ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
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Intention of medical student to work in rural setting and associated factors among the public Universities undergraduate medical students of Ethiopia

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Acronyms

AAU	Addis Ababa University
AOR	Adjusted Odds Ratio
C.I	Confidence Interval
COR	Crude Odds Ratio
C.P	Cumulative percent
ERG	Existence Related Growth
FGD	Focus Group Discussion
GH	General Hospital
GP	General Practitioner
GPs	Graduate Programs
HR	Human Resource
HRH	Human Resource for Health
IRBCHS	Institutional Review Board of College of Health Science
LIC	Low Income Countries
MDG	Millennium Development Goal
NGO	Non-governmental Organization
NIMEI	New Innovative Medical Education Initiative
PH	Primary Hospital
REC	Review of Ethical Committee
SD	Standard Deviation
SSA	Sub-Saharan Africa
SPSS	Statistical Package for Social Science
TASH	Tikur Anbessa Specialized Hospital
TH	Tertiary Hospital
THC	Township Health Center
USA	United State of America
WHO	World Health Organization
WSU	Wolayita Sodo University
WU	Wachemo University

Abstract

Background: Health workforce demand and supply increased last two decade**.** In Ethiopia, about 84% of the country's total populations live in rural areas. However, shortages and imbalances in physician workforce distribution between urban and rural areas among different regions are enormous. A little was known about medical students' intention to work in the rural area after completing medical school. This study was done to assess the intention of undergraduate medical students towards rural work settings and to identify factors associated with intention to work in the rural areas.

Methods: A cross-sectional study was employed in January to April 2018 among 342 (254 male Vs 88 female) medical students (year IV to Year V) in three public medical schools in Ethiopia. Stratified random sampling technique was used. The pretested self-administered questionnaires were used. Data was entered into EPI-data version 3.1 and exported to Statistical Package for Social Science (SPSS) version 24 for analysis. A bivariate and multivariate analysis of logistic regression was used to identify associated factors with 95% of confidence interval.

Results*:* This study found that; 24.9% of participants are intended to work in the rural areas. The odds of intention to work in the rural area were higher among the male and Addis Ababa University medical students' as compared with the females, Wolayita Sodo, and Wachemo Universities medical students. As independent predictors: gender (AOR = 2.125[1.012, 4.462]), study medical colleges (AOR [C.I] = 2.926[1.299, 6.589]), career advancement (AOR [C.I] = 2.911[1.377, 6.154]), availability of medical equipment (AOR [C.I] = 3.524[1.140, 10.892]), and type of hospital (AOR [C.I] = 6.572[2.716, 15.904]) were significantly associated factors.

Conclusion*:* Majority of Ethiopian medical students' intention were less likely to work in the rural setting and primary hospitals. Gender, medical school, availability of essential medical equipment, and expansion of career advancement were associated factors with intention of medical students to work in the rural setting after graduation. Enrolling altruistic and rural background students into medical schools and influencing the attitude of medical students to work in rural location are expected to create graduates who are more likely to work in rural settings. Improving essential medical equipment is also more likely to create encouraged graduates.

Key words: medical students, intention, rural setting, urban setting, motivation, health facility, career advancement, medical equipment, push and pull factors

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1. Introduction

1.1. Background

The mobilization and strengthening of human resources for health is central to building sustainable health systems(1). Health worker shortages and mal-distribution have important implications for the capacity of health systems, but health worker shortages have now reached serious level in many rural areas(1, 2) worse in developing countries(3) particularly in Africa(4) As a result, the shortage of doctors and their mal-distribution between urban and rural areas contribute to inequitable health care delivery(5).

Ethiopia is the second most populous (more than one hundred million) sub-Saharan country in Africa next to Nigeria. About 80% of the country's total populations live in rural areas and urbanization rate increased by 4.64% so that the rural to urban migration is high(6). The number of medical schools is more than 24 and the annual undergraduate medical students were more than 2000 currently and it was more than 3000 per year after 2018 from the level of only 336 in 2010(7).

However, there are major HRH management challenges including shortage, urban/rural and regional disparities, poor motivation, retention and performance. Hence, enhancing human resources management practice including motivation, and retention schemes is the main component(8). Shortages and imbalances in physician workforce distribution between urban and rural areas among different regions in Ethiopia are enormous (9). The doctor to population ratio is 1 per 14,000 populations(8).

Studies identified that medical students have low positive attitudes towards to work in rural area as well as low confidence in overall competency to work in the rural area in five Asian countries(10). In Uganda, medical students had a negative perception about the rural areas and did not intend to practice medicine in rural area after their qualification(3).

Different intrinsic example work itself and extrinsic factors like financial and non-financial incentives that pull or push the attitude of medical students towards rural area practicing after their graduation(4, 11-13).

1.2. Statement of the problem

The health workforce crisis is a worldwide phenomenon particularly physicians(14, 15) and there is serious shortage of physicians in the rural area mainly in sub-Saharan Africa(16). In Ethiopia, the intake and number of medical schools have increased, and curtailing the brain drain by holding successive consultations with new graduates(17) but there is imbalanced distribution of physicians between regions, urban and rural setting moreover, the physician to population ratio is lower in rural area of the country hence the ratio is an expression of the relative inequality reflecting proportional differences in health among rural and urban area(8).

Ethiopian medical schools are training medical workforce with preferences not to work in rural and remote places(9). The attitudes of the majority of Ethiopian medical students in the capital city towards practicing medicine in rural areas were found to be poor(18)

Most of the medical students were intended to migrate abroad, rural to urban but small number of students anticipated a rural work location and then increased physician shortage in rural areas and high accumulation of doctors were found in big cities (6, 11, 19-21).

Therefore, the magnitude of the problem is still high in the rural area. Limited evidences are available regarding medical students' intention to work in the rural setting after completing medical school and its associated factors. Hence, this study was aimed to assess the intention to work in the rural area and identify major associated factors with their intention to work in the rural setting.

1.3. Significance of the study

In Ethiopia, there is limited availability of evidence because very few studies were conducted regarding medical students intention to work in the rural area and factors associated with their intention to work in the rural area.

Hence, the findings of this study help to provide evidence on regarding less intention of medical students to work in the rural setting in public University of Ethiopia.

The findings of the study also help to create awareness towards rural community posting to increase the magnitude of their intention to work in rural setting.

The new message of this study gives information for medical colleges to give special attention regarding rural career guidance from early medical education course time. In addition, it helps to

carryout practical sessions in rural locations in order to familiarize medical students with rural community life style.

The new finding of the study will also help to: advance careers in the rural setting by Ministry of Health and Hospital and gives evidence to increase the number of tertiary hospitals in rural work location.

Finally, the findings of this research will add new information for program developers and policy formulators regarding intention of medical students to work in the rural setting and give directions for the other researchers interested on this area.

2. Literature review

2.1. The concept of migration and motivation

2.1.1. Migration of health workers

Migration is a phenomenon where health workers leave from rural to urban regions within a country, from developing to developed countries or from public to the private sector. It can be defined as a form of relocation diffusion (the spread of ideas, innovations, behaviors, from one place to another) involving a permanent move to a new location.

The World Health Organization estimates the current global shortage of health workers at more than 4 million(22). Because, health professionals migrate from rural to urban, from low to middle and middle to high-income countries, from developed countries with lower wages to those with higher ones. Less developed countries are most likely to be net suppliers, and although other developed countries are also net recipients the main receiver appears to be the US(10)

The Global pattern reflects the importance of migration from less developed country to more developed countries. Migrants from countries with relatively low-income and high natural increase rate tend to head for wealthier countries where job prospects are higher(23). The migration of health workers from developing countries to developed ones is a well-recognized contributor to weak health systems in low income countries and is considered a primary threat to achieving the health-related millennium development goals(16, 24, 25). The emigration of doctors from developing countries to developed countries could be considered deleterious for the low income countries of departure but more associated with the amount of remittance sent home by migrants(26).

From a global perspective, therefore, the medical brain drain could be seen as a matching process through which workers are allocated to places and jobs where they are most productive (22). The drain of health resources from low income countries to richer ones is not a new phenomenon, and Ethiopia is one of the countries with the lowest density of physicians in the world & health migration is a problem in several categories of health workers in Ethiopia(12).

The literature shows that the brain drain of medical professionals is threatening the very existence of the countries' health services. The problem of brain drain has reached quite

disturbing proportions in certain African countries, with Ethiopia ranked first in the continent in terms of rate of loss of human capital, followed by Nigeria and Ghana(13)

2.1.2. Motivation of health workers

Motivation is a driving force that influences individuals to act in a certain way in their work place. It can be defined both intrinsically and extrinsically. Intrinsically, self-generated like self-feeling, the freedom to act, to choose the goals, to develop one's goals, interesting and stimulating tasks, promotion and development opportunities. But extrinsically, comes from outside, to motivate the employees such as incentives as raising the salary, recognition of one's work(27).

The increased focus on health workers' motivation as vital to ensure good quality health service is a very important shift from seeing quality of service delivery in the health sector as a function of the number of health workers and their qualifications(28).

Human resources management focuses on recruitment as per the need, deployment of staff, performance management and motivation. In order to improve development and management of human resources for health-enhancing human resources management practice including motivation and retention schemes can be taken as a strategy (8). The motivation of health professionals is one of the key ways to ensuring efficient provision of health services. Improving the motivation of health workers in rural and remote areas is of greatest concern to all countries worldwide(19).

2.1.3. Some theories of motivation

It is better to state different theories of motivation in order to confirm the study finding whether agree or disagree with them because the study approach was deductive. Behavioral theories, such as those developed by Maslow and Herzberg, show a more complex decision-making process regarding the movement of labour(27).

Alderfer's ERG Theory: the three components (Existence, Relatedness, and Growth) identified by *Alderfer* (1972) drew upon Maslow's theory, but also suggested that individuals were motivated to move forward and backward through the levels in terms of motivations. The three levels are: 1. Existence related to Physiological and Safety needs 2. Relatedness addresses the

belonging needs 3. Growth pertains to the last two needs, thereby combining Esteem and Self-actualization (29).

Herzberg Two-Factors Theory further modified Maslow's needs theory and consolidated down to two areas of needs that motivated employees. These were characterized as lower level motivators called Hygiene's and higher level factors and focused on aspects of works known as motivators. This theory easily understood the approach that suggests that individuals have desire beyond the Hygiene's and that motivators are very important to them(27).

Reinforcement Theory: *B.F. Skinner* (1953) studied human behaviors and proposed that individuals are motivated when their behaviors are reinforced which are associated with desirable and undesirable(30)**.**

These theories deal with a particular aspect of motivation, it seems unrealistic to address them in isolation, since these factors often do come into play in and are important to employee motivation at one time or another. Other approaches to motivation are driven by aspects of management, such as productivity, human resources, like *Scientific Management Theory, McGregor's Theory X and Theory Y, Ouch's Theory Z* these theories are helpful in understanding management and motivation from the conceptual perspective, it is important to recognize that most managers draw upon a combination of needs, extrinsic factors and intrinsic factors in an effort to help motivate employees, to help employees meet their own personal needs and goals. Managers should focus on expectancy, goal setting, performance, feedback, equity, satisfaction, commitment, and other characteristics(31-33).

2.2. The role of medical students for the rural community

The healthcare sector at the rural community level is important for many reasons. Living in a rural area is appealing to many people, primarily for the quiet lifestyle and strong community relationships. These quality of life variables are important not only to those who want to continue living in a rural area, but also to urban residents that are searching for a change. However, for a rural community to survive, the local economy must be sustainable which will allow for the provision of important local services(16). Typically, rural communities pay little attention to their health care system until they need it. As a result, many people have little idea of the non-medical importance of the health care system to the local communities. The employment

opportunities and the resulting wages and salaries make the health care system an extremely important part of the local economy and strong viable hospital must have support from local physicians to maintain sufficient utilization. Lack of local physician support will significantly impact the financial stability of the hospital. In addition to the inpatient visits, physicians can generate significant outpatient activity that increases hospital net revenue(16, 34). However, unpopularity for rural lifestyle indicated by medical students were: it is difficult or uncomfortable, it is backward, lack of social and family networks, poor accessibility of services and facilities, more fun and interesting in urban areas, financially is not as good, change from original lifestyle, and concern regarding children and schools(35).

2.3. Intentions of medical students to work in the rural area in world context

The Neoclassic Wage Theory, which suggests that the choice is driven largely by financial motives and by the probability of finding employment(11)**.** On the other hand, people are motivated by a complex structure of rewards, in which non-financial benefits and move quickly to another job or place if their expectations are not met (22).

Retention of health workers, particularly in rural areas of LICs (Low Income Countries), was great agenda, due to the severe staff shortages that hamper the attainment of the MDGs (Millennium Development Goal). As a result, the study done on Germany and France24% of physicians were found in rural area(16), correspondingly in USA, Canada**,** South Africa**,** and Kenya, only 9%, 9.3%, 12% and 36% of physicians were found in rural areas respectively (22).

In Kazakhstan, only 8% of the students reported a wish to work in rural localities(36). In China, among 4,669 medical students (33%) had a positive attitude and (55%) had a neutral attitude toward working in rural THCs (Township Health Centers). Twenty-one per cent of medical students showed a strong willingness to work in a deprived area, 57.3% manifested weak willingness and 21.5% unwillingness to work in a low-resource setting(37). There was a significant increase in students' perceptions of rural primary care physicians' primary care service features and medical expertise.

In the majority of countries, rural and remote areas are usually lacking sufficient numbers of health workers. Approximately one half of the global population lives in rural areas, but these

areas are served by less than a quarter of the total physicians' workforce and then at the country level, imbalances are even more prominent. Some countries apparently have a sufficient number on average, but with shortages in rural areas (Germany, France) as a result 24% and 76% of physicians were found in rural and urban areas respectively (22).

Medical students preferring to work in rural areas were more likely to believe there are good opportunities for employment, to practice variety of skills, to get clinical practice autonomy in rural areas than those intending to work in urban areas. On the other hand, students preferring urban areas versus rural locations in the future were more likely to believe that working in rural areas would be more isolated(38). But in Bangladesh 43% of medical students had positive attitude towards working in rural areas and attitude about overall competency(10). Almost half the participant's students chosen regional or rural practice, with the balance (majority) of the students preferring an urban Centre(38). Though, female students had negative attitude to practice rural area than male students. Students who lived in urban areas during their high school period significantly had lower positive attitude compared to those living in rural areas. Students whose parents lived in semi-urban areas significantly had higher positive attitude compared to those living in rural areas (10, 37, 39, 40).

Studies conducted in Bulgarian and Germany describes that, students prefer to specialize and to work in other European countries due to the better payment and they have intention to return and practice their profession in their country of origin(41). Conversely, Students perceived the physicians' work demand more positively, and there was no change in students' perceptions of the physicians' income potential (42).

The only factor significantly associated with positive attitudes towards their school in terms of preparing or inspiring them to work in rural areas is parents‟ residence. Factors significantly associated with intention to work in public sector five years after graduation includes residence during childhood and mode of admission into medical schools. Students living in urban areas during their childhood period had significantly less intention to work for public-sector (10, 37, 39, 40).

Rural medical recruitment and retention through education and training, with important insights into the factors affecting preference for future rural practice were essential(38).

Selecting medical students through interviews to identify their family support and intentions to work in THCs would increase recruitment and retention(43). A rural background (i.e being brought up in a rural area) training with a community-based curriculum, was early exposure to the community during medical training and rural location of medical school motivate medical students to work in rural areas(44).

2.4. Intentions of medical students to work in the rural area in sub-Saharan African context

Migration from and within sub-Saharan Africa (SSA) is an important macroeconomic issue for both sending and receiving countries. Amid rapid population growth countries, migration in sub-Saharan Africa has been briskly increasing over the last 20 years(20). Most of the medical students were expected to migrate abroad, but small number of students anticipated a rural career(19). From the African and Asian context, 28% expected to migrate abroad, while only 18% anticipated a rural career. There were more nursing than medical students desired professions abroad(45).

There are sub-Saharan African countries (Cote d'Ivoire, Mali, Democratic Republic of the Congo), where there is large overproduction of health workers, with medical unemployment in urban areas, and at the same time with shortages in the rural areas (22). For the reason that, a minor proportion of the students (13.6%) were willing to practice in the rural area after graduation and only (22.5%) were satisfied with rural community posting due to lack of interest in rural communities(46). Majority of the students (80.1%) were of the opinion that doctors working in rural area should earn more than their urban counterparts (47). Almost half (49.7% or 167/336) of all the respondents who answered the research questionnaire did not intend to work in rural health units after training. A quarter (25% or 84/336) of the respondents intended to work in rural facilities.

Finding from Uganda assured that few students who intended to work in rural areas hoped to stay for not more than three years, before going either for further studies or for self-employment in urban areas and intention of medical students to work in rural health facilities decreased progressively from the first academic year to graduation even if none of the fourth and fifth year respondents had any intention to work in rural units after training(3).

In Malawi, medical students with rural backgrounds and small towns, and whose parents were 'non-professionals', were more likely to intend working in rural areas and small towns than students from urban and professional families(35). Medical students and young doctors were eager about working at district level, although this is curtailed by their desire for specialist training and frustration with resource shortages. There is currently little intention to move into the private sector. Time spent in rural areas before matriculation predicted the preference for a rural career and against work abroad(45). So that, admissions standards favoring medical and nursing students with rural backgrounds could promote greater graduate retention in the country of training and in rural areas in Ghana(19).

2.5. Intentions of Medical Students to Work in the Rural Area in Ethiopian Context

The public health sector physician workforce largely constituted of male physicians, young and less experienced due to 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(21). Female physicians were 1.4 times more likely 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. In terms of educational levels, Graduate Programs (GPs) had more incidence of turnover compared to specialists/subspecialists, in addition, turnover variations were observed between health service delivery settings that mean physicians working in referral hospitals and those working in the general hospitals were 1.39 times more likely to move out than physicians working in district hospitals. The incidence of physician migration was two times higher in Amhara region than capital AAU(21).

In Ethiopia, physicians' first placements occur through a lottery, leading to self-selection into the lottery while non-lottery participants apply mainly to private institutions. The authors argue that such random placement does not allow for efficient signaling of individual ability and therefore leads to adverse selection into the lottery, which is indeed what they find using career and wage records of physicians who remain in the public sector. They also find that within the group of lottery participants, the most able tend to leave and are likely to account for a substantial part (one-third) of the physician brain drain out of Ethiopia(22).

From the total respondents 67% (i.e. 63) of physicians express their wish to go abroad if they got the opportunity(13). The attitudes of the majority of Ethiopian medical students in the capital city, towards practicing medicine in rural areas were found to be poor, and the intent to migrate after completing medical training was found to be very high among the study participants, creating a huge potential for brain drain following completion of obligation in the public hospital(18). Thirty percent of the study participants like to practice in rural areas of the country after completing their training, while 28% preferred to work in urban areas. However, 21% of the participants would prefer to work abroad following graduation, without serving in the country. Among the participants (44%) of them, preferred to initially practice medicine in public sector compared with NGOs (17%) or private sector (6%)(18).

2.6. Factors that influence medical students to work in the rural area

Descriptive characteristics about medics' migration designate, through the representative components for financial aspects, health system, and professional career, those important aspects that are relevant for a medic's career, related to the migration phenomenon. The attraction and retention of health professionals in rural areas are influenced by the local environment, which encompasses living conditions (electricity, drinking water, schools for children), social factors (isolation, international, national, and local security issues), working conditions (workload, numbers of health workers, availability of equipment, drugs, and supplies), salaries, financial compensation and assigned responsibilities, along with individual factors such as marital status and gender (48). The possibility of emigrating in more developed countries was mainly for economic reasons but also in search for better career advancement opportunities(24). Demographic characteristics, personal job concerns, and knowledge of THCs were associated with the choice of a career in rural THCs(43).

Financial rewards as the number one motivator; followed by promotion, growth and development; job security; acknowledgment, praise, and recognition; and working environment in that order but doctors were motivated by their working environment mostly(19).

Motivational factors (satisfaction, intrinsically or content factors): events usually associated with positive attitudes regarding the workplace. These events are usually linked to the professional activities (realization, work itself, responsibility and promotion), which means they are intrinsic to the activity itself Hygiene factors (dissatisfaction, extrinsically or context factors). The events

associated with negative attitudes regarding the workplace are extrinsically to the work itself and are more likely associated with the context of the activity (the organization's administration and policy, job security, salary, management, interpersonal relationships and general work conditions) (19, 24). Factors associated with satisfaction with rural community posting included being a student in a federal institution, being a male student and intention to specialize in community medicine after graduation(46). Being female, of older age, not having a university-trained professional parent, previous exposure or service in a poor area, choice of pediatrics as a specialty and strong altruistic motivations were highly associated with the willingness to practice medicine in rural or underprivileged areas. Only 21.5% of respondents considered that medical school encourage the practice of medicine in poor deprived regions. Likewise, only 6.2% of students considered that national public health authority suitably stimulate physician distribution in poorer districts(37).

Factors associated with willingness to work in the rural area included family residence in an urban area, work experience before admission into medical school, intention to specialize in Community Medicine and satisfaction with rural community posting (47). Marital status, some perceived difficulty of getting a job, having family support, sufficient knowledge of THCs, optimism toward THC development, seeking lower working pressure and a lower expected monthly salary affect intention of medical students to practice in rural area(43). Exposure of facilitators to rural location, role models, working conditions; income, prestige, medical school environment, understanding of rural needs, intellectual challenge, attitude towards social problems, voluntary work, the influence of family, and length of residency impact the medical students to work in rural areas(49).

Most of the existing literatures recognize that the decision to migrate is the result of the interaction between several identifiable factors both from home and abroad which are expressed as push and pull factors. Different kinds of literature like (50, 51) push factors are conditions that can drive people to leave their homes, they are forceful and relate to the country from which a person migrates. A few examples of push factors are not enough jobs in your country; few opportunities; "Primitive" conditions; desertification; famine/drought; political fear/persecution; poor medical care; loss of wealth; and natural disasters. Low pay (absolute or relative), poor working conditions, lack of resources to perform work in an efficient manner, limited career opportunities, limited education and further training opportunities, the burden of infectious

diseases such as HIV/AIDS, unstable and dangerous working environment, economic instability(13). Examples of pull factors are; better living conditions; religious freedom; enjoyment; education; better medical care; and security. Higher payment, better working conditions, well-financed health systems, attractive career opportunities, further education opportunities, political stability, travel opportunities(52). Students prioritizing individualistic values more often planned international careers whereas those prioritizing altruistic values preferred rural careers and trainees prioritizing high-resource environments preferentially planned careers abroad and were unlikely to seek rural work. The independent of their priorities, students with prolonged prior rural residence were unlikely to plan emigration and were more likely to plan a rural career (45).

According to the study conducted in public Hospitals of West Amhara, Northwest Ethiopia, Professional category, age, type of the hospital, non-financial motivators like performance evaluation and management, staffing and work schedule, staff development and promotion, availability of necessary resources, and ease of communication were found to be strong predictors of health worker motivation. Across the hospitals and professional categories, health workers' overall level of motivation with the absolute level of compensation was not significantly associated with their overall level of motivation(53).

All job satisfaction subscales like professional training, autonomy, and work environment and cohesion, promotion, recognition at work, perceived alternative employment opportunity and leadership relationship except benefit and salary subscale were significant predictors of overall job satisfaction. Satisfactions with the work environment and group cohesion, single cohesion, and working in the hospital was the final significant predictors of anticipated turnover of Sidama zone nurses(54).

Even though factors influencing health worker motivation are well established in the literature, little evidences are known about the attracting factors that are of relevance to different categories of rural health workers in developing countries(19).

3. Conceptual framework

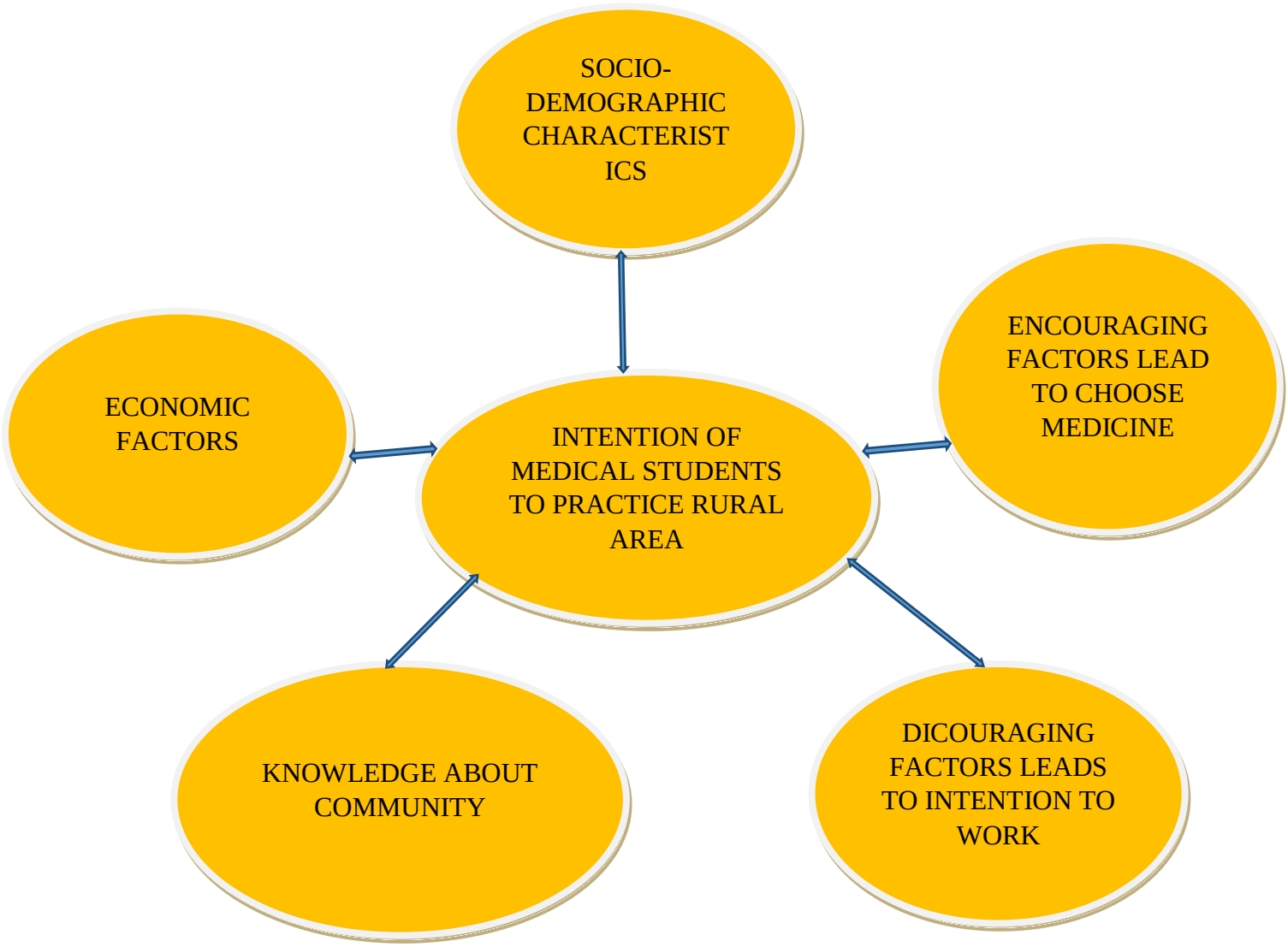

Figure 3-1: Conceptual frame work for intention of medical students in public Universities of Ethiopia, 2018

4. Objectives

4.1. General objective

To assess intention of medical students to work in the rural setting after completing medical school and associated factors in public universities of Ethiopia.

4.2. Specific objectives

1. To assess intention of undergraduate medical students to work in rural setting in public universities of Ethiopia.
2. To identify factors associated with intention of undergraduate medical students to work in the rural setting in public universities of Ethiopia.

4. Methods

4.1. Study area and period

Medical colleges of Addis Ababa, Wolayita Sodo, and Wachemo Universities were the areas of the study.

Addis Ababa University health Sciences College is a professional health Sciences College established in 2009/10. The College of Health Sciences is comprised of four schools and one teaching hospital. Those are School of Medicine, School of Pharmacy, School of Public Health, and school of Allied Health Sciences. All schools of the Health Sciences College offer professional degrees at both undergraduates and postgraduates levels to medical students, dentists, nurses, mid wives, pharmacists, medical laboratory technologists, radiology technologists except School of Public Health which offers only postgraduate degree at MSc and PHD levels. Currently, the college has more than 1800 medical students and over 3000 permanent and administrative staffs in the College(17).

Wolayita Sodo University (WSU) is new Generation University established in 2007 in Southern Nations Nationalities and People Region at Sodo Town which is 390 kilometers far from Addis Ababa. The University catering teaching learning processes in six Colleges, 42 departments in 23 postgraduate programs and one PHD program. Wolayita Sodo University (WSU) Health Sciences College is one of the six Colleges in the University. Among 13 New Innovative Medical Education Initiative (NIMIE) program medical schools in Ethiopia; the Health Sciences College started the School of Medicine by launching the NIMIE program by enrolling health and other natural science undergraduates in to medical schools. Currently, above 300 medical students is actively learning on medical education(17, 55).

Wachemo University (WU) Health Sciences College is among the newly emerged third generation public Universities Colleges which is started in 2012. It is located 230 km south-west of AAU, at Hosanna Town. The college offers medicine, public health officer, nursing, midwifery, medical laboratory, pharmacy in undergraduate programs and surgical nursing, pediatric nursing and general public health in post graduate programs. Currently, the University has admitted over 18,000 students among these more than 1500 students are the Health Science College students of these more than 330 are medical students(17).

The reasons to choose such areas were the accessibility, and the former researchers were not included and cost minimization was considered. The study was conducted from January to April 2018.

4.2. Study design

A cross-sectional study design was employed to assess intention of medical students' to work in rural setting after completing medical school.

4.3. Target population

All undergraduate medical students in the three public Universities were source of population.

4.4. Sources of population

All clinical year II medical students in the three public Universities were source of population.

4.5. Study population

All clinical year II (year IV and V) sample medical students of the three medical schools of public universities were the study population.

4.6. Variables of the study

4.6.1. Independent variables

Socio-demographic factors**:** Variables such as medical school, age, sex, birth place, religion, academic year, current family residence area.

Factors that initiate medical students to choose medicine: Self-interest for life saving, demanding better income, social prestige, family or peer group pressure, senior medical students or health professionals advice were considered as independent variables.

Economic factors: perceived economic status of the family, source of family income

Social factors: professional isolation, family or social isolation.

Factors related to essential supplies: basic infrastructures, updated technologies, and essential medical equipment, career advancement.

Factor related to awareness about rural community: rural career guidance.

Factors related to areas to work: type of organization, type or levels of health facility were considered as independent variables.

4.6.2. Dependent variable

Preferred setting of medical students to work after graduation which means either (Urban = 0) or (Rural = 1) which was dichotomous.

4.7. Operational definitions

Rural setting: Geographical areas excluding major or biggest cities or towns recognized by Central Statistics Agency (CSA) of Ethiopia in 2017.

Urban setting: Major or biggest cities or towns recognized by Central Statistics Agency (CSA) of Ethiopia in 2017.

Health workers migration is a well-known phenomenon where health workers move from rural to urban regions within a country.

Intention: mental state that represents a commitment to carrying out an action in the future.

Push factors: circumstances that force physicians to leave their countries and rural area due to different reasons or factors.

Motivational factors: are attractive reasons for acting or behaving in a particular way "or "desire or willingness to work in rural area.

Pull factors: circumstances that force to attract medical students to their countries due to different reasons or factors.

Career advancement: opportunity for development and expansion of medical students' profession through different training and experiences.

4.8. Sample size determination

The sample size was calculated by using estimation of single population proportion based on(18). As a result of this, P = 0.3, q = 0.70, Z = 1.96 from 95% confidence interval and 0.05 was the degree of precision (*d*) value. Therefore, sample size was calculated as follows.

$$n = \frac{(z\ \alpha/2)^2 x\ pq}{d^2} = ((1.96)^2(0.3)\ (0.7)) \div (0.05)^2 = 323$$

Finally, by considering 10% of non-respondents' rate the sample size of this study was 355 undergraduate clinical year one and year two medical students.

4.9. Sampling procedures

Stratified random sampling technique was employed. First, the target population was stratified according to years of clinical practicum then sampling frame was generated through consultation with respective medical colleges' registrar and determined sample was proportionally allocated to the study medical colleges. Finally eligible participants selected randomly from respective colleges of the three public universities.

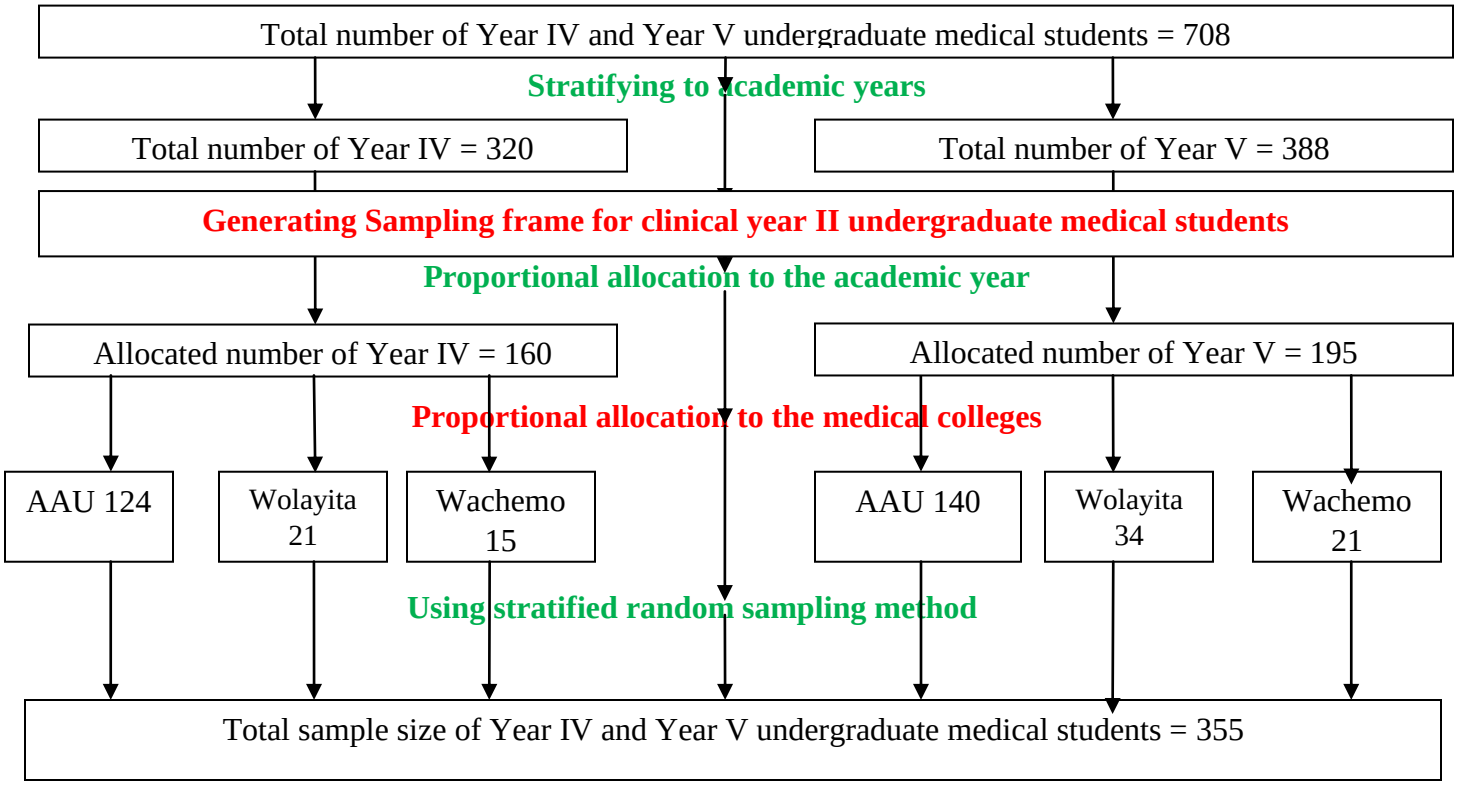

Fig 4-1 sampling procedure of medical students to work in the rural area, 2018
Source: own survey, 2018

4.10. Data collection tools and procedures

The questionnaire for the participant was adapted from prior literature (12, 13, 18, 19) and modified to the study context. The tools comprise of questions related to Socio-demographic characteristics, reasons to choose medicine initially, factors that discourage to work in the rural area, factors that attract to work in the rural setting and future work location plan of medical students after graduation. The study participants were randomly selected from each class. The expected relevant data was gathered by using self-administered English version questionnaires because English is media of instruction in higher education institutions in Ethiopia. The closed-

ended type of items was used in the form of Likert-scale. Then the questionnaires were administered to sample medical students in the selected public medical colleges. The participants were allowed to give their own answers to each item independently as needed by the researcher. The study participants were strictly assisted and supervised by the researcher himself. Finally, the questionnaires were collected back at the right appointment.

4.11. Data quality management

The school of Medicine directors from each University were coordinators and department heads of the schools were assigned as data collectors. Sufficient orientation was given to co-coordinators, data collectors and study participants regarding way of answering and confidentiality of the data. The facilitators supported to collect data through provided questionnaires. Checking the validity and reliability of questionnaires before providing to the actual study subject was done through Pre-tested pilot study conducted in St. Paulos Millennium Medical College among 24(6.8%) clinical year two medical students prior to the final administration. Data collection process was strictly followed by the researcher. Each questionnaire was checked for completeness, missed values and unlikely responses; those incomplete questionnaires were omitted from the analysis then final administration was started. After completion of data collection; data was entered in to EPI-Data version 3.1 then Editing, coding and cleaning was carried out and also recoding, transforming, and re-categorizing of variables was done.

4.12. Data analysis procedure

The cleaned data were exported from epi-data to Statistical Package for Social Science (SPSS) version 24 for analysis. After checking the correct entry of the data, basic descriptive summaries of medical students' characteristics and outcome of interest was computed. Accordingly, simple frequencies, measure of central tendencies and measure of dispersions were calculated. The magnitude of their intention to work in the rural area was determined by using descriptive analysis. Bivariate and multivariate analysis of binary logistic regression was done to determine the association of dependent and independent variables. During bivariate analysis of binary logistic regression, factors with P-value less than 0.20 were entered into multivariate analysis of binary logistic regression. Statistical significance was declared at P value less than 0.05 for multivariate analysis of binary logistic regression. Finding of final model was reported using adjusted odds ratio (AOR) at 95% confidence interval.

4.13. Ethical consideration

Ethical permission was received from Review of Ethical Committee (REC) of the school of public health and the Institutional Review Board (IRBCHS) of College of Health Science at AAU. Ethical clearance was also received from St. Paulos Millennium Medical College Ethical Review Board to conduct pretest before distributing the questionnaires. The researcher informed the respondents about the way of answering and confidentiality. Participants were informed that their participation in the study was based on their consent and the purpose of the study was explained to them prior to the distribution of the questionnaires. Any identification of the students did not record anywhere on the questionnaire. In addition, the research has not personalized any of the respondent's response during data presentations, analysis and interpretation. Furthermore, all the materials used for this research had been acknowledged.

4.14. Dissemination of the study findings

The final edition (revision) will be disseminated to Ministry of Health and Ministry of Education, AAU University, College of Health Science, School of Public Health, School of Medicine, through hard and soft copies. In addition, effort will be exerted to publish the study findings on the local/ international journal by preparing manuscript.

5. Results

5.1. Socio-demographic characteristics of the study participants

A total of 342 undergraduates' medical students participated in this study which is 96.4% of response rate. The non-response rate was 2.8% due to absence of data collection time from the class and only three (0.8%) questionnaires were incomplete. Of the total participants 254(74.3%) were males while 88(25.7%) were females. The participants were from medical school of Addis Ababa University 257(75.10%), medical school of Wolayita Sodo University 50(14.7), and medical school of Wachemo University 35(10.2). The mean age of study participant was 23.85 with standard deviation (S.D) 3.02.

Regarding to religion affiliation, 201(58.8%) were Orthodox, 41(12%) were Islam, 91(26.6%) were Protestant and 8(2.3%) were Catholic religions. Most of their family residency was urban area 199(58.2%). The main source of the family income was, 156(45.6%) from Salary, 100(29.2%) from Business and 86(25.2%) from Agriculture. Finally, out of total respondents 254(74.3%) were medium, 66(19.3%) were poor and 22(6.4%) were rich regarding to perceived economic status of their families.

Table 5-1: Socio-demographic characteristics of medical students in public Universities of Ethiopia, 2018

Variables		Frequency	Percent
Sex	Female	88	25.7
	Male	254	74.3
Age	20-25	284	83.0
	Above 25	58	17.0
Medical school of the respondents	Addis Ababa	257	75.1
	Wolayita	50	14.7
	Wachemo	35	10.2
Birth place of respondents	Urban	184	53.8
	Rural	158	46.2
Religion of the respondents	Orthodox	201	58.8
	Islam	41	12.0
	Protestant	91	26.6
	Catholic	8	2.3
	Others	1	0.3
Academic year of respondents	Fourth year	157	45.9
	Fifth year	185	54.1
Medical education program	Generic	292	85.4
	Accelerated	50	14.6
Current family residence	Urban	199	58.2
	Rural	143	41.8
Main income source of family	Agriculture	86	25.2
	Salary	156	45.6
	Business	100	29.2
Perceived economic status of family	Poor	66	19.3
	Medium	254	74.3
	Rich	22	6.4

'**Others**' refers to Seventh day Adventist religion follower

5.2. Future work location plan of medical students after graduation

Almost an equal number of study participants intended to work at the private or Non-government health organization 174(50.1%) and public health organization 168(49.1%) after graduation. From the total respondents of the study 257(75.1%) were preferred urban area but only 25 percent were intended to work in the rural area 85(71 males and 14 females) of respondents intended to work in the rural area after their graduation.

Table 5-2: Medical students intention to work placement in public Universities of Ethiopia, 2018 (n=342).

Variables		Frequency	Percent
Organization	Public or Government	168	49.1
	Private or NGO	174	50.9
Intended location after graduation	Urban	257	75.1
	Rural	85	24.9

More than half of the medical students 175(51.2%) intended to work in the tertiary or teaching hospital; nearly forty percent 129(37.7%) preferred general hospital and approximately ten percent 38(11.1%) of them preferred primary hospital to work after their qualification.

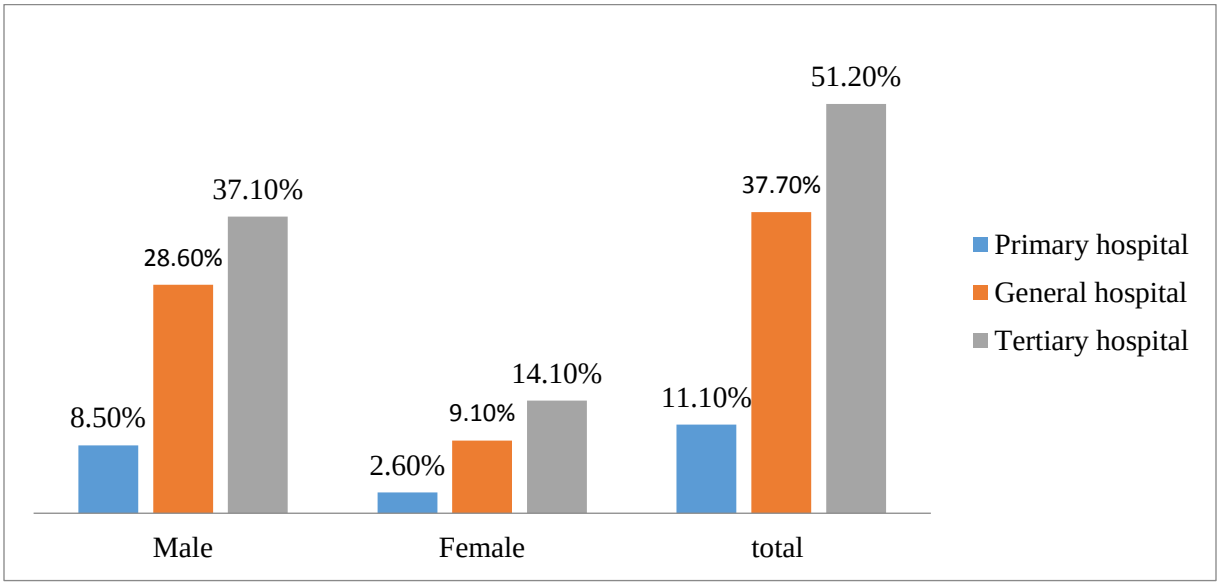

Fig 5-1: Medical students' preference hospitals in public Universities of Ethiopia, 2018

Among 257 medical students who had intended to work in urban setting, 183(71.2%) were males and the rest 74(28.8%) were females. However, among 85 medical students who had intention to work in rural setting, 52(61.2%) were planned maximum of two years (45 males Vs 7 females) but, 33(38.8%) of them were agreed to work more than two years (26 males Vs 7 females). The implication of this indicated that majority of medical students planned to accomplish their obligation years.

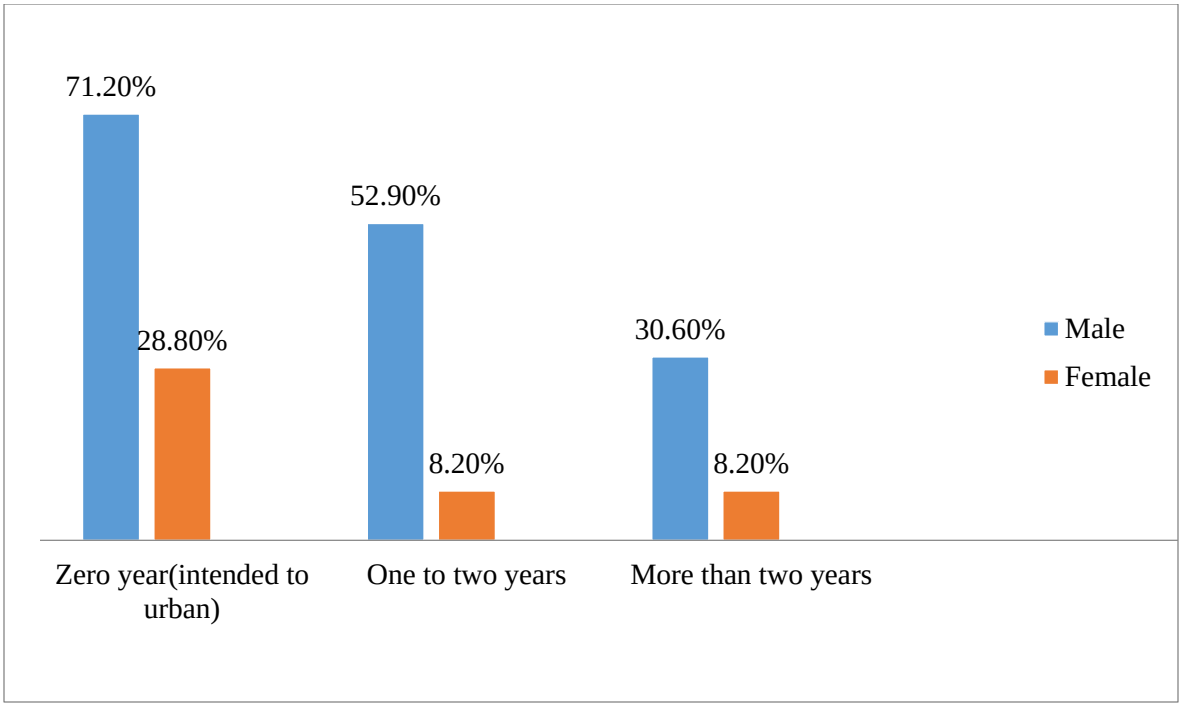

Fig 5-2 Medical students intended years to work in rural setting in public Universities of Ethiopia, 2018

5.3. Factors that inspire medical students to choose medicine

Greater part of the respondents chosen medicine department according to their interest in the field for life saving (Mean score: 2.72) and the second inspiring factor to choose medicine initially was searching better income which means 239(69.9%) of respondents were agreed on searching income was basic reason to choose medicine (Mean score: 2.56). In addition, nearly half of the total respondents 169(49.4%) were chosen medicine due to the presence of family or peer group influence.

Table 5-3 Factors that inspire medical students to choose medicine among public Universities of Ethiopia, 2018 (n = 342)

Variables		Frequency	Percent	Mean	S.D
My interest in the field for life saving	Disagree	30	8.8	2.72	0.61
	Neutral	35	10.2		
	Agree	277	81.0		
In order to search better income	Disagree	46	13.4	2.56	0.72
	Neutral	57	16.7		
	Agree	239	69.9		
Family or peer group influence	Disagree	110	32.2	2.17	0.89
	Neutral	63	18.4		
	Agree	169	49.4		

5.4. Factors that attract medical students to work in the rural setting

More than two-third of the respondents are interested to work in those areas with high existence of medical need. About half of respondents encouraged to practice variety of skills or to get work autonomy in the rural area which was the mean score of 2.24. Nearly forty percent of respondents identified having better opportunity for career advancement was encouraging factor for medical students. Furthermore, out of total study participants 120(35.1%) agreed on good opportunity for employment as motivating factor. Similar number of respondents 111(32.5%) were agreed on familiarizing different cultures or gaining cultural advantages and nearness for family or friends or spouse as an encouraging factor for them.

Table 5-4: Factors that encourage medical students to work in rural area in public Universities of Ethiopia, 2018 (n=342).

Variables		Frequency	Percent	Mean	S.D
Opportunity to practice variety of skills or work autonomy	Disagree	96	28.1	2.24	0.86
	Neutral	67	19.6		
	Agree	179	52.3		
Having better opportunity for employment in the rural area	Disagree	145	42.4	1.93	0.88
	Neutral	77	22.5		
	Agree	120	35.1		
Having high medical need for rural area	Disagree	50	14.6	2.53	0.74
	Neutral	59	17.3		
	Agree	233	68.1		
Having better opportunity for career advancement	Disagree	139	40.6	1.98	0.89
	Neutral	72	21.1		
	Agree	131	38.3		
Locating near to the family or friends or spouse	Disagree	178	52.0	1.80	0.89
	Neutral	53	15.5		
	Agree	111	32.5		
Adopting with different cultures or cultural advantages in the rural areas	Disagree	133	38.9	1.93	0.84
	Neutral	98	28.6		
	Agree	111	32.5		

5.5. Factors that discourage medical students to work in the rural area

Just about ninety percent of respondents identified poor accessibility of essential infrastructures and low availability of essential medical equipment and laboratory facilities discouraged to work in the rural area after their qualification (Mean score: 2.87 and 2.83 respectively). The response of 272(79.5%) medical students shown inadequate financial incentives such as salary, bonus, allowances, compensations, loans might discourage their intention to work in the rural area (Mean score: 2.71). Furthermore, seventy-four percent of respondents agreed on language barrier and about sixty-six percent of participants agreed on less access to par time work as discouraging factor for them (Mean scores 2.61 and 2.51 respectively). More than sixty percent

of the study participants demonstrated family isolation (Mean scores: 2.48) and professional isolations (Mean score: 2.53) minimized their intention to work in the rural area.

Table 5-5: Factors that discourage medical students to work in rural area in public Universities of Ethiopia, 2018 (n=342).

Variables		Frequency	Percent	Mean	S.D
Poor accessibility of essential infrastructures in the rural area	Disagree	13	3.8	2.87	0.44
	Neutral	19	5.6		
	Agree	310	90.6		
Low availability of medical equipment and laboratory facilities	Disagree	17	5.0	2.83	0.49
	Neutral	24	7.0		
	Agree	301	88.0		
Inadequacy of financial incentives in the rural area	Disagree	29	8.5	2.71	0.61
	Neutral	41	12.0		
	Agree	272	79.5		
Having language barrier in the rural area	Disagree	43	12.6	2.61	0.70
	Neutral	46	13.4		
	Agree	253	74.0		
Professional isolation will face if the location to work after graduation is rural area	Disagree	33	9.6	2.53	0.66
	Neutral	95	27.8		
	Agree	214	62.6		
Less access to par time work in the rural area	Disagree	51	14.9	2.51	0.74
	Neutral	66	19.3		
	Agree	225	65.8		
Family or friends isolation	Disagree	48	14.0	2.48	0.73
	Neutral	80	23.4		
	Agree	214	62.6		

5.6. Awareness of medical students about the rural setting

Regarding on career guidance, 275(80.4%) of respondents were not properly received rural career guidance. Among 342 respondents more than sixty percent of respondents were not attending different experimental rural health programs. Finally, below the average number of medical students are aware about rural community posting as well as the life style of rural community.

Table 5-6: Awareness of medical students about rural area or rural community in public Universities of Ethiopia, 2018 (n=342).

Variables		**Frequency**	**Percent**	**S.D**
Receiving rural career guidance while medical education carried out	Yes	67	19.6	0.38
	No	275	80.4	
Attending on different experimental rural health programs	Yes	124	36.3	0.48
	No	218	63.7	
Having good awareness about rural community posting	Yes	145	42.4	0.49
	No	197	57.6	

5.7. Factors associated with intention of medical students to work in rural setting by bivariate analysis.

Among all the study variables, sex of the respondents,' study medical college, academic year of medical students, main income sources of respondents family, perceived economic status of respondents family, accessibility for exercising different skills, opportunity for career advancement, location near to the family or friends, feeling of professional isolation, availability of medical equipment, updated technologies and other recreational facilities availability of essential facilities and infrastructures, type of organization and type of hospital were candidate variables during Bivariate analysis of logistic regression.

Table 5-7: Factors associated with intention of medical students to work in the rural setting in public Universities of Ethiopia, 2018 by bivariate analysis (n=342).

Variables		Preferred location **n(%)**		**Bivariate analysis**	
		Urban **(n= 257)**	Rural(n= 85)	COR(95% C.I)	p-value
Sex	Male	183(71.2)	71(83.5)	**2.051(1.088, 3.864)***	**0.026**
	Female	74(28.8)	14(16.5)	1.00	
Age of respondents	20-25	214(83.3)	70(82.4)	0.938(0.491, 1.790)	0.845
	Above 25	43(16.7)	15(17.6)		
Academic year	Fourth	109(42.4)	48(56.5)	**1.761(1.074, 2.890)***	**0.025**
	Fifth	148(57.6)	37(43.5)	1.00	
Medical colleges	**Addis Ababa**	186(72.4)	71(83.5)	**1.936(1.026, 3.653)***	**0.041**
	Others	71(27.6)	14(16.5)	1.00	
Religion of the respondents	Orthodox	137(59.1)	64(58.2)	0.280(0.065, 1.209)	**0.080**
	Islam	25(10.8)	16(14.5)	0.384(0.080, 1.833)	0.230
	Protestant	66(28.6)	25(22.7)	0.227(0.051, 1.022)	**0.053**
	Catholic	3(1.3)	5(4.5)	**1**	
Birth place	Urban	118(50.9)	66(60.0)	1.449(0.915, 2.296)	**0.114**
	Rural	114(49.1)	44(40.0)	**1**	
Perceived economic status of respondents family	Poor	42(16.3)	24(28.2)	2.571(0.779, 8.485)	0.121
	Medium	197(76.7)	57(67.1)	1.302(0.424, 4.002)	0.645
	Rich	18(7.0)	4(4.7)	1.00	
Income source of respondents family	Agriculture	57(22.2)	29(34.1)	1.914(0.992, 3.691)	0.053
	Salary	121(47.1)	35(41.2)	1.088(0.591, 2.004)	0.786
	Business	79(30.7)	21(24.7)	1.00	
Getting variety of skills from many cases in the rural area	Disagree	82(31.9)	14(16.5)	**0.385(0.201, 0.737)***	**0.004**
	Neutral	51(19.8)	16(18.8)	0.707(0.371, 1.348)	0.293
	Agree	124(48.2)	55(64.7)	1.00	

Career advancement	Agree	85(33.1)	46(54.1)	**3.041(1.691, 5.468)***	**0.001**
	Neutral	54(21.0)	18(21.2)	1.873(0.924, 3.799)	0.082
	Disagree	118(45.9)	21(24.7)	1.00	
Feeling of location near to the family	Disagree	34(13.2)	14(16.5)	1.463(0.725, 2.951)	0.288
	Neutral	56(21.8)	24(28.2)	1.523(0.855, 2.713)	0.153
	Agree	167(65.0)	47(55.3)	1.00	
Feeling of professional isolation	Disagree	21(8.2)	12(14.1)	2.272(1.037, 4.978)	0.040
	Neutral	65(25.3)	30(35.3)	**1.835(1.062, 3.171)***	**0.029**
	Agree	171(66.5)	43(50.6)	1.00	
Existence of attractive social life	Disagree	33(12.8)	18(21.2)	1.851(0.961, 3.534)	0.062
	Neutral	34(13.2)	11(12.9)	1.098(0.523, 2.306)	0.806
	Agree	190(73.9)	56(65.9)	1.00	
Provision of updated technologies and other recreational facilities	Disagree	15(5.8)	13(15.3)	**3.129(1.411, 6.940)***	**0.005**
	Neutral	29(11.3)	13(15.3)	1.618(0.792, 3.308)	0.187
	Agree	213(82.9)	59(69.4)	1.00	
Availability of medical equipment	Disagree	9(3.5)	8(9.4)	**3.165(1.175, 8.524)***	**0.023**
	Neutral	13(5.1)	11(12.9)	3.013(1.290, 7.036)	0.011
	Agree	235(91.4)	66(77.6)	1.00	
Availability of essential infrastructure	Disagree	7(2.7)	6(7.1)	2.734(0.891, 8.389)	0.079
	Neutral	14(5.4)	5(5.9)	1.139(0.397, 3.268)	0.809
	Agree	236(91.8)	74(87.1)	1.00	
Rural career guidance	Yes	40	27	1.561(0.899, 2.712)	0.114
	No	192	83	**1**	
Type of organization	Public	133(51.8)	35(41.2)	1.532(0.933, 2.517)	0.092
	Private	124(48.2)	50(58.8)	1.00	
Type of preferred hospitals	Primary	17(6.6)	21(24.7)	**6.219(2.928, 13.211)***	**0.001**
	General	94(36.6)	35(41.2)	1.875(1.075, 3.269)	0.027
	Tertiary	146(56.8)	29(34.1)	Reference	

"*" implies significance at 95% confidence interval, and others refers Wolayita and Wachemo medical schools

5.8. Factors that associated with intention of medical students by multivariate analysis

Out of total candidate variables, only five variables such as sex, medical colleges of the respondents, opportunity for career advancement, availability of medical equipment and type of hospital were significantly associated with intention of medical students to work in the rural area after graduation during multivariate analysis of logistic regression. However; the rest variables were not significantly associated with intention of medical students to work in the rural area.

The odds of intention to work in the rural area was about two times higher among male medical students as compared with odd of intention of female students (AOR [95%CI] = 2.125[1.012, 4.462]).

The odds of intention to work in the rural area were three times higher among Addis Ababa University medical students as compared with odd of intention of Wolayita and Wachemo universities medical students (AOR [95%CI] = 2.926[1.299, 6.589]).

The odds of intention to work in the rural area were about 3 times higher among medical students who agreed on career advancement as attracting factor as compared with odds of intention of disagreed students (AOR [95%CI] = 2.911[1.377, 6.154]).

The odds of intention to work in the rural area were 6.5 times higher among medical students who preferred Primary Hospital as compared with odd of intention of medical students who preferred Tertiary Hospital (AOR [95%CI] = 6.572[2.716, 15.904]).

Table 5-8 Factors associated with intention of medical students to work in the rural setting in public Universities of Ethiopia, 2018 by multivariate analysis (n=342).

Variables		Preferred location **n(%)**		**Bivariate analysis**		**Multivariate analysis**	
		Urban n= 257	Rural n= 85	COR(95% oC.I)	p-value	AOR(95% oC.I)	p-value
Sex	Male	183(71.2)	71(83.5)	**2.051(1.088, 3.864)***	**0.026**	**2.125(1.012, 4.462)****	**0.047**
	Female	74(28.8)	14(16.5)	1.00		Reference	
Medical Colleges	**Addis Ababa**	186(72.4)	71(83.5)	**1.936(1.026, 3.653)***	**0.041**	**2.926(1.299, 6.589)****	**0.010**
	Others	71(27.6)	14(16.5)	1.00		Reference	
Academic year	Fourth	109(42.4)	48(56.5)	**1.761(1.074, 2.890)***	**0.025**	1.590(0.858, 2.950)	0.141
	Fifth	148(57.6)	37(43.5)	1.00			
Career advancement	Agree	85(33.1)	46(54.1)	**3.041(1.691, 5.468)***	**0.001**	**2.911(1.377, 6.154)****	**0.005**
	Neutral	54(21.0)	18(21.2)	1.873(0.924, 3.799)	0.082	1.340(0.575, 3.126)	0.498
	Disagree	118(45.9)	21(24.7)	1.00		Reference	
Updated technologies	Disagree	15(5.8)	13(15.3)	**3.129(1.411,6.940)***	**0.005**	2.684(0.878, 8.209)	0.083
	Neutral	29(11.3)	13(15.3)	1.618(0.792, 3.308	0.187	**1.00**	
	Agree	213(82.9)	59(69.4)	1.00			
Availability of medical equipment	Disagree	9(3.5)	8(9.4)	**3.165(1.175, 8.524)***	**0.023**	2.235(0.635, 7.864)	0.210
	Neutral	13(5.1)	11(12.9)	3.013(1.290, 7.036)	0.011	**3.524(1.140, 10.892)****	**0.029**
	Agree	235(91.4)	66(77.6)	1.00		Reference	
Preferred Hospital	Primary	17(6.6)	21(24.7)	**6.219(2.928, 13.211)***	**0.001**	**6.572(2.716, 15.904)****	0.001
	General	94(36.6)	35(41.2)	1.875(1.075, 3.269)	0.027	1.564(0.815, 3.003)	0.179
	Tertiary	146(56.8)	29(34.1)	Reference		Reference	

"*" implies significance during Bivariate, "**" implies significance at 95%C.I, and Others refers Wolayita and Wachemo medical schools

5. Discussion

Uneven distribution of doctors between rural and urban areas is an issue faced by Ethiopia. The central purpose of this study was to assess the intention of medical students to work in the rural setting and identify associated factors.

This finding revealed that the enrollment of majority of medical students was from the urban background particularly female medical students which mean nearly eighty percent of female medical students' families were living in the urban area. Studies verified that, students with rural backgrounds were more likely intended to work in the rural setting than those with urban backgrounds (18, 45, 56-59).

Medical students in the study rated the availability of fundamental infrastructures in the rural area is an important motivating factor to work in the rural area. This finding is supported by Similar study done in India, Uganda, and low and middle income countries (44, 60, 61).

In this study, provision of adequate financial incentives like remote area, allowances, bonus, salary, and loan were an important factor to attract medical students to work in the rural location. Similar studies witnessed that adequate salary and financial rewards are essential motivating factors(19, 43).

This study demonstrated that, the work location near to the family or friends was determining factors to choose work location after graduation. Studies indicated the feeling of near to the family or friends after graduation was a key factor to prefer work location(40).

This study illustrated that almost all of the study participants preferred rural work location because obligation year for rural areas is less than urban areas as result medical students shown their willingness to work in the rural area for maximum three years. Finding from Uganda assured that few students who intended to work in rural areas hoped to stay for not more than three years, before going either for further studies or for self-employment in urban areas(3). In Ethiopia, new graduates of medicine face an obligation to serve the public to compensate for their training expenses(18).

The finding of this study indicates about twenty-five percent of the study participants intended to work in rural area. This study found that 85(24.9%) of participants were willing to work medicine activities in rural areas after graduation. Similarly, the studies done regarding medical

students intention to work rural area confirm that 40% in Australia, 52.0% in Chinese, 30% in Pakistan, 18% in Asia and Africa and 21% in Ethiopia were willing to work in the rural area(9, 18, 45, 58, 62, 63).

The odd of intention of male medical students to work in the rural area was two times more likely as compared with odd of intention of female students. Likewise, researches done in Nepal, Ghana, South Africa, and Ethiopia contrary that male medical students were more interested to work in rural area than those female medical students(5, 9, 40, 46, 56, 64). Similar studies justified that women are less likely to accept positions in remote areas due to varying family reasons; they would like to live where their husbands jobs are, have difficulties convincing their husbands to follow them to rural areas and want their children to have better education in the urban areas(1, 65)

The odds of intention to work in the rural area were three times higher among Addis Ababa University medical students as compared with odd of intention of Wolayita and Wachemo universities medical students. Similar finding is available in previous study done among six governments owned medical schools in Ethiopia where the odds of intention to work in the rural area was higher among Addis Ababa University medical students(9). The implication of this finding, medical students from Addis Ababa University were more aware about rural setting work as compared with other new generation students in Ethiopia

The odds of intention to work in the rural area were three times higher among medical students who agreed on career advancement as attracting factor as compared with odds of intention of disagreed students. A study carried out in Pakistan, India and Uganda confirmed that the career development was the main factors identified by young doctors and a good motivator for work location preference (57, 60, 61, 63, 66). Literatures in Ethiopian context also confirmed that limited career opportunities impact the intention of medical students to work in rural area(13).
In this study, availability of essential medical equipment increased the motivation of medical students' intention to work in the rural area after graduation. Similarly, improving medical equipment in the rural area was significantly influencing to prefer rural work location after graduation (61, 67, 68).

The odds of intention to work in the rural area were 6.5 times higher among medical students who preferred Primary Hospital as compared with odd of intention of medical students who

preferred Tertiary Hospital. In Hungary, the majority of the young doctors preferred to work in large cities or major teaching or central hospitals (69)**.** In Ethiopia the result of the survey shown that physicians working in district or general hospitals were more likely to migrate out than physicians working in referral hospitals(21). The fact that the majorities want to practice in large hospitals and urban centers might suggest preferring the place where alternative opportunities and better working environment is available and possible explanation might be the existing medical education curriculum limited the role in preparing the students to serve in the rural places(9).

Generally, the odds of intention to work in the rural area were higher among males and Addis Ababa University medical students. Better opportunity for career advancement and availability of essential medical equipment were significant motivators and level of the hospital associated significantly with intention to work in the rural area after their graduation.

6. Strength and Limitation of the study

The study incorporated both capital city and new generation medical schools students as a result it was better to compare the outcomes. The response rate of this study was much higher than the other studies related to this topic as a result it was better to declare the representativeness of the participants.

However; the study is cross-sectional and only self-administered questionnaire was used so it is not possible to make inferences about the causal effects relationship. The sample consisted of more generic students than accelerated ones. Hence, the magnitude of their intention may be different. The study did not incorporate private medical schools students. Finally, this study was based on self-reported data and possibly susceptible to responder bias. However, all the above limitations may not have a negative effect on the validity of the findings, and data can be used for policy formulation and sustainable interventions to bring about positive changes in the attitudes of medical students towards location to medical practice and motivational factors.

7. Conclusions and recommendations

7.1. Conclusions

Majority of Ethiopian medical students' intention were less likely to work in the rural setting. And also greater part of the medical students in public Universities of Ethiopia preferred tertiary hospitals rather than primary hospitals. Male medical students in public Universities of Ethiopia were more planned to work in the rural setting as compared with female students. In addition, medical students from Addis Ababa University were more likely to work in the rural setting as compared with other new generation Universities medical students of Ethiopia. Availability of essential medical equipment and expansion of career advancement were associated factors with intention of medical students to work in the rural setting after graduation.

Creating awareness of medical students regarding rural placement was very important activity to produce more interested students and influencing the attitude of medical students to work in rural location are expected to create graduates who are more likely to work in rural settings. Improving essential medical equipment is also more likely to create encouraged graduates.

7.2. Recommendations

A range of activities should be targeted to shape the attitudes of medical students to work in the rural settings and provide interventions for medical students' motivation.

Adding positive knowledge which influences work location preference should be emphasized and rural career guidance must be taken as a core activity during medical education by medical colleges.

Practical sessions for clinical level medical students should not be done only in urban hospitals because this may limit the intention of medical interest towards rural placement.

As a suggestion, comprehensive interventions starting from enrolment and recruitment of medical students who have the drive and motivation to be health professionals, to continuously engaging students of health science to reflect on what it means to be a health professional and inspiring practicing health professionals to demonstrate commitment to their country, people and care for their patients should be emphasized by medical colleges.

From government point of view, fair distribution of physicians should be the core activity to balance urban and rural setting. Furthermore career advancement in the rural setting should be taken in to account to increase the interest of medical students regarding rural placement.

Greater number of medical students had intended to work in teaching hospitals however, the least number of them were planned to work in rural placement. Hence, tertiary hospitals should be expanded into different rural part of the country

Ministry of Health should facilitate different conditions to attract female students towards rural placement because they are less interested than male medical students.

Finally, in order to decrease the shortage of physicians in the rural part of the country a New Innovative Medical Education Initiative (NIMEI) launched in Ethiopia using a new approach should be expanded to all medical schools in the country.

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Lists of annex

Information sheet

This study was conducted on the assessment of intention to work in rural area after graduation among clinical year medical students in AAU University, WSU University, and WU University, 2018.

Hello, my name is Berhanu Achiso I am from AAU University, Health Science College, School of Public Health, Graduate program of Health Economics. I would like to ask a few questions about intention of clinical year medical students to work in rural area after graduation and their associated factors. Your genuine information that you are going to provide will help educational policy makers to design strategy/give priority for improvement of rural community health. Your answers will remain confidential and your name will not be taken. Participation in this study is voluntary and you are not obligated to answer any questions that you do not want to answer and it takes at most 20 minutes.

Title of the study: Intention of medical student to work rural areas and its associated factors among undergraduate medical students in public University, 2018

Objective of the study: To determine the intention of rural medical practice among clinical level medical students in medical schools of AAU, WU, WSU Universities and the associated factors, Ethiopia 2018.

Rights of the participant: participating and not participating is the full right and the participant can stop from participation in the study at any time. And the participant can skip question which he or she does not want to respond. Participants can ask any questions, which is not clear for understanding.

Confidentiality: - Any information forwarded was kept private. Data collector and the principal investigator will not know his /her name.

INFORMED CONSENT

I have read all this form or it has been read to me in the language I comprehend and understood all conditions stated above. Therefore, I am willing to participate in this study Yes. ☐ No. ☐

Signature of participant----------

Name of researcher: **Berhanu Achiso** Signature ----------Address Tell (E-mail) 0910049019 or berhanuachiso8@gmail.com

Name of witness _____Signature_____

Date_____ starting time _____Ending time_____**Result of administration:** 1. Completed 2. Respondents are not available 3. Respondents are refused. 4. Partially completed

Questionnaires

N.B: Please, circle only one alternative given on choice questions whereas put (√) mark for questions part II to V listed below. ***Do not write your name anywhere in these questionnaire.***

No	***Part-I questions related to Socio-economic and demographic characteristics***	***Response***	***Skip***
1	Age	**----------year**	
2	Sex	**1. Male 2. Female**	
3	Your birth place	**1**. Urban **2**. Rural	If **Rural** →Q5
4	If your birth place is Urban	Name of town or city----------	
5	Marital status	**1**. Single **2**. Married **3**. Divorced 4. widowed	
6	Religion	**1**. Orthodox **2**. Islam **3**. Protestant **4**. Catholic **5**.Others	
7	Place of your secondary school	**1**. Urban **2**. Rural	If **Rural** →Q9
8	If your response is urban	Name of town or city----------	
9	Medical education program	**1.** Generic **2.**NIMEI(New Innovative Medical Education Initiative) or Accelerated	If **Generic** →Q11
10	If your response is accelerated	How many years----------	
11	Your academic year	**1**.Fourth year **2**.Fifth year	
12	Father's educational status	**(1).** Never educated (**2).** 1-4grade (**3).** 5-8 grade **(4)**. 9-10 grade (**5)**. 11-12 grade (6.) >12 grade	If **>12grade**→13 If not >12grade→14
13	If your response is **>12grades**	**1.**Heath background **2.**None health background	
14	Father's occupation	**1.** Farmer **2.** Business man **3.** Employee **4.** Others	
15	Mother's educational status	**(1).** Never educated (**2).** 1-4grade (**3).** 5-8 grade **(4)**. 9-10 grade (**5)**. 11-12 grade (6.) >12 grade	If **>12grade**→16 If not >12grade→17
16	If your response is **>12grades**	**1.** Heath background **2.** None health background	
17	Mother's occupation	**1.** Farmer **2.** Business man **3.** Employee **4.** House wife **5.** Others	

18	Current family Residence place	**1.** Urban **2.** Rural	If **Rural** →Q20
19	If your response is **Urban**	Name of city or town----------	
20	Main income source of your family	**1**. Agriculture **2**. Salary **3**. Business **4**. Others	
21	Perceived Economic status of your family	1. Poorest of poor **2**. Poor **3**. Medium **4**. Wealthy (Rich).	

Part II questions related to factors that inspire medical students to choose medicine

What initiated you to choose medicine primarily?		Strongly disagree**(1)**	Disagree**(2)**	Neutral**(3)**	Agree**(4)**	Strongly agree**(5)**
22	My interest in the field for life saving					
23	Searching better income					
24	Getting social prestige					
25	Family or peer group influence					
26	Assignment of government					
27	Advice of health professionals					
28	If you have any other factors---------- ----------					

Part III questions related to the existing feeling of medical students

N^{o}	Currently, what kind of feeling do you have on medical education?	**Bad**	**Poo**	**Goo**	**Ver**	**Exc**
29	Attractiveness or being role models of instructors					
30	Punctuality of instructors in every practical activities					
31	Equipment of facilities for practical sessions					
32	Excitement or satisfaction of medical education					
33	If you have another feeling---------- -					

Part IV questions related to factors that encourage medical students to practice rural area

What factors lead you to **intend** to practice in rural area after graduation?		Strongly disagree**(1)**	Disagree **(2)**	Neutral**(3)**	Agree **(4)**	Strongly agree**(5)**
34	Opportunity to practice variety of skills or work autonomy					
35	Opportunity for employment					
37	Opportunity for career advancement					
38	Better for enjoyable lifestyle					
39	Near to family or friends or spouse					
40	Family income potential is poor					
41	Cultural advantages					
42	High medical need of rural area					
43	Similar to the community in which you grew up					
44	If you have additional factors----------					

Part V questions related to factors that discourage medical students to practice rural area

Are the following factors discouraging you to practice in rural area after graduation?		Strongly disagree**(1)**	Disagree **(2)**	Neutral**(3)**	Agree **(4)**	Strongly agree**(5)**
45	Inadequacy of financial incentives (salary, bonus, remote, allowance, compensation, loans)					
46	No opportunity for better social life					
47	Less availability of recreational facilities and technologies					
48	Professional isolation					
49	Family or friends isolation					

50	Fear of weather condition or climate					
51	Low availability of medical equipment and laboratory facilities					
52	Poor accessibility of essential infrastructures like education, roads, electricity, telecom services etc					
53	Poorness of the rural community					
54	Less access to par time work					
55	If you have any other factors---------- ----------					

Part VI- questions related to awareness about rural area or community

No	***What is your awareness about rural area or community?***	***Response***	***Skip***
56	I have attended on different experimental rural health programs	**1. Yes 2. No**	
57	I have good awareness about quality of rural community posting	**1. Yes 2. No**	
58	Rural community postings could influence my decision negatively	**1. Yes 2. No**	
59	I have received rural career guidance	**1. Yes 2. No**	
60	I am ready to live with different society's traditions, values, customs, and cultures if I was in the rural area after my graduation	**1. Yes 2. No**	

Part VII- questions related to locations that intend to practice after graduation

Where do you prefer to practice after graduation?		***Response***	***Skip***
61	Where do you intend to practice after graduation?	**1**. Public/ Government **2**. Private/NGO	
62	Which health facility do you want to practice?	**1.** Health center **2**.Primary Hospital **3.** General Hospital **4.** Tertiary or teaching Hospital	
63	Which location do you anticipate to practice	**1**.Urban **2**.Rural	**If Rural→64**
64	If your response is **Rural** in **Q#63** for how long	**----------years**	

Thank you very much!

Assurance of investigator

The undersigned investigator agrees to accept responsibility for the scientific, ethical and technical conduct of this research project and for provision of required progress reports and conditions of the research and Institutional Review Ethical Board of Addis Ababa University.

Name of the Investigator: Berhanu Achiso

Signature: _____

Date: _____

Approval of the advisors

Advisors:

Name	Signature	Date
Mr. Wondimu Ayele (PHD candidate)	_____	_____

Declaration sheet

I, the undersigned, senior MPH in Health Economics student declare that this thesis report is my original work in partial fulfillment of the requirement for the degree of Master in Health Economics and it has not been presented for a degree in this or another university.

Name: Berhanu Achiso

Signature: _____

Place of submission: Addis Ababa University, College of Health Sciences, School of public Health, Department of Health Economics.

Date of Submission: _____

This thesis work has been submitted for examination with my approval as university advisor.

	Name	Signature
Advisor	1 _____	_____
Examiners	1._____	_____
	2._____	_____