



ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR POPULATION STUDIES

INTERRELATIONS BETWEEN MIGRATION AND FERTILITY IN
ADDIS ABABA

By
Aragaw Zewdie

December, 2020

AAU, Ethiopia

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**A Thesis Submitted to the School of Graduate Studies of Addis Ababa
University in Partial Fulfillment for the Degree of Master of Science in
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Declaration

I, the undersigned, declare that this thesis is my own work and has not been presented for a degree in any other university and that all the sources of the material used in this have been dully acknowledged.

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Acronyms

| | |
|--------|--|
| AIC | Akaike's Information Criterion |
| AIDS | Acquired Immune Deficiency Syndrome |
| BIC | Bayesian Information Criterion |
| CEB | Children Ever Born |
| CSA | Central Statistical Agency |
| EDHS | Ethiopian Demographic Health Survey |
| GFR | General Fertility Rate |
| HIV | Human Immune Virus |
| ICF | Inner City Fund |
| TFR | Total Fertility Rate |
| WB | World Bank |
| WEF | World Economic Forum |
| UNICEF | United Nations Children's Fund |
| GFDRR | General Facility for Disaster Reduction and Recovery |
| UN | United Nations |

Abstract

Conceptually migration can affect fertility through adaptation, selection, disruption or socialization. This effect can be expressed in children ever born, timing of birth, contraceptive use or conception. The study attempts to examine the impact of migration on fertility (children ever born and timing of birth) with regard to adaptation and disruption hypothesis in Addis Ababa Ethiopia using data from the 2016 Ethiopian Demographic and Health Survey. To discern the effect of migration on cumulative fertility and timing of birth Poisson regression and discrete time event models were fitted. Poisson regression model is explored to study the impact of migration on mean CEB with respect to adaptation model while; discrete time event model is explored to study the effect of migration on delaying timing of first and second birth in respect of disruption model. Migrants were compared with non-migrants living in Addis Ababa. In addition, characteristics of migrants by duration at place of destination are also examined and compared with those non migrants. The study reveals non-significant relationship between migration and lifetime fertility of women which is against to the concept of adaptation hypothesis. The results also indicate there is difference in hazard of first and second birth between migrants and non-migrants. However, this evidence strengthens migration effect in delaying timing of first and second birth for migrant which support disruption hypothesis. The study finds that migrant adaptation in fertility was not evident but gives speculative evidence for fertility disruption of migrants for first and second birth in the context of Addis Ababa. Future researches further investigate determinants of migrant fertility in Addis Ababa and also examine the relationship with regard to other fertility differentials (selection and socialization).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The World Bank 2016 report ranks Ethiopia 11th from the poorest countries by income per person from the globe (World Bank, 2016). In relation to poverty the country faces complex challenges in food security, political stability, population issue and climatic change like drought. In addition, Ethiopia faces large challenges with respect to migration flows (Fransen and Kuschminder, 2009). According to Hill (1989, as cited in Ezra, 2001), migration may be viewed as a part of household survival strategy even during non-drought year. Along with births and deaths, migration is one of the three demographic components of population change, and it has often described as the most difficult to measure, model and forecast (Ronald, 2013). Despite its difficulty to measure or forecast studies show that migration have social and economic implication at the destination or at the place of origin (Ratha, 2010).

Migration can take place within the country (internal migration) or outside the country (international migration). Internal migration was thought to be a natural process in which surplus labor was gradually withdrawn from the rural sector to provide the needed human power for urban industrial growth (Todaro, 1997). World Bank 2015 report shows that dimension of internal migration in Ethiopia is linked to urbanization. Accordingly the study revealed in 2018 by Bundervoet also indicates internal migration in Ethiopia has increasingly been directed towards urban areas. Urbanization is one of the most important processes to be considered in the study of population migration.

Worldwide levels of urbanization were increasing over time and by the mid twenty-first century urban population roughly reaches two thirds (68 %) of the world's population (United Nation, 2018). Africa is the world's fastest urbanizing region with the average growth rate of 3.7 per cent per year. The level of urbanization in Ethiopia has increased after 2013 mainly due to infrastructure development and designed governmental policies (CSA, 2013). According to the 2013 CSA report, urban population of Ethiopia was estimated as 16 percent in 2007. It is expected to increase and reach about 31 percent by the year 2037 (CSA, 2013). Ethiopia's capital

city Addis Ababa is one of the fastest growing cities in Africa with a population of over 3.4 million in 2017 (CSA, 2013) and the growth engine of the entire country, which is home to 25 % of urban population (World Bank, 2015). Keyfitz (1980) demonstrates that city population growth is mediated by a complex interplay between natural increase and net increase but rural to urban migration remains the pivotal process in many countries. Conceptually it is expected that population growth and decline mainly affected by fertility (Teklu, Sebhatu, & Gebreselassie, 2013). According to the 2016 EDHS data the fertility rate of urban areas are lower than the corresponding rural areas which is 2.3 and 5.2 respectively (CSA, 2016). Despite the low fertility level in Addis Ababa, TFR has increased from 1.4 children in 2005 to 1.5 in 2011 and 1.8 in 2016 which may be due to expansion of urbanization and macroeconomic growth of the city that in turn attract migrants from different regions of Ethiopia relatively having higher fertility.

The fertility for the capital city is however, very low (1.8) as compared to other urban (TFR = 2.3) and rural areas (TFR = 5.2) (CSA, 2016). According to Garenne (2008) the fertility decline is closely associated with modernization process. From this demographic observation, the inference is often drawn that migration plays a role in explaining declining fertility rates. Although, the social and economic implication of migration have been widely recognized. Different studies have concluded that migrant fertility may be higher, lower, or the same as that of non-migrants (Majelantle & Navaneethan, 2013). Despite holding an assumption of fertility differentials between migrants and non-migrants, little is known about the relationship between migration and fertility in Addis Ababa as well as in the country. Thus there is a critical need for research on the contribution of migrants to the fertility rate in the city and to the growth of urban centers in the country. This study broadly examines whether migrants are likely to make a substantial contribution to natural growth of the city and examines the fertility differentials between migrants and non-migrants among residents of the city.

1.2 Statement of the Problem

Fertility rate is an important determinant of population size. The fertility rate of different countries in the world has fallen markedly over recent decades (UN, 2014). According to revision of the 2015 world population prospect, the global total fertility rate has been reached 2.5 children per women, and Africa remains the region with the highest fertility rate of 4.7 in 2010-2015 (UN, 2015). There is a decline in fertility in Sub Saharan Africa, but from the global perspective high fertility countries are still concentrated in Sub Saharan Africa where 45 out of 66 high fertility nations are located in the region (UN, 2014).

Likewise, fertility declines significantly in Ethiopia over time and reaches 4.6 children per women in 2016 (CSA, 2016). The fertility rate of Addis Ababa is by far the lowest; i.e., TFR for the city is 1.8 according to the recent 2016 EDHS result. In 2017 the city hosts an estimated population of 3.4 million and estimated to reach 4.5 million by the year 2030 (CSA, 2013). As fertility rates have steadily declined in Addis Ababa, natural increase contributes modestly for population growth, whereas rural to urban migration is significantly contributing for the population growth of the city (UN Habitat, 2017)

Migration is the third dynamic constituent of population growth (Mittal, 2018) which plays a significant role in the future to change not only population size and structure but also the employment, labor market and wage rates at destination (Majelantle & Navaneethan, 2013). Migrants tend to remain in cities once they have arrived in their destination country and become significant drivers of economic and urban population growth (World Bank, 2009). Ethiopia has been identified as one of the countries in Africa with a relatively high level of internal migration (Mberu, 2006). Since the start of the urban renewal and construction boom in 2008, young rural dwellers have increasingly moved to urban areas in search for employment and a better life (Bundervoet, 2018).

In Ethiopia, Addis has been the main destination area rather than an intermediate transit city (World Bank, 2010) in which close to 40 percent of all rural migrants moving to the capital (Bundervoet, 2018). According to World Bank 2015 Report, from 1995 to 2000, 58% of the average growth of the city was attributed to migration, and migration flows have been an important contribution to the growth of Addis Ababa. Recent study conducted by Bundervoet in

2018 revealed that from 2008 to 2013, of all migrants moving to cities about 39 % of them moved to Addis Ababa. Nonetheless, little is known about migrants' fertility as compared to the non-migrants who resided in the city for the entire period of their life. Different studies focus on fertility and migration issues independently.

According to the 2019 United Nations report the most populous countries in Africa are Nigeria, Ethiopia, Democratic Republic of Congo, Tanzania, Uganda and Sudan with fertility rates of four and above live births per women. Ethiopia is the second most populous country in Africa, which has an estimated population of 102 million people by the year 2020 (CSA, 2013). The country's high population growth rate is also sustained mainly by this high fertility rate (Tadesse, 2010) in the country. From the total population, the majority (78.6%) of Ethiopians is residing in rural areas, and in contrary to this 21.4% of Ethiopians are residing in urban areas (CSA, 2013).

Ethiopia has been experiencing a rapid urbanization process since the implementation of economic development and privatization policy. Terfa et al. (2019) showed that the cities of Addis Ababa, Adama and Hawassa in Ethiopia have the main hot spots facing the problem of urban dynamics. These cities have been facing urbanization challenges due to their uncontrolled fast growing nature. However, Ethiopia's urban population had doubled from 4.87 to 11.86 million between 1984 and 2007 respectively; and growing at a rate of 3.8% annually. The level of urbanization in Ethiopia stands at 19% in 2015 (World Bank, 2015). Urban residence is generally expected to reduce fertility because of the higher costs of raising children in cities (Easterlin, 1968) more favorable attitudes toward smaller families and better access to family planning services.

The relationship between migration to and subsequent residence in new urban areas and fertility outcomes is less clear (Becker, 1992). Most cross-sectional studies have found that migration to urban areas is associated with lower fertility (Brockhoff, 1995) both for migrants themselves (Brockhoff and Yang 1994) and for subsequent generations born in the urban place of destination. Most of the analyses, however, have not fully assessed the importance of migration because they fail to take in to account fertility differentials between migrants and non-migrants. Migrants and non-migrants fertility differentials reflect whether it is due to selection or socialization at the place of origin and disruption or adaptation at the place of destination (Manner, 2003).

To date research has not explored the complex association between internal migration and fertility or the implication for population growth and future policies in Addis Ababa. Despite the contribution of migration to the population size of Addis Ababa, urban life basically decrease fertility rate. However, little is known about the status of migrants and non-migrants fertility rate in the city. Thus, the study assesses the relationship between migration and fertility through children ever born and birth interval in the context of Addis Ababa by using the data of 2016 Ethiopian Demographic Health Survey (EDHS).

1.3 Objectives of the study

The overall purpose of this study is to assess the relationship between migration and fertility in Addis Ababa. Specific objectives of the study are:

1. To assess the level of migrants and non-migrants fertility in Addis Ababa
2. To examine the relationship of migration and fertility by controlling for other explanatory variables and fitting regression models for the Addis Ababa.
3. To show the implication of migration on fertility in Addis Ababa.

1.4 Research questions

Based on the statement of the problem and review of related literature the following basic questions were set:

1. What is the relationship between migrants and non-migrants fertility in Addis Ababa?
2. Which fertility theories (models) explain the relationship between migrants and non-migrants fertility in the context of Addis Ababa?
3. What is the implication of the relationship between fertility and migration for future and policy process in the capital city?

1.5 Significance of the study

The overall purpose of research is to discover answers for questions through the application of scientific procedures (Kothari, 2004). To this end, efforts are made to find out the truth which is hidden and has not been discovered in the relationship between migration and fertility in the context of Addis Ababa through adaptation and disruption theories. As fertility is the major determinant of population growth and migration also affects fertility, it is important to assess the

complex relationship between migration and fertility. Thus, assessing the relationship between these two main demographic variables helps to:

- (a) know the relationship of migration and fertility in the context of Addis Ababa.
- (b) enables to develop programs and strategies based on the relationship between migration and fertility, and
- (c) initiate and encourage academicians for further investigation.

1.6 Limitations of the study

The relationship between migration and fertility is complex. In conducting this study, the researcher face research methodology constraint as the study is based on the cross sectional data collected in the 2016 EDHS. As known, in cross sectional data the dependent and independent variables were collected at a specific point in the life of respondents, it does not enable to detect causality of migration and fertility, though focusing on the relationship between the dependent variable and included covariates. Hence, the researcher has focused on the comparison only at the place of destination and restricted the statistical test to the effects of adaptation and disruption hypotheses. In addition the study does not consider the clustered nature of data.

1.7 Definitions of terms

Children Ever born: Children ever born comprises information on the number of children born alive (lifetime fertility) and should include all children born alive (that is to say, excluding fetal deaths) during the lifetime of the woman concerned up to the census date.

Covariate: a covariate is complementary to the dependent, or response variable. Any variable that is measurable and considered to have a statistical relationship with the dependent variable would qualify as a potential covariate. The control variables are also called the covariates.

Fertility: The actual reproductive performance of an individual, a couple, a group, or a population.

Fertility rate: is the ratio between the number of live births in a year and the whole female population of childbearing age (average number of women between 15 and 50 years of age over the year).

Mean Children Ever born: The mean number of children born alive to women in that age group

Migration: The movement of people across a specified boundary for the purpose of establishing a new or semi-permanent residence.

Urbanization: Urbanization or “urban transition” refers to “a shift in a population from one that is dispersed across small rural settlements, in which agriculture is the dominant economic activity, towards one that is concentrated in larger and denser urban settlements characterized by a dominance of industrial and service activities.

1.8. Organization of the study

The research report was organized in five chapters. Introduction and statement of the problem was described in chapter one. Chapter two deals and assesses review of related literature. Chapter three focused on research design and the methodology used for the study. Chapter four comes next and states the result of the study and also discussion of the result. Finally, summary of the result, conclusion and recommendation of the study are presented in chapter five. List of reference materials for conducting the study are annexed at the end.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Conceptual Literature

2.1.1 Overview of Migration and Fertility

Fertility is the actual reproductive performance of an individual, a couple, a group, or a population. Fertility can be measured through Total Fertility Rate (TFR) and Children Ever Born (CEB). TFR is the average number of children a woman would have by the end of her childbearing years if she born children at the current age specific fertility rates (CSA, 2016). According to United Nation (UN) definition CEB to women in a particular age group is the mean number of children born alive to women in that age group. Fertility varies between countries, mainly due to differences in cultural, economic and health factors which interfere with the process of human reproduction (Teklu, Sebhatu& Gebreselassie, 2013). The socio economic factors like the cost of children, female education, female labor force participation, economic growth and the sociocultural factors like family formation, timing of child birth, value given to children affect fertility (Hoorens, et al., 2011).

On the other hand migration is the geographic movement of people across a specified boundary for the purpose of establishing a new permanent or semi-permanent residence. According to Show's conventional definition migration is the relatively permanent movement of persons over a significant distance (Kok, 1999). The factors that influence in the decision of migration are varied and complex because migration is a selective process affecting individuals with certain economic, social, educational, and demographic characteristics (Todaro, 1997).

Whether it is caused by social, political, economic or not, both international and internal migration played important role in the history of population growth of any country. Differences in the natural increase among the states of a country are often very small, while in reality there are wide variations in their growth rates. The only principal mechanism for such wide variations is internal migration. Migrants from the rural areas tend to adopt the urban way of life, which in turn has a direct impact on reducing fertility (Mittal, 2018).

Research direct that woman who migrate to new environments where education is high, jobs are available and living standards are high, show almost universally lower fertility than their counter

parts in areas of lower education standards, non-availability of jobs or blue collar jobs, and low standards of living (Goldstein & Goldstein, 1982). According to Easterlin (1968) fertility is the result of relative income and also past level of fertility is negatively correlated with the current fertility level. Economic factors affect fertility whereas, high fertility is hypothesized to induce migration due to absence of basic amenities for children in most of the rural areas, high economic value placed on children by fathers and their kin and to work or employee in another place as raising additional young child may require more money (Brocherhoff & Eu, 1993). It was assumed that economic hardship times would cause people to migrate in search of jobs and thus increase migration (Mittal, 2018).

Migration can be driven by a set of favorable (i.e. pull) and unfavorable (i.e. push) factors. Push factors operating from the region or country of origin like poverty, unemployment, landlessness, rapid population growth, political repression, low social status, poor marriage prospects etc. and pull factors operating from the place or country of destination like better income and job prospects, better education and welfare systems, land to settle and farm, good environmental and living conditions, political freedom etc. (King, 2012).

Ezra and Kiros (2001) summarize the main push factors in Ethiopia as over population, famine, poverty, land scarcity, governmental agricultural policies, and a lack of agricultural resources. In addition to these push factors, many rural civilians were pulled to Ethiopian urban areas in the post-revolution period as a result of the development of these areas into more important business and political center. Movements may be beneficial or not. When people move from place to place they make adjustments in their personal and sociocultural lives. Fertility is the one that is adjusted accordingly on the context of economic, social and cultural aspect.

2.1.2 The effect of Urbanization on Migration and Fertility

Breeze (1969) described urbanization as a process of becoming urban, moving to cities, changing from agriculture to other pursuits common to cities and corresponding changing of behavior pattern (Hussen & Imitiyaz, 2018). Historically, urbanization has been driven by the concentration of investment and employment opportunities in urban areas including productive activities in industry and services cluster in cities. As cities attract businesses and jobs, they

bring together both the human and entrepreneurial resources to come up with new ideas, innovations and increasingly productive uses of technology (UN Population Division, 2010).

Urbanization is a process which is deeply influenced by the dimension and nature of economic, social and political change (Tacoli, Migration and inclusive urbanisation, 2017, p.2). The sustained increase of the urban population combined with the pronounced deceleration of rural population growth will end in continued urbanization or increasing proportions of the population living in urban areas (UN Population Division, 2010). Population migration is one of the most important processes to be considered in the study of urbanization. It provides a key mechanism through which urbanization and industrialization can develop. Urbanization is closely linked to modernization and industrialization (World Bank, 2009). Totally Urbanization implies a change in economic, social and cultural aspects of the society (Hussen & Imitiyaz, 2018). Africa's urban growth rate is almost 11 times greater than that of Europe mainly due to internal migration that includes movement from rural to urban areas. And yet, this is one of the main drivers of rapid urbanization in the continent (World Economic Forum, 2017).

Research findings on economic migration states that people move from poor developing areas to richer areas that wages are higher and more jobs are available (World Bank, 2010). It is also common for people from rural areas to move to more competitive urban areas in order to find more opportunities. Social factors also motivate people to migrate to satisfy the human needs and desires and achieve a better quality of life. A migration survey conducted by World Bank (2010) in Ethiopian also indicates that the move has improved the living condition of migrants (World Bank, 2010).

Migrants often move to ensure better opportunities for themselves or their family, like sending their child to a better, safer school or finding a job that would have not only a sufficient salary, but also important benefits and career growth prospects. In this regard, Wester (2017) argues that individuals migrate in search of services, such as life-saving surgery and medical treatment that are in accessible in their home area. Most migrants select Addis Ababa for their destination because of educational opportunities and job opportunity (World Bank, 2010). The gathering of economic and human resources in one place stimulates innovation and development in business, science, technology and industry. Access to education, health, social services and cultural activities is more readily available to people in cities than in villages. Cities are products of

urbanization. The density of urban populations makes it easier and less costly for the government and utilities to provide essential goods and services (Brockhoff, 1995).

Schools, colleges and universities are established in cities to develop human resources. A variety of educational courses are available, offering students a wide choice for their future careers. People of many classes and religions live and work together in cities, which creates better understanding and harmony and helps break down social and cultural barriers. Cities that have advanced communication and transport networks also maximize women's opportunity for paid employment both in formal and informal sectors. Due to this, it is possible to argue that urbanization motivates people to migrate to urban areas for seeking such services.

In addition, according to Lewis (1954) classic model, a traditional rural sector initially having surplus labor and a modern urban industrial sector which exist in the economy are associated with resource transfers from rural low productivity sectors to urban high productivity sectors. This leads to the reallocation of the labor force through migration from low population- density rural areas to high population density urban areas. Such resource transfers and labor migration result in obvious spatial agglomeration of population that constitutes urban centers. In the long term, rising urban accumulation rates imply increased rates of modern sector job vacancies, a rural to urban migration response, and further urbanization (He, 2012). An alternative perspective, grounded in the new economics of labor migration (Stark & Bloom 1985), argued that rural to urban migration might be undertaken primarily to improve individual's or household's comparative income position with respect to that of other individuals or households in the relevant reference group. Migration allows more capable labor to transfer to more productive industrial sectors and to urbanized areas.

According to King (2012), the occupational and spatial mobility of labor triggers the processes of industrialization and urbanization, which in turn result in further labor migration. Urbanization was perceived as strong, universal force that was accelerating fertility reduction. Economic and social changes such as industrialization, urbanization, and increased education accelerated decline in mortality (Martine, Alves & Cavenaghi, 2013). Subsequently, the declining economic value and the rising cost of children in urban life and the desire of parents to promote better health and education for their children prompted fertility decline in developed countries, and this could be expected to soon reduce fertility in developing countries as well. Different

demographers like Thompson (1935:153) and Alfred Jaffe's (1942) suggested that urbanization contributes to fertility decline. The classic theory suggests that the process of modernization induces a process of family Nuclearization which in turn conducive to fertility slow down (Farina, Gurmu, Hasen, & maffioci, 2011). Here there is a relationship between urbanization, migration and fertility. Peoples mostly migrate to urban areas for better life and opportunity. On the other hand urban life style affects in lowering their fertility in relation to social and economic constraints.

2.1.3 Fertility and Migration Trends in Addis Ababa

According to CSA (2013) report about 45 percent of the population of Ethiopia is under the age of 15 which is younger age group. This demographic indicator shows existence of past high fertility rate (Teklu, Sebhatu, & Gebreselassie,2013). However, in the last few years Ethiopia has been showing a decline in fertility. In Ethiopia during the early 1970s the TFR was 5.5 children per woman which increased to 7.2 within 5-9 years, that was in 1984 (Kinfu, 1993). But in the latter year, the TFR decrease radically. According to the 1990 National Family and Fertility Survey, the TFR of Ethiopia was 6.6 children per woman. However, this rate declined to 5.9 in the year 2000 (CSA, 2000), 5.4 in 2005 (CSA, 2005), to 4.8 in 2011 (CSA, 2011) and reached 4.6 in 2016 (CSA, 2016).

Likewise fertility has shown a sharp decline in Addis Ababa, since early 1970s. The total fertility rate of the city has consistently declined from about 4 children per woman in 1967 to 3.23 children in 1984 (Gurmu & Mace, 2008) and further declined to 1.9 children in 2000 (CSA, 2000) and 1.4 in 2005 (CSA, 2005) which is below replacement level. After the year 2005 there is a slight increment in total fertility rate of the city but, it is still below replacement level. In 2011 the fertility rate was increased to 1.5 (CSA, 2011) and reached 1.8 in 2016 (CSA, 2016).

The other principal determinant of population size next to fertility and mortality is migration. Past Ethiopian migration flows were mainly generated by political violence, poverty, famine, and limited opportunities furthermore, 1980's migration is viewed as a part of livelihood survival strategy for the rural family (Mberu, 2006). The primary internal migration flows are rural-urban migration, and rural-rural migration. In Ethiopia rural-urban migration is continuing to occur at high levels as people seek new opportunities in the city to escape rural poverty (Fransen & Kuschminder, 2009). Internal migration in Ethiopia has highly directed towards urban areas. Of

all internal population movements from 2008 to 2013, 34 percent went from rural to urban areas while 25 percent was within-urban migration. Intra-rural migration accounted for 23 percent of population movements from 2008 to 2014. From 2000 to 2005, for instance, as both internal migration and population have increased since the early 2000s, a higher absolute number of people now come to urban areas than before (Bundervoet, 2018).

Rural-rural and rural-urban migration was a result of the accumulated impact of famines and Ethiopians' survival strategies (Kloos & Lindtjorn, 1994). Regarding to migrant composition, the 1994 Ethiopian census age-specific sex ratio shows that males dominate females in age groups of 30-44 and 45-59, while females dominate males at young and old ages of 0-14, 15-29 and 60-65 years. The female dominance at young ages, particularly at age group 15-29 is linked to marriage-related migration including divorce (Mberu 2005). Before the early 1970s, Addis Ababa was the most important urban destination for Ethiopians moving from the rural areas and after 1974 a shift to other Ethiopian cities occurred (Ezera, 2001). Urbanization is growing concern in Ethiopia. Rural to urban migration is continuing to occur at high levels as peoples seek new opportunities in the city to escape rural fertility. Now Ethiopian capital city, Addis Ababa has high employment rates and education opportunity (World Bank, 2010). One of the push factors for migration is job opportunity and education access so, this initiate people to move to city from the overall country. Different theories explain the relationship between fertility and migration which is contextual (i.e. Different from country to country)

2.2 Theoretical Literature

In demographic literature there are four main theoretical perspectives or models that explain the relationship between migration and fertility (Majelantle & Navanneetham, 2013). The four theories that explain the relationship are namely Selective, Disruption, Adaptation and Socialization (Anglewicz, korker and kayembe, 2017; Kulu, 2005; Liang, Yi & Sun, 2014). Migration have negative or positive relationship with fertility depending on the particular migratory pattern impact on fertility (Gyimah, 2006). These models have received varied empirical support in the world (e.g. Brockerhoof & Yang, 1994; Farber & Lee, 1984; Goldstein, 1973). These theories of migration and fertility differ in several respects; the main difference being in the relationship between is the timing of migration and changes in the reproductive attitudes and behaviors of migration (Rokicki, Montana, & Fink, 2014). Many studies have

attempted to assess interrelations between migration and fertility. Studies prove that there is a relationship between migration and fertility either negatively or positively. Even though the degree of influence on fertility differs, those studies have recognized that the difference between migrant fertility and non-migrants could be due to selection of migrants, adaptation to urban constraints and norms, and disruption of migration. Nevertheless these linkages have critical implications for government program for fertility reduction (Muhidin & Ledent, 2005). The following are models that explain the relationship between migration and fertility.

2.2.1 Selective Model

According to selectivity model, women who migrate are a selective group with different socioeconomic and demographic characteristics from that of rural population, and their preferred family size is also expected to be different (Manner, 2003; Kulu, 2005). This implies that migrants are different from non-migrants in a number of ways like observable characteristics (e.g. education, age, etc.) and non-observable characteristics (e.g. motivation, prosperity to postpone child bearing, openness to change and fertility aspiration), that lead migrants to have lower fertility than non-migrants (Jensen & Ahlburg, 2004).

The model assumes that an unobserved preference of migrants is revealed by the place to which they move. They go to areas where local relative prices and labor market opportunities favor their pattern of behaviors and consumption (Majelantle & Navanneetham, 2013). Goldstein suggests that the rational behavior that motivates individuals to move, especially to urban areas, may also motivate them to restrict their family size (Manner, 2003). The strong selectivity model will imply that rural-urban migrants will have smaller families compared to urban natives. Rural to urban migrants may adopt destinations fertility attitudes and behavior (Majelantle & Navanneetham, 2013).

Selectivity does not refer to a direct causal link between migration and fertility, and migrants would still have lower fertility if they had stayed in rural areas. Selection may occur at the place of origin (Muhidin & ledent ,2005). Thus, woman with profiles or desires similar to the place of destination including for education, fertility preference, willing to use modern method may have been more likely have lower fertility outcomes regardless of whether or not they migrated (Rokicki, Montana, & Fink, 2014).

The selection hypothesis has been discussed in many papers, but examined in only few studies. Goldstein (1973) raised the question of migrant selectivity in the final sections of his paper. Macisco et al. (1970) compared fertility of migrants and non-migrants in San Juan, Puerto Rico. While both groups exhibited significantly lower levels of fertility than the rural population, the fertility of migrants was even lower than that of urban natives. The analysis showed that a higher activity rate and education level of migrants explained some differences, but not all. This led the authors to conclude rural-urban migrants in Puerto Rico were more oriented toward achievement and innovation, as were the stayers.

Hendershot's (1971) similar analysis showed lower migrant fertility at older ages, but higher fertility among younger migrants to Manila in the Philippines. While in the early stages of urbanization rural-urban migration was difficult and selective whereas in later stages it was less difficult and less selective (Zarate & Zarate, 1975). The study conducted in Kinshasa by Anglewicz, Corker and Kayembe (2017) show that migrants have higher fertility than non-migrants (natives of Kinshasa). Chattopadhyay, white and Debpurr (2006) in Ghana found evidence for selection.

2.2.2 Disruptive Model

Disruptive theory proposed by Goldstein (1973) suggests that the migration process itself may interfere with fertility and migration may be stressful enough to interfere with a woman's biological capacity to conceive and bear children. There are several disruptive factors associated with the migration process like interruption of the supply of contraceptives or the weakening of controls on sexual behavior (Jensen & Ahlburg, 2004).

Disruption associated with migration can cause lower fertility through the physical separation of spouses or it can lead to accelerated fertility in the post migration called the catch-up effect (Goldstein & Goldstein, 1982). The effect of disruption, which has been studied most often in relation to temporary migration, is to lower the fertility of migrants compared with that of non-migrants. However the interruption in child bearing caused by migration in such cases may be followed by accelerated child bearing among the same migrants. Impact of disruption therefore is seen in the time of fertility and may last for short time only (Chattopadhyay, White, & Debpurr, 2006). Disruption effects are related to the process of migration rather than residence in a new

area and restricted to short time window before or after migration interruption in the supply of contraceptives or by weakening of control on sexual behavior (Muhdin & ledent, 2005; Chattopadhyay, White & Debpuur, 2006).

According to the disruption hypothesis, migrants' fertility decreases temporarily just before or after migration because of disruptive factors associated with the migration process (Lee, 1993:36). One of these disruptive factors is the separation of spouses that can occur in the early stage of migration (Lee, 1993; Goldstein,1973). Smith (1983, p.500) also suggests that, among unmarried migrant women, marriage may be delayed because "institutional arrangements for meeting and evaluating potential spouses are weak or inefficient". Physiological effects due to the stress associated with the migration have also been cited as possible mechanisms for the disruptive effects (Muhdin and ledent, 2000).

The long-term effect on fertility depends on whether women subsequently compensate for the disruptive effect by a higher fertility. This disruption effect is likely for migrations involving major changes, such as long distance moves and moves to greatly different environments or severe climate (Muhdin and ledent, 2000). Fertility reduction attributable to disruption is expected to be only temporary, and a more normal or even somewhat accelerated pace of fertility is expected to be resumed gradually (Majelantle & Navanneetham, 2013). The disruption hypothesis states that migration affects fertility due to the delay off higher order births and not necessarily of the total fertility rate as the lost opportunities could be captured later on whilst adapting to the environment.

2.2.3 Adaptation Model

The adaptation model argues that rural-urban migrants with average socioeconomic characteristics and fertility patterns come to acquire urban characteristics, including lower fertility norms, through a process of adaptation to city life (Manner 2003). This model emphasizes the role of the urban environment on fertility behavior. Migrants who arrive in a new environment may influence their demand for children and the costs of fertility regulation. For instance, greater availability of contraception, better access to health care, increased contacts with "modern values", greater employment opportunities may all contribute to a lower fertility among migrants than among rural stayers (Muhidin & Ledent, 2005). Rural-urban migrants face

a different environment in their new place of residence and that environment provides distinctly different prices for a number of interrelated life-cycle consumption investment choices. These include the rewards to women for labor market participation outside the family, the opportunity cost attached to child bearing and child rearing, and the chance for children to receive health care and education. The incentives of this new environment induce women to reduce their fertility from non migrant (Lee and Pol, 1993).

Adaptation generally is taken to imply that average fertility at the destination is lower than average fertility at the origin controlling for individual level variation (Jensen & Ahlburg, 2004) while, there must be differences between environments at the origin and destination that generate fertility declines. Accordingly recent migrants will have higher fertility compared to urban natives and long-term migrants, after controlling for age and other demographic and socioeconomic characteristics (Majelantle & Navanneetham, 2013). It also implies that post-migration fertility of long-term rural-urban migrants will be similar to that of urban natives. By inference the theory implies that long-term rural-urban migrants will have lower fertility compared to rural non-migrants, that rural-rural migrants will have similar fertility to rural non-migrants, and fertility of rural and urban non-migrants will be further apart than fertility of rural-rural and rural-urban migrants (Majelantle & Navanneetham, 2013).

In the study of migration and fertility in Korea, Mexico and Cameroon, Lee and Pol (1993) found significant evidence which support adaptation hypothesis in Korea and Mexico after selection and disruption effects of migration is controlled. So there is a significant relationship in between fertility and migration and rural urban migrants has low fertility than rural non migrants due to their adaptation. If a Korean rural-urban migrant woman spent her entire 34 childbearing years in urban areas, her completed fertility would be lower by 2.57 children when compared to a rural stayer. The Mexican total fertility adaptation effect, which was, 1.45 fewer children, is smaller than that of the Korean effect.

From the result of study conducted in Burkina Faso by Muhidin & Ledent (2005) the effect of migration and urbanization is strong, both before and after controlling for the effects of certain covariates (i.e. age, cohort, marital and working statuses, education, and duration of residency). Results from the primary analyses show that migration does not have an impact to the hazard of first birth. The study that was conducted by Lee and Farber on migration and fertility in Korea

shows evidence that rural urban migration slow down the fertility rate of Korean women (Lee & Farber, 1984). In another study conducted by Jensen and Ahlburg (2004) in Philippines, there is significant evidence for the negative relationship of migration and fertility due to adaptation effect.

A study on migration in sub-Saharan Africa by Brockerhoff and Yang (1994) also found that the fertility of migrants to urban areas declines to levels at or below that of urban-born women in several Sub Saharan African countries. They attribute this to structural features of urban living, or to changes in preferences due to exposure to groups or institutions preferring lower fertility. The above studies show that migrants have lower fertility than non-migrants of rural residents.

2.2.4 Socialization Model

The socialization hypothesis, on the other hand, predicts that the fertility of migrants will primarily reflect the fertility prevalent in childhood environment in their place of origin (Muhidin & Ledent, 2005). With the assumption that norms about fertility are learned at young age, and any changes in fertility behavior among migrants will only occur over the longer term, if migrant areas of origin are typically rural, rural-to-urban migrants will therefore have higher fertility than non-migrants at the place of destination (Kulu, 2005).

The socialization hypothesis predicts that no significant change in the fertility of migrants (rural-urban) compared to that of stayers at origin would take place, irrespective of their duration of stay in the urban area (Muhdin and Lendet, 2005). It also implies that the first generation of migrants to be born in the urban areas will have lower fertility compared to rural-urban migrants. Further, generational hypothesis emphasize that culture, norms and values of place of origin continue to prevail even after migrating to a new low fertility setting (Majelantle & Navanneetham, 2013).

It is also expected that, because of socialization in an area of high reproductive norms and behavior, migrants will have higher fertility than their non-migrants cotemporaries at place of destination (Rindfuss, 1976). Generally socialization theory claims that migrants may have higher fertility than urban non migrants. This is the reason that fertility is higher in rural areas than urban areas. With this assumption fertility behavior of migrants in childhood place was

reflected or dominant at destination area. Thus the fertility of migrants is expected to be dissimilar to those at destination area but similar to those at origin area (Kulu, 2005).

The selection and socialization models, in general, point to pre migration at place of origin while, adaptation and disruptive model point to post-migration conditions at place of destination. Researchers disagree on which factors are most important in stimulating changes in the fertility behavior of migrants. Lee and Farber (1984) emphasize economic factors, such as rural- urban differences in the costs of child rearing, men's and women's wages, and occupational structures. Schultz (1976), on the other hand, stresses non-economic factors. For example, movement to cities, where health conditions are better, may reduce infant mortality and generate a replacement effect. i.e. fewer births will be needed to achieve a given number of surviving children. Selection effect was revealed on the pace of childbearing among the rural-urban migrants, especially after parity 3 and higher (Muhidin & Ledent, 2005). Recent studies suggest that disruption can increase fertility by causing an interruption in the use of supply of contraceptives or by the weakening of controls on sexual behavior (Manner, 2003).

Most cross-sectional studies have pointed to a positive association of migration to urban areas and fertility decline (Brockerhoff 1995), both for migrants themselves (Brockerhoff and Yang 1994) and for subsequent generations born in the urban place of destination found evidence of lower fertility among rural-to-urban migrants (Chattopadhyay, White & Depur, 2006; White et al. 2008). At least two older studies of Sub Saharan Africa, however, found no association between migration and fertility decline.

Some reasons for internal urban migration involve characteristics that are typically associated with lower fertility, like attending school or starting a job. Other research has shown that moving to begin a marriage is common in some parts of SubSaharan Africa (Reniers, 2003) which suggests that fertility may increase as a result of migration. Research in Sub Saharan Africa has often found higher fertility and frequent marriage-related migration among women in virilocal and patrilineal societies (Anglewicz, Corker & Kayembe, 2017).

Goldstein (1978) who used census data in Thailand to analyses the fertility behavior of migrants to Bangkok found that they tended to assimilate the fertility behavior of the native population at destination when they moved from rural areas and smaller urban areas to larger cities. According

to him, migrants to Bangkok had lower fertility than those to other urban places, especially if they had an urban origin. Thus ‘selectivity’ and ‘adjustment’ have a joint impact on fertility levels. His findings suggest strongly that in Thailand movement from rural to urban places is associated with considerable reduction in fertility that results both from the initial selection of persons with lower fertility and from the adherence to lower fertility levels than the non-migrant population in the urban metropolis, at least in the period immediately following migration (Goldstein, 1973:238).

In the study of relationship between migration and fertility in China, Liang; Yi and Sun (2014) also found that migration significantly affects fertility rate. The fertility rate changes before and after migration, but some differences exist in the direction and the degree. In view of China's large number of existing rural-urban migration, social migration in China will decrease fertility rate. The family planning policy aimed at controlling the number of the population still plays a role in the decrease in China's fertility rate. This research shows that among migrants, the family planning policy still plays an important role in declining the fertility rate. The traditional concept of fertility still influences the fertility rate.

The above mentioned four theories have been proposed to predict and explain fertility patterns of migrants, each of these theories received support in the literature. These theories are not mutually exclusive (Mckinney, 1993). It is probable that all the four model effects of migration on fertility operate to some extent during the migration process. The migratory movement will have a greater effect on the future population of Addis Ababa and more depends on the fertility behavior of the migrants.

2.3 Synthesis of Literature Review

The relationship between migration and fertility differentials can be explained by four hypotheses (socialization, adaptation, selection and disruption). These models suggest that there is a positive or negative relationship between migration and fertility at the place of destination or origin. Adaptation model claims migration alters fertility at the destination area which causes lower fertility. The selection model suggests migrants have lower fertility than non-migrants as they have low fertility before moving out or at place of origin due to their selectivity behavior. On the other hand, the disruption process makes spouses of migrants to face challenge in bearing

children and consequently plan to postpone timing of pregnancy and thus having low fertility (negative relationship). The socialization model, on the contrary, argues that due to the influence of cultural factors adopted during childhood, fertility behavior of migrants from rural areas appear to be higher fertility than the fertility of residents in urban areas.

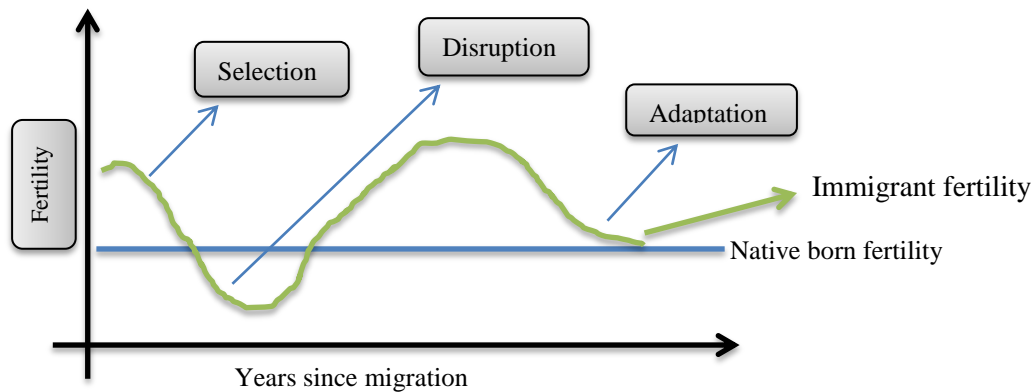


Figure 1. Mechanisms affecting the fertility of migrants. (Source: Xiana, B. (2011). Age at Migration and Fertility Patterns in Spain. V.23).

Different Studies (Chattopadhyay, White and Debpuur, 2006; Ribe and Schultz, 1980) show that the relationship between migration and fertility in different places is different. Some studies support selection and adaptation (Anglewicz, Corker and Kayembe, 2017) while some get evidence for selection (Chattopadhyay, White and Debpuur, 2006). Furthermore, some get evidence which support disruption (Muhdin and Ledent, 2005) whereas, others strength adaptation hypothesis (Lee and Farber, 1984). There is also evidence for socialization and for adaptation, selection and disruption theories in combination.

The expected outcome which is drawn from this study is assessing migration effects of fertility with regard to mean CEB and timing of birth depending on the relationship existed between migrants and non-migrants. It also identifies the models that explain the effect and further predicting its implication for the future. There are no sufficient studies which are conducted on the relationship between migration and fertility in the context of Addis Ababa. This research is expected to initiate others for further investigation to gives more information about migrant's fertility level in the city.

CHAPTER THREE

METHODOLOGY OF THE STUDY

The relationship between migration and fertility can be conducted in the case of Addis Ababa. Addis Ababa is the capital and largest city of Ethiopia. It is located on a well-watered plateau surrounded by hills and mountains, in the geographic Centre of the country. Since the late 19th century Addis Ababa has been the capital of the Ethiopian state.

Addis Ababa is the educational and administrative Centre of Ethiopia. Museum of the Institute of Ethiopian Studies (operated by the university), the National School of Music, the National Library and Archives, palaces of former emperors and governmental ministries are located in the city. Addis Ababa's economy is growing annually by 14% and the city alone currently contributes approximately 50% towards the national GDP, highlighting its strategic role within the overall economic development of the country (World Bank, 2015).

3.1 Research Approach

The study aims to assess the relationship between migration and fertility in Addis Ababa using the 2016 Ethiopian Demographic and Health Survey dataset through the exploration of numeric patterns. To investigate this relationship, quantitative research approach is appropriate for the study as quantitative research method deals with quantifying and analyzing variables in order to get results. It also involves the utilization and analysis of numerical data using specific statistical techniques to answer questions like who, how much, what, where, when, how many, and how (Apuke, 2017).

3.2 Research Design

A research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It constitutes the blueprint for the collection, measurement and analysis of data (Kothari, 2004). The study was retrospective cross-sectional in design and utilized the 2016 Ethiopian Demographic and Health Survey conducted by Central Statistical Agency and ICF.

3.3 Data Source

The study uses the 2016 Ethiopia Demographic and Health Survey (EDHS) data collected by CSA and ICF which was conducted from January 18, 2016, to June 27, 2016, based on a nationally representative sample that provides estimates at the national and regional levels and for urban and rural areas. The conducted survey targeting on women age 15-49 and men age 15-59 in randomly selected households across Ethiopia on fertility, marriage, fertility preferences, awareness and the use of family planning methods, child feeding practices, nutritional status of women and children, adult and childhood mortality, awareness and attitudes regarding HIV/AIDS, female genital mutilation, domestic violence, and height and weight of women and children age 0-5 from 16,650 households and 28,371 Respondents (15,683 female and 12,688 male). The report presents comprehensive, detailed, final outcomes of the survey at the national level, for the nine regional states and two city administrations of Ethiopia (CSA and ICF, 2016).

The study on the impact of migration on fertility is limited to look at women of reproductive age groups (i.e. 15-49 years) and lived in Addis Ababa at the time of survey by using fertility and birth files from EDHS data. According to the data compiled in the 2016 EDHS, internal migration takes place from rural to urban, small city to urban and also urban to urban. The study considers all migrants to Addis Ababa from all directions.

3.3.1 Sample of the study

Although the 2016 EDHS data contains a total of 28,371 respondents (15,683 female, and 12,688 male) from all regions, the study is restricted only to women respondents from Addis Ababa. Sample respondents taken from Addis Ababa consist of 1824 females that were living in the City at the time of the study.

3.3.2 Variable Measurement

a. Independent variable

The primary explanatory variable that is extracted from the 2016 EDHS dataset; that is, migration status, is derived from a response to the question ‘how long have you lived in this place?’ Accordingly, a women who responds ‘always’ to this question is classified as ‘non-migrant’ while those who respond ‘inconsistent’ is classified as migrant. Among those who

responded as inconsistent, the length of duration lived in the city is categorized as recent migrant (less than five years), midterm migrant (5-9 years), long term migrant (9-14 years) and lifetime migrant (15 years and above). The duration of residence in the city is used to assess the effect of urbanization on fertility. Respondents who regarded as visitors are, however, excluded from the study as they are neither migrants nor non-migrants in the city.

b. Dependent Variable

Two analyses are done to investigate the relationship between migration and fertility. Children ever born (CEB) and birth order are used as measures of fertility and dependent variable. Children ever born are obtained from the question on “Total number of children” the woman had in life time while, birth interval, the other dependent variable is compute by taking the time elapsed between to consecutive births. In this study, two theories; namely, adaptation and disruption theories are tested. The effect of the adaptation theory is tested by investigating the relationship between migration status with that of cumulative fertility and their duration residence in the City. Similarly, the disruption hypothesis is tested by considering the timing of births of migrants after moving to the City.

c. Control Variables

Control variables are the variables that is controlled for held constant during conducting research and included in regression analyses to estimate the causal effect of a treatment on an outcome (Schjoedt and Sangboon, 2015). Control variables are usually included in the independent variable category that predicts the effect of dependent variable. Age, educational status, marital status, house hold wealth status, contraceptive use, employment status and religion are the factors that affect fertility at the place of destination and held constant in the study.

3.4 Data Analysis Technique

Analysis of the study mainly focuses on the estimation of the effects of migration on both timing and number of child born to a woman in lifetime. Firstly, the study examines how past migration experience affects the total number of children born to a woman. Secondly, it analyzes the effect of migration on timing of childbearing. To reveal the selection of migrants by observable factors,

covariates that are known to influence the selectivity aspects of migration are included in the model.

Two models were fitted in the analyses. For the first estimate the study uses Poisson regression. In this model total number of children ever born at the time of the survey is considered as the dependent variable. The independent variable is a binary category of migration (migrants vs. non-migrants). The characteristics that significantly differ by migration status and likely to affect fertility; namely, (age, level of education, marital status, household wealth status, occupation status, contraceptive use and religion) are controlled.

The second analysis is made to look at the differences in timing of birth by migration status of respondents through discrete time hazard model (i.e., sequential logit model). In this case, the dependent variable is timing of birth; specifically, first order and second order births while the independent variable is migration status being classified as non-migrant and migrant (Chattopadhyay, White, & Debpuur, 2006). The covariates that change with time (i.e., time varying variables like age) and the covariates that do not change with time (i.e., fixed covariates like age at first birth, education and house hold wealth status) during the observation period are controlled. The model examines the effect of migration on timing of birth.

3.4.1 Migration and cumulative fertility

In the analysis of the effect of migration on the total number of children ever born, the first regression is made for the whole sample (i.e. children ever born for both migrants and non-migrants). Furthermore analysis is made for CEB of migrants and non-migrants independently by controlling only age and then by controlling age, education status, marital status, house hold wealth status, contraceptive use, religion and occupation status. Here migrant fertility was compared with non-migrants or natives of Addis Ababa and non-migrants are reference groups.

In order to examine the urbanization effect, variable of duration at urban residence is included. As indicated above duration of time at Addis Ababa is categorized as recent migrant, mid-term migrant, long-term and also life time migrant. In this regression the variables age, education, contraceptive use, household wealth status, occupation status, marital status and religion are controlled by means of a dummy variable multiple regression technique (Rindfuss, 1976).

To study how past migration experience affects the total number of children a women bears, mostly multivariate method can be employed but CEB is a count variable that follows a discrete probability distribution. However, using regression model for the variable is not correct theoretically (Shrestha, 2013). So the standard model for multivariate analysis of cumulative fertility was Poisson model. It was developed to model discrete count data, since it is easy to interpret in many aspects.

Poisson regression can be conducted to investigate whether moving to Addis Ababa have an effect on fertility in the City or not. The Poisson regression model can be given as (Rokicki, Montana, & Fink, 2014)

$$Y_i \sim \text{Poisson} (\lambda_i) \dots \dots \dots (1)$$

Y_i = the outcome or CEB

The incidence rate of birth λ , is modeled by our explanatory variables of interest and individual covariates X_i while the Poisson distribution model is expressed as the probability of y (CEB) (Chattopadhyay, White & Debpuur, 2006) and given as

$$Pr \{ y = y \} = \frac{e^{-\lambda} \lambda^y}{y!}$$

The incidence rate of birth λ is influenced by a set of explanatory variables x_i

$$\lambda = \exp (\beta_0 + \sum b_i X_i)$$

$$\lambda = \exp (\beta_0 + \beta_{1\text{migrants}} + x_i y)$$

The parameter β_1 is the parameter of interest the effect of moving on completed fertility compared with those who had never moved. X_i is a vector of individual covariates including mother's age group, education, household wealth status, marital status, occupation status, contraceptive use and religion.

To choose the best fitted model from Poisson regression and Negative binomial regression, Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) of the data was compared for Poisson distribution and Negative binomial distribution. According to Sturman (1999), the apparent simplicity of Poisson regression comes with two restrictive assumptions. The first assumption is assumed to be equal variance and mean of the count variable. However, in practice the variance is usually larger (i.e., over dispersion) or lower (i.e., under dispersion)

than the mean. Poisson regression may not be well suitable to handle some types of count outcomes such as an over dispersed or under dispersed data.

There are two main sources of over dispersion. One of them is based on zero-inflation and the other is based on heterogeneity (Ozonur, Tul Kubra A, & Bayrak, 2017). If there is presence of excess zeros in the count data, and leads to over dispersion it is called zero-inflation while, when something important in the model such as relevant explanatory variables are missed or when the form of dependency between individual observations do not take in to account, and leads to over dispersion it is called heterogeneity. Thus, it is crucial to determine presence of over dispersion in data. In the presence of over dispersion due to the above cases goodness of fit tests is commonly used to test hypothesis expressing that determined model is true. The other assumption of Poisson models is the occurrences of the event are assumed to be independent of each other. In the analysis of effect of migration on life time fertility Fitness of Poisson model for the data was tested according to the above assumptions.

3.4.2 Migration and timing of births

The investigation on the effect of migration on timing of birth can be done through event history analysis by using annual birth histories of person year data structure. An event history is a longitudinal record of the timing of the occurrence of one or more types of event (Steele, 2005). Each person year is between the ages of 12 and 40. Age 12 is selected as starting time because it presented a uniform starting point for all women and the observation ends at age of 40 (end of birth for women included in the sample) or survey time. Due to repeatable event of birth a one year interval is chosen. A one year interval was chosen because the event (birth) does not occur twice within one year interval and multiple births are considered as one event. The advantage of the discrete time approach is the need for further data manipulation prior to the analysis (Steele, 2005). According to Alilison (1982) the corresponding discrete-time hazard function is given by the formula

$$P_{it} = 1 - \exp [-\exp (\alpha_t + \beta' X_{it})]$$

Where P_{it} is the probability of duration of birth at time interval t

α_t ($t = 1, 2, \dots$) is just a set of constants.

X_{it} is a vector of covariates which is fixed covariates (age at first birth, education, wealth status and employment status) and time vary covariates (age, marital status, birth interval) the covariates that vary with coefficient β . One of the disadvantages of the above model (discrete time approach) is the need for further data manipulation prior to analysis (Steele, 2005).

There are many different types of event history model. From those models the most commonly applied model is the Cox model which makes no assumptions about the shape of the hazard function, treats time as continuous and assumes the effects of covariates are constant over time (Steele and Washbrook, 2013). So, the standard model for analysis of birth interval of migrants and non-migrants is cox regression model. Cox proportional hazard can be given as

$$h(t) = h_0(t) \exp (\beta_{migrant} + \beta X_n)$$

where $h(t)$ is the expected hazard at time t , $h_0(t)$ is the baseline hazard and represents the hazard when the predictors (migration status) X_n (age, education etc.) is equal to zero. There are two assumptions that have to be satisfied for Cox's regression model. The first one is the log-linearity for the hazard rate and the second assumption is proportional hazards, which means that the hazard rates for any individuals, with the vector of covariates x have to be proportional (Zhang, 2015). However, the proportional hazard can be tested through using time dependent explanatory variables and with goodness of fit tests (Yao, 2018). The above assumptions are tested for the cox regression model in the analysis

CHAPTER FOUR

RESULTS AND DISCUSSION

The study is based on analysis of data undertaken in several steps. The first section deals with tabulation of background characteristics for the respondents. The second part deals with the analysis and interpretation of data on the interrelationship between migration and fertility by conducting bivariate and multivariate analysis based on cumulative fertility and timing of birth.

4.1 Background Characteristics of the Study Population

The background characteristics of the study population were examined in terms of demographic and socioeconomic variables to show the attributes of respondents. Table 1 presents percent distribution of women (respondents) with summary of background characteristics. The distribution of respondents who never moved out from Addis Ababa (non-migrants) and moved to Addis Ababa (migrants) are 34.3 % (N = 622) and 65.7% (N =1194) respectively from the total 1816 population. Moreover, this shows that migrant women are almost twice greater than those of non-migrant women. The proportion of unemployed and employed respondents is 34.1% and 65.9 % respectively. About 75.1 % of respondents do not use any contraceptive method and 3% of them use traditional method, while the proportion of respondents who use traditional method was about 21.9 %. Different descriptive characteristics for the full data set with regard to different socio economic characteristics of the sample are evident in Table 1.

As shown in Table 2, there are more non migrant single women than migrants in the sample which is 59.2 and 49.2% respectively. Characteristics related to illiterate preference shows difference, which is 12% for migrant and 1% for non-migrant which implies there are more illiterate migrants than non-migrants. Accordingly, 6.9% of migrants and only 1.9% of non-migrants are reporting as poor in their wealth status. With regard to their work status 30.1% migrants and 41.8% non-migrants are not participating in any income generating activities whereas, majority (69.9%) of migrants and above half (58.2%) of non-migrants are engaged in work sector.

As it was indicated in Table 1 the respondents of the survey were divided into two main categories: those who never moved and those who moved to Addis Ababa. Those women who

move to Addis Ababa are categorized in to four. Thus, 28.8% (N=344) of them are reported as stay 0-2 year in Addis Ababa whereas, 23.5% (280) of them live for 3-6 years. On the other hand 22.9% (274) of women reported as residing for 7- 14 years and one fourth (24.8%) of migrants live for 15 years and above in the city.

Table 1. Background Characteristics of the respondents included in the study

| | Variables | N | Percent |
|--------------------|--------------------|-------------|----------------|
| Migration Status | Migrant | 1194 | 65.7% |
| | Non Migrant | 622 | 34.3% |
| Educational Status | Illiterate | 149 | 8.2% |
| | Primary | 662 | 36.5% |
| | Secondary | 559 | 30.8% |
| | Higher | 446 | 24.6% |
| Wealth Status | Poor | 94 | 5.2% |
| | Middle | 303 | 16.7% |
| | Rich | 1419 | 78.1% |
| Marital Status | Single | 955 | 52.6% |
| | Married | 674 | 37.1% |
| | Separated | 187 | 10.3% |
| Contraceptive Use | No Contraceptive | 1364 | 75.1% |
| | Traditional Method | 54 | 3.0% |
| | Modern Method | 398 | 21.9% |
| Religion | Orthodox | 1376 | 75.8% |
| | Protestant | 167 | 9.2% |
| | Muslim | 261 | 14.4% |
| | Other | 12 | 0.7% |
| Age group | 15-19 | 431 | 23.7% |
| | 20-24 | 360 | 19.8% |
| | 25-29 | 318 | 17.5% |
| | 30-34 | 268 | 14.8% |
| | 35-39 | 212 | 11.7% |
| | 40-44 | 137 | 7.5% |
| | 45-49 | 90 | 5.0% |
| Occupation status | Not working | 619 | 34.1 |
| | Working | 1197 | 65.9 |
| Total | | 1816 | 100.0 |

Table 2. Background and socio economic characteristics of migrants and non-migrants

| | Variables | Migrants | | Non migrants | |
|-------------------------|--------------------|-------------|-------------|--------------|-------------|
| | | N | % | N | % |
| Educational Status | Illiterate | 143 | 12.0% | 6 | 1.0% |
| | Primary | 546 | 45.7% | 116 | 18.6% |
| | Secondary | 291 | 24.4% | 268 | 43.1% |
| | Higher | 214 | 17.9% | 232 | 37.3% |
| Wealth Status | Poor | 82 | 6.9% | 12 | 1.9% |
| | Middle | 236 | 19.8% | 67 | 10.8% |
| | Rich | 876 | 73.4% | 543 | 87.3% |
| Marital Status | Single | 587 | 49.2% | 368 | 59.2% |
| | Married | 474 | 39.7% | 200 | 32.2% |
| | Separated | 133 | 11.1% | 54 | 8.7% |
| Contraceptive Use | No Contraceptive | 876 | 73.4% | 488 | 78.5% |
| | Traditional Method | 35 | 2.9% | 19 | 3.1% |
| | Modern Method | 283 | 23.7% | 115 | 18.5% |
| Religion | Orthodox | 886 | 74.2% | 490 | 78.8% |
| | Protestant | 129 | 10.8% | 38 | 6.1% |
| | Muslim | 173 | 14.5% | 88 | 14.1% |
| | Other | 6 | 0.5% | 6 | 1.0% |
| Age of women | 15-19 | 296 | 24.8% | 135 | 21.7% |
| | 20-24 | 260 | 21.8% | 100 | 16.1% |
| | 25-29 | 203 | 17.0% | 115 | 18.5% |
| | 30-34 | 172 | 14.4% | 96 | 15.4% |
| | 35-39 | 120 | 10.1% | 92 | 14.8% |
| | 40-44 | 86 | 7.2% | 51 | 8.2% |
| | 45-49 | 57 | 4.8% | 33 | 5.3% |
| Occupation status | Not working | 359 | 30.1% | 260 | 41.8% |
| | Working | 835 | 69.9% | 362 | 58.2% |
| Duration at destination | 0-2 Years | 344 | 28.8% | - | - |
| | 3-6 Years | 280 | 23.5% | - | - |
| | 7-14 Years | 274 | 22.9% | - | - |
| | 15 Years and above | 296 | 24.8% | - | - |
| Total | | 1194 | 100% | 622 | 100% |

4.2 Bivariate Analysis of cumulative Fertility

The bivariate analysis was based on average number of children ever born for migrants and non-migrants by different socio-economic characteristics. The descriptive analysis was made to observe mean CEB values of migrants and non-migrants by different categorical factors which is likely associated with it.

Table 3. Mean CEB of migrants and non-migrants by socio demographic characteristics

| | Variables | Migrants | | Non migrant | |
|-------------------|--------------------|----------|------|-------------|-----|
| | | Mean | N | Mean | N |
| Education status | Illiterate | 2.03 | 143 | 2.67 | 6 |
| | Primary | 0.86 | 546 | 1.21 | 116 |
| | Secondary | 0.82 | 291 | 0.76 | 268 |
| | Higher | 0.79 | 214 | 0.59 | 232 |
| Wealth Status | Poor | 1.05 | 82 | 0.08 | 12 |
| | Middle | 1.12 | 236 | 0.84 | 67 |
| | Rich | 0.93 | 876 | 0.81 | 543 |
| Marital Status | Single | 0.05 | 587 | 0.08 | 368 |
| | Married | 1.94 | 474 | 1.85 | 200 |
| | Separated | 1.65 | 133 | 1.85 | 54 |
| Contraceptive Use | No Contraceptive | 0.70 | 876 | 0.52 | 488 |
| | Traditional Method | 1.86 | 35 | 1.79 | 19 |
| | Modern Method | 1.75 | 283 | 1.83 | 115 |
| Work Status | Not working | 1.29 | 359 | 0.76 | 260 |
| | Working | 0.85 | 835 | 0.83 | 362 |
| Age Group | 15-19 | 0.02 | 296 | 0.04 | 135 |
| | 20-24 | 0.24 | 260 | 0.07 | 100 |
| | 25-29 | 0.88 | 203 | 0.59 | 115 |
| | 30-34 | 1.49 | 172 | 1.23 | 96 |
| | 35-39 | 2.31 | 120 | 1.30 | 92 |
| | 40-44 | 2.69 | 86 | 1.92 | 51 |
| | 45-49 | 2.81 | 57 | 2.45 | 33 |
| Religion | Orthodox | 0.96 | 886 | 0.83 | 490 |
| | Protestant | 0.74 | 129 | 0.68 | 38 |
| | Muslim | 1.23 | 173 | 0.67 | 88 |
| | Other | 1.50 | 6 | 0.67 | 6 |
| Total | | 0.98 | 1194 | 0.80 | 622 |

Table 3 displays values of average CEB of migrants and non-migrants by various levels of different variables. According to the result mean CEB of migrants and non-migrants was 0.98 and 0.80 respectively which is below one. The result shows that mean CEB of illiterate and primary educated migrants was less than that of their corresponding non migrants. This may show that the women who have smaller family are favored to move to Addis Ababa. In relation to women age group, for both migrants and non-migrants cumulative fertility increases as their age increases notably it was 0.02 for migrant and 0.04 for non-migrant with women age group of 15-19 whereas, 2.81 for migrants and 2.45 for non-migrants with 45-49 age group. Here, the result shows that older women have more children than young women and there is slight difference in mean CEB of migrants and non-migrant women which is below one (15-19 age group) and above two (44-45 age group).

The mean number of children ever born with middle and rich wealth index was almost similar which is approximate to one. Those migrant women who have poor wealth index showed higher mean CEB as compared to those non migrants of the same wealth index which may show that women with poor wealth status are favored to migration to get better job opportunities. In both migration status groups women which do not use any method of contraceptive shows the lowest value (0.5 for migrant and 0.7 for non-migrant which is below one) of mean CEB compared to women using traditional and modern method.

According to marital status currently married and separated women in both groups are similar which is approximate to mean CEB of 2. Never married women mean CEB show similar result in both migrant and non-migrant category which is almost below 0.1. Results in table 3 also shows that migrant and non-migrant women who engaged in work sector have similar mean CEB of less than one but those non migrant women who do not participate in any income generating activity have slightly lower mean CEB (0.76) than migrants group (1.29) here the migrants relatively having higher mean CEB than non-migrants and that do not engage in any work activity are migrated to the city to escape from economical problems.

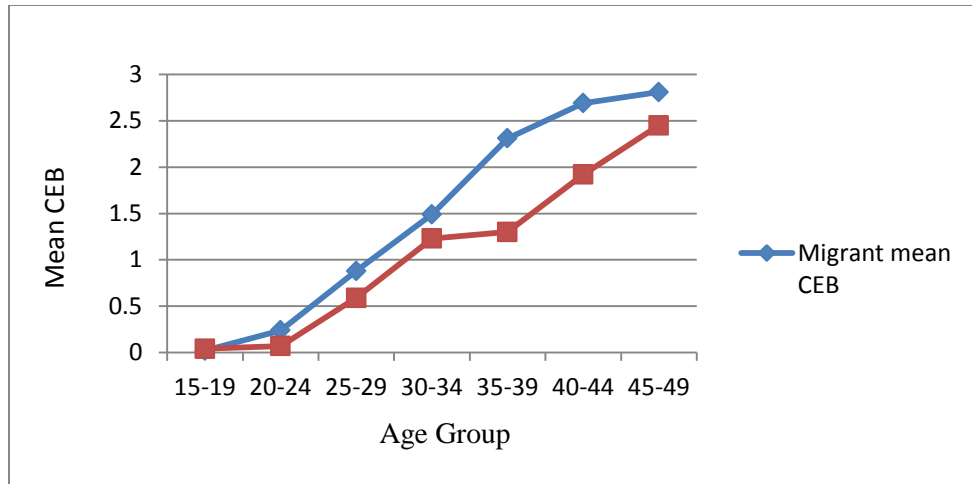


Figure 2. Mean CEB of migrant and non-migrant women by age group

Figure 2 reveals that women with higher age group (45-49 years) are associated with higher mean CEB and younger age groups (15-19 years) are associated with lower mean CEB. The figure also shows that migrants mean CEB is slightly higher than that of non-migrants. Mean CEB of migrants by duration at place of residence are stated in Table 4.

Table 4. Migrants mean CEB by their duration at place of destination

| Migrants Duration at place of residence (Addis Ababa) | Mean | Std. Deviation | N |
|--|-------------|-----------------------|----------|
| Recent migrant (0-2 Years) | 0.31 | 0.789 | 344 |
| Mid-term migrant (3-6 Years) | 0.61 | 1.042 | 280 |
| Long term migrant (7-14 Years) | 1.07 | 1.293 | 274 |
| Lifetime migrant (15 Years and above) | 2.02 | 1.858 | 296 |
| Total | 0.98 | 1.451 | 1194 |

Table 4 shows that women who live for 2 years in Addis Ababa have a cumulative fertility of 0.31 (N=344) while women who live for 3-6 years have a cumulative fertility of 0.61(N=280). Mean CEB for long term migrants is 1.07(274) while for the life time migrants equals 2.02 (N=296).

Women who stay few years in Addis Ababa (recent migrants) have the lowest cumulative fertility than those living for more years (long term or lifetime migrants). To sum up, total children ever born for women increases when their duration of residence at destination increases.

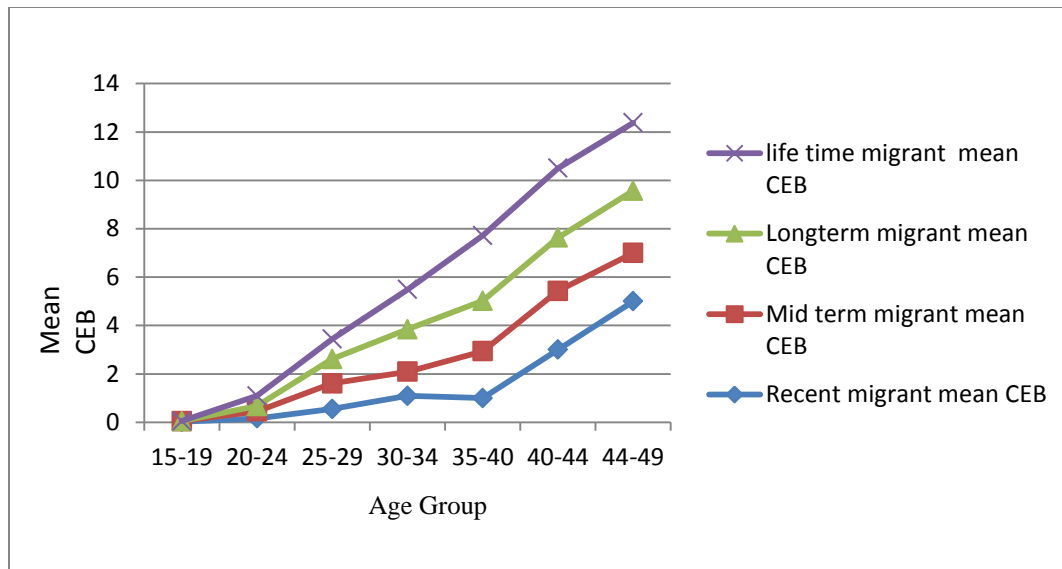


Figure 3. Mean CEB of migrants by their duration at Destination

Figure 3 shows mean CEB of migrant groups by age group. The graph clearly shows that life time migrants mean CEB is higher than that of other migrants within the same age group.

4.3 Multivariate Analysis of Children ever born

To show the effect of migration on fertility, the Poisson regression model was fitted for women along with current residential setting. The AIC and BIC of Poisson distribution was less than that of Negative binomial distribution which indicates that Poisson regression was best fitted model for the data than negative binomial regression (see Appendix 2). On the other hand the goodness of fit test for the result shows that deviance of < 1 which indicates the presence of over dispersion in the data which is resulted from zero inflation (see Appendix 1).

Migration related variable coefficients are shown in Table 5. The estimated effect of migration status when controlling only age is given in Model 1 while, the effects when controlling for age and other socio economic factors are shown in Model 2. The study finds that controlling for socio economic factors other than age reduces the effect of migration on CEB.

Table 5. Poisson regression results of life time fertility of women respondents by migration status and background characteristics, EDHS 2016

| Variables | Category | Model 1 | | Model 2 | |
|-------------------|--------------------|----------|------------|----------|------------|
| | | IRR | Std. Error | IRR | Std. Error |
| Migration Status | Non Migrant (ref.) | 1.00 | | 1.00 | |
| | Migrant | 1.427*** | 0.0537 | 1.059 | 0.0577 |
| Age | 15-19 | 0.009*** | 0.3227 | 0.048*** | 0.3344 |
| | 20-24 | 0.070*** | 0.1366 | 0.162*** | 0.1429 |
| | 25-29 | 0.288*** | 0.0906 | 0.364*** | 0.0967 |
| | 30-34 | 0.520*** | 0.0826 | 0.532*** | 0.0858 |
| | 35-39 | 0.716*** | 0.0817 | 0.694*** | 0.0845 |
| | 40-44 | 0.899 | 0.0848 | 0.896 | 0.0855 |
| | 45-49 (ref.) | 1.00 | | 1.00 | |
| Education Status | Illiterate (ref.) | - | - | 1.000 | . |
| | Primary | - | - | 0.809** | 0.0759 |
| | Secondary | - | - | 0.710*** | 0.0851 |
| | Higher | | | 0.601*** | 0.0946 |
| Occupation Status | Not working (ref.) | - | - | 1.00 | |
| | Working | - | - | 0.805*** | 0.0527 |
| MaritalStatus | Never married | - | - | 0.115*** | 0.1501 |
| | Currently Married | - | - | 1.139 | 0.0680 |
| | Not in union (ref) | - | - | 1.00 | |
| Wealth Status | Poor (ref.) | - | - | 1.00 | |
| | Middle | - | - | 1.179 | 0.1250 |
| | Rich | - | - | 1.179 | 0.1224 |
| Contraceptive Use | Not Using (ref.) | - | - | 1.00 | |
| | Traditional Method | - | - | 1.310* | 0.1108 |
| | Modern Method | - | - | 1.425*** | 0.0576 |
| Religion | Orthodox(ref.) | - | - | 1.00 | |
| | Protestant | - | - | 0.917 | 0.0962 |
| | Muslim | - | - | 1.134 | 0.0689 |
| | Others | - | - | 1.208 | 0.2821 |

Note: The significance level of each modalities are coded as follows: *** p<0.001; ** p<0.01 and *p < 0.05.
(ref.) is reference category.

The likelihood ratio test (i.e. omnibus test) for the above Poisson model shows a p value of < 0.001 which shows all predictor variables used in the Poisson regression model are meaningful predictors of the effects of mean CEB. When controlling for age (model 1), the coefficients for migration related variable is statistically significant ($p < 0.001$). Migration increased mean CEB by 42.7%. However, this effect disappears when controlling for age and other socioeconomic characteristics (model 2). This shows that controlling other socioeconomic characteristics greatly reduce the effect of migration on fertility.

Age of women is one of the most important biological and demographic determinants of fertility. It is natural that an elder woman has more number of children as compared to her counterpart. A comparison of those in their older reproductive years (i.e., 44-49 age group), shows that fertility is low among the younger age group (15-19) but high among 35-39 age group. Women in the 15-19 age groups had the lowest number of children ever born when compared to women in the 45-49 age groups. Women in the 15-19 and 35-39 age groups have 30.6% and 95.2% fewer children respectively than women in the 45-49 age groups. The difference was, however, not statistically significant among those with 40-44 age group (model 1) showing that women residing in the city would reach their highest fertility rate by age 40.

The above result (Table 5 model 2) also shows that occupation status, education status, marital status and contraceptive use significantly affect CEB while, religion and wealth status do not have association with CEB of women. Compared to those women with illiterate women who had primary, secondary and tertiary education had fertility lower by 19.1%, 29% and 39.9% respectively. Employed women had 19.5% fewer children compared to those unemployed. The effect of marital status show that single women had lowest fertility, that is, 88.5% fewer number of children than separated women. Although women who use modern and traditional contraceptive had 42.5% and 31% more children respectively than those women who do not use any method of contraceptive. This shows that women in the city are using contraceptive to space between births. Hadn't they used contraceptive methods, they would have had more number of children by the time of the survey.

Table 6. Poisson regression results for differences in cumulative fertility by duration at urban residence (Addis Ababa)

| Variable | Categories | Model 1 | | Model 2 | |
|-------------------|---------------------|----------|------------|----------|------------|
| | | IRR | Std. Error | IRR | Std. Error |
| Migration Status | Recent migrant | 1.007 | 0.1094 | 0.831 | 0.0782 |
| | Midterm migrant | 1.327** | 0.0906 | 1.056 | 0.0933 |
| | Long term migrant | 1.438*** | 0.0743 | 1.022 | 0.1128 |
| | Life time migrant | 1.560*** | 0.0618 | 1.137 | 0.0662 |
| | Non migrant (ref.) | 1.00 | | 1.00 | |
| Age | 15-19 | 0.010*** | 0.3259 | 0.056*** | 0.3394 |
| | 20-24 | 0.081*** | 0.1428 | 0.183*** | 0.1516 |
| | 25-29 | 0.318*** | 0.0951 | 0.394*** | 0.1022 |
| | 30-34 | 0.554*** | 0.0857 | 0.560*** | 0.0889 |
| | 35-39 | 0.745*** | 0.0827 | 0.713*** | 0.0857 |
| | 40-44 | 0.927 | 0.0854 | 0.198 | 0.0862 |
| | 45-49 (ref.) | 1.00 | | 1.00 | |
| Education Status | Illiterate (ref.) | - | - | 1.00 | . |
| | Primary | - | - | 0.803** | 0.0762 |
| | Secondary | - | - | 0.720*** | 0.0860 |
| | Higher | | | 0.610*** | 0.0953 |
| Occupation Status | Not working (ref.) | - | - | 1.00 | |
| | Working | - | - | 0.808*** | 0.0528 |
| Marital Status | Never married | - | - | 0.112*** | 0.1508 |
| | Currently Married | - | - | 1.121 | 0.0684 |
| | Not in union (ref.) | - | - | 1.00 | |
| Wealth Status | Poor (ref.) | - | - | 1.00 | |
| | Middle | - | - | 1.096 | 0.1254 |
| | Rich | - | - | 1.176 | 0.1233 |
| Contraceptive Use | Not Use (ref.) | - | - | 1.00 | |
| | Traditional Method | - | - | 1.305* | 0.1111 |
| | Modern Method | - | - | 1.411*** | 0.0578 |
| Religion | Orthodox(ref.) | - | - | 1.00 | |
| | Protestant | - | - | 0.915 | 0.0963 |
| | Muslim | - | - | 1.126 | 0.0691 |
| | Others | - | - | 1.309 | 0.2838 |

Note: The significance level of each modalities are coded as follows: *** p<0.001; ** p<0.01 and * p < 0.05.
(ref.) is reference category.

The likelihood ratio test (Omnibus test) for the above Poisson model also shows a p value < 0.001 which indicates all predictor variables used in Poisson regression are meaningful predictors of mean CEB. When controlling for age (model 1), the effects for the coefficient of migration

and related variable is statistically significant ($p < 0.001$) but there is no significant relationship between migration and mean CEB ($p = 0.058$) when controlling for age and other socioeconomic characteristics (model 2). The result shows that lifetime migrant's fertility was 56 % higher than non-migrant women residing in Addis Ababa. Similarly, long term and midterm migrant women fertility was found to be higher by 43.8% and 32.7% respectively compared to those non migrants. Unlike this, recent migrants (i.e., those living 0-2 years in the city) appear to have same level of fertility with non-migrants.

As shown in Table 5, fertility has declined by 25.5%, 44.6 and 68.2% among women with 35-39 age group, 30-34 age group, as well as 25 -29 age group respectively when compared to women in the 45-49 age group. Furthermore, 15-19 age groups have 99 % fewer children than the corresponding 45-49 age group women. The difference was, however, not statistically significant among those 40-44 age group. As observed elsewhere age, education, marital status and contraceptive use have significant effect on fertility while religion and wealth do not have any association with life time fertility.

4.4 Analysis of Migration and Fertility Timing

The event-history analysis model was fitted to investigate the effect of moving on delaying first and second order births. Table 9 shows the effect of migration on annual birth probabilities when controlling for age and different socio-economic factors. This model explicitly examines the effect of birth timing. The first column of the table shows the effect of migration on the risk of experiencing the first birth, while the second column gives the effect of migration on the risk of experiencing second births. The model, however, doesn't consider those women who had first birth before migrating to Addis Ababa and those women who did not give first birth at all. With these restrictions, the analysis finally found 656 women for first birth and 375 women for second birth from the total of 1816 sampled women included in the sample. Thus, the analysis of migration on fertility through timing of birth consider this and compared migrants who give first and second birth after migration with that of non-migrants having the same birth history.

Table 7. Summary of mothers and their children in Addis Ababa

| Migrants and Non migrants First and Second Birth | | | |
|--|---------------|---------------|-------------|
| Variable | Event (Birth) | Censored | Total |
| 1 st Birth | 656 (36.1.6%) | 1160(63.9%) | 1816 (100%) |
| 2 nd Birth Interval | 375 (20.6%) | 1441(79.4.0%) | 1816 (100%) |

The first column of Table 8 shows that the effect of migration on probability of first birth controlling only for the age group while the third column indicates the effect of probability of second birth when controlling for age group and other socio economic factors. The omnibus test of model coefficients shows a p value of less than 0.01 which suggests that all predictor variables entered in to the analysis are meaningful predictors of time to first and second birth.

According to results given in Table 8 column1, migrant women were 27.1% less likely to have first birth as compared to non-migrant women. This indicates that migrants have a lower hazard of first birth than non-migrants. Women in the 15-19 age groups were 67.6 % less likely to have first birth when compared to women in the 45-49 age groups. The hazard ratios of having first birth for women in the 20-24 and 25-29 age groups was also 1.52 and 1.55 times that of 45-49 age group women respectively (column 1), and the effect is statistically significant. Furthermore, employed women were 21.6% less likely have first birth than unemployed women.

Table 8. Effect of migration status on Annual first and second birth probabilities in Addis Ababa; result from Hazard model

| Variables | | First birth | | Second birth | |
|--------------------------|---------------------|-------------|-------|--------------|-------|
| | | HRR | SE | HRR | SE |
| Migration status | Non migrant (ref.) | | | | |
| | Migrant | 0.729*** | 0.088 | 0.721** | 0.117 |
| Age | 15-19 | 0.324** | 0.428 | 1.176 | 0.186 |
| | 20-24 | 1.522* | 0.214 | 2.146 | 0.178 |
| | 25-29 | 1.546** | 0.161 | 0.965 | 0.179 |
| | 30-34 | 1.218 | 0.150 | 0.999 | 0.207 |
| | 35-39 | 0.871 | 0.152 | 0.664* | 0.393 |
| | 40-44 | 1.024 | 0.162 | 0.938 | 0.862 |
| | 45-49 (ref.) | | | | |
| Education | Illiterate (ref.) | | | | |
| | Primary | 1.154 | 0.142 | 1.139 | 0.183 |
| | Secondary | 1.251 | 0.158 | 1.303 | 0.205 |
| | Higher | 1.465* | 0.169 | 1.688** | 0.226 |
| Occupation | Not working (ref.) | | | | |
| | Working | 0.784* | 0.086 | 0.740* | 0.116 |
| Marital status | Never Married | 0.199*** | 0.211 | 0.264* | 0.568 |
| | Currently Married | 0.824 | 0.115 | 0.935 | 0.160 |
| | Not in Union (ref.) | | | | |
| Wealth status | Poor (ref.) | | | | |
| | Middle | 0.803 | 0.195 | 1.095 | 0.298 |
| | Rich | 0.688 | 0.193 | 0.897 | 0.300 |
| Contraceptive Use | Not Using (ref.) | | | | |
| | Traditional Method | 1.212 | 0.183 | 1.238 | 0.235 |
| | Modern Method | 1.097 | 0.094 | 1.151 | 0.123 |
| Religion | Orthodox (ref.) | | | | |
| | Protestant | 0.971 | 0.147 | 1.154 | 0.192 |
| | Muslim | 0.988 | 0.120 | 1.453* | 0.146 |
| | Others | 1.460 | 0.509 | 1.460 | 0.724 |

Note: The significance level of each modalities are coded as follows: *** $p < 0.001$; ** $p < 0.01$ and * $p < 0.05$. (ref.) is reference category.

In the first birth order model, marital status also has statistically significant influence on the length of birth interval. The result shows that never married women were 80.1% less likely to have first birth as compared to those women who are not in union. The study also reveals that the effect of education, household wealth status, contraceptive use and religion on first birth is not statistically significant (Table 8 column 1). There is also significant effect of migration status on second birth. The result shows that migrant women were 27.9% less likely to have second birth

as compared to those non migrant women (column 3). Women in the 35-39 age groups were also 33.6% less likely to have second birth than those women in the 45-49 age groups.

It was also observed from the model that employed women have 26% less likelihood of having second birth than unemployed women while other demographic factors such as education, household wealth status, contraceptive use and religion do not have statistically significant effect on the probability of having second birth. The first and third columns of Table 9 show that duration of residence in Addis Ababa has statistically significant effect on the likelihood of having first and second births after controlling for the effects of age and other socio-economic variables.

The omnibus test of model coefficients also show that the p value < 0.01 which suggests that all predictor variables entered into the model are meaningful predictors of time to first and second births. According to results given in Table 9 column 1, with the exception of life time migrants, recent, mid-term and long-term migrant women respectively have 61.8%, 38% and 13.7% less likely to have first birth when compared to non-migrant women. The hazard ratios of having first birth for women with 20-24 and 25-29 age groups was 1.954 and 1.730 times that of 45-49 age group women, respectively. The difference, however, was not statistically significant among those women in the 15-19, 30-34, 35-39 and 40-44 age groups (Table 9 column 1). Furthermore, employed women were 21.7 % less likely to have first birth when compared to unemployed women. Women with higher educational status also have 54.2% and 100% more likely to have first and second births than women with no education. This could probably be due to their late entry into marriage due to their longer stay in the school system. Never married women have 81.5% less likely to have first birth than those women who are not in union.

The study also reveals that the effects of household wealth status, contraceptive use and religion on first birth are not statistically significant (Table 9 column 1).

Table 9. The effect of age at migration on first and second birth probabilities when controlling for demographic and socio economic factors.

| Variable | Category | First birth | | Second birth | |
|--------------------------|--------------------|-------------|-------|--------------|-------|
| | | HRR | SE | HRR | SE |
| Migration status | Non migrant (ref.) | | | | |
| | Recent migrant | 0.382*** | 0.255 | 0.041** | 1.026 |
| | Mid-term migrant | 0.620** | 0.148 | 0.338*** | 0.264 |
| | Long term migrant | 0.746* | 0.118 | 0.655* | 0.164 |
| | Life time migrant | 0.863 | 0.105 | 0.972 | 0.129 |
| Age | 15-19 | 0.434 | 0.436 | 3.023 | 0.873 |
| | 20-24 | 1.954** | 0.223 | 3.562** | 0.395 |
| | 25-29 | 1.730** | 0.166 | 1.208 | 0.213 |
| | 30-34 | 1.319 | 0.154 | 1.186 | 0.183 |
| | 35-39 | 0.911 | 0.154 | 0.717 | 0.180 |
| | 40-44 | 1.056 | 0.163 | 0.990 | 0.187 |
| | 45-49 (ref.) | | | | |
| Education | Illiterate(ref.) | | | | |
| | Primary | 1.168 | 0.142 | 1.178 | 0.182 |
| | Secondary | 1.305 | 0.158 | 1.416 | 0.205 |
| | Higher | 1.542* | 0.170 | 2.008** | 0.228 |
| Occupation | Not working (ref.) | | | | |
| | Working | 0.783** | 0.086 | 0.701** | 0.117 |
| Marital status | Never Married | 0.185*** | 0.213 | 0.228* | 0.589 |
| | Currently Married | 0.808 | 0.115 | 0.910 | 0.161 |
| | Not in Union(ref.) | | | | |
| Contraceptive Use | Not Using (ref.) | | | | |
| | Traditional Method | 1.176 | 0.184 | 1.106 | 0.238 |
| | Modern Method | 1.083 | 0.094 | 1.140 | 0.125 |
| Wealth status | Poor (ref.) | | | | |
| | Middle | 0.806 | 0.195 | 1.110 | 0.297 |
| | Rich | 0.703 | 0.193 | 0.922 | 0.298 |
| Religion | Orthodox (ref.) | | | | |
| | Protestant | 0.987 | 0.147 | 1.274 | 0.194 |
| | Muslim | 0.985 | 0.120 | 1.426* | 0.146 |
| | Others | 1.933 | 0.513 | 4.331* | 0.736 |

Note: The significance level of each modalities are coded as follows: *** $p < 0.001$; ** $p < 0.01$ and * $p < 0.05$.
(ref.) is reference category.

Age of woman has significant effect on the likelihood of having second birth. The hazard ratios of having second birth for women of 20-24 age groups was 3.562 times that of 45-49 age group women however, the difference was not statistically significant among the other age groups (column 3). Results of the study also show that recent, midterm, and long term migrant women have 95.9%, 66.2% and 34.5% less likelihood of having second birth when compared to non-migrants. The difference, however, is not statistically significant among life time migrants showing that those who live longer time in the city have similar reproductive behavior as of that of non-migrants.

Similarly the women who employed in different sectors have 29.9% less likelihood of having second birth than unemployed women. Likewise the hazard ratios of having second birth for higher educated women have 2.008 times that of women with no education. The difference, however, was not statistically significant for those having primary and secondary education. Marital status and religion are found to be significant predictors of having second birth while there is no statistically significant evidence for the effects of contraceptive use on the likelihood of having second birth.

4.5 Discussion of Results

This paper intended to investigate the relationship between migration and fertility in Addis Ababa, the capital city of Ethiopia. It uses the 2016 EDHS data to investigate the effect of migration on cumulative fertility and timing of birth. The analysis is done by applying the Poisson regression and event history models using SPSS version 23 software. From the finding of bivariate analysis of mean CEB, there is small difference (below 1) in cumulative fertility between migrants and non-migrants which is 0.98 and 0.80 respectively. Comparison of migrant fertility with that of non-migrant women show statistically significant difference when controlling for age only and it becomes non-significant when controlling for age and other socio economic factors (Table 5 and 6) which indicates lack of the effect of fertility on migration.

The finding from poisson model indicates that migrants have significantly more children than that of non-migrants ($p < 0.01$) in Addis Ababa when controlling only age and this effect disappears when controlling for age and other socio economic factors. Conceptually to have adaptation effect recent migrants have higher fertility than urban natives and long term migrants or post-

migration fertility of long-term rural-urban migrants will be similar to that of urban natives whereas, to disruption, migration may interfere in lowering women fertility temporarily in the process of before or after migration.

The study focuses on identifying the relation between migration and fertility with regard to adaptation and disruption model at destination. From the result of Poisson model (Table 6) by controlling age and other socio economic factors there is no significant relationship between the fertility of recent migrants with that of non-migrants and also between life time migrants with those non migrants which is statistically non-significant ($p>0.05$), while against to the above concept of adaptation. However, the results are not consistent for adaptation mechanisms as influential factors in the impact of migration on fertility because of non-significant differences in mean CEB between non migrant fertility with that of recent and long term migrants. Overall there is non-significant difference in mean CEB of migrants and non-migrants fertility at place of destination (Addis Ababa) unlike to the result of Kinshasa, Democratic republic of Congo (Anglewicz ,Corker and Kayembe; 2014) which is found significant difference outcome mean CEB between migrants and non-migrants of Kinshasa that show significant effect of migration on fertility.

Since recent migrants are new for their destination and do not adjust themselves for the new environment as well as economic opportunities and constraints as the adaptation theory suggests, non-significant relation of recent and life time migrants with that of non-migrants in Addis Ababa may not provide support for the adaptation hypotheses unlike that of (chattopadhyay,white and Debpuurr; 2006). On the other hand the other effect of migration on fertility was timing of first or second birth at the place of destination but having little or no impact on the total number of children. The hypothesis which suggests as migration delay timing of birth was linked to disruption model. From the result (Table 8 and 9) there is statistically significant difference in hazard of first birth and also second birth for migrants and non-migrants. The study also revealed migrants have significantly lower likelihood of having first and second birth than non-migrants. Therefore, from the result there is evidence that support disruption hypotheses for migration effects in timing of birth.

Recent migrants have significantly lower hazard rate of first and second birth than other groups and also long term migrants have significant greater hazard rate for first and second birth than

other groups. Generally, recent migrants have lower likelihood of hazard of first and second birth which indicates the effect of migration on timing of birth. Our analysis, in general, shows that migrants have statistically significant difference from that of non-migrants in the context of Addis Ababa pointing a possibility of disruptive effect due to movement to the city.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

5.1 Summary

This study strives to explore interrelations between migration and fertility in Addis Ababa through retrospective cross sectional survey method using the data 2016 EDHS collected by CSA and ICF targeting on women with 15-49 age group living in Addis Ababa. The relationship was explored through Poisson regression and discrete time event model. The study noticed there is no significant difference between migrants and non-migrants with regard to cumulative fertility. In the univariate analysis there is slight difference in mean CEB of migrants and non-migrants but from multivariate model there was no evidence for significant difference in children ever born of women between migrants and non-migrants and also between migrant's category when controlling age and other socio economic factors. Age of women is one of the most important biological and demographic determinants of fertility. It is true that older women have more number of children as compared to their young counterparts.

Findings of the study point out that in the long run women tend to have significantly higher fertility than their young women. Albeit the pattern of having high fertility at the beginning time of migration was evident, there is no similar fertility pattern at older age of migrants with that of non-migrants. Thus, it does not converge to adaptation effect of migration on fertility regardless of being of their previous region. Results of the study reveal that there is statistically significant difference in the hazards of first and second birth for different status of migrants showing the support for the disruptive hypotheses (hazard of timing of first and second order birth). Considering major theories that support the relationship between migration and fertility, we could not find evidences supporting for the effects of adaptation theory but evidences for the support of disruption on the fertility level of residents in Addis Ababa. That means, the study finds substantial support for disruption hypothesis for the migration effect of fertility in delaying timing of first and second birth in the context of Addis Ababa.

5.2 Conclusion

Using data from EDHS 2016 conducted in Ethiopia this study examines the interrelation between fertility and migration at Addis Ababa. Studies have shown that existed differences between migrant and non-migrant fertility could be due to selection of migrants, adaptation to urban constraints and norms, and disruption of migration. This study strives to examine both adaptation and disruption effect of migration specifically in comparing migrants with that of non-migrants at destination place, Addis Ababa.

Analyses using bivariate and multivariate procedures have produced results that support the following observations and conclusions. From the total sample many of inhabitants of Addis Ababa are migrants. Comparison within migration status groups indicates that migrants and non-migrants mean CEB was below one. Albeit, this difference is too small, migrants mean CEB is higher than non-migrants. For each migrant category (based on duration of residence at the place of destination), recent migrants have a lower mean number of children ever born than long term migrants but higher mean CEB than non-migrants. Here, older migrants have higher mean CEB than recent migrants which is most probably the effect of age.

The finding indicates that migration does not affect significantly fertility in the city whereas, age, marital status and employment status have also significant effect on fertility level in Addis Ababa. What we have learned about the result is that there is no significant difference in fertility between migrants and non-migrants which suggests migration does not influence on fertility in Addis Ababa. However, urban area is associated with lower fertility level. Thus, in this assumption when migrants adapt their urban destination, they converge the fertility pattern of urban non migrants. From multivariate analysis by duration of migrants at place of destination, there is no significant difference in mean CEB between migrant women who lived for short period of time (recent migrants), migrants who lived for longer year (long term migrants), short term migrants, midterm migrants and also non-migrants which is against the resocialization and economic perspective of adaptation theory.

On the other hand, migration may affect fertility of women in delaying birth due to separation of spouses or other factors. From the result of hazard analyses there is significant evidence that indicate first or second birth hazard rate of migrants is lower than those of non-migrant women

that strengthens migration effect in timing of birth mostly first and second birth. The study also finds evidence that shows moving to Addis Ababa delays timing of first or second birth which points disruption fertility differential.

Generally the study strongly suggest that residence in a new area do not play an important role in lowering life time fertility rates of migrant women but temporarily delays the timing of first and second birth which may be due to challenge that face new areas at beginning years. So, in the context of Addis Ababa the relationship between migration and fertility is mainly explained by the disruptive effects than the effects of adaptation.

5.3 Recommendation

The study cannot determine the causal effect of migration and fertility relationship but the result shows fertility of migrants from different areas of Ethiopia to Addis Ababa will likely have no impact on the city's natural growth rate than non-migrants given the indications that there are no significant fertility differences between them. Accordingly, continued migration to Addis Ababa may have greater impact in population size and structure. In addition it may also impact the macro economy of the city. Depending on the result of the research the researcher suggests that focusing on macroeconomic programs other than fertility issues should, therefore, be the focus of the Addis Ababa city Administration to reduce macro-economic problems. Based on result of the study the researcher would like to mention that this study contributes to the literature on migrant fertility in testing the main theoretical perspectives and also in providing empirical evidence that the major hypotheses may predict different fertility outcomes of migrants.

However, the study is not without limitations and these should be kept in mind when these results are interpreted. Lack of information on timing of migration restricts to test selection hypotheses and migrants are treated only at destination place. They are not categorized in to rural-urban or urban-urban to investigate the effect with respect to their previous residence. These issues are not addressed in the study and future research should examine to extend this strand of the research.

REFERENCE

- Allison, P.D. (1982). Discrete Time Methods for the Analysis of Event Histories. *Sociological Methodology*. American Sociological Association, Vol. 13, pp. 61-98.
- Anglewicz, P., Corker, J and kayembe, P. (2017). The fertility of Internal migrants to kinshasa. *Demography*.
- Apuke, O. D. (2017). Quantitative research Methods: A Synopsis Approach. *Arabian Journal of Business and Management Review*. Vol.6, N.10.
- Becker, G. S. (1992). Fertility and The Economy. *Population Economics* .Vol.2.
- Brocherhoff, M., & Eu, H. (1993). Demographic and Socioeconomic Detrminants of Female Rural to Urban Migration in Sub saharan Africa. *The International Migration Review*. Vol. 27.N.3,pp.557-577.
- Brockehoff, M and Yang X.(1994). Impact of migration on fertility in sub-Saharan Africa. *Social Biology*. Vol.41,N(1-2),pp.19-43.
- Brockehoff, M. (1995).Fertility and Family planning in Africa cities:The impact of female migration. *Journal of Biosocial science*. Vol.27, N.3, pp.347-358.
- Brockehoff, M. (1998). Migration and The fertility Transition in African cities, in R.E. Bilsborrow (Ed.). *Migration, Urbanization, and Development; New directions and Issues*,pp.357-390:United Nation population Fund(UNFPA) and Kluwer Academic publisher.
- Bundervoet, T. (2018). *Internal Migration in Ethiopia Evidence from a Quantitative and Qualitative Research Study*. World Bank.
- Chattopadhyay, A., White, M. J., & Debpuur, C. (2006). Migrant Fertility in Ghana:Selection versus Adaptation and Disruption as Causal Mechanism. *Population studies*, Vol.60. N.2, pp.189-203.
- CSA. (2000). *Ethiopian Demographic and Health Survey*. Central Statistics Agency. AddisAbaba. Ethiopia.
- CSA. (2005). *Ethiopian Demographic and Health Survey*. Central Statistics Agency. AddisAbaba. Ethiopia.
- CSA. (2011). *Ethiopian Demographic and Health Survey*. Central Statistics Agency. AddisAbaba. Ethiopia.

- CSA. (2013). *Population Projections for Ethiopia 2007-2037* . Addis Ababa: Central Statistics Agency. Addis ababa.Ethiopia.
- CSA. (2016). *Ethiopia Demographic and health Survey*. Central Statistics. Addis Ababa, Ethiopia.
- Easterlin (1968). An Economic analysis of fertility. In Demographic and Economic change in Developing countries, National Bureau of Economic research.Princeton University Press.Princeton.
- Ezra, M. (2001). Ecological Degradation,rural povertyand Migration in Ethiopia: A contextual Analysis. *Policy Research Division Working Paper*.No.149,Newyork.population Council.
- Ezra, M., & Kiros, G.-E. (2001). Rural Out-migration in the Drought Prone Areas of Ethiopia: A Multilevel Analysis.*International Migration review*.Vol. 35, N.3,pp.749-771.
- Farina, P., Gurmu, E., Hasen, A., & maffioci, D. (2011). Fertility and Family change in Ethiopia.Central Statistical Authority (CSA) Addis Ababa, Ethiopia and Institute for Population Research and National Research Council (Irp-Cnr) Roma, Italy.
- Fransen, S., & Kuschminder, K. (2009). Migration in Ethiopia: History,Current trends and Future prospects. *Paper series*.Vol. 5.
- Jaffe, A. J. (1942) Urbanization and fertility. *The American Journal of Sociology*, 48(1):48–60.
- Garenne, M. (2008). *Fertility Changes in Sub Saharan Africa (DHS Comparative Reports*. Macro International Inc.calverton.No.18.
- Goldstein,S.(1973). Interrelations Between Migration and Fertility in Thailand. *Demography*.Vol.10, N.2, pp.225-258.
- Goldstein, S., & Goldstein, A. (1982). The Impact of Migration on fertility: an Own Children analysis for Thailand. *Population studies*.Vol.35, N.2, pp.265-281.
- Gurmu, E., & Mace, R. (2008). Fertility Transition Driven by Poverty the Case of Addis Ababa (Ethiopia). *Journal of Biosocial Science*.Vol.40, N.3:339-58.
- Gyimah, Stephen O.(2006). Migration and Fertility Behavior in Sub-Saharan Africa : The Case of Ghana. *Journal of Comparative Family Studies*, University of Toronto Press.Vol. 37, No. 2, pp. 235-252 .
- He, C. (2012). *Urbanization and Migration*. Blackwell Publishing.
- Hendershot, G. F. (1971). City ward migration and urban fertility in the Philippines, Paper presented at the 1971 annual meeting of the Population Association of America.

- Hoorens, S., Clift, J., Staetsky, L., Janta, B., et al. (2011). Drivers of fertility: *what the literature tells us*. Rand Corporation.
- Hussen, M., & Imitiyaz, I. (2018). Urbanization concepts, Dimensions and Factors. *International Journal of Recent Scientific Research*. Vol.9, N.1, pp.23513-23523.
- Jensen, E., & Ahlburg, D. A. (2004). Why Does Migration Decrease Fertility? Evidence from the Philippines. *Population Studies*, Vol. 58.
- Keyfitz, N., (1980). Population Appearances and Demographic Reality: Population and Development Review, vol. 6, nr. 1, p. 47-64.
- Kinfu, Y. (1993). *Fertility Trend In Ethiopia: An Application of Own-Children Method*. Accra Ghana: Regional Institute for Population Studies, University of Ghana.
- King, R. (2012). Theories and Typologies of Migration: an overview and a primer. Malmö Institute for studies of migration, Diversity and Welfare (MIM). Malmö University.
- Kloos, H., & Lindtjorn, B. (1994). Malnutrition and Mortality During Recent Famines in Ethiopia: Implications for Food Aid and Rehabilitation.
- Kok, P. (1999). The Definition of migration and Its Application: Making sense of recent south African census and Survey Data . *journal of Demography*.
- Kothari, C. (2004). *Research Methodology: Methods and Techniques*. 2nd edition. New Age International. Jaipur India.
- Kulu, H. (2003). Migration and Fertility: Competing Hypotheses Re examined. *Population*, Vol.21, No.1, pp.51-87.
- Lee, B. S., & Farber, S. C. (1984). Fertility Adaptation by Rural Urban Migrants in Developing Countries: The Case of Korea. *Population Studies*, Vol. 38, pp.141-155.
- Lee, B.S. (1992). The Influence of Urban rural Migration on Migrants Fertility behavior in Camerron. *International Migration review*. Vol.26, N.4, pp.1416-1447.
- Lee, B. S., & Pol, L. G. (1993). The Influence of rural-urban migration on migrants Fertility in Korea, Mexico, and Cameroon. *Population Research and policy review*. V.12, N.1, pp.3-26.
- Lewis, W.A. (1954). Economic Development with Unlimited Supplies of Labour. The Manchester School.
- Liang, Y., L., Yi, Y., & Sun, Q. (2014). The Impact of Migration on Fertility under China's Underlying Restrictions: A Comparative Study Between Permanent and Temporary Migrants. *Social Indicators Research*, Vol. 116. pp.307-326.

- Macisco, J. J., Bouvier, L. F and Weller. R. H. (1970). The effect of labor force participation on the relation between migration status and fertility in San Juan, Puerto Rico. *Milbank Memorial Fund Quarterly*, vol. 48(1): pp. 51–70.
- Majelantle, RG. & Navaneethan, K. (2013). Migration and Fertility:A review of Theories and Evidences. *Journal of Global Economics*.1: 101.
- Manner, C. K. (2003). A Model of Rural Urban Migration and Fertility. *The Journal of Developing Areas*. Vol.37, N.1, pp.55-71.
- Martine, G., Alves, J. E., & Cavenaghi, S. (2013). Urbanization and Fertility decline: Cashing in our structural change. *Working Paper*. published by IIED.
- Mberu, B. (2006). Internal Migration and household living condition in Ethiopia. *Demographic research*.Vol.14.
- McGranahan, G., Satterthwaite, D. (2014). Urbanisation Concepts and Trends. *Working Paper*.
- Mckinney, B.s.(1993). Impact of Rural-Urban Migration on migrant Fertility in Senegal . DHS working paper. Macro International INC.Columbia,Maryland, USA.
- Mittal, R. (2018). Population Policy and Population Education Sociology. *Population Policy and Population Education M.A. Sociology I - Semester 351 13*. Alagappa University ,Directorate of Distance Education.
- Muhidin, S., & Ledent, J. (2005). Migration and Fertility in Burkina Faso: Evidence from the 2000 Survey on Migration(Urbanization and Environment).
- Ozonur, D., TulKubra, A.H. & Bayrak, H. (2017) Comparisons of tests of Distributional Assumption in Poisson regression model. *Communications in Statistics Simulation and Computation*. V.46:8, pp. 6197-6207.
- Ratha, D. (2010). Impact of Migration on Economic and Social Development: Review of Evidence and Emerging Issues. *Kunda Datar Memorial Lecture, 2010*.
- Reniers, J.,(2003). Divorce and Remarriage in rural Malawi. *Demography*.Vol .1, N.6.
- Ribe, H., Schultz, T. (1980). Migrant and Native Fertility in Colombia in 1973: Migrants Selected According to Their Reproductive Preferences?, Center Discussion Paper, No. 355, Yale University, Economic Growth Center, New Haven.
- Rindfuss, R. R. (1976). Fertility and Migration:The case of PuertoRico. *International Migration Review*.Vol.10, N.2, pp.191-203.

- Rokicki, S., Montana, L., & Fink, G. (2014). Impact of Migration on Fertility and Abortion: Evidence From the Household and Welfare Study of Accra. *Demography*.Vol.51,No.6.
- Ronald, S. (2013). *Global Migration: Demographic Aspects and Its Relevance for Development*. Newyork: United Nation Department of Economic and Social Affairs.
- Schjoedt, L and Sangboon, k .(2015):Control Variables:Problematic issues and Best Practices. The Palgrave Handbook of research Design in Business and Management.Newyork.
- Shrestha, S.(2013). Poisson Model for linking Children Ever Born with Some Key Predictor Variables in Nepalese Women: Journal of Institute of Science and technology 18(2).
- Schulz, R. (1976). Effects of control and predictability on the physical and psychological well-being of the institutionalized aged. *Journal of Personality and Social Psychology*, 33(5), 563–573
- Smith, P.C. 1983. The Impact of Age at Marriage and Proportions Marrying on Fertility. In: Bulatao, R.A., and Lee, R.D. (Eds.). *Determinants of Fertility in Developing Countries: Fertility Regulation and Institutional Influences*. New York: Academic Press, p.500.
- Stark, O. and Bloom, D.E.(1985).The New Economics of Labor Migration. *American Economic Review*, 75(2): 173-178.
- Steele, F.(2005). Event History Analysis. ESRC national Centre for Research Methods . NCRM Methods Review Paper NCRM/004.
- Steele, F., and Washbrook, E.(2013). *Discrete-time Event History Analysis; Lectures*. Centre for Multilevel Modelling University of Bristol. National centre for research methods.
- Sturman, M. C. (1999). Multiple approaches to analyzing count data in studies of individual differences: The propensity for type I errors, illustrated with the case of absenteeism prediction. *Educational and Psychological Measurement*.v.59: pp. 414–430.
- Suseł, A. (2005). *An Overview of Contemporary Theories of Fertility*.
- Tacoli, C. (2017). *Migration and inclusive urbanisation* . London: International Institute for Environment and Development .
- Tadesse, F. (2010). *A Socioeconomic Analysis of Fertility determinants in Urban Ethiopia. Working paper*.
- Terfa, K., Chen, B., Liu, N., Zhang, D.,& Niyogi, D. (2019). Urban Expansion in Ethiopia from 1987 to 2017: Characteristics, Spatial Patterns, and Driving Forces .

- Teklu, H., Sebhatu, A., & Gebreselassie, T. (2013). *Components of Fertility Change in Ethiopia: Further Analysis of the 2000, 2005, and 2011 Demographic and Health Surveys*. Calverton, Maryland, USA: ICF International.
- Thompson, W. (1935). *Population Problems*. New York: McGraw-Hill Book Co.
- Todaro, M.P. (1997). *Urbanization, unemployment and migration in Africa: Theory and policy*, Policy Research Division Working Paper no. 104. New York: Population Council.
- United Nation. (2014). *World Fertility Report 2013: Fertility at the Extremes.*: UN Department of Economic and Social Affairs, Newyork.
- United Nation. (2015). *World Fertility patterns 2015*. United Nations, Department of Economic and Social Affairs Population Division.
- United Nation.(2016). *The Demographic Profile of African Countries*. United nation Economic Commission for Africa
- United Nation. (2018). *Sustainable cities, human mobility and international migration* . United nation:Economic and Social Council:Report of the Secretary-General.
- United Nation. (2018). *World Urbanization Prospects. The 2018 Revision*. Department of Economic and Social Affairs Population Division. ST/ESA/SER.A/420
- UN Habitat. (2017). *The Addis Ababa We Want*. Addis Ababa: United Nations Human Settlements Programme (UN-Habitat).
- United Nation. (2019). *World Population Prospects 2019*. New york: Department of Economic and Social Affairs Population Division.
- United Nation Population Division. (2010). *World Urbanization Prospects: The 2000 Revision*. Nwyork: United Nations Department of Economic and Social Affairs, Population Division.
- Wester, J. C. (2017). *Root cauese of Migration*.
- White et al., (2008). *Urbanization and fertility: An event History Analysis of Coastal Ghana*. Demography. Vol.45, N.4, pp.803-816.
- World Health Organization. (2019). *THE Demography of Fertility and Infertility*. Retrieved November 30, 2019, from Geneva Foundation for Medical Education and Research.
- World Bank. (2009). *Urbanization and Growth*. Washington: World Bank, The International Bank for Reconstruction and Development.

- World Bank. (2010). The Ethiopian Urban Migration Study 2008: The Characteristics, Motives and Outcomes of Migrants to Addis Ababa. *Poverty Reduction and Economic Management*.
- World Bank. (2015). *Enhancing Urban Resilience*. Addis Ababa Ethiopia: World Bank.
- World Bank. (2016). *Priorities for Ending Extreme poverty and Promoting Shared Prosperity Systematic Country Diagnostic: Federal Democratic Republic of Ethiopia*. World Bank Group.
- World Economic forum. (2017). *Migration and its impact on cities*. Geneva Switzerland.
- Yao, Y.(2018). Several Methods to assess proportional hazard assumption when applying COX regression model. B oehringer Ingelheim Inc. Shanghai, China. SP-75.
- Xiana, B. (2011). Age at Migration and Fertility Patterns in Spain: Differences by Origin and Length of Stay. Draft Version 23.
- Zarate,A and Zarate A.U.de. (1975). On the Reconciliation of research finding of migrant nonmigrant fertility Defferentials in Urban Areas. *International Migration Review*.Vol.9, N.2, pp.115-156.
- Zhang,H.(2015). Checking proportionality for Cox's regression model: Thesis for the degree of Master of Science (Master i Modelling og dataanalyse). Department of Mathematics Faculty of Mathematics and Natural Sciences University of Oslo.

APPENDIX 1

Goodness of fit test for Poisson regression model

a. Poisson regression by migration status

Goodness of Fit

| | Value | df | Value/ df |
|--------------------------------------|-----------|------|--------------|
| Deviance | 1754.845 | 1808 | .971 |
| Scaled Deviance | 1754.845 | 1808 | |
| Pearson Chi-Square | 2334.024 | 1808 | 1.291 |
| Scaled Pearson Chi-Square | 2334.024 | 1808 | |
| Log Likelihood ^b | -1848.341 | | |
| Akaike's Information Criterion (AIC) | 3712.683 | | |
| Finite Sample Corrected AIC (AICC) | 3712.763 | | |
| Bayesian Information Criterion (BIC) | 3756.718 | | |
| Consistent AIC (CAIC) | 3764.718 | | |

Dependent Variable: Total children ever born

Model: (Intercept), Migration status

b. Poisson regression by duration at destination(age at Migration)

Goodness of Fit^a

| | Value | df | Value/df |
|--------------------------------------|-----------|------|----------|
| Deviance | 1737.145 | 1805 | .962 |
| Scaled Deviance | 1737.145 | 1805 | |
| Pearson Chi-Square | 2270.629 | 1805 | 1.258 |
| Scaled Pearson Chi-Square | 2270.629 | 1805 | |
| Log Likelihood ^b | -1839.491 | | |
| Akaike's Information Criterion (AIC) | 3700.982 | | |
| Finite Sample Corrected AIC (AICC) | 3701.128 | | |
| Bayesian Information Criterion (BIC) | 3761.530 | | |
| Consistent AIC (CAIC) | 3772.530 | | |

Dependent Variable: Total children ever born

Model: (Intercept), Age at migration (Recent migrant, Midterm migrant long term migrant and Life time migrant)

APPENDIX 2

AIC and BIC comparison of Poisson and Negative binomial Distribution

a. Poisson Distribution

Goodness of Fit

| | Value | df | Value/df |
|--------------------------------------|-----------|------|----------|
| Deviance | 1754.845 | 1808 | .971 |
| Scaled Deviance | 1754.845 | 1808 | |
| Pearson Chi-Square | 2334.024 | 1808 | 1.291 |
| Scaled Pearson Chi-Square | 2334.024 | 1808 | |
| Log Likelihood ^b | -1848.341 | | |
| Akaike's Information Criterion (AIC) | 3712.683 | | |
| Finite Sample Corrected AIC (AICC) | 3712.763 | | |
| Bayesian Information Criterion (BIC) | 3756.718 | | |
| Consistent AIC (CAIC) | 3764.718 | | |

Dependent Variable: Total children ever born

Model: (Intercept), Migration status, age

b. Negative Binomial Distribution

Goodness of Fit^a

| | Value | df | Value/df |
|--------------------------------------|-----------|------|----------|
| Deviance | 993.395 | 1808 | .549 |
| Scaled Deviance | 993.395 | 1808 | |
| Pearson Chi-Square | 1539.973 | 1808 | .852 |
| Scaled Pearson Chi-Square | 1539.973 | 1808 | |
| Log Likelihood ^b | -1918.889 | | |
| Akaike's Information Criterion (AIC) | 3853.778 | | |
| Finite Sample Corrected AIC (AICC) | 3853.858 | | |
| Bayesian Information Criterion (BIC) | 3897.813 | | |
| Consistent AIC (CAIC) | 3905.813 | | |

Dependent Variable: Total children ever born

Model: (Intercept), Migration status, age*/