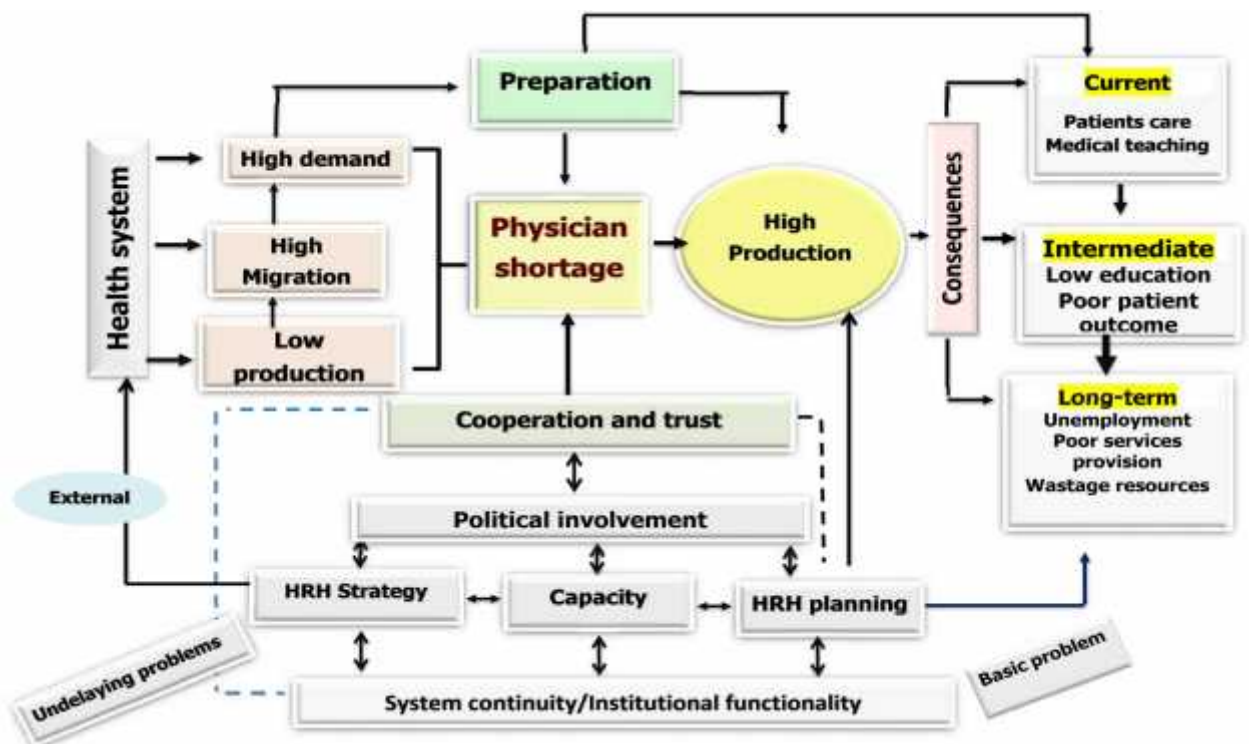




PHYSICIAN WORKFORCE SITUATION AND HEALTH SYSTEM'S RESPONSE IN
ETHIOPIA: A MIXED-METHODS STUDY

TSION ASSEFA (MPH)

DISSERTATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD) IN PUBLIC
HEALTH ADDIS ABABA UNIVERSITY, ETHIOPIA



DECEMBER 2017



ADDIS ABABA UNIVERSITY
SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES

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MIXED-METHODS STUDY

A DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH, COLLEGE OF
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**PHYSICIAN WORKFORCE AND HEALTH SYSTEM’S RESPONSE IN ETHIOPIA: A
MIXED-METHODS STUDY**

TSION ASSEFA

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LETTER OF DECLARATION

I, the under signed, declare that this is my original work and it has never been presented in this or any other university, and that all the resources and materials used for the dissertation, have been fully acknowledged.

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DEDICATION

This dissertation is dedicated to the memory of my beloved brother

Dr. WOUDNEH ASSEFA BEYENE

LIST OF ORIGINAL PAPERS

This dissertation is based on the following five original papers and one policy brief. Three quantitative and two qualitative papers came out of the primary data which had been collected for the purpose of this dissertation and the policy brief is a synthesis of five papers.

1. Assefa T, Haile Mariam D, Mekonnen W, Derbew M, Enbiale W. Physician Distribution and Attrition in the Public Health Sector of Ethiopia. Risk Management and Health Care Policy. 2016; 9: 285–295. <http://dx.doi.org/10.2147/RMHP.S117943>
2. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Survival Analysis to Measure Turnover of the Medical Education Workforce in Ethiopia. BMC Human Resources for Health 2017;15 (23). DOI 10.1186/s12960-017-0197-0
3. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Medical Students' Career Choices, Preference for Placement, and Attitude Towards the Role of Medical Instruction in Ethiopian (BMC Medical Education 2017; 17: (96). DOI: 10.1186/s12909-017-0934-z
4. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Health System Response for Physician Workforce Shortages and the Upcoming Crisis in Ethiopia: A Grounded Theory Research (Accepted: BMC: human resources for health HRHE-S-17-00058):
5. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Physician Migration and Potential Solutions in Ethiopia: A Qualitative Study (manuscript)
6. Assefa T, Haile Mariam D, Mekonnen W, Derbew M. Accelerated Medical Doctors Training in Ethiopia: Health Policy Brief (manuscript)

LIST OF ABBREVIATIONS

AAU	Addis Ababa University
ARHB	Amhara Regional Health Bureau
AHR	Adjusted Hazards Ratio
BUD	Bahir Dar University
CPH	Cox's Proportional Hazards
FMOE	Federal Ministry Of Education
FMOH	Federal Ministry Of Health
GPs	General Practitioners
GT	Grounded Theory
GHWA	Global Health Workforce Alliance
HHRM	Health Human Resources Management
HRD	Human Resources Development
HMIS	Health Management Information System
HRB	Regional Health Bureau
HR	Human Resources
HRH	Human Resources for Health
HRIS	Human Resource Information System
HSDP	Health Sector Development Program
IMO	International Migration Office
IRB	Institutional Review Board
MDGs	Millennium Development Goals
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
ORHB	Oromia Regional Health Bureau
PHCU	Primary Health Care Unit
SNNPR	Southern Nation Nationalities and Peoples Region
SPSS	Statistical Package for Social Science
UOG	University of Gondar
WB	World Bank
WHO	World Health Organization

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ABSTRACT

Background: Shortages and imbalances in physician workforce distribution between urban and rural and among the different regions in Ethiopia are enormous. However, with the recent rapid expansion in medical education training, by adopting the so called “flooding strategy”, it is expected that the country can make progress in physician workforce supply. Nevertheless, the effectiveness of the intended strategy also relies on a lot of interrelated factors. Factors such as accessibility, composition and turnover of the medical education workforce; the role of medical instruction in influencing the medical students’ attitudes and career choices; and also the level of preparation and cooperation made in the system when such strategy is implemented.

Objective: This research aimed to investigate physician workforce (distribution, attrition and associated factors), medical students’ career choice and intention (to work in rural/remote locations and to leave abroad), and to discover the health system response and its consequences which have been made to overcome the physician workforce shortages in Ethiopia.

Methods: The study employed a mixed-methods study design (organizational survey, medical students’ survey, and qualitative study design by adopting a grounded theory approach). A longitudinal medical education and physician workforce data sets of about six years (between September 2009 and June 2015) were retrospectively collected from seven government owned medical schools, and five regional and two city administration health bureaus to examine the physician workforce distribution in and turnover from the public health sector and the medical schools. In measuring the medical education workforce turnover, the study employed the concepts of survival analysis with a Cox Proportional Hazards Model. However, the study opted to use Poisson Regression Model hence the data collected from regional health bureau and city administrations failed to satisfy the Cox’s Proportional Hazards Model assumptions. For medical student survey, 959 medical students who pursue their medical education in six government owned higher learning institutions of Ethiopia were involved through self-administered questionnaire to examine the medical students’ career choice and intention to work in rural and remote locations, and also regarding moving abroad.

The qualitative study was employed to discover perspectives and viewpoints on the health system response and its consequences by involving 43 purposefully selected respondents from government, academics, and private settings. Each interview was transcribed verbatim, coded and

analyzed using the grounded theory research approach and presented in a narrative form. Finally, the relationships between the main categories were illustrated using figures.

Results: In the public health care settings, the majority of the medical doctors were males (80.5%), young (born after the year 1985 (50.9%), work experience of less than three years (57%), and were general practitioners (84.2%). A decreased incidence of turnover was observed among physicians born between 1975 and 1985 compared to those born after 1985. However, increased rate of turnover was found among females, physicians working in district and general hospitals, and in Amhara Region.

Similarly, in the academic health care settings, a total of 6,670.5 physician-years observation was analyzed. About 15.7% of the observations were completed and the remaining 84.3% were censored. In this setting, lower risk of turnover was observed among those who were born before 1975 and with those high academic rank (associate professors and above). The risk of turnover was also lower among those working in Mekelle and Gondar universities but the reverse was observed among those working in Jimma University.

Regarding medical students' career choices, (70.1%) of the medical students wanted to practice in clinical care settings. However, only a small proportion of them showed interest to work in rural and remote areas (21% in zonal and 8.7% in district/small towns). On the contrary, most of them had the intention to leave abroad for both economic and non-economic reasons. For the majority of them internal medicine was the first specialty of choice followed by surgery. However, students showed little interest in obstetrics and gynecology, as well as in pediatrics and child health as their first specialty of choices. In addition, medical students' attitudes towards their institution in preparing them to work in rural and remote areas, to pursue their career within the country and to specialize in medical disciplines in which there are shortages in the country were very low.

In the qualitative study, almost all participants agreed that physician migration (emigration and out-migration) has contributed to skilled human resource shortage in the country. The most frequently cited reasons were both financial and non-financial. The latter one includes lack of recognition, not valuing expertise, and incompetent leadership and management as well as external factors which include opportunities and value shift.

In relation to massive admission and production, two distinct types of preparation were identified; preparation that needs to be made in the medical schools and in the system, though at the time of the study, both were not sufficiently addressed. As a result, there were potential consequences at the present. These were related to clinical service delivery, patient right and privacy, medical education workforce, and quality of medical education. In the future, it was anticipated to affect the graduates, the system, as well as the community in the short and long term consequences of physician workforce flooding. Besides, in relation to HRH preparation and utilization, lack of cooperation, strategic planning and capacity, and system continuity were also identified as underlying and basic problems of the system, respectively.

Conclusion: Overall, young and less experienced physicians make up significant proportions of the public and academic physician workforce of the country, which is a signal for the presence of substantial improvement in supply. However, without retention efforts, skilled turnover will result in a “*system of ever-green hands* (Ac16)”; a system staffed with junior physician workforce. In addition, shortage, lack of composition and diversity, and low satisfaction of the medical education workforce can hinder the quality of medical education, which failed to influence the medical students’ attitudes to prefer to work in rural and remote locations including their career choices. Moreover, across the settings, economic and non-economic reasons were the main reasons of turnover as well as the reasons behind the medical students’ intention to move.

Furthermore, massive admission has negative impact on the quality of medical education, patient care and satisfaction, and also on the medical workforce at the present with its additional consequences on the medical graduates, system and the community at large in the long run. Hence, the flooding is not only limited to issues to do with what currently has been observed but also rooted in the underlying (strategy, planning, and capacity) and basic (functional continuity of the system) problems of the health system.

Recommendations: Therefore, there is a need to revisit the flooding strategy in such a way as to minimize the consequences of massive medical students’ admission and physician workforce production along with working on the other dimensions of the problem.

Key words: *flooding, grounded theory, medical education/students, medical/health workforce, mixed methods, system response, survival analysis, physician workforce turnover/attrition.*

CHAPTER 1. INTRODUCTION

1.1 Background

1.1.1 Global context on human resources for health

Human resources for health (HRH) has been a global agenda over the last several years (1). Four decades ago (in 1978) World Health Organization (WHO) indicated the need for strong cooperation between two public sectors, health and education systems for health workforce preparation, planning and utilization. The two sectors have distinct but strongly interlinked responsibilities, the education sector is responsible for health workforce production, whereas the health system is responsible for advance planning of the required human resources and their proper utilization (2). Similarly, there has been global and regional guidelines for HRH policy formulation and planning (3) including strong support for health human resources training and development for many low-income countries including Ethiopia (4).

In relation to this, in 2006 WHO produced a framework for human resources for health (HRH) which is called “*the lifespan approach*”, indicating the need for addressing different dimensions of the problem at different stages of the workforce’s life. That means when preparing the workforce through strategic investments in education (quality and influencing students’ intention to work within their country, and career choice); enhancing workforce performance through better management and retention mechanisms. And finally through managing migration and attrition to reduce wasteful loss of human resources through continuous inventory and monitoring system (Figure 1) (5, 6).

Over the years, the perspective on HRH has also changed. Between 1960s and 1970s, the focus was on predicting future health workforce needs. At the time, planning models which laid a foundation for global, regional and national health human resources planning and projection were developed. Then between (1980s and 1990s) the health workers were viewed as economic actors of the health system. Health workers’ technical efficiency, increasing health expenditures and health workers’ behaviors became an area of concern (7).

Lifespan Approach (WHO, 2006)

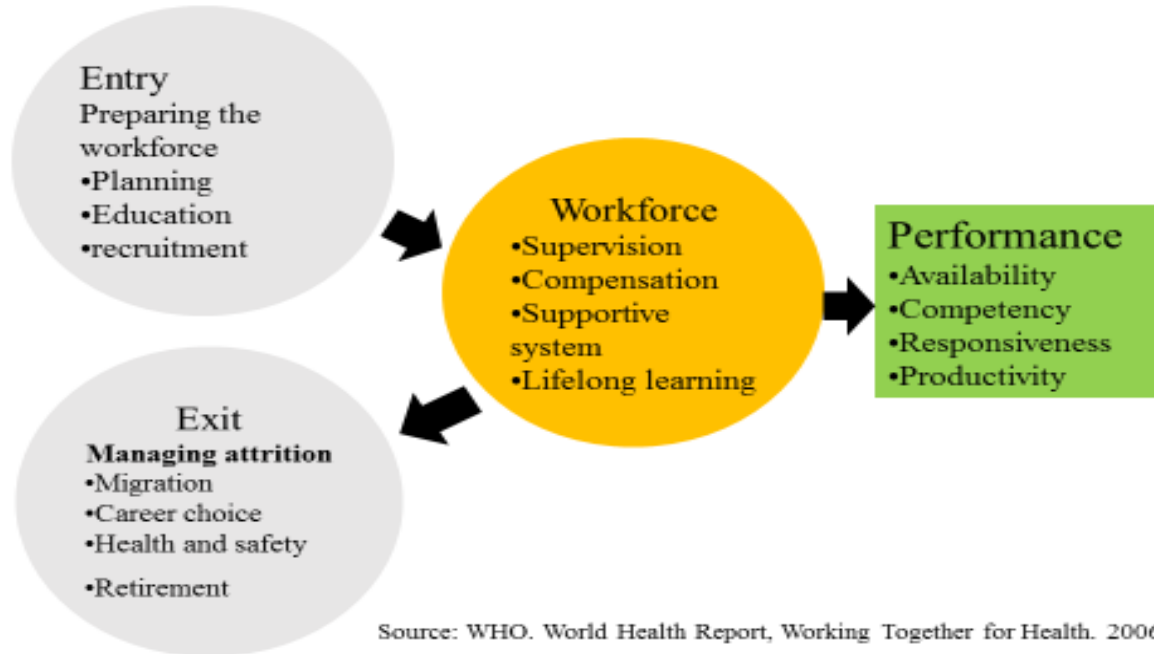


Figure 1 Lifespan approach for health workforce management

Then between 1990s - 2000s and onward, a new perspective on HRH has emerged, a view which signifies health workers as necessary resources of health system to implement health policies (for instance the Millennium Development Goals (MDGs)). Interventions to increase health workers' supply and reducing HRH shortages, and health worker migration from low and middle-income countries to high-income countries become an area of global concern (8, 9). This resulted in the formulation of Global Code of Practice for Ethical International Recruitment of Health Personnel (10).

However, according to the WHO Global Atlas of health workforce of 2010, worldwide about 57 countries face critical health workforce shortages. In some part of the world, the proportional deficits are greatest, especially in Sub-Saharan African, and South-East Asian countries (11). Our continent, Africa has only 3% of the global health workforce but accountable for 24% of the global burden of diseases (6). Similarly, Ethiopia is one of the Sub-Saharan African countries with high workforce shortages and with the least medical doctor density to population ratio (11-13).

International migration of health professionals is a response for shortage and physician workforce demand in physician receiving countries. However, for sending countries, brain-drain is hugely

contributing to health workforce shortages (9, 10, 14). In many developing countries, qualified professionals often leave their home countries in order to practice in developed countries with better paying jobs and better standards of living (15). Expanded global labor market, international migration from poor to high-income countries and internal migration to urban areas and high paying jobs left many developing countries in severe shortage and health workforce crises (16).

In fact, HRH is an integral part of and a subsystem of a country's health care system, which requires preparation and planning in advance to have the required health workers at proper time, type and mix (no more and no less than the required) both in high and low-income countries (6). However, many low-income countries including Ethiopia do not have such well-established monitoring system to detect when the crisis or the surplus can potentially occur (17).

In this regard, to support the health system of low-income countries, human resources information system (HRIS) was also a global call since the first Kampala declaration on HRH with its motto "*Health Workers for All and All for Health Workers, in 2008*"(17). However, despite this global call and huge health workforce loss from many developing countries, the countries still do not have appropriate and accurate data related to the supply, loss rates including effect of migration on health system delivery (18, 19).

More recently, for sustainable health human resources development, WHO demonstrated the pluralistic/multidimensionality nature of the problem on its HRH action framework. The framework encompasses six action fields: Human Resource Management (HRM) a central core, encircled with HRH policy which is appropriate to the context, financial resource, workforce production/education, leadership, capacity and partnership to align key stakeholders for mutual benefit which is supported by situational analysis, planning, implementation along with a system of monitoring and evaluation to have the required HRH for better health outcomes (Figure 2)(5, 20). Similarly, the global commitment has also continued through the Global Strategy on HRH: "workforce 2030". It aimed at optimizing the HRH performance, investment in HRH with health needs of the population, building institutional capacity at different levels and strengthening data on HRH(21).

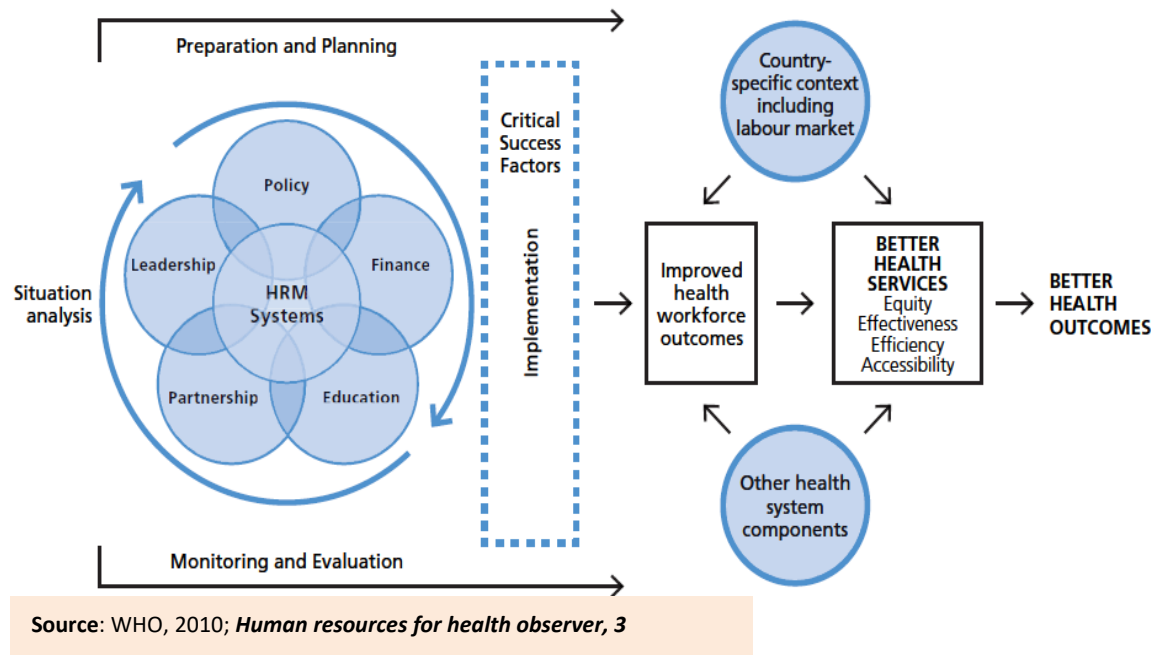


Figure 2 HRH action framework. HRH observer, 3

Overall, the global concern has been emphasizing at different dimensions of the problem such as HRH related policy, strategy and planning. HRH planning often consists of incremental changes in staffing pattern on a year-to year basis, using static standards and norms, combined with short-term adjustments to services and staffing in response to emerging health crises (3). In addition, globally and across the regions, there are a range of tools and resources to assist countries in order to develop their own national HRH policy/strategy, planning and to establish a system of monitoring (3). Nevertheless, countries may operate without a sustained or informed direction (about the past, understanding the current including workforce movements), or without predicting how the national situation, health needs and delivery of services can change in the future. Their HRH approaches may be driven by the needs of targeted programmers or projects without sufficiently preparing for various internal and/or external uncertainties(5, 7, 21).

1.1.2 Background of human resources for health in Ethiopia

In Ethiopia, institution based modern health service was introduced by foreign health workers at the beginning of the 20th century. Following the victory of Adwa, the first Russian Hospital was established by Russian physicians in Addis Ababa in 1896, followed by Harar Ras Makonnen Hospital in 1903 and Menelik II Hospital in Addis Ababa in 1906 which is still functioning (22).

After that, the hospital establishment expanded in the capital, Addis Ababa and in other few provinces before the establishment of ministry of health in the country. At that time it used to be called “Ministry of Public Health” in 1948 and in 1936 there were 11 hospitals in the country (23).

In Ethiopia, the health service development has passed through various stages. According to Kitaw and his colleagues, starting from post Italian-occupation there has been three developmental stages in accordance with the political system in the country (Figure 3) (23, 24):

1. ***Reconstruction and basic health services (BHS) period (1941-1974)***: here in relation to health workforce development, the first school of nursing, the Gondar Public Health College, and Faculty of Medicine, Addis Ababa University were opened in the country. In addition, there was training of health workers abroad. At the end of this period, there were 93 health centers (HC), 650 health stations (HS) and 84 hospitals in the country. And almost all doctors were solely foreigners until the early 1960s. However, in another literature the same author has divided this phase into two; these are 1) the reconstruction (hospital/clinic based) period (1941-1953), and 2) the basic health services period (1953-1974), which makes the developmental period to have four stages (23).
2. ***Primary Health Care (PHC) period (1974-1991)***: in this period the training of community health workers (community health agents and trained traditional birth attendants), nurse practitioners, and health assistants were the main categories of the health workforce. There was expansion of medical education in Jimma and Gondar. However, the health officers training stopped. Post-graduate training in medicine at the Faculty of Medicine Addis Ababa University was introduced. By the end of this period, in 1991 there were 167 health centers, 2,125 health stations and 88 hospitals in the country.
3. ***Sector-wide approach period (SWAP) (1991-2010)***: indicates implementations of Health Sector Development Programs (HSDP I-IV). In this phase, massive production of low and mid-level health workers happened including reintroduction of health officers training, and health extension workers (HEWs), new health cadres. In addition, high attrition/ ‘brain-drain’ of health workers was observed since the beginning of this period. However, currently in line with this phase, the country is also implementing Health Sector Transformation Plan (HSTP)

which is a continuation of HSDP-IV. And in relation to HRH, the accelerated health workforce production has been shifted from other health workforce categories to medical doctor (25-27).

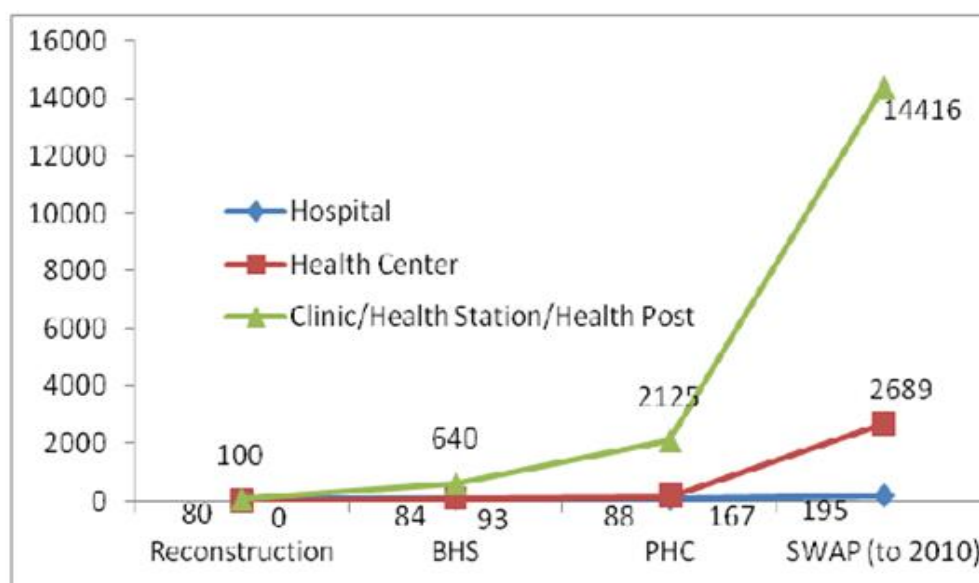


Figure 3 Evolution of Number of Health Facilities 1941-2010 by Period (Source: Kitaw Y, et al. Ethiop Med J, 2016, 54:3)

However, according to Berhan (22), the evolution of modern medical service is classified into four major phases like that of the four stages of Kitaw (24) but there are distinctions in classification across the periods. Berhan (22) started from the time at which the modern health service was first introduced in the country (before the Italian occupation) and illustrated the changes which have happened over the years, with an assumption that it has been progressive. The first phase— between 1896 and 1901; the second phase — between 1901 and the establishment of the ministry of health in 1948; the third phase — between the establishment of the ministry of health and the 1974 revolution; and the fourth phase began in 1974 and continues till the present which is the era of primary health care (22).

With regard to the expansion and development of medical education, it began in 1960s. The former medical school, Faculty of Medicine, Addis Ababa University was established in 1964, followed by Gondar Public Health College in 1978 (by converting the Health Officers and Public Health Nurses Training to a new medical school and clinical nurse training) and Jimma Health Science

Institute (Jimma School of Medicine) in 1983 (13, 22, 28). Although addressing community health needs was the prime intention of the medical education program, given the size of the population and health services demand, the training of health workers in all categories including the medical doctors has been very low for long period of time (Figure 4) (29).

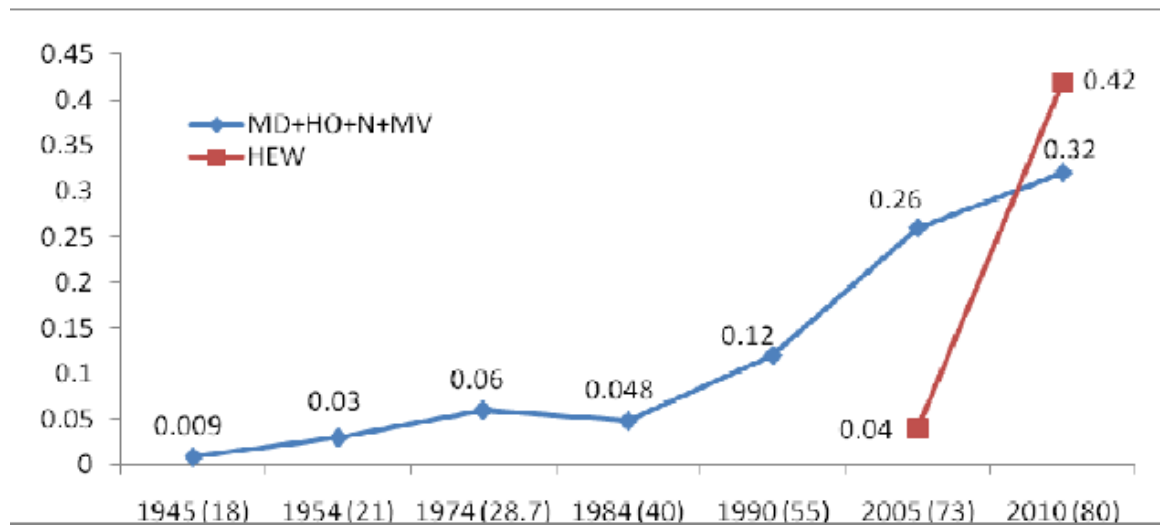


Figure 4 Evolution of Workforce Density (per 1000) 1945-2010 by Period(Population in millions)(MD=Medical Doctor, HO=Health Officer, N=Nurse, MW=Midwife, HEW=Health Extension Workers). (Source Kitaw Y. Ethiop Med J, 2016, 54:3)

Following the global HRH perspective changes and other international commitments for instance the target to achieve the 2015 MDGs, much attention has been given for the size, distribution and skill mix of HRH. In addition, a lot of efforts have also been made to support the health system of many low-income countries in which Ethiopia is included. However, many countries cannot overcome the existing health workforce crisis, particularly many Sub-Saharan African countries including Ethiopia (11, 30).

In Ethiopia, health workforce to population ratio is very low. The density for physician to population ratio was about 0.03 per 1000 population. Although the national health worker density to population ratio seems to have increased from 0.64 in 2003-2004 to 0.84 in 2008-2009; on the contrary, physician to population ratio has declined from 0.0281 in 2003-2004 to 0.027 in 2008-2009 (13).

Similarly, variations were also observed among regions, in 2006 physician to population ratio in Amhara region was estimated to be (1:280,000), in Oromia (1:220,000), and in SNNPR (1:230,000)(13). However, HSDP-IV has reported some improvement, all physicians to population ratio (1:34,986), and specialist to population ratio (1:62,785) (31). And currently in spite of imbalanced geographical distributions and urban rural variations, it is estimated to be (1:32, 000) (32).

In Ethiopia, many factors has contributed to the shortages and uneven distributions of health workforce. These include: increase in population growth, shortage of medical schools or low production, and migration/brain drain (29).

The population grew with a rate of 2.8% between 1995 and 2000, and 2.1% between 2010 and 2015 which makes the current population 93 million, which in turn increases the demand for health services. However, expansion of medical schools and the physician workforce production was not in line with the health service demand (22, 28). On the contrary, the attrition of medical doctors was high since 1990s. Between 1987 and 2006, the country lost about three fourth of the physician workforce from the public health sector due to internal and/or international migration (13). This situation drives a number of international and local initiatives to reduce the effect of health workers migration from low-income countries (10, 16). Task shifting through excess supply of low and mid-level health professionals and selective health service provision approaches have also been tried to address the demand for health workforce along with health sector development plans (3, 33).

Health Sector Development Plan (HSDP) has been implemented in different successive phases (from HSDP I in 1997 to HSDP IV in 2015). In all phases of the plan, much attention has been given for human resource production than the other components of health human resources. For instance, HSDP-II (2002/03) introduced the Health Extension Program (HEP) which is a community based health service delivery run by Health Extension Workers (HEWs). And at the end of HSDP III (in 2009/2010) a total of 31,831 HEWs were trained and deployed to rural kebeles (the lowest administrative unit) within short period of time through blanket coverage (31).

Similarly, in order to address mid-level health workforce needs at district level, Accelerated Health Officer Training Program (AHOTP) was launched in 2005, in five universities and 20 hospitals.

Through this initiative, more than 8000 health officers were trained. Also it was tried to address the HRH requirements for Comprehensive Emergency Obstetric Care (CEmONC) and other emergency surgery services. Masters' program on Emergency Surgery was started in five universities. Currently, the last batch of the trainees are going to complete their training. Then, most universities have upgraded from health officer training to medical doctor trainings and to the residency programs (25, 27).

Succeeding the "*flooded strategy*" recommended by the WHO and Global Health Workforce Alliance (GHWA) in 2010 (27) the country has made huge progress in the expansion of medical education by increasing the enrolment limits at the existing medical schools, by opening many new medical schools, and also using the so called "innovative medicine" which is a new approach in medical teaching in 2012 (25, 34). As a result, the number of medical schools has grown from three to more than 33 out of which, five are private and the number of graduates are expected to reach three thousand each year (25, 34, 35).

In the system, HRH production seems overemphasized throughout the country though there are other dimensions of the problem which deserve equal attention as the production. For instance issues related to management and leadership which consist of value for expertise, incentives and work environment, and understanding the effect of opportunities both internally and externally are push and pull factors that are not usually dealt with effectively as the production(7).

Besides, the system does not have policy or strategy for HRH for both short and long term planning, except the draft for national health human resources strategic plan that covers (2009 - 2020) (36). This document is not officially released or communicated for the purpose it was developed. The continuation of the draft document that has informed to deal with systems' capacity to absorb the upcoming workforce is not yet available. Only three years is remaining for the strategic planning period to come to an end(36). On the other hand, the system would have also been benefited from the review made by Geressu and his colleagues (19); which showed the alignment between the health policy, the proposed national HRH strategy and HSDP which is an opportunity to further examine its contextual feasibility and effectiveness (19, 36). The same lesson can be learnt from Campbell and Settle's recommendations (37).

Furthermore, the structural arrangement of the health service delivery also has an impact on the physician workforce distribution and attrition. In the country, the services delivery is organized into three-tier system (Figure 5). The First level or district health system comprises a primary hospital (with population coverage of 60,000-100,000 people), health centers (1/15,000-25,000 population) and five satellite health posts with each health center (1/3,000-5,000 population) that are to be connected to each other through referral. The second level includes a General Hospital with population coverage of 1-1.5 million people and the third a Specialized Hospital that covers population of 3.5-5 million. And at each level, there is also staffing standard for the required health workforce including for physicians. Medical doctors are expected to practice in primary, secondary and specialized hospitals with the exception of specialists in primary hospitals (25).

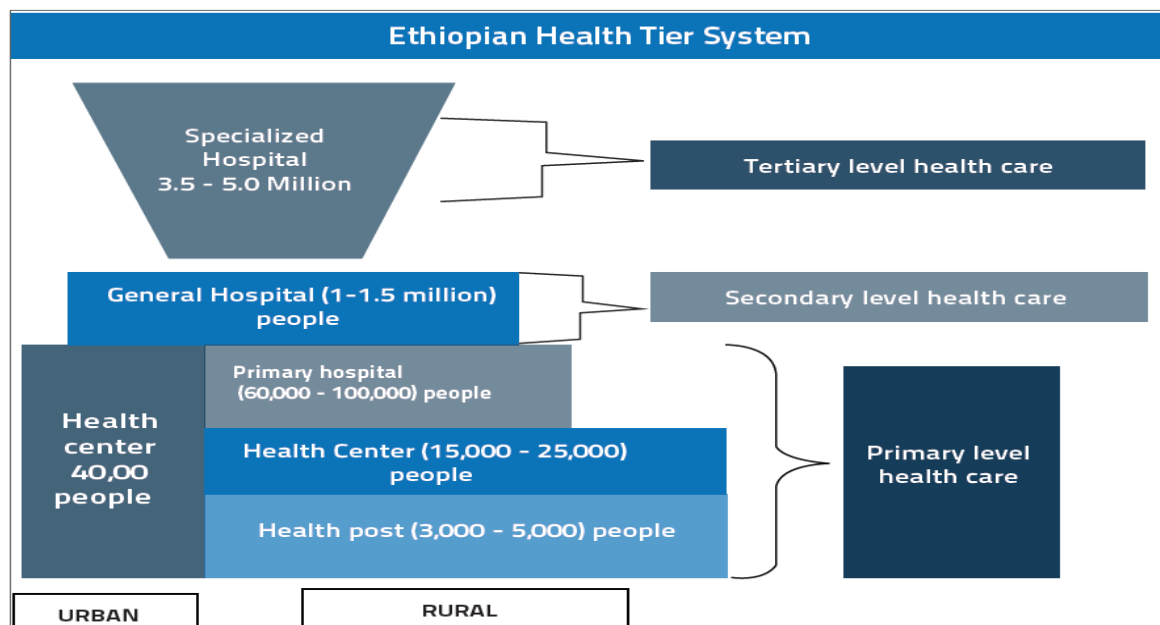


Figure 5 Ethiopian health tier system, FMOH, 2015

1.2 Statement of the problem

Globally, there is a shortage of human resources for health. In 2010, worldwide about 57 countries face severe health worker shortages. In some part of the world the proportional deficits are greatest, especially in Sub-Saharan African countries (11). The continent has the least global health workforce but accountable for nearly one fourth of the global burden of diseases (6). These countries are challenged by multifaceted HRH problems including severe health workforce

shortages, skills mix imbalance, mal-distribution, out-migration and gaps in service coverage (11-13). In this regard, Ethiopia is not exceptional, one of the Sub-Saharan African countries with high workforce shortages and with the least medical doctor density to population ratio. Imbalances in professional skills mix and variations in physician distribution between urban and rural places is enormous among the regions (36, 38).

Overall, in Ethiopia health worker to population ratio remains very low. More recently, it was estimated that (the doctor, health officer, nurse and midwife) to be 0.7 per 1000 population (25) which is below 2.3 per 1000 population, the WHO millstone for minimum requirement to deliver skilled care. In addition, geographic maldistribution of physicians is also another challenge. Substantial proportion of the physicians work in urban areas and/or outside the public health sector. The large regions and other small regions share the remaining small proportion which makes physicians inaccessible in most rural and remote communities (32). Health outcome disparities between the urban and rural populations and among the regions may also reflect the situation very well, which shows the presence of imbalanced distribution in qualified health workforce (39, 40).

In addition, the professional skills mix is also another problem. Medical doctors are the least within the health care professional mix in the country, which accounts for less than 3%. Low and mid-level professionals account for the largest proportion of the national health workforce (41). Such professionals play insignificant role in clinical service delivery because they don't have enough knowledge and skills (26, 42). In turn, such poor skill and practice in the system may affect the demand for health care service, care seeking practice and the referral system from both sides, lower to the upper and from the upper to the lower levels(33).

In a country, many interrelated factors can affect the distribution and demand for physician workforce. Such as increase in health care demand, shortage of medical schools or low production, migration or brain drain, health human resources strategy, policy and retention efforts contribute to health workforce shortages and uneven distribution (43).

Health workforce migration (brain drain) is an issue that hugely contributes to skilled health workforce shortages in many developing countries (9). Qualified professionals often leave their home countries in order to practice in high-income countries with better paying jobs and better standards of living (15). For instance, Africa loses 20,000 skilled health care providers per year,

out of which, more than 60% are doctors migrating to high-income countries such as UK and the United States of America (10, 14, 44).

In Ethiopia, the attrition rate of medical doctors is very high and affects the health system delivery, particularly the public health sector and higher learning institutions. Qualified medical doctors usually serve in the public health sector for very short period - on average for only about three years or in some instances may not serve at all (45). The country is also one of the African countries with high physician emigration fraction (46). However, it is difficult to be certain about the annual attrition rate, patterns and its trends because the country doesn't have continuous inventory and monitoring system. In spite of huge physician workforce loss from the public sector, there is no proper information about the patterns, reason given for migration, and suggested solutions taken by the system (47). Similarly, the International Migration Office (IMO) also reported lack of data on emigration from low-income countries (44).

In the health system, HRH preparation is a cornerstone for the required health human resources. In Ethiopia, however, physician workforce preparation has a relatively short history. This is not only reflected in the small number of medical schools which were only three for several years; but also in the small number of medical doctors. Since the establishment of the first three medical schools (Addis Ababa, Gondar and Jimma) to 2006, the medical schools were able to produce only less than four thousand medical doctors (13, 22, 28). Besides, attractive overseas remuneration, non-governmental organizations (NGOs) or the private-sector pull the majority of the physician workforce out of the public health sector (13, 48). This incidence, together with low production left the country in severe physician health workforce shortages and crisis for both clinical service provision and medical teaching.

However, recently in response to the apparent shortages, Ethiopia has made huge progress in medical education expansion. Which started with the establishment of the two medical schools in Mekelle and Hawassa universities in 2003 and made the number of medical schools to grow from three to thirty three(25, 49) using the so called "*flooding strategy*"(27, 34, 50).

However, by its nature clinical service provision and medical education is human resources intensive. This claims a human resources development strategy that should fit with the context, in a way that balances the supply and demand. That means, taking into account the economic and

health system demand to accommodate large number of graduates (10). Concurrently, the available medical education workforce, setup and other needed requirements to produce competent and good quality medical doctors(51-53).

In addition, appropriate education and training policy is essential for both high-income and low-income countries. For instance, high-income countries do not rely on migrant health workers (54). And low-income countries need to retain their workers along with strengthening the system of medical education (55). In many low-income countries, scaling up the number of medical doctors through rapid medical education expansion has also been taken as best strategy to overcome the apparent shortages in physician workforce (25, 35). However, the response strategy (expansion in medical education) is influenced by lack of qualified medical teachers which is caused by high migration and/or longstanding low production (56); the capacity of teaching hospitals and also other necessary resources (19, 53).

In many low-income countries, for several complex reasons HRH planning and implementation was accomplished in a limited scope. This is due to insufficient balance between the plan and implementation process, lack of using planning methods and tools suitable for solving problems, lack of appropriate and accurate data related to various components of the workforce and low levels of involvement of stakeholders in the planning process (3, 19). In relation to this, the situation in Ethiopia is not an exception. In fact it may be the worst because the country does not have clear HRH policy/strategy and planning document but there is huge investment in HRH training to overcome the shortages (36).

Although, the system already recognized the other dimensions of HRH problems which are as equally important as the training to deal with (such as problems related to HRM capacity, technical skills and experience in HRM and leadership, inadequate HR structure and staffing at all levels including limited capacity and practices in strategic and operational HR planning and budgeting) the system is still due more attention to the preparation of health workforce (25).

Moreover, in spite of methodological variations employed for estimation, there are also inconsistencies between the projected figures for the required HRH for Ethiopia. For instance, according to the estimate made by Girma and his colleagues the required a number of physicians by 2015 is 9895. However, the estimate made by other authors showed the need for many more

physicians, which is beyond what the country's economy affords to employ (57). In addition, according to the draft strategic plan of the ministry (2009 to 2020) or HSDP IV, the country requires 10846 general practitioners and 5178 specialists in various clinical disciplines (36, 58). But according to the recent MOH statistics on HRH of 2016, the actual figure for physician workforce is much lower than the estimated (41).

Nevertheless, in some accelerated programs, the number of health workers has already exceeded the estimation which had been made for the years 2015 or 2020. In the case of health officers, the required number by 2015 was estimated to be 6345 and by 2020 it was estimated to be 8,293 (36), however the actual figure in 2016 is 9366. Similarly, for health extension workers, the number has already exceeded to be by 2015(41). This might demonstrate the fact that the physician workforce has been accelerated throughout the country. Over 14000 medical students were enrolled to thirty-three medical schools in the academic year 2014/2015(25).

In medical doctors training, the training demands good composition of medical instructors and their relative stay in the medical schools along with other necessary resources (52, 53). For instance, in the Ethiopian context, in organizationally embedded teaching hospitals, medical teachers are professional physicians. The medical education workforce has dual roles — both as instructors of the medical students and clinical service providers. Thus, there should be many physicians with various specialty and sub-specialty training coupled with rich experience in their field of specialty in these teaching hospitals which makes the accelerated training strategy inconsistent with the actual situation which has been taking place to produce qualified medical doctors (34). Such approach can potentially result in another form of shortage in the physician workforce (43, 51) as it has been observed in previous health workforce training programs made through acceleration (26).

Furthermore, the two scenarios, the economic and health system demand to accommodate large number of graduates, and the readiness of the medical schools to produce quality graduates for the local demand and beyond (if exceeded) becomes a critical point of debate, particularly using rapid medical education expansion strategy as a 'quick fix' throughout the country than working on retention and any of the other HRH related problems (50).

In health system, health workers' retention encompasses two inter-linked assumptions: the factors that influence the decision of health workers to stay or leave their job, and the other one is the extent to which health system policies and interventions respond to these factors. Without taking specific context into account, retention strategies are commonly grouped into four general themes: education, regulatory, financial, and personal and professional support interventions (59). In HRM health workforce retention is one of the essentials as increasing the supply and expanding the medical education capacity (47, 59). This is because it improves service delivery, quality of care, and reduces referrals and waiting times. In the academic part, it is a critical requirement for knowledge and skill transfer to the trainees (51, 52).

Besides, in Ethiopia, regional governments, city administrations and the academics are also autonomous on their health worker employment, setting retention strategies and managing their human resources, and also generating evidences which help them to make decisions. Health workers also have the right to resign when they finish the required obligatory services. This can make HRH planning for supply and retention strategies more complex and challenging at each level and the way of synchronizing, particularly when it comes to physician workforce (19, 60). Thus, retention strategies need to be viewed and investigated within the local context by understanding the reasons for migration that provide policy and strategic options for managing migration and taking substantial actions (19, 47).

For effective HRH Planning, data on health workforce inflows and out flows are essential as reflected in the global call for establishing HRIS (17). The WHO has also given attention continuously on its current HRH strategic direction, "workforce 2030"(21). However, despite this global call and huge health workforce loss from the public health sector, Ethiopia does not have appropriate and accurate data related to supply and loss rates including the effect of migration on the health system delivery (61). As a result, the available data in various settings are not easily amenable for making informed decisions including human resource planning which fits to the context (26).

For instance, in project driven training approaches such as HEWs, AHOTP, and Masters' Program in Emergency Surgery, they were not incremental and were not used static standards and norms (combined with short-term adjustments to services and staffing in response to emerging health crises). In fact, there is no doubt about the importance of these groups to the health human

resources. But the main questions are; are these approaches strategic? Do they have clear career plans? And why have they been done in a hurry and become short-lived? Are the things system based through lesson learnt from previous programs?

In fact, the Ethiopian public health system has gone through multiple and frequent reforms, including the human resources preparation (47). In 1980s there was a community based health service program which was equivalent to the current HEP, with the exception of voluntary community health workers and not institutionalized as in the present day 'health post'. In 1954, there was health officer and public health nursing training program in Gondar, later (in 1978) the trainings have switched to medical doctors and clinical nurse training program. More recently, to address mid-level health workforce shortages, most institutes were involved in the AHOTP either alongside the medical doctors training or alone (23).

However, currently most health officer trainings have been changed to the medical doctors training programs. This implies, the training of health workforce has changed over the years from one category to another. Indeed, the other underlying dimensions of the problem — issues related to proper planning and system of continuity is under exercised and is not effectively dealt with using lessons from previous activities including the major problem identified in the national HRH strategic plan of 2009 -2020. This problem was mainly poor training capacity with low output for major HRH categories (19, 36). The scaling up of the medical training which is documented as noticeable success of the system would have been noticed with due consideration to proportionally balance the existing capacity and readiness of medical schools with the enrolment (25).

Concerning HRH development, there are a range of tools and resources to assist countries in HRH policy/strategy formulation, health workforces planning and projections. These include the requirements and possible uncertainties including the way of enhancing worker performance, effectiveness and reduce wasteful loss of human resources(5). In spite of these, in Ethiopia the human resource planning and implementation has not been made clear, particularly in the recently recommended strategy *-the use of flooding strategy* for medical doctors training, as it had been made for low and mid-level health workforce training, through acceleration and blanket coverage (27). Such recommendation and approach might not take in to consideration the demand for medical education and/or the context in which it is being implemented (62-64).

Therefore, the main purpose of this research is to examine issues related to the physician workforce and health system response in Ethiopia from various dimensions. This includes the distribution and attrition (from academic and non-academic health care settings), career plans from medical students' perspectives, reasons for migration and to discover perspectives and viewpoints on the response made by the system for physician workforce shortages.

1.3 Rationale of the Study

Health human resource is central to the functionality of any health system in determining the health system performance and its effectiveness. Thus, appropriate human resource policy, strategy, planning and projection that takes the local context into account is very essential. In this regard, this research intends to add to the existing body of limited evidence in Ethiopian context following the “*flooding strategy*” recommended by WHO and GHWA (in 2010). This flooding strategy has been implemented to overcome severe skilled human resources shortage by setting a goal to make medical doctors accessible at each hospital level by 2015 (27). The strategy is also emanated from the achievements made in low (HEWs) and mid-level (AHOTP) health workers training using similar principles of acceleration. Moreover, flooding is recommended hence skilled human resource migration is unavoidable and multifaceted (27).

Consequently, the strategy has been implemented by opening many new medical schools and increasing the enrolment limits of the existing medical schools since 2012 (34). However, unlike that of low and mid-level health workforce training, such strategy and recommendations need to take into account the requirements for medical education, and the local context in which the recommended strategy is being implemented. For instance medical education workforce distribution and composition, the teaching hospitals' capacity, patients flow and other inputs including issues related to motivation, experience in implementing and organizing such medical education programs in the country (34, 50, 53). Also the potential consequences, for instance if the intended strategy do not work out properly.

Moreover, in effective health workforce production, the recommended strategy needs to pass through a standard health human resources planning process or strategic HRH planning cycle. From detailed situational analysis which means understanding the context along with potential challenges through to have workable plan which specifies the kind of knowledge, skills and attitudes to be achieved. Such type of planning is not only performed to increase the number of

physicians to reach to the benchmark density but also to produce medical doctors with personnel efficiency and provider quality when they enter to the workforce (7).

Moreover, HRH production must be a continuing and progressive process than a sporadic (or flooded at once), through a system of continuous monitoring and evaluation mechanisms to balance the supply with the demand (2). In fact, in HRH supply, health managers can utilize frameworks to implement various strategies to best manage their workforce need. However, their success depends on selecting the proper approach and the cooperation they made between the stockholders (medical schools, professional associations and experts) from which results will be derived.

In addition, the use of evidences to project future workforce requirements and lesson learnt from previous programs are also essential. That means, attention need to be given not to move from one side of the crisis to the other, from severe physician workforce shortage to excess/ unemployment either due to low demand or being incompetent within the available market. Because, so far there is no well-established HRIS system to anticipate or detect the upcoming crisis very soon.

In Ethiopia, in spite of the rapid transition from severe physician workforce shortages to massive production and supply no comprehensive study has been carried out to assess the situation. Which means in order to address issues related to the aforementioned facts, the current and future physician workforce requirements, and investment in many medical schools. This is particularly, to describe progress in supply, and understand how the medical schools are dealing with it and to get opinions about it.

Therefore, the research intends to generate comprehensive evidence by taking in to account how the multidimensionality nature of the problem can affect each other. Particularly, the medical education workforce composition, and the effect of the massive admissions on physician workforce of dual roles who work as instructors of medical students and clinical service providers. And also the effect it has on medical education and patient care at the present; and the system capacity to absorb the new graduates, how to use them efficiently and other anticipated consequences in the near future.

In general, this research aims to fill the existing huge information gap with regard to physician workforce and health system response, which is timely and essential to provide evidence about the

flooding strategy which has been implemented for physician workforce production in the country. In addition, the findings of the study will also highlight the need for appropriate HRH policy/strategy, health workforce planning and management at each level and at various stages of the health workforce life.

1.4 Literature Review

1.4.1 Overview

The literature review was done through considering both local and international evidences and experiences. The local literatures comprise evidences from research reports which conducted on human resources for health, physician workforce distribution and also health planning documents and working papers. The international evidences also include journals, working papers, books, conference and opinion papers, and other internet sources. The literature review was made through database search using key words; mesh terms from Pub med and direct search from internet and manual search from books and published papers and reports. This section is systematically organized into different subsections together with personal opinion and critiques. Such as pattern and distribution of physicians, health workforce performance, physician migration, factors affecting migration, physician tracking and HRIS, medical education, health workforce planning, and health system response.

Good health service is a fundamental input to the health status of populations, and is highly dependent on the health workforce, one of the building blocks of a health system (30, 65). As a result, the ability of a country to meet population health goal depends largely upon the knowledge, skills, motivation and deployment of people, responsible for organizing and delivering health services (65). The direct and positive link between the health workforce, especially of physicians, and population health outcomes is documented elsewhere (5, 20). Many countries, however, lack the required human resources to deliver essential health interventions for a number of reasons, including limited production capacity, migration of health workers within and across countries, poor skill mix and geographic imbalances (66).

According to WHO, three factors can influence the current health workforce status of a country: health worker density (the number of health workers in different profession); distribution and composition (distribution of human resources across geographical regions, skill categories and

personal or institutional characteristics, and intra-organizational distribution of skill sets or cadres); and performance (what the health workers do and how they do it). Besides, health workers' migration, threat to the health of health workers (such as HIV/AIDs), multiple job holding, absenteeism and low motivation also play an important role (7).

1.4.2 Pattern and distribution of physicians

There are clear imbalances in physician workforce distribution. However, African and South-East Asia regions face the largest disparities and shortages (57). Geographic mal-distribution is also a global challenge even in high-income countries, specialists and physicians do not diffused to the rural areas as needed, a reasons for high physician migration from developing to developed countries (67, 68). Moreover, the situation in many developing countries including Ethiopia (urban-rural, regional and sub-regional disparities) are obvious and worse (29).

The causes of physician mal-distribution are also interdependent. A study from Canada categorizes the main reasons into five: sources and selection of medical students, educational exposures and influences, financial, professional lifestyle, and personal lifestyle considerations (68). On the other hand, a study in Japan identified that population characteristics and medical demand can determine the distribution of physicians (69). However, a study in African countries pointed out the effect of intrinsic motivation and being from rural origin can play an important role in health workers' decisions to work in rural areas, in addition to the economic incentives (70).

1.4.3 Health workforce performance

In addition to the pattern of distribution and composition, performance of health workers is also essential. In health system, health workforce performance encompasses two interrelated factors, personnel efficiency and provider quality. Health workers' efficiency is assessed in terms of financial efficiency and productivity (e.g. the number of services provided per person–hour). Both are important for health system performance, in terms of making optimum use of scarce resources and covering costs of health workers. In addition, HRH performance is a reflection of health care quality: clinical quality (measured objectively as clinical performance); and patient satisfaction (quality measured subjectively as perceived by patients). However, health worker density, distribution and composition, migration, multiple job holding and motivation can affect their

performance(2, 7). In Ethiopia, lack of adequate resources for delivering the health care also critical (71).

1.4.4 Physician migration

International migration of physicians is a global issue over the years. The push and pull factors usually influence health workforce migration (30). Increase in ageing populations in most developed countries expected to increase the demand for additional health workers, contributes to the pull factors (44, 72). On the contrary, the push factors include financial insecurity, political instability, relatively low compensation, and high workloads(65).

In addition, the developed countries employment policy favors and sustains their apparent health workforce need, which can easily attract physicians from their home country and populations. However, evidences indicate as the approach (physician migration from home to developed countries) does not confer the benefits of home and host countries mutually (54, 73, 74). For example, Britain has saved £65m by recruiting trained doctors from Ghana alone between (1999–2005). In turn, Ghana has lost more than half, £35m of what the Britain gained (75). On the contrary, physician emigration can lead to human development but decreases GDP per capita growth, its effect on overall economic growth is contingent on existing levels of economic prosperity of the host country (8).

Many researches on migration focus on international migration than internal mobility, which is also very common even in developed countries. A study from Canada reported the challenge to retain physicians in the rural settings (76). Similarly a longitudinal study in Mozambique indicates the negative effect of both types of physician migration to the health system, the internal and international(77). Likewise, another study in six African countries also reported similar findings (9). At the same time, international migration has also a tendency to exacerbate in-country rural-urban migration, since vacancies in urban areas to replace migrating workers attract the rural health care providers (78).

Literatures in health workforce migration identified problems related to medical migration and its effect especially on the source countries including potential solutions. For instance, policy related solutions, such as blanket health-worker emigration control is less likely to succeed hence different levels of human development and economic prosperity exist between developed and developing

countries (54). In addition, educational restrictions, promotion of employment and wages in countries of origin and boosting of supply to meet the global demand of health workers are also identified as less effective solution in isolation. Thus, a study from Canada indicates the need for reducing the pull factors by improving domestic supply and push factors by strengthening the source countries health care system (79).

However, so far no single solution has been identified for this global problem either as a strategy or a policy, neither in the country of destination nor in the country of origin, even though the literature points out the need for various efforts in both, receiving and as well in source countries (44, 78). Receiving countries need to expand education and training capacity to fill their domestic supply including best use of the existing health workforce and also proper understanding of the developing countries health workforce crises, ethical international recruitment of health personnel (10). Similarly, source countries need to strengthen health workforce retention strategies (78).

Recently, there is also another recommended approach, which is called “third country development” model, which aims on migrant health workers that are based in a developed countries to provide health care services temporarily in developing countries either in their country of origin or in another (44). A study in South Africa also reported, the possibility of such approach as nearly half (53%) of the migrant physicians involved in the study wanted to return back permanently to their home country, South Africa (15).

In fact, physician migration is a complex issue. It involves different stakeholders: potential migrant health workers, their countries of origin and population, and the countries of destinations and their population. And currently, the WHO Global Code of Practice on the International Recruitment of Health Personnel pointed out the need for global cooperation, coordination and integrated approaches to such global problems. And nationally countries need to establish and promote voluntary principles and practices for ethical international recruitment of health personnel and WHO also encourages its member countries to implement the code of practice (10).

1.4.5 Factors affecting turnover

Physician migration is a complex and multifaceted phenomenon which entangled with a lot of interrelated factors. The causes of physician migration mainly categorized under the push and the pull factors (65). The push factors include financial insecurity, political instability, relatively low

compensation, and high workloads. Another one is the pull an attractive force draws physicians towards developed nations. These are higher standard of living, benefit from greater financial and political stability, and have greater professional opportunities, more satisfactory work conditions and opportunities for continued education are widely available (15). High physician demand in the physician receiving countries is also good contributor to the pull (44, 80).

Medical education is also another factor to influence migration and in turn strongly influenced by migration (56). Another study found factors such as age, sex, and marital status predict to relocate from one place to another. Dissatisfaction with professional life, professional relationships and being isolated in remote or small-town clientele are also potential predictors to relocate (81).

1.4.6 Physician tracking and HRIS

A well-organized HRIS ensures a better understanding of the past, current and future health workforce demand in a given country. It also provides information for making effective HRH planning and projection (57).

However, the progress report of Kampala declaration and other literatures indicate absence of data in many developing countries in order to monitor health workforce in and out flow patterns, including the extent and effect of migration (82). Rather, the need for further collaboration to increase local capacity to establish health workforce tracking system is indicated repeatedly. In this regard in Ethiopia, in spite of the investment in physician workforce supply and high rate of migration, the establishment of HRIS seems very late compared to other African countries (61). Similarly, a global systematic review also indicates lack of information on HRH data (data collection, management and use). Data on health workforce attrition is also of the least available information in many low income countries (18, 25).

1.4.7 Medical education and training

Health workforce education and training align education, finance, labor market and policies (6, 21). In this regard, however, many low-income countries including Ethiopia face significant challenges to train medical doctors (50, 53, 83). Most medical schools have limited residency programs to satisfy the postgraduate career preference, limited role on current and future possibilities (enhancing participation for collective and individual learning) including in providing career and social orientations to medical students (53, 84, 85). On the other hand, medical students

have misunderstandings about the wider picture of medical profession and their personal learning plans (62, 86)

However, strengthening medical education may be the best option which can address the global shortage of physician workforce and their imbalanced distributions. Studies suggest that the need of putting in place appropriate education and training policies by developed countries and not relying on migrant physicians (54). On the other hand, developing countries also need to work to retain their medical doctors along with strengthening medical education training because they train medical doctors primarily for their need, not for the international market (55).

In career choice, orientation to medical students on career and socialization, recruitment of medical students, faculty values and institutional culture play an important role. In addition, characteristics of students such as age, gender, geography, study year, students' values and attitudes, expected salary, intellectual satisfaction and workload, perception on specialty and experience during the medical schools can affect their career choices (62, 64).

A study in Pakistan identifies majority of medical students wanted to pursue their careers abroad and most students want to migrate to developed countries such as (USA, Canada, Europe and Australia). Lucrative salary, quality of training, job satisfaction and better way of life, more opportunities and better working environment were mentioned as the most common reasons for migration. In addition, considerable number of students already started studying for licensing examinations to leave their home country (87). Similarly, a study conducted among Addis Ababa University medical students also shows similar findings, nearly half of the medical students want to leave the country and only few intended to work in the rural part of the country (88). Similar finding is also reported from Malawi, 38.9% of medical students plan to leave their home country (89).

In addition, migration of physicians can form a continuous chain between migrant physicians and in country physicians, and with newly graduate physicians. A study in South Africa identified migrant physicians recommending newly graduate medical doctors to leave their home country and another study found the influence of friends and relatives (15, 90).

1.4.8 Health workforce planning

Health workforce planning is a complex process. It needs to consider both the technical aspect (related to estimating the number, skills and distribution of health personnel), and the political decision and choices that emphasize on the economic and social values of a particular health system context (91).

Health workforce planning is defined in detail by Hall and Mejia, *“Human Resources for Health (Health Manpower) planning is the process of estimating the number of persons and the kind of knowledge, skills and attitudes they need to achieve predetermined health targets and ultimately health status objectives. Such planning also involves specifying who is going to do what, when, where, how and with what resources for what population group or individuals, so that the knowledge and skills necessary for adequate performance can be made available according to predetermined policies and time schedules. This planning must be a continuing and not a sporadic process, and it requires continuous monitoring and evaluation”*(2).

In addition, the WHO African Region (in 2006) also developed guidelines in order to support its member countries to formulate their own HRH policies and strategies which fits to their specific context (3). However, to this day some member countries do not have such clear HRH policy and strategy including Ethiopia (19, 36).

Similarly, there are also models with their descriptions, assumptions, advantages and limitations which used to estimate the required health workforce. These models generally grouped into different categories. Needs-based estimates future requirements based on estimated health deficits of the population. Utilization-based (or demand-based) estimates future requirements based on current level of service utilization in relation to future projections of demographic profiles. Health workforce to population ratio specifies desired worker to population ratio. Service target-based sets targets for the production and delivery of specific outcome oriented health services; and adjusted service target approach identifies service needs based on epidemiological and demographic profile, and programmatic targets) (2, 3, 91).

Likewise, more recently for effective human resource planning, the American Hospital Association also revealed the needs for data, strategy, planning, and evaluation (DSPE). Data (collecting, analyzing and understanding) of the current health workforce and the needs in the

future. Strategy encompasses an overarching workforce planning approach. Planning is an approach which help to create pipelines to fill future workforce needs; and evaluation indicates the ability to monitor the effectiveness of the plan (72). .

1.4.9 Response by health system

To overcome physician workforce shortage, a study from Canada identified the need of two major health system efforts; physician recruitment and retention. Recruitment without retention often results in a "revolving door" phenomenon – physicians come and go. In addition, programs initiated in earlier years focused mostly on recruitment, whereas those intended to retain physicians came very late (92). However, the current approach which has been observed in many developing countries including Ethiopia mainly focuses on medical doctors training and recruitment, than the emphasis given for retention, which seems relatively very weak (27).

As a strategy, different countries can use various strategies to overcome shortage of physicians, such as working with doctors, medical students and communities, as well as providing financial assistance to medical students. But some of the initiatives had not improved the supply or distribution of physicians in short period even in developed countries (93). Alternative providers, rural medical education/training, service outreach, patient travel assistance, telemedicine, and research to support rural health workforce planning had been tried as policy and strategy options. However, researchers argue on the mismatch between solution and the issue, highlighting the application of uni-dimensional solution to resolve multidimensional problem (94). Similarly, the multidimensionality issue is also summarized by the WHO HRH action framework. It indicates the need for taking comprehensive action than emphasizing only on health workforce training (5, 20).

In this regard, a case study report conducted in Ethiopia by the WHO and Global Health Workforce Alliance (in 2010), recommended **a flooding strategy** to be implemented to overcome severe skilled human resources shortage because skilled workforce migration is an unavoidable and multifaceted (27). However, such strategy and recommendation need to take in to consideration the requirements for medical education and the available medical education workforce, and the context which highly affected by high migration. In turn, high workload as a result of flooding exacerbates skilled human resource migration from the medical schools (50, 53).

In addition, such strategies have also certain implication on system's capacity, resource and expenditure, it touches both the capital (training cost) and recurrent (salary and incentives). Massive student admission means high level of training expenditure and high salary level expenditure when the graduates enter to the workforce. Higher levels of expenditure on health workers also lead to higher total health care expenditure which decreases system's efficiency and financial protection to the citizen in the long run. And also increases the total salary level expenditure than the current in most countries, estimated to be 65% to 80% of recurrent health care expenditures) (7).

On the contrary, low salary level to highly skilled workers may discourage to entry to the system or fail to attract health workers to rural areas. This will lead to low motivation to improve efficiency and quality of performance and results in multiple job holding, migration to countries with high salary levels and/ or professionals job satisfaction (7, 95, 96).

1.5 Conceptual Framework

The conceptual framework of the study is developed through reviewing various international and local literatures and evidences and also using relevant frameworks (2, 5). The literature review helped to conceptualize the study and to understand the interrelation among the constructs (physician distribution, migration, health system response, and medical students' career plan) including the direction of influences. And at the end to represent and illustrate various constructs in a logical way.

The conceptual framework comprises various factors which influence one another. It illustrates the logical interaction among various constructs such as the interaction among medical education related factors, medical students' career plan, health workforce related factors, health system response, and physician attrition in different ways, and finally the distribution of physician to be the outcome of the study and the others to be the intermediate and background factors.

In this conceptual framework, the demand for health workforce is an initial point for HRH strategic planning. However, the demand for health workers is not only determined by the strategy but also on the system capacity, preparation and cooperation made to respond to the required health workforce. HRH planning is also very essential to identify the type and number of health workers and also the knowledge, attitude and skills the learners need in order to provide the required health

service to the society. Medical education is a place where the HRH plan is transformed into action. Thus, the capacity, value and culture of the medical schools are very essential to provide quality education, to shape the students' perception, and personal career need. However, the students' characteristics and personal needs have also play a role in their career choice and decision where to work. In addition, HRH management is also central around human resource preparation, retention and distribution. In the end, the human resource management together with the individual career choice and motivation determines the distribution, retention and attrition of physician workforce in a country (Figure 6).

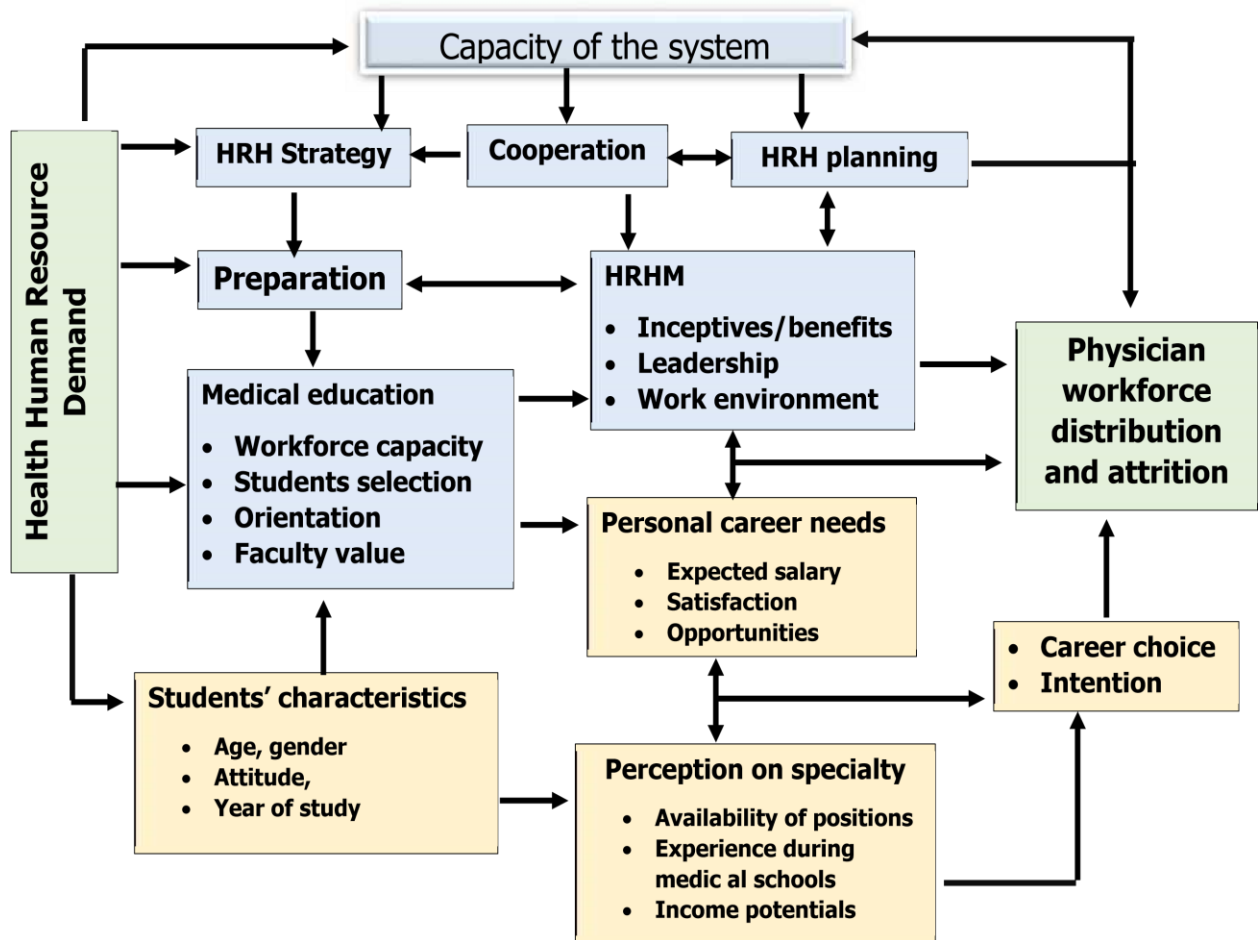


Figure 6 Conceptual framework for physician workforce and health system response
(Source: Self-constructed using the literatures above)

CHAPTER 2. RESEARCH OBJECTIVES

2.1 General objective

To assess physician workforce (distribution, attrition and associated factors), medical students' career choices and intentions where to work, and to discover views on the response made by the system to address physician workforce shortages in Ethiopia.

2.2 Specific objectives

1. To examine the distribution and attrition of physician workforce in the public sector of Ethiopia (Paper I);
2. To identify the distribution of medical education workforce in Ethiopia and to quantify the extent and factors associated with their turnover (Paper II);
3. To assess medical students' career choices and intentions where to work and role of medical instruction on these intentions (Paper III);
4. To explore reasons for physician workforce migration from the public health sector (Paper V); and
5. To discover how the health system response for physician workforce shortage using the so called '*flooding strategy*' is viewed by different stakeholders (government officials, academics, researches and so on) (Paper IV).

CHAPTER 3. METHODS AND MATERIALS

3.1 Study setting

Geography: the study setting is Ethiopia, East Africa. Ethiopia is bounded on the Northeast by Eritrea and Djibouti, on the East and Southeast by Somalia, on the South by Kenya and on the West and Northwest by Sudan. Ethiopia is located at 3degree and 14.8degree latitude, 33 degree and 48-degree longitude in the Eastern part of Africa lying between the Equator and the Tropical contour.

Ethiopia has nine Regional States: Tigray, Afar, Amhara, Benishangul-Gumuz, Gambella, Harari, Oromia, Somali, and Southern Nation Nationalities and People's Region (SNNPR); and two City Administration Councils: Dire Dawa and Addis Ababa (97). The regional states and city administrations are subdivided into 817 administrative districts and about 16,253 Kebeles, the smallest administrative units.



Figure 7 Geographic location of the settings

Population: Ethiopia is the second most populous country in Africa with an exponential growth rate of 2.3%, the projection from the 2007 population and housing census estimate a total population in 2016 is estimated about 93 million (40).

Education: according to the Federal Ministry of Education (FMOE) annual statistical abstract of 2014/2015 about forty-three government owned higher learning institutions and many more private education institutions are available in the country. In the same academic year, about 729,028 students were enrolled in undergraduate programs, of which, 15.2% were in the private higher learning institutions. In addition, there were 25,068 instructors in the government higher learning institutions, of these 1078 (4.5%) of the instructors were expatriates and other few proportion were also available in the non-governmental higher learning institutions(35, 49).

Medical education: in Ethiopia, there are about thirty-three universities/colleges who have undergraduate medical education programs, out of which five of them are owned by the private sector. Although, the medical education program started with the oldest Faculty of Medicine, Addis Ababa University (AAU) which was about fifty years ago, other medical schools such as Gondar, Jimma, Hawassa, and Mekelle universities have long time experience in medical education. Currently, many more universities have medical education programs such as Bahir Dar, Haromaya and Arbamich including the most recently established universities, Wollo, Adama, Aris, Debere Markos, Debre Birhan and Defense University College. These have also opened to overcome the physician workforce shortages in the country. In addition, there has been project based medical education programs which are sponsored by regional governments (such as in Somali region of Ethiopia, and Oromia) in collaboration with the public and private medical schools in addition to the new teaching approach in medicine which is called “*innovative medicine*”(26, 34).

3.2 Study design

The study employed mixed-methods study design. The purpose of employing mixed methods (quantitative and qualitative approaches) in combination provides a better understanding of research problems under the study than using either approach alone (98, 99). In addition, the application of mixed methods involves methodology with philosophical assumptions that guide the direction of the study; integration of qualitative and quantitative approaches in reporting the findings of the study and at the end in discussing and comparing the main outcomes of the study.

As a method, it also focuses on collecting both quantitative and qualitative data from various sources which enables one to generate strong evidence. As a result, the study gives equal emphasis concurrently for both approaches quantitative and qualitative (Figure 8).

For objective #1 and 2: the study employed organizational survey of the physician workforce. Despite the importance and global recognition of creating HRIS (17), at the time of data collection both the academic and the non-academic settings did not have a well-organized health workforce database. Thus, the surveys used retrospective longitudinal data set of six years which were available in the human resources departments of the study organizations; RHBs, hospitals and the medical schools.

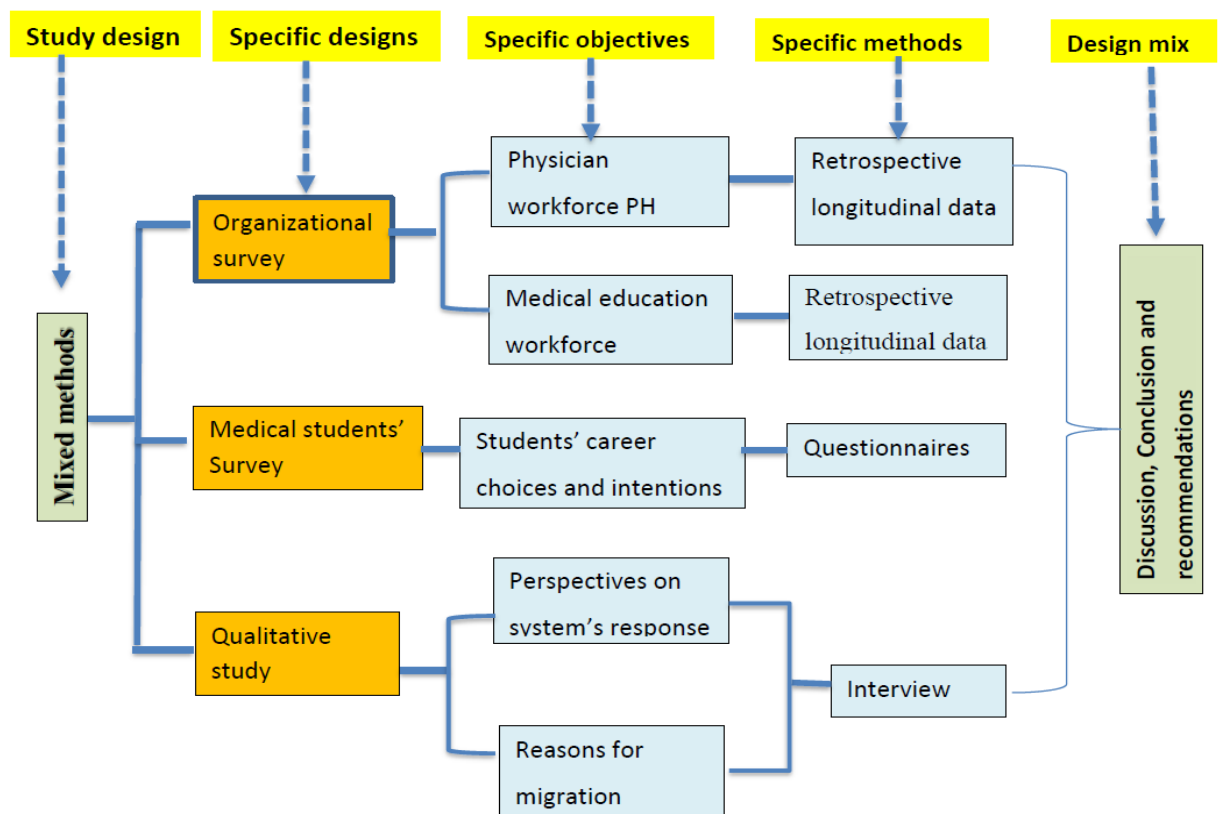


Figure 8 Schematic presentation of the study designs

For objective #3: the study employed a cross-sectional study design among undergraduate medical students who pursue their medical education in government owned higher learning medical institutions of Ethiopia and was carried out between February and May 2015.

For objective # 4 and 5: the study used a qualitative research design. Qualitative research is a system of inquiry and a tool which provides and informs researchers to understand a complex social or cultural phenomenon including organizational one. The study adopted one of the qualitative research approaches a grounded theory research to develop an explanation on the response which have been made by the system to overcome physician workforce shortage and migration in the public health sector (100). Overall, this research was conducted between February and September 2015. Detailed description of the study designs is given here below.

3.3 Physician distribution and attrition in the public health sector (objective #1/ paper I)

3.3.1. Settings and data

Physician workforce organizational survey was conducted in six regions (Amhara, Oromia, SNNPR, Tigray, Harari, and Somali Region of Ethiopia), and two city administrations (Addis Ababa and Dire Dawa City Administrations) of Ethiopia. Overall, the study gathered information on physician workforce from 119 hospitals (19 referral, 46 general and 54 district hospitals) which were under the auspices of regional health and city administration health bureaus. Five hospitals from Addis Ababa (1 referral and four general), 20 from Amhara (6 referral, 10 general and 4 district), one referral hospital from Dire Dawa, 63 hospitals from Oromia (5 referral, 18 general and 40 district), 17 from SNNPR (3 referral, 6 general and 8 district) and 11 from Tigray (2 referral, 7 general and 2 district) were covered by the survey.

3.3.2. Source of data

During the initial phases of the present study, the HRIS at the Federal Ministry of Health was on the process of establishment. As a result, data for the present analysis were collected from human resources departments of regional health bureaus and hospitals found in the study area.

In Oromia, Harari, Tigray, SNNPR and Somali regions of Ethiopia, the required data on physician workforce were obtained via excel spread sheets from the HR Departments of the respective regional health bureaus. However, in Amhara Region, Addis Ababa and Dire Dawa City Administrations, the data were received in excel speared sheets from each of the hospital HR department through the support of regional health bureau HR departments. Furthermore, in the absence of such organized data (in excel spread sheet), data were also collected from accessible documents from archives. In Addis Ababa, data were collected from the HR department of five

hospitals (namely, Zewditu Memorial, Ras Desta Damtew Memorial, Menelik II Memorial, Yekatit 12, and Tirunesh Beijing). Data could not be accessed from Gandhi Memorial and Dire Dawa Sabian Hospitals within the study period. In addition, data for Somali Region were excluded because they were not complete. Similarly, in SNNPR and Tigray Regions, data on physicians who were recently hired or deployed as well as those who left for specialty training were not included as they were not complete. SNNPR data on physician turnover and data on private practicing physicians across the regions could not also be found for the present analysis.

3.3.3. Data collection

Checklist was used to collect retrospective data from the study organizations. The checklist had two main components: inflows and outflows. In the study organizations, the inflow data is recorded to each physician when the physician takes-up position in the place where s/he assigned or employed and the outflow data are recorded at the time when physician left the position. In addition, the checklist also captured data related to training opportunity, distribution, physician turnover, and socio-demographic variables such as date of birth, gender, date of appointment were commonly available from human resources departments. In addition, field of specialty and information on training opportunities were also collected. However, demographic variables such as marital status and ethnicity were not completely recorded.

During the study, all retrospective longitudinal data of six years between September 2009 and July 2015 were collected from the human resources departments of the regional health bureaus, and two city administration health bureaus. Here, the beginning and ending time of the observation was limited to the recent events because the previous data sets were not completely available in the human resources departments of the study organizations.

Furthermore, ensuring the confidentiality of the information and other organizational documents to be reviewed in gathering the required data from different organizations was given emphasis. Also in order to minimize unnecessary exposures to the data sources, the study recruited data collectors from human resources departments/units of the study organization. As a result, data were extracted and collected by information system officers and/or data clerks. To make the data collectors familiar with the data collection tools (checklists), training was given by the principal investigator before the start of the data collection process along with close supervision during the data collection.

3.3.4. Study variables

The study variables were socio-demographic (date of birth and gender), date of employment, field of specialty and sub-specialty of the medical doctors, and information on training opportunity. The outcome variable of the study was '*physician turnover*' which indicates a transition made (in the form of official resignation/dismissal, transfer, retirement or death) by a physician after taking up position as a medical doctor within the time of interest (between September 2009 and July 2015).

3.3.5. Operational definitions

The following description is given for both category of the physician workforce, working in the public health sector and in the medical schools:

- **Actively working physician:** those physicians who were (during the data collection) working in the medical schools as medical instructors and clinical service providers or in the public health sector as practicing physicians.
- **General practitioner (GP):** refers to a medical doctor who is qualified as a general practitioner or a medical doctor who does not specialize in one particular area of medicine.
- **Physician:** refers someone who is educated, clinically experienced, and licensed to practice medicine in Ethiopia including (GPs, and specialist and/or sub-specialist of all category).
- **Specialist:** one who completed medical education in a certain areas of medical specialty (such as internal medicine, surgery, pediatrics, gynecology and obstetrics and so on) after being trained/having served as a GP.
- **Sub-Specialist:** one who received training in certain sub-specialty area after being trained/having served as a GP and/or specialist.
- **Turnover:** any transition made (in the form of official resignation, transfer or non-official) by a physician after taken up position as a medical doctor within the time of interest.
 - **Officially Left/resign:** refers to those who left a certain medical school/public health care setting by getting permission from authorities and whose whereabouts and reason for leaving is known; the one who took a release paper officially.
 - **Runaway:** refers to those physicians who left from the medical schools/ public health care settings without informing the office to know whereabouts while they leave.

- **Retired:** refers to those who depart from the medical school/public health care settings due to retirement
 - **Transferred:** indicates movement of physicians within the public health sector, it could be to the academic or non-academic health care settings.
 - **Died:** refers to departure of a physician from the medical school/public health care settings because of death.
 - **Unrecognized:** refers to a turnover not recognized by the HR office before the date of data collection.
 - **Not specified:** refers to the lack of reliable information in the HR department to label the event under any of the above categories.
- **Duration of stay/service:**
 - For actively working physicians' duration of stay/service years in the assigned place is calculated by subtracting the date of employment from the date of data collection;
 - For those who left appointment duration of stay is calculated using the date of departure; and for those with unknown dates of attrition, service year was subtracted from the date of data collection.

3.3.6. Data management

Data management and processing involved data organization, data cleaning, and editing using excel spread sheet. However, time related data such as date of birth, employment and data of departure were converted from local calendar (Ethiopian calendar which lags seven years behind for the months between September to December and eight years for January to August with date variation ranging from 6 days in August to 11 days in October) to Gregorian calendar. In addition, repeated appointments and turnover events within the study settings were captured using physician's recruitment identification number. Finally data were exported from MS Excel to Stata version 13 (101) using Stat transfer version 9 for statistical analysis.

3.3.7. Data analysis

Descriptive statistics was used to describe the distribution and attrition of physician workforce. Poisson regression model was also used to identify factors associated with physician attrition from the public health care facilities. The outcome variable of interest, turnover/out-migration is measured in count of the events which is appropriate for the case in point for this study. Poisson regression model is recommended for count events such as turnover especially when the Cox's proportional hazards model assumptions are not satisfied, which is the case in this study (102).

In the Poisson regression modeling, the exposure variable is duration of stay/service year (is non-zero integer), which is used as offset variable. In addition, for running the model, the event of interest is coded as "1" which indicates the occurrence of the event, turnover (all attrition events excluding retirement and death), and "0" indicates event did not occur, it includes actively working and inevitable events (such as retirement and death).

For explanatory variables, dummy variables were created for categorical explanatory variables used to identify the covariates associated with event turnover. For example, gender was coded as male = 1 (reference) and female = 2; date of birth was also categorized into three (born after 1985 = 1 (reference), between 1975 to 1985 = 2 and before 1975 = 3; educational level GPs =1 (reference), specialist/sub specialist =2; setting was coded as referral hospital =1 (reference), general hospital=2 and district hospital =3; and for geographic locations Addis Ababa is chosen as a reference.

Incident rate ratio (IRR) was used (with 95% CI, and P-value =0.05 as cut-off points) see the statistical association between the dependent and explanatory variables. Finally, the validity of the model was assessed using goodness of fit test after Poisson model run. Deviance goodness of fit (GOF) test is ($P=0.818$), which indicates that the model is well fitted to Poisson regression assumptions.

3.3.8. Data quality assurance

In this survey various quality assurance techniques were used. For instance, during the data collection orientation was given for the data collectors, close supervision was made by supervisors and the principal investigator throughout the data collection. In addition, attempts were also made to make the data set complete (to reduce omission, duplication, and incomplete data were

excluded) by using the data collectors who were familiar with the settings and data, and by using additional data sources such as archives and pay role. In addition, to maintain the quality of the data, extensive data cleaning and editing was made in excel spread sheet.

3.4 Medical education workforce survey (objective #2/Paper II)

3.4.1. Overview

This part of the study involved seven government owned medical schools of Ethiopia. Each medical school has organizationally embedded teaching hospital (in the country's health care tier system, teaching hospital provides the highest/tertiary level health care; also called specialized hospital) with the exception of Bahir Dar University. For instance, Faculty of Medicine, Addis Ababa University (AAU) is the biggest medical school in the country owned Tikur Anbessa Referral Hospital which is the biggest referral hospital in the country. School of Medicine, University of Gondar (UOG) is located in Amhara region, Northwest Ethiopia. Its teaching hospital serves as one of the referral hospitals in the region.

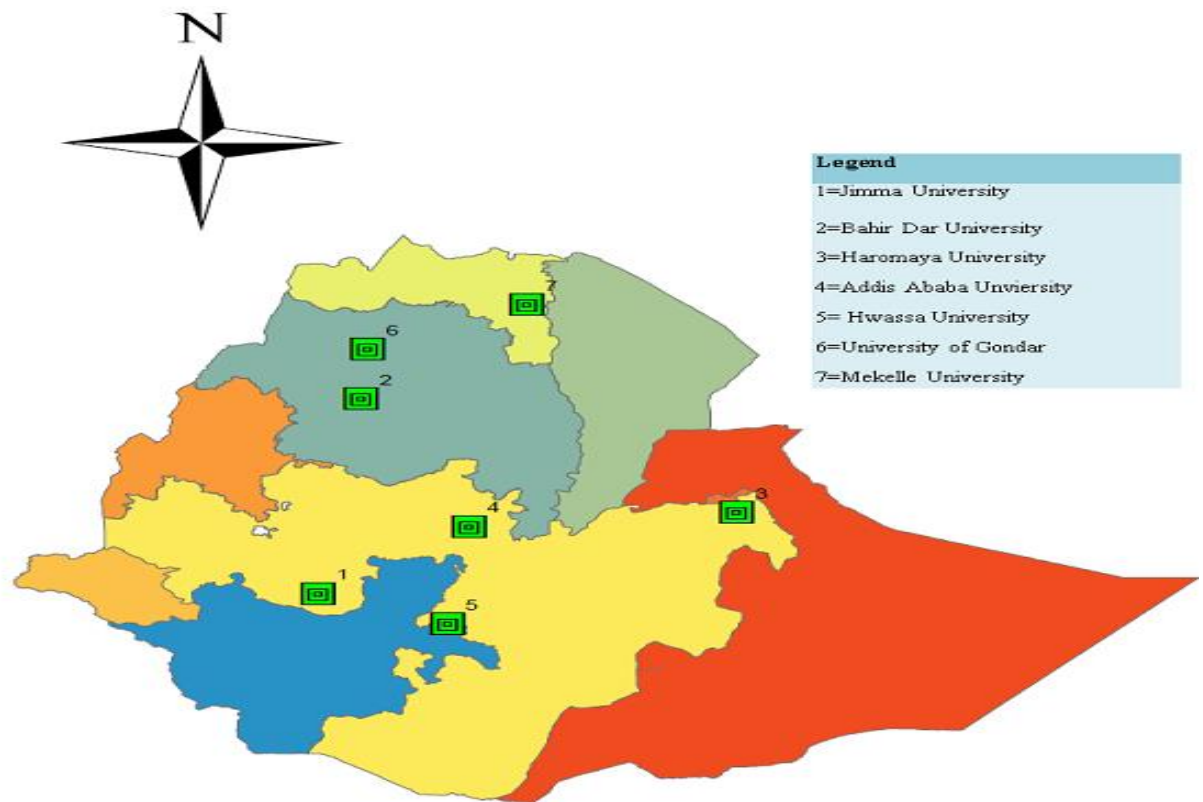


Figure 9 Location of the medical schools involved in the study

Similarly, School of Medicine, Bahir Dar University (BDU) is located in Bahir Dar city, the capital of Amhara Region. At the time of this study, this medical school did not have its own teaching hospital though it has been using Felege Hiwot Referral Hospital, owned by the regional health bureau.

Similarly, School of Medicine, Mekelle University (MU) is located in Mekelle city, the capital of Tigray Region. Its teaching hospital is called Ayder Referral Hospital, the biggest referral hospital in the region. School of Medicine, Jimma University (JU) is located in Jimma town, Southwest Ethiopia. Its teaching hospital is also the biggest referral hospital in Southwest Ethiopia. School of Medicine, Hawassa University (HwU) is located in Hawassa city, the capital of SNNPR. The teaching hospital serves as a referral hospital for the community residing in the region and around. Likewise, School of Medicine, Haromaya University (HU) is located in the old Harar city, Harari region. And its teaching hospital, Hiwot Fana Referral provides clinical service for the population residing in the eastern provinces of the country (Figure 9).

In addition, the proportion of foreign and contract staffs were varied across the medical schools and estimated from less than 1% to 13.5% of the workforce. At the time of the study, each medical school had an average of 578 pre-clinical and 589 clinical year students (table 1).

3.4.2. Source of data

Despite the importance and global recognition of creating Human Resource Information System (HRIS) (17), the country still does not have a well-organized health workforce database system. This organizational survey was used retrospective longitudinal data that were available in the human resources departments of the medical schools. In measuring health workforce turnover and retention, the use of survival analysis approach has strengths in generating evidence for human resource planning and informed decision making (103), because in turnover studies, the dependent variable has a construct represented by time until an event occurs and changes.

In this study, the event is *“the turnover of a physician from appointment s/he had been working between September 2009 and June 2015”*. The observation time begins with the date of employment (time zero) and ends on the date in which the health worker leaves her/his appointment.

Table 1 Background information of the medical schools with their respective teaching hospitals involved in the study

S.No	Name of the university	Year established	Pre/clinical year students (2014/2015)		Name of teaching /referral hospital	Teaching staff	
						Expatriate/contract	Non/Academic
1.	Addis Ababa	1964	926	776	Tikur Anbessa	10/-	4/320
2.	Gondar	1978	564	616	Gondar Referral	1/3	14/164
3.	Jimma	1983	631	568	JU Specialized	13/1	21/120
4.	Mekelle	2003	489	637	Ayder	5/-	2/160
5.	Hawassa	2003	503	477	Hawassa Referral	2/4	2/116
6.	Haromaya	2007	550	580	Hiwot Fana	-/-	6/65
7.	Bahir Dar	2007	386	470	Felege Hiwot	2/18	NA/115

Sources: FMOE, annual educational abstract, 2014/2015 and the medical schools, -=information not accessed, NA=not applicable

Recently in the medical schools, health workforce data are in stage of transition from rudimentary paper-based systems to excel spreadsheet using computers. The data are not easily amenable for use in health workforce planning and undertaking research. For this study, individual practitioner level data were collected from the human resource units/departments of the medical schools. Like that of the public health sector data, this data sets had also two main components: inflows and outflows which recorded for similar purpose. However, for the outflows, our observation was limited to recent events (since September 2009) because the previous data were not completely available in the human HR department of the medical schools.

This part of the survey collected the data on three important elements of medical education workforce such as training opportunity, distribution, and physician turnover. Socio-demographic variables such as date of birth, gender, and date of appointment were commonly available in the medical schools HR department/units. In addition, field of specialty and information on training opportunities were collected. However, some demographic variables such as marital status and ethnicity were not completely recorded including detail information about foreign and contract

staffs at the HR units/departments of the schools. In each medical school, data were extracted and collected by individuals who were working in human resources departments as information system officers and/or data clerks.

This section did not present the data collection, processing, editing and quality assurance techniques hence it used similar techniques with the section above.

Operational Definitions: in addition to the definitions given in section 3.2.5 the following definition is used for the medical education workforce survey:

- **Medical education workforce:** refers to physicians (medical doctors) who teach medical students and provide direct patient/clinical care to patients/clients in the affiliated teaching hospitals.

3.4.3. Data analysis

After completing the data processing and edition in excel spreadsheet, data were imported into Stata Version 13 (101) using Stat transfer version9. Descriptive statistics were used to describe the characteristics of actively working medical education workforce/trainer physicians, the inflows and outflows of physicians, to compare educational levels, and to illustrate differences across medical schools. However, survival analysis techniques were considered for statistical modeling.

Survival Analysis

Survival analysis is convenient for studies with time to event data. If study participants are unable to get enrolled at the start of observation time and did not leave before the end of the observation, retire or die during the follow-up then they will be censored (104). “Retention/stay in” is the duration in which faculty physicians were working in their place of appointment, while “turnover/migration” refers the time at which they left their place of appointment.

Event: implies “the turnover/migration of a physician from the academic health care setting”. Here in this survey, there may be repeated transitions and taking-up of positions in different medical schools which were considered as an episode of independent observation. The date of employment is considered as the beginning time of the observation with time = 0; and ends on the date on which the physician leaves the appointment (September 10th 2009 and June 30th 2015)/or the date of data collection. The ending time was limited for two possible reasons: the first reason was to examine

the recent physician turnover experience from the medical schools; and the second reason was the availability and completeness of turnover data.

The Kaplan-Meier survival curve was used to describe the survival/length of stay of physicians in the medical schools by their academic ranks. In this study, Cox's Proportional Hazards (CPH) model was employed because the model is semi-parametric that allows for no assumptions to be made about the baseline distribution; and its flexibility to handle censoring of the survival time due to its use of the partial likelihood function. This was important to our study in that any temporal biases due to differences in the date of employment (delayed entry to the system) for different physicians over the period; and also it allows investigating the effect of covariates by controlling other confounding variables (115). Thus, the Cox proportional hazard model was run to identify the risk factors for physicians leaving their appointment. In fitting the model, first we set the data as panel which is a requirement in survival analysis. For categorical variables dummy variables were created which used to measure the association using the reference category of choice (for example, gender was coded as males = 1 (reference), females = 2; academic rank was categorized into three (lecturers = 1 (reference), assistant professors = 2 and associate professors and above = 3); date of birth is also categorized into three (born after 1985 = 1 (reference), between 1975 to 1985 = 2 and before 1975 = 3; and for medical schools, Addis Ababa university is chosen as a reference and the other medical schools are given subsequent numbers.

The Cox proportional hazard model was run using enter method model building approach and hazard ratios (with 95% CI, and P-value <0.05 as cut-off points) were used to explain the observed significant differences and Breslow's approximation was used to handle ties. The proportional hazard assumption was checked, and then posttest of proportional-hazards assumption was run. The P-value for global test equals to 0.466, indicating validity of proportional hazard assumptions. However, two variables which are educational level, and service year were excluded from the model because they were found collinear with the academic rank.

3.5 Medical students' career choices and intentions (for objective #3/paper III)

3.5.1. Study design and population

This cross-sectional survey involved undergraduate medical students who pursue their medical education in government owned higher learning institutions of Ethiopia. In the survey, fifth year

(clinical-II) and final year (internship) medical students were involved because assuming that they have thought over their future career plan than the junior ones.

3.5.2. Sample size and sampling methods

The sample size was calculated by using a single population proportion formula considering the following assumptions: proportion of medical students' intention to work abroad ($p=53\%$) (88), and 95% confidence interval at $Z_{\alpha/2}=1.96$ (level of significance). However, in our case given the medical schools' geographic variations, difference in students' characteristics/selection and the scope of the study to get adequate sample size for modeling and statistical analysis the study used a margin of error of 3% and non-response rate of 10%, which made the required sample a size of 1165 medical students.

Sampling method: The study involved all government owned medical schools/colleges with fifth and sixth year medical students. At the time of the study, eight medical schools (Addis Ababa, Jimma, Gondar, Mekelle, Hawassa, Haromaya, Bahir Dar and Aris) from the conventional program and two from the innovative (St. Paul's Millennium Medical College and Dire Dawa University) had the upper class (5th and 6th year students) eligible medical students. In the sampling procedure, four out of eight medical schools (namely AAU, Mekelle, Hawassa and Haromaya) with the conventional program were randomly selected and the illegible two from the innovative (St. Paul's Millennium Medical College and Dire Dawa) were also included. And then all accessible and willing fifth and sixth year medical students were involved from each medical school.

3.5.3. Variables and measurements

The main dependent variables of the survey were medical students' intention to work in rural and remote places, and to work abroad. And the independent variables were socio-demographic characteristics (such as age, gender, and place of birth, father's / mother's education); academic year, social networks abroad and reasons for career development choice (possibility of working abroad, personal interest, and income potentials). Detailed description of the study measurements is given below.

Practice location: *refers to the intended place of practice by the medical students just after graduation. Here, practice location is categorized into two: 0= rural and remote (zonal and*

district hospitals, and underserved areas) and 1=urban (big cities where specialized hospitals are found, such as Addis Ababa, Bahir Dar, Hawassa, Dire Dawa).

Intention to leave: *measured using a single-item Likert's scale type question with five response options. The response categories ranged from lowest (never) through highest (always); (never, seldom, sometimes, often, and always). Here, the intention is categorized into two: high= (sometimes, often and most of the time), and low= (never and seldom).*

Career plan of medical students: *was assessed using single item question with list of choices given. Students were asked to indicate their first three career choices in which they were interested to specialize in a particular area of medical specialty (such as internal medicine, surgery, gynecology and obstetrics, radiology and so on).*

Medical instruction: *refers to a process whereby an experienced (teacher/instructor) guides medical students in the development of their own ideas in clinical knowledge, skills and personal and professional development through formal and informal approaches (such as laboratory sessions, during inpatient clerk, bedside teaching, morning sessions, clinical round, research activity and so on) to address the objective of medical education.” To have common understanding, this description was added in the questionnaires.*

Thus, in this study the role of medical instruction was measured using questions of six dimensions (*guidance in field of medicine, mentoring on professional development, orientation on research undertaking and ethics, the medical instruction/teaching-learning process, orientation towards in country practice and the teaching- learning environment*).

Each dimension has various items with five response categories. Each item had five categories of responses (1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree). When items are combined in to a single scale the response values were reverted for negatively worded statements and then the mean score is used for binary logistic regression modeling.

Guidance in field of medicine: *is measured using four items (medical instruction plays an important role on medical students' career choice and professional development, medical instruction supports to reduce stress experience to practice medicine, medical instruction supports medical students to get broader insight on various specialty areas, and medical instruction*

increases medical students' awareness on professional responsibilities). And the items have internal consistency, with a reliability coefficient Cronbach's alpha value of 0.88.

Mentoring on professional development: is measured using three items (*mentoring stimulates medical students' interest towards a certain clinical specialty area, instructors serve as role model to obtain the required professional skills, and instructors serve as a role model to specialize in a particular clinical specialty area*). The reliability coefficient alpha value 0.85 showed that the scale is internally consistent.

Orientation on research undertaking and ethics: is measured using three items (*here the medical school gives special attention on ethical issues, medical instruction stimulates students' interest towards research oriented careers, and teaching-learning process encourages creative thinking and taking an active role in new discovery*). The scale has a reliability coefficient of 0.85.

The teaching-learning process: is measured using five items (*instructors commit their time and energy on a regular base in teaching medical students, provide feedback in constructive and caring manner, non-judgmental and accepts individual differences, mentoring help to enhance clinical skills and professionalism, and instructors assist medical students in developing professional identity*) The scale has a reliability coefficient alpha value of 0.87.

Orientation towards in country practice: is measured using three items (*the process encourages the students' interest in pursuing their career within country, the training encourages to pursuing a career in an area that country has shortages of qualified physicians, and medical instruction encourages medical students to work in the rural/distant part of the country*). The scale has a reliability coefficient of 0.85. However, the scale on the teaching- learning environment was excluded because of low reliability coefficient Cronbach's alpha value of 0.50.

3.5.4. Data collection

Medical schools play a key role in professional life, career preference, and choice (62-64). These include the characteristics of medical schools such as curriculum, orientation on career choice, faculty values to influence the students' attitudes where to practice. Likewise, medical students experience and exposure during the medical schools also influence their perception and attitudes in their future career plans. Thus, this survey developed new questionnaire to measure these

important components of the career plans by reviewing various literatures written in this area (14, 15, 62, 88).

Before the actual use of the survey tools, senior experts in medical education and behavioral research examined the content, language and sequence including fitting to the context. In addition, pre-test was done among medical students of University of Gondar which was not included in the actual study. At the end, the modified version of the survey tool was used to collect the data through self-administered questionnaires in all of the medical school. The process was facilitated by the deans of medical schools and assisted by class/group representatives.

3.5.5. Data management and analysis

The data were entered, edited and cleaned using Epi Data version 3.1 and exported to SPSS version 16.0 statistical software for analysis. Descriptive statistics was used to describe the demographic characteristics of medical students, career preferences, and attitudes towards medical instruction.

Binary logistic regression model was run to identify variables associated with medical student's intention to work in rural/ remote areas, and to leave abroad. Initially, univariate logistic analysis was used to investigate the association between demographic, and medical education related variables with the dependent variables, students' intention to work in rural/remote areas and intention to leave. And finally, binary logistic regression model was fitted to identify variables that significantly associated with medical students' intention to work in rural/remote areas, and intentions to leave abroad.

In fitting the model, the dependent variables: intention to work in remote/rural location was coded in to two (rural and remote =0 and urban =1) and for intention to leave abroad the response categories were coded in to two; those with low intention scores (never and seldom) was labeled as "low" intention to work abroad and the remaining high scores to be "high" intention (sometimes, often and always).

The remaining independent variables were also coded accordingly. For instance, gender was coded (male=1 and female=2); place of birth: urban (regional town, and zonal town) and rural (born in district and rural village); year of study: (fifth year /C-II =1 and final year/interns =2); medical school: (AAU=1 and others =2). In all cases, $p < 0.05$ and 95% confidence interval was used to

check statistical significance of associations. Finally, Hosmer and Lemeshow test was used to check model adequacy ($P=0.583$ for the intention to work in remote/rural locations and for the intention to leave $P=0.404$).

3.5.6. Quality assurance

For medical students' survey to ensure the quality of the data, first study instruments were developed using relevant literature and then examined by expertise in medical education and behavioral research. In addition, the questionnaire was pretested among the medical students of Gondar. Likewise, attention was also given during data coding, entry and processing using EPI data software. Finally, in fitting the statistical models assumptions were also checked to reduce statistical errors.

3.6 Health system response for physician workforce shortages in Ethiopia (for objective # 4 & 5/paper IV&V)

3.6.1. Overview

The study used a qualitative research design to address specific objectives #4 and 5. Qualitative research is a system of inquiry and a tool which provides and informs researchers to understand a complex social or cultural phenomenon including organizational. Qualitative research methods such as interviews provide in-depth, thick and detail information pertaining to participants' experiences and viewpoints of a particular topic. In addition, qualitative research uses flexible approaches which enable to capture various viewpoints and perspectives of a given context in comprehensive manner (105). As a result, this study adopted one of the qualitative research approaches, a grounded theory research to develop an explanation about response made by the system to overcome physician workforce shortage and migration in the country. Furthermore, grounded theory research is appropriate for this new area of research problem since there is lack of grounded concepts that describe and explain what is going on around the phenomena, rapid medical education expansion and massive admission of medical students. Therefore, this grounded theory research attempted to examine the causes, contexts, contingencies, and consequences of the flooding strategy which has been recommended for medical education expansion and physician workforce production in Ethiopia (27, 100).

3.6.2. Sampling procedure

In order to capture a wider range of perspectives and viewpoints, respondents of the qualitative study were selected through purposive sampling strategy from six regions (Amhara, Oromia, SNNPR, Tigray, Harari, and Somali Region of Ethiopia) and two city administrations (Addis Ababa and Dire Dawa City Administrations), and seven medical schools (Addis Ababa, Bahir Dar, Jimma, Haromaya, Hawassa, Mekelle, and University of Gondar), and from the private sector (professional associations, NGOs, researchers and consultants).

Gradual sampling procedure was employed in three phases. This was done in order to capture a wider range of different and balanced viewpoints about the event (reasons for physician workforce shortage and health system response for the shortages), and the local context in which the event has been taken place and also to discover the different perspectives among the actors/stakeholders, which is very helpful to provide thick description in the end(106-108).

In this inquiry, the study purposefully given an account first at context/ site level (medical training sites–responsible for medical workforce preparation and regional health bureaus- responsible to deploy/employ and give further training opportunities). Second, at event or process level: how the health system response has been implemented and viewed by different actors. Third, at participant level, for individuals with current and previous experience, exposure, and concern about health human resource development and preparation in Ethiopia (107).

At the initial phase of the sampling procedure, the study intentionally involved five individuals from three different settings (academic, clinical care position and administrative in the government health bureau). This was done to get an entry point for further data collection and selecting study sites and participants subsequently. This phase informed us to involve government officials, the academics, and hospital chief executive officers (CEOs). And then gradually the study involved government officials from various regions and hospitals. However, information on physician shortage, migration, retention, leadership and flooding were reached to the level of information saturation as we collected the data from regional health bureau officials, hospital CEOs and academicians.

Nevertheless, issues related to the system such as strategies on health human resources, planning, policy and capacity were emerged as new points of discussion behind the central phenomena. As

a result, senior researchers, senior consultants, knowledgeable individuals who had been working in the system, with NGOs and professional associations were involved and shared their long time experience, observation and appraisal about HRH development in Ethiopian context in particular, and different viewpoints about the health system of the country in general.

3.6.3. Data collection tools

Semi-structured interview guide was prepared to direct the interviews and discussion with the respondents. The main points of the discussions were (reasons for physician shortage, physician migration and retention, the reasons for flooding, readiness of the medical schools to admit massive number of medical students, consequences of flooding at the present and in the future, medical instruction with large volume of students, future workforce and their competency, job opportunity in the market, opinion on the flooding approach itself and the like), at the end participants' demographic information was also collected.

3.6.4. Data collection process

Semi-structured interview was used to collect the data and the interview was conducted face-to-face with each of the study participants in a convenient place and time. Field notes and memos were taken during the discussions to follow new emerging ideas and to refine the subsequent interviews. The interviews were conducted in Amharic language and were flexible to each of the respondent's background and exposure including variations in the length of discussions (which ranged between 40 minutes to 1:30 hour). The principal investigator conducted the interviews, however with the interest of time, the transcriptions and translations were done by other experienced individuals.

Since data transcription was begun side by side with the data collection, two distinct health system responses were came out of the discussions very soon. The first one was "*physician migration and retention including potential solutions*" and the second one which came up for detailed exploration was "*the issue of flooding and its consequences.*"

At the initial phases of the data collection, the main points of discussions were physician migration from and retention in the public health sector. However, as data collection proceeded, information on health workers' migration and retention including potential solutions reached to the level of information saturation. And then, information on "*physician workforce flooding*" emerged as a

critical point of research question to be discovered in detail. So that, the interview has continued on issues related to the flooding till new ideas stopped to emerge from the subsequent respondents (table 2).

During data collection, the two individuals (the PI and her supervisor) established contact with the potential participants. Participants also suggested additional potential knowledgeable respondents and how to reach them (109). None of the invitees refused to participate except one senior government official in one of the regions.

3.6.5. Data management and analysis

Data analysis began side by side with the data collection. First, verbatim transcription was made to all tape recorded data and then translated in to English language with the same person. Consistency of the transcribed and the translated data was checked and compared by the principal investigator. Then textual data were read, edited and organized in MS word files to assign to the ATLAS.ti 7.0 scientific software.

To be familiar with the interviews, each transcript was read line by line as a whole before breaking it into different categories. During the field work, taking memo helped to track concepts, categories and generate questions and subsequent samples. Similarly, during data analysis such notes were also helped to formulate and relate categories, describe their property and meaning through constant comparison techniques (100). In the study events, patterns and actions were compared constantly for similarity and differences in the context which they usually occur. Similar concepts were grouped in to the same category. In addition, this approach was also helpful to develop subcategories and to verify differences. In the process of constant comparison, the analysis gave account for events, actions which have similar patterns and variations including the meaning they hold in the context they occur.

Data coding, at the beginning of the study open coding was carried out line-by-line to the transcriptions to identify common categories quickly that emerge from the data and to develop those categories through further sampling, which designated conceptual levels. During open coding, code names were drawn from the words of participants, it enables to group similar events, patterns and opinions under a common heading or classification using a code book (100). During the coding process, the code book together with memo was very helpful to track concepts,

categories and generate questions and subsequent samples. In addition, as the analysis proceeded, the code book also helped to formulate and relate categories, describe their property and meaning from various dimensions.

And then similar subcategories along the lines of their properties and dimensions subsequently construct similar categories, this coding process is commonly called axial coding which is very essential for clustering, categorization and data reduction (110). Here quotations and explanations were made using the words of the respondents and the researcher's conceptualization of the event, process and context through continuous forth and back alternates with open coding.

Selective coding: The purpose of this phase is to establish the central phenomena, or core category of the study through integrating and refining categories. In this study, two central categories were emerged; *physician migration/retention and physician production*, the so called “*flooding strategy and its consequences*”. In fact, the second integrates all categories and subcategories, and conceptual level that emerged. However, for the purpose of this study abstraction was made first separately and then by integrating in to one. Finally, diagrammatic representation was made to illustrate connections between the main categories (108). This provides an effective way of coping with complex interactions among the constructs of the phenomenon, indicating the main categories and their logical interrelation. And this is also called the final step of GT research, which is adopted by this study (110).

Table 2 Summary of the qualitative data collection processes

Categories	Phase 1	Phase 2	Phase 3
Settings	- Academics (AAU, UOG) - RHB (AACAHB) - Service provider	- Medical schools and academics (HwU, MU, HU) - Medical students - Government regional health bureau (SNNPR, Harari, Dire Dawa, Jigiga, ARHB, ORHB) - Service providers, NGO	- Academics (AAU, JU) - Private - Researchers - NGO
Respondents	- Instructors (college dean, department head) - Gov't official - Clinician	- College and medical schools (deans, medical school heads, department heads) - Instructors (Specialists, GPs) - Senior residents - Gov't officials (dputy office heads, sub/process owners, CEOs) - Services providers (Specialists and GPs) - NGO- Senior Advisors	- Academics: professors and/or associate professors - Private: (Individual consultant, researchers in HRH) - Former senior government officials - International NGO - Professional associations
Data collection	Semi-structured: exploring	Semi-structured: exploring and comparing	Semi-structured: comparing, verifying and questioning
Areas of discussion	Workforce shortage, migration, retention, leadership, political involvement	Physician shortage, workload, incentives, migration medical education expansion, massive admission (flooding), quality of medical education	System related problems: policy, strategy and planning on HRH, cooperation

3.6.6. Reporting the qualitative findings

The findings have come out of the interviews which were made with respondents working in the medical schools, regional health bureaus, and the private sector will be presented in section 4.4 through to 4.8. In addition, though no distinctions have been made where from for some respondents, they interviewed because of their experiences and position they had with the professional associations (Such as Ethiopian Medical Association (EMA), Surgical Society of Ethiopia, Ethiopian public health association (EPHA) and so on).

The qualitative findings will be presented in terms of main categories. Categories and sub-categories that stands for the phenomena under the study, a requirement for grounded theory research. The findings are also presented in the narrative style with the respondents' descriptions. However, the researcher's interpretations will be presented separately at the end of the qualitative report.

In addition, to protect the originality of the descriptions, quotations from the respondents are presented as they were spoken. That means in the words used by respondents which is called "in vivo" (111). Quotations from respondents ensure that the real meanings are presented. The quotations are presented in *italics* with a source for each quotation. The source of quotations is presented by the code of each respondent setting at the time of the study then followed by the number of the respondents. There are three codes in the study; Ac: means the academic setting/medical school, Gov: means government health sector, Pr: means the private sector. Therefore, for example (Ac1) means the source of quotation is from academic/medical school respondent number one, (Gov1) means the source of quotation is from government/public sector respondent number one, and (Pr1) means the source of quotation is from private respondent number one.

In accordance with the confidentiality agreement, no names of each individuals or settings were disclosed. Moreover, in certain circumstances, the symbol [*] is used within the body of quotations to indicate the researcher's clarification of the meanings of some unclear or multi-interpretation words.

Each section of the qualitative findings has a brief overview of the findings before the evidence supporting them are presented in a logical way. The research findings are described in accordance with the following:

1. **Phenomena:** The main phenomenon investigated in this study is the *physician workforce migration, and massive production in Ethiopia*.
2. **Categories:** The main categories are 1) physician workforce migration, 2) massive physician workforce production, and 3) role of the system on HRH development.
 - a. **Subcategories:** The subcategories related to physician workforce migration are 1) *extent of migration*, 2) *reasons for migration (economic, non-economic and external)*, and 3) *physician retention*
 - b. The subcategories related to massive physician production are 1) *reasons for medical education expansion*, (2) *preparation on medical education expansion* 3) *the consequences of rapid medical education expansion* and 4) *massive production as HRH strategy*
 - c. The subcategories related to the role of the system on HRH development are 1) *cooperation on HRH development*, 2) *HRH strategy and planning*, 3) *system capacity for HRH development*, and 4) *institutional continuity for HRH development*

3.6.7. Data quality assurance

For qualitative data, the study employed gradual sampling procedure which allowed to involve adequate number of respondents and to collect data to the level of information saturation. The interviews were conducted by the principal investigator which enable familiarization, or in qualitative study with the so called “data immersion” for subsequent data collection, and analysis. Even though with the interest of time audio taped data transcriptions and translations were made by other experienced individuals, the accuracy of the transcripts was continuously crosschecked against the audio recordings.

In addition, the use of grounded theory research approach helped to discover issues related to the problem in detail. Finally, to maintain the originality of the data, distinction was made between the respondents’ view and the researcher’s interpretations and also by involving respondents from different setting in order to maintain impartialities in opinions and viewpoints.

Overall, this research employed a mixed methods study design not only to address the research objectives systematically but also to generate comprehensive evidence from highly interlinked sources. And finally presenting the way how the design mix can take place in this particular study also indicates the methodological strength as well as the research findings and their implications (table 3).

3.7 Ethical conditions

The study received permission from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph). The approval from AAU was also accepted for conducting the study in Bahir Dar, Haromaya, Hawassa, and Jimma Universities. In addition, ethical review boards of University of Gondar (Protocol No. R/C/S/V/P 346/2015) and Mekelle University (Protocol No. ERC 0546/2014) have reviewed the proposal and gave additional ethical permissions to conduct the study. Furthermore, the review board of other regions, Amhara Regional Health Bureau and Oromia Regional Health Bureau (Protocol No. BEFO/AHBT/1-8/3789) reviewed the proposal and provided ethical permissions for conducting the study.

Similarly, support letter was obtained from the Federal Ministry of Health, Human Resources Directorate to the regional and city administration health bureaus involved in the study. However, because of the nature of the data, they were obtained from the study organizations; partly secondary (attrition data) and the available organizational data through recode review, individual consent was not required for reviewing the records. Nevertheless, the data were used anonymously and kept confidential at all times, analyzed, and reported in aggregate.

For medical students and qualitative studies, informed consent was obtained from each study participant at the time of the study. No personal identification was used either to collect or analyze the data. Findings of the study were reported in aggregate in case of quantitative and anonymously for qualitative. All the audio taped data were erased after data transcription and translation was completed.

Table 3 Summary of the research design, Ethiopia, Feb 2015- Sep 2015

Characteristics	Objective #1	Objective #2	Objective #3	Objective #4 and 5
Settings	6RHBs and 2 city administrations	7Medical schools	6 medical schools	RHBs, medical schools and NGOs and private
Study design	Physician workforce organizational survey	Medical education workforce survey	Questionnaires/Survey	Qualitative study
Study population and data	Retrospective data from RHBs	Retrospective data from medical schools	Medical students	Respondents
Sampling	All data of six years	All data of six years	5 th and 6 th year medical students	Purposeful sampling (43 interviews)
Data collection/ source of data	Record review	Record review	Self -administered	Semi-structured Interview
Data analysis	Poisson regression	Survival analysis	Binary logistic regression	Constant comparative analysis
Results reporting	Tables and figures	Tables and figures	Tables and figures	Narration and graphic illustration
Design mix at	Discussion, conclusion and recommendation			

CHAPTER 4. RESULTS

This section provides the findings of the research section by section. The findings are organized into five main sections: the first section focuses on physician distribution and attrition in the public health sector. The second emphasizes on the findings of medical education workforce. And the third discusses results from the medical students' survey and the qualitative study findings will be presented in the last two sections.

4.1. Physician distribution and attrition in the public health sector of Ethiopia (Paper I)

During the study there were 2,300 medical doctors in five regions and two city administrations in six years of observations. Of these, 1,747 were actively working medical doctors (during the study), and the remaining 553 were attritions (536 medical doctors were moved out of their duty stations, 11 died, and 6 retired).

4.1.1. Actively working physicians

Of the total 1,747 actively working physicians, the majority 80.5% were males and the remaining 19.5% were female physicians. Younger physicians who were born after 1985 accounted for half of the actively working physician workforce 889 (50.9%), whereas those who were born between 1975-1985 years were 493 (28.2%) and those born prior to 1975 were only 216 (12.4%).

Regarding their work experience, 997 (57%) had less than 3 years of work experience, 334 (19.12%) had 3 to 6 years, 167 (9.56%) had 7 to 10 years, 54 (3%) had 11 to 14 years, and 161 (9.22%) had ≥ 15 years of work experience.

In terms of educational levels, GPs constituted the majority of 1471 (84.2%) the actively working physician workforce, while specialists/sub-specialists constituted, less than one fifth 276 (15.8%). During the study (excluding SNNPR and Tigray), about 279 (19.6%) of physicians have been sent for long term medical training in different areas of clinical specialty/sub-specialties. In terms of service provision in health care settings, more than half, 979 (56.04%) of the physicians were serving in general hospitals, 474 (27.13%) were serving in referral hospitals and few proportion 275 (15.74%) were serving in district hospitals (Table 4).

Table 4 Distribution of actively working physicians and those who moved out of their duty stations, Sep 2009 to July 2015

Variables	Characteristics	Actively working (n=1747) NO(%)	Turnover events(n=536) NO(%)
Gender	Male	1407(80.5)	411 (76.68)
	Female	340(19.5)	125(23.32)
Date of birth	After 1985	889(50.9)	206(38.43)
	1975 -1985	493(28.2)	187(34.89)
	Before 1975	216(12.4)	86(16.04)
	Missing	149(8.5)*	57(10.63)*
Service years	Less than 3	997(57.1)	330(61.57)
	3- 6	334(19.1)	91(16.98)
	7-10	167(9.6)	32(5.97)
	11-14	54(3.1)	20(3.73)
	>= 15	161(9.2)	43(8.02)
Educational Level	GPs	1471(84.2)	413(77.05)
	Sub/specialists	276(15.8)	123(22.95)
Settings Hospitals	Referral	474(27.13)	103(19.22)
	General	979(56.04)	289(53.92)
	District	275(15.74)	92(17.16)
	Missing		52 (9.70)
Position during the study ^a	On duty	1220(81.4)	
	On training	279(19.6)	
	Total	1499(100)	

^aExcluding SNNPR and Tigray, * proportion

Table 5 shows physician distribution across the regions in three categories (GPs, residents/fellows and specialists/subspecialists). Of the total, about 696 (39.8%) physicians were working in Oromia region, followed by 422 (24.1%) in Amhara, 330 (18.9%) in Addis Ababa. However, in small regions like Harari and Dire Dawa city administration the number of physicians were relatively small. Compared to big regions (Oromia and Amhara) and the proportion of specialists and sub-specialists who were serving in the capital Addis Ababa and Dire Dawa city administrations were higher. In Addis Ababa, it was about more than one fourth, 88 (26.7%) and in Dire Dawa more than one third, 11 (37.9%) of the physician workforce. In big regions like Oromia and Amhara the proportion of specialists/sub-specialists were very low: in Amhara only 59 (13.9%), in Oromia about 80 (11.5%) and in SNNPR about 22 (14.6%) of the actively working physician workforce. In addition, 139 (19.9%) of physician workforce in Oromia, 77 (19.2) in Amhara, 57 (17.3%) in Addis Ababa city administration have been sent for further long term medical training in various clinical specialty/sub-specialty areas.

Table 5 Physician distributions in various regions using three main categories, 2015

Setting	GPs		Residents/fellows		Sub/specialists		Total	
	NO	%	NO	%	NO	%	NO	%
Oromia	477	68.5	139	19.9	80	11.5	696	39.8
Amhara	286	67.8	77	18.2	59	13.9	422	24.1
Addis Ababa	185	56.1	57	17.3	88	26.7	330	18.9
SNNPR	151		-	-	22	14.6	173	9.9
Tigray	64		-	-	11	14.6	75	4.3
Dire Dawa	18		-	-	11	37.9	29	1.7
Harari	15		2		5	22.5	22	1.3
Total	1196	68.5			276	15.8	1747	100

(- Information was unavailable)

4.1.2. Characteristics of physician turnover

Table 4 above showed the characteristics physician turnover. Of the total 553 attrition cases, 536 (96.93%) physicians were left from their duty stations for various reasons. However, the remaining 17(3.07%) physicians were departed because of death and retirement. Of the total 536 turnover events, the majority 411(76.68%) were males and the remaining 125 (23.3%) were females.

Younger physicians (born after 1985) were accounted for 206 (38.43%) of the turnover cases, those who were born between 1975-1985 years were 187 (34.9%), and those who were born before 1975 years were 86(16%).

In terms of work experience, 330(61.57%) had less than three years of work experiences, 91(16.98%) had 3-6 years, 32(5.97%) had 7-10 years, 20 (3.73%) had 11-14 years and 43(8.0%) had greater or equal to 15 years work experiences. Likewise, compared to specialists 123 (22.95%), GPs were contributed for the highest proportion of the turnover, 413 (77.05%). In terms of health service delivery settings, the majority 289 (53.92%) were left from the general hospitals, 103(19.22%) from referral hospitals, and remaining 92(17.16%) were left from the district hospitals. The study also examined the reasons of attritions in the study settings. Information was available for about 391 (70.7%) of the cases; however, information was limited for the remaining 162 (29.29%) events. Of 391 of the cases, 228 (41.23%) were resigned from their duty station for personal reasons, 139 (25.14%) were transferred, 11 (1.99%) were died, 6 (1.08%) were deployed to other settings, and 6 (1.08%) retired, one dismissed because of discipline. However, of the remaining 162(29.29%) events, some 92 (16.64%) left without letting the office know their absence, 57 (10.31%) did not specify their reasons and 13 (2.35%) of the cases were not recognized by the HR departments (Figure 10).

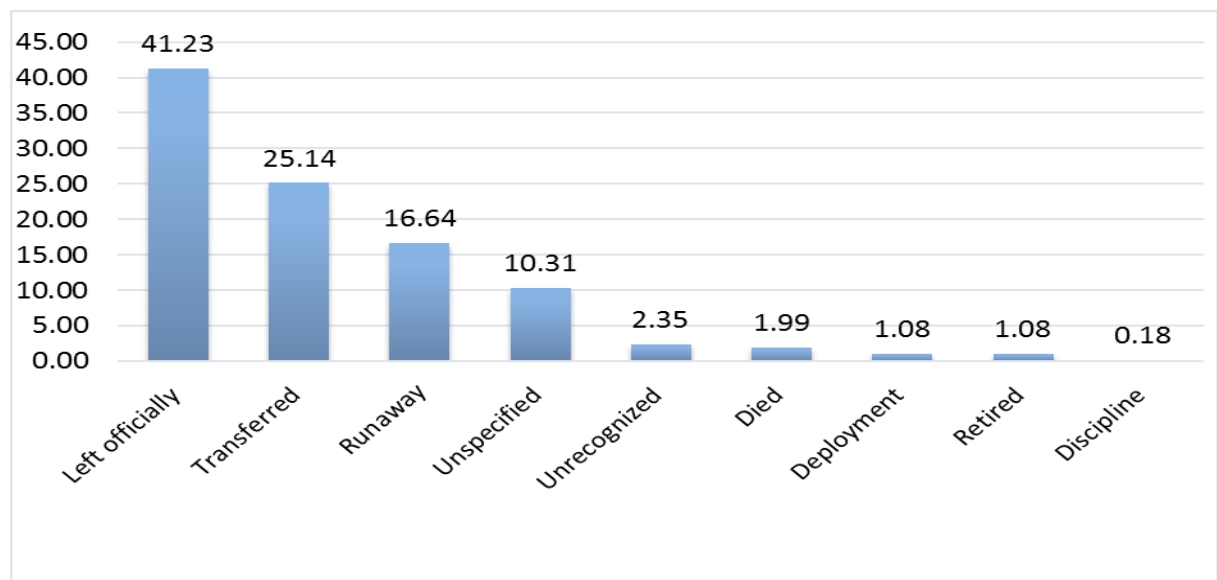


Figure 10 Turnover types for those who left their appointment (in %) Sep.2009 to July 2015

Figure 11 compares the proportion of specialists/sub-specialists who were actively working with those who moved out of their duty stations across the regions. Of the total 536 physicians who left from their duty stations, 123 (22.9%) were specialists. Of these 123 specialists, 45(43.27%) of the turnover cases were in Amhara region, 38 (30.16%) in AACAHB, 27(25.23%) in Oromia, 6(35.29%) in Tigray, 4 (44.44%) in Harari and 3(21.43%) in Dire Dawa city administrations.

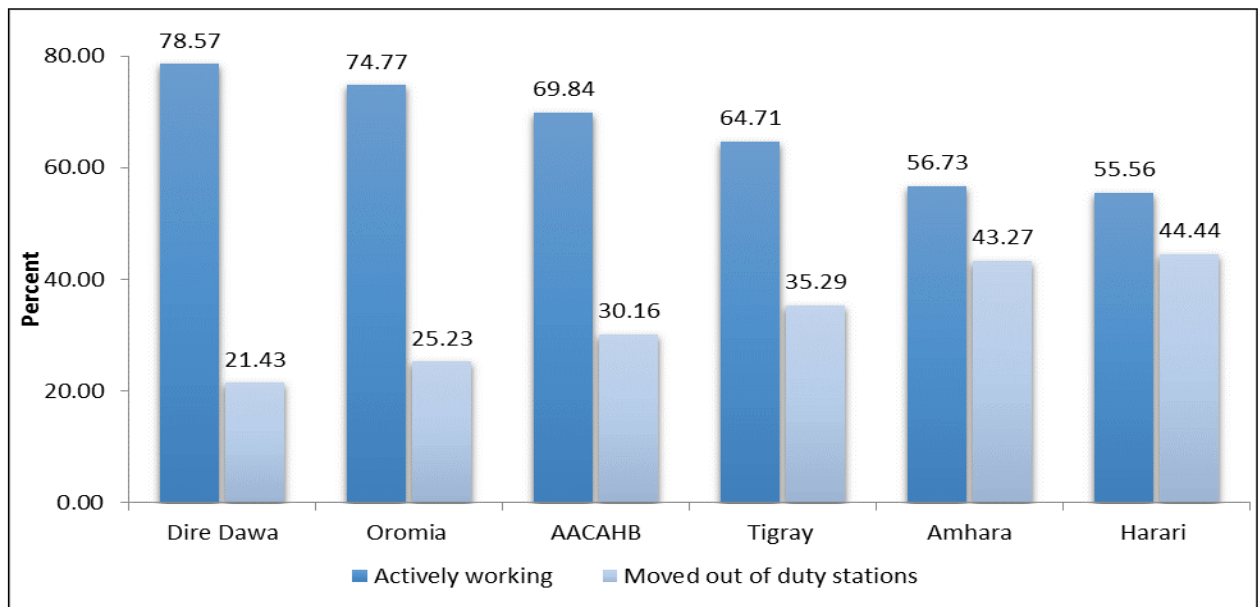


Figure 11 Comparisons between specialists who were actively working (during the study) and those who moved out of their duty stations across the regions, Sep. 2009 to July 2009

4.1.3. Repeated turnover events

Of the total 536 turnover events, 131(24.44%) had more than one appointments. Of these repeated cases, 99 (75.57%) were males and the remaining were females. In terms of educational levels, initially 111 (84.73%) were GPs and the remaining 20 (15.27%) were specialists. However, in the second appointments the educational level improved in some of the cases and the number of specialists were increased from 20 to 31 (25.10%) and the number of GPs decreased to 98 (74.81%). In addition, 93 (71.0%) of the physicians went to similar health care settings (to the public health sector), whereas 37 (29.0%) went to the academic positions (medical schools). Of those who went to public health sector, 54 (58.06%) went to the same regions, while 39 (41.9%) left to other regions (most, 82.05% came to the capital, Addis Ababa). Furthermore, the length of stay in between the destinations came down from one destination to next; initially, the mean duration of stay was 3.4 years (95% CI: 2.66, 4.10), for next destination and it became 1.33 years

(95% CI: 1.12, 1.55) and then it declined to 1.01year (95% CI: 0.20, 1.20). Despite being small in the number whereabouts of physicians in the second destination there were 3 physicians shift to the academia, 8 to other regions (5 to different regions, 2 to Addis Ababa and 3 moved out of Addis), and 3 to the same regions. However, no information was found for about 20 of the cases with in the study settings (Table 6).

Table 6 Characteristics of repeated turnover events, Sep. 2009- July 2015

Variables	Characteristics	Frequency	Percent
Gender	Males	99	75.57
	Females	32	24.43
Educational Level	GPs	111	84.73
	Specialists	20	15.27
Duration of stay in years	Mean	3.4 (95%CI: 2.66, 4.10)	
Fist destination(n=131)			
Settings	Clinical	93	70.99
	Academic	37	29.01
Educational levels	GPs	98	74.81
	Specialists	31	25.19
Place moved (n=93)	To same region	54	58.06
	To different regions	39	41.94
Form different regions (n=39)	To Addis Ababa	32	82.05
	Another region	7	17.95
Duration of stay in years	Mean	1.33 (95%CI:1.12, 1.55)	
Second destination(n=31)			
Settings	Clinical	8	
	Academic	3	
	Unknown	20	
Place moved	To same region	3	
	To different regions	5	
Form different regions (n=5)	To Addis Ababa	2	
	Out of Addis Ababa	3	
Duration of stay in years	Mean	1.01 (95%CI:0.20, 1.20)	

4.1.4. Factors associated with physician turnover

Univariate analyses showed the presence of significant ($\alpha < 0.05$) association between physician turnover and their gender, birth year, health service delivery settings and geographical locations. The Poisson regression model revealed that female physicians were 1.4 times more likely (IRR= 1.44; 95% CI: 1.14, 1.81) to move out from their duty stations compared to their counterparts.

On the other hand, as the age of physicians increased the incidence of physician turnover decreased; the incidence of turnover among physicians born between 1975- 1985 was 37% (IRR= 0.63; 95% CI: 0.51, 0.79) lower compared to those who were born after 1985. Likewise, the likelihood of turnover among physicians born prior to 1975 was 76% (IRR= 0.24; 95% CI: 0.17, 0.34) lower compared to those who were born after 1985.

Table 7 the association of different characteristics of physician with turnover: using Poisson regression model between Sep. 2009 and July 2015

Variable	Category	IRR	SE	P-value	95%CI	
					Lower	Upper
Gender	Male(Ref.)					
	Females	1.44	0.17	0.002	1.14	1.81
Date of Birth	Later 1985(Ref.)					
	1975 -1985	0.63	0.07	0.000	0.51	0.79
	Before 1975	0.24	0.04	0.000	0.17	0.34
Educational level	Specialist/sub(Ref.)					
	GPs	1.31	0.19	0.062	0.99	1.75
Settings	Referral hospital (Ref.)					
	General hospital	1.39	0.18	0.008	1.08	1.78
	District hospital	2.14	0.33	0.000	1.59	2.89
Regional Location	Addis Ababa(Ref)					
	Amhara	2.01	0.31	0.000	1.49	2.73
	Dire Dawa	1.05	0.50	0.90	0.41	2.68
	Harari	0.75	0.38	0.57	0.27	2.04
	Oromia	1.10	0.17	0.53	0.82	1.48
	Tigray	0.60	0.18	0.10	0.34	1.10

Ref= reference group

In terms of educational levels, GPs had a 31% increased incidence of turnover compared to specialists/sub-specialists (IRR= 1.31; 95% CI: 0.99, 1.75), the CI is marginal not statistically significant (P=0.062). In addition, turnover variations were observed between health service delivery settings. Compared to physicians working in referral hospitals, those working in the general hospitals were 1.39 times more likely to move out (IRR=1.39; 95% CI: 1.08, 1.78) from their duty station. Similarly, physicians working in district hospitals had more than two fold increased chance of turnover compared with those working in the referral hospitals (IRR=2.14; 95% CI: 1.59, 2.89). Regarding the turnover risk of physicians across the regions, compared to the capital Addis Ababa, the incidence of physician migration was two times higher in Amhara region (IRR=2.01; 95%CI: 1.49, 2.73), however no statistical significant association has been observed for the remaining regions and city administration (P>0.05) (Table 7).

4.2. Medical education workforce distribution and turnover (Paper II)

During the observation period of the study, between September 2009 and June 2015, there were a total of 1,258 faculty physicians in seven medical schools. A total of 6,670.5 physician-years of observation were analyzed for the study period, 198 (15.7%) observations were completed and the remaining 1,060 (84.3%) were censored. The average turnover rate is about 29.7 per 1,000 physician-years of observations.

4.2.1. Characteristics of actively working faculty physician workforce

Of the total 1,060 observations (actively working faculty physicians during the study), the majority 877 (82.8%) were males and the remaining 182 (17.2%) were female physicians. Younger physicians who were born after 1985 accounted for nearly half of the faculty physician workforce 501 (47.3%), while those born prior to 1975 were only less than twenty percent, 207 (19.5%). In terms of work experience, 461 (43.5%) had worked for less than three years, while 335 (31.6%) had served the medical schools between three to six years. Whereas only very few proportion 74 (6.9%) had worked for 15 or more years.

Regarding the educational levels, General practitioners (GPs) constituted 61.7% of the actively working academic physician workforce, while specialists/ subspecialists constituted only 38.3%. The study has also revealed that lecturers/junior faculties constituted the large majority, 61.4%, while associate and full professors represent only 4.2% and less than one percent of the teaching physician workforce respectively (Table 8).

Table 8 Characteristics of actively working and faculty physician turnover rates

Variable	Characteristics	Actively working (n=1060) No(%)	Turnover rates (n=198) No(%)
Gender	Male	877 (82.8)	177 (20.1)
	Female	183(17.2)	21(11.53)
Date of birth	Prior to 1975	207(19.5)	54(26.08)
	1975-1985	338(31.9)	99(29.28)
	After1985	501(47.3)	35(6.98)
Service years	Less than 3	461(43.5)	65(14.1)
	3-6	335(31.6)	84(25.1)
	7-10	152(14.3)	22(14.5)
	11-14	32(3.0)	9(28.1)
	>=15	74(6.9)	17(23.0)
Educational level	GPs	653(61.7)	55(8.4)
	Sub/specialists	407(38.3)	143(35.1)
Academic rank	Lecturers	651(61.4)	55(8.4)
	Assistant Prof.	354(33.4)	134(37.9)
	Associate Prof	45(4.2)	7(15.6)
	Full Professors	10(0.9)	2(20)
Medical school	AAU	320 (30.2)	66(20.6)
	JU	120(11.3)	52 (43.3)
	HwU	116(11.0)	22(19.0)
	HU	65(6.1)	18(27.7)
	UOG	164(15.1)	17(10.4)
	BDU	115(10.9)	17(14.8)
	MU	160(15.1)	6(3.8)

The number of physicians varied across the medical schools involved in the study. AAU had 320 (30.2%) of the total medical education workforce followed by University of Gondar 164(15.5%), and Mekelle 160(15.1%). In terms of level of specialty, 59.2% the teaching physician workforce at AAU were specialists/sub-specialists, 30.7% were residents, and only 10% were general practitioners.

Table 9 Distribution of actively working faculty physicians in three main categories: GPs, residents, specialists/sub-specialists in Ethiopia, Feb–Jun 2015

Medical school	GPs		Residents/Fellows		Sub/specialists		Total	
	No	%	No	%	No	%	NO	%
AAU	32	10.0	98	30.7	190	59.2	320	30.2
UOG	34	20.7	87	53.1	43	26.2	164	15.5
MU	23	14.4	85	53.1	52	32.5	160	15.1
JU	15	12.5	46	38.3	59	49.2	120	11.3
HwU	24	20.7	49	42.2	43	37.1	116	11.0
BDU	64	55.6	41	35.6	10	8.7	115	10.9
HU	26	40	29	44.6	10	15.4	65	6.1
Total	218	100	435	100	407	100	1060	100

On the other hand, the proportions of specialists/sub-specialists in the other universities ranged from 49.2% in Jimma to below 20% in Haromaya and Bahir Dar. Similarly, significant proportions of the medical education workforce were also continuing their education (either in the residency or fellowship programs) (Table 9).

The study also examined the distribution of medical education workforce across the common clinical specialty areas (internal medicine, surgery, obstetrics and gynecology, and pediatrics) (Figure 12). At AAU, the highest number of specialists/sub-specialists was observed in the area of surgery (39) and the least (7) were in pathology. In the area of obstetrics and gynecology the distribution ranges from 10 at AAU to only one at Bahir Dar and Haromaya. The two later medical schools did not also have a specialist in pediatrics and child health at the time of the study. Moreover, Haromaya medical school did not have specialists of pathology and ophthalmology. Mekelle medical school did not also have a specialist in the field of ophthalmology at the time of the study.

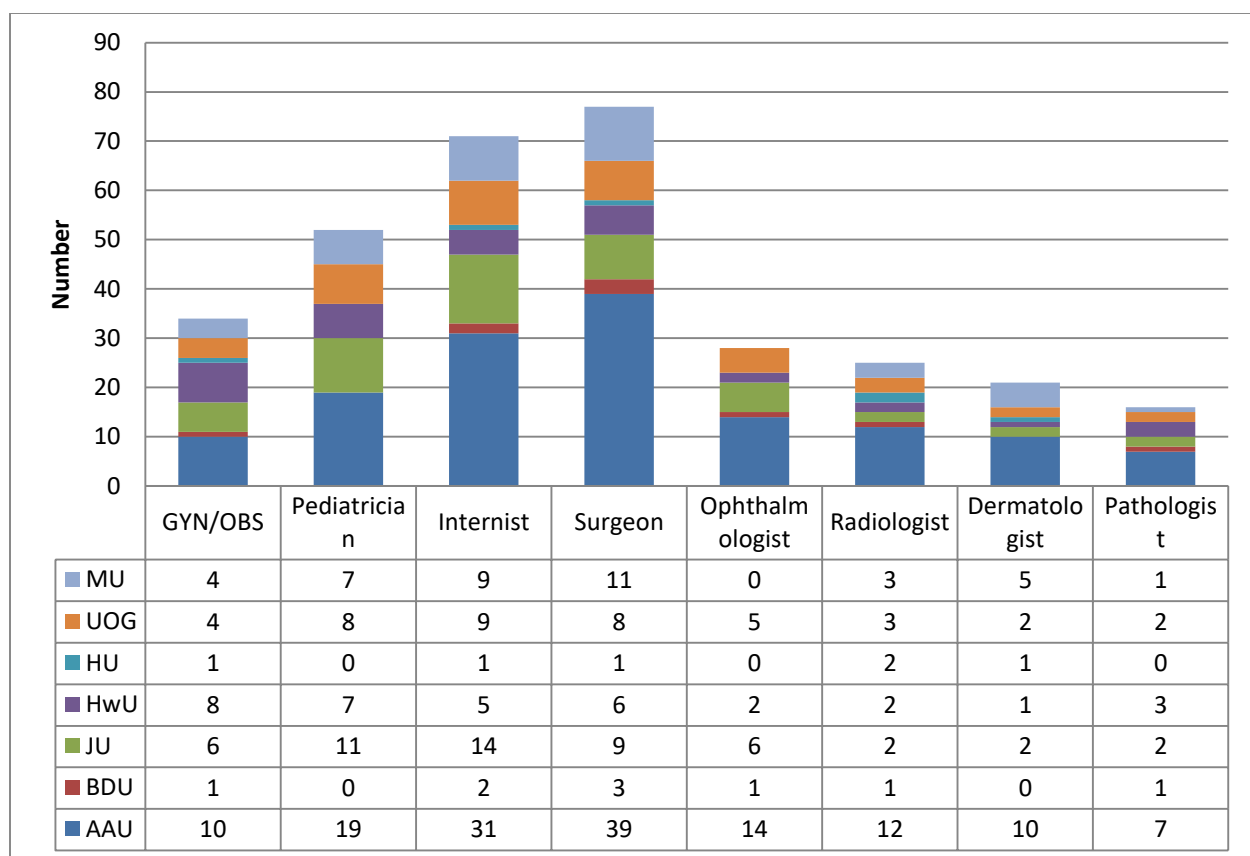


Figure 12 Distribution of faculty physicians by different areas of specialty category across the medical schools between Feb-June 2015

4.2.2. Characteristics of faculty physicians' turnover

Table 8 above showed the overall turnover rates among studied medical schools. It indicates that turnover rate is much higher among males (20.1%) than females (11.5%). On average, turnover rate among physicians born during 1975-1985 was 29.3%, while the same rate was only 7% for those physicians whose birthdates were after 1985.

On the other hand, the rate of turnover did not also show uniformity across service years. It is much higher among those who worked as faculty physician for the duration of 3-6 and 11-14 years, which is 25.1% and 28.1% respectively, whereas, the turnover rate among physicians who served their respective medical schools for less than three and between 7-10 years is nearly identical, 14.1% and 14.5% respectively.

Turnover rate was much higher among specialists/sub-specialists than GPs. On average, the turnover rate among specialists/sub-specialists was 35.1% whereas among GPs it was only 8.4%. Within academic ranks, more than twofold turnover rate was observed among assistant professors 37.9% compared with associate professors and full professors, 16.4%.

In addition, the turnover rate also varied among study medical schools. The highest turnover rate was observed in Jimma Medical School (43.3%), followed by Haromaya (27.7%). Whereas, much lower turnover rate was observed in Mekelle and University of Gondar medical schools, which was only 3.8% and 10.4% respectively. In addition, the study also examined the procedures used for the move out from the studied medical schools. Some obtained official permission while others did it without the permission. Official permission through legal release was secured among 46.2% of the out migrant physicians whereas 41.7% of them did it without even informing their respective medical schools. And only very few proportion departed through inevitable events, such as retirement (3%) and death (0.5%) (Figure 13).

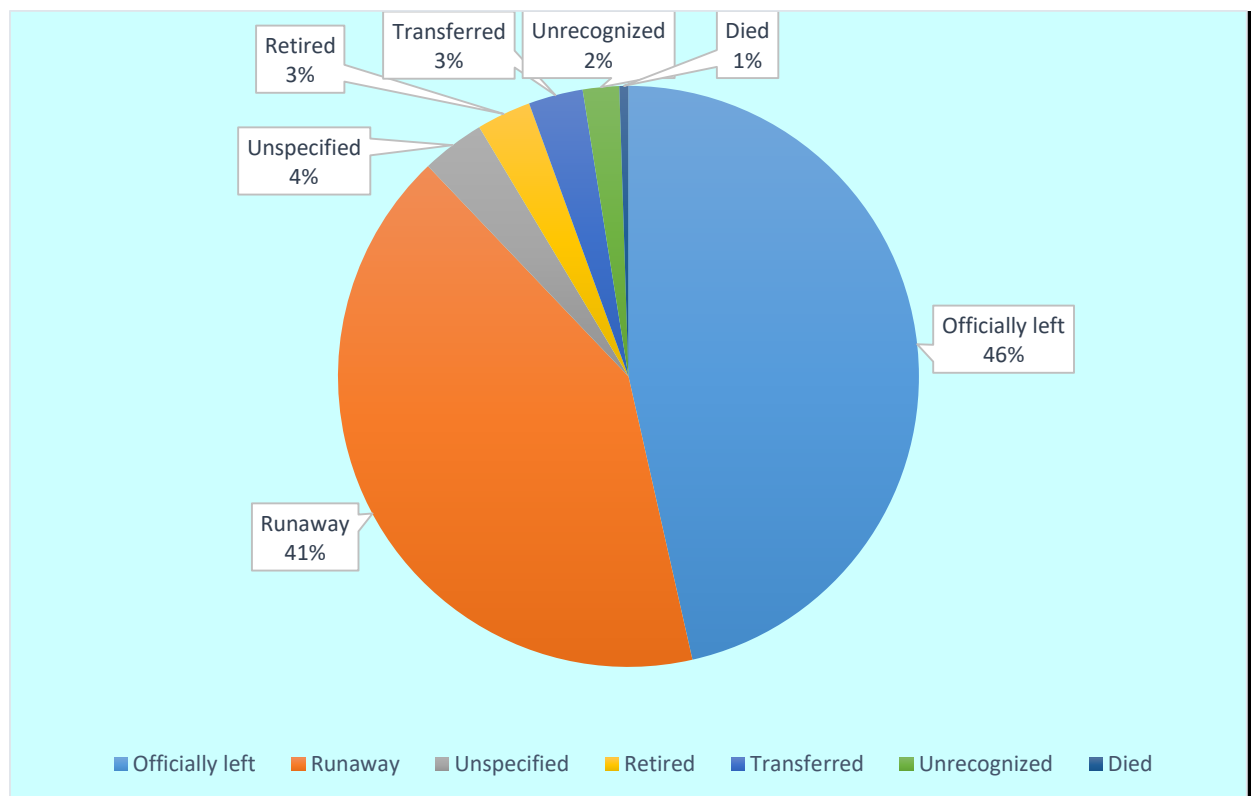


Figure 13 Turnover types for faculty physicians who left their appointment, Sep.2009 - Jul 2015

4.2.3. Findings from the survival analysis

Figure 14 illustrates a turnover pattern for academic physicians working as lecturers, assistant professors, and associate and full professors after adjusting for educational levels. The Log-rank test is statistically significant ($X^2=24$; $P<0.001$), that means turnover rate varies between the academic ranks. Turnover rate was higher among the middle rank (assistant professors), followed by the lower rank (lecturers) and the highest academic ranks associate and full professors. The sharp increase in turnover pattern among assistant professors was noticeable in the first ten years of service. In fact, the attrition rate has been fast in the early years of service for all academic ranks portrayed in Figure 14. The turnover curve was steadily increasing for physicians working for 10 to 27 years and labeled off for those working between 27 to 38 years indicating very low turnover rate among these group. In the end, the line goes up vertically which indicate a natural separation for those who reached to the age of retirement.

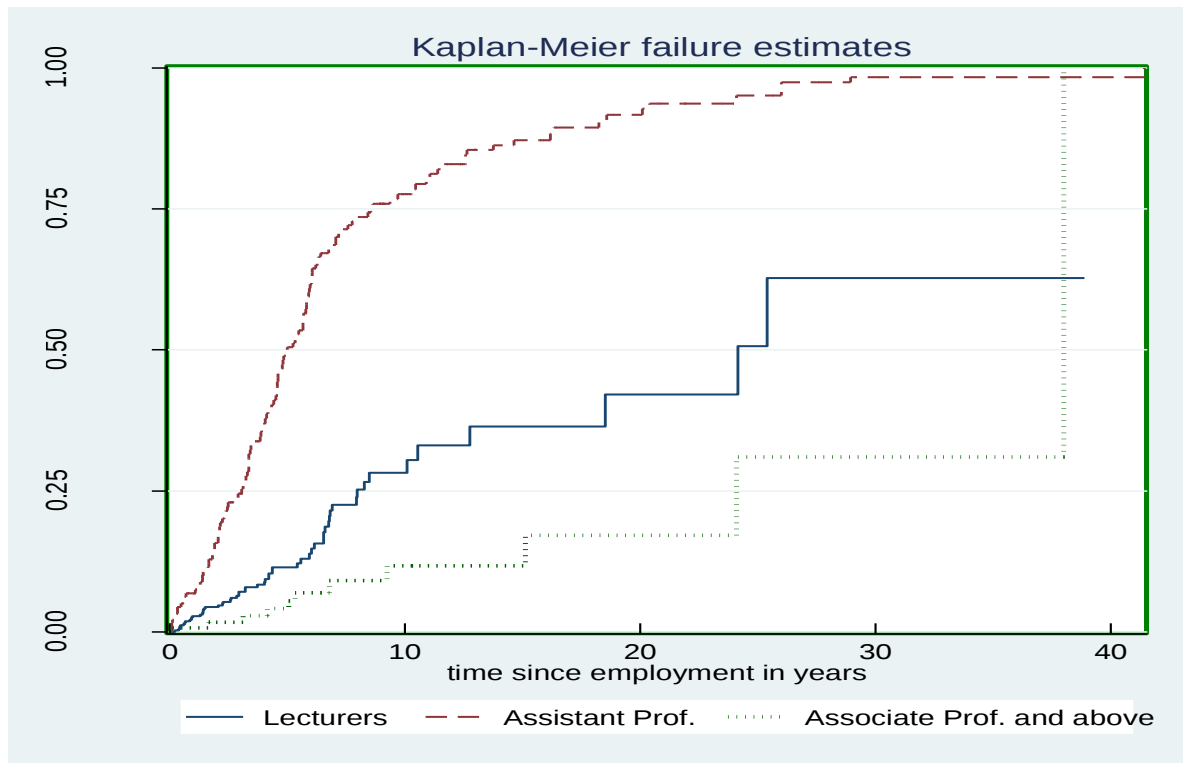


Figure 14 Kaplan-Meier failure estimate by academic rank adjusted for educational levels

Univariate analyses revealed statistically significant ($p < 0.05$) differences in the turnover rates of faculty physicians by their sex, birth year, educational level, academic rank, and the medical school groups. When multivariate Cox's proportional hazard model was fitted to identify factors associated with physician turnover after controlling other variables, no statistical significant difference was observed in the rate of turnover between males and females (AHR: 1.12; 95% CI: 0.71, 1.80). However, the model revealed that those who were born prior to 1975 had a 63% lower rate of turnover (AHR: 0.37; 95%CI: 0.20, 0.69) compared with physicians born after 1985.

Table 10 Cox proportional hazards model: risk factors for faculty physician turnover, Sep 2009 and June 2015

Variables	Category	AHR	SE	P-value	95% CI	
					LL	UL
Gender	Males (Ref.)					
	Females	1.12	0.27	0.60	0.71	1.80
Date of birth	After 1985 (Ref.)					
	1975-1985	0.91	0.23	0.73	0.56	1.49
	Prior 1975	0.37	0.11	0.002	0.20	0.69
Academic rank	Lecturers (Ref.)					
	Asst. professors	1.03	0.24	0.89	0.66	1.61
	Associate and above	0.25	0.11	0.002	0.11	0.60
Medical Schools	AAU (Ref.)					
	BDU	1.12	0.34	0.70	0.62	2.04
	UOG	0.46	0.14	0.01	0.25	0.84
	HU	1.25	0.37	0.44	0.70	2.24
	HwU	0.84	0.23	0.54	0.49	1.45
	JU	1.66	0.36	0.02	1.08	2.55
	MU	0.16	0.07	0.00	0.06	0.41

Ref: Reference group; SE: Standard error; CI: Confidence interval; LL: Lower limit; UL: Upper limit

No statistical significant difference in the rate of physician turnover was revealed between those born during 1975-1985 and the reference group, who were born after 1985 ($P > 0.05$). Physicians with the academic rank of associate professors and above were also associated with a 75% lower (AHR: 0.25; 95%CI: 0.11, 0.60) rate of turnover compared with lecturers but not for assistant professors compared with the reference group, lecturers ($P > 0.05$). With regards to differences in

the risk of turnover across medical schools, physicians working in Jimma had 1.66 times increased rate of turnover compared with the rate for those at AAU (AHR: 1.66; 95%CI: 1.08, 2.55). On the other hand, physicians in Mekelle had an 84% decreased risk of turnover and those at the University of Gondar had a 54% decreased risk of turnover compared with the reference group, AAU with the following values (AHR: 0.16; 95%CI: 0.06, 0.41) and (AHR: 0.46; 95%CI: 0.25, 0.84), respectively. However, in the risk of physician turnover in the remaining medical schools (Bahir Dar, Haromaya and Hawassa) was not statistically significantly different compared with the risk of turnover among physicians working in the Medical Faculty of Addis Ababa University ($P>0.05$) (Table 10).

4.3. Medical students' career choices and attitudes towards the role of medical instruction (Paper III)

4.3.1. Background characteristics of the study participants

Of the total study participants, 692(72.2%) were male medical students and the remaining 264 (27.6%) were females. The mean age of the study participants was 24 (SD 2.7) years, 546 (56.9%) were below the age of 25 years and 412 (43%) were older than or equal to 25 years. In terms of their academic years, 582 (60.7%) were clinical-II students and 373 (38.9%) were final year students, in internship. Of the total, 306 (31.9%) were attending medical education in Addis Ababa University, 215 (22.4%) in Haromaya, 158 (16.5%) in Mekelle, 132(13.5%) in Hawassa, and 100 (10.4%) in St. Paul's Millennium Medical College, and 38 (4%) in Dire Dawa University.

With regards to their place of birth nearly half, 445(46.4%) of the medical students were born in big towns, 130(13.6%) in zonal towns, 166(17.3%) in district capitals and 167 (17.4%) in rural villages. Regarding their geographic background, about a third, 350(36.5%) came from the capital city Addis Ababa, 159(16.6%) from Amhara Region, 159(16.6%) from Oromia, 102(10.6%) from Southern Nations and Nationalities People Region (SNNPR), 78(8.1%) from Tigray region and 86(9%) did not document the place of origin, while about one percent were from other regions. In addition, 201(21%) mothers of the medical students had no formal education however, more than half (51.2%) had secondary and above educational levels (Table 11).

Table 11 Background characteristics of the study participants, Ethiopia, 2015

Variables	Characteristics	No(%)	Variables	Characteristics	No (%)
		N=959			N=959
Gender	Males	694(72.4)	Region of origin	Addis Ababa	350(36.5)
	Females	265 (27.6)		Amhara	159(16.6)
Age	<25 years	546(56.9)		Oromia	159(16.6)
	>=25years	412(43.0)		SNNPR	102(10.6)
Academic year	C-2	582(60.7)		Tigray	78(8.1)
	Medical intern	373(38.9)		Dire Dawa	25(2.6)
Medical school	Addis Ababa	306(31.9)		Others	20(0.1)
	Haromaya	215(22.4)		Missing	86(9.0)
	Mekelle	158(16.5)	Level of education (of mother)	No formal education	201(21.0)
	Hawassa	132(13.8)		Primary	123(12.8)
	SPMMC	100(10.4)		Junior	116(12.1)
	Dire Dawa	38(4.0)		Secondary	132(13.8)
Place of birth	Big town	445(46.4)		Diploma/certificate	170(17.7)
	Zonal town	130(13.6)		Above diploma	189(19.7)
	District capital	166(17.3)			
	Rural villages	167(17.4)			

4.3.2. Medical students' career choice

Medical students were asked about their career choices and where they intend to practice medicine just after they graduate. The majority 672(70.1%) want to practice in clinical care settings, 162(16.9%) in the academic/research areas, 76(7.9%) in non-clinical (management) and 24(2.5%) in other settings.

Similarly, students were asked about the best setting they will be interested to work with: 430(44.8%) were interested to work in teaching hospitals, 165(17.2%) in the private settings, 152 (15.8%) in NGO (non-clinical), 104 (10.8%) in zonal hospitals, and 53(5.5%) in district hospitals.

In addition, they were asked about the place where they want to be assigned in their first practice after graduation; 387(40.4%) of the respondents want to begin in big cities (such as Addis Ababa, Hawassa, and Bahir Dar), 201(21.0%) in zonal towns, 83(8.7%) in small/district capitals, and 113 (11.8%) in under-served areas. Only 102 (10.6%) of the medical students want to serve anywhere within the country, and about 38 (4.0%) do not want to practice within the country at all (table 12).

Table 12 Medical students' career development plans in Ethiopia, 2015

Variable	Characteristics	Frequency	Percent
Career choice	Patient/Clinical care	672	70.1
	Academic/researcher	162	16.9
	Management	76	7.9
	Others	24	2.5
Setting	Academics/teaching hospitals	430	44.8
	Private -clinical	165	17.2
	NGO-non-clinical	152	15.8
	Zonal hospital	104	10.8
	District hospital	53	5.5
	Management- government	17	1.8
Place	Big cities	387	40.4
	Zonal towns	201	21.0
	Underserved	113	11.8
	Anywhere	102	10.6
	District capitals	83	8.7
	Do not want to practice	38	4.0
Reasons for career choice(multiple response)	Personal interest	840	87.59
	Income potential	403	42.02
	Professional prestige	287	29.93
	Availability of positions	178	18.56
	Influence from instructors	149	15.54
	Possibility of working abroad	133	13.87
	Duration of study	99	10.32

In this survey, medical students were asked to put their first three priority career choices in which they were interested with to continue their specialty training (Figure 15). Of the total, 441(46%) put internal medicine as their first priority of choice to specialize. The next choice was surgery being prioritized by 288(30.0%) of the students. Obstetrics and gynecology, and pediatrics and child health were prioritized as first choice by 65(6.78%), and 53(5.53%) of the medical students

respectively. As the second priority of choice surgery was chosen by 268(27.95%), pediatrics and child health by 123(12.8%), whereas obstetrics and gynecology by 118(12.3%) of the medical students. Obstetrics and gynecology was the third priority of choice for 183(19.1%) of the medical students. However, in the remaining specialties interest was below 10% (Figure15).

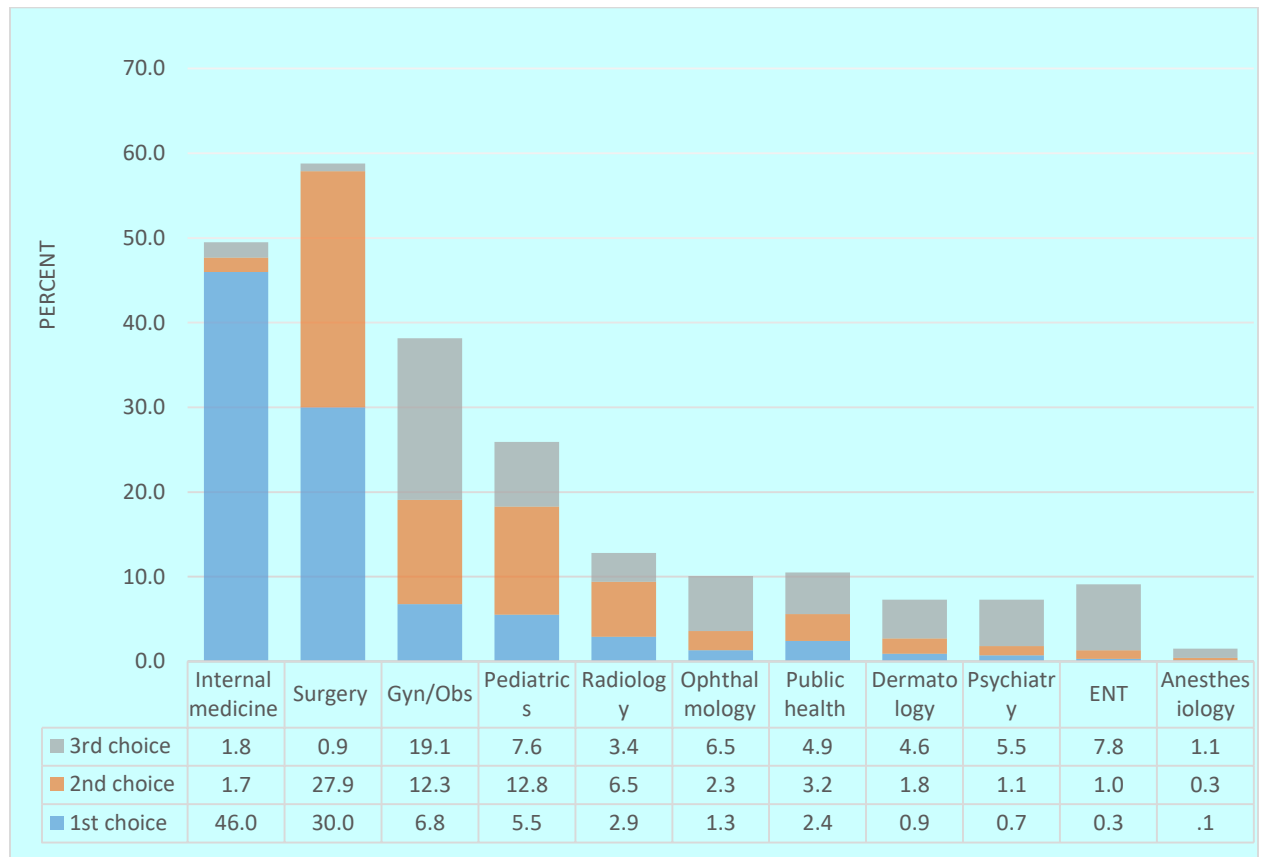


Figure 15 **The first three preference of choices to specialize by the medical students, 2015**

Personal interest 840(87.59%), income potential 403 (42.02%), professional prestige 287 (29.93%), availability of positions 178 (18.56%), influence from instructors 149(15.54%), possibility of working abroad 133(13.87%), and duration of training 99(10.32%) were mentioned by students as the main reasons behind their priority career choices (Table12).

4.3.3. Medical students' opinion about medical instruction

Table 13 shows medical students' attitudes and opinions towards their medical schools. On the first dimension- guidance in the field of medicine: the highest proportion (59.2%) of the medical students were strongly agreed on the positive role of medical instruction in their academic career and professional development. Similarly, the highest proportion were agreed (33.9% strongly

agreed and 27.1% agreed) on the role of medical instruction to get broader insight in different medical specialties. There was also positive opinion on the role of guidance to increase awareness on professional responsibilities (36.3% strongly agreed and 30.7% agreed).

With regards to professional development: the highest proportion were agreed (41.0% strongly agreed and 39.2% agreed) as their instructors could influence their interest towards a certain clinical specialty. Besides, a reasonable proportion of medical students strongly agreed/agreed on the fact that they made their instructors role models to acquire professional skills (78.9%) and to specialize in a particular medical specialty (76.3%).

Orientation in relation to research undertaking and ethics: nearly half of the medical students (18.2% strongly agree and 30.1% agree) agreed on the role of medical schools in giving special attention to ethical issues. However, nearly one third of the medical students were not in favor of the statement *'the medical school encourages creative thinking and new discoveries'*.

With regards to the teaching-learning process: the highest proportion agreed (30.3%) on their instructors' commitment to teach medical students, however nearly one fourth of them had neutral (26%) opinion about it. Similar level of agreement (33.7% agreed and 22.9% neutral) was observed on the way how their instructors provide feedbacks.

Moreover, concerning the role of medical schools towards within the country practice: the medical education has been playing limited role to influence students' interest to pursue their postgraduate training within the country, which was agreed only by (33.6%) and quite a lot (27.2%) had neutral opinion about it. Similarly, on inspiring them towards an area that the country has shortages of specialists were agreed by (34.9%) but considerable number of them were neutral (28.9%). On rural practice, highest proportion had neutral (34.1%) stand towards the role of their medical schools in preparing the students to work in the rural/remote places of Ethiopia (Table 13).

Table 13 Medical students' opinion towards medical instructions

Statements on mentoring in field of medicine	NO	St. Dis. %	Dis. Agr %	N %	Agree %	St. Agr. %
I. Guidance in field of medicine and medical instruction: 730(76.1%)*						
1. Plays an important role on medical students' career choice	903	1.8	1.5	5.6	26.1	59.2
2. Supports to reduce stress experience to practice medicine	768	1.9	4	9.6	27.8	36.8
3. Supports medical students to get broader insight on various specialty areas	764	2.5	3.6	12.5	27.1	33.9
4. Increases medical students' awareness on professional responsibilities	711	2.1	3.2	8.1	30.7	36.3
II. Professional development: 882(92%)*						
1. Mentoring stimulates medical students' interest towards a certain clinical specialty	908	1.3	2.3	10.9	39.2	41
2. Instructors serve as role model to obtain the required professional skills	912	1.9	2.4	12.1	39.4	39.3
3. Instructors serve as a role model to specialize in a particular clinical specialty	900	1.9	2.7	13	40.8	35.5
III. Orientation on research undertaking and ethics: 853(88.9%)*						
1. The medical school gives special attention on ethical issues	902	4.9	13.3	27.4	30.1	18.2
2. Instruction stimulate students' interest towards research oriented careers	880	3.9	8.9	26	32.3	20.8
3. Teaching-learning process encourages creative thinking and new discovery	911	3.9	8.3	22.8	36.9	23
IV. The teaching- learning process: 823(85.8%)*						
1. Instructors commit their time and energy on a regular bases	899	7	19.6	26	30.3	10.8
2. Provide feedback in constructive and caring manner	894	8.7	16.6	22.9	33.7	11.4
3. Non-judgmental and accepts individual differences	897	9.6	17.4	25.7	28.8	12.1
4. Mentoring help to enhance clinical skills and professionalism	882	5.3	9.9	21.2	35.8	19.8
5. Instructors assist medical students in developing professional identity	886	6.2	13.1	26.1	33.3	13.8
V. Orientation towards in country practice: 871(90.8%)*						
1. The process encourages the students' interest in pursuing their career within country	900	4.9	10.4	27.2	33.6	17.7
2. Pursuing a career in an areas that country has shortages of qualified physicians	896	4.1	10.3	28.9	34.9	15.2
3. Encourages medical students to work in the rural/distant part of the country	882	5.2	15	34.1	23.1	14.5

* Composite score, St.Dis= strongly disagree; Dis= disagree; N= Neutral; St. Agr= strongly agree

4.3.4. Factors associated with medical students' intention to work in rural locations

Table 14, shows findings from univariate and binary logistic regression analysis. In the univariate analysis gender, place of birth, parent's educational level (father's), medical school and the desire to serve within the country were statistically significantly ($p < 0.05$) associated with medical students' preference to work in rural and remote locations. However, when binary logistic regression model was fitted to identify the potential predictor variables after controlling other variables, no statistical significant difference was observed in work place preference by parents' education ($p > 0.05$).

However, a significantly increased odds (AOR:1.55; 95%CI; 1.05,2.28) of intention to work in rural and remote places was found among male medical students than females. Similarly, those who were born in rural places have a significantly increased odds (AOR:1.52; 95%CI; 1.03, 2.25) of intention to work in rural and remote areas than those who were born in urban areas. Furthermore, there was significantly increased odds of intention to work in rural and remote places among the medical students of Addis Ababa University (AOR: 2.34, 95%CI; 1.64, 3.34) than the students in the other medical schools. And also the odds of intention to work in rural and remote places among those who had the desire to serve within the country was higher than their counterparts (AOR: 1.62, 95%CI; 1.18, 2.25).

4.3.5. Medical students' intention to work abroad

In the study, most medical students had the intention to leave abroad with various degrees. About 341(35.6%) intended to leave abroad sometimes, often 153(16%), always 123(12.8%) and only 87(9.1 %) were intended seldom (Figure 16). In addition, the most frequently cited reasons behind their intention to work abroad were better quality of training in foreign universities 428(44.6%), anticipated job satisfaction 155(16.2%), better way of life 346 (36.1%), have already emigrated family/relatives 53(5.5%), more opportunities 247(25.8%), anticipated better working environment 296(30.9%), political reasons 93(9.7%), and peer pressure 11(1.1%) (Figure 17).

Table 14 Factors associated with medical students' intention to work in rural areas of Ethiopia

Variables		Intended place		OR (95% CI)	AOR (95% CI)
		Rural n=397	Urban n= 387		
Gender	Female	89	129	1	1
	Male	308	258	1.73(1.26, 2.38)*	1.55(1.05, 2.28)*
Age in years	>25	177	168	1	1
	<=25	219	219	0.95(0.71, 1.26)	0.96(0.68, 1.35)
Place of birth	Urban	215	262	1	1
	Rural	162	106	1.86(1.37, 2.52)**	1.52(1.03, 2.25)*
Parent education (of father)	>=9 th	219	250	1	1
	<=8 th	160	117	1.56(1.16, 2.10)*	1.14 (0.77, 1.69)
Year of study	6 th	145	166	1	1
	Fifth (C-II)	251	221	1.3(0.98, 1.73)	1.10 (0.77, 1.55)
Medical school	Others	243	283	1	1
	AAU	152	100	1.77(1.31, 2.40)**	2.34(1.64, 3.34)**
Desire to serve within the country	No	161	198	1	1
	Yes	221	172	1.58(1.19, 2.11)**	1.62(1.18, 2.25)*
Intention to leave	High	249	263	1	1
	Low	119	106	0.84(0.62, 1.15)	0.91(0.64,1.30)

****p<0.001, *p<0.05; OR: Odds ratio, AOR: Adjusted odds ratio; CI: confidence interval, AAU: Addis Ababa university**

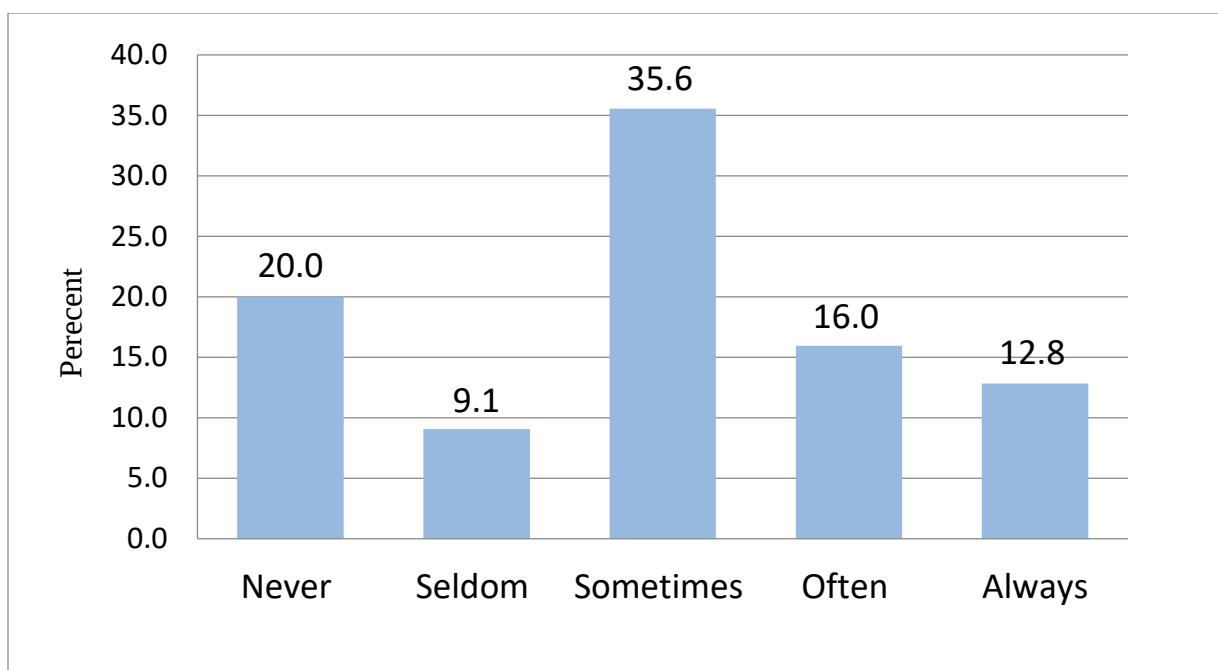


Figure 16 Medical students' intention to leave abroad, 2015

4.3.6. Factors associated with medical students' intention to work abroad

Table 15 shows results from univariate and binary logistic regression models. In the univariate logistic regression model parent education (of father), year of study, medical school and the desire to serve the country showed statistical significant associations ($p < 0.05$) with the medical students' intention to work abroad.

However, when binary logistic regression model was fitted to identify the potential predictor variables after controlling other variables, no statistical significant difference was observed by parents' education ($p > 0.05$). However, a significantly increased odds (AOR: 1.55, 95%CI; 1.10, 2.20) of intention to work abroad was found among final year students than the junior ones.

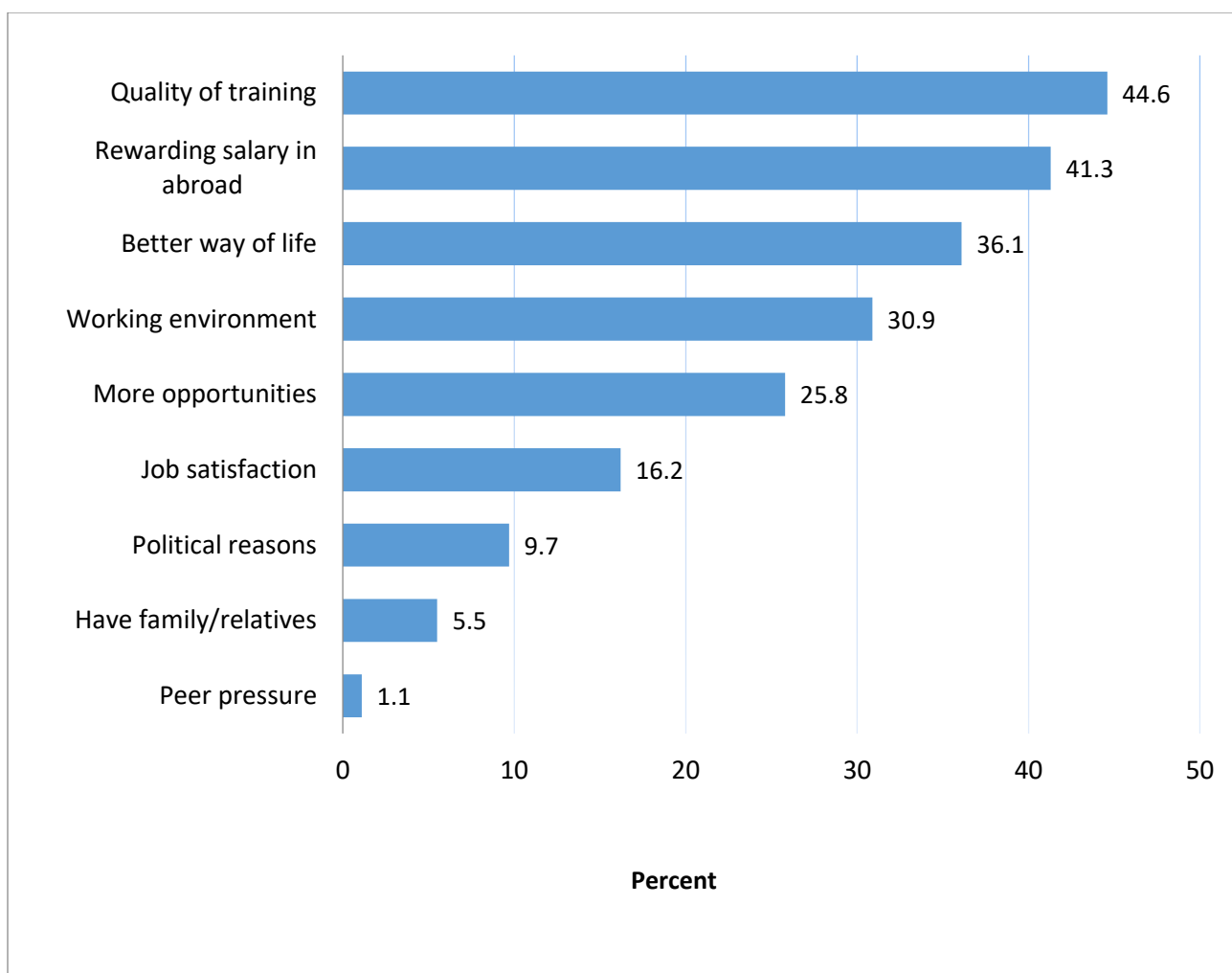


Figure 17 Medical students' reasons for the intention to leave abroad in percent, 2015

Furthermore, there was significantly increased odds of intention to work abroad among the medical students of Addis Ababa University (AOR: 1.61, 95%CI; 1.127, 2.30) than the students in the other medical schools. And also the odds of intention to work abroad among those who had less desire to serve within the country was higher than their counterparts (AOR: 1.61, 95%CI; 1.13, 2.3).

Table 15 Binary logistic regression analysis for factors associated with medical students' intention to work abroad, 2015

Variables		P-value	OR (95% CI)	P-value	AOR (95% CI)
Gender	Male		1		1
	Female	0.58	0.92(0.67, 1.25)	0.36	0.84(0.58,1.22)
Age in years	>25		1		1
	<=25	0.54	0.91(0.69, 1.22)	0.52	0.89 (0.64, 1.25)
Place of birth	Rural		1		1
	Urban	0.88	0.98(0.72, 1.32)	0.09	1.39(0.95, 2.05)
Father's education	>=8 th grade		1		1
	>=9 th grade	0.04	1.36(1.01, 1.83)	0.07	1.43 (0.98, 2.09)
Year of study	5 th year		1		1
	Final year	0.01	1.50(1.11, 2.03)	0.01*	1.55 (1.10,2.20)
Medical school	Others		1		1
	AAU	0.00	1.65(1.20, 2.27)	0.01*	1.61(1.27, 2.30)
Emigrant family	No		1		1
	Yes	0.13	0.80(0.56, 1.07)	0.35	0.85(0.61,1.19)
Desire to serve the country	Yes		1		1
	No	0.00	2.71(2.01, 3.65)	0.00**	2.58(1.87, 3.55)

**P<0.001, *P<0.05; OR: odds ratio, AOR: Adjusted odds ratio; CI: confidence interval

4.4. Findings from the qualitative study

This section presents the qualitative research findings using the following categories and subcategories which emerged: 1) physician workforce migration: extent of migration, reasons for migration which include economic, non-economic and external, as well as physician retention 2) massive physician production: reasons for medical education expansion, preparation on medical education expansion, the consequences of rapid medical education expansion, and massive production as HRH strategy; 3) role of the system on HRH development: cooperation on HRH development, HRH strategy and planning, system's capacity, and institutional continuity for HRH development.

Demographic characteristics of the study participants

This study involved 43 purposefully selected individuals with varied representation of age, academic levels, years of experience within the country's health care delivery system in senior positions both in academics, public and private sector as well as in local and international NGOs (Table 16).

4.5. Physician workforce migration and potential solutions (Paper V)

Almost all participants agreed on the extent of physician migration (emigration and out migration) and its contribution to skilled human resource shortages in the country:

“We may sometimes undermine the brain drain but it is too much. If I tell you my experience, from the medical doctors whom I have learnt with, without exaggerating around 20 out of 58 are now in America or Europe or somewhere else. So this is not negligible, I think it contributes a lot”. (Ac17)

The potential destinations for emigration are US, Europe and other African countries. In addition, working for NGOs and the private sector were mentioned for out migrants:

One of the respondents expressed his view by saying:

“If he fails to go to America, he will join NGOs. Exactly! The existing environment allows this, if not he will set up his own private practice”. (Ac17)

4.5.1. Reasons for physicians out/emigration

The most frequently cited reasons for out migration and emigration were financial as well as non-financial. Some respondents underscored on both economic/non-economic but some mentioned the presence of opportunities and value shift as additional factors which is the third factor.

Table 16 Characteristics of the study participants 2015

Characteristics	Variable	NO
Gender	Male	39
	Female	4
Date of Birth	After 1980	12
	1981-1970	16
	1969-1950	8
	before 1950	7
Educational level	BSc	3
	GPs	5
	MD+SP/SS*	25
	MPH	4
	PhD	1
	MD+MPH	5
Affiliation	Academics (full professors)	21(4)
	Public health (senior position)	16 (5)
	Private (researchers in HRH)	6 (2)
Service years	<=10	17
	11 to 20	10
	>20	16

MD: medical doctor, SP: Specialist, SS: sub-specialist

1. Economic factors

The respondents emphasized on the importance of economic factors for high health worker migration from the public health sector, especially physicians. Regarding issues related to economic factors the amount of pay, uniformity of payment and benefits for the same job, means of retention and recognition, and relativity (in comparison with academic levels, job engaged, and with other sectors) were raised. One respondent stated:

“Most leave their job and their country to a place where these basic needs are fulfilled easily. When he goes to America and gets a new job, he will buy a new car and a house on loan, it will also be easy to rent a house. (Ac21); Our incentive is low, our salary is also low, the things that we are provided are also low”. (Gov7)

Relative to long term education: One of the sub-specialists said:

“Economically, there is no change after a long term and exhaustive training”. (Ac8) However, one specialist argued that: “I do not agree with the idea of some, who say, ‘we have spent seven and half years in school so that we have to be paid more... I do not care about the society’, no! I struggle to change such perceptions ...”. (Ac11)

Uniformity: The respondents were concerned with lack of uniformity in incentives across the regions:

*“...it is difficult to consider it [*incentives] across the regions. It is different here, in Tigray region because the duty payment schemes are like the old style. The new one has not been implemented yet. I do not know the reason behind. (Ac15); yes, there are requests. They usually raise their concern on duty payment because there is no nationwide system that takes this in to consideration”. (Gov4)*

Satisfaction: financial incentives were mentioned as main sources of dissatisfaction among physicians working in the public health sector. A respondent said:

*“...when we compare the long years of education & work load we have, the payment is not satisfactory. (Ac5); I observed when they [*physicians] collect their salary. GPs get frustrated because of their expectation”. (Gov4)*

Relativity: respondents compared their salary scale with other sector workers within the country and with other African countries and also internationally. They compared it with similar professionals who have similar qualifications working in Europe and America. One of the respondents said:

*“No one living here in Harar will compare himself/herself with the one living in here [*a regional town] rather he compares with the one in Addis [* the capital] or NGO. He will go and join NGOs”. (Gov8)*

“The government is trying its best but if you compare it with other government organizations like revenue and customs authority, their junior staffs are better paid in comparison to a highly trained specialist”. (Ac6)

In-kind incentives: participants described that incentives should not be limited to just pay rise. In-kind incentives such as mortgage for buying an automobile and receiving land free of lease tax for constructing houses were mentioned repeatedly than pay rise because of the economic inflation following the pay rise for civil servants in the country. One respondent stated:

“What bothers us is building a house, we can’t think of buying a land for building a house and owning vehicle for transport ... “. (Gov11)

“As per their duration of service, the government will give them land to build a house. Majority of the specialists built their own house and started families and so they are living here. There has been loan for purchasing an automobile (Ac14); Regarding mortgage, I agree that it is the best strategy which works in Kenya and America. They cannot go anywhere without paying their loan”. (Ac7)

However, one respondent from the private stressed the fact that there should be an organized system which can manage the issue of mortgage in order not to let either the system or the physician to be stressed:

“For mortgage, first there should be a capacity to manage and established system to facilitate the process with banks and it needs some form of warranty. Second, it has to consider the individual’s paying capacity, to avoid unnecessary stress. Instead, we have to treat individuals separately for example giving priority for those who have served for a long time as opposed to the newly assigned ones.... At the end there should be a means to evaluate the effectiveness of such strategies”. (Pr5)

2. Non-economic reasons for migration

Most respondents mentioned the role of non-financial factors that contributed for physician migration such as *lack of recognition, training opportunity and giving value for experts.*

Lack of recognition: the study found the role of recognition and the attention given for it. Proper recognition enhances physician's feeling of belongingness and their contribution in the system:

*“It is not a matter of money, never, not money. First, there should be recognition that means making the physicians part of a problem and a solution of their own country; showing as there are concerns, and care for them; providing equivalent salary and career structure according to their experience; if further training is needed we have to look for ways to make them happen, and creating conducive research environment in the work place. Making them part of a problem and as well as the solution, otherwise ignoring them [*physicians], may aggravate the migration”.* (Ac2)

*“...appropriate recognition is very important and it is the main reason for migration from the public health system. There is issues which is called such highly intellectual people should not be sensitive for it[*recognition], but in all round we [*inclusive of the speaker] are human beings [*needs recognition] ”.* (Pr1)

Lack of relative recognition: some respondents who have been working in the public health sector cited better recognition have been given by the government for diaspora physicians as opposed to the local physicians. The following statements represent the respondents' view:

“The diasporas are the ones who live better lives than the locals. But they are given land free of lease charge for building a house. There may be a reason but for me the reason was not clear still now...Here you are working with the community and for the community by sharing both the good and the bad. For you, nothing has been given or done to But the country favors those who have money”. (Ac20)

However, a few participants working outside the public health sector, particularly in the private ignored the issue by saying: *“...that is politics”.* (Pr1, Pr5)

On the other hand, most study participants but not all agreed that lack of proper recognition arises from lack of integration in the system not from lack of resources in the system. One of the senior government officials said that

“...for recognition, in terms of resources there is no problem. The main problem is lack of time and we are busy with urgent activities, thus we haven’t paid attention on this area”.
(Gov5)

Another respondent stated: “There is a problem of integration, if not lack of resources”. (Ac19)

Having a recognition mechanism: majority of the respondents suggested there should be a recognition mechanism to those who contributed to the community and the country:

“if I have served for 10 years, why can’t I buy an automobile duty free? The Ethiopian government must be wise. Uganda and Ghana did this”. (Ac16)

“... asking for land is a question of citizenship, you have to ask to get the land given for diaspora. Such things should be done in order to retain physicians; it is not a big thing”.
(Ac19)

Not valuing expertise: many participants repeatedly said that the value given for expertise in the public sector in general is very low.

*“No I don’t think this [*turnover] bothers them. I don’t think that our expertise will be valued in the public organizations. Take Jimma University as an example, nobody cares! Why don’t you go to hell? I’m telling you the truth. Because I have never heard from senior or mid-level leaders saying why do people leave....? I’ve seen so many valuable experts leaving, and nobody cares. Even sometimes you find them doing something that facilitates your move. Therefore, I don’t think it bothers them”.* (Ac17)

“There is no system which makes the staff to stay longer. Here I have served for about 8 years, there are many challenges. Many people stay here till they finish their compulsory service or to finish the projects they had started... The attrition rate is high... There is no one who asks why?”. (Ac5)

Work environment: participants repeatedly stated the public sector work environment is not conducive. These include *the setup, leadership appointment and competency, political assignment, frequent turnover of leadership and partiality related to one’s ethnic background.* These were mentioned to play a critical role for physician migration. The following statements illustrate the existing work environment:

“Sometimes there are hospital CEOs who do not understand the sector. There are some who do not have leadership quality and common sense. The sector is unique that needs special leadership skills which demands understanding the context”. (Gov1)

“...the one you see as a CEO today in the hospital, you may find him in the health bureau next month ...and then after two months you may find him in NGO. Thus, you cannot make your system stable...”. (Gov8)

When it comes to the competency of individuals appointed in different positions of the system:

“... It is very shameful. The people who are leading the health system and those who are assigned at the directorate level, t are too young, not well qualified and even their attitude is not good...due to lack of competent appointee in that position, they are not capable of doing ...”. (Ac17)

In the system, the political involvement and partiality related to ethnic background were also cited as important source of dissatisfaction in the work environment:

*"I do not want to talk too much about it. It is not only because of political appointments. If you see the people in the structure, the top officials are political appointees of the region including lower officials. It has to be from X [*by naming] ethnic group, if you see them up there”. (Ac8)*

On the contrary it was said: *“There are no other components like what we hear in other areas like ethnic issues... Here the dean came from the school head position. He knows the expectation of the position and has a lot of experiences”. (Ac11)*

Respondents suggest the need for appointing appropriate person, managerial integrity, and proper incentive to reduce leadership turnover and the leadership appointment should follow the country's law:

“One of the reasons for peoples' lack of interest to come to the responsibility of leadership is that there is no incentive in the leadership except dispute. That is why the right people do not take the leadership position.... Secondly, for political appointees, their main issue is not the loyalty they have for the institution rather to the political system... (Ac1)”. (Ac1)

“Managerial integrity is very crucial, nothing is critically required than the managerial integrity and good leadership. It is not, like the one who sits at the top and gives orders ...; rather what is needed is one who see the issue/problems in the eyes of the affected (Ac19)”

3. External factors

In addition to the financial and non-financial factors, this study found the third factor which we called it, external factor. It has two important subcategories which interplay between the financial and non-financial factors, and migration. Value shift and opportunities (internal and external).

Value shift: participants emphasized on the value changes which have emerged in the community, the system and the country as a whole. This has been influencing professionals to act in favor of making more money and meet their personal needs. The following quotations represent respondents view:

“...but now by hook or crook, “bring the money” for this we all are contributing, the society, the system (Ac19); in such circumstance expecting different attitude from the physicians, may be very difficult, ‘the one who says I have been to provide service’. (Ac3); ... the values I had when I graduated and today are different... the society judges you based on your money and what you have... As a result, such value shift has diffused from the society to the professionals”. (Ac20)

The value given for money has also been influencing career choice and human resource development. Regarding this issue one of the respondents stated:

“Yes! The generation has changed. When we send them for education like surgery, we used to tell them to sub-specialize on next ones like cardiology. However, their main question is how much I will earn then?” (Ac16)

Most of the study participants agreed on the effect of value shift on physicians’ perception and inclination towards money, but few argued that there are physicians who give priority for the clinical practice:

“In fact there may be some, who value money. But there are so many more who put their profession and service first. Even the private wing has such problems and some physicians refuse to work in the private wing because of such compliant, which says ‘they work for making money’. (Go15)

“There is competition so one has to be competent. In addition, to cover his living cost, he has to put extra effort. There are individuals who are inclined to work in private by showing their face here but the majority do not do so”. (Ac2)

Opportunities: the other external factor is the presence of local and international opportunities, which satisfies the financial and non-financial demands identified as important pulling factors from the public sector:

“In addition to the incentive, there is no conducive work environment. Instead, the private sector setup is more attractive and gives satisfaction to provide service, which is more important than the payment. So, they move from the public to the private after finishing their compulsory service”. (Ac12)

International and regional opportunities also are pulling physicians for similar purposes:

“You know what, the current people are using the existing opportunity... I shouldn't negatively comment on it (Ac18); if one fails to go to America, one will join NGOs. Exactly! The existing environment allows. Or one will start his own private practice”. (Ac17)

4.5.2. Physician retention

There are three most frequently cited reasons for the needs of physician retention. Firstly, the health workforce should continuously serve in the system for longer period of time. Secondly to have skilled professionals in the system; and thirdly, it helps to reduce the extent of migration:

“...preserving appropriate professional development, in health human resources the product you produced, of course should serve for next 30 to 40 years continuously...”. (Pr1)

“They (migrant) learnt in this country and people while they were on their job as junior physicians... then they will leave to other countries. So, Ethiopia will remain only with ‘ever green hands’- junior physicians”. (Ac17)

“... today the migration is high. Globally there is HRH shortage for the upcoming two to three decades. There is a need to take from us, Ethiopia/low- income countries”. (Pr1)

However, on retention mechanisms, there was disagreement between participants. Salary, duty payment, and hazard allowance were not mentioned as retention mechanisms especially by most physicians. Instead, the most frequently mentioned ones were poor retention efforts:

"I have a different idea on this. The professionals in the health sector work because of various reinforcements. It is not because of the retention mechanisms in the sector; it is difficult to say that there are retention mechanisms. I suggest that the government has to rethink this". (Ac5)

However, the opposite was mentioned from the system:

*"We always try to fulfill the standard for the specialist, if you see it at the national level but they do want to work [*in the public sector and rural places] although there are others who are very devoted". (Go3)*

For demanding skills, especially for specialists the regional health bureaus were using short term retention mechanisms. For example, in Amhara region:

"...at Sekota town, the town administration assigned 60000 ETB annually for a specialist, he got land for building house free of lease tax; he got also full month duty payment. Similarly, in Mehal-Meda town from the hospital, he got incentives...". (Go5)

4.5.3. Contributing factors for physician retention

The most repeatedly cited reasons for physician retention in the public health system were personal interest, starting their own family, economic and social stability and sense of belongingness.

Personal interest: some mentioned the interest they have towards their job/the workplace was one of the reasons which helped them to stay longer in a certain place:

"...personal interest makes a person to stay many years in the system; such as academic interest, the interest of teaching, doing research; and the feeling of contributing to the country. Personally, I believe that I have contributed to my country and to my people; I taught many students and did such things... I feel such things can make the person to stay longer, it is also related to 'patriotism'". (Ac1)

“...if you ask me why I have stayed here for a long period; to tell you the truth, I like teaching very much. I enjoy doing research, advising students.... basically, I like the job...”. (Ac17)

Starting one’s own family: starting family also contributed to stay stable in a certain place:

“...We have tried, but the chance of retaining those physicians who don’t have family is very low. If a surgeon or gynecologist is single/doesn’t have his/her own family, s/he can go anywhere and is difficult to retain such specialists”. (Go3)

Social and economic stability: sense of economic and social stability is an important factor to stay longer in a certain place:

“...for your surprise, I don’t want to leave. Even from the social life aspect, I feel stable. It is true if I go to Addis Ababa and join NGOs, I may get a lot of money within a short period of time but still I have the sense that I’m not economically disadvantaged...”. (Ac17)

Obligatory service schemes: has been working to keep professionals in the public health sector however the approach was not viewed as attractive. The following statements reflect the situations:

*“It is difficult to think about this issue [*about obligatory services schemes] because it pushes me to be in a dilemma. As an individual, my question is why my educational credential is denied. But as a citizen, a number of professionals serve in different areas; you may say that it is right”. (Ac20)*

“It is because of the compulsory service that we are working here. We are assigned without our will. We are doing our work-treating patients and teaching students because we respect our work. The majority of the people are doing like this even though it is difficult to generalize this for all...”. (Ac14)

Sense of belongingness: few respondents explained the positive role of sense of belongingness to stay longer in the system, especially towards their community. However, for most respondents there has been a lot of circumstances which affect such feelings. In addition, the existing medical education has also played limited role in preparing the students’ attitudes in this regard:

“Most of them consider this like their home. They want to work even if they do not get any other incentives. They see it like their home. (Ac10); ...if one is not having a sense of nationality, they will not have the spirit of providing service to their country. He wants to go somewhere else that makes him comfortable”. (Go8)

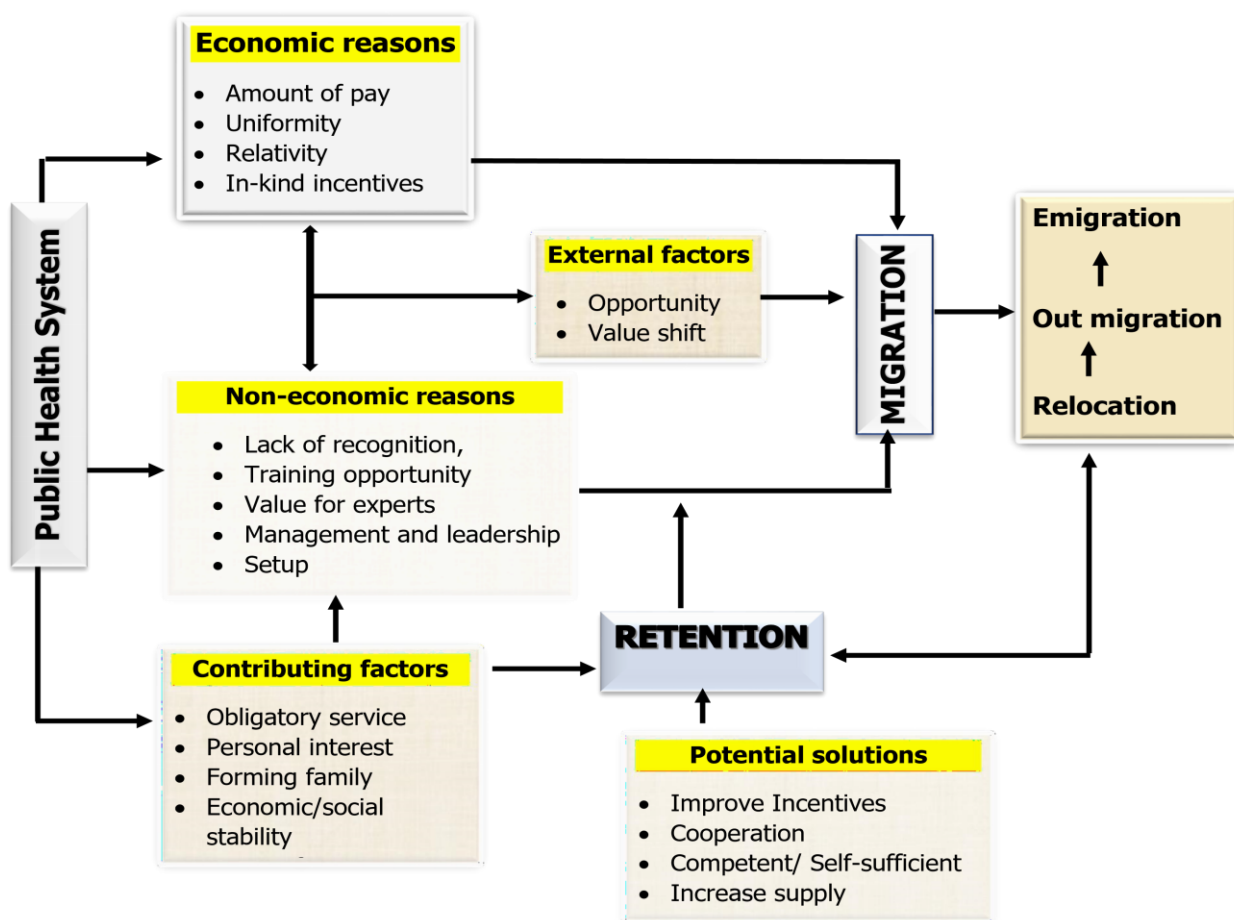


Figure 18 Potential reasons for physician migration from the public sector of Ethiopia

However, some respondents argued that such feeling has diminished among the people:

"...the sense that says ‘my own community, my own people’ is I think disappearing”. (Ac17)

*“...he has to be told to have such feelings [*sense of belongingness], he [*a medical doctor] is learning to serve this community and country, and we are working not because of having such feeling [* meaning sense of belongingness] which we were not told when we were at school, just may be by chance. Many more may want to work and live in US and Europe, but*

they may be very few who have sense of belongingness to work here; in Ethiopia nevertheless the current system has been affecting this badly, the sense of ownership and citizenship”.
(Ac20)

Figure 18 above illustrates the relationship between the main categories of migration: economic, non-economic and external. However, in the system individual factors and system’s response also play a role in physician workforce migration.

4.6. Health system response for physician workforce shortages (Paper IV)

4.6.1. Reasons for massive physician workforce production

The analysis identified two main reasons which forced the government for rapid expansion in medical education: the first one is high physician workforce demand in the country which is aggravated by high physician migration, low production of medical doctors and expansion in health care facilities. None of the study participants denied the high demand but they have concerns regarding the way the government went about increasing the numbers using *“the flooding strategy”*.

“In our region, there was extreme shortage of physicians when it is compared with the figure two years ago. Their number was not above 100 in the region two years ago. But now, there are increasing numbers of medical doctors who are coming to our region because of the government strategy that has started to produce a huge number of medical doctors...”. (Gov3)

The second cited reason was for gaining political advantage both internally and externally:

“High migration creates negative image for the country, so the government has to give coverage by flooding large number of medical doctors, to overcome the shortages”.
(Ac6)

“The government should address the health demand of the community. Otherwise, it puts the existence of the government into question..., unless it produces huge number of nurses, physicians, midwives and surgeons... ”. (Gov4)

4.6.2. Preparation on medical education expansion

The medical education expansion has to be done with due consideration of the system's capacity. Here two different but interlinked capacities were raised, the capacity of the medical schools to enroll large number of medical students, and the service demand to absorb the medical graduates and how to use them successfully:

"The major issue is the facility not the number of students; the number should take in to account the available resources such as number of classrooms, patient flows, medical teachers, library and IT facilities. If you accept 1000 students, side by side there are issues that have to be taken into consideration". (Ac11)

System's capacity: the second point of argument was on the system capacity or preparation made to employ or deploy the upcoming large number of graduates and how to use them effectively:

"...If the production of medical doctors continued like this, our existing system is not ready to accommodate, ...although there are 800 primary hospitals, 200 general hospitals and 50 specialized hospitals that will be soon built as it has been planned by the government... if so the system may not accommodate all...". (Ac6)

"...the system should rethink again how to absorb 3000 graduates each year and use them effectively. If that is not the case, it should devise a way where to take them, including the change in the medical school curricula for not considering the international market". (Pr3)

4.6.3. The consequences of rapid medical education expansion

Respondents were increasingly concerned about enrollment expansion at the existing medical schools and the opening of many new medical schools. They were more concerned about the consequences at the present, in the near future and in the long-run.

Current consequences: as most respondents from the academia explained massive enrollment in the medical schools have been affecting the quality of patient care. Some of the consequences are dissatisfaction, the violation of the patients' right and in some cases potential sources of treatment errors:

"How could you say that a mother should stand naked and give birth in front of 20 students? Even for the teachers how could you consider this as a good practice... as a teacher I myself do not agree, so that the policy violates patient right. (Ac11); If you go to wards on Tuesdays and Thursdays, there are a number of queues and mistreatments of patients. They may not come again due to the ill treatment they have received from our hospital". (Ac13)

Furthermore, it was noted that the approach has also been affecting many aspects of teaching-learning process. For instance, teacher – student relation, skill acquisition and teaching style

" Yes, there is a flood of students... there is dissatisfaction; you may not know some of these students by name due to their huge number and some of them come only for exam". (Ac15)

*"...the rooms become too suffocated during clinical round so that there is a change from 'bed side to tree side sessions' [*observed during the data collection in one of the prestigious medical school]". (Ac5)*

In addition, when it comes to the medical instructors, it caused workload, job dissatisfaction, and affects their motivation especially for those who want to work in the public sectors:

"Most of the time, the huge number of patients may not create frustration but the huge number of the students who flood to the university which create workload on medicine instructors ...those departments which have been teaching 60-100 students are now teaching about 300, so that, this caused the staff to raise quality issues, creates workload, and frustrations on the teachers". (Ac9)

Intermediate consequences: for most respondents, the current medical education approach produces medical graduates of low quality, incompetent and having low professional value. While delivering medical care:

"It is good to have more human resources that satisfy the needs but we have to think of the quality of our graduates; they should not commit mistakes while providing service". (Ac12)

“... for the coming generation we are producing medical doctors through flooding strategy, however, it is difficult to teach the value of medicine... they will leave without knowing why and what to do”. (Ac14)

Long- term consequences: anticipated to affect the system, graduates and the community. Most participants expect surplus in physician workforce, unemployment and pressure on the system in the long term:

“...flooding may seem a good strategy superficially but it is a dangerous strategy. It may put the country into crisis even if good physicians are being produced; they may not get jobs, it will be very difficult after investing a lot... this happened in Mexico once, in history, they flooded new medical doctors but their system could not absorb them”. (Ac17)

“... ‘speed, volume and quality’ should not go together at once. When you load the truck beyond its capacity, the truck can break down and cause damage to the public [used to explain the effect of flooding], it affects quality as well. The flooding is more than the country’s capacity (Pr5); as it happened to the other health care professionals, being unemployed for the physician workforce is going to be a reality very soon...”. (Ac3)*

In spite of the physician workforce shortage, during the study in Dire Dawa and Addis Ababa city administrations and to some extent in Tigray and Harari regions the demand for general practitioners are saturated. However, one of the government officials argued:

“... this is done based on the plan and policy direction, otherwise I do not believe that the government does this without any facts and research findings. The number and professional mixes are usually taken into consideration so that the human resources are capacitated based on the needs...”. (Gov3)

4.6.4. Flooding as HRH production strategy

In the study, most respondents have similar views on flooding as HRH preparation strategy. They viewed it as ‘forced’, ‘disastrous’ and ‘wrong’ strategy which can potentially lead the country to another crisis. The following statements illustrate the respondents’ opinions:

“There is no doubt that we have the shortage; and doing something to come out of this problem with in short time is correct. But the main question is, are we trying to satisfy

our human resources needs or taking steps which make us to commit another severe crisis?” (Pr1)

“...the government forces public universities to take a huge number of students at once without equipping them with the needed resource. That is a disaster. (Ac10); I am saying that the strategy by which we are trying to increase the numbers is ‘wrong’”. (Ac17)

However, few government officials have different opinions about the strategy though they admit the fact that it affects the quality. One of the government officials stated his opinion as follows:

“It may compromise quality, yes, it may. But, if you ask me about the system, yes! It is the right strategy. If you do not do this, you will not address the needs of the society”. (Gov4)

However, another respondent disagreed with the idea of merely increasing the number without the necessary medical skills:

“After making the number, number, numberso big, what if the number is not working? ... It has danger! As to me to tell you frankly, the strategy that compromises the quality for the sake of increasing the number will not be palatable as a citizen”. (Ac17)

4.7. The role of the system on HRH development

The system plays a critical role on HRH development. In response to this, the following subcategories have emerged. Subcategories such as cooperation, HRH strategy and planning, system’s capacity, institutional continuity, and the role of external influence.

4.7.1. Cooperation on HRH preparation

Although, all have been working for common goals which is to improve health service delivery, this study discovered the following: lack of mutual understanding and trust, co-operation between government, academics, professional associations and individual experts, and lastly the perception difference among the actors:

*“When they [*government officials] answer these questions [*HRH related] they do it by themselves or they may involve very few experts. They invite professional associations for the sake of formality; not for real. This is done for two reasons; first*

the policy makers create limited opportunity of participation for mutual understanding and problem solving using evidences, and second professional associations have also limited capacity ...” (Pr1)

“...in the system, the bureaucracy should not ignore physicians, from my experience I learned that physicians contribute more when they get involved...”. (Ac2)

In addition, partiality, lack of dialogue and mutual trust were also mentioned as contributing factors for the existing low cooperation:

*“Both [*government officials and medical professionals] have their own biases about one another which discourages dialogue to narrow the gap; they should be flexible to accommodate their differences. (Ac13); ...they [*professionals and the government] do not work closely; they do not work together, because they are skeptical to each other”. (Ac1)*

Some respondents are also concerned about the role of political ideology involvement in the professional and technical matters as potential source of dissatisfaction, limited professional involvement and lack of cooperation with the system. The following statements illustrate such views:

*“I have problem to judge on this specific issue [*political involvement] according to the Ethiopian law, the leadership position has to be assumed by members of the ruling political party is up to level of a minister. The positions below the minister must be filled with technocrats that may not be affiliated to any political party including the one in power. However, what is practically applied is not so... There might not be non-politician individuals who are fit for that position. The politicians may be the only people who have the privilege to get it ... (Ac16)*

“...the existing political elites lost trust on the educated group of the country. There is no mutual respect, sense of belongingness...”. (Ac3)

4.7.2. HRH strategy and plan

During the study, there was no written document on the HRH strategy or plan at the FMOH level or in the regional health bureaus. And we were told that the federal Ministry of Health will finalize

its revision very soon. However, respondents were concerned on the fact that the delay in drafting HRH strategy has been contributing for ineffective HRH development and unclear career path for health human resources. It is also cited as a reflection of the health sector's lack of capacity:

"We have to make things clearer through the human resource policy/ strategy, but still now we do not have that because we are working in urgency". (Pr1)

"I think first there should be a plan how many physicians do we want to have in the coming ten years in the system? What type of physicians do we want to have? GPs, surgeons, OBS/GYN specialists, cardiac surgeons and so on? Ok, we need all, if so, we have to prioritize. At the same time, we have to look at the need. Really, it needs detailed analysis and plan". (Ac2)

"...first let's have a short term plan, which is developed and reached into consensus at all level through strong discussion and evidence. And let's be committed not to change that direction while we implement it, either by internal or external pressure". (Pr5)

4.7.3. System's capacity for HRH development

This study has discovered that the system has limited capacity to execute its activities such as proper HRH planning, leadership, coordination and valuing expertise. In addition, such capacities are also important to properly work with internal and external stakeholders, to have sustainable institutional functionality and to evaluate the effectiveness of the intended strategies:

"... the ministry that lead the country's health system is staffed with very few prominent people and the vast majority, the so called officers are simply...". (Ac17)

"... things should go without losing their starting point... by focusing on their destination. For that, it needs experience...and when you do something for ten years, you provide a witness of ten years' experience, and when you do it for 20 years it is so...". (Pr3)

In the system, high attrition and low retention also contributed for the system's lack of human resource capacity for the functionality of the system:

*“Institutional memory is affected by attrition in human resources from the system... activities which require high skills are usually done by seconded individuals by UN system or NGOs [*advisors, consultants] and their role is not in decision making... when they got better opportunity, they just leave. Thus, there is lack of institutional continuity and the system prefers to start anything as new... ”. (Pr5)*

The role of external support to influence independent decisions was also mentioned as an additional factor:

*“Since our country is poor, they [*donors] run everything; important decisions are made in Washington, because most of the health programs are funded by the United States Agency for International Development (USAID)...However, here the strength of the ministry is very important. If they are wise enough, the sector can harmonize its plan with the donors’ interest or be able to resist to some programs which are not in its priorities and are prescribed by partners”. (Pr2)*

4.7.4. Institutional continuity for HRH development

Experienced respondents were concerned about the functional continuity of the system. It contributes for HRH strategic planning, and to have connected transitions when changes are made. However, in the public health sector things are short lived and there is no lesson learnt from the past:

“In HRH there should be clear strategic directions and reasons for that but we do not have that. Because things are short lived and there is no institutional memory. No one looked what had been done in the past. It is simply said, oh this is changed, that is changed but no one thinks how we can link with the previous and what was the debate, and the area of consensus, nobody asks questions in the system”. (Pr3)

“But, the system lacks sustainable functionality, if it is so there is continuous in and outflow monitoring mechanisms before the things worn out, ends in shortage or surplus”. (Pr5)

Another point which has been raised in relation to the system’s functionality was absence of uninterrupted professionalism in each political system:

“Practically, if we have clear central principle for community health needs, as the government changes, there should be a continuity of system with some modification but when we lose institutional continuity, we also lose our central principle and then we start fresh but we remain there, when you uncover things and comeback to the central principle, because the definitions and the principles might not be changed in each system”. (Pr2)

However, another respondent argued as it was challenging within the same government:

“...Institutional memory, let alone to have long term planning, the system cannot proceed on the issues that had been started by the successor of the former minister”. (Pr5)

4.8. Summary of the qualitative findings

Three main categories have emerged and the obvious ones within this research are physician migration, massive production and system related problems. In Ethiopia, physician workforce shortage is precipitated by high migration, low workforce production, high population growth and health demand in the community. On the other hand, physician migration is mainly caused by economic and non-economic factors as detailed in the above sections, in fact the non-financial factors can trigger the financial ones or vis-a-vis. External and internal opportunities and value shift play an intermediate role between the financial or non-economic factors or can be standalone as pulling factor.

Although, medical education needs longer time of preparation within the context of this study, rapid transition has been made from low production and severe physician workforce shortages to massive production. It is one of the main categories of the study. With regards to massive production, two distinct types of preparation were identified. The first one is that preparation needs to be made at the medical schools and the second one is the preparation that needs to be made in the system, at the time both were not sufficiently addressed.

In addition, population and health facility related factors including geography, infrastructure, workload as a result of health demand and workforce shortage can also push physicians from the public health sector to relocate within the public sector, or to join the private or NGO (out migration) or leave the country/emigration.

The aforementioned, lack of preparation at the medical schools has been affecting the teaching-learning process as well as the medical education workforce lack of job satisfaction due to workload and multiple roles. As we understood, the medical education workforce can have triple common roles which are teaching, patient care and private practice as par-timer/owner. In addition, massive admission has also been affecting the clinical care delivery or patient right and privacy (consequences at the present).

The second type of preparation which was needed in the health system is the capacity to absorb and use the graduates effectively. These days, in spite of massive admission to the medical schools (for instance in 2014/2015 academic year, there were more than 14000 medical students in thirty-three medical schools with less than 5% attrition rates) some respondents especially from the government system did not anticipate as the longstanding physician workforce shortage can end up in surplus in quantity. However, it resulted in shortage of the required skills to provide health care services as a result of the flooding strategy (which we called “*the upcoming crisis*”).

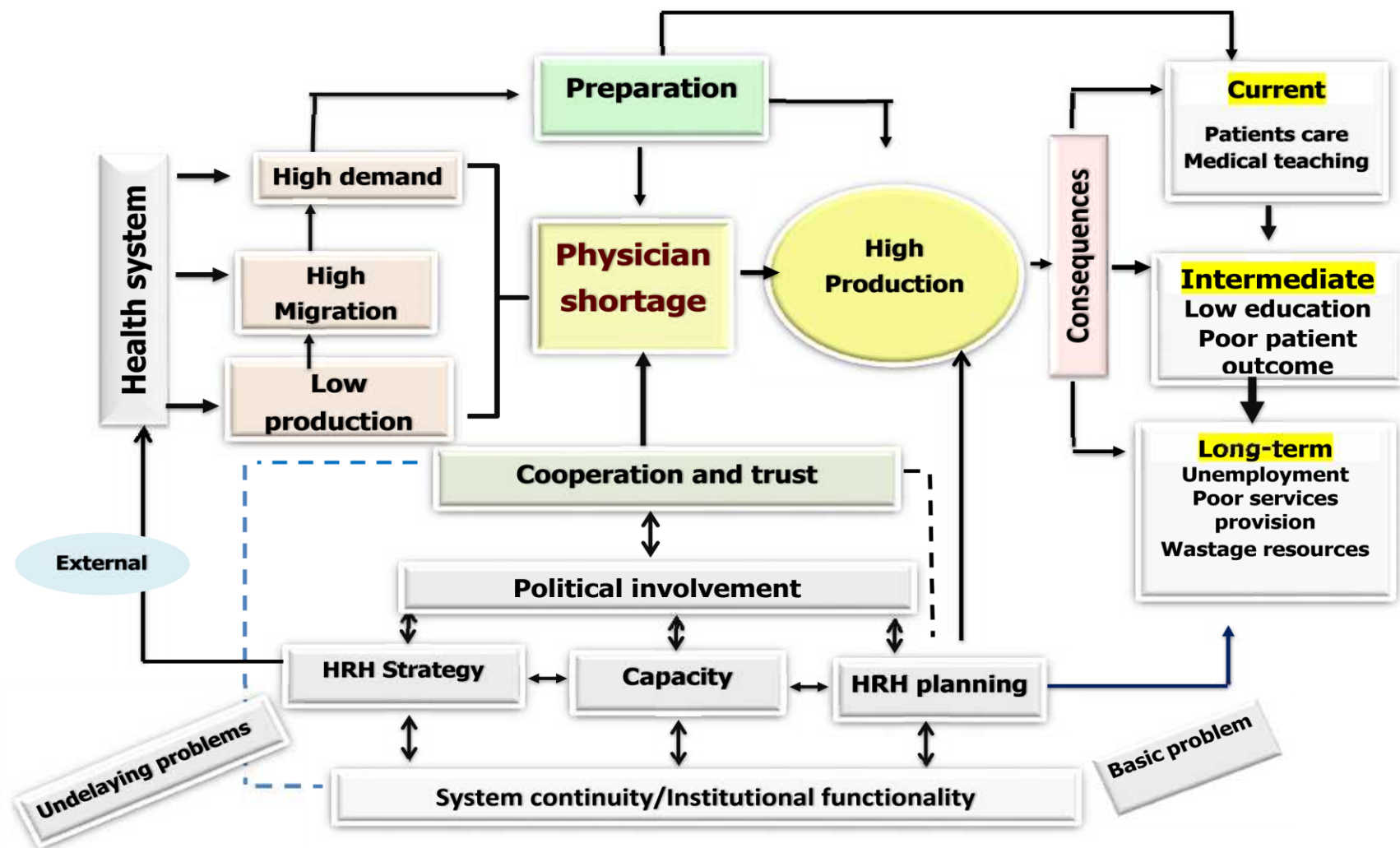


Figure 19 Health system response for physician workforce shortage and its consequences

On the other hand, one of the main categories which is massive production has taken place within the context which lacks cooperation and mutual trust between the medical schools, professional association, expertise and the government. That means, the implementers of human resource strategy and the ones who design the strategy implement within highly perceived politicized environment. Here, how much the strategy is smart enough in all aspects, in the absence of cooperation and mutual trust it is challenging to be successful.

Furthermore, during the study, there is no HRH policy or strategy either at the federal ministry or regional levels. None of the regions showed or provided a planning document for their HRH. However, there has been a medical doctors training for their own consumption for instance in Oromia and Somali region of Ethiopia. In addition, in some places positions for GPs are saturated (for instance Addis Ababa and Dire Dawa), in other places there were also temporarily assignments because new health care facilities constructions were not finished to function for instance in Amhara region.

As a result, lack of HRH policy/strategy, HRH planning including leadership/ management workforce capacity (system capacity) who deal with the strategy and planning can influence each other. In the absence of leadership workforce and planners' capacity, the system cannot have HRH policy or strategy and in turn in the absences of clear strategy it is difficult to produce suitable plan which balance the supply with the demand. So, from these interrelated perspective, the three (HRH policy/strategy, HRH planning and system capacity) categories are considered as ***underlying problems*** in response to the HRH development. And finally, functionality of the system/ system continuity might be the ***basic problem***, because there is no lesson learnt from the past, understanding about the present and predicting what will happen in the future. If there is a system of continuity, the system can certainly have HRH strategy, or at least short and long term plan and a means for evaluation. In conclusion, there is also one subcategory, external influence indicates the support provided to the system from international organizations, and also global agenda can influence the HRH direction, such as the commitment to achieve the then MDG, the intention of flooding (Figure 19).

CHAPTER 5: DISCUSSION

5.1. Introduction

This study employed mixed-methods research design as a logical plan to answer the research questions mainly through organizational survey, medical students' survey, and qualitative study. As a design, different research questions need different techniques of inquiry (either quantitative or qualitative or both at a time), in combination they provide a better understanding of research problems under the study than either approaches alone (98, 99). In mixed-methods research process, there are different types of mix at different stages of the research, however in this study the mix will be applied from this section onwards.

In this and subsequent chapters the findings identified from different but highly interlinked sources will mix together to explain the objectives of the study and their potential implications. In this section, all similar findings across the sources that support or contradict each other will be discussed in addition to the findings from single source which stands alone (qualitative or quantitative alone). And the discussion section is systematically organized into different subsections.

5.2. Physician workforce distribution and imbalances

According to the study, in the non-academic public health care settings there are substantial improvement in physician workforce across the regions, particularly compared to the previous five years of the Federal Ministry of Health report (112). Similarly, in the medical education workforce, overall the absolute number has showed marked improvement across the medical schools. However, specialist to GPs ratio has declined in Addis Ababa and Jimma, whereas improvements have been seen in Mekelle, Gondar and Hawassa(24). These findings might suggest improved supply in physician workforce in the country, regardless of the number of medical students coming to the medical schools. On the contrary, the findings which indicate a decline in the medical education workforce particularly that of specialists might show high migration which is consistent with the qualitative and the quantitative (of the Cox's PH model) research findings.

Young and less experienced physicians make up significant proportion of the public health sector physician workforce of the country, which has also similarity with the findings from medical

education workforce survey. This workforce composed of predominantly males who are young, and less experienced faculty physicians. This might be a reflection of the fact that many new graduates were joining the physician workforce as a result of increase in supply(25).

According to both surveys, 82.8% of the academic and 80.5% of the public/non-academic which is a significant proportion of the medical service providers were predominantly male physicians. This indicates the presence of gender imbalance, the common type of health workforce imbalance (45, 113). On the contrary, in the non-academic health care settings, females frequently moved out of their duty stations compared to males. However, in the academic health care settings, no statistically significant difference was observed in the rate of turnover between male and female physicians. The observed difference in the non-academic settings might be explained by remote geographical locations, family reasons and professional lifestyle factors. These factors might push female physicians to urban places (114-116). No difference has been observed among faculty physicians by their gender since most medical schools are found in urban places, particularly those involved in the study.

In health service delivery and knowledge transfer to the medical students, the role of specialist physicians is more critical in undertaking clinical procedures than the general practitioners. Except for Faculty of Medicine, Addis Ababa University, however, in the remaining medical schools and regions the number of specialists were below the standard set by the system (36). In addition, the turnover among specialists was 21.4% in Dire Dawa and 43.3% in Amhara. It suggests that regional disparity, and rural-urban migration which can potentially affect the clinical service quality, and health service provision (113). This finding also highlight the measures that need to be considered on the implementation of the recent HSTP and its achievement which aimed at compassionate, respectful and good quality care across all the levels of health service delivery (25).

The present study has also identified shortage and lack of diversity in the medical education workforce. The shortage of specialists in the areas of pediatrics and child health, obstetrics and gynecology are particularly significant and concerning. These areas are most demanding and critical to address the maternal and child health needs of the country (39, 40). Moreover, lack of diversity may have some sort of influence on medical students' choice of their specialty. Most students were interested in limited clinical areas to specialize which are internal medicine and

surgery which are more popular even than obstetrics and gynecology, and pediatrics and child health. It seems that in places where there are good number of medical instructors, there are many relatively in the field of surgery and internal medicine. In addition to transferring the required skills and quality education, these findings imply the need to balance the enrollment limit with the medical education workforce composition and/or addressing the critical incentive needs of the teaching workforce to retain (52). And it also puts the appropriateness of the flooding strategy for medical doctors training under question (27, 34).

Besides, the future physician health workforce skills mix of the country largely depends upon on the current medical education workforce composition. As most students were in favor of the statements on professional development *stimulating medical students' interest towards a certain clinical specialty, instructors serve as role model to obtain the required professional skills and to specialize in a particular clinical specialty area*. This implies that attention needs to be given for medical education workforce composition in the medical schools. Furthermore, there are also evidences in the literature about the importance of diversity in the medical workforce for improved patient outcomes and for better educational attainment of medical students(117).

5.3. Physician turnover

In both settings, there was high physician workforce migration as well as movement from rural to urban, and from the non-academic to academic settings. In the non-academic, the turnover rate was significantly higher among younger and less experienced physicians. This might be explained by the deployment of new graduates in remote areas that have poor infrastructure with unsatisfied expectations in incentives and professional lifestyles (68, 116). Next to economic incentives, the importance of intrinsic motivation and coming from rural areas were reported from African countries (3, 70). For example in Japan, population characteristics and medical demand in the population have been reported to attract physicians (69). However, in India the role of domestic policies on training, recruitment, and retention have also been reported (118).

At the same time, reasons for physician turnover across the sources (in qualitative and quantitative) appears to be complementary to each other. The two main reasons were economic and non-economic. Economic reasons such as the amount of pay, uniformity, as means of retention, recognition and relativity (compared to academic levels, job engaged, and with other sectors) were stated as important drives behind the decision to leave the public health sector.

On the other hand, the non-economic reasons such as lack of recognition, lack of valuing expertise, and non-conducive working environment also play an important role for migration. Here, the financial reasons seem very powerful to push than the non-financial ones and indeed the non-financial can precipitate the financial. In addition, this study also found another external factor which are value shift and opportunities as a mediator between the two. Thus, the study grouped the reasons into three: economic, non-economic and external (119).

5.3.1 Economic reasons

In this study, the economic factors identified as main reasons for physician workforce migration from the public health sector (academic or non-academic). This is similar to previous findings in six African countries (the most frequently cited reason between 68% and 84% of respondents) (9, 47, 120). This is also consistent with the findings in the medical students' survey which is the fact that economic reasons are the most commonly given reasons for intention to migrate. The qualitative findings also provided detailed explanation in this regard. For instance, low salary (inadequacy to fulfill the basic needs) are among the most important pushing factor for migration to the place where these basic needs are easily satisfied. On economic reasons, the issue might not be limited directly to salary but also it includes other indirect financial incentives such as loan opportunities which are also important. It has similarity with the previous reports on role of economic factors for health workers migrations (16, 79).

In addition, the availability of loan for buying automobile in Mekelle University might indicate the role of financial incentives in decreasing faculty physicians' turnover. In line with this, in kind incentives such as mortgage and land (free of lease tax) for constructing houses were frequently mentioned to be considered as part of the retention strategies. This is also mentioned as a best strategy which works across the world. In addition, across the regions and the medical schools, there should be uniformity in incentive schemes to reduce the internal movement of physicians (7).

On the other hand, the levels of economic incentives have also been explained in relation to different factors. For instance, in comparison with long term and exhaustive training at academic levels, and with risk of job they engaged including the workload, the current economic incentives (salary levels) did not satisfy the Ethiopian physician expectations. Rather such issues were

frequently mentioned as common source of dissatisfaction to work with the public sector, which is similar to the previous reports (19, 36, 119).

Furthermore, physicians also mentioned as they earn less relative to workers in the other sectors (such as NGOs, private, airlines, and revenue authority) and also similar professionals in other countries. This is the most commonly given reason behind their decision to leave the public health sector. The concept of relativity in economic incentive has also similarity with the WHO report for strategic planning on HRH. It indicates that such issues can be used as indicators and benchmarks in HRH planning, in addition to its effect on determining the level, distribution, and performance of health workers and job satisfaction (7).

5.3.2 Non-economic reasons

Non-financial reasons are the second most commonly cited reason for physician migration from the public health sector. These include work experience, geographic locations, lack of appropriate recognition, lack of value for experts, unconducive work environment (such as setup, leadership and management), and training opportunities. These are the most common non-financial reason if not all, which matches with previous report (119). Similarly, non-financial reasons such as moral dissatisfaction, management style, workload, and task also reported as main sources of job dissatisfaction with the public health workers of Ethiopia (96).

In this study, work experience is an important factor for turnover, for instance the turnover rate was seen to be significantly lower among younger and less experienced faculty physicians but higher among those who recently finished their specialty training (assistant professors). And lower for those associate professors and above. This difference might be partly explained by the emerging competition within the private sector particularly for GPs. Even in the urban public health care settings for example in places like Addis Ababa and Dire Dawa positions for GPs were getting saturated. This might be an indication for improved supply in physician workforce and/ or the use of compulsory service schemes to retain them. On the contrary, high turnover rate may suggest low incentive packages as potential sources of inducing turnover as explained by most respondents in the qualitative and elsewhere in previous studies (9, 15, 56).

On the other hand, even though the proportion of physicians who reached to the highest academic ranks like associate and full professors were very low, the rate of turnover among them was

comparatively lower. In addition, it is also possible that senior physicians in teaching and research might be relatively more satisfied in their careers to stay longer in their positions which indicates the need for rewarding excellence and professional standards for retaining the physician workforce (53, 117). This finding is also in line with the existing value shift in personal and professional life between the previous and the current generations of physicians as detailed in the qualitative findings and also in the quantitative which shows that the turnover rates were varied across the age groups.

In the non-academic health care settings, level of health care delivery is found to be an important factor for turnover. For instance, the incidence of turnover was higher among those physicians who were working in the general and district hospitals than those working in referral hospitals. This is also very consistent with the findings in the medical student survey most students want to work in tertiary hospitals and more urbanized places as they graduate. Similar findings are available in other African countries study (121).

In addition, repeated movement within the study settings particularly to the medical schools and the capital city Addis Ababa might reflect the situation very well. That means, the presence of high medical education workforce demand following the expansion in medical education in the country. Or it might be due to perceived better working environment (in the academic) than the non-academic or a means to shift from rural and distant places to the urban, most medical schools are found relatively in the urban places. Similarly, in the qualitative study urban and the academic health care settings are the most common destination for internal movement, which is consistent with the previous report and main reasons for rural-urban variations in HRH distribution and service provision (59, 70, 103).

Furthermore, the repeated turnover events within the study settings suggest the interest of physician to work in the public health sector or unfinished compulsory service years or the presence of vacant places in urban areas for experienced physicians. This might be true in the case of specialists as the educational level improved (from GP to specialist). They may be assigned to the next level, which is consistent with the descriptive findings and the regression model which states that the turnover rate is higher from district hospitals or might be a reflection of the existing poor management, setup and working environment. Thus, this finding indicates the attention which needs to be given for those who assigned at distant and remote places. Because previous studies

indicated the direct link between physicians access and improved health outcomes (122) and the negative impact of migration (120); subsequently, it results in low institutional performance and service delivery inequities among the community (113).

Furthermore, the Cox's proportional hazards model shows variations in the rate of turnover among the medical schools included in the study. This might be a reflection of the different working environment within the medical schools as detailed in the qualitative results. Despite the fact that all of them are owned and administered by the same government ministry, leadership appointment and competency, political involvement, frequent leadership turnover and partiality due to ethnic background also play a crucial role for physician migration. In particular, high rates of turnover within the longstanding medical schools might reflect the presence of pushing factors in the work environment (70, 119). This is on top of the issues of management that relate to the retention of the medical education workforce (123). The descriptive findings might also support such justifications since significant proportion of the physicians left their positions without notifying their reasons.

Lack of recognition and valuing expertise was discovered as critical problem in the public sector; which is not the 21st century perspective of health human resources (21, 65). Recognition and valuing experts is not meant for the physicians as individual, but for the system which employed them. These are important indispensable resources. Lack of recognition and valuing expertise might indicate the fact that the crucial role of HRH is not fully appreciated until recently by the system (3). This might be due to lack of leadership workforce capacity and/or appointment, lack of attention and cooperation as explored in this study, which frequently is recognized as a challenge by the ministry (25, 26). High attrition in both physician workforce and leadership, inadequate motivation, functionality of the system/system continuity and the capacity might contribute for low recognition and valuing expertise. In addition, it is also interesting to highlight on the meaning given for recognition by the medical education community, which says *"recognition is making the physicians part of the problem and the solution of their own country"*. This is aligned with the principles of community participation and ownership (124).

In the system, appropriate recognition is very important because it touches the intrinsic motives, interest and concern towards their job and the system. Moreover, the sector depends on a precise

application of the knowledge and skills of its workforce to ensure improved patient outcome and educational quality (3, 70). The intrinsic component of recognition might be best reflected through the comparison made with diaspora physicians. It is also interesting to ask, who truly deserves recognition? Though, lack of valuing for expertise was mentioned as a general problem, *“the weight of mind work is not placed in its proper scale”*. (Ac18)

In some places, the problem seems serious because both the quantitative and qualitative study designs showed similar findings. For instance, in the qualitative finding it was stated *“No, I don’t think this bothers them. I don’t think that expertise will be valued in the public organizations. Take Jimma University as an example, nobody cares! Why don’t you go to hell? Even sometimes you find them doing something that facilitates your exit...”*. In the same medical school, the Cox’s PH model showed highest rate of physician turnover. On the contrary, in Mekelle both findings have showed the opposite of Jimma University which is lower turnover rates and relatively good concern for their human resources.

5.3.3 External factors

Value change which has been emerged in the community, the system and the country as a whole has been influencing professionals to act in favor of making more money and looking for better opportunities. Such situations have been affecting the intrinsic motives of physicians, not to be judged by the society for not having a lot of money or property or prosperous life. These factors are internal because it exists in the country of origin but external to the public sectors (for the intention of this study) and it pulls the physicians from the public sector in which they were trained for (119). In fact, there are physicians who value their professional expertise than money, however, lack of proper incentives, low recognition and lack of valuing their expertise might spoil such vital professional ethos (116).

In addition, the role of value shift in health service provision was also highlighted in the qualitative study. In the public health care settings, in addition to the above discussed factors such as management, setup and recognitions physicians might not spend their time and energy in their work place; this is partly due to poor pay and secondary job holding in the private sector either to compensate their low income or to make money (7, 125). In the private sector, the emergence of value shift was mentioned as a source of high treatment cost, low quality of care and exploitation of the health workers as well. In addition, absence of potential system that regulates the private

sector can complicate the issue, which is in line with a literature review conducted in HRH in Ethiopia (126). Moreover, specialties with perceived high income potential become favorites to specialize in among faculty physicians and medical students. Similar findings are reported elsewhere regarding the role of financial incentives on career choice(62).

The existing opportunities are the main reasons for migration, the pull factors from the public health sector. Locally, the private sector satisfies both the economic and non-economic demand; to practice in a best setup and/or in conducive work environment either by taking their release from the government or in conjunction with full-time employment in the public sector. There are also similar findings in previous study (125). International and regional opportunities are also pulling physicians for similar purpose, *“they are using the existing opportunity”*. In general in health workforce migration literature, these are frequently called the “push and pull factors” (78).

5.4. Health workers’ retention

In health human resource development, supply and retention are different sides of the same coin(92). This study explored low health workers’ retention mechanisms and less attention has been due for health worker retention. In Ethiopia, the efforts which have been made on physician workforce supply without retention might not be effective because as the new graduates come to the system and the experienced will leave. Such phenomenon will result in a ***“system of ever-green hands”*** (a system staffed with junior physician workforce). Which is comparable with previous study concept with the so called a ***“revolving door” phenomenon*** where physicians come and go. It indicates high physician movement with less retention efforts (92).

Such findings also showed that the system has been losing its human resource unnecessarily. Especially, highly trained and skilled resources and those who can serve for longer period and able to capacitate the new health workers coming to the system without due attention for both simultaneously, the supply and retention (92). Thus, attention should be given for retention not only to reduce migration but also to improve the performance and productivity of the health workers by making the public health sector competent, effective, and efficient (7, 71).

In addition, retention efforts should not be substituted with high production or campaign when there is a crisis. For instance, in Ethiopia health workforce which underwent through accelerated trainings (such as health officers and health extension workers), the number of health workers in

these categories has already exceeded to be available for the due date (41) but still there are shortages of skills as frequently reported. If so, the system might expect similar scenario in the current accelerated physician workforce training approach as well. Moreover, the system need to have proper planning for health worker retention through appropriate incentive and recognition mechanisms. It has to understand the loss rate and its effect along with the supply. However, this study identified low retention and lack of HRIS to monitor the loss rate as major problem. Similar findings have already been reported in previous studies (36, 119).

5.5. Health human resource management (HHRM)

In this study, either from the academic or non-academic settings, significant proportion of physicians left without letting the office to know the whereabouts from their duty stations. This provides strong support for the qualitative findings and it might be a signal for the dissatisfaction with the leadership and management, and work environment. A study conducted in Addis Ababa reported supportive finding which shows high health workers dissatisfaction with health system reform (96). Another study also reported, that there is competency gap and limited HRM skills among health managers of Ethiopia (127).

However, not informing or enquiring the whereabouts might be lack of concern from both sides — the physicians as responsible professionals and the system as accountable employer. In addition, it also shows inadequate capacity of the system to monitor the in and out flow of the workforce (128). Similarly, such problems frequently reported as a challenge in (HSDP III, IV and in the present HSTP as well) (25, 58).

In this study, problems related to lack of effective management and leadership in the health sector such as lack of leadership workforce capacity and competency, lack of merit based appointment and turnover were the main sources of dissatisfaction with the public health sector. In turn, it affects the human resource development functions (HRH policy, planning, management of personnel and monitoring and evaluation) and ultimately it affects the sustainable functionality of the system (system continuity). Similar findings were reported in previous study conducted in African countries (128). And in Nigeria, the way to improve leadership and governance competencies for better HRH development in low-resource settings was also highlighted (129).

Overall, these findings are aligned with the WHO action framework for sustainable human resource development. This indicates the central role of HHRM around the other dimensions of HRH development (HRH policy, health workforce training, leadership, partnership, and finance) and its implementation. Eventually, HHRM influences the principal goal of HRH production; better health services delivery and improved health outcomes in the society (5).

5.6. Physician workforce preparation

In 2010, in response to concerns of severe physician workforce shortage, the WHO and GHWA recommended *a flooding strategy* to be implemented to overcome severe skilled human resources shortage in Ethiopia (27). This might be the point at which massive admission and rapid scale up in medical education emanated. However, in relation to the flooding strategy and its implementation, the present study identified four major interrelated problems:

1. Mismatch between the number of medical students, patients flow, size of teaching hospitals and medical education workforce to produce competent medical doctors. This might be a good indication for lack of preparation at the outset of massive admission/ flooding. Similarly, a local study conducted among Hawassa health science students reported that clinical instructor support, clinical practical placement and integration of learning domain as influential factors for clinical competency (130).
2. Inadequate medical education workforce with multiple roles (patient care, teaching and private practice) in conjunction with dissatisfaction (due to low incentives, workload, management and work environment) may result in low motivation and energy to teach the medical students. This may also reflect lack of acknowledging the existing situations (severe medical education workforce shortages and limited resources) while accepting massive students or the requirement for medical education as detailed in the quantitative findings (severe shortage, low composition and migration). It might be lack of preparation on the anticipated challenges(34).
3. Other insufficient resources such as library, books and infrastructures indicate the system capacity to fulfill the requirement for medical education and to implement the intended strategy.
4. Lack of cooperation between the health system/policy makers and medical schools (the implementers of strategies) indicates that the flooding strategy has lost one of the important

components of medical education and HHRM to succeed. This is cooperation, WHO 2010 (5), and “coordination of medical education and health care systems”, the Edinburgh Declaration, 1988 (131). This might be due to lack of flexibility when policy makers approve changes by taking the local context into consideration (132). On the contrary, medical educators might be resistant to change regardless of the direction of change whether it is good or bad (33, 132). At the same time, inadequately designed strategy and reform might be a source of dissatisfaction among health workers (96) which resulted in lack of cooperation.

Overall, there might be too much to do in the way of setting the medical education to the required direction, however, the current situation might put the system’s efforts barely successful to produce competent professionals either for local or international market. In another words, the system might move from one form of the crisis to another, from shortage in quantity to scarcity in skills. Because professional competency is widely accepted standard for health professional training regardless of change in the training strategies(131). Similarly, in a literature review conducted on the limitations of the MDGs, it was found that MDGs are overambitious or unrealistic and they ignore limited local capacities (133).

The other aspect of the problem in medical education is also identified in the medical students’ survey. In the survey, the majority of the medical students had the desire to practice in tertiary/teaching hospitals and in the private sector than in the general and primary hospitals. They also want to work in big cities. This might suggest preferring places which have alternative opportunities and better working environment (81). The existing medical education curriculum has limited role in preparing the students to serve in the rural places (6, 15) which rather leads to the choice of working in affluent communities (55, 56, 134). And this is a reflection of high rate of turnover from district hospitals in the organizational survey. In addition, this might imply in spite of good supply in physician workforce, geographic variations and imbalanced distributions will remain as a challenge in Ethiopia, since intrinsic motivation plays an important role in health workers’ decision to work in the rural areas (70). Such findings also imply lack of orientation to the medical students, or recognition on the effect of flooding on deployment, career choice and professional life (84).

In career choice, considerable number of the medical students were interested in very limited clinical areas to specialize as discussed in 5.2 section above including the influence of mentoring on skills mix in the physician workforce in the country. Thus, the findings of the study also suggest that the needed attention and orientations for career paths at the medical schools including the role of curriculum, orientation, institutional value, and attitudes (62, 135).

5.7. Health system response

Strategic response for HRH demand in a country through participatory planning process is very essential(5). However, implementing human resource production strategy in isolation either to gain political advantage (regardless of its strong support for health results) or which is not closely aligned with medical schools' capacity, the medical education workforce and the setup will end up in unanticipated or adverse consequences (7).

In Ethiopian context, most medical teachers are clinical service providers (36) and teaching hospitals are expected to provide the highest level of care in the country. Nevertheless, the study explored the quality of care, patient rights and satisfaction have been contradicting with the primary aims of teaching hospitals which is delivering specialized care. Admitting large volume of students to the teaching hospitals have been affecting quality of patient care, their right and privacy in the short term and in the long-term. This is regarded totally inconsistent with the government's health sector transformation plan which aims to bring quality of care, compassionate, and respectful service (25, 36).

The ultimate aim of medical education is for better health care delivery through scientific, ethical and social standards of medical education (5). Such effective teaching also requires flexibility, good teacher-student interaction, energy, a variety of teaching methods and teaching styles and commitment to address learners' needs within a busy background of clinical care (136). The current study explored as a major challenge across the medical schools and is becoming a critical factor to produce the required human resource and is also an area of critical concern for most respondents is the use of flooding strategy in medical doctors training as wisely indicated "*the volume, speed and quality cannot go together*".

In fact, in the system there were contradicting reports. On one hand massive expansion in health workforce preparation is reported as a success (25) and on the other hand, the presence of

inadequate knowledge and skills among health professionals during their regular training which consists of critical shortage of qualified teaching staffs in the teaching institution; poor motivation and retention strategy were reported as a challenge (26). Such reports provide strong support for the finding of this study, which might indicate that the country has been moving from one form of crisis to another, from *shortage in quantity to scarcity in skills*.

Furthermore, in some places there are signals which may indicate that the system cannot absorb and use the upcoming physician workforce effectively, particularly GPs. For instance, in Amhara region, GPs were assigned to different health care facilities temporarily till the new facilities construction were completed. Similarly, in Dire Dawa and Addis Ababa city administration health bureau, they reported that they did not have vacant positions for GPs. Supportive evidence is also documented on HSDP EFY 2007 (2014/2015) annual report (26). As rightly asked by the respondents, “*What if the system is unable to absorb? Even though they will be competent enough to work in the system, where do we take them?*”. Including the issue of curriculum change which does not consider the international market, although there is the opportunity and the demand(137).

As a principle, these are human resources, which cannot be stored or discarded. In the notion of this study, it reverts the direction of discussion back to the issue of proper context based planning before implementing the intended strategy. And this study identified as one of the problems at all levels in the system is lack of clear strategy and planning for health human resources. The only exception is the draft strategic plan which indicates the required number of physicians by 2015 (10846 general practitioners and 5178 specialists) (36).

The problem related to planning might be more complicated when things are done in urgency, or in this case through rapid expansion and flooding. It may not capture the entirely HRH planning process including time for analyzing the situation (5). Because at the time of this study, there is no clear HRH strategy for physician workforce which means there is no proper planning, as it was discovered. However, the HRH production should be a result of HRH strategy (a product of lesson learnt from the past, a consulted and coordinated efforts of the present). In addition, human resource planning indicates the system’s capacity (including predictive capacity of the future using demographic, epidemiologic, labor market and HR productivity in a fast changing environment along with the need/demand) through interconnected transitions. This is deep-rooted into another problem of the health system a “*system of functional continuity*” which the study discovered as

a “basic” problem of the system. And issues related to strategy, planning and system’s capacity are understood as “underlying” problems of the health system. This justification matches with previous report which stressed on the need for a system of continuity in Ethiopian context (23).

A system of functional continuity is one of the major requirements of the health system. In this study, it refers to the point at which things started, the direction it goes and the destination where and when to reach through interconnected transitions including the lessons. However, the study underlined that its absence can play a key role for not having HRH strategy, long and short term plan at all levels. The situation might be more complicated by additional factors (such as working in urgency, frequent reforms, political system changes and lack of HR and economic capacity including other internal or external influences). For instance, lack of HRH strategic plan in the country to this day (the draft for HRH strategic plan dated 2009 to 2020 which is not officially communicated or indorsed but partly implemented) (36) is a good example. In addition, accelerated HRH production and a shift from one category to another also explains the situation very well.

On the other hand, sustainable functionality of the system also requires its own human resources with the required capacity for planning and prediction (leadership workforce capacity) (138). In addition, understanding the principles of cooperation and partnership to work effectively with local people and international stakeholders might be essential and can contribute to sustainable functionality of the system. In the system, there are also external and internal drives and interests. For instance the intention to achieve the then MGDs is documented as a reason for flooding (27). On the contrary, there is also internal demand, sever physician workforce shortage which might be in favor of flooding (31, 139). However, the use of flooding strategy for physician workforce preparation in Ethiopian context is not viewed positively instead was seen as a “dangerous”, “forced” and “wrong” strategy. Thus, there should be a leadership workforce capacity for harmonizing and interpreting such influences to the local context. As a result, in this study the system’s capacity is considered as one of the underlying problems.

5.8. Implications of the health system response

Overall, this chapter presents the research findings in relation to the literature and implications in the system. Most of the study findings are found complementary to one another. And some of them were standalone to reflect the HRH development and HRM in Ethiopian context and beyond in

similar setup like ours. In HRH in Ethiopia there had been a shortage for a long time because of low production, high migration and fast population growth. But now there has been a rapid or accelerated production in various categories to address the shortage. For instance, when it comes to the health officers and health extension workers such approach resulted in excess in number but shortages in the required skills for the job to deliver health service. However, in environmental health professionals there is shortage, because the training shifted to other health workers' categories (26).

In spite of this fact, similar principles have been followed for medical doctors training (in the academic year 2014//2015, more than 14000 medical students were enrolled in 33 medical schools) within unprepared system. Its execution and the upcoming consequences will lead the country from one type of shortage to another, from quantity to quality, which might put the health service quality through improved health workforce into question which is the prime aim of health workforce production (21).

Today's workforce of the country is the result of decisions made by system or institutions over the past several years (140). For instance, too many mid and low levels health workers (inadequate or inappropriate training for the jobs, or unemployed or under-employed health personnel) and too few medical doctors (23, 24). Similarly, the future physician workforce of the country is also the result of the decisions taken by the system at the present in response to the crisis. This implies that inadequately or inappropriately trained medical doctors will decrease the productivity of the system. Too many medical doctors necessitate hiring of more medical doctors than can be reasonably afforded, resulting in low salaries, poor productivity, and high turnover. In the long run too many medical or surgical specialists require costly equipment and tend to drive the health system towards urban and hospital-based care (140).

Furthermore, in medical education, the consequences of bad decisions or failure to make decisions are often slow to appear, hence the training takes longer period of time. For instance, a decision to change medical student intakes by two fold would increase the doctor supply by 20% in 10 years (140). Thus, with the current many fold increase in medical student intakes and expansion (25), the effect could be far greater during the subsequent decades and it takes long time to detect and correct major mistakes (140).

In addition, in Ethiopia, the public sector is the primary employer and have a major say in deciding the enrollment limit of medical training. At the same time, it is also responsible for all academic expenses which is costly. Thus, system will take the responsibility to deal with the consequences of its decisions in the future such as wastage of limited resources, surplus (dealing with high salaried occupational category with huge number) or skill shortage (low productivity), and/or role overlap with other health workforce. On the contrary, reducing enrollment or closing programs will not be as easy as opening, especially in the case of university faculties of medicine (140).

CHAPTER 6: VALIDITY AND GENERALIZABILITY

This study investigates issues related to physician workforce preparation, distribution, attrition, and medical students' career plans and intentions to work in rural/remote places as well as their intentions to leave Ethiopia and work abroad. In addition, it also discovered the response made by the system for addressing physician workforce shortages and how this response has been viewed by different stakeholders.

The use of mixed methods study design enables to involve various study participants and data sources at a time, for complementation and confirmation of the study findings. In the organizational surveys, making disaggregation between the academic and non-academic physician workforce shows the existing context difference in physician workforce between the two settings, in addition to reducing the possibility of biases if analyzed in aggregate.

In addition, the medical education workforce survey reflects the Ethiopian medical schools' capacity in terms of their health human resources to teach massive number of medical students along with providing clinical care for patients/clients visiting the teaching hospitals and other additional responsibilities as academic institutions. The use of Cox proportional hazards models and Poison regression analysis have also methodological strength over the binary logistic regression since attrition is a variable which has time to event dimension. However, there may be some missed data hence there was no uniform and standard database system either in academic or non-academic health care settings, in addition to the limited number of variables to control the effect of confounding.

In the medical students' survey, it involved large sample size from diverse settings. In addition, developing survey items which fit to the context might also be one of the methodological strengths

of the survey which indicated with high Cronbach's alpha value shows the internal consistency of the items to generalize the findings of the study. In addition, most of the findings have similarity with previous reports and consistent with the qualitative study findings, with the exception of increased the odds of intention to work rural and remote places among the medical students of Addis Ababa University. Here, there might be social desirability bias or students may be pre-informed about the actual situation and the effect of flooding.

One of the potential strength of the qualitative study is the use of the grounded theory approach. It allowed to investigate the phenomenon from various perspectives. The trustworthiness of the analysis and the diagrammatic representation of the findings can be assessed according to four criteria which are credibility, dependability, plausibility and transferability (111).

The analysis and findings have credibility because these were attained through interviewing potential actors (academia, government officials, researchers in the area and those who have been working with the system and know the context very well). Particularly, the use of purposive sampling through various stages of the data collection along with back and forth process of analysis and data collection supported by memo writing can potentially reduce personal biases.

The principle of theoretical saturation was also adhered during the data collection to ensure that the categories and sub-categories in the study were fully explored. In addition, the feedback given by the respondents and other individuals (external audit) was also used as a means of accreditation. The findings of the study have also originality because they bring together several viewpoints that have not been discovered previously in Ethiopian context in this particular phenomenon, physician workforce and health system response. However, most of the categories have similarity with previous literature in the area, particularly, with the WHO models and frameworks which indicate the needed preparation, cooperation, policy/strategic planning, recognition in HRH production and management, and system capacity.

This study also presented the qualitative findings in three distinctive scenarios (physician turnover and potential solutions, flooding and its consequences, and the role of the health system on HRH production) for different stakeholders to act to the dimensions of the problem at different levels accordingly. The study findings are also transferable to other health workforce categories in

Ethiopia and other countries with similar contexts in health human resources and weak health system like Ethiopia.

Finally, the study findings have complementary nature. The quantitative findings revealed the magnitude and the nature of the problem, whereas the qualitative discovered the causes (basic and underlying) and consequences of the problems which is an insight for future direction and action.

CHAPTER 7: STRENGTHS AND LIMITATIONS

This study employed a mixed methods study design. It combines both quantitative and qualitative research strategies at a time. Applying mixed methods design has a lot of benefits and strengths than using a single strategy alone. Such inquiries allow one to investigate the research problem from different dimensions by involving diverse methods of data collection in a diverse population. Thus, this research generated strong evidence from a wide range of perspectives. The organizational surveys collected and analyzed retrospective data of six years from five regions and two city administrations, and seven medical schools. This helps to understand and compare the attrition rate, and the physician workforce compositions in the non-academic and academic health care settings of the country.

In addition, the medical students' survey provides information about medical students' career choices (intentions to work in rural settings and to leave) and attitudes towards the medical instruction through involving six medical schools which is very essential to understand the current situation and gain an insight for future direction.

The qualitative study employed a grounded theory research approach, which allows one to render the complexity of the phenomena and explore the causes, contexts, consequences, and relationships among these elements. In addition, it also helps to verify, clarify and justify the quantitative findings. As a result, the study generated comprehensive evidence on physician workforce by complementing one another. Furthermore, the qualitative study helps to discover the underlying and the basic problems related to the HRH development in Ethiopia.

In spite of its methodological strength, this research has also some limitations. First, the available human resource data lacks uniformity, there was no well-organized database system. In addition,

to control the effect of confounding the number of variables in the data sets were also very limited, and the study could not trace the whereabouts of those who left from the medical schools.

In the students' survey, the study did not include students from the private sector. Hence the medical schools do not have their own teaching hospitals to access the students easily. In addition, by its very nature behavioral intention might or might not be converted into practice. However, the odds of preference to work in rural and remote areas among the medical students of AAU might indicate social desirability bias and/or students' orientation on the effect of flooding (saturation of positions in urban places) or shorter obligatory period to those who are deployed in remote areas. On the other hand, their high intention to leave might also indicate their intention of using all possible opportunities which are perceived to work best. Thus, this needs to be investigated through follow up studies. In addition, the medical survey could not involve adequate number of students from the innovative medicine because at the time of the study most students were in the preclinical years.

One of the potential limitation of the qualitative study is that the study did not capture the views of undergraduate medical students and patients directly.

CHAPTER 8: CONCLUSIONS

This research came up with comprehensive evidence in relation to the physician workforce and health system response in Ethiopia. It will inform the policy makers, the academics and professional associations about the progress in medical education and the issues related to the flooding strategy in the health system. In addition, it also gives an insight on how to improve the situation including the health workforce performance and productivity.

The study first indicated the distribution and attrition of the physicians in the academic and non-academic health care settings. In addition, evidences from the medical students' career choice and intention to work in rural/remote places and the intention to leave are also very essential in health workforce preparation and future direction in the country. Moreover, reasons for migration and information on the need for retention are also critical for HRH development and proper management. Furthermore, though the flooding looks like a helpful strategy to overcome the physician workforce shortage with short period of time, there might be various types of negative consequences which have resulted from this strategy.

The study indicated substantial improvement in physician workforce supply across the regions. However, compared to the health demand in the community at the time there might be physician workforce shortages, particularly that of specialist physicians along with high turnover rates. This situation can potentially affect health service provision, clinical service quality, and its outcomes among the community that is the potential source of health service inequalities. Turnover to the academic settings might also imply the demand in response to the expansion. However, the turnover through transfer and release might indicate the presence of internal and external migration, and the external and rapid expansion in medical education might also exacerbate in-country rural–urban migration.

On the other hand, in spite of the observed improvement in physician workforce supply, the findings on the medical education workforce was concerning. Particularly, shortages and lack of diversity in clinical specialties in the medical schools can affect the quality of medical education, the current and the future clinical service provision in the country. Hence the current medical schools and their practices will build the future HRH of the country. This is also an indication to scrutinize the issue beyond admitting massive number of medical students. In addition, different rates of turnover among medical schools might indicate the need for creating uniform and better work environment across the medical schools including in the regions.

According to the medical students' survey, most of the medical students had the intention to practice in clinical/patient care settings. Nevertheless, most had the desire to practice in tertiary/teaching hospitals and the private sector or in big cities, this can imply the urban-rural variations in physician workforce to continue. In addition, the students' intention to leave the country when they graduate highlights an area of critical concern in the medical workforce preparation and future direction. And their inclination towards very few clinical specialty areas might also indicate the existing shortage of instructors in various clinical specialty areas.

In the qualitative findings physician migration interrelated with three main factors: economic, non-economic and external. Lack of uniformity in incentives and recognition mechanisms were also contributing for internal and international movement. In addition, personal interest, starting family, sense of belongingness towards the community and country, social and economic stability, and obligatory services were contributing factors to stay in the assigned place for longer period of time, even though the obligatory service approach was not seen as attractive and voluntary.

Concerns and dissatisfaction in relation to management and leadership might be very important for everyone who works with the system to succeed.

In the health system, there has been a rapid transition, from low production and severe physician workforce shortages to massive production without taking in to consideration the actual situation such as the capacity of the medical schools and the medical education workforce of dual role (teaching, and patient care). In addition, massive admission has also been affecting the clinical care delivery at teaching hospitals. And also it puts the system's capacity to absorb and the way it uses the graduates effectively under question. However, though there are signals to anticipate the upcoming crisis which is the surplus in number and the shortage in the required skills to provide health service, in the absence of proper planning, and in and out flow monitoring system may not be easy to identify and anticipate very soon. The longstanding severe shortage can potentially lead to another problem.

Moreover, in the absence of cooperation and mutual trust, it might be challenging to succeed in HRH preparation. Furthermore, lack of HRH policy or strategy at all levels including human resources (system capacity) to deal with the strategy and proper planning can influence one another. In the absence of human resource capacity, the system might not formulate HRH policy or strategy, which directs the system to develop and have suitable plan (balancing the supply, the demand and the system's capacity). Finally, functionality of the system might be the basic problem to connect the past, the current efforts and to move ahead for the future by incorporating the lessons learnt.

CHAPTER 9. RECOMMENDATIONS

This section provides detailed recommendation for FMOH, HRBs, FMOE, medical schools and physicians in accordance with the findings of the research.

For Federal Ministry of Health and Regional Health Bureaus

- Need to give more attention for those who are assigned in remote and far to reach places by devising attractive human resources management and retention schemes;

- Improving the financial expectations of the medical doctors with consideration given for the non-financial matters (such as recognition, and valuing expertise) which are as important as the financial aspect;
- Need to consider appropriate HRH retention schemes along with progressive improvement in physician workforce supply;
- Need to consider selective strategies in order to overcome severe physician specialist shortages in the medical schools as well as in the country.
- Need to work closely to the medical schools to minimize the consequences of massive medical student admission on patients, quality education and also on the medical education workforce;
- The system needs to prepare synchronized short and long-term plan for physician workforce at each level;
- The system needs to build its management, leadership and technical workforce capacity for HRH strategy formulation, planning and its effective execution;
- Need to reexamine whether the flooding strategy is working or not. Whether it is efficient, effective and productive in physician workforce preparation in Ethiopian context.
- At all levels, attention should be given for HRH data recording and management and transforming such data into valuable evidences.

Federal Ministry of Education

- In HRH workforce preparation, FMOE need to consider the nature of medical education and discipline, deal with human beings at all times including during the workforce preparation thus preparation should be done with due consideration;
- Need to revisit the current flooding strategy in a way which balances the available medical education workforce, teaching hospitals capacity including patient flows and other necessary resources; and
- To be effective in physician workforce preparation, the ministry need to work in collaboration with the FMOH, medical schools and professional experts

Medical Schools

- Need to improve the medical education workforce composition in order to provide quality education, patient care and produce competent medical doctors;

- Need to revise retention schemes of the medical instructors by devising various strategies, for both economic and non-economic factors accordingly;
- Need to design a strategy to influence their students' intention and career plans to work within their country in various geographic locations and clinical specialty areas; and
- Need to work on minimizing the consequences which have resulted from massive admission of medical students on patients, teaching-learning process and medical education workforce.

Practicing physicians

- Need to maintain their professional integrity and oaths, although there is no recognition which they deserve;
- Need to exercise free dialogue and tolerance with leadership and management bodies by understanding the actual context.

Future research

- Longitudinal study is recommended to evaluate the extent in which intentions of the medical students will be converted into practice; and
- Longitudinal study is also recommended to examine the effect of massive production at various stages of the workforce life.

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Physician distribution and attrition in the public health sector of Ethiopia

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Background: Shortages and imbalances in physician workforce distribution between urban and rural and among the different regions in Ethiopia are enormous. However, with the recent rapid expansion in medical education training, it is expected that the country can make progress in physician workforce supply. Therefore, the aim of this study was to examine the distribution of physician workforce in Ethiopia and assess the role of retention mechanisms in the reduction of physician migration from the public health sector of Ethiopia.

Methods: This organizational survey examined physician workforce data from 119 hospitals from 5 regions (Amhara, Oromia, Southern Nations Nationalities and Peoples Region [SNNPR], Tigray, and Harari) and 2 city administrations (Addis Ababa and Dire Dawa City). Training opportunity, distribution, and turnover between September 2009 and July 2015 were analyzed descriptively. Poisson regression model was used to find the association of different covariates with physician turnover.

Results: There were 2,300 medical doctors in 5 regions and 2 city administrations in ~6 years of observations. Of these, 553 (24.04%) medical doctors moved out of their duty stations and the remaining 1,747 (75.96%) were working actively. Of the actively working, the majority of the medical doctors, 1,407 (80.5%), were males, in which 889 (50.9%) were born after the year 1985, 997 (57%) had work experience of <3 years, and most, 1,471 (84.2%), were general practitioners. Within the observation period, physician turnover among specialists ranged from 21.4% in Dire Dawa to 43.3% in Amhara region. The capital, Addis Ababa, was the place of destination for 32 (82%) of the physicians who moved out to other regions from elsewhere in the country. The Poisson regression model revealed a decreased incidence of turnover among physicians born between the years 1975 and 1985 (incident rate ratio [IRR]: 0.63; 95% confidence interval [CI]: 0.51, 0.79) and among those who were born prior to 1975 (IRR: 0.24; 95% CI: 0.17, 0.34) compared to those who were born after 1985. Female physicians were 1.4 times (IRR: 1.44; 95% CI: 1.14, 1.81) more likely to move out from their duty stations compared to males. In addition, physicians working in district hospitals were 2 times (IRR: 2.14; 95% CI: 1.59, 2.89) more likely to move out and those working in general hospitals had 1.39 times (IRR: 1.39; 95% CI: 1.08, 1.78) increased rate of turnover in comparison with those who were working in referral hospitals. Physicians working in the Amhara region had 2 times (IRR: 2.01; 95% CI: 1.49, 2.73) increased risk of turnover in comparison with those who were working in the capital, Addis Ababa. The probability of migration did not show a statistically significant difference in all other regions ($P>0.05$).

Conclusion: The public health sector physician workforce largely constituted of male physicians, young and less experienced. High turnover rate among females, the young and less experienced physicians, and those working in distant places (district hospitals) indicate the need for special attention in devising human resources management and retention strategies.

Keywords: health workforce, physician retention, physician turnover/migration/attrition

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Background

Health workforce (one of the building blocks of the health system) determines the health system performance and its effectiveness to achieve community health needs.^{1,2} However, many sub-Saharan African countries, including Ethiopia, have weak strategies to retain their health workforce.^{3,4} In Ethiopia, physicians density to population ratio is very low.^{5,6} Imbalances in professional skill mix, variations in distribution between urban and rural places, and among the regions are enormous.⁵⁻⁷

Human Resources for Health (HRH) has been continued as global agenda over the years.^{8,9} A number of international initiatives (including developing policy and global code of practice on international recruitment) were attempted to reduce international migration of health care workers from low-income to high-income countries.^{10,11} In addition, enormous efforts have been done to assist the health system of many developing countries. Task shifting through excess supply of low- and mid-level health professionals along with health sector development plans acts as ways of overcoming the problem. Nevertheless, as evidences show, such strategies might play insufficient role either in health service provision^{12,13} or in professional mix (eg, in Ethiopia, low- and mid-level professionals constituted the large majority of the national health workforce).⁵

Health service is a product of the existing health human resources, along with other critical requirements. As a result, inequalities in health care access and outcomes among the nations, between urban and rural populations, and among the regions may reflect the situation better with the presence of imbalanced distribution in qualified health care workers.^{5,14,15} Such imbalances usually manifest in terms of low life expectancy at birth, high maternal mortality, infant and child mortality, and variation in health service utilization and health service quality.¹⁵

More recently, in cognizant to the need of highly qualified health professionals across the regions, Ethiopia has made rapid expansion in medical education training to increase the supply in physician workforce.^{16,17} In addition, the most recent 2015 Health Sector Transformation Plan (HSTP) of the country indicates the clinical service delivery to be “compassionate, respectful, and with high quality of care,”¹³ which may depend not only on the access, availability of physicians, and using regulatory schemes⁵ but also on workforce issues, professional lifestyle, satisfaction, and stay in their duty stations; hence, health service is personal in nature.^{18,19}

However, reasons for mal-distribution and challenges for retaining health workforce in the public health sector (particu-

larly in rural and remote areas) have become evident.¹⁸ Large body of literature has documented the critical role of skilled, motivated, and balanced human resources for achieving population health goals (the direct link between skilled human resources and population health outcomes).²⁰ However, this is highly dependent on several interlinked factors. First, on the clear HRH policy and uniform strategy for health workforce development.^{12,21} Second, on the ability of the health system for retaining and managing migration to reduce inefficient loss of human resources.^{22,23} Third, on the functioning of human resource information system (to understand the inflows and outflows).²⁴ And lastly on the factors that affect the decisions of health workers to work in rural and remote settings.¹⁸ Health system in many developing countries including Ethiopia, however, lack these important components of HRH to deliver essential health interventions.^{25,26}

In Ethiopia, recently, the presence of slight improvement in physician workforce distribution was reported.²⁷ In addition, with the current rapid trend in medical education expansion and supply, the country could make promising improvement in physician workforce, when proper retention mechanisms and balanced distribution work together. However, only limited evidences are available in this regard to understand the progress in physician workforce distribution (following the rapid expansion in medical education), and the role of retention mechanisms to reduce migration from the public health facilities across the regions. Therefore, this study aimed to investigate the distribution and attrition of physician workforce in the public health facilities of Ethiopia.

Methods

This physician workforce organizational survey was conducted in 5 regions (Amhara, Oromia, Southern Nations Nationalities and Peoples Region (SNNPR), Tigray, and Harari) and 2 city administrations (Addis Ababa and Dire Dawa City Administrations) of Ethiopia. The survey was conducted between February and July, 2015. However, data for Somali Region of Ethiopia were excluded because they were not complete. Overall, the study gathered information on physician workforce from 119 hospitals (19 referral, 46 general, and 54 district hospitals) which were under the auspices of regional health and city administration health bureaus. Five hospital from Addis Ababa (1 referral and 4 general), 20 from Amhara (6 referral, 10 general, and 4 district), 1 referral hospital from Dire Dawa, 63 hospitals from Oromia (5 referral, 18 general, and 40 district), 17 from SNNPR (3 referral, 6 general and 8 district), and 11 from Tigray (2 referral, 7 general, and 2 district) were covered by this study.

Data

During the initial phases of the present study, the human resources information system at the Federal Ministry of Health was on the process of establishment. As a result, data for the present analysis were collected from the human resource departments of regional health bureaus and hospitals found within the study locality.

In Oromia, Harari, Tigray, SNNPR, and Somali regions of Ethiopia, the required data on physician workforce were obtained via excel spread sheets from the human resource (HR) departments of the respective regional health bureaus. However, in Amhara Region and Addis Ababa and Dire Dawa City Administrations, the data were received in excel spread sheets from each of the hospital HR department through the support of regional health bureau HR departments. Furthermore, in the absence of such organized data (in excel spread sheet), the data were also collected from accessible documents from archives. In Addis Ababa, data were collected from the HR department of 5 hospitals (namely Zewditu Memorial, Ras Desta Damtew Memorial, Menelik II Memorial, Yekatit 12, and Tirunesh Beijing). Data could not be accessed from Gandhi Memorial and Dire Dawa Sabian Hospitals within the study period. In addition, the data for Somali Region were excluded because they were incomplete. Similarly, in SNNPR and Tigray Regions, data on physicians who were recently hired or deployed as well as those who left for specialty training were not included as they were incomplete. SNNPR data on physician turnover and data on private practicing physicians across the regions remains unavailable for the present analysis.

Data collection

The data were collected on 3 important elements of the physician workforce: distribution, training opportunity, and turnover between September 2009 and July, 2015. Within the study organizations, data were collected by individuals who were working as human resource information system officers and/or data clerks using the local languages in which the study facilities were using to record the data.

Study variables

The study variables were socio-demographic (date of birth and gender), date of employment, field of specialty and subspecialty of the medical doctors, and information on training opportunity. However, other demographic variables such as marital status and ethnicity were incomplete in most places. In addition, the outcome variable of the

study is “physician attrition” which indicates a transition made (in the form of official resignation/dismissal, transfer, retirement, or death) by a physician after taking up an appointment within the time of interest (between September 2009 and July 2015).

Operational definitions

- **Actively working physicians:** those physicians who were working in the public health care settings during the data collection period.
- **General practitioner (GP):** one who completed undergraduate medical education program.
- **Specialist:** one who completed medical education in a certain areas of medical specialty (such as internal medicine, surgery, pediatrics, gynecology and obstetrics, and so on) after being trained/having served as a GP.
- **Subspecialist:** one who received training in certain subspecialty area after being trained/having served as a GP and/or specialist.
- **Duration of stay/service:**
 - For actively working physicians, duration of stay/service years in the assigned place is calculated by subtracting the date of employment from the date of data collection.
 - For those who left appointment duration of stay is calculated using the date of departure.
 - For those with unknown dates of attrition, service year was subtracted from the date of data collection.

Data management

Data management and processing involved data organization, data cleaning, and editing using excel spread sheet. However, time-related data such as date of birth, employment, and date of departure were converted from local calendar (Ethiopian calendar that lags 7 years behind for the months between September and December and 8 years for January to August with date variation ranging from 6 days in August to 11 days in October) to Gregorian calendar. In addition, repeated appointments and turnover events within the study settings were captured using physician's recruitment identification number.

Data analysis

Data were exported from MS Excel to Stata version 13,²⁸ using Stat Transfer version 9. Descriptive statistics was used to describe the distribution and attrition of physician workforce.

Poisson regression model is recommended to count events such as turnover especially when the data fail to satisfy Cox's proportional hazards model assumptions, which is the case in this study.²⁹ In the study, the outcome variable of interest, turnover/out-migration is measured in the count of events, which is appropriate to perform Poisson regression model on the data. As a result, Poisson regression model was used to identify factors associated with physician attrition from the public health facilities.

Poisson regression modeling

In the Poisson regression modeling, the exposure variable is duration of stay/service year (is non-zero integer), which is used as offset variable. In addition, for running the model, the event of interest is coded as "1" which indicates the occurrence of the event, turnover (all attrition events excluding retirement and death), and "0" indicates event is not occurred, it includes actively working and inevitable events (retirement and death).

For explanatory variables, dummy variables were created for categorical explanatory variables to identify the covariates associated with event turnover. For example, gender was coded as male = 1 (reference), female = 2; date of birth is also categorized into 3 (born after 1985 = 1 (reference), between 1975 and 1985 = 2, and before 1975 = 3; educational level GPs = 1 (reference) and specialist/subspecialist = 2; setting referral hospital = 1 (reference), general hospital = 2, and district hospital = 3; and for regional locations, Addis Ababa is chosen as a reference.

Incident rate ratio (IRR) with 95% confidence interval (CI), and *P*-value = 0.05 was used as cutoff points to explain the observed statistical differences. Finally, validity of the model was assessed using goodness-of-fit (GOF) test after running Poisson model. Deviance GOF test is *P*=0.898 which indicates that the model is well fitted to Poisson regression assumptions.

Ethical approval

Primarily, the study received ethical permission from the Institutional Review Board (IRB) of College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph). The approval from AAU was accepted for conducting the study in Addis Ababa and Dire Dawa city administration health offices, Harari, SNNPR, and Tigray region health bureaus and by the health bureau of Somali region of Ethiopia. In addition, the review board of other regions, Amhara Regional Health Bureau (Protocol No. *m/g°/t-ñ/1/250/07*) and Oromiyaa Regional Health Bureau (Protocol No. BEFO/

AHBT/1-8/3789) reviewed the proposal and provided ethical permissions for conducting the study. Permission was obtained from regional health bureaus and city administrations to collect the data. However, because of the nature of the data, they were obtained from the study organizations; partly secondary (attrition data) and the available organizational data through recode review, and individual consent was not required for reviewing the records.³⁰ However, the data were used anonymously and kept confidential at all times, analyzed, and reported in aggregate.

Results

In 5 regions and 2 city administrations, there were 2,300 medical doctors within about 6 years of work experience, of these about 1,747 were actively working physicians (during the study), and the remaining 553 were attritions (536 physicians were moved out of their duty stations, 11 died, and 6 retired).

Actively working physicians

Of the total 1,747 actively working physicians (during the study), the majority 1,407 (80.5%) were male physicians and the remaining 340 (19.5%) were female physicians. Younger physicians who were born after 1985 accounted for half of the actively working physician workforce 889 (50.9%), whereas those who were born between 1975 and 1985 were 493 (28.2%) and those born prior to 1975 were only 216 (12.4%). Regarding the work experiences, 997 (57%) had <3 years of work experiences, 334 (19.12%) had 3–years, 167 (9.56%) had 7–10 years, 54 (3%) had 11–14 years, and 161 (9.22%) had ≥15 years of work experiences.

In terms of educational levels, GPs constituted the majority of 1,471 (84.2%) actively working physician workforce, while specialists/subspecialists constituted less than one-fifth, 276 (15.8%). During the study (excluding SNNPR and Tigray), ~279 (19.6%) physicians have been sent for long-term medical training in different areas of clinical specialty/subspecialties. In terms of service provision in health care settings, more than half, 979 (56.04%) of the physicians were serving in general hospitals, 474 (27.13%) were serving in referral hospitals, and few proportion of 275 (15.74%) were serving in district hospitals (Table 1).

The study assessed physician distribution across the regions in 3 categories (general practitioners, residents/fellows, and specialists/subspecialists). Of the total, ~696 (39.8%) physicians were working in Oromia region, followed by 422 (24.1%) in Amhara, and 330 (18.9%) in Addis Ababa. However, in small regions like Harari and Dire Dawa city administration, the number of physicians were relatively

Table 1 Distribution of actively working physicians in the public health facilities of Ethiopia, September 2009 to July 2015

Variables	Characteristics	Actively working	
		Frequency	Percent
Gender	Male	1,407	80.5
	Female	340	19.5
Date of birth	After 1985	889	50.9
	1975–1985	493	28.2
	Before 1975	216	12.4
	Missing	149	8.5
Service years	<3	997	57.07
	3–6	334	19.12
	7–10	167	9.56
	11–14	54	3.09
	≥15	161	9.22
Educational level	General practitioners	1,471	84.2
	Specialists/subspecialists	276	15.8
Settings	Referral hospital	474	27.13
	General hospital	979	56.04
	District hospital	275	15.74
	Health offices	19	1.09
Total of each variable		1,747	100.0
Position during the study ^a	On duty	1,220	81.4
	On training	279	19.6
	Total	1,499	100

Note: ^aExcluding Southern Nations Nationalities and Peoples Region and Tigray.

small. Compared to big regions (Oromia and Amhara), the proportion of specialists and subspecialists who were serving in the capital Addis Ababa and Dire Dawa city administrations were higher. In Addis Ababa, it was about more than one-fourth, 88 (26.7%), and in Dire Dawa more than one-third, 11 (37.9%) of the physician workforce. In big regions like Oromia and Amhara, the proportion of specialists/subspecialists were very low, in Amhara only 59 (13.9%), in Oromia ~80 (11.5%), and in SNNPR ~22 (14.6%) of the actively working physician workforce. In Tigray and

Harari regions, the proportion was 11 (14.6%) and 5 (22.5%) of the physician workforce, respectively. In addition, 139 (19.9%) of physician workforce in Oromia, 77 (19.2%) in Amhara, 57 (17.3%) in Addis Ababa city administration have been sent for further long-term medical training in various clinical specialty/subspecialty areas (Table 2).

Characteristics of physician turnover

Of the total 553 attrition cases, 536 (96.93%) physicians were left from their duty stations for various reasons. However, the remaining 17 (3.07%) physicians were departed because of death and retirement.

Of the total 536 turnover events, the majority of 411 (76.68%) were males and the remaining 125 (23.3%) were females. Younger physicians (born after 1985) accounted for 206 (38.43%) of the turnover cases, those who were born between 1975 and 1985 were 187 (34.9%), and those who were born before 1975 years were 86 (16%).

In terms of work experience, 330 (61.57%) had <3 years of work experiences, 91 (16.98%) had 3–6 years, 32 (5.97%) had 7–10 years, 20 (3.73%) had 11–14 years, and 43 (8.0%) had ≥15 years of work experiences. Likewise, compared to specialists 123 (22.95%), GPs were contributed for the highest proportion of the turnover, 413 (77.05%). In terms of health service delivery settings, the majority of 289 (53.92%) were left from the general hospitals, 103 (19.22%) from referral hospitals, and remaining 92 (17.16%) were left from the district hospitals (Table 3).

The study also examined the reasons of attritions in the study settings. Information was available for ~391 (70.7%) of the cases; however, information was limited for the remaining 162 (29.29%) events. Of 391 of the cases, 228 (41.23%) were resigned from their duty station for personal reasons, 139 (25.14%) were transferred, 11 (1.99%) died, 6 (1.08%)

Table 2 Physician distributions in various regions using the main categories (GPs, residents, and specialists/subspecialists) in Ethiopia, September 2009 to July 2015

Setting	GPs		Residents/fellows		Specialists/subspecialists		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Regional locations								
Oromia	477	68.5	139	19.9	80	11.5	696	39.8
Amhara	286	67.8	77	18.2	59	13.9	422	24.1
Addis Ababa	185	56.1	57	17.3	88	26.7	330	18.9
SNNPR	151	—	—	—	22	14.6	173	9.9
Tigray	64	—	—	—	11	14.6	75	4.3
Dire Dawa	18	—	—	—	11	37.9	29	1.7
Harari	15	—	2	—	5	22.5	22	1.3
Total	1,196	68.5	—	—	276	15.8	1,747	100

Note: — indicates information was unavailable.

Abbreviations: GP, general practitioner; SNNPR, Southern Nations Nationalities and Peoples Region.

Table 3 Characteristics of physicians who moved out of their duty stations (n=536), September 2009 to July 2015

Variables	Characteristics	Frequency	Percent
Gender	Male	411	76.68
	Female	125	23.32
Date of birth	After 1985	206	38.43
	1975–1985	187	34.89
	Prior 1975	86	16.04
	Missing	57	10.63
Service years	<3	330	61.57
	3–6	91	16.98
	7–10	32	5.97
	11–14	20	3.73
	≥15	43	8.02
	Missing	20	3.73
Educational level	General practitioners	413	77.05
	Specialist/subspecialist	123	22.95
Setting	Referral hospital	103	19.22
	General Hospital	289	53.92
	District hospital	92	17.16
	Missing	52	9.70

were deployed to other settings, 6 (1.08%) retired, and 1 was dismissed because of discipline. However, of the remaining 162 (29.29%) events, some 92 (16.64%) left without letting the office know their absence, 57 (10.31%) did not specify their reasons, and 13 (2.35%) of the cases were not recognized by the HR departments (Figure 1).

Figure 2 compares the proportion of specialists/subspecialists who were actively working (during the study) with those who moved out of their duty stations across the regions. Of the total 536 physicians who left from their duty stations, 123 (22.9%) were specialists. Of these 123 specialists, 45 (43.27%) of the turnover cases were in Amhara region, 38

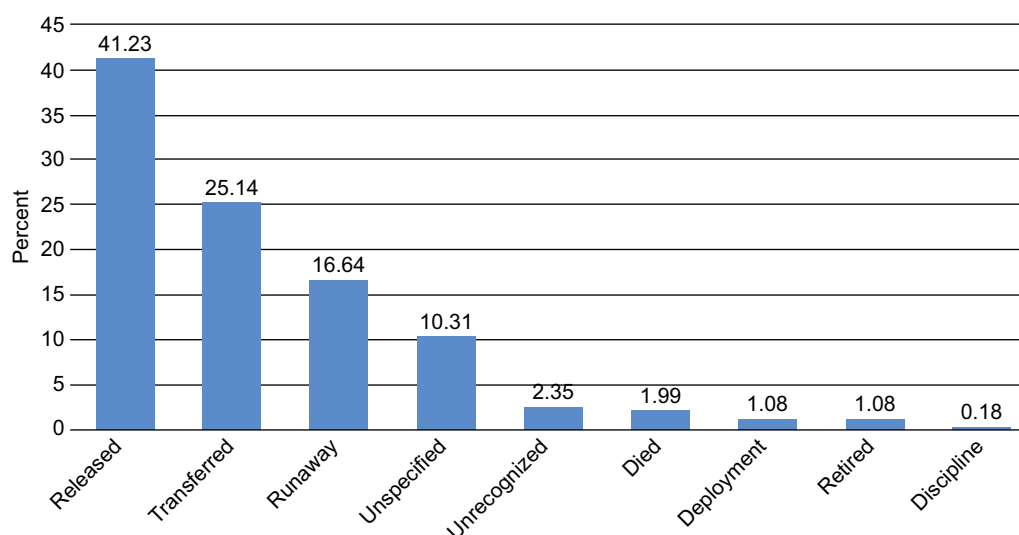
(30.16%) in Addis Ababa City Administration Health Bureau, 27 (25.23%) in Oromia, 6 (35.29%) in Tigray, 4 (44.44%) in Harari, and 3 (21.43%) in Dire Dawa city administrations.

Repeated turnover events

Of the total 536 turnover events, 131 (24.44%) had more than 1 appointments. Of these repeated cases, 99 (75.57%) were males and the remaining were females. In terms of educational levels, initially 111 (84.73%) were GPs and the remaining 20 (15.27%) were specialists. However, in the second appointments, the educational level improved in some of the cases and the number of specialists were increased from 20 to 31 (25.19%) and the number of GPs decreased to 98 (74.81%). In addition, 93 (70.99%) of the physicians went to similar health care settings (to the public health sector), whereas 37 (29.01%) went to the academic positions (medical schools). Of those who went to public health sector, 54 (58.06%) went to the same regions, while 39 (41.94%) left to other regions (~82.05% come to the capital, Addis Ababa).

Furthermore, the length of stay in between the destinations was come down from one destination to next; initially, the mean duration of stay was 3.4 years (95% CI: 2.66, 4.10), for next destination it became 1.33 years (95% CI: 1.12, 1.55) and then it declined to 1.01 years (95% CI: 0.20, 1.20).

Despite being small in number, whereabouts of physicians in the second destination were 3 physicians shift to the academics, 8 to other regions (5 to different regions, 2 to Addis Ababa, and 3 moved out of Addis), and 3 to same regions. However, no information was found for ~20 of the cases within the study settings (Table 4).

**Figure 1** Reasons for attritions for physicians who left their appointments in percent, September 2009 to July 2015.

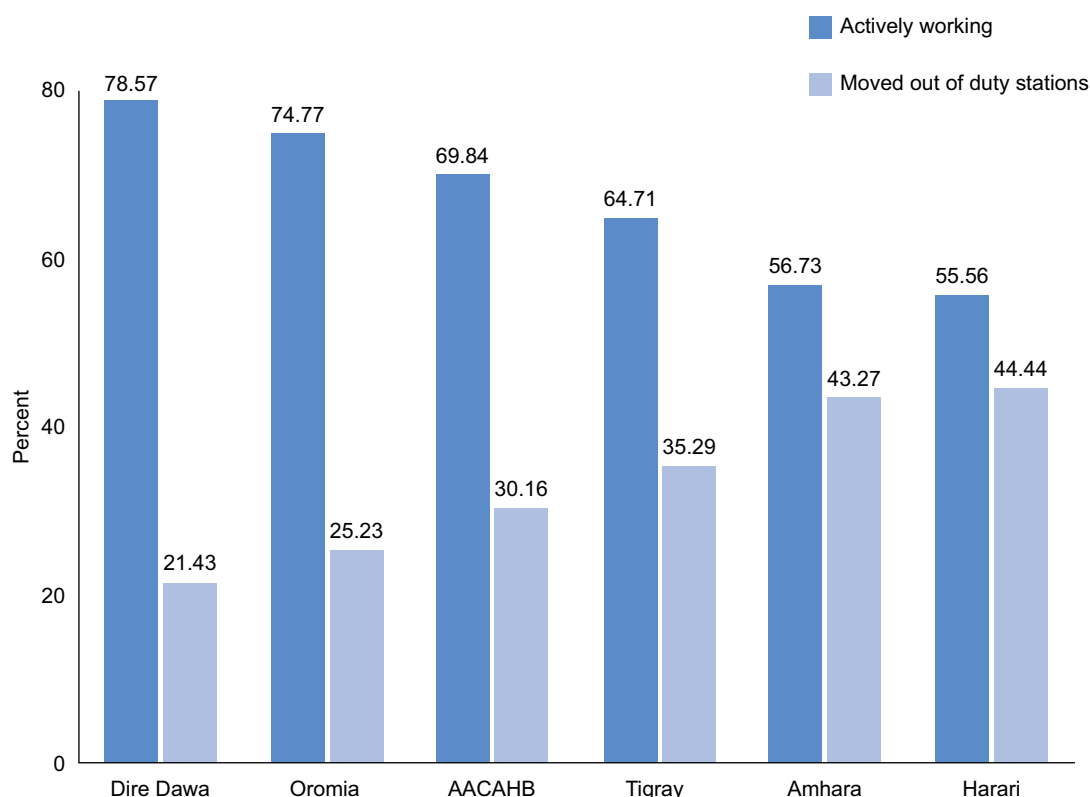


Figure 2 Comparisons between specialists who were actively working (during the study) and those who moved out of their duty stations across the regions in percent, September 2009 to July 2015.

Abbreviation: AACAHB, Addis Ababa City Administration Health Bureau.

Factors associated with physician turnover

Univariate analyses showed the presence of significant ($\alpha < 0.05$) association between physician turnover and their gender, birth year, health service delivery settings, and geographical locations. The Poisson regression model revealed that female physicians were 1.4 times more likely (IRR = 1.44; 95% CI: 1.14, 1.81) to move out from their duty stations compared to their counterparts. On the other hand, as the age of physicians increased, the incidence of physician turnover decreased; the incidence of turnover among physicians born between 1975 and 1985 was 37% (IRR = 0.63; 95% CI: 0.51, 0.79) lower compared to those born after 1985 years. Likewise, the likelihood of turnover among physicians born prior to 1975 was 76% (IRR = 0.24; 95% CI: 0.17, 0.34) lower compared to those who were born after 1985.

In terms of educational levels, GPs had a 31% increased incidence of turnover compared to specialists/subspecialists (IRR = 1.31; 95% CI: 0.99, 1.75), and the CI is marginal and not statistically significant ($P = 0.062$). In addition, turnover variations were observed between health service delivery settings. Compared to physicians working in referral hospitals, those working in the general hospitals were 1.39 times more likely to move out (IRR = 1.39; 95% CI: 1.08, 1.78) from their

duty station. Similarly, physicians working in district hospitals had more than 2-fold increased chance of turnover compared with those working in the referral hospitals (IRR = 2.14; 95% CI: 1.59, 2.89).

Regarding the turnover risk of physicians across the regions, compared to the capital Addis Ababa, the incidence of physician migration was 2 times higher in Amhara region (IRR = 2.01; 95% CI: 1.49, 2.73), however no statistically significant association has been observed for the remaining regions and city administration ($P > 0.05$) (Table 5).

Discussion

This study generates important information about the most recent physician workforce distribution and attrition in the public health facilities of Ethiopia through involving 119 hospitals (19 referral hospitals, 46 general hospitals, and 54 district hospitals) in 5 regions and in 2 city administrations. It examined the distribution and attrition of physician workforce including career opportunities in further training. The findings of the study suggest the presence of substantial improvement in physician workforce across the regions compared to the last 5 years.²⁷ Such information is valuable for making informed decisions for physician workforce planning, physician workforce retention, and health facility expansion and quality service provision in the country.

Table 4 Characteristics of repeated turnover events between September 2009 and July 2015

Variables	Characteristics	Frequency	Percent
Gender	Male	99	75.57
	Female	32	24.43
Educational level	GPs	111	84.73
	Specialists	20	15.27
Duration of stay in years	Mean	3.4 (95% CI: 2.66, 4.10)	
Fist destination			
Settings	Clinical	93	70.99
	Academic	37	29.01
Educational levels	GPs	98	74.81
	Specialists	31	25.19
Place moved (n = 93)	To same region	54	58.06
	To different regions	39	41.94
From different regions (n=39)	To Addis Ababa	32	82.05
	Another region	7	17.95
Duration of stay in years	Mean	1.33 (95% CI: 1.12, 1.55)	
Second destination (n = 31)			
Settings	Clinical	8	
	Academic	3	
	Unknown	20	
Place moved	To same region	3	
	To different regions	5	
From different regions (n = 5)	To Addis Ababa	2	
	Out of Addis Ababa	3	
	Ababa		
Duration of stay in years	Mean	1.01 (95% CI: 0.20, 1.20)	

Abbreviations: GP, general practitioner; CI, confidence interval.

In this study, the significant proportion of the medical service providers were male physicians, which indicates gender imbalance.⁷ On the contrary, females frequently moved out of their duty stations compared to males. This might be due to personal and family reasons and professional lifestyle factors.^{18,31}

Young and less experienced physicians share significant proportion of the public health sector physician workforce of the country. This might imply the presence of increase in physician workforce supply in the country. Nevertheless, the turnover rate was significantly higher among these groups, younger and less experienced because of the deployment of new graduates in remote areas that have poor infrastructure with unsatisfied expectations in incentives and professional lifestyles.^{19,32} Next to economic incentives, the importance of intrinsic motivation and being from rural origin were reported from African countries.³³ From Japan, population characteristics and medical demand in the population reported to attract physicians.³⁴

In this study, more than half of the physician workforce was serving in the general hospitals. However, the incidence of turnover was higher among those physicians who were working in general and district hospitals than those working in referral hospitals. This finding might imply the attention that needs to be given for those who assigned at distant and remote places.³⁵ Because previous studies indicated the direct link between physicians access with improved health outcomes, especially from chronic illness (which have been emerging in the country),²⁰ and the negative impact of

Table 5 Factors associated with physician turnover: using Poisson regression model between September 2009 and July 2015

Variable	Category	IRR	SE	P-value	95% CI	
					Lower	Upper
Gender	Male (reference)					
	Female	1.44	0.17	0.002	1.14	1.81
Date of birth	After 1985 (reference)					
	1975–1985	0.63	0.07	0.000	0.51	0.79
	Before 1975	0.24	0.04	0.000	0.17	0.34
Educational level	Specialist/subspecialist (reference)					
	GPs	1.31	0.19	0.062	0.99	1.75
Settings	Referral hospital (reference)					
	General hospital	1.39	0.18	0.008	1.08	1.78
	District hospital	2.14	0.33	0.000	1.59	2.89
Regional location	Addis Ababa (reference)					
	Amhara	2.01	0.31	0.000	1.49	2.73
	Dire Dawa	1.05	0.50	0.90	0.41	2.68
	Harari	0.75	0.38	0.57	0.27	2.04
	Oromia	1.10	0.17	0.53	0.82	1.48
	Tigray	0.60	0.18	0.10	0.34	1.10

Abbreviations: GP, general practitioner; CI, confidence interval; IRR, incident rate ratio; SE, standard error.

migration;³⁶ subsequently, it might result in institutional and service delivery imbalances.⁷

The study also examined turnover reasons, transfer (within the public health sector), and release (might be out of or within the public) were the common types. This might indicate the importance of both the types of migration (internal and external) as both affect the health service delivery.^{37,38} At the same time, the external migration also has a tendency to exacerbate in-country rural–urban migration,³⁹ it may result in mal-distribution of physicians between the regions, and urban–rural settings.¹²

In addition, significant proportion of physicians left uninformed regarding the whereabouts of their duty stations. This findings might imply lack of uniformity in human resource management^{8,22} and lack of functioning human resource information system which is very critical for health workers planning and understanding the loss rate.^{12,19,40}

In health service delivery, specialist physicians play critical role in undertaking clinical procedures than the general practitioners. However, compared to GPs proportion of specialists were very few. In addition, the turnover among specialists was 21.4% in Dire Dawa to 43.3% in Amhara region. It may suggest that regional disparity and rural–urban migration can potentially affect the clinical service quality and health service provision,⁷ and this finding might highlight the measures that need to be considered on the implementation of the recent HSTP and its achievement (which aimed at compassionate, respectful, and quality of care).

Repeated movement within the study settings might imply physicians' interest to work in the public health sector or unfinished compulsory service years or the presence of vacant places in urban areas. This might be true in the case of specialist as the educational level improved (from GP to specialist), they may have assigned to the next level, which is consistent with the descriptive findings and the regression model, the turnover rate is higher in district hospitals. However, improving benefits and creating conducive work environment might improve the situation, particularly for those who are interested to work in the public health sector because the role of intrinsic and motivational factors are reported in similar study.³³

Physician migration to the academic medical schools might be another important finding of this study. This might be explained by high demand for medical teachers following the rapid expansion in medical schools in the country. Or it might be due to perceived better working environment than the public health sector or a means to shift from the rural

and distant places, as most medical schools are located in urban places.

However, the higher incidence of migration to the capital, Addis Ababa, might be similar to the rural–urban migration as reported in previous studies,⁶ which might result in disparities in service provision, skill transfer, and health outcomes to the large majority of the population who live in the rural parts of Ethiopia.⁵ In addition, the mean duration among physicians who moved out from their duty stations also supports this explanation, as the rate of turnover increased the mean duration of stay in the duty station decreased.

Limitations

Despite its relevant contribution to human resource development and management in Ethiopia, this study has its own limitations. The available human resource data lack uniformity; the study did not address the performance of physicians and physicians working under the federal ministry of health or academics in the study settings.

Conclusion

The findings of this study suggest the presence of substantial improvement in physician workforce supply across the regions. However, compared to the size of population and health service demand in the community, there is physician workforce shortages, particularly of that of specialist physicians along with high turnover rates. This situation can potentially affect health care access, service provision, clinical service quality, and its outcomes among the community (potential source of health services inequalities), thus seeking the attention for those who have served their compulsory service years. More importantly, attention needs to be given in dealing with the challenges and opportunities to retain physicians in distant and remote places.

Turnover to the academic settings might also imply the way how the education and public health sector needs to work together. However, the turnover through transfer and release might indicate the presence of internal and external migration, and the external and rapid expansion in medical education might also exacerbate in-country rural–urban migration. On the other hand, physicians who left their duty stations uninformed about the whereabouts might indicate lack of uniformity in human resource management and retention mechanisms.

Finally, HRH data handling needs critical attention and improvement throughout the country. Further research on exploring the reasons for physician turnover and retention strategies that can potentially fit to the local context is recommended.

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Author contributions

TA conducted the study and performed statistical analysis, interpretation of the data, and manuscript writing. DHM supervised the study and performed statistical analysis and manuscript writing. WM supervised the study and assisted in statistical and data analysis and interpretation of the data. MD supervised the study and assisted in interpretation of the data and report writing. WE involved in interpretation of the findings and report writing. All the authors were involved in drafting and revising the manuscript and read and approved the final manuscript.

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Disclosure

The authors report no conflicts of interest in this work.

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Survival analysis to measure turnover of the medical education workforce in Ethiopia

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Abstract

Background: Until recently, there were only a few medical schools in Ethiopia. However, currently, in response to the apparent shortage in physician workforce, the country has made huge progress with respect to the expansion of medical schools, by adopting the so-called flooding strategy. Nevertheless, the effectiveness of the intended strategy also relies on physician accessibility and turnover. Therefore, the aim of this study was to examine the distribution of physicians in the medical schools of Ethiopia and to quantify the magnitude and identify factors associated with physician turnover.

Methods: This organizational faculty physician workforce survey was conducted in seven government-owned medical schools in Ethiopia. Longitudinal medical workforce data set of about 6 years (between September 2009 and June 2015) were retrospectively collected from each of the medical schools. The observation time begins with the date of employment (time zero) and ends at the date on which the physician leaves the appointment/or the data collection date. Kaplan-Meier survival method was used to describe the duration of stay of physicians in the academic health care settings. A Cox proportional hazards (CPH) model was fitted to identify the risk factors for physician turnover.

Results: In this study, a total of 1258 faculty physicians were observed in seven medical schools which resulted in 6670.5 physician-years. Of the total, there were 198 (15.7%) turnover events and the remaining 1060 (84.3%) were censored. The average turnover rate is about 29.7 per 1000 physician-years of observations. Multivariate modeling revealed no statistical significant difference in the rate of turnover between males and females (adjusted hazard ratio (AHR), 1.12; 95%CI, 0.71, 1.80). However, a lower rate of physician turnover was observed among those who were born before 1975 (AHR, 0.37; 95%CI, 0.20, 0.69) compared with those who were born after 1985. Physicians with the academic rank of associate professor and above had a lower (AHR, 0.25; 95%CI, 0.11, 0.60) rate of turnover in comparison to lecturers. In addition, physicians working in Jimma University had 1.66 times higher rate of turnover compared with those working in Addis Ababa University. However, the model showed a significantly lower rate of turnover in Mekelle (AHR, 0.16; 95%CI, 0.06, 0.41) and University of Gondar (AHR, 0.46; 95%CI, 0.25, 0.84) compared with that of Addis Ababa. Physician turnover in the remaining medical schools (Bahir Dar, Haromaya, and Hawassa) did not show a statistically significant difference with Addis Ababa University ($P > 0.05$).

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Conclusions: This study revealed a strong association between physician turnover with age, academic rank, and workplace. Therefore, the findings of the study have important implications in that attention needs to be given for the needs of faculty physicians and for improving the work environment in order to achieve a high level of retention.

Keywords: Ethiopia, Health workforce, Medical education workforce, Specialist, Faculty physician/physician, Physician turnover/retention, Physician migration, Survival analysis

Background

Medical education has a relatively short history in Ethiopia. This is reflected not only by the small number of medical schools, only three for several years, but also by the small number of medical doctors which have been produced. Since the establishment of the first three medical schools (Faculty of Medicine, Addis Ababa University (AAU) in 1964, Gondar Public Health College in 1978, and Jimma Medical School in 1983) to 2006, the medical schools were able to produce only less than four thousand medical doctors [1–3]. Besides, attractive overseas remuneration, non-governmental organizations (NGOs), or the private sector pulled the majority of the physician workforce out of the public health sector [2, 4]. This incidence, together with low production, left the country in severe physician workforce shortages and crisis.

However, following the apparent shortages and crisis, the country began to work on health workforce retention and production. Salary increment, incentives according to geographical location, and further training opportunities have been set as retention strategies [5]. Moreover, massive increase has been made in medical education expansion which started with the establishment of the two medical schools in Mekelle (MU) and Hawassa (HwU) Universities in 2003 by involving the private sector. The number of medical schools grew from three to more than 25 [6] using the so-called flooding strategy [7].

By its very nature, clinical service provision and medical education are human resource intensive. This claims a human resource development strategy that can possibly fit to the context, in a way that balances the supply and demand that means, taking into account the economic and health system demand to accommodate large number of graduates [8]. And on the supply side, medical training demands good composition of medical instructors and their relative stay in the medical schools along with other necessary resources [9, 10].

This research intends to add to the existing body of little knowledge in resource-limited settings. For instance, in the Ethiopian context, in organizationally embedded teaching hospitals, medical teachers are professional physicians (the medical education workforce have dual

roles—both as instructors of the medical students and clinical service providers). Thus, there should be many physicians with various specialty and sub-specialty trainings coupled with rich experience in their field of specialty in these teaching hospitals. We need, therefore, to examine the availability (in required number, qualification, and composition) of physicians in the medical schools of Ethiopia and identify factors associated with their turnover which warrants this study.

Balancing health workforce distribution and retention strategies through evidence-based intervention in the academic health care setting mostly depends upon different factors: firstly, on the availability of continuous data and the practice of analyzing the data to understand the situation; secondly, on the experience of transforming such data into valuable information for informed decision making [11] which is very important for making policy decisions on medical education expansion and to strengthening the existing medical schools; and finally, on the system's commitment in using evidence-based interventions to improve the situation together with the knowledge of their effectiveness. Many developing countries including Ethiopia, however, lack these important interlinked components of health human resources management.

In Ethiopia, the medical education expansion to address the severe workforce shortage would have been complete if adequate evidence were taken into consideration, particularly on the medical education workforce composition and the effect of the massive admissions to medical schools on physician workforce performance (as instructors of medical students and clinical care providers). Such evidence would also inform the effectiveness of human resource retention strategies in reducing the turnover. Therefore, this study tries to show the distribution of medical education workforce by their different characteristics and their turnover and retention.

Methods

Settings

This study involved seven government-owned medical schools in Ethiopia. Each medical school has organizationally embedded teaching hospitals (in the

country's health care tier system, teaching hospital provides the highest/tertiary level health care; also called specialized hospital) with the exception of Bahir Dar University (BDU). For instance, the Faculty of Medicine, AAU, which is the biggest medical school in the country owned Tikur Anbessa Specialized Hospital which is the biggest referral hospital in the country. The School of Medicine, University of Gondar (UOG), is located in Amhara Region, Northwest Ethiopia. Its teaching hospital serves as one of the referral hospitals in the region. Similarly, the School of Medicine, BDU, is located in Bahir Dar city, the capital of Amhara Region. At the time of this study, this medical school did not have its own teaching hospital though it has been using Felege Hiwot Referral Hospital, owned by the regional health bureau.

Similarly, the School of Medicine, MU, is located in Mekelle city, the capital of Tigray Region. Its teaching hospital is called Ayder Referral Hospital, the biggest referral hospital in the region. The School of Medicine, Jimma University (JU), is located in Jimma town, Southwest Ethiopia. Its teaching hospital is also the biggest referral hospital in Southwest Ethiopia. The School of Medicine, HwU, is located in Hawassa city, the capital of Southern Nations, Nationalities, and Peoples Region (SNNPR) of Ethiopia. The teaching hospital serves as a referral hospital for the community residing in the region and around. Likewise, the School of Medicine, Haromaya University (HU), is located in the old Harar city, Harari Region. And its teaching hospital, Hiwot Fana Referral, provides clinical service for the population residing in the eastern provinces of the country (Fig. 1). At the time of the study, each medical school had an average of 578 pre-clinical and 589 clinical year students. In addition, the proportion of foreign and contract staffs were varied across the medical schools and estimated from less than 1 to 13.5% of the workforce (Table 1).

Study design

This organizational medical education workforce survey was conducted between February and June, 2015. Despite the importance and global recognition of the Human Resource Information System (HRIS) [11], Ethiopia does not yet have a well-organized Human Resources for Health (HRH) database system. Thus, this particular study retrospectively organized longitudinal data by collecting the available records from the human resource departments of the study medical schools. In measuring the medical education workforce turnover and retention, we employed the concepts in survival analysis [12]. In this study, the event of interest was "turnover of physicians from the medical schools in which they had been working between

September 2009 and June 2015." The observation time begins with the date of employment (time zero) and ends at the date in which the health worker leaves the appointment/or were observed during data collection.

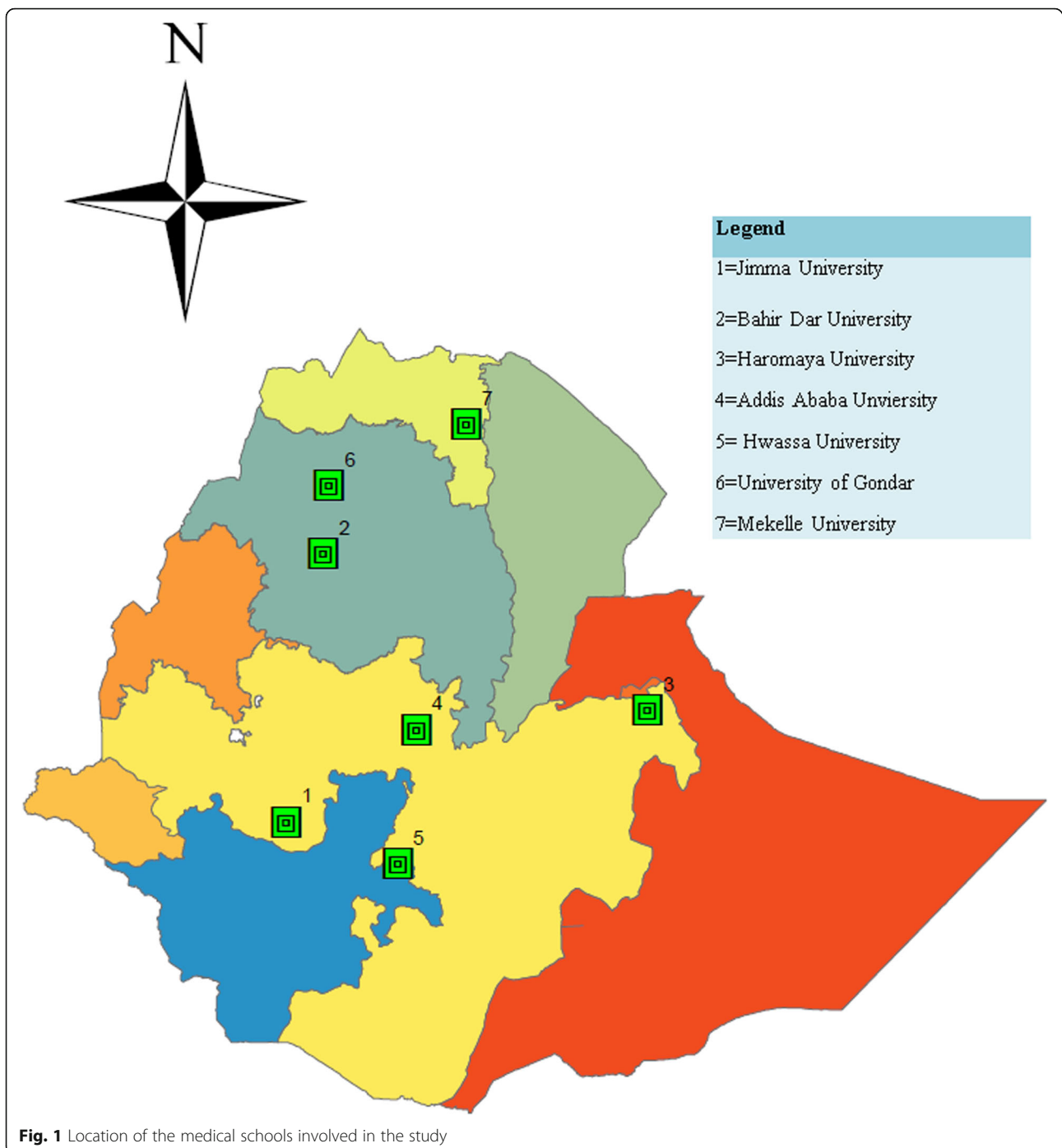
Data

Currently, the health workforce data are at the stage of transition from rudimentary paper-based system to capturing with excel spreadsheet using computer so that the data were not easily amenable for use in health workforce planning and undertaking research. For this study, individual practitioner level data were collected from the human resource units/departments of the study medical schools. The data have two main components: inflows and outflows. The inflow data are recorded to each physician when the physician takes up the position in the medical school, and the outflow data are recorded at the time when the physician leaves the position.

The data have also milestone characteristics including faculty physicians training opportunities, distribution, and turnover. Moreover, socio-demographic variables such as date of birth, gender, and date of appointment were commonly available including the field of specialties. However, some demographic variables such as marital status, ethnicity, and the names of institutions at which they had their residency training and fellowship were not completely recorded.

Operational definitions

- *Medical education workforce*: refers to physicians (medical doctors) who teach medical students and provide direct patient/clinical care to patients/clients in the affiliated teaching hospitals.
- *Actively working faculty physicians/medical education workforce*: those physicians who were currently (during the data collection) working in the medical schools as medical instructors and clinical service providers.
- *General practitioner (GP)*: refers to a medical doctor who qualified as a general practitioner or a physician who does not specialize in one particular area of medicine.
- *Specialist*: one who completed medical education in a certain area of medical specialty (such as internal medicine, surgery, pediatrics, gynecology, and obstetrics) after being trained/having served as a GP.
- *Sub-specialist*: one who received training in a certain sub-specialty area after being trained/having served as a GP and/or specialists.



- *Turnover*: a transition made (in the form of official resignation, transfer by a physician after taking up appointment within the time of interest).
- *Officially left*: refers to those who left a certain medical school by getting permission from authorities and whose whereabouts and reasons for leaving are known; the one who took a release paper officially.
- *Runaway*: refers to those faculty physicians who left from the medical schools without letting the office know their whereabouts while they leave.
- *Retired*: refers those who depart from the medical school due to retirement.
- *Transferred*: indicates movement of physicians within the public health sector, could be to the academic or non-academic health care settings.

Table 1 Background information of the medical schools with their respective teaching hospitals involved in the study

S.No	Name of the university	Year established	Pre-clinical and clinical year students (2014/2015)		Name of teaching hospital	Teaching staff			
						Expatriate	Contract	Non-academic	Academic
1.	Addis Ababa	1964	926	776	Tikur Anbessa Specialized Hospital	10	–	4	320
2.	Gondar	1978	564	616	Gondar Referral Hospital	1	3	14	164
3.	Jimma	1983	631	568	Jimma University Specialized Hospital	13	1	21	120
4.	Mekelle	2003	489	637	Ayder Referral Hospital	5	–	2	160
5.	Hawassa	2003	503	477	Hawassa Referral Hospital	2	4	2	116
6.	Haromaya	2007	550	580	Hiwot Fana Referral Hospital	–	–	6	65
7.	Bahir Dar	2007	386	470	Felege Hiwot Referral Hospital	2	18	NA	115

Sources: FMOE, annual educational abstract, 2012/2013 and the medical schools

– information not accessed, NA not applicable

- *Died*: refers to the departure of a physician from the medical school because of death.
 - *Unrecognized*: refers to a turnover not recognized by the HR office before the date of data collection.
 - *Unspecified*: refers to lack of reliable information in the HR department to label the event under any of the above categories.
- Duration of stay
- For actively working medical education workforce, duration of stay in the assigned place is calculated by subtracting the date of data collection from the date of employment.
 - For those who left their place of appointment, duration of stay is calculated using the date of departure.
 - For those with unknown dates of attrition, service year was subtracted from the date of data collection.

Data analysis

After completing the data processing and edition in excel spreadsheet, data were imported into Stata Version 13 [13] using Stat transfer version9. Descriptive statistics were used to describe the characteristics of actively working medical education workforce/trainer physicians, the inflows and outflows of physicians, to compare educational levels, and to illustrate differences across medical schools.

Survival analysis

Survival analysis is convenient for studies with time to event data. If study participants are unable to get enrolled at the start of observation time and did not leave before the end of the observation, retire, or die during the follow-up, then they will be censored [14]. “Retention/stay in” is the duration in which faculty physicians were working in their place of appointment, while “turnover/migration” refers the time at which they left their place of appointment.

Event implies “the turnover/migration of a physician from the academic health care setting.” Here in this survey, there may be repeated transitions and taking up of positions in different medical schools which were considered as an episode of independent observation. The date of employment is considered as the beginning time of the observation with time = 0 and ends at the date on which the physician leaves the appointment (September 10, 2009, and June 30, 2015)/or the date of data collection. The ending time was limited for two possible reasons: the first reason was to examine the recent physician turnover experience from the medical schools and the second reason was the availability and completeness of the turnover data.

The Kaplan-Meier survival curve was used to describe the survival/length of stay of physicians in the medical schools by their academic ranks. In this study, Cox’s proportional hazards (CPH) model was employed because the model is semi-parametric that allows for no assumptions to be made about the baseline distribution; and its flexibility to handle censoring of the survival time is due to its use of the partial likelihood function. This was important to our study in that any temporal biases due to differences in the date of employment (delayed entry to the system) for different physicians over the period; also, it allows investigating the effect of covariates by controlling other confounding variables [14]. The Cox proportional hazard model was run to identify the risk factors for physicians leaving their appointment. In fitting the model, first we set the data as panel which is a requirement in survival analysis. For categorical variables, dummy variables were created which were used to measure the association using the reference category of choice (for example, gender was coded as males = 1 (reference), females = 2); academic rank was categorized into three (lecturers = 1 (reference), assistant professors = 2, and associate professors and above = 3); date of birth is also categorized into three (born after 1985 = 1 (reference), between 1975 and 1985 = 2, and before 1975 = 3); and for medical schools, Addis Ababa University is

chosen as a reference and the other medical schools are given subsequent numbers.

The Cox proportional hazard model was run using an enter method model building approach, hazard ratios (with 95%CI, and P value <0.05 as cut-off points) were used to explain the observed significant differences, and Breslow's approximation was used to handle ties. The proportional hazard assumption was checked, and then posttest of proportional hazards assumption was run. The P value for global test equals to 0.466, indicating validity of proportional hazard assumptions. However, two variables, educational level and service year, were excluded from the model because they were found col-linear with the academic rank.

Results

During the observation period of the study, between September 2009 and June 2015, there were a total of 1258 faculty physicians in seven medical schools. A total of 6670.5 physician-years of observation were analyzed for the study period, 198 (15.7%) observations were completed, and the remaining 1060 (84.3%) were censored. The average turnover rate is about 29.7 per 1000 physician-years of observations.

Characteristics of actively working faculty physician workforce

Of the total 1060 observations (actively working faculty physicians during the study), the majority 877 (82.8%) were males and the remaining 182 (17.2%) were female physicians. Younger physicians who were born after 1985 accounted for nearly half of the faculty physician workforce 501 (47.3%), while those born prior to 1975 were only less than 20%, 207 (19.5%).

In terms of work experience, 461 (43.5%) had worked for less than 3 years, while 335 (31.6%) had served the medical schools between 3 and 6 years, whereas only very few proportion 74 (6.9%) had worked for 15 or more years.

Regarding the educational levels, GPs constituted 61.7% of the actively working academic physician workforce, while specialists/sub-specialists constituted only 38.3%. The study has also revealed that lecturers/junior faculties constituted the large majority, 61.4%, while associate and full professors represent only 4.2% and less than 1% of the teaching physician workforce, respectively (Table 2).

The number of physicians varied across the medical schools involved in the study. AAU had 320 (30.2%) of the total medical education workforce followed by the University of Gondar 164 (15.5%) and Mekelle 160 (15.1%). In terms of level of specialty, 59.2% of the teaching physician workforce at AAU were specialists/sub-specialists, 30.7% were residents, and only 10% were

Table 2 Characteristics of actively (during the study) working faculty physicians in the medical schools of Ethiopia, Feb–June 2015

Variable	Characteristics	Frequency	Percent
Gender	Male	877	82.8
	Female	182	17.2
Date of birth	Prior to 1975	207	19.5
	1975–1985	338	31.9
	After 1985	501	47.3
Service years	<3	461	43.5
	3–6	335	31.6
	7–10	152	14.3
	11–14	32	3.0
	≥ 15	74	6.9
Educational level	GPs	653	61.7
	Specialist/sub-specialist	407	38.3
Academic rank	Lecturers	651	61.4
	Assistant professors	354	33.4
	Associate professors	45	4.2
	Full professors	10	0.9
	Total of each variable	1 060	100.0

general practitioners. On the other hand, the proportions of specialists/sub-specialists in the other universities ranged from 49.2% in Jimma to below 20% in Haromaya and Bahir Dar. Similarly, significant proportions of the medical education workforce were also continuing their education (either in the residency or fellowship programs) (Table 3).

The study also examined the distribution of medical education workforce across the common clinical specialty areas (internal medicine, surgery, obstetrics and gynecology, and pediatrics) (Fig. 2). At AAU, the highest number of specialists/sub-specialists was observed in the area of surgery (39) and the least were in pathology (7). In the area of obstetrics and gynecology, the distribution ranges from 10 at AAU to only one at Bahir Dar and Haromaya. The two latter medical schools did not also have a specialist in pediatrics and child health at the time of the study. Moreover, Haromaya medical school did not have specialists of pathology and ophthalmology. Mekelle medical school did not also have a specialist in the field of ophthalmology at the time of the study.

Characteristics of faculty physician turnover

Table 4 showed the overall turnover rates among the studied medical schools. It indicates that the turnover rate is much higher among males (20.1%) than females (11.5%). On average, the turnover rate among physicians born during 1975–1985 was 29.3%, while the same rate was only 7% for those physicians whose birthdates were after 1985.

Table 3 Distribution of actively working faculty physicians in three main categories: GPs, residents, specialists/sub-specialists in Ethiopia, Feb–June 2015

Medical school	GPs		Residents/fellows		Specialists/sub-specialists		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
AAU	32	10.0	98	30.7	190	59.2	320	30.2
UOG	34	20.7	87	53.1	43	26.2	164	15.5
MU	23	14.4	85	53.1	52	32.5	160	15.1
JU	15	12.5	46	38.3	59	49.2	120	11.3
HWU	24	20.7	49	42.2	43	37.1	116	11.0
BDU	64	55.6	41	35.6	10	8.7	115	10.9
HU	26	40	29	44.6	10	15.4	65	6.1
Total	218	100	435	100	407	100	1 060	100

Abbreviations: AAU Addis Ababa University, BDU Bahir Dar University, HU Haromaya University, HwU Hawassa University, JU Jimma University, MU Mekelle University, UOG University of Gondar

On the other hand, the rate of turnover did not also show uniformity across service years. It is much higher among those who worked as faculty physician for the duration of 3–6 and 11–14 years, which is 25.1 and 28.1%, respectively, whereas the turnover rate among physicians who served their respective medical schools for less than 3 and between 7 and 10 years is nearly identical, 14.1 and 14.5%, respectively.

The turnover rate was much higher among specialists/sub-specialists than GPs. On average, the turnover rate among specialists/sub-specialists was 35.1% whereas among GPs, it was only 8.4%. Within academic ranks, more than twofold turnover rate was observed among assistant professors, 37.9%, compared with associate professors and full professors, 16.4%.

In addition, the turnover rate also varied among study medical schools. The highest turnover rate was observed in Jimma medical school 43.3%, followed by Haromaya 27.7%, whereas much lower turnover rate was observed in Mekelle and the University of Gondar medical schools, which was only 3.8 and 10.4%, respectively. In addition, the study also examined the procedures used for the move out from the study medical schools. Some obtained official permission while others did it without permission. Official permission through legal release was secured among 46.2% of the out migrant physicians whereas 41.7% of them did it without even informing their respective medical schools. And only very few proportion departed through inevitable events, such as retirement (3%) and death (0.5%) (Table 4).

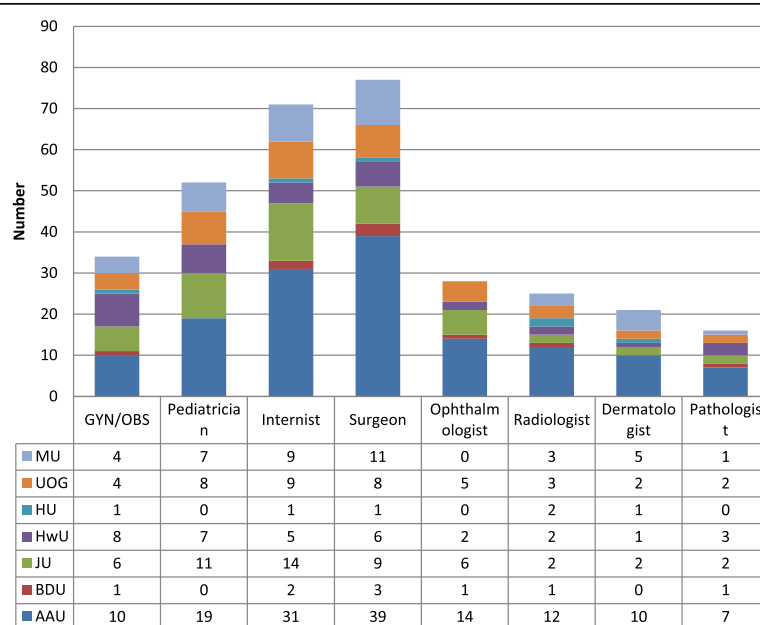
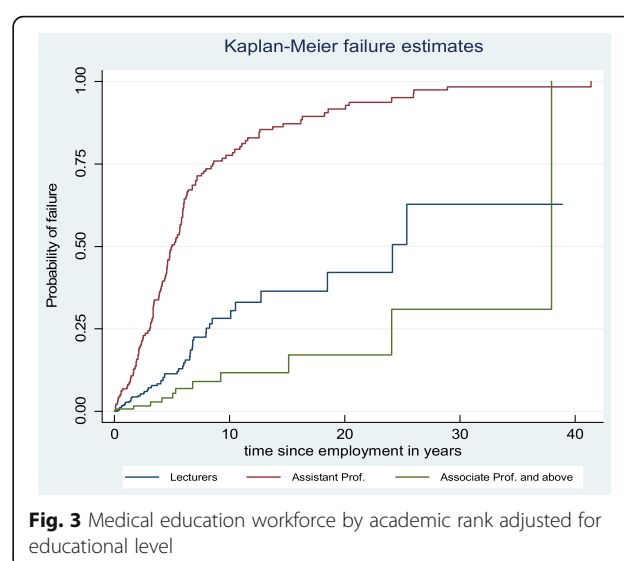
**Fig. 2** Distribution of faculty physicians by different areas of specialty category across the medical schools between Feb–June 2015

Table 4 Faculty physician turnover rates between Sep 2009 and June 2015

Variable	Characteristics	Frequency	Percent
Gender	Male	177	20.1
	Female	21	11.53
Date of birth	Prior to 1975	54	26.08
	1975–1985	99	29.28
	After 1985	35	6.98
Service years	<3	65	14.1
	3–6	84	25.1
	7–10	22	14.5
	11–14	9	28.1
	≥15	17	23.0
Educational level	GPs	55	8.4
	Specialists/sub-specialists	143	35.1
Academic rank	Lecturers	55	8.4
	Assistant professors	134	37.9
	Associate professors	7	15.6
	Full professors	2	20
Medical schools	AAU	66	20.6
	JU	52	43.3
	HwU	22	19.0
	HU	18	27.7
	UOG	17	10.4
	BDU	17	14.8
Turnover categories	MU	6	3.8
	Officially left	92	46.2
	Runaway	82	41.7
	Unspecified	7	3.5
	Retired	6	3.0
	Transferred	6	3.0
	Unrecognized	4	2.1
	Died	1	0.5

Findings from the survival analysis

Figure 3 illustrates a turnover pattern for academic physicians working as lecturers, assistant professors, and associate and full professors after adjusting for educational levels. The log-rank test is statistically significant ($\chi^2 = 24$; $P < 0.001$), that means the turnover rate varies between the academic ranks. The turnover rate was higher among the middle rank (assistant professors), followed by the lower rank (lecturers) and the highest academic rank associate and full professors. The sharp increase in the turnover pattern among assistant professors was noticeable in the first 10 years of service. In fact, the attrition rate has been fast in the early years of service for all academic ranks portrayed in Fig. 3. The turnover curve was steadily increasing for physicians working for 10 to



27 years and leveled for those working between 27 and 38 years indicating a very low turnover rate among this group. In the end, the line goes up vertically which indicate a natural separation for those who reached to the age of retirement.

Univariate analyses revealed statistically significant ($p < 0.05$) differences in the turnover rates of faculty physicians by their gender, birth year, educational level, academic rank, and medical school groups. When multivariate Cox's proportional hazard model was fitted to identify factors associated with physician turnover after controlling other variables, no statistical significant difference was observed in the rate of turnover between males and females (AHR, 1.12; 95%CI, 0.71, 1.80). However, the model revealed that those who were born prior to 1975 had a 63% lower rate of turnover (AHR, 0.37; 95%CI, 0.20, 0.69) compared with physicians born after 1985. No statistical significant difference in the rate of physician turnover was revealed between those born during 1975–1985 and the reference group, who were born after 1985 ($P > 0.05$). Physicians with the academic rank of associate professors and above were also associated with a 75% lower (AHR, 0.25; 95%CI, 0.11, 0.60) rate of turnover compared with lecturers but not for assistant professors compared with the reference group, lecturers ($P > 0.05$).

With regard to differences in the risk of turnover across medical schools, physicians working in Jimma had 1.66 times increased rate of turnover compared with the rate of those at AAU (AHR, 1.66; 95%CI, 1.08, 2.55). On the other hand, physicians in Mekelle had an 84% decreased risk of turnover and those at the University of Gondar had a 54% decreased risk of turnover compared with the reference group, AAU with the following values (AHR, 0.16; 95%CI, 0.06, 0.41) and (AHR, 0.46; 95%CI,

0.25, 0.84), respectively. However, in the risk of physician turnover in the remaining medical schools (Bahir Dar, Haromaya, and Hawassa) was not statistically significantly different compared with the risk of turnover among physicians working in the Medical Faculty of Addis Ababa University ($P > 0.05$) (Table 5).

Discussion

Using a longitudinal retrospective data, this study showed the characteristics of medical education workforce in Ethiopia. Our results confirm that the medical education workforce is composed of predominantly males, young, and less experienced faculty physicians. The medical education workforce composition and turnover significantly varied across the studied medical schools, even among the long-standing medical schools (the turnover rate has been average in Addis Ababa, higher at JU, and lower in UOG and Mekelle). This might have an important implication for managing HRH turnovers in the teaching health care settings, in creating uniform and conducive work environment across the medical schools, and for improved patient outcomes at teaching hospitals and for the better attainment of medical students. And also, this is valuable evidence for making informed decision in the expansion of medical education.

In the study, general practitioners and residents share substantial proportion of the medical education workforce of the country. Nevertheless, the turnover rate was seen to be significantly lower among younger and less experienced physicians. This may indicate the presence

of improved supply in physician workforce and/or use of compulsory service schemes delayed the turnover of younger physicians from the public sector [15].

On the other hand, even though the proportion of physicians who reached to the highest academic ranks (associate and full professors) were very low, the rate of turnover among them was comparatively lower. This finding may suggest low incentive packages as potential sources of inducing turnover as reported elsewhere [16–18]. In addition, it is also possible that senior physicians in teaching and research might be relatively more satisfied in their carriers to stay longer in their positions, indicating the needs for rewarding excellence and professional standards for retaining the physician workforce [10, 19].

The present study has also identified shortages and lack of diversity in medical education workforce. The shortage of specialists in the areas of pediatrics and child health and obstetrics and gynecology are specially concerning since these areas are the most demanding and critical to address the maternal and child health needs of the country [20]. Furthermore, there are also evidence in the literature regarding the importance of diversity in the medical workforce for improved patient outcomes and for better educational attainment of medical students [19]. These findings also imply that instead of mere expansion of medical schools without having appropriate medical teaching workforce, it is important to fulfill basic requirements and to address the critical incentive needs of the teaching workforce [9].

The results of the Kaplan-Meier survival curve showed statistically significant difference in the rate of turnover

Table 5 Cox proportional hazards model: risk factors for faculty physician turnover, Sep 2009 and June 2015

Variables	Category	Adjusted hazard ratio (AHR)	SE	P value	LL 95%CI	UL 95%CI
Gender	Males (Ref.)					
	Females	1.12	0.27	0.60	0.71	1.80
Date of birth	After 1885 (Ref.)					
	1975–1985	0.91	0.23	0.73	0.56	1.49
	Prior 1975	0.37	0.11	0.002*	0.20	0.69
Academic rank	Lecturers (Ref.)					
	Assistant professors	1.03	0.24	0.89	0.66	1.61
	Associate professors and above	0.25	0.11	0.002*	0.11	0.60
Medical schools	AAU (Ref.)					
	BDU	1.12	0.34	0.70	0.62	2.04
	UOG	0.46	0.14	0.01*	0.25	0.84
	HU	1.25	0.37	0.44	0.70	2.24
	HwU	0.84	0.23	0.54	0.49	1.45
	JU	1.66	0.36	0.02*	1.08	2.55
	MU	0.16	0.07	0.00**	0.06	0.41

$n = 198$

Ref reference group, SE standard error, CI confidence interval, LL lower limit, UL upper limit

* $p < 0.05$; ** $p < 0.001$

between the academic ranks. In addition, the findings from the Cox proportional hazard model showed lower risk of turnover among older and higher academic ranks, indicating the need for focusing in research-oriented retention strategies and for working more on retaining younger physicians because they are the successors of the retiring seniors. Furthermore, the Cox proportional hazard model shows variations in the rate of turnover among the schools included in the study. This might be a reflection of the different working environments within the schools, despite the fact that all of them are owned and administered by the same government ministry (an issue of serious concern). In particular, high rates of turnover within the longstanding medical schools might reflect the presence of pushing factors in the work environment [20, 21], in addition to issues of management that relate to the retention of the medical education workforce [22]. The descriptive findings might also support such justifications since about 41.7% of the physicians left their appointments without notifying their reasons [15].

Overall, to be effective in human resource development, two major health system efforts, physician recruitment and retention, should go side by side [23], in addition to the need for reducing the pull factors by improving the supply and push factors by strengthening health care system which is also necessary [24–26].

Limitations

This study has two potential limitations: it did not address the performance and was not able to capture the whereabouts of those who left their appointments and the medical schools did not also have well-organized HRIS database.

Conclusions

The studied medical schools provide not only medical education to the medical students but also clinical care for the large segment of the population in the country. Shortages and lack of diversity in clinical specialties in the medical schools can affect the quality of medical education and the current and the future clinical service delivery in the country; hence, the current medical schools and their practice will build the future health human resources of the country. To sustain the quality of medical education, the findings of this study suggest the need for improving the medical education workforce composition and retention through devising various strategies. In addition, different rates of turnover among medical schools might indicate the need for creating uniform and better work environment across the medical schools. Furthermore, attention should be given for health human resources data recording and management throughout the medical schools. And finally, qualitative

study is recommended to explore the potential reasons for physician turnover including the observed turnover variations among the medical schools.

Abbreviations

AAU: Addis Ababa University; AHR: Adjusted hazard ratio; BDU: Bahir Dar University; CPH: Cox proportional hazards; FMOE: Federal Ministry of Education; GNY/OBS: Obstetrics and gynecology; GP: General practitioner; HRH: Human Resources for Health; HR: Human resources; HRIS: Human resource information system; HU: Haromaya University; HwU: Hawassa University; IRB: Institutional review board; JU: Jimma University; MEPI: Medical Education Initiative Partnership; MU: Mekelle University; UOG: University of Gondar

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Availability of data and materials

The data set supporting the findings and the conclusions of this article are available. However, the study institutions need to be consented for sharing the raw data.

Authors' contributions

TA conducted the study, statistical analysis, interpretation of the data, and manuscript writing. DM supervised the study, the statistical analysis, and the manuscript writing. WM supervised the study and assisted in the data analysis and the interpretation of the data. MD supervised the study, the interpretation of the data, and the report writing. All authors were involved in drafting the manuscript and the manuscript revision. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

Initially, the study received permission from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No. 043/14/SPH). The approval from AAU was also accepted for conducting the study in Bahir Dar, Haromaya, Hawassa, and Jimma Universities. In addition, the review boards of the other study organizations, University of Gondar and Mekelle University have reviewed the proposal and gave ethical permissions to conduct the study in their respective medical school.

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RESEARCH ARTICLE

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Medical students' career choices, preference for placement, and attitudes towards the role of medical instruction in Ethiopia

Tsion Assefa^{1*}, Damen Haile Mariam¹, Wubegzier Mekonnen¹ and Miliard Derbew²

Abstract

Background: In Ethiopia, the health care delivery and the system of medical education have been expanding rapidly. However, in spite of the expansion, no studies have been carried out among medical students to identify their career choices and attitudes towards the medical instruction. Therefore, this study aimed to fill the gap in evidence in these specific areas.

Methods: Pretested questionnaire was self-administered among fifth and sixth year medical students in six government owned medical schools in Ethiopia. A total of 959 students were involved in the study with a response rate of 82.2%. Career choices, intention where to work just after graduation, and attitudes towards medical instruction were descriptively presented. Binary logistic regression model was fitted to identify factors associated with the intention of medical students to work in rural and remote areas.

Results: Majority, (70.1%) of the medical students wanted to practice in clinical care settings. However, only a small proportion of them showed interest to work in rural and remote areas (21% in zonal and 8.7% in district/small towns). For most, internal medicine was the first specialty of choice followed by surgery. However, students showed little interest in obstetrics and gynecology, as well as in pediatrics and child health as their first specialty of choice. Medical students' attitudes towards their school in preparing them to work in rural and remote areas, to pursue their career within the country and to specialize in medical disciplines in which there are shortages in the country were low. The binary logistic regression model revealed that a significantly increased odds of preference to work in rural and remote areas was observed among males, those who were born in rural areas, the medical students of Addis Ababa University and those who had the desire to serve within the country.

Conclusion: This study showed that Ethiopian medical schools are training medical workforce with preferences not to work in rural and remote places, and not to specialize in disciplines where there are shortages in the country. Thus, attention should be given to influence medical students' attitude to work in rural and remote locations and to specialize in diverse clinical specialties.

Keywords: Career choice, Ethiopia, Medical students, Medical instruction/education/mentoring, Specialty choice, Practice location, Rural/remote practice

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Background

Health workforce education and training is a complex investment, which align education, finance, labor market and policies [1, 2]. In this regard, however, many low-income countries including Ethiopia face significant challenges to train medical doctors [3–5]. Most medical schools have limited residency programs to satisfy the postgraduate career preference, limited role on current and future possibilities (enhancing participation for collective and individual learning) including in providing career and social orientations to medical students [3, 6, 7]. On the other hand, medical students have misunderstandings about the wider picture of medical profession and their personal learning plans [8, 9].

For several years, expansion and development in medical education in Ethiopia was very slow given the fast growing population along with increasing health care demands. However, addressing community health needs were the prime intention of the medical education program since the 1960s, when the country's first medical faculty was opened with a slogan of *"the clinical training and internship must be related to the needs of Ethiopia"* [10]. To date, however, the medical doctors are not available in the communities of rural and remote inhabitants [11–14]. Furthermore, the needs of the medical graduates do not seem to have been addressed, given that many of them have left the country and significant proportion of medical students also intend to leave [15, 16].

In professional life, career preferences and choices depend upon different interlinked factors [8, 17, 18]. These include the characteristics of [1] medical schools such as curriculum, orientation to students on career

and socialization, recruitment of medical students, faculty values and institutional culture; (2) the characteristics of students such as age, gender, geography and study year; (3) the student values including marital status, academic performance, and attitudes; (4) needs to satisfy for instance expected salary, career options, intellectual satisfaction and workload; (5) perception on specialty characteristics such as availability of positions, and experience during the medical schools; and (6) perception of opportunities such as emigration and working abroad. Figure 1, illustrates the theoretical framework and the interaction among the interlinked factors with career choice [8, 18].

Strengthening medical education is the best strategy to address shortages and distribution of physicians for health care service provision in rural and remote areas. Thus, evidences suggest that the need for putting in place appropriate education and training policies in high-income and low-income countries. For high-income countries not to rely on emigrant physicians [19]; whereas for low-income countries there is a need to retain medical doctors along with strengthening the system of medical education for delivering health care to the rural population and underserved areas [2, 20]. Retention issues are also important in low-income countries since many of their medical graduates want to migrate and pursue their careers abroad [21]. The situation in Ethiopia is not different in this regard despite the limitations of evidences [15].

Understanding medical students' career preference and intentions where to practice just after graduation is crucial for designing suitable medical school curricula and responding for the requirements of the medical workforce at different stages of their professional life. Therefore, this

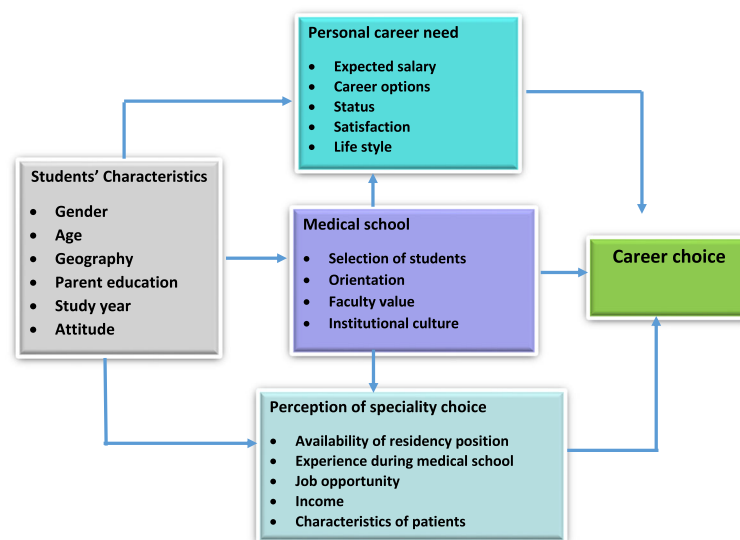


Fig. 1 Factors that affect medical students' career choices (Source: Adopted from Bland CJ, Meurer LN, Maldonado G. Acad. Med. 70:7, 1995)

study aimed to examine medical students' career choices and attitudes towards medical instruction in preparing the medical students to work in rural and remote locations of Ethiopia.

Methods

Setting

Ethiopia has nine regional states and two city administrative councils. The regional states are subdivided into zonal, district (woreda) and kebele (the lowest) structural administrative units. The country has a population of 92 million, of which about 80% reside in rural areas [11].

In addition, the health service delivery is organized into three-tier system. The first level/district health system, comprises of primary hospitals, health centers and health posts, while the second level includes general hospitals (also called zonal hospitals), and the third tier consists of teaching/specialized hospitals. Medical doctors in Ethiopia are deployed at all levels of hospitals, with the exception of primary hospitals for specialists [22].

In Ethiopia, students usually join to the medical schools directly after completion of high school without previous tertiary or college level training. However, in more recent years graduates of other health science disciplines or related fields have been join to the medical schools using the so called "innovative medicine" program. The total length of undergraduate medical education in the country is 6 years.

In the country, there are about 33 universities/colleges that have undergraduate medical education program, of which five are owned by the private sector [22]. Among the medical schools, three have longer training experience: the oldest Addis Ababa University (AAU) was established (in 1964), Gondar (in 1978), and Jimma (in 1983). Mekelle and Hawassa Universities have relatively intermediate experience in medical education (both opened in 2003). Haromaya, Bahir Dar, Arsi, Dire Dawa Universities, and St. Paul's Millennium Medical College are relatively new in medical education training. All the remaining public medical schools did not have graduating class medical students at the time of the study.

Population

This cross-sectional survey involved undergraduate medical students who pursue their medical education in government owned higher learning institutions of Ethiopia, and was carried out between February and May 2015. In the survey, fifth year (clinical-II) and final year (internship) medical students were involved (assuming that they have thought over their future career plan than the junior ones) from six randomly selected medical schools/colleges out of the ten medical schools with eligible upper class medical students (interns and clinical-II) at the time of the study. These were Addis Ababa, Haromaya, Mekelle,

Hawassa, and Dire Dawa Universities, and St. Paul's Millennium Medical College.

Sample size calculation

The sample size was calculated by using a single population proportion formula considering the following assumptions: proportion of medical students' intention to work abroad ($p = 53\%$) [15], and 95% confidence interval at $Z_{\alpha/2} = 1.96$ (level of significance). However, in our case given the medical schools' geographic variations, difference in students' characteristics/selection and the scope of the study to get adequate sample size for modeling and statistical analysis we used a margin of error of 3% and non-response rate of 10%. Nevertheless, about 959 completed questionnaires were returned out of 1165 questionnaires which were given for medical students that made the response rate 82.2%.

Data collection

Pretested structured questionnaire was used to collect the data. The questionnaire was prepared by reviewing relevant literatures [15, 23, 24] to gather data on (demographic characteristics, career choices and attitudes towards medical instruction). Before the actual use, senior experts in medical education and research examined the content, language and sequence including suitability to the context of the study, in addition to the pretest which was done among the medical students of Gondar (which excluded from the actual study). Finally, the revised version of the tool was self-administered by the medical students. The data collection process was facilitated by the respective medical school deans and assisted by class/group representatives.

Measurements

The main dependent variable of the survey was medical students' intention of placement just after graduation, and the predictor variables were socio-demographic, personal and academic related characteristics. Brief description of some variables is given as follows:

Career plan/preference: was assessed using single item question with list of choices; medical students were asked to indicate their first three career choices in which they were interested in to specialize (such as internal medicine, surgery, gynecology and obstetrics, radiology and so on)

Practice location: refers to the intended place of practice by the medical students just after graduation. Here, practice location is categorized into two: 0 = rural and remote (zonal and district hospitals, and underserved areas) and 1 = urban (big cities where specialized hospitals are found).

Medical instruction: in the survey instrument short description was given to the medical students about the medical instruction (see the appendix). Accordingly, the medical students' attitudes towards medical instruction was measured using six multi-item questions. Each item has five category of responses (strongly disagree, disagree, neutral, agree and strongly agree).

Cronbach's alpha was calculated to evaluate the reliability of the instrument for questions regarding attitudes towards medical instruction. Of six multi-item questions, five of them demonstrated strong internal consistency. For instance, the Cronbach's alpha in relation to *guidance in the field of medicine* was (0.88); *professional development* (0.85); *research undertaking and ethics* (0.85); *the teaching-learning process* (0.87); and in relation to *orientation towards in country practice* the Cronbach's alpha was (0.85). However, the scale on the teaching-learning environment was excluded because of low Cronbach's alpha value, 0.50 (Table 2, Additional file 1).

Data analysis

The data were entered into EpiData version 3.1 and analyzed with SPSS version 16.0 statistical software. Demographic characteristics of medical students, career preferences, attitudes towards medical instruction were descriptively presented. However, binary logistic regression model was run to identify the predictor variables of medical student's intention to work in rural and remote areas. Initially, univariate logistic analysis was used to investigate the association between demographic, and medical education related variables with the dependent variable, students' intention to work in rural and remote areas. And finally, binary logistic regression model was fitted to identify variables that predict medical students' intention to work in rural and remote areas.

In fitting the model, the dependent variable is coded (rural and remote =0 and urban =1), including other demographic, and medical schools related variables. For instance, gender is coded (male = 1 and female = 2); place of birth: urban (regional town, and zonal town) and rural (born in district and rural village); year of study: (fifth year/C-II =1 and final year/interns =2); medical school: (AAU = 1 and others =2). In all cases, $p < 0.05$ and 95% confidence interval was used to check statistical significance of associations. Finally, Hosmer and Lemeshow test was used to check model adequacy ($p = 0.583$).

Ethical considerations

The study received permission from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph). The

approval from AAU was also accepted for conducting the study in Haromaya, Hawassa, and M St. Paul's Millennium Medical College. In addition, ethical review boards of University of Gondar (Protocol No. R/C/S/V/P 346/2015) and Mekelle University (Protocol No. ERC 0546/2015) have reviewed the proposal and gave additional ethical permissions to conduct the study in their respective universities. Informed consent was obtained from each study participant. No personal identifier was written during data collection and summary measures were used to interpret findings.

Results

The mean age of the study participants was 24 ± 2.7 years and the higher proportion (56.9%) were below 25 years old. Nearly three fourth of the students, (72.2%) were males, a higher proportion (60.7%) were clinical-II (fifth year) students and the remaining were final year (interns). Also the highest proportion (46.4%) were born in big towns followed by those born in districts (17.3%), rural villages (17.4%), and zonal towns (13.6%).

Table 1, shows medical students' intended place of practice just after they graduate. The highest proportion (70.1%) of the medical students wanted to practice in clinical care settings. However, only a very small proportion of medical students were intended to work in rural and remote areas (10.8% in zonal hospitals and 5.5% in district/primary hospitals), while the majority (44.8%) of them

Table 1 Medical students' intended places of practice just after graduation, 2015

Variable	Characteristics	Frequency	Percent
Career choice	Patient/Clinical care	672	70.1
	Academic/researcher	162	16.9
	Management	76	7.9
	Others	24	2.5
Setting	Academics/teaching hospitals	430	44.8
	Private -clinical	165	17.2
	NGO-non-clinical	152	15.8
	Zonal hospital	104	10.8
	District hospital	53	5.5
	Management- government	17	1.8
	Others	5	0.5
Place	Big cities	387	40.4
	Zonal towns	201	21.0
	Underserved	113	11.8
	Anywhere	102	10.6
	District capitals	83	8.7
	Do not want to practice	38	4.0
	Other	5	0.5

were interested to work in teaching/specialized hospitals and in big cities of Ethiopia.

Figure 2, illustrates the first three selected specialties of choices for postgraduate training. Internal medicine was the first specialty of choice for (46%) of the medical students and surgery was the first for about one third, (30.0%) of the medical students. However, obstetrics and gynecology, and pediatrics and child health were the first choice only for (6.8%) and (5.5%) of the medical students, respectively. The main reasons for specialty preference were personal interest (87.6%), income potential (42%), professional prestige (29.9%), availability of positions (18.6%), and influence from instructors (15.5%) (Fig. 3).

Table 2, shows medical students' attitudes and opinions towards their medical schools. On the first dimension-guidance in the field of medicine: the highest proportion (59.2%) of the medical students were strongly agreed on the positive role of medical instruction in their academic career and professional development. Similarly, the highest proportion were agreed (33.9% strongly agreed and 27.1% agreed) on the role of medical instruction to get broader insight in different medical specialties. There was also positive opinion on the role of guidance to increase awareness on professional responsibilities (36.3% strongly agreed and 30.7% agreed).

With regards to professional development: the highest proportion were agreed (41.0% strongly agreed and 39.2% agreed) as their instructors could influence their interest towards a certain clinical specialty. Besides, a reasonable proportion of medical students strongly agreed/agreed on the fact that they made their instructors role models to acquire professional skills (78.9%) and to specialize in a particular medical specialty (76.3%).

Orientation in relation to research undertaking and ethics: nearly half of the medical students (18.2% strongly agree and 30.1% agree) agreed on the role of medical schools in giving special attention to ethical issues. However, nearly one third of the medical students were not in favor of the statement '*the medical school encourage creative thinking and new discoveries*'.

With regards to the teaching-learning process: the highest proportion agreed (30.3%) on their instructors' commitment to teach medical students, however nearly one fourth of them had neutral (26%) opinion about it. Similar level of agreement (33.7% agreed and 22.9% neutral) was observed on the way how their instructors provide feedbacks.

Moreover, concerning the role of medical schools towards within the country practice: the medical education has been playing limited role to influence students' interest to pursue their postgraduate training within the country, which was agreed only by (33.6%) and quite a lot (27.2%) had neutral opinion about it. Similarly, on inspiring them towards an area that the country has shortages of specialists were agreed by (34.9%) but considerable number of them were neutral (28.9%). On rural practice, highest proportion had neutral (34.1%) stand towards the role of their medical schools in preparing the students to work in the rural/remote places of Ethiopia.

Table 3, shows findings from univariate and binary logistic regression analysis. In the univariate analysis gender, place of birth, parent's educational level (father's), medical school and the desire to serve within the country were statistically significantly ($p < 0.05$) associated with medical students' preference to work in rural and remote areas. However, when binary logistic regression model was fitted to identify the potential predictor variables after

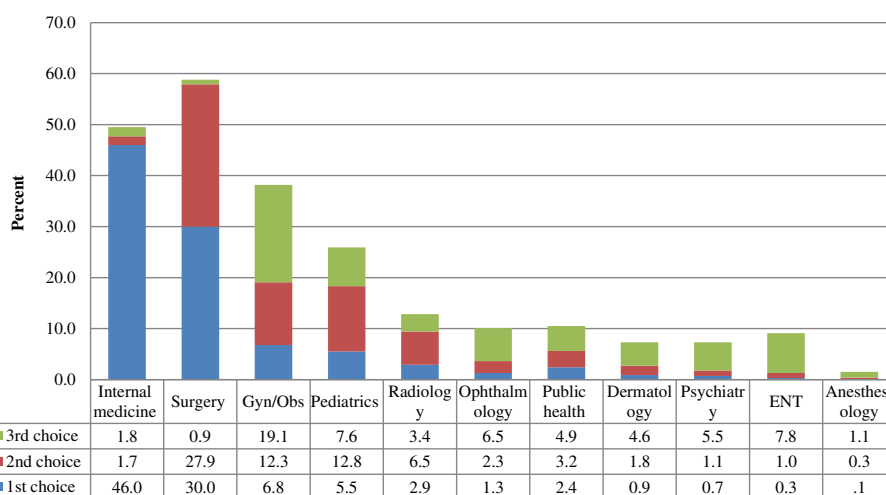


Fig. 2 The first three priority of choices to specialize by the medical students in Ethiopia, 2015

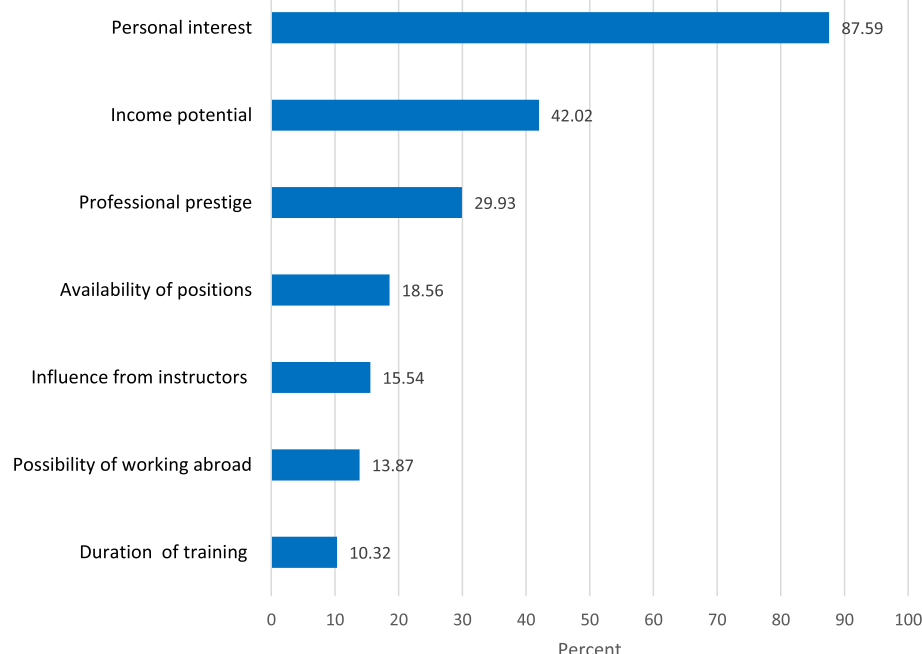


Fig. 3 Main reasons for specialty choice among the medical students of Ethiopia, 2015

controlling other variables, no statistical significant difference was observed in work place preference by parents' education ($p > 0.05$). However, a significantly increased odds (AOR:1.55; 95%CI; 1.05,2.28) of intention to work in rural and remote places was found among male medical students than females. Similarly, those who were born in rural places have a significantly increased odds (AOR:1.52; 95%CI; 1.03, 2.25) of intention to work in rural and remote areas than those who were born in urban areas. Furthermore, there was significantly increased odds of intention to work in rural and remote places among the medical students of Addis Ababa University (AOR: 2.34, 95%CI; 1.64, 3.34) than the students in the other medical schools. And also the odds of intention to work in rural and remote places among those who had the desire to serve within the country was higher than their counterparts (AOR: 1.62, 95%CI; 1.18, 2.25).

Discussion

This study generated evidences on medical students' career choices, role of medical education and their intention to work in rural and remote areas by involving senior medical students from six medical schools in Ethiopia as study participants. The majority of the medical students had the intention to practice in clinical/patient care settings. However, most want to practice in tertiary/teaching hospitals and the private sector than in general and primary hospitals, and also want to work in big cities. Internal medicine was the first cited career

choice to specialize by most students followed by surgery. Survey items used to examine the role of medical instruction which relate to physician workforce preparation had strong internal consistency.

The fact that the majority want to practice in large hospitals and urban centers might suggest preferring the place where alternative opportunities and better working environment is available over those these things are not available [25]. The other possible explanation might be the existing medical education curriculum has limited role in preparing the students to serve in the rural places [24, 26] which rather leads to the choice of working in affluent communities [20, 27]. In addition, this might imply that in spite of good supply in physician workforce, geographic variations and imbalanced distributions might remain a challenge in Ethiopia, since intrinsic motivation plays an important role in health workers' decision to work in the rural areas [28].

In human resources for health (HRH), skills mix is very essential. In the study, considerable size of the medical students was interested in very limited clinical areas to specialize (internal medicine, and surgery). Similarly, the need for proper career guidance for medical students in line with the national HRH needs was reported from Nigeria [29]. Their main reasons have also similarity with previous studies, which indicate the role of intellectual content, individual's competencies, anticipated income, job value, and influence from others on specialty choices [30, 31]. In addition, this might be dependent on

Table 2 Medical students' attitudes towards medical instruction

Statements on mentoring in field of medicine	NO(%)	St. Disagree No(%)	Disagree No(%)	Neutral No(%)	Agree No(%)	St. Agree No(%)
I. Guidance in field of medicine						
1. Medical instruction plays an important role on medical students' career choice and professional development	903(94.2)	17(1.8)	14(1.5)	54(5.6)	250(26.1)	568(59.2)
2. Medical instruction supports to reduce stress experience to practice medicine	768(80.1)	18(1.9)	38(4.0)	92(9.6)	267(27.8)	353(36.8)
3. Medical instruction supports medical students to get broader insight on various specialty areas	764(79.7)	24(2.5)	35(3.6)	120(12.5)	260(27.1)	325(33.9)
4. Medical instruction increases medical students' awareness on professional responsibilities	711(80.4)	20(2.1)	31(3.2)	78(8.1)	294(30.7)	348(36.3)
Composite score	730(76.1)					
II. Professional development						
1. Mentoring stimulates medical students' interest towards a certain clinical specialty area	908(94.7)	12(1.3)	22(2.3)	105(10.9)	376(39.2)	393(41.0)
2. Instructors serve as role model to obtain the required professional skills	912(95.1)	18(1.9)	23(2.4)	116(12.1)	378(39.4)	377(39.3)
3. Instructors serve as a role model to specialize in a particular clinical specialty area	900(93.8)	18(1.9)	26(2.7)	125(13.0)	391(40.8)	340(35.5)
Composite score	882(92)					
III. Orientation on research undertaking and ethics						
1. Here the medical school gives special attention on ethical issues	902(94.1)	47(4.9)	128(13.3)	263(27.4)	289(30.1)	175(18.2)
2. Medical instruction stimulate students' interest towards research oriented careers	880(91.8)	37(3.9)	85(8.9)	249(26.0)	310(32.3)	199(20.8)
3. Teaching-learning process encourages creative thinking and taking an active role in new discovery	911(95.0)	37(3.9)	80(8.3)	219(22.8)	354(36.9)	221(23.0)
Composite score	853(88.9)					
The teaching- learning process						
1. Instructors commit their time and energy on a regular bases in teaching medical students	899(93.7)	67(7.0)	188(19.6)	249(26.0)	291(30.3)	104(10.8)
2. Provide feedback in constructive and caring manner	894(93.2)	83(8.7)	159(16.6)	220(22.9)	323(33.7)	109(11.4)
3. Non-judgmental and accepts individual differences	897(93.5)	92(9.6)	167(17.4)	246(25.7)	276(28.8)	116(12.1)
4. Mentoring help to enhance clinical skills and professionalism	882 (92.0)	51(5.3)	95(9.9)	203(21.2)	343(35.8)	190(19.8)
5. Instructors assist medical students in developing professional identity	886(92.4)	59(6.2)	126(13.1)	250(26.1)	319(33.3)	132(13.8)
Composite score	823(85.8)					
IV. Orientation towards in country practice						
1. The process encourages the students' interest in pursuing their career within country	900(93.8)	47(4.9)	100(10.4)	261(27.2)	322(33.6)	170(17.7)
2. The training encourage to pursuing a career in an areas that country has shortages of qualified physicians	896(93.4)	39(4.1)	99(10.3)	277(28.9)	335(34.9)	146(15.2)
3. Medical instruction encourages medical students to work in the rural/distant part of the country	882(92.0)	50(5.2)	144(15.0)	327(34.1)	222(23.1)	139(14.5)
Composite score	871(90.8)					

medical education workforce composition, as most students were in favor of the statements on professional development (*stimulating medical students' interest towards a certain clinical specialty, instructors serve as role models to obtain professional skills and to specialize in a particular clinical specialty*). This might imply attentions need to

be given for medical education workforce composition, faculty value and institutional culture in the medical schools [8, 32].

The medical schools play important roles to influence students' attitudes in addition to other interrelated factors [6, 7]. However, in this study, in spite of strong internal

Table 3 Results of univariate and binary logistic regression for predictors of medical student's intention to work in rural and remote areas of Ethiopia (N = 784)

Predictor variables		Intended place		OR (95% CI)	AOR (95% CI)
		Remote/Rural n = 397	Urban n = 387		
Gender	Female	89	129	1	1
	Male	308	258	1.73(1.26, 2.38)*	1.55(1.05, 2.28)*
Age in years	>25	177	168	1	1
	<=25	219	219	0.95(0.71, 1.26)	0.96(0.68, 1.35)
Place of birth	Urban	215	262	1	1
	Rural	162	106	1.86(1.37, 2.52)**	1.52(1.03, 2.25)*
Parent education (of father)	> = 9th grade	219	250	1	1
	<=8th grade	160	117	1.56(1.16, 2.10)*	1.14 (0.77, 1.69)
Year of study	Sixth (Final)	145	166	1	1
	Fifth (C-II)	251	221	1.3(0.98, 1.73)	1.10 (0.77, 1.55)
Medical school	Others	243	283	1	1
	AAU	152	100	1.77(1.31, 2.40)**	2.34(1.64, 3.34)**
Desire to serve within the country	No	161	198	1	1
	Yes	221	172	1.58(1.19, 2.11)**	1.62(1.18, 2.25)*
Intention to leave	High	249	263	1	1
	Low	119	106	0.84(0.62, 1.15)	0.91(0.64, 1.30)

** $p < 0.001$, * $p < 0.05$; OR: Odds ratio, AOR: Adjusted odds ratio; CI: confidence interval, AAU: Addis Ababa university

consistency (the items used to examine the role of instruction), the medical instruction was not influencing medical students' attitudes towards working in rural places. This might suggest the presence of limited attention in preparing them to work in rural and remote areas, which imply the needed attention in medical workforce preparation along with the rapid expansion in medical education, since most Ethiopians are rural dwellers.

Moreover, in the regression model: males, those born in rural areas, and those from AAU have an increased odds of preference to work in rural and remote areas. Similar findings are available in previous studies where gender, residence during high school, and parents' residence were found to be significantly associated with attitudes towards working in rural areas [25]. These findings might also indicate the need for strategic approaches in strengthening rural-based medical training to inspire medical students to work in rural and remote areas [33]. Intensifying the desire to serve within the country can also potentially decrease the odds of working in urban areas.

Limitation

One limitation of this study is behavioral intention might not be converted into practice by its very nature. In addition, this study did not include medical students from the private sector.

Conclusion

In conclusion, majority of the medical students intend to practice in clinical/patient care settings. Nevertheless, a higher proportion of them intended to work in urban than the rural and remote locations, this might be an area of concern in medical workforce preparation and future direction. In addition, medical students' inclination towards very few clinical specialty areas might suggest the role of medical instruction and/or shortages of instructors in various clinical specialty areas.

Furthermore, the internal consistency of new survey items used to examine medical instruction might indicate the need for using context based evidences in dealing with health workforce preparation in addition to illustrating the existing limited medical schools' role in preparing students to work in rural and remote places. Therefore, the medical schools and the government of Ethiopia should give due consideration not only to equip the students with clinical skills but also to influence their attitudes to work in rural and remote locations and specialize in diverse clinical specialties.

Additional file

Additional file 1: Questionnaires. (DOCX 40 kb)

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Availability of data and materials

The dataset supporting the findings and the conclusions of this article are available.

Authors' contributions

TA conducted the study, statistical analysis, interpretation of the data and manuscript writing. DM supervised the study, interpretation of the data and report writing. WM supervised the study, assisted in data analysis and interpretation of the data and in manuscript writing. MD supervised the study, interpretation of the data and report writing. All authors were involved in drafting and manuscript revision. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interest.

Consent for publication

Not applicable.

Ethics approval and consent to participate

The study received permission from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph). The approval from AAU was also accepted for conducting the study in Haromaya, Hawassa, and M. St. Paul's Millennium Medical College. In addition, ethical review boards of University of Gondar (Protocol No. R/C/S/V/P 346/2015) and Mekelle University (Protocol No. ERC 0546/2015) have reviewed the proposal and gave additional ethical permissions to conduct the study in their respective universities. Informed consent was obtained from each study participant. No personal identifier was written during data collection and summary measures were used to interpret findings.

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Health system response for physician workforce shortages and the upcoming crisis in Ethiopia: a grounded theory research

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Abstract

Background: a rapid transition from severe physician workforce shortage to massive production to ensure the physician workforce demand might take the Ethiopian health care system into variety of challenges. Therefore, this study discovered how the health system response for physician workforce shortage using the so called '*flooding strategy*' was viewed by different stakeholders.

Methods: the study adopted a grounded theory research approach to explore the causes, contexts, contingencies, and consequences of massive medical student admissions on patient care, the medical education workforce and students. 43 purposefully selected individuals were involved through semi-structured interview from different settings (the academics, government health care system and private sector). Data coding, classification and categorization was facilitated using ATLAS.ti scientific software.

Results: eight main categories were emerged: 1) *reasons for rapid medical education expansion*; 2) *preparation for medical education expansion*; 3) *consequences of rapid medical education expansion*; 4) *massive production as HRH strategy*; 5) *cooperation on HRH development*; 6) *HRH strategy and planning*; 7) *system's capacity for HRH development*; and 8) *institutional continuity on HRH development*.

The demand for physician workforce and political advantage were cited as main reasons which enforced the government to scale up the medical education rapidly. However, the rapid expansion was beyond the medical schools' capacity (human resource, patient flow and the size of teaching hospitals). Which potentially affect the clinical service delivery, and teaching learning process at the present: "*the number should consider the available resources such as number of classrooms, patient flows, medical teachers, library and...*". In the long-term it ends in surplus in physician workforce, unemployment, skill insufficiency and pressure on the system: "*...flooding may seem a good strategy superficially but it is a dangerous strategy. It may put the country into crisis, even if good physicians are being produced; they may not get a place where to go...*".

Conclusion: massive physician workforce production which is not closely aligned with medical schools' capacity to teach and the system to absorb the graduates can create a mismatch between the means and ends. The situation has been affecting the clinical service delivery, and the teaching-learning process at the present and in the long-term it ends in surplus in physician workforce, unemployment, skill insufficiency and pressure on the system.

Key words: Flooding, Grounded theory, Medical education expansion, HRH strategy, System response/continuity, Purposive sampling.

Background

In Ethiopia, since the modern health service has been introduced in early 19th century to the present, there is a shortage for human resources for health. Besides, high physician workforce migration over the last several years coupled with longstanding low medical doctors supply hasten the demand for physician workforce (1, 2). Nevertheless, in response to the shortage, the country without making appropriate preparation started to expand the medical education program, through opening many new medical schools and also by introducing new teaching approaches. For instance, in the academic year 2015/2016 there were more than 14000 medical students in 33 medical schools/colleges(3, 4).

However, human resources for health (HRH) supply should be an integral part of and a subsystem of a country's health care system. The system should have a monitoring mechanism for the required human resources (at proper time, type and mix) and it has to be planned far in advance (5). Nevertheless, many low-income countries including Ethiopia do not have such well-organized monitoring system to detect when the crisis or the surplus can potentially occur as it has been observed in low and mid-level health workforce (6).

In a system, policy makers can utilize various techniques to overcome the apparent shortage of their HRH demand. However, their success depends upon several interrelated factors such as the capacity of the medical schools and the availability of medical education workforce (2, 7); the cooperation made between the stakeholders from which results will be derived; the use of evidences to project future workforce requirements (the HRH supply and requirements are two sides of the same coin). And finally on the extent of lessons learnt from previous programs are also essential for not to move from one crisis to another (from severe shortage to surplus/ skill shortages).

In this regard, however, the rapid transition from severe shortage to massive supply to ensure the current and future physician workforce demand has become a contradicting phenomenal context which lead us to raise various questions around the phenomena and the context which has been taking place. Particularly, the capacity of the medical schools to admit massive number of medical students, the service demand to absorb the forthcoming medical graduates and the quality of medical education (2).

Therefore, the purpose of this qualitative study was to discover views and opinions of different stakeholders (government officials, academics, individuals working with NGOs, professional associations, consultants, and researchers in the area) on how the rapid scaling up of physician workforce production has been taking place, and the forces and influences that drive to its occurrence and the potential consequences at the present and in the future on (the government, students and communities). Therefore, this study discovered how the health system response for physician workforce shortage using the so called '*flooding strategy*' was viewed by different stakeholders including the current and future consequences on (medical instructors, patients, system and the medical graduates).

Methods

Setting: the study setting is Ethiopia, East Africa. Ethiopia is a low-income country with a total population of about 93 million(8).

Study design: the study adopted a grounded theory research approach, which examines the causes, contexts, contingencies, consequences, and conditions of phenomena to understand the patterns and relationships among these elements (9, 10).

Sampling procedures

Purposive sampling strategy was employed at several phases of the data collection (11, 12). Initially, five individuals were selected from three different settings (academics, clinical care setting and administrative, government health bureau). This initial phase informed the direction of subsequent sampling, which is referred to as theoretical sampling in the grounded theory research. So that, in the second phase, the study involved government officials, medical instructors, and hospital Chief Executive Officers (CEOs). Information related to physician shortage, migration, retention, and massive production and its consequences were reached to the level of saturation as we collected the data from regional health bureau officials, hospital CEOs and the academics.

Nevertheless, issues related to HRH strategies, policy and system were emerged and become critical and an issues of discussion. As a result, senior researchers, consultants, knowledgeable individuals who had been working in the system, with NGOs and the professional associations were involved till information saturation achieved. The two investigators (TA and DH) established contact with the potential participants. None of the invitees refused to participate except one senior government officials in one of the study regions.

Data collection

Semi-structured interviews were used to collect the data. The main points of discussion were (reasons for physician shortage, physician migration and retention, the reasons for flooding, readiness of the medical schools to admit massive number of medical students, consequences of flooding at the present and in the future, future workforce and their competency, job opportunity in the market, opinion on the flooding approach and questions related to HRH policy/strategy/planning and the like, and participants' demographic information was also collected). The interviews were conducted in Amharic language and were flexible to each of the respondent's background and exposure, and tape recorded with the permission of the respondents. During the discussion, notes were taken on emerging ideas that helped to inform the direction of the interviews as well as the selection of the next respondents. One of the investigators (TA) conducted the interviews, however with the interest of time, the transcriptions and translations were done by other experienced individuals.

Data analysis:

First, verbatim transcription was made to all tape recorded data and then translated into English language with the same person. Consistency of the transcribed and the translated data was checked and compared by TA. The textual data were read, edited and organized in MS word files to assign to ATLAS.ti 7.0 scientific software. Each transcript was read line by line before breaking it into different categories.

The data coding process followed the procedure recommended by Strauss & Corbin, 1990 (10) for grounded theory research approach including the use of constant comparative analysis and memoing. During open

coding, code names were drawn from the words of participants, it enables to group similar events, patterns and opinions under a common heading or classification (9). And then similar categories were related to subcategories along the lines of their properties and dimensions, this coding process is commonly called axial coding which is very essential for clustering, categorization and data reduction (13). Selective coding, the purpose of this phase is to establish the central phenomena, or core category of the study through integrating and refining categories. In this study, the central category is massive physician workforce production (flooding) and its consequences.

The coding procedure was made by TA and WM who evaluated naming, dimensions and properties of the codes and finally the research team agreed on the categories and subcategories, and their relationships to be illustrated on the diagram (14, 15). In addition, the study also benefited from the presentation made at the school of public health, AAU (as external audit) and the feedback given on the preliminary findings by the study participants who were willing to do so (members check).

The findings are presented in the narrative style with short introductory descriptions, whereas the researchers' interpretations will be presented in the discussion section. The quotations are presented in *italics* with a source for each quotation (respondent setting at the time of the study) then followed by the number of the respondents. There are three codes in the study; Ac: means the academic setting; Gov: means government health sector; and Pr: means the private sector. Moreover, in certain circumstances, the symbol [*] is used within the body of quotations to indicate the researcher's clarification of the meanings of some ambiguous or multi-interpretation words.

Ethical conditions

The study was approved by Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph). At the time of data collection, informed consent was obtained from each respondent.

Results

Demographics

This study involved 43 purposively selected individuals with varied representation of age, academic levels, years of experience within the country's health care delivery system in senior positions both in academics, public and private sector including in local and international NGOs (Table 1).

Categories of the study findings

The central phenomenon of this study is massive physician workforce production within Ethiopian context. The main categories are *1) reasons for medical education expansion; 2) preparation for medical education expansion; 3) the consequences of rapid medical education expansion; 4) massive production as HRH strategy; 5) cooperation on HRH development 6) HRH strategy and planning; 7) system's capacity for HRH development; and 8) institutional continuity on HRH development.*

1. Reasons for massive physician workforce production

The analysis revealed two main reasons which forced the government for rapid expansion in medical education: the first one is high physician workforce demand in the country (severe physician workforce shortage) which exacerbated by high physician migration, low production of medical doctors and expansion

in health care facilities, none of the study participants counter-argued about the high demand but on the way how it has been taken to increase the number through *“the flooding strategy”*.

“In our region, there was extreme shortage of physicians when we compare with their number that was before two years. Their number was not above 100 in the region two years ago. But now, there are increasing numbers of medical doctors who are coming to our region because of the government strategy that has started to produce a huge number of medical doctors...”. (Gov3)

The second cited reason was for gaining political advantage both internally and externally:

“High migration have negative image for the country, so the government has to give coverage by flooding large number of physicians, to overcome the shortages (Ac6); the government should answer the health demand of the community. Otherwise, it puts the existence of the government into question..., unless it produces huge number of nurses, physicians, midwives and surgeons...”. (Gov4)

2. Preparation for medical education expansion

Medical education expansion has to be made with due consideration of the system's capacity. Here two different but interlinked capacities were identified, the capacity of the medical schools to admit large number of medical students, and the service demand to absorb the medical graduates and how to use them successfully:

“The major issue is the facility not the number of students; the number should consider the available resources such as number of classrooms, patient flows, medical teachers, library and IT facilities. If you accept 1000 students, side by side there are issues that have to be taken into consideration”. (Ac11)

System's capacity: the second point of argument was on the system capacity or preparation made to employ or deploy the upcoming large number of graduates and how to use them effectively:

“...If the production of medical doctors continued like this, our existing system is not ready to accommodate (Ac6); the system should rethink it again how to absorb 3000 graduates each year and use them effectively. If that is not the case, it should devise a way where to take them, including the change in the medical school curricula for not considering the international market”. (Pr3)

3. The consequences of rapid medical education expansion

Massive admission of students in the medical schools and opening many new medical schools were viewed to have negative consequences at the present, in the near future and in the long-term.

Current consequences: as most respondents from the academia explained massive admission of medical students have been affecting the quality of patient care (satisfaction, makes patient right to be violated and also cited as potential source of treatment errors):

"How could you say that a mother should stand naked and give birth in front of 20 students? Even for the teachers how could you consider this as good job... as a teacher I myself do not agree, so that the policy makes patient right violated (Ac11); if you go to wards on Tuesday and Thursday, there are a number of queues and mistreatments of patients, so that, they may not come again due to the treatment they have received from our hospital". (Ac13)

Furthermore, it was noted that the approach has also been affecting many aspects of teaching-learning process (teacher –student relation, skill acquisition and teaching style):

*" Yes, there is a flood of students... there is dissatisfaction; you may not know some of these students by name due to their huge number and some of them come only for exam(Ac15); the rooms become much suffocated during a clinical round so that there is a change from 'bed side to tree side sessions' [*observed during the data collection in one of the longstanding medical school]". (Ac5)*

In addition, on medical instructors it has been causing workload, job dissatisfaction, and affect motivation especially for those who want to work in the public sector:

"most of the time, the huge number of patients may not create frustration but the huge number of the students who flood to the university create workload on medicine instructors ...those departments which have been teaching 60-100 students are now teaching about 300, so that, this cause the staff to raise quality issues, creates work load, and frustrations on the teachers". (Ac9)

Intermediate consequences: for most respondents, the current medical education approach can produce medical graduates of low quality, being less competent and having low professional value while delivering medical care and such health workforce can compromise the quality of health service delivery:

"It is good to have more human resource that satisfy the needs but we have to think of the quality of our graduates; they should not commit mistakes while providing service (Ac12); for the coming generation we are producing medical doctors through flooding strategy, however, it is difficult to teach the value of medicine... they will leave without knowing why and what to do". (Ac14)

Long- term consequences: were also anticipated to affect the system, graduates and community. Most participants were expecting surplus in physician workforce, unemployment and pressure on the system:

"...flooding may seem a good strategy superficially but it is a dangerous strategy. It may put the country into crisis even if good physicians are being produced; they may not get a place where to go/assigned, it will be very difficult after investing a lot... this happened in Mexico once, in history, they flooded new medical doctors but their system could not absorb them (Ac17); 'speed, volume and quality' should not go together at once. When you load the truck beyond its capacity, the truck can fail down and can cause damage to the public, it affects the one which you call it quality. The flooding is more than the country's capacity (Pr5); as it happened to the other health care professionals, being jobless for physician workforce is going to come very soon. I am wondering if there is any country, which opened medical school outside the hospital compound and without hospital?". (Ac3)

In spite of the physician workforce shortage, during the study in Dire Dawa and Addis Ababa city administrations and to some extent in Tigray and Harari regions the demand for GPs were coming to saturated. However, one of the government officials argued:

“... this is done based on the plan and policy direction, otherwise I do not believe that the government does this without any facts and researched findings. The number and professional mixes are usually taken into consideration so that the human resources are capacitated based on the scarcity needs... “. (Gov3)

4. Massive production as HRH strategy

In the study, most respondents had similar views on massive production as HRH preparation strategy. They viewed it as ‘forced’, ‘disastrous’ and ‘wrong’ strategy which can potentially lead the country into another crisis. The following statements illustrate the respondents’ opinions:

“We have the shortage with no doubt; and doing something to come out of this problem with in short time may be correct. But the main question is, are we trying to satisfy our human resources needs or taking steps which make us commit another severe crisis? (Pr1); the government forces public universities to take a huge number of students at once without equipping them with the needed resource. That is a disaster (Ac10); I am saying that the strategy through which we are traveling to increase the number is wrong”. (Ac17)

However, few government officials had different opinions about the strategy though they admit the fact that it affects the quality. One of the Government officials stated his opinion as follows:

“It may compromise quality, yes, it may. But, if you ask me about the system, yes! It is the right strategy. If you do not do this, you will not address the needs of the society”. (Gov4)

However, another respondent counter argued about the mere increase in the number of physicians without the needed medical skills; “After making the number, number, number....so big, what if the number is not working? ... It has danger! As to me to tell you frankly, the strategy that compromises the quality for the sake of increasing the number will not palatable, as a citizen”. (Ac17)

5. Cooperation on HRH preparation

This study discovered lack of mutual understanding and trust, co-operation (between government officials, academics and professional associations and individual experts), perception difference among the actors, though all have been working for common goals, to improve health service delivery through improved health human resources:

*“When they [*government officials] answers these questions [*HRH related] they do it by themselves or they may involve very few experts. They invite professional associations for token participation; not for real. This is done for two reasons; first the policy makers create limited opportunity of participation for mutual understanding and problem solving using evidences, and second professional associations have also limited capacity ...(Pr1); in the system, the bureaucracy should not ignore physicians, from my experience I learned that physicians contribute more when they get involved more...”. (Ac2)*

Among the existing ineffective cooperation between actors, lack of mutual trust was mentioned as one factor:

*“Both [*government officials and medical professionals] have their own biases about one another which deters conversation to narrow the gap; they should be flexible to accommodate their differences (Ac13); they [*professionals and the government] do not work closely; they do not work together, because they are skeptic to each other”. (Ac1)*

Some respondents stated that high inculcation of political ideology into technical matters became a source of dissatisfaction and a reason for limited professional involvement and cooperation in the system. The following statements illustrate this views in more detail:

*“I have problem to judge on the specific issue [*political involvement] based on the Ethiopian law, the leadership position has to be assumed by members of the ruling political party is up to level of a minister. The positions below the minister must be filled with technocrats that may not be affiliated to any political party including the one in power. However, what is practically applied is not so... There might not be non-politician individuals who fit for that position. The politicians may be the only people who have the merit to fit for ... (Ac16); the existing political elites lost trust on the educated group of the country. There is no mutual respect, sense of belongingness...”. (Ac3)*

6. HRH strategy and plan

During the study, there was no written document on the HRH strategy or plan at both the FMOH level or in the regional health bureaus. And we were told that the FMOH will finalize its revision very soon. However, respondents were concerned on the fact that the delay in drafting HRH strategy has been contributing for an ineffective HRH development and unclear career path for health human resources. It also cited as a reflection of the health sector's incapacity:

“We have to make things more clear through the human resource policy/ strategy, but still now we do not have that because we are working in urgency(Pr1): I think first there should be a plan, how many physicians do we want to have in the coming ten years in the system? What type of physicians do we want to have? GPs, surgeon, OBS/GYN specialists, cardiac surgeons and so on? Ok, we need all, if so, we have to prioritize? At the same time, we have to look the need. Really, it needs detail analysis and plan (Ac2); first let's have a short term plan, which is developed and reached into consensus at all level through strong discussion and evidence. And be committed not to change that direction while we implement it, either by internal or external pressure”. (Pr5)

7. System's capacity for HRH development

The study also discovered limited capacity of the health sector, for proper HRH planning, leadership, coordination and valuing expertise. In addition, health workers' capacity (non-clinical) was also important to properly work with the internal and external stakeholders, to have sustainable institutional functionality and for professional leadership. In addition, in the system there should be a capacity to evaluate the effectiveness of the intended strategies:

“... the ministry that lead the country’s health system is staffed with very few prominent people and the remaining majority, the so called officers are simply... (Ac17); things should go without losing their starting point... by focusing on their destination. For that, it needs experience...and when you do something for ten years, you provide a witness of ten years’ experience, and when you do for 20 years it is so...”. (Pr3)

In the system, high attrition and low retention also contributed for system’s lack of human resource capacity for the functionality of the system:

“Institutional memory is affected by human resources attrition from the system... activities which require high skills are usually done by seconded individuals hired by UN organization or NGOs [as advisors, consultants] and their role is not in decision making... when they got better opportunity, they just leave. Thus, there is lack of institutional continuity and the system prefers to start everything as new...”. (Pr5)*

The role of external support to influence independent decisions was also mentioned as an additional factor:

*“Since our country is poor, they [*donors] run everything; important decisions are made from Washington, because most of the health programs are funded by the United States Agency for International Development (USAID). Even it is impossible to make adjustment... similarly from bilateral and multilateral international organizations, their area of interest comes first, working on very few selected health problems. However, here the strength of the ministry is very important. If wise enough, the sector can harmonize its plan with the donors’ interest or be able to resist to some programs which are not in its priorities and are prescribed by partners”. (Pr2)*

8. Institutional continuity for HRH development

The respondents mentioned the role of institutional memory for HRH development, its contribution for preparing strategic plan, and lessons learnt when changes are made, not to lose focus and to have sustainable functionality on human resource development. However, the public health system lacks such functional continuity, thus things are short-lived, there is no lesson learnt from the past:

“In HRH there should be clear strategic directions and reasons for that but we do not have that. Because things are short-lived and there is no institutional memory. No one looked what had been done in the past. It is simply said, oh this is changed, that is changed but no one thinks how we can link with the previous and what was the debate, and the area of consensus, nobody asks in the system (Pr3); But, system lacks sustainable functionality, if it is so there is continuous in and outflow monitoring mechanisms before the things worn out, ends in shortage or surplus”. (Pr5)

Another point which has been raised in relation to system’s functionality was absence of uninterrupted professionalism in each political system:

“Practically, if we have clear central principle for community health needs, as the government changes there should be a continuity of system with some modification but when we lose institutional continuity, we also lose our central principle and then we start as fresh but we remain there, when you uncover things and comeback to the central principle, because the definitions and the principles might not be changed in each system”. (Pr2)

However, another respondent argued as it was challenging within the same government: “...*Institutional memory, let alone to have long term planning, the system cannot proceed on the issues that have been started by the successor of the former minister*”. (Pr5)

Discussion

This study discovers a lot of problems in relation to the current medical workforce preparation through massive admission of medical students. There is a mismatch between the number of students, patients flow, size of teaching hospitals and medical education workforce. Which give rise to different forms of negative consequences at the present, in the near future and in the long-term. Furthermore, lack of cooperation between policy makers and medical schools (the implementers), lack of HRH policy/strategy and planning might put the system’s effort barely successful.

Strategic response for health human resources demand in a country through participatory human resources planning process is very essential (7). However, implementing human resource production strategy in an isolated manner either to gain political advantage or which is not closely aligned with medical schools’ capacity, the medical education workforce and the setup can create a mismatch between the means and ends.

In the Ethiopian context, most medical teachers are clinical care providers (16) and teaching hospitals are expected to provide the highest level of care in the country (3). Nevertheless, the study explored the quality of care, patient rights’ and satisfaction have been contradicting with primary aims of the teaching hospitals, which is delivering specialized care. Admitting large volume of students to the teaching hospitals have been affecting health service delivery (quality of patient care, their right and privacy in the short term and in the long-term health care seeking practice and their satisfaction). This is regarded totally inconsistent with the government’s health sector transformation plan which aimed at providing quality health care as well as compassionate and respectful services (3, 16).

The whole aim of effective health workers training is for bringing better health outcomes through better health service delivery by well-trained health workforce(7). Effective teaching in medicine also requires flexibility, good teacher-student interaction, energy, a variety of teaching methods and teaching styles and commitment to address learners’ needs within a busy background of clinical care. However, the current situation is far beyond this to succeed in medical teaching as wisely indicated “*the volume, speed and quality cannot go together(Pr5)*”.

In fact, in the system there are contradicting reports, in one hand massive expansion in medical workforce preparation cited as a strong success made by the system(3). On the other, the inadequate knowledge and skills during regular training, critical shortage of qualified teaching staffs in the teaching institution, poor motivation and retention strategy were reported as main challenges (17). Such report might provide a strong support for our findings, which indicates the country has been moving from one crisis to another, from shortage in quantity to scarcity in skills.

Furthermore, in some places there was an indication for failure to absorb the physician workforce particularly of GPs, supportive evidence also documented on HSDP EFY 2007 (2014/2015) annual report (17). The flooding seems more than the country’s capacity, as rightly asked by the respondents, “*what if*

the system is unable to absorb? Including the issue of curriculum change which does not consider the international market, in spite of the opportunity and demand created for high qualified medical workforce even in abroad. In all round, these human resources neither can it be stored nor discarded. It has to be planned for in advance in the right amount and type(18). However, similar scenarios were observed in Mexico (19).

Human resources production is a result of human resource strategy, a product of lesson learnt from the past, consulted and coordinated efforts of the present and a system of predictive capacity of the future using demographic, epidemiologic, labor market and human resource productivity of the fast changing environment along with the community health need and demand- system of continuity (which the study understood as underlying and basic problems of the system). This findings matches with previous report which stressed on the need for system of continuity in the country (20).

System of continuity or sustainable functionality of the system is one of the major requirements of the health system, indicates the point at which things started, the direction it goes with and the destination where to reach through interconnected transitions. However, the study identified its absence as basic problem for not having HRH strategic plans, long and short term plan at all levels. The situation might be more complicated by additional factors (such as working in urgency, frequent reforms, changes in the political system and lack of HR and economic capacity including other internal or external influences). For instance, the draft HRH strategic plan (dated 2009 to 2020) which was not officially communicated or indorsed but partly implemented) (16, 21) might be a good reflection of lack of functional continuity. In addition, accelerated HRH production and a shift from one category to another also reflect the situation better.

On the other hand, sustainable functionality of system also required human resources capacity to appraise the past and considering its lessons to the present, and strong analytic/prediction capacity or the use of such human resources wisely is required at all levels. Understanding the principles of cooperation and partnership to work effectively with all the concerned might be essential and can contribute to the sustainable functionality of the system(7). In the system, there are also external and internal drives and interests, thus there should be a human resource capacity to harmonize such influences with the local context through a firm-stand. Otherwise, depending upon the country's economic and technical capacity such factors can negatively contribute to the functionality of the system. In such complex circumstances, there might be a need of human resources for health human resources management for cooperation and building mutual trust for working together.

Limitation

In this study, the views of the community and medical students was not included in this study.

Conclusion

Medical education needs longer time of preparation, however within the context of this study, rapid transition has been made from low production, high migration and severe physician workforce shortages to massive production and creating many new medical schools. In relation to massive production, two distinct type of preparations were needed; preparation which need to be made at the medical schools and at the system, at the time of the study both were not sufficiently addressed. Currently, lack of preparation at the

medical schools has been affecting the teaching- learning process, the medical education workforce job satisfaction, student-teacher interaction and clinical care delivery of the teaching hospitals. In the long-term, in the health care system it causes excess of physician workforce, inefficiency in the required skills and poor health service delivery, wastage of resources.

On the other hand, massive production has been taking place in the context which lacks cooperation and mutual trust between the medical schools, professional association, expertise and the government within highly politicized environment. Here, how much the strategy is smart enough in all round, in the absence of cooperation and mutual trust, may be difficult to succeed. Particularly, the absence of clear HRH policy/ strategy and planning, and human resource capacity are the *underlying problems* for HRH development. Whereas, lack of institutional functionality might be the *basic problem* behind the underlying and the apparent problems which have been observed in the system.

Conflict of interest

The authors declare that they have no competing interest.

Authors' contributions

TA conducted the study, analysis, interpretation of the data and manuscript writing up. DM supervised the study, the analysis and in manuscript writing. WM supervised the study, assisted in data coding and categorization. MD supervised the study, interpretation and report writing. All authors were involved in drafting and manuscript revision. All authors read and approved the final manuscript.

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Table 1 Characteristics of the study participants 2015

Characteristics	Variable	NO
Gender	Male	40
	Female	3
Date of Birth	After 1980	12
	1981-1970	16
	1969-1950	8
	before 1950	7
	BSc	3
Educational level	GPs	5
	MD+SP/SS*	25
	MPH	4
	PhD	1
	MD+MPH	5
Affiliation	Academics (full professors)	21(4)
	Public health (senior position)	16 (5)
	Private (researchers in HRH)	6 (2)
Service years	<=10	17
	11 to 20	10
	>20	16

MD: medical doctor, SP: Specialist, SS: sub-specialist

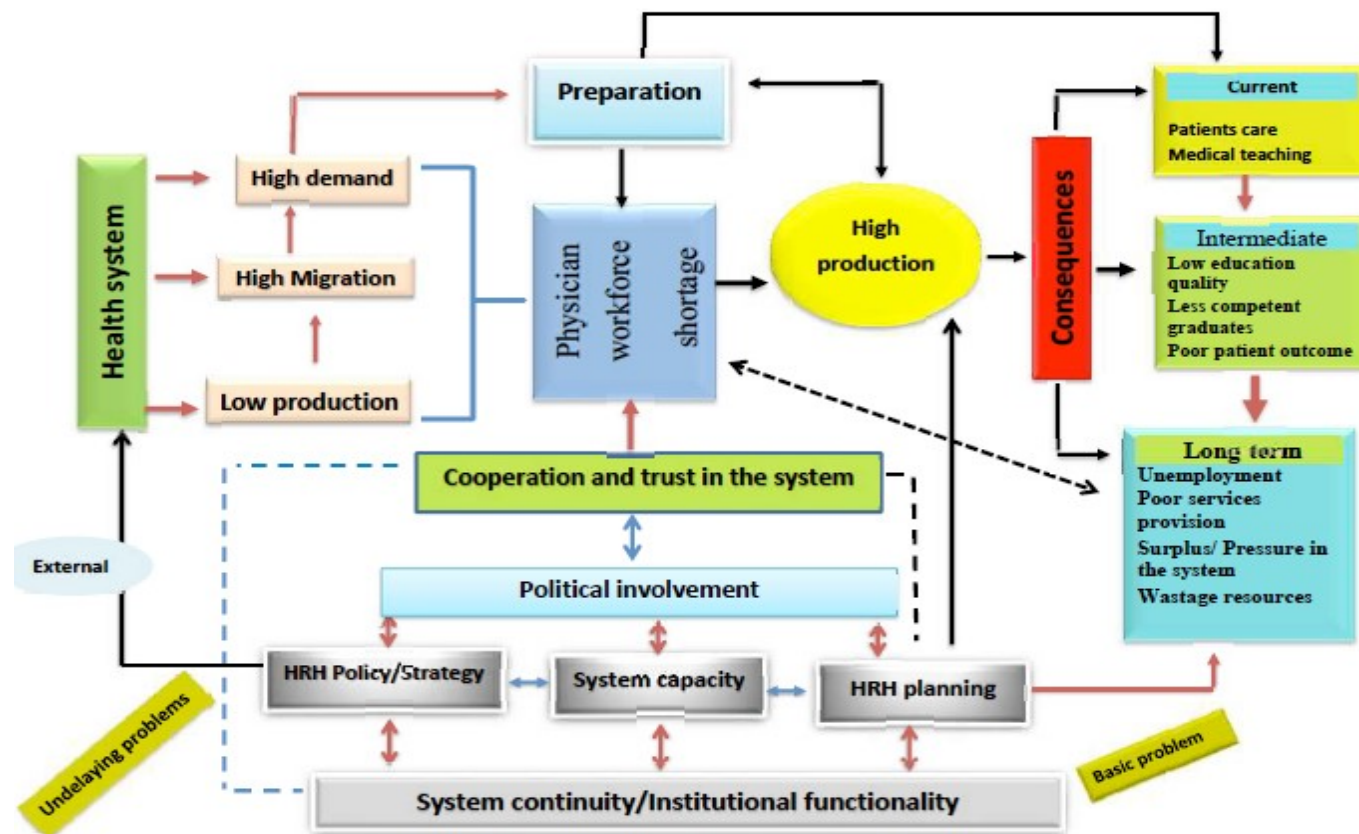


Figure 1 Health system response for physician workforce shortage and its consequences

Reasons for physician migration and potential solutions in Ethiopia: a qualitative study

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Abstract

Background: International and internal opportunities made easier for health professionals to move from one place to another. However, reasons for migration need to be viewed and investigated within the local context for providing retention strategic options and taking substantial action.

Objective: the aim of this study was to understand reasons for physician migration from the public health sector and to elicit suggestions for future strategies to deal with the problem in Ethiopia.

Methods: through purposive sampling the study involved out migrants, retired physicians, and who dealt with the issue directly or indirectly (government officials, academicians, hospital chief executive officers (CEOs) and senior researchers, consultants, and people work with NGOs). Semi-structured interviews were conducted in person with the study participants. Verbatim transcribed tape recorded data were analyzed using ATLAS.ti software. The emerged themes were regrouped into various families/ sub-categories to develop various constructs. In the end, main themes were mapped to show the logical relationship between them which might have an effect on physician migration in Ethiopian context. Direct quotes were used to represent the participants' speech.

Results: Almost all participants agreed as physician migration (emigration and out migration) contributed to human resource shortage in the country. The most frequently cited reasons were financial and non-financial (low recognition, lack of valuing expertise, and incompetent leadership and management), however some participants provided equal emphasis for both “*It is not a matter of money, never, not money. First, there should be recognition that means making the physicians part of a problem and a solution of their own country*” (Ac2). Besides, available opportunities and value shift might be the driving power for migration. Personal interest, having family, economic and social stability and sense of belongingness were emerged as contributing factors to stay stable in the public health sector. Making the public health sector competent and self-sufficient, and building mutual trust were proposed as potential solutions to reduce health worker migration from the public sector, in addition to improving the financial matters.

Conclusion: The concern which was raised on management and leadership might be important for everyone who works in the system for complementing. Therefore, the system needs to consider the proposed solutions and have strategies to deal with migration and retention mechanisms by building mutual trust with the health workers. The physician workforce should keep on their professional integrity without compromising professional values and their personal interests in order to serve their own community which is in need of their support.

Key words: Non/economic reasons, physician migration/retention, qualitative study, value shift

Introduction

International and internal opportunities made easier for health professionals to move from one place to another. Indeed, health workers demand in high-income countries has driven overseas employment to compensate their shortage (1). In contrast, for sending countries health system loss of skilled professionals critically affects the already weak system (2-4). Accordingly, physician migration has contributed to highly skilled health workforce shortages in Ethiopia (2, 5).

In the system, health workers' migration/retention encompasses two inter-linked assumptions: the factors that influence the decision of health workers to stay in or leave their job, and the extent to which health system policies and interventions respond to these factors. Without taking specific context into account, retention strategies are commonly grouped into four general themes: education, regulatory, financial, and personal and professional support interventions (6). However, retention strategies needs to be viewed and investigated within the local context through understanding reasons for migration that provide policy and strategy options for managing migration and taking substantial actions (7).

In this regard, Ethiopia has a challenge in retaining qualified physicians in the public health sector(8, 9). However, in Human Resource for Health (HRH) development, health workforce retention is one of the critical requirements as increasing the supply and expanding the medical education capacity (10, 11). Because, it improves service delivery, quality of care, and reduces referrals and waiting times. In the academic, it is a critical requirement for knowledge and skill transfer to the trainees (12, 13). In the country, regional governments, city administrations and the academics are autonomous on worker employment, setting retention strategies and managing their human resource, and generating evidences which help them to make decisions. Similarly, health workers also have the right to resign when they finish the required obligatory services.

In order to develop strategic options for managing migration evidences of the extent of the problem, understanding of the local context and labor market (international and internal) is needed. Nevertheless, to the best of our knowledge no attempt is made to explore the reasons for migration and concerns expressed in comprehensive manner through involving various stakeholders in Ethiopian context. Rather, noticeable efforts have been made on increasing the supply than working on retention and understanding the reasons for migration nevertheless both need to go side by side.

Therefore, this study employed a qualitative inquiry to understand the reasons for physician migration. Qualitative research methods such as interviews provide in-depth, thick and detail information pertaining to participants' experiences and viewpoints on this particular topic, physician migration and potential solutions. In addition, qualitative research uses flexible approaches which enable to capture various viewpoints and perspectives of a given context in comprehensive manner (14). As a result, the objective of this study was to understand reasons for physician migration from the public health sector and to elicit suggestions for future strategies to deal with migration and health workforce management in Ethiopia. This report is the continuation of a manuscript submitted to BMC human resources for health (*Assefa T, Mariam DH, Mekonnen W, Derbew M. Health system response for physician workforce shortages and the upcoming crisis in Ethiopia: a grounded theory research. HRHE-S-17-00058*).

Methods

Setting: Ethiopia is a low income country located in the horn of Africa with a population size of more than 93 million. For long time the country had only three medical schools (Addis Ababa, Gondar and Jimma). However, following the rapid expansion in medical education currently there are about thirty three medical schools/colleges (15, 16). In the country's health care system physicians are expected to practice in primary/rural hospitals (general practitioners/beginners), general hospitals and referral/teaching hospitals. In addition, those who finish the obligatory service years have the right to resign and can be employed anywhere else. Obligatory service is a cost sharing scheme designed to serve in the public health sector for a certain period depending on the length of training, distance/geographic location assigned to practice or can be substituted with money payment for those who can afford to pay before the license and academic credential issued to a medical professional.

Participants

The study used purposive sampling techniques to identify the study participants. In order to incorporate a wide range of different perspectives, the study took into account individuals' previous experience, exposure, and concern about internal and international physician migration in various situations. Thus out migrants, retired physicians, friends of migrant physician, and who dealt with the issue directly or indirectly; government officials (from 6 regions and two city administrations), academicians (from teaching hospitals/universities), hospital CEOs and senior researchers on HRH, consultants, and those who were working with international NGOs were involved as study participants. The two investigators (TA and DH) established contact with the potential participants. Participants also suggested additional potential knowledgeable respondents and the way how to reach them (17).

Data collection

Semi-structured interviews were conducted in person with each of the study participants in a convenient place and time. The interviews were conducted in Amharic language and were flexible to each respondent's background and exposure and also tape recorded with the permission of each of the respondents.

Guiding questions were prepared to facilitate the discussion from general (E.g "how do you describe the accessibility of physicians in this region? How do you describe the extent of migration of physicians in this region/Ethiopia?"), to more specific guiding questions such as (in your opinion, what are the barriers for appropriate recognitions?). At the end of the discussion participants were asked to summarize their opinions and provide suggestions for future policy and strategic direction. Data collection was ended when level of information saturation was arrived (new idea was ceased to emerge). TA conducted the interviews, however with the interest of time the transcriptions and translations were conducted by individuals with similar previous experience.

Data analysis

The audio tape-recording data were transcribed verbatim and then translated into English. The textual data were assigned to ATLAS.ti qualitative software version 7.1 (18). The texts were read line by line and coded to identify meaningful themes. The coding was begun with open coding and subsequently as major categories to emerge axial coding and selective coding process was used. Different concepts were regrouped

into various families/ sub-categories to develop important constructs for reasons of migration and factors which contributed to stay longer in a certain place. In the end main themes were mapped to show the logical relationship between the constructs which have an effect on physician migration in Ethiopian context. Direct quotes were used to represent and illustrate the participants' speech; similarity and/or difference in their opinion and perceptions (19).

Ethical permission: received from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol No.043/14/Sph).

Results

The finding of the study is presented under various main themes and several sub-themes as emerged from the data such as extent of migration, reasons for migration (economic, non-economic and external), and physician retention and potential solutions. Direct quotes are established to represent the participants' viewpoints in their speech.

Extent of physician migration

Almost all participants agreed on the extent of physician migration (emigration and out migration) and its contribution for skilled human resource shortages in the country:

“We may sometimes undermine the brain drain but it is too much. If I tell you my experience, from the medical doctors whom I have learnt with, without exaggerating around 20 out of 58 are now in America or Europe or somewhere else. So this is not negligible, I think it contributes a lot (Ac17); we produce for USA and South Africa, and about 30% of our graduates have left...Starting from my three junior graduates, physicians are not in the country, they are in the US”. (Ac2)

Potential destination for emigration are US, Europe and other African countries. However, NGOs and joining the private sector were mentioned for out migrants:

One of the respondents expressed his view by saying “If he fails to go to America, he will join NGOs. Exactly! The existing environment allows this if not he will start his own private practice (Ac17)”. One of the CEOs stated “There are physicians who say, I’ll go; especially to African countries. But the hurdle of the journey to African countries currently gave us some relief”. (Gov8)

In addition to the external movement, respondents also mentioned lack of uniformity in incentives, satisfaction with the work environment, and setup and leadership issues as reasons behind the decisions to relocate within the public health sector.

One of the senior government officials expressed “Currently they want to join the academic health care setting in a university either for education or to work there; others demand to work in Addis Ababa(Gov5); management, setup and the work environment contribute more. Unless you just stay to work in the private sector or less concerned to the institute matters, the public institute setup is not attractive. It has to compute with the private. Even these become a reason for internal migration, people move to a place where better setup and working environment exist”. (Ac4)

Factors influencing physician migration

The most frequently cited reasons for out migration and emigration were financial and non-financial. Some respondents emphasized on both (economic/non-economic) but some mentioned the presence of opportunities and value shift as third factors.

- 1. Economic reasons:** Respondents emphasized on the importance of economic factors for high health worker migration from the public sector, especially of physicians. In relation to economic factors issues such as the amount of pay, uniformity of payment and benefits for the same job, as means of retention and recognition, and relativity (in comparison with academic levels, job engaged, and with other sectors) were raised:

“Most leave their job and their country to a place where these basic needs are fulfilled easily. When he goes to America and is hired for a new job, he will buy a new car and a residential house to live, for credit. Or it will be easy to rent a house (Ac16); our incentive is low, our salary is also low, the things that we are providing are also low”. (Gov7)

Relative to long term education: one of the sub-specialists said, *“Economically, there is no change after a long term and exhaustive training (Ac8)”*. However, one specialist argued that *“I do not agree with the idea of some, who say, ‘we have spent seven and half years in school so that we have to be paid more... I do not care about the society’, no! I struggle to change this ...”. (Ac11)*

Uniformity: The respondents were concerned with lack of uniformity in incentives across the regions: *“...it is difficult to consider it [*incentives] across the regions. It is different here, in Tigray region because the duty payment schemes are the old one. The new one is not implemented yet. I do not know the reason behind (Ac15); ...Yes, there are requests. They usually raise their concern on duty payment because there is no nationwide system that considers this”. (Gov4)*

Satisfaction: financial incentives mentioned as main sources of dissatisfaction among physicians working in the public health sector: *“...when we compare to longer years of education & work load we have, the payment is not satisfactory (Ac5); I observed when they [*physicians] collect their salary. GPs get frustrated because of their expectation”. (Gov4)*

Relativity: respondents compared themselves with other sector workers in the country (national), continental (with other African countries) and also international (with similar professionals with similar qualifications working in Europe and America) in terms of what they remunerated.

*“No one living here will compare himself with the one living in here [*a regional town] rather he compares with the one in Addis [* the capital] or NGO. He will go and join NGOs (Gov8); the government is trying its best but if you compare it with other government organization like revenue and customs authority, junior staff is paid more than a specialist”. (Ac6)*

In-kind incentives: Participants described that incentive should not be limited to direct salary increment. In kind incentive such as mortgage for buying an automobile and receiving land for constructing residential house were mentioned repeatedly than salary increment because of the economic inflation following the salary increment to civil servants in the country.

“What bothers us is the house, we can’t think of buying a land for constructing a house and owning vehicle for transport and to my kid... (Gov11); as per their duration of service, government will give them land to build a house. Majority of the specialists built their own house and formed families and they are living here (Ac7); there has been loan for purchasing an automobile (Ac14); about mortgage, I agree with it as a best strategy which works in Kenya and America. They cannot go anywhere without paying their loan”. (Ac7)

However, one respondent from private underscored there should be an organized system based approach that the system and the physicians not to be stressed unnecessarily:

“For mortgage, first there should be a capacity to manage and establish the system to facilitate the process with business bank and it needs some form of warranty. Second, it has to consider the individual’s paying capacity, to avoid unnecessary stress. Rather, we have to put separate priority, for the newly assigned and the one who served longer accordingly... At the end there should be a means to evaluate the effectiveness of such strategies”. (Pr5)

- 2. Non-economic reasons:** Most respondents mentioned the importance of non-financial factors that contribute physician migration such as *lack of recognition, training opportunity and value for experts.*

Lack of recognition: the study found the importance of recognition and the attention given for it. Proper recognition enhances physician belongingness to and contribution in the system:

*“It is not a matter of money, never, not money. First, there should be recognition that means making the physicians part of a problem and a solution of their own country; showing as there are concerns/ attention/ care to them; showing equivalent salary and structure for each service year; if further training is needed we have to make the way open, and creating conducive research environment in the work place. Making part of a problem and a solution, otherwise ignoring them [*physicians], may aggravate the migration (Ac2); appropriate recognition is very important and it is the main reason for migration from the public health system. There is an issue which is called such highly intellectual people should not be sensitive for it[*recognition], but in all round we [*inclusive of the speaker] are human beings”. (Pr1)*

Lack of relative recognition: some respondents who have been working in the public health sector cited better recognition have been given by the government for diaspora physicians relative to physicians working at home. The following statements represent the respondents’ view:

“The diasporas are the one who lives better life than the inhabitant. But they are rewarded a land free of lease charge for constructing a house. There may be a reason but for me the reason was not clear still now...Here you are working with the community and for the community by sharing both the good and the bad. For you, nothing has been done to But the country prefers the one who has money”. (Ac20)

However, other few participants working outside the public health sector, particularly in the private ignored the issue by saying *“that is politics”. (Pr1, Pr5)*

On the other hand, most study participants but not all agreed that lack of proper recognition arises from lack of integrity in the system, which may not be from lack of resources in the system. One of the senior government officials said that “...for recognition, in terms of resources not at all, there is no problem. The main problem is lack of time and we are busy with urgent activities, thus we did not pay attention on this area”. (Gov5); Another respondent stated: “there is a problem of integrity, if not of resources”.

(Ac19)

Having a recognition mechanism: majority of the respondents suggested the need for recognition to those who contributed to the community and the country: “What if I served for 10 years and buy an automobile free from tax? The Ethiopian government must be wise. Uganda and Ghana did this (Ac16); ... asking for land is the question of citizenship, you have to ask to get the land given for diaspora. Such things should be done to retain; it is not big thing”. (Ac19)

Lack of valuing for expertise: many participants repeatedly expressed that in the public sector in general, the value given for expertise is very low:

“No I don’t think this[*turnover] bothers them. I don’t think that expertise will be valued in the public organizations. Take Jimma University as example, nobody cares! Why don’t you go hell! I’m telling you the truth. Because I have never heard from senior or mid-level leaders saying why do somebody... left? I’ve seen so many valuable expertise leaving, and nobody cares. Even sometimes you find them doing something that facilitates your exit. Therefore, I don’t think it bothers them (Ac17); There is no system which makes the staff to stay longer. Here I served about 8 years, there are many challenges. Many people stay here till they finish their compulsory service or to accomplish the projects they started... The attrition is high... There is no one who asks why?”. (Ac5)

Work environment: participants repeatedly stated that the public sector work environment is not conducive particularly the setup, leadership appointment and competency, political assignment, frequent turnover of leadership and partiality related to your ethnic background were also playing critical role for physician migration. The following statements illustrate the existing work environment:

“Sometimes there are hospital CEOs who do not understand the sector. There are some who do not have leadership quality and sense. The sector is unique that needs special leadership skills through understanding the context (Gov1); the one you see as a CEO today in the hospital, you may find him in the health bureau in the next month ...and then after two months you may find him in NGO. Thus, you cannot make your system stable...”. (Gov8)

On the competency of individuals appointed in different positions of the system: “... It is very shameful. The people who are leading the health system and those who are assigned at the directorate level, they are too young, not well qualified, even their attitude is not good...due to lack of competent appointee in that position, they are not capable of doing ...”. (Ac17)

In the system the political involvement and partiality related to ethnic background also cited as important source of dissatisfaction with the work environment:

“I do not want to talk too much about it. It is not only because of political appointments. If you see the people in the structure, the top officials are political appointees of the region including lower officials

*and also has to be from X [*by naming] ethnic group, if you see them here...(Ac8)” On the contrary it was said, “There are no other components what we hear in other areas like ethnic issues... Here the dean came from the school head position. He knows the expectation... and has a lot of experiences”. (Ac11)*

Respondents suggest the need for appointing appropriate person, managerial integrity, and proper incentive to reduce leadership turnover and *the leadership appointment* should follow the country’s law:

“One of the reasons for peoples’ lack of interest to pass through the responsibility of leadership is that there is no incentive in the leadership except dispute. So that, appropriate person does not take the leadership position.... Second for political appointee their important issue is not the loyalty they have for the institution rather to”. (Ac1)

“The integrity of the management is very crucial, nothing is critically required than managerial integrity and good leadership. It is not, like the one who sits at the top and transfers orders ...; rather what is needed is the one who see the issue/problems in the eyes of the affected”. (Ac19)

3. External factors: In addition to the financial and non-financial factors, this study found two important external factors which interplay between the financial and non-financial factors and migration. Value shift and opportunities, internal and external.

Value shift: Participants emphasized on value changes which have been emerged in the community, the system and the country as a whole has been influencing professionals to act in favor of making more money and inflate their personal needs. The following quotations represent respondents view:

“Starting from the family there is a value change, it is called a mother is in favor of her child who has money, with in such circumstances expecting different attitude from the physicians, ‘the one who says I am created for providing service’ may be very difficult (Ac3); ...But now by hook or crook, bring it the money for this we all are contributing, the society (raising property value), the system wants to retain physicians by adding salary than recognizing what they are doing (Ac19); yes, there is no question about it, even in my ages, the values I had when I graduate ... and today are different. There are a lot of changes, the society judges you based on your money and what you have. As a result, such value shift is diffused from the society to the professionals”. (Ac20)

The value given for money has also been influencing career choice and human resource development. In relation to this one of the respondents stated:

“Yes! The generation is changed. When we send them for educations like surgery, we used to tell them to sub-specialize on next ones like cardiology. However, their main question is “how much I will earn then? (Ac16); ...the other incentive is, there is no physician who works the whole 8 working hours here. They work the whole 8 hours in other places. But they work only for 4 hours here not more than this”. (Go8)

Most of the study participants agreed on the effect of value shift on physicians’ perception and inclination towards in favor of money, but few argued there are physicians who give priority for clinical practice. The following quotations represent the respondents view:

One of the participants said that *“In fact there may be some, who value money. But there are so many more that put their profession and service first. Even the private wing has such problems and some physicians refuse to work in the private wing because of such compliant, which says ‘they work for making money’ (Go15); The competition drives, as a result he has to be competent. In addition, to cover his living cost, he has to put extra effort. There are individuals who incline to work in private by showing their face here but the majority was not so”.* (Ac2)

Opportunities: Local and international opportunities satisfy both financial and non-financial demands of the physicians. And identified as important pulling factors from the public sector:

“There is no conducive work environment, with low incentive. More than the payment they find the private sector more attractive due to the setup which gives satisfaction to serve. So, they go from the public to the private while they finish the compulsory service”. (Ac12)

International and regional opportunities also pulling physicians for similar purposes: *“You know what because the current people are using the existing opportunity... I shouldn’t negatively comment on it (Ac18); if he fails to go to America, he will join NGOs. Exactly! The existing environment allows. Or he will start his own private practice”.* (Ac17)

4. Physician retention

The most frequently cited reasons for the needs of physician retention were: first, the health workforce can continuously serve in the system for longer period of time; second to have skilled professionals in the system; and third, it helps to reduce the extent of migration:

“...preserving appropriate professional development, health human resource, the product you produce, of course should serve for next 30 to 40 years continuously... (Pr1); they (migrant) learnt in this country and were trained by its people while they were on their job as juniors ...they will leave to countries like...So, Ethiopia will remain having only ‘ever green hands’- junior physicians (Ac17); today the migration is high. Globally there is HRH shortage for the upcoming two to three decades. There is a need to take from us, Ethiopia/low- income countries”. (Pr1)

However, on retention mechanisms, there were disagreement between participants. Salary, duty payment, and hazard allowance were not mentioned as retention mechanisms especially by most physicians. Instead, most mentioned there were poor retention efforts:

"I have a different idea on this. The professionals in the health sector work because of various reinforcements. It is not because of the retention mechanisms in the sector; it is difficult to say that there are retention mechanisms. I suggest that the government has to rethink this”. (Ac5)

However, the opposite was mentioned from the system: *"We always try to fulfill the standard for the specialist, if you see it at the country level but they do want to work [*in the public sector and rural places] although there are others who are very devoted”.* (Go3)

For demanding skills, especially for specialists the regional health bureaus were using short term retention mechanisms. For example, in Amhara region: *“...at Sekota the town, town administration assigned 60000 ETB annually for a specialist, he got land for building house free of lease tax; he got also full month duty payment. Similarly, in Mehal-Meda there is incentives from hospital, he got ...”.* (Go5)

Contributing factors for physician retention

Most frequently mentioned reasons to physician retention in the public health system were personal interest, forming their own family, economic and social stability and sense of belongingness.

Personal interest: some mentioned the interest they had towards their job/the workplace was one of the reasons which makes them to stay longer in a certain place:

“...The other one that makes a person to stay many years in the system is personal interest; such as academic interest, the interest of teaching, doing research; and the feeling of contribution to the country. Personally I believe as I have contributed to my country and to my people; I taught many students and did such things... I feel such things which can make the person to stay longer, like ‘patriotism’ (Ac1); if you ask me why I have stayed here for a long period; to tell you the truth, I like teaching very much. I enjoy doing researches, advising students, doing myself..... basically, I like the job...”. (Ac17)

Forming their own family: forming family also contributed to stay stable in a certain place:

“...We have tried, but the chance of retaining those physicians who don’t have family is very low. If a surgeon or gynecologist is single/doesn’t form a family, he can go anywhere and is difficult to retain such type of specialist (Go3); as you see me, I am here and I will be here tomorrow as well but if there is something urgent among my family unfortunately, I will go, why should I be here? Who is there more than your family, there is a family, community and country. By chance, there are some who leave their job due to this reason so that it has to be taken in to consideration”. (Ac13)

Socially/ economically stable: sense of economic and social stability found an important factor to stay longer in a certain place:

“...for your surprise, I don’t want to leave. Even from the social life aspect, I feel stability. It is true if I go to Addis Ababa and join to NGOs, I may get much money within short period of time but still I have the sense of I’m not economically disadvantaged...”. (Ac17)

Obligatory service: most participants expressed using obligatory service schemes as retention mechanism was not attractive but they were assured it has been working to keep professionals in the public health sector. The following statements reflect the situations:

*“It is difficult to think about this issue [*about obligatory services schemes] because it pushes me to be in a dilemma. As an individual, I just raise a question like why my educational credential is denied? But as a citizen, a number of professionals serve in different areas; you may say that it is right (Ac20); It is because of compulsory service that we are working here. We are assigned without our will. We are doing our work-treating patients, teaching students because we respect our work. The majority of the people are doing like this even though it is difficult to generalize this for all...”. (Ac14)*

Sense of belongingness: few respondents explained the positive role of sense of belongingness towards their community to stay longer in the system. However, for most respondents, there are circumstances which have been affecting such feelings negatively. In addition, the medical education also not influencing the students’ perception in this regard:

“Most of them consider this like their home. They want to work even if they do not get any other incentives. They see it like their home (Ac10); if one is not having a sense of nationality, he will not have the spirit of providing service to his country. He wants to go somewhere else that makes him comfortable”. (Go8)

However, some respondents argued such feeling has been diminished among the people:

*“...the sense that says ‘my own community, my own population’ is I think a little bit hurt. Even those in the community have also become money makers (Ac17); he has to be told to have such feelings [*sense of belongingness], he [*a medical doctor] is learning to serve this community and country, and we are working not because of having such feeling [*to mean sense of belongingness] which we were not told when we were in schools, just may be by chance. Many more may want to work and live in US and Europe, but they may be very few who have sense of belongingness to work here; in the country nevertheless the current system has been affecting this badly, the sense of ownership and citizenship”. (Ac20)*

Fear of competition in urban areas: some respondents also mentioned fear of competition in urban places has been emerged for new graduates including high living cost in urban areas and being unable to compete within the private market in big towns have been challenging to work in big cities:

“...because the living cost in Mekelle town (relatively big) is very expensive than Axum town (smaller) so that most want to go to Axum rather than to be in Mekelle (Go4); they want to remote area for fear of competition. At the beginning, even the seniors also do not want to be assigned in big cities rather they want to go out ...”. (Go3)

Potential solutions

In the system HRH retention is needed because of the above mentioned reasons: the health workforce can continuously serve for long time, to have skilled professionals in the system and also to reduce migration or not to lose the skilled human resources.

From the discussion the following points were raised as potential solutions to keep skilled physicians in the public health sector: improving incentive mechanisms, improve both the supply and retention, making the public health sector competent and self-sufficient, having a recognition mechanism, building trust or culture of communication, and creating conducive work environment.

1. Improving incentives

Almost all participants suggest the need to improve incentives with due consideration of the service they have been providing, the economic demand and also to retain them in the public health sector:

“It is difficult to say that there are retention mechanisms. I suggest that the government has to rethink this. There are expectations and demands when you become physician, so that there are problems with this. It is incomparable when it is compared with others who earn enough and become happy with what they have”. (Ac5)

2. Increase in supply alongside with retention: participants discussed making the physicians accessible in the market can reduce attrition and the shortage however, it should go side by side with the retention mechanisms to balance the skills required among the physician workforce:

“...now there is no problem in the market to get physician even sometimes they come and ask to be hired beyond our demand...(Gov7); increasing the number does not mean doing the job/ providing the

service, but the ministry of health does not accept this (Gov13); when you simply take and train GPs, without taking action to stop attrition ...this is just like adding water in a barrel with big hole”. (Ac17)

3. **Making the public health sector competent and self-sufficient:** participants suggest making the public health sector self-sufficient and competent with the private can improve physician retention and improve the quality of service:

One of the senior physicians said, “If the public health system has good infrastructure and other facilities as the private to provide quality service, the physicians may prefer to work, especially if the benefits are attractive; because they work in the private to get money. The system can learn from other African countries...(Ac15); ... there should be a mechanism of cost sharing for the service provided. The institute should generate income using their (physicians) knowledge... it is possible, unless it becomes self-sufficient with 500 physicians, and how can it be? The institutions have not maximally utilized the available human resource and investigation and material resource. It can deliver service for 24 hrs.; possible to do so”. (Ac2)

4. **Having a recognition mechanism:** a number of participants suggest there should be some recognition mechanisms for those who contribute to the community and the country.

One of the senior respondents asked that “what if I serve for 10 years and buy a car, free of tax? The Ethiopian government must be wise. Uganda and Ghana did this (Ac16); but as recognition mechanism, it is possible to facilitate in kind incentives, preparing land for constructing a house, mortgage for buying cars, and supporting to invest in the place where they are working... Such things should be done to retain; it is not big thing”. (Ac7)

5. **Building trust or culture of communication** between professionals and government is suggested to have mutual understanding, to work together and to implement the intended policy or strategy through acknowledging limitations than taking aside:

“The arguments may be there but it does not weigh for me. This is because the professionals do not have the capacity to manage and the same things happen when it comes to managerial aspects, so that they have to come together and work hand in hand to be successful in the sector (Ac6); in Ethiopia professional discussion has to be practiced and accustomed with open mind”. (Ac13)

6. **Creating conducive work environment:** participants suggest the importance of appointing appropriate person, managerial integrity, and proper incentive to reduce leadership turnover and the leadership appointment should follow the country’ law.

One of the senior physicians said, “One of the reasons for peoples’ lack of interest (desire) to pass through the responsibility of leadership is that there is no incentive in the leadership except dispute. So that, appropriate person does not take the leadership position.... Second for political appointee their important issue is not the loyalty they have for the institution rather to (Ac1); there is no political interference as we heard from other places”. (Ac5)

One of the seniors also said *“The integrity of the management is very crucial...”*. (Ac19)

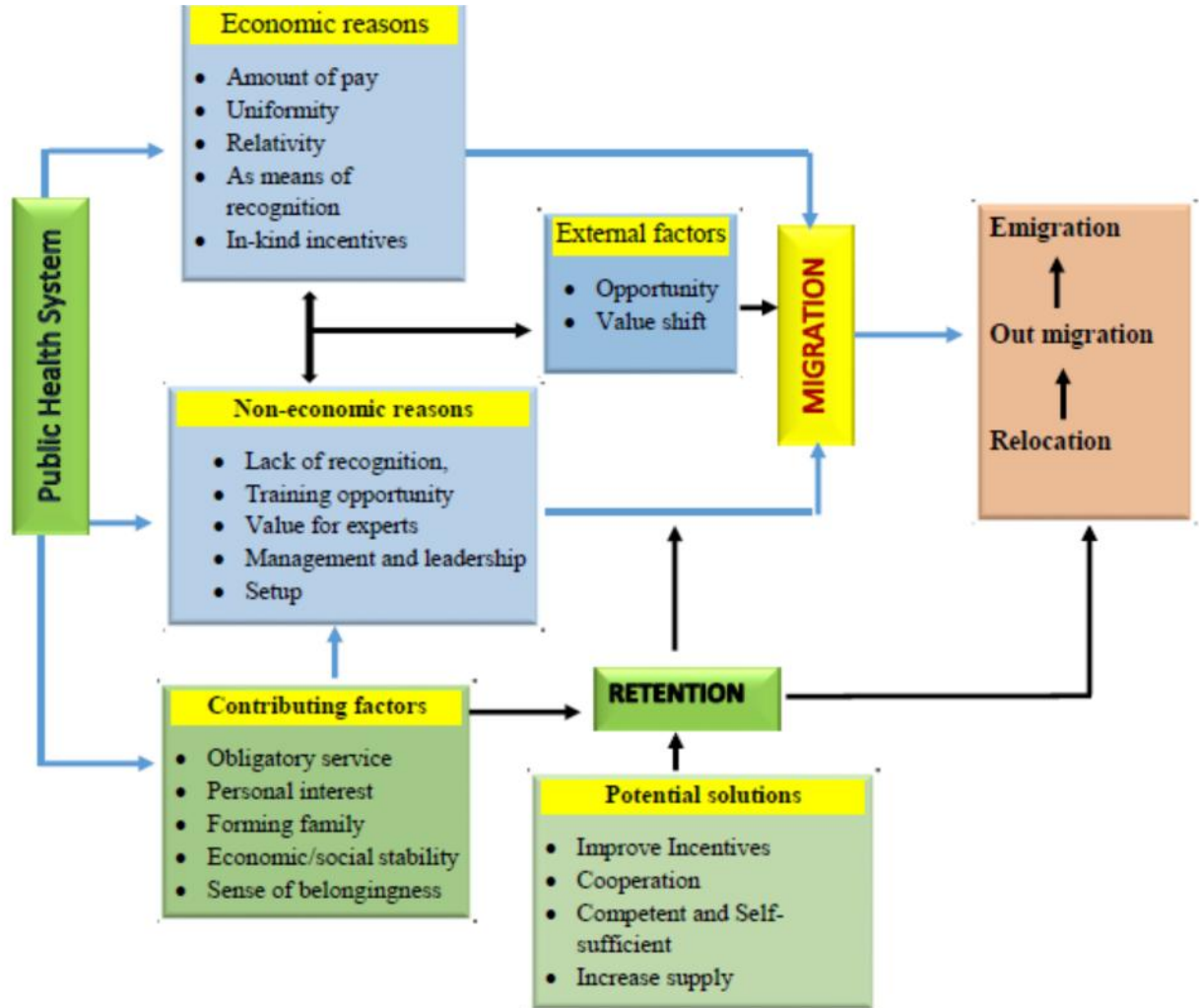


Figure 1 an illustration on reasons for physician workforce migration and potential solutions in Ethiopia

Discussion

Participants do not differ in their opinion on the extent of migration and its contribution for physician workforce shortage in the country. They also agreed economic reasons are the main reason for migration, through the non-financial reasons such as low recognition, lack of valuing expertise, and non-conductive work environment play an important role for migration. Value changes, changes in personal needs, the presence of opportunity (on local and international levels) play a critical role in the process of migration. In addition, they also agreed personal interest, family, fear of competition (especially for new graduates), sense of belongingness, obligatory services, feeling of economic/social stability and geographic locations contribute to stay longer in the system. And most agreed on the proposed solutions however to some extent they disagreed on the role of political appointment and involvement on migration.

Financial incentives were frequently discussed as main reasons for migration, similar evidences are documented elsewhere (1, 11, 20). In addition, non-financial incentives (lack of recognition and valuing for

expertise) are very critical issues which emerge from the discussion as problematic, especially among professionals(21). Indeed, in the system there is the lack of national plan for human resource for health, policy and uniform strategy for retention, except the obligatory service (22).

The second problematic issue is the less concern given by health leaders and managers when valuable expertise leaves and for migration in general. Although there are evidences which support this, the emphasis needs to be given not only for the production but also for the retention (10); because highly skilled health workers are critically required to address the shortages in clinician service provision and academics as well (23). Showing recognition might have an intrinsic influence in order to stay stable to work in the public health system (4).

The third issue emerged from the discussion as problematic is the concern on the relation between leadership/ management and the physicians. As participants said both took their own side and are skeptic to one another, though their relation matters a lot to build professionalism, quality health services delivery and HRH development.

This study has a number of strengths. It generates relevant evidence for Ethiopian policymakers, academics and other stockholders seeking to understand the migration of physicians and identify potential solutions through involving various important stakeholders. One limitation of the study is; the study did not collect data from physicians working outside the country.

Conclusion

This study has generated detail evidences on physician health workforce migration in Ethiopian context. Reasons for physician health workforce migration from the public health sector are either economic and/or non-economic reasons. Lack of uniform incentives and recognition mechanisms are also contributing for internal and international movement. In addition, personal interest, forming family, sense of belongingness, fear of competition, feeling of stability, and obligatory services are contributing factors to stay in the assigned place longer, though the obligatory services approach is not attractive and voluntary.

The concern which is raised on management and leadership might be important for everyone who works in the system for complementing. Therefore, the system needs to consider the proposed solutions and have strategies to deal with migration and retention mechanisms by building mutual trust with the health workers. The physician workforce should keep on in their professional integrity without compromising professional values and their personal interest in order to serve their own community which is in need of their support.

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HEALTH POLICY BRIEF

Accelerated medical doctors training in Ethiopia

Executive Summary

Although the rapid scale up and expansion in medical education seems optimistic to overcome the acute physician workforce shortage within a short time, it seems to have been executed within unprepared environment. As a result, there are consequences at the present as well as anticipated in the future. At the present, the expansion is affecting the clinical service delivery of the teaching hospitals (patient rights and satisfaction), and the medical education process (workload and dissatisfaction among the medical instructors and quality of medical education). In the long run, it is anticipated to affect the competency of new graduates, the system's efficiency and productivity, and the level and quality of service provision to the community.

Therefore, the system needs to revisit its strategy in such a way to minimize the current and the upcoming consequences of the accelerated medical doctors training program in Ethiopia.

Key words: accelerated/ flooding, physician/medical doctor shortage, health worker competency.

The Problem

Although health workforce education and training is a complex investment (1, 2), Ethiopia has made remarkable progress in the area to address the severe health worker shortages. Most of the trainings have been done through accelerated programs. For instance, the training needs of low level (health extension workers) and mid-level (health officers) health workers were addressed in accelerated manner. Nevertheless, there are shortages in the required skills for specific jobs to deliver health services. Furthermore, these trainings are neither incremental nor used static standards and norms, since training programs are nearly closed (at low-levels) or switched (at mid-levels) to other categories (3, 4).

In Ethiopia, medical education was started with a slogan of "...clinical training and internship must be related to the needs of Ethiopia" (5). However, low production, high migration, and high health care demand left the country in severe physician workforce crisis (6, 7). Nevertheless, currently the number of medical schools has grown to thirty-three, with accelerated enrollment (more than 14,000 medical students in 2014/2015) (4, 8). This approach has also been called the "*flooding strategy*" (7, 9, 10).

However, unlike that of low and mid-level health workforce training, medical education is resource intensive: it demands good composition of medical instructors and their stability in the medical schools in which they are assigned along with other necessary resources (11, 12). For instance, in the Ethiopian context, medical instructors are professional physicians. The medical education workforce has dual roles — both as instructors of medical students and clinical service providers. Thus, there should be adequate and experienced physicians with various specialty and sub-specialty trainings. However, shortage of specialists and sub-specialists has made the accelerated training strategy inconsistent with the context in which it has been implemented (7), including the demand to absorb and use the upcoming large number of workforce effectively and efficiently (11-13).

Objective: The objective of this policy brief is to provide evidence based information to policy makers on caveats of the accelerated medical doctors training program and its consequences on the training of physicians and health care provision in Ethiopia.

Approach

This policy brief is a summary of the large scale study which was conducted on recent trends in the training and deployment of physician workforce in Ethiopia (14). It synthesized evidences from three surveys (physician workforce distribution and attrition in the public sector of Ethiopia (15); medical education workforce survey (16); and medical students survey (17); as well as a qualitative study on the health system's response (14).

The findings

Young medical doctors (born after 1985) and less experienced (less than three years of service) general practitioners constitute significant proportions of the public and academic physician workforce of the country, which is a signal for substantial improvement in physician workforce supply. The rate of turnover within the public sector was lower among physicians born between 1975 and 1985 compared to those born after 1985. However, the rate was found to be higher among females, physicians working in district and general hospitals, and those in Amhara Region. The capital city - Addis Ababa and the medical schools were the common destinations for physicians (15).

Within the medical schools included in the study, the physician workforce composition and diversification by different specialty and sub-specialty areas and work experience does not seem commendable. Low level of satisfaction (in both financial and non-financial terms) has also been documented. Within the medical schools, lower risk of turnover was observed among those: who were born before 1975; with rank of associate professors and above; working in Mekelle and Gondar Universities. On the other hand, relatively high turnover was observed among those working in Jimma University (16). This shows that (unless there are efforts for retention), the situation might result in a phenomena called “*ever-green hands*” – a system composed of only junior physicians both as faculty as well as practitioners.

Physician migration from the public sector is basically related to three interrelated factors: financial, non-financial (low recognition, and incompetent leadership and management) and external (opportunities and value shift). The non-financial factors, particularly lack of recognition, can precipitate the financial ones. As this study discovered recognition means: “*...not only providing financial incentives, but also considering physicians from the beginning - in the problem identification and devising solutions...*”.

The health system continues to respond to the severe shortage of physician workforce. However, the response should be implemented with proper assessment of its effectiveness and its consequences. For instance, the medical schools do not seem to prepare their graduates for working in rural and remote areas, as only few proportions were interested to work in the places that they are assigned in (21% in zonal and 8.7% in district/small towns). The specialty choices of graduates are also seem to be influenced by the medical education workforce composition - most were interested in specialties of internal medicine and surgery (16, 17).

The implementation of the “*flooding strategy*” was a recommendation of the WHO and Global Health Workforce Alliance in 2010 to overcome the severe health workforce shortages in the country (10). This might have been the point at which massive admission and rapid scale up in medical education began. However, the present study has identified four major interrelated problems in the implementation and outcomes of the flooding strategy:

1. Mismatches between enrollment limits, patients flow, size of teaching hospitals, and medical education workforce;
2. Inadequacy of the medical education workforce to effectively discharge the required multiple functions (patient care, teaching, and private practice);
3. Insufficiency of educational resources, such as library, books, and infrastructure; and
4. Lack of cooperation between policy makers and medical schools – which is, however, an important element in such undertaking (20).

In addition, there are also perception differences among the various stakeholders. Most viewed the current strategy as “forced”, “dangerous”, “wrong”, “disastrous”, and “taking the country from crisis management to another crisis”. This is manifested by the fact that even the so called “first generation medical schools” are not fully committed and prepared for undertaking the required massive enrollment (16).

As a result, various forms of ill consequences were observed within the teaching institutions: deteriorating quality of clinical services as well as medical education; erosion of patient right and privacy; dissatisfaction and workload on teaching faculty. All these, in turn, are anticipated to affect the competency of the graduating medical doctors, the productivity and efficiency of the system, as well as the overall pattern of health service provision. Besides, there are issues related to strategic planning capacity, continuity of the management system, as well as institutional sustainability (14).

Furthermore, the health systems’ readiness is also important to use the upcoming workforce effectively - including anticipation of the possibility that the longstanding shortage can end up in surplus, but with skill shortages. For instance, there are premature signals in Addis Ababa and Dire Dawa for saturation of demand for general practitioners. The lack of appropriate planning and well-organized human resource information system at all levels also seem to exacerbate the situation (14).

Implications and conclusions

The current situation in human resources for health in the country is a result of decisions made over the past several years (24). Unless policy measures are in place to correct the issues outlined above, it is likely that problems may continue with consequences such as:

- Too many low and mid-level health workers with inadequate training for their jobs, or unemployed or under-employed (25, 26);
- Too many - but incompetent - medical doctors that will decrease the absorptive capacity, productivity, and efficiency of the system; and
- Too many specialists requiring costly equipment and driving the cost of health system as well as increasing the resource gaps between urban hospital-based and rural primary care (24).;

Recommendations

Therefore, the system has to revisit its strategy in a way to minimize the current and the upcoming consequences of massive medical students' admission and physician workforce production, along with working much more in cooperation with the medical schools and other stakeholders.

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DATA COLLECTION TOOLS

Part one: Organization Survey

1. Information sheet

Title of the project: “PHYSICIANS WORKFORCE AND HEALTH SYSTEM RESPONSE IN ETHIOPIA: A MIXED METHODS STUDY”

Principal Investigator: Tsion Assefa

Supervisor: Prof. Damen H/ Mariam

Coordinating Office: School of Public Health, Addis Ababa University

Introduction: Good health service is a fundamental input to the population health status, and which highly dependent on the health workforce (one of the building blocks of the health system). As a result, the ability of a country to meet the population health goals depends largely on the knowledge, skills, motivation and deployment of people, responsible for organizing and delivering health services.

Purpose: The purpose of the study is to assess the distribution, attrition and associated factors among physicians in Ethiopia and to explore the health system response for physician workforce shortages. This research undertaking is a post graduate PhD of Public Health partial fulfillment research thesis.

Procedure and Participation: Here the particular method of the research is a retrospective record review study. The expected duration of the data recorder's contact with the individual and organization file will be not more than sixty minutes per person and expected to finish all the activities within a month. Your organization is asked to participate in this research because the original information which you have is important for the understanding of the proposed subject matter. Your organization will be asked to make the retrospective records that you have on medical doctors (socio-demographic, work experiences and educational history) and also data on organizational level accessible to the data collectors.

Confidentiality: During record review the study will not use the individual full name rather recruitment ID and/or ID is given to collect the data. The data set will include year of employment, deployment and data about their work experience. The original data will be locked in cabinets until the data analysis carryout and no person shall access except the PI and the supervisor for data checking and cleaning purpose. The use of information for any purpose other than that to which the organization consented is unethical.

The information your organization provide is not disclosed in the way it identified individual characteristics and privacy. After the research defense and final work is approved by the school of public health and academic commission and university senate, the original data questionnaire will be incinerated in secure manner.

Benefit: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction on human resource for health production and management in Ethiopia based on the recommendations and the findings.

Risk: The proposed research does not have any inhumane treatment of research participants/ organizations and any physical harm, social discrimination, psychological trauma and economic loss.

Incentive and compensation: This study process has no any form of inducement, coercion and the study does not bring any risks that incur compensation.

Results Dissemination: The researcher is responsible for dissemination of findings moreover fully accountable to provide feedback to medical schools, regional health bureaus and to the policy makers. Maximum effort will be done to publish the finding in scientific reputable journal.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and/or during the research work. You can contact the principal investigator and her supervisor. Moreover, this research undergone ethical reviewed and approved by Addis Ababa University College of Health Sciences IRB. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm. In addition, the protocol will also undergo through the IRB process of the local institutions.

If you want more information and check about this project, you can contact the following people

Addis Ababa University College of Health Sciences IRB Secretary Office Tel. 0115512876

Principal Investigator name and address: Tsion Assefa Tel: 0917 76 59 07

Supervisor name and address: Prof. Damen H/Mariam, School of Public Health, College of Health Science, Addis Ababa University; Mobile: 0911 22 89 81

Informed consent form for collecting retrospective data from medical schools and regional health bureaus

Title of the project: “PHYSICIANS DISTRIBUTION, ATTRITION AND HEALTH SYSTEM RESPONSE IN ETHIOPIA: A MIXED METHODS STUDY”

The institute (AAU/ Gondar/ Jimma/Mekele,/Haromaya/Hwassa) and the regional health bureau of (Amhara, Oromia, SNNP, Harari, Addis Ababa, Dire Dawa, and Somali region of Ethiopia) has been well aware of that this research undertaking is a post graduate degree partial fulfillment of research dissertation which is fully supported and coordinated by AAU School of Public Health and the designate principal investigator is Tsion Assefa. We have been fully informed in the language we understand about the research project and its objective is to examine the progress in medical and physician workforce in Ethiopia.

We have been informed that all the information we shall provide will be kept confidential. We understood that the research has no any risk and no composition. We also knew that the data will be used only for the purpose of the research objective which was stated above. We have also assured that the right to ask information that is not clear about the research before and/or during the research work and to contact

Principal Investigator’s Name: Tsion Assefa Tel: 0917 76 59 07

Supervisor’s Name and Address: Prof. Damen H/Mariam Tel: 0911 22 89 81

We have read this form in the language we comprehend and understood the condition stated above, therefore, we are willing and confirm to provide the retrospective data of all medical education workforce or physicians workforce in our institutions by signing the consent.

Name of the institute/medical school _____; Region -----

Signature _____

Data collection checklist for organizational survey

Instruction: Please record the following information correctly from the original sources

S.NO	Questions		Questions
1.	ID/code _____	2.	Date of birth EC:day.....mo.....year
3.	Level of hospital ☐ Primary ☐ Secondary ☐ Tertiary	4.	Gender: ☐ Male ☐ Female
5.	Marital status: -----	6.	Ethnicity /Nation.....
Professional and services related data			
7.	Date of hiredate....mo/.....year	8.	Academic level _____
9.	Area of specialization.....	10.	Area of sub specialization.....
11.	Current status ☐ Actively working ☐ On training ☐ Left	12.	Date of attritiondate.....mo.....year
13.	Attrition category ☐ Officially left ☐ Run away ☐ Unrecognized ☐ Unspecified ☐ Died ☐ Retired	14.	Whereabouts, if any?

Part Two: Medical students survey

Participants Information Sheet for Medical Students Survey

Title of the project: “PHYSICIANS DISTRIBUTION, ATTRITION AND TRACKING SYSTEM IN ETHIOPIA: A MIXED METHODS STUDY”

Principal Investigator: Tsion Assefa

Supervisor: Prof. Damen H/ Mariam

Coordinating Office: School of Public Health, Addis Ababa University

Introduction: Good health service is a fundamental input to the population health status, and which highly dependent on the health workforce (one of the building blocks of the health system). As a result, the ability of a country to meet the population health goals depends largely on the knowledge, skills, motivation and deployment of people, responsible for organizing and delivering health services.

Purpose: The purpose of the study is to assess the distribution, attrition and associated factors among physicians in Ethiopia and to explore the health system response for physician retention and tracking mechanisms. This research undertaking is a post graduate PhD of Public Health partial fulfillment research thesis.

Procedure and Participation: Here the particular method of the research is a cross-sectional survey. The expected time you take to respond to the survey questions will be not more than 30 minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter. Moreover, your particular participation is affirmed by the sampling frame through the procedure of probability sampling technique which provides equal chance of selection. You will be asked about your socio-demographic, future career, intention to work in the public health system and including the mentorship and its effect in your campus.

Confidentiality: to establish secured safeguards of the confidentiality of research data, the PI will use codes during data collection period instead of using names. The original data will be locked in cabinets until the data analysis carryout and no person shall access except the PI and the supervisor for data checking and cleaning purpose. The use of information for any purpose other than that to which participants consented is unethical to the participants. The information you provide is not disclosed in the way it identified your personal characteristics and privacy. After the research defense and final work is approved by the school of public health and academic commission and university senate, the original data questionnaire will be incinerated in secure manner.

Benefit: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy on improving medical education programs and mentoring including human resource tracking and monitoring system in Ethiopia based on the recommendations and the findings.

Risk: The proposed research does not have any inhumane treatment of research participants and any physical harm, social discrimination, psychological trauma and economic loss.

Incentive and compensation: This study process has no any form of inducement, coercion and the study does not bring any risks that incur compensation.

Results Dissemination: The researcher is responsible for dissemination of findings moreover fully accountable to provide feedback to the universities and FMOH and to the policy makers. Maximum effort will be done to publish the finding in scientific reputable journal.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and/or during the research work. You can contact the principal investigator and her supervisor. Moreover, this research undergone ethical reviewed and approved by Addis Ababa University College of Health Sciences IRB. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.

If you want more information and check about this project, you can contact the following people

Addis Ababa University College of Health Sciences IRB Secretary Office Tel. 0115512876

Principal Investigator name and address: TsionAssefa Tel: 0917 76 59 07

Supervisor name and address: Prof. Damen H/Mariam, School of Public Health, College of Health Science, Addis Ababa University; Mobile: 0911 22 89 81

Informed consent

Good morning/good afternoon. Thank you for taking the time to participate on the survey “*Ethiopian Medical Students Future Career Plan*”. This survey has been conducted by a PhD candidate at School of Public, Addis Ababa University.

This study will help to understand the Ethiopian medical students’ future career plan and expectation, which is very helpful to strengthening medical education programs and human resource development for health in the country since the inception, health workforce preparation. So that, your participation in this survey is very valuable to fill the existing information gap in health care system and to look a solution in the future. In the survey you will be asked kindly about your future career plan and expectation related issues.

The information you provided is kept confidential and no one else other than [Mrs. TsionAssefa and other research team members and data entry clerk] would get access to it. In addition, in the process only aggregated data will be used for data analysis and reporting the study findings. This interview will not take more than 20 to 25 minutes.

Your participation in this survey is very useful but only based on your personal willingness and permission. Are you willing to participate?

Agree.....(√)
____/____/____ (dd/mm/yy)

Decline.....(√)

Moderator Signature _____ /____/____ (dd/mm/yy);

Medical school/University/ College/institution

General Instruction: Please indicate your response on the space provided corresponding to the response level of the questions.

I. Socio-Demographic Characteristics of the Respondents			
S. NO	Questions	Questions	Remark
1.	Gender ☐ Male ☐ Female	2. Place of birth ☐ Regional town/city ☐ Zonal town ☐ Woreda town Rural kebele	
3.	Age in years	4. Please indicate your academic status? (<i>year of study</i>) ☐ C-2 ☐ Medical intern	
5.	The region you came from? ☐ Addis Ababa ☐ Amhara ☐ Oromia	☐ SNNPR ☐ Tigray ☐ Dre-dewa Other regions.....	
II. Household Characteristics			
What is your parents' highest level of education?			
6.	Mothers' education ☐ No education ☐ Able to read and write ☐ Primary school(grade 1-4) ☐ Junior school (grade 5-8) ☐ Secondary school (9-12) ☐ Above secondary school (12+)	7. Father education ☐ No education ☐ Able to read and write ☐ Primary school (grade 1-4) ☐ Junior school (5-8) ☐ Secondary school (9-12) ☐ Above secondary school (12+)	
What are your parents' occupations for most of their lives?			
8.	Mother's occupation ☐ Government employ ☐ Private/NGO employ ☐ Housewife ☐ Farmer ☐ Self-employ	9. Father's occupation ☐ Government employ ☐ Private/NGO employ ☐ Farmer ☐ Self-employ	
III. Career Development Plan			

1.	When you graduate from medical school, which one of the alternatives below is the main focus of your career?	☐ Patient/clinical care ☐ University /Scientific research ☐ Management ☐ Other (specify).....													
2.	Following is a list of work settings. Check the category which best describes the setting where you are interested to work with?	☐ Private clinic/hospital ☐ NGOs- non clinical/ management ☐ Teaching or university hospital ☐ Zonal hospital ☐ District hospital ☐ Community health center ☐ Administrative office (government) ☐ Other (please specify).....													
3.	The first place that you want to initially practice medicine in Ethiopia? (Just after you graduated)	☐ Large cities (Addis Ababa, Hawassa, Bahr Dar) ☐ Urban (zonal towns) ☐ Small towns (woreda towns) ☐ Remote/underserved (Gambela, Somali, Afar) ☐ Anywhere ☐ I do not want to practice within the country at all ☐ Other (Specify).....													
4.	Following is a list of career. Which one are your first three career choices in which you are interested to specialize? (mark the first three)	<table border="0"> <tr> <td>☐ Internal Medicine</td> <td>☐ Dermatology</td> </tr> <tr> <td>☐ Surgery</td> <td>☐ Orthopedics</td> </tr> <tr> <td>☐ Pediatrics</td> <td>☐ Anesthesiology</td> </tr> <tr> <td>☐ Gyn and Obs</td> <td>☐ Public health</td> </tr> <tr> <td>☐ Radiology</td> <td>☐ Biomedical sciences</td> </tr> <tr> <td>☐ Ophthalmology</td> <td>☐ Other (Specify)</td> </tr> </table>		☐ Internal Medicine	☐ Dermatology	☐ Surgery	☐ Orthopedics	☐ Pediatrics	☐ Anesthesiology	☐ Gyn and Obs	☐ Public health	☐ Radiology	☐ Biomedical sciences	☐ Ophthalmology	☐ Other (Specify)
☐ Internal Medicine	☐ Dermatology														
☐ Surgery	☐ Orthopedics														
☐ Pediatrics	☐ Anesthesiology														
☐ Gyn and Obs	☐ Public health														
☐ Radiology	☐ Biomedical sciences														
☐ Ophthalmology	☐ Other (Specify)														
5.	For the above career plan you have chosen in Q4. Where do you want to receive training/education?	☐ Within the country ☐ Outside the country	If your Ans. Is within the country pls. skip to Q next section												
6.	If your first choice is outside the country, which country is your first choice? (Multiple response is possible)	<table border="0"> <tr> <td>☐ USA</td> <td>☐ Australia</td> </tr> <tr> <td>☐ Canada</td> <td>☐ Other Europe countries</td> </tr> <tr> <td>☐ UK</td> <td>☐ Other African countries</td> </tr> <tr> <td></td> <td>☐ Other (specify).....</td> </tr> </table>		☐ USA	☐ Australia	☐ Canada	☐ Other Europe countries	☐ UK	☐ Other African countries		☐ Other (specify).....				
☐ USA	☐ Australia														
☐ Canada	☐ Other Europe countries														
☐ UK	☐ Other African countries														
	☐ Other (specify).....														

IV. Intention to work abroad/outside the country			
1.	Have you ever received advice/sought information on how to move abroad?	☐ Yes ☐ No	
2.	Do you have any intention to live and work in abroad?	☐ Never ☐ Rarely ☐ Sometimes ☐ Most of the time ☐ Always	If your answer is never, please skip to Q. 7
3.	What are your main reasons for living in abroad? (multiple response is possible)	☐ Lucrative salary in abroad ☐ Quality of training ☐ Job satisfaction ☐ Better way of life ☐ Have family/relative	☐ More opportunities ☐ Better working environment ☐ Peer pressure ☐ Parent pressure ☐ Political reasons
4.	Do you have anything that you already started to leave the country?	☐ Yes ☐ No, I do not have	If your ans. Is No skip to 6
5.	If you already start the process, which one of the choice suit best for your attempts?	☐ Searching for information ☐ Writing email with friends or relatives ☐ Studying for licensing examinations ☐ Application for Visa Other specify).....	
6.	If you intend to live and work abroad, which country is your favorite? (more than one response is possible)	☐ Australia ☐ Europe ☐ Asia	☐ USA ☐ Canada ☐ UK ☐ African countries Then skip to the next section
7.	If you do have the intention to stay and work within the country, what would be your main reasons? (more than one response is possible)	☐ Desire to Serve Country ☐ Peer Pressure ☐ Visa Problems ☐ Have better way of life ☐ Lack of opportunities in abroad ☐ Long working hours abroad ☐ Parent Pressure ☐ More competition abroad	

		☐ Other(specify).....
V. Social Networks Abroad		
1.	Do you have parents/siblings living outside of Ethiopia	☐ Yes ☐ NO
2.	Do you have any close friends or relatives (other than sibling/s or parent/s) who live outside of Ethiopia that you could rely on in case of emergency?	☐ Yes ☐ NO
3.	If your answer is yes for either of the above information, the communication media you contact with them?	☐ Phone call ☐ E-mail ☐ Postal ☐ Other (specify).....
4.	Did you receive any money/gift from your close friends/siblings/parents since you admit to medical school?	☐ Yes ☐ NO

4. Section on medical education

Brief description: **Instruction in field of medicine:** is a process whereby an experienced (the mentor/instructor) guides medical students (the mentee) in the development of their own ideas in **clinical knowledge, skills and personal** and professional development through formal and informal approaches (lab. sessions, during inpatient clerk, bedside teaching, morning sessions, round, research activity and so on) to equip them with required professional skills and guidance in their career choices.

Instruction: Please put (√) mark corresponding to the option you agreed. While you choose the response please consider the situation which reflects in your medical school best.

Question Statements	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Guidance in field of medicine					
1. Medical instruction plays an important role on medical students' career choice and professional development					
2. Medical instruction supports to reduce stress experience to practice medicine					
3. Medical instruction supports medical students to get broader insight on various specialty areas					
4. Medical instruction increases medical students' awareness on professional responsibilities					

Professional development					
1. Mentoring stimulates medical students' interest towards a certain clinical specialty area					
2. Instructors serve as role model to obtain the required professional skills					
3. Instructors serve as a role model to specialize in a particular clinical specialty area					
Orientation on research undertaking and ethics					
1. Here the medical school gives special attention on ethical issues					
2. Medical instruction stimulate students' interest towards research oriented careers					
3. Teaching-learning process encourages creative thinking and taking an active role in new discovery					
The teaching- learning process					
1. Instructors commit their time and energy on a regular bases in teaching medical students					
2. Provide feedback in constructive and caring manner					
3. Non-judgmental and accepts individual differences					
4. Mentoring help to enhance clinical skills and professionalism					
5. Instructors assist medical students in developing professional identity					
Orientation towards in country practice					
1. The process encourages the students' interest in pursuing their career within country					
2. The training encourage to pursuing a career in an areas that country has shortages of qualified physicians					
3. Medical instruction encourages medical students to work in the rural/distant part of the country					

Thank You for Your Time and Participation!!!

Part Three: Semi-Structured Interview Guide

Information Sheet for Key Informant Interview

Introduction

Good morning, thank you for taking the time to discuss with me on exploring the health system response for physician shortage in Ethiopia.

Now, we are going to talk about your experience, on the topics of physician distribution, attrition, and reasons for physician migration and response made by the system. You were asked to join this interview not just because you are a member of this organization but also because of the unique and important perspective you can provide to these topics.

In this interview there are no right and wrong answers. We expect you to have different opinions, experiences and lessons, so please feel free to share your thoughts and opinions. We only ask that you are respectful participating in the interview, even if you feel as you have different opinions.

We are taking notes on this session because what you say is really important for us. However, when we write up the notes no names will be included in any of the reports. The conversation will be taped only with your own permission; however, after we transcribed the audio data in to textual form the taped data will be erased. So, all of your comments will be confidential with us.

As the conversation proceeds feel free to jump in and comment if something comes to your mind.

Are you willing to participate in the interview?

Agree (✓) Decline..... (✓)

Interviewer: Name, Signature

Key Informant Interview Guide with stakeholders

I. Physician distribution in Ethiopia.

Q. We're going to start with some very general questions about physician workforce in Ethiopia. When I said physician workforce in Ethiopia; what things do you think of?

Follow-up questions

1. How would you describe the accessibility of physician workforce throughout the country? (in terms of number, density, distribution across the regions)
2. Any different programs that the government is doing to encourage young doctors to accept positions in rural areas right after they finish their training

Follow up questions:

- ✓ Services delivery and need
- ✓ Population size
- ✓ Urban rural variations

✓ Population distributions

3. How would you describe the retention of physician in the public health system?
4. What factors influence them to serve in the public health sector?
5. Factors that hinder not stay longer in the public health sector?

II. Physician migration in Ethiopia.

1. Would you describe reason why physicians decided to work outside their home country?
2. Would you describe reason why physicians decided to work outside the public health sector of Ethiopia?

Please probe on the following separately for internal and international migration

- *The pull factors, the push factors, Any other factors*

Follow-up questions to what extent the following are important?

- Education, salary, better way of life, a new working environment, management, dissatisfaction, work environment, professional practice

III. Effect of physician migration

1. In your opinion, how would you describe the effect of migration on various groups?

Any positive effect on various groups

Probe: Family: financial, providing better life...

✓ Community and the country?

- Making different investment (business, education, health services, real estate...) in their home country?
- Knowledge and skill acquisition/transfer to improve health service delivery
- Making donation to any health care provider/ medical schools or community (computers, medical equipment, money, working being as a volunteer)
- Helping Ethiopian physician or medical student find a position for internship, residency or permanent employment position abroad in the last three years?

Any negative effect for various groups/family/ community and the country (education sector vs. health)

- Probe:

✓ Brain-drain, quality of health services, ...

✓ Negative investment returns on education sector

IV. Experience and intention of migrants to work with the public health system?

1. In your experience, how would the migrant physician been involved in specific investments in healthcare in Ethiopia (such as opening a private clinic, hospital etc).

- ✓ Were they (internal/international migrants) ever involved in such opportunity?
- ✓ Have they ever considered such opportunity?
- ✓ Would they ever consider taking part in such opportunity if offered?
- ✓ How the system affects their involvement?

2. Experience and intention about specific involvement in medical/public health education opportunities in Ethiopia (*such as being a guest lecturer, external examiner, research supervisor*, were they ever involved in such opportunity?

- ✓ Have they ever considered such opportunity?
- ✓ Would they ever consider taking part in such opportunity if offered?

V. Managing migration

1. In your opinion, how the county can manage physician migration?

Probe on the following

- ✓ Blanket control, putting legal requirement/obligation, improving salary and incentives
- ✓ Selection of medical students

VI. System response for physician workforce shortages

1. In your opinion, how the country is responding to overcome longstanding physician workforce shortages?
2. How the production of medical doctors is going on?
3. Rapid expansion and massive admission of the medical students?
4. Readiness of the medical schools to teach?

Probing

- ✓ In accordance with the available human resources to teach?
 - ✓ Institutional capacity, class rooms, library, lab,
 - ✓ The capacity of teaching hospitals: patient flows, hospital beds
5. Readiness of the system to absorb?

Probing

- ✓ Deployment, utilize, salary, performance, the demand
- 6. Consequences of flooding
- 7. Problem related to HRH strategy,
 - ✓ policy, planning and systems capacity
- 8. Closing, anything that you want to add, main points you want to emphasize?

Socio- Demographic characteristics of the KIIs

S.No	Character	
1.	Gender	
2.	Age in years	
3.	Organization	
4.	Work experience with the current position	
5.	Total work experience	
6.	Level of education	

Thank you for your time and participation!!

QUALITATIVE DATA ANALYSIS CODE BOOK

Physician workforce migration and potential solutions		
Open coding	Axial Coding	Selective coding
1. About 30% left, 2. Most left 3. Around 20 out of 58 are now in	Extent	Physician migration
4. America or Europe or somewhere 5. Join NGOs 6. Move to other African countries 7. Private practice, own practice	Destination	
8. Amount (<i>Our incentive is low; our salary is also low...</i>) 9. Relativity (<i>no change after a long term and exhaustive training; he compares with the one in Addis...; junior staff is paid more than a specialist</i>) 10. Uniformity (<i>payment schemes are the old one</i>) 11. Satisfaction (<i>the payment is not satisfactory; GPs get frustrated ...</i>) 12. In-kind incentives (<i>What bothers us is the house; there has been loan for purchasing an automobile, school for our children</i>). 13. Recognition (<i>making the physicians part of a problem and a solution; ...main reason for migration, involving...</i>) 14. Relativity (<i>country prefers the one who has money, airlines, revenue authority, other African countries, same professionals</i>)	Economic factors	Reasons for migration
15. Work environment: (<i>setup, supply, resource, management, leadership quality and sense; leadership turnover; competent appointee; ethnic issues; political appointment; lack of interest to pass through the responsibility, managerial integrity, workload</i>). 16. Valuing for expertise (<i>for recognition, in terms of resources not at all..., in the public health sector values for..., value for mind work, not only for physicians to all civil servant, it was asked a lot of time..., there was research on value,)</i>	Non-economic	
17. Value shift (<i>value change, raising property value, generation is changed, value for money.</i>)	External factors	
18. Opportunities (<i>private sector, NGOs, USA, Europe, other African countries, if I go to Addis Ababa, satisfy basic needs, mortgage; people are using the existing opportunity</i>)		
19. You cannot substitute one skilled with 2 new, make the system stable,		

20. Skill transfer 21. Can serve for 30 to 40 years continuously 22. They (migrant) learnt in this country , ever green hands	Reasons for retention	Physician retention
23. Personal interest (<i>I like teaching very much. I enjoy doing researches</i>) 24. Forming family (<i>if single/doesn't form a family, he can go anywhere</i>) 25. Stability (<i>I don't want to leave. Even from the social life aspect, I feel stabile</i>) 26. Obligatory service (<i>a number of professionals serve in different areas; because of compulsory service that we are working here</i>) 27. Sense of belongingness (<i>most of them consider this like their home.</i>)	Contributing factors	
Flooding/ rapid medical education expansion		
1. We left only with 14 physicians 2. There was extreme shortage 3. People living in the rural areas 4. Physician to population ratio	Demand	Reasons for medical education expansion
5. Government should answer... 6. Migration has negative image	Political advantage	
7. The number should consider the available resources 8. The issue of balancing	Medical schools	Preparation on expansion
9. Our existing system that is not ready to accommodate 10. The system should rethink it again how to absorb... and use them effectively	System	
11. Naked and give birth in front of 20 students 12. Number of queues and mistreatments of patients 13. Students who flood the university which create workload 14. Rooms suffocated during clinical rounds	Current consequences	Consequences
15. Commit mistakes while providing service 16. They will leave without knowing why and what to do	Intermediate consequences	
17. They may not get a place where to go/assigned 18. Speed, volume and quality' should not go together 19. Being jobless for physician workforce is going to come very soon..	Long- term	
20. Government inforce 21. Dump	Forced	Flooding as HRH strategy
22. Commit another severe crisis 23. That is a disaster 24. What if the number is not working? ... it has danger!	Disastrous	
25. Strategy through which we are traveling to increase the number is wrong	Wrong	

26. The strategy that compromises the quality for the sake of increasing the number will not palatable		
Role of the system on HRH development		
1. Policy makers create limited opportunity of participation for mutual understanding 2. Understanding the situation 3. Academicians do not see the demands	Mutual understanding	Cooperation on HRH preparation
4. They are skeptic to each other 5. There is no mutual respect, sense of belongingness...	Mutual trust	
6. Contribute more when they get involved 7. Making physicians part of the problem and the solution 8. There is no involvement. Because they are not politically affiliated,	Involvement	
9. Make things more clear through the human resource policy/ strategy, 10. I think first there should be a plan 11. First let's have a short term plan. be committed not to change 12. Continuous in and outflow monitoring mechanisms	HRH Planning	HRH strategies/ planning
13. Staff capacity in country's health system 14. It needs experience 15. Attrition in human resources from the system... 16. Activities which require high skills are usually done by seconded 17. Professional associations capacity	Technical Capacity	System capacity for HRH development
18. Strength of the ministry is very important... 19. Political appointment	Leadership capacity	
20. They [*donors] run everything 21. Our country is poor 22. Their area of interest comes first	Financial capacity External influence	
23. In HRH there should be clear strategic directions and reasons. 24. Things are short lived	Strategic plan	Institutional continuity
25. There is no institutional memory. 26. No one looked what had been done in the past	Lessons learnt	
27. Starting point... by focusing on their destination 28. Government changes 29. Political change 30. Proceed on the issues that have been started	Connected transitions	