DEVELOPMENT AND VALIDATION OF HUMAN POPULATION GROWTH SCALE IN THE CONTEXT OF SUSTAINABILITY

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ABSTRACT

DEVELOPMENT AND VALIDATION OF HUMAN POPULATION GROWTH SCALE IN THE CONTEXT OF SUSTAINABILITY

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The aim of this study is (1) to construct valid and reliable scales to identify beliefs towards the effects of human population growth (HPG), (2) to explore the HPG beliefs of pre-service teachers' at Middle East Teachnical University (METU). HPG is one of the essential elements of education for sustainable development (ESD) and pre-service teachers were included in this study since they are future teachers to implement ESD programs.

The data were collected in the fall term of 2013-2014 academic year from 658 pre-service teachers from Faculty of Education at METU pursuing different undergraduate program. Human Population Growth Belief Scale (BHPG) was constructed as a measuring tool and implemented in classroom environment settings.

The results of Exploratory and Confirmatory Factor Analyses revealed that BHPG scale is valid and reliable scale for determining pre-service teachers' beliefs towards

the effects of HPG. The results proposed six dimensions named as *Requirements to Support HPG*, *Neo-Malthusian Environmentalism*, *Population and National Economy*, *Quality of Human Life*, *Population, Resources, and Environment*, and *Population and Migration*. Moreover, descriptive analysis results indicated that pre-service teacher did not have complex and consistent belief systems towards the effects of HPG concept.

Keywords: Human Population Growth, Carrying Capacity, Teacher Education, Belief, Sustainable Development

ÖZ

SÜRDÜRÜLEBİLİRLİK ÇERÇEVESİNDE İNSAN NÜFUS ARTIŞI ÖLÇEĞİNİN GELİŞTİRİLMESİ VE GEÇERLİĞİ

Demirci, Sinem

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Bu çalışmanın amacı iki basamaktan oluşmaktadır: (1) Öğretmen adaylarının nüfus artışı ve etkileri üzerine inançlarını belirlemek için geçerli ve güvenilir bir ölçek oluşturmak; (2) Orta Doğu Teknik Üniversitesi (ODTÜ) Eğitim Fakültesi'nde öğrenim gören öğretmen adaylarının nüfus artışı ve etkilerine yönelik inançlarını belirlemektir. Sürdülebilir Kalkınma için Eğitim kapsamında insan nüfusunun artışı ve etkileri önemli bir yer tutmaktadır. Öğretmen adayları, bu programın gelecekteki uygulacısı oldukları için çalışmanın katılımcıları olarak belirlenmişlerdir.

Bu çalışmanın verileri 2013-2014 eğitim öğretim yılı sonbahar döneminde ODTÜ Eğitim Fakültesi'nde farklı lisans programlarına devam eden 658 öğretmen adayına, sınıf ortamında İnsan Nüfus Artışı Hakkındaki İnançlar Ölçeği uygulanarak toplanmıştır.

Açımlayıcı ve Doğrulayıcı Faktör Analizi sonuçları, ölçeğin öğretmen adaylarının nüfus artışı ile ilgili inançlarını ölçmek için geçerli ve güvenilir olduğunu göstermiştir. Faktör analizi sonuçlarında *Nüfus Artışını Desteklemek için Gereksinimler*, *Neo-Mathusçu Çevrecilik, Nüfus ve Milli Ekonomi, İnsan Yaşam Kalitesi, Nüfus, Kaynaklar ve Çevre ve Nüfus ve Göç* şeklinde altı faktör ortaya çıkmıştır. Ayrıca, betimsel istatistik sonuçlarına göre ODTÜ'deki öğretmen adaylarının nüfus artışı ve etkileri üzerine karmaşık ve tutarlı bir inanç sistemine sahip olmadıkları tespit edilmiştir.

Anahtar Sözcükler: İnsan Nüfus Artışı, Taşıma Kapasitesi, Öğretmen Eğitimi, İnanç, Sürdürülebilir Kalkınma

To my grandmother,

İnci

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BHPG	Beliefs on Human Population Growth
CEIT	Computer Education and Instructional Technologies
CFA	Confirmatory Factor Analysis
CHED	Chemisty Education
EFA	Exploratory Factor Analysis
EME	Elementary Mathematics Education
ESD	Education for Sustainable Development
ESE	Elementary Science Education
ECE	Early Childhood Education
FLE	Foreign Language Education
HPG	Human Population Growth
METU	Middle East Technical University
MoNE	Ministry of National Education
NDP	National Development Program
PCA	Principle Component Analysis
PHED	Physics Education
SD	Sustainable Development
SSME	Secondary Science and Mathematics Education
UNFPA	United Nations Population Fund

CHAPTER 1

INTRODUCTION

All the people around the world desire to meet their basic needs for survival such as healthy nutrition, fresh water, living in a shelter and clothes; however, when the world's current situation is examined, people come across with some challenges, especially in some societies that have a rapid population growth (Raven & Berg, 2006). Nevertheless, no consensus is reached on the interactions between human population growth (HPG), environment, economic systems and quality of human life. Many authorities (Ehrlich & Ehrlich, 1972; Hardin & Baden 1977; Wilson, 2002) in different academic disciplines have arguments on the possible long term effects of HPG and propose various solutions to minimize these effects.

The growing concern about HPG is based on the trend of population growth throughout the history. When the first human being appeared (8000 B.C.), the number of individuals was approximately 5 million (Ehrlich and Ehrlich, 1977). Although it took thousands of years to reach 1 billion inhabitants in nineteenth century, today nearly 7.2 billion individuals live on the earth (United Nations, 1999; United Nations, 2013). Furthermore, despite of the decreasing HPG rate in the 21st century, in 2050, it is predicted that nearly 9 billion people will be on the planet (United Nations, 2004).

This population growth trend leads to an idea that the number of people could not increase forever (Withgott & Brennon, 2011). However, in order to grasp the complex nature of these emerging debates, it is also necessary to consider the context of carrying capacity. *Carrying capacity* (CC) indicates the maximum number of individuals, who can live in an area within natural resource capacities and who do not lead to deterioration the natural, social, cultural and economic environment for present and future generations (Daily & Ehrlich, 1992). Estimating CC of an area is hard to accomplish since it can be affected by different variables such as

technological improvement, economic systems, amount of natural resources, cultural differences, and consumption patterns of individuals, etc. Consequently, no consensus is reached for the Earth's CC varying from 1 billion to 33 billion (Withgott & Brennon, 2011). Nonetheless, today's scientific data revealed that people consume more than they need and also more than renewal capacity of Earth (Raven &Berg, 2006). That is to say, CC of Earth decreased due to consumption patterns o individuals.

Arguments about the HPG and carrying capacity have become one of the most controversial issues in the world and in Turkey. Many books and articles have been published, and many scientific meetings have been arranged associated with the effects of HPG since 80's (Johnson & Nurick, 1995), yet people have not reached any agreement. According to some scientists, overpopulation leads to some environmental problems (Raven & Berg, 2006). United Nations Population Fund (1995) declared that atmospheric pollution, water pollution, soil pollution, desertification, global warming, deforestation and poverty could be provided as some examples for these problems. Economists, on the other hand, do not compromise on the interaction between HPG and economic development (Kelley, 1988). For example, Boserup (1965) and Clark (1967) declared that HPG is necessary and could be regarded as a prerequisite for economic development, whereas some other economists claimed that HPG hinders economic development (Weeks, 2012). Besides this disagreement, some other economists like Simon (1992) affirm that the marketplace is more essential than HPG; hence; it is non-sense to discuss the relationship between HPG and economic development. Different from scientists and economists, some authors (Raven & Berg, 2006; Sagoff, 1993) allege that consumption patterns of developed countries have much more negative effects on the environment than HPG itself. Furthermore, Sagoff (1993) pointed out that despite the stable population trends; developed countries contribute to damaging the environment and natural resources more than developing countries with increasing population growth.

Many countries on the world have being facing higher rates of HPG which may be already beyond the limits of carrying capacity of lands (Coffin, 1993). Hence, in order to maintain the HPG within the carrying capacity, sustainable development can be considered as essential context (Daily & Ehrlich, 1992). Sustainable Development (SD) is defined as *"ensure that needs of the present generation and the human activities arising from these needs do not compromise the ability of future generations to meet their own needs"* (Mackenzie, 2010, p.518). As far as the definition is considered, HPG and carrying capacity can be regarded as a substantial element for SD since HPG affects the human welfare and maintenance the renewal capacity of earth (Engelman, 1997). Moreover, increasing awareness of individuals for this issue can be considered as an essential step to achieve SD goals (Global Science Panel on Population in Sustainable Development, 2002).

UNESCO (1982) declared that education has an important role to increase individuals' awareness about national population goals. Likewise, in Agenda 21, action plan of United Nations Conference in 1992, it was highlighted that education is essential part to make generations be able to meet the solutions for the problems of present and future people to explore new directions to a better future. Therefore, during 21st century, promoting education and public awareness are being emphasized in the sustainability programs. Following the outcomes of Agenda 21, population growth was included in the SD program in International Conference on Population and Development in 1994. The outcome of the conference emphasized that sustained economic growth regarding SD context help the countries handled with adverse consequences of HPG and provide balance between HPG and development policies.

Population concepts in Education for Sustainable Development (ESD) are being considered as an important concept for achieving sustainability goals and are included in many countries' curricula especially those who have high population growth rate (Mfono, 1993). Furthermore, some of the most populated countries have specifically population education in schools. Even though Turkey is one of the 20 most populated countries in the world (United Nations Population Fund [UNFPA], 2013), there is no related population education program offered yet.

Mckeown (2002) highlighted that in order to revise education programs by means of sustainability, contribution of teachers to sustainability needed to be explored. As ESD is a newly-introduced concept in national science curriculum in Turkey by Ministry of National Education (MoNE, 2013), pre-service teachers becomes substantial because teachers' ideas and conceptions affect their teaching style in the classroom (Nespor, 1987). However, in the accessible literature, there are still limited studies related to the teacher education for ESD (Boon, 2011; Yang, Lam & Wong, 2011).

The main focus of the current study is determined as beliefs of pre-service teachers since their beliefs have essential effect on their classroom implementation (Pajares, 1992; Richardson, 1996). The way they believe in something influences their teaching styles and classroom behaviors (Bloom & Ellis, 2009). Moreover, beliefs usually shape attitudes and behaviors of individuals, and are related to family and cultural background, experiences, education, and social factors (Bloom, & Ellis, 2009). Even though the research studies on pre-service teachers' beliefs have been extensively explored (Bryan, 2002), there are limited studies pertinent to the pre-service teachers' beliefs in the context of ESD. On the other hand, there is no study specifically focusing on pre-service teachers' beliefs toward HPG in the accessible literature. However, because of pre-service teachers' beliefs about population growth are also needed to identify for ESD since environmental attitudes and behaviors are coming from the beliefs and background knowledge of people (Hines, Hungerford, & Tomera, 1986). In line with this perspective, due to not existing belief scale on the effects of HPG in the literature, the aim of the study is to construct a valid and reliable belief scale on HPG and identify pre-service teachers' beliefs towards this issue. Determining pre-service teachers' beliefs may elucidate their instructional behavior in the classroom and contribute to embedding HPG and carrying capacity concept in ESD courses.

1.1. Purpose of the study

In the light of the literature review, the present study aims to (1) to construct and test a scale about pre-service teachers' beliefs on human population growth (BHPG) (2) identify pre-service teachers' beliefs toward HPG.

1.2. Research Questions

Research Question 1: What are the dimensions of BHPG Scale?

1. a) How do experts classify the dimensions of the BHPG scale?

1. b) Is there any congruence between the results of expert opinion and pilot study with respect to dimensions of BHPG scale?

1. c) Is there any congruence between the results of pilot study and main study with respect to dimensions of BHPG scale?

Research Question 2: What are the pre-service teachers' beliefs towards HPG?

1.3. Definition of key terms

Human Population Growth (HPG): Human Population Growth (HPG) is defined as the trends of increasing human population in the current study. (Raven & Berg, 2006).

Carrying capacity: Maximum number of individuals, who can live in an area within natural resource capacities and who do not lead to deterioration the natural, social, cultural and economic environment for present and future generations (Hardin & Baden, 1977).

Human Population Growth Rate: Population growth rate is the increase in a country's population during a period of time, usually one year, expressed as a percentage of the population at the start of that period. It reflects the number of births

and deaths during the period and the number of people migrating to and from a Country (Turkish Statistical Institute, 2010).

*Neo-Malthusian Environmentalism: "…*We use the term neo-Malthusianism when ultimate bio-physical limits, often global, are being invoked to strengthen claims that population growth presents a serious problem, one that should be kept at the centre of our attention. Degradation of environment and exhaustion of resources is directly related to such population growth..." (Taylor & Barrios, 1999, p. 140)

Descriptive Beliefs: In the current study, descriptive beliefs refer to the beliefs shaped by direct experiences of individuals (Fishbein & Ajzen, 1976).

Inferential Belief: This term refers to the beliefs that are derived from *descriptive beliefs* (Fishbein & Ajzen, 1976).

Informational belief: Informational beliefs in the current study refer to the beliefs formed from an outside source such as TV, papers, journals, books, magazines, lecturers, friends or coworkers etc. (Fishbein & Ajzen, 1976).

Pre-service Teacher: Pre-service in this study refers to students enrolling in an undergraduate program at Faculty of Education at Middle East Technical University.

Sustainable development (SD): **"…**ensure that needs of the present generation and the human activities arising from these needs do not compromise the ability of future generations to meet their own needs." (Mackenzie, 2010, p.518)

1.4.Significance of the Study

Recent arguments indicate that HPG is one of the essential elements of sustainability (Global Science Panel on Population in Sustainable Development, 2002). Some of the most populated countries have already started to have specific educational programs in the context of human population growth and carrying capacity (Mfono, 1993). Although Turkey is one of the 20 most populated countries in the world (UNFPA, 2013), ESD is a newly-introduced concept in elementary science

curriculum (Ministry of National Education [MoNE], 2013), yet the context of HPG and carrying capacity are not being emphasized. On the other hand, ESD courses are being offered in education faculties' programs in universities as an elective course. However, research studies about sustainability and HPG are very limited in the accessible literature in Turkey. Therefore, this study may be regarded as an initial point for future studies or also some projects related to population education in the context of ESD in Turkey. Moreover, it can contribute to reaching SD goals because many programs including environmental and population problem need for sustainable environment. Besides, newly-developed HPG scale may contribute to ESD courses by determining pre-service teachers' beliefs using the BHPG scale and may help embedding HPG and carrying capacity concept in ESD courses in a way that pre-service teachers acquire knowledge about the complex nature of HPG and its interconnectedness with environment, economy, and society.

In the accessible literature, there are some detached studies (Alkın, 2000; Hirschman, 1958; Keleş, 1972) linked to the effects HPG on the economy, environment and society. However, these interactions demand more studies to understand these interrelationships clearly because there is no consensus for the interactions between HPG and environment, economy and society. In addition, these studies do not emphasize the role of teacher on such a current issue, but focus on some other topics such as economical and societal issues. Therefore, this study may connect these studies mentioned in the literature with the education aspect and may facilitate solving these problems rooted from HPG.

Determining pre-service teachers' beliefs may highlight to decide how to shape students' beliefs about this issue correspondingly. These beliefs are also crucial in helping teachers discover and understand themselves as well as their world (Taylor, 2003; Taylor &Caldarelli, 2004). In the accessible literature, there are limited studies related to the teacher education for education for sustainability (ESD) (Yang, Lam & Wong, 2011). Moreover, no related studies with beliefs towards HPG are found in the accessible literature. Therefore, this study may contribute to literature in the

context of pre-service teacher training and also evaluate their beliefs towards population growth with the education aspect.

In addition, this study may also provide educators, policy-makers, and environmentalists some detailed information about different beliefs in HPG and the factors shaping these beliefs. In the long term, it would guide teacher educators to develop a teaching method or a strategy in order to teach next generations about population growth and its effects on human life and environment properly.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study is to construct a belief scale about the effects of HPG, and to describe pre-service teachers' beliefs toward this issue. This chapter of the thesis is composed of a summary of the related literature within the theoretical framework of the study. Accordingly, the chapter is comprised of 4 sections. The first section is about the literature on as the history of HPG, including current debates linked to interactions between HPG and the environment, economy, development, natural resources, and urbanization; and international perspective on the population policies. It is attempted to summarize the related literature on present state of HPG in Turkey and national policies regarding population growth in the 2nd section. Third section is related to the literature on interrelationship between HPG, education for sustainable development, and population education. The research on the belief theories, belief scale construction and importance of pre-service teachers' beliefs on ESD are presented in the last section.

2.1 Human Population Growth

2.1.1 History of Human Population Growth

The first "human" inhabited at least 200,000 years (Cann & Wilson, 2003), perhaps much longer- because first "man" lived between one and two million years ago (Ehrlich & Ehrlich, 1972). If the time interval that we live explore closely, human population growth can be examined in the context of some transition periods such as agricultural revolution, preindustrial period, and industrialization which have some significant influences on number of people. Figure 2.1 displayed world population growth through history.
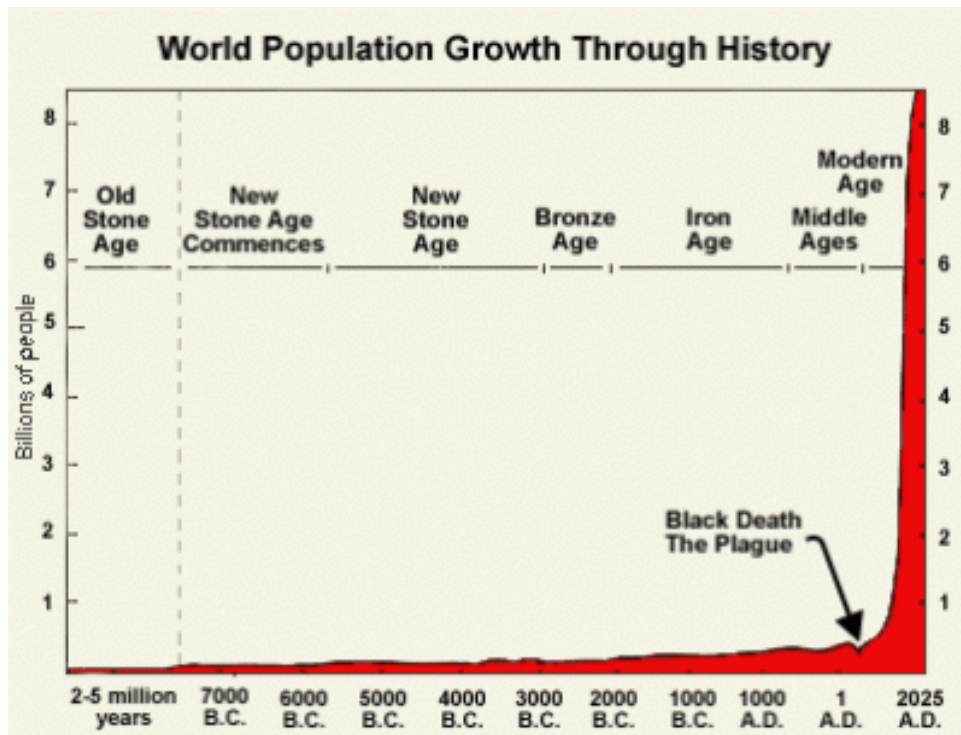
Figure 2.1 History of World Population Growth

As presented in Figure 2.1, before the period of agricultural evolution when human beings provided their own food by hunting and gathering, the number of individuals was estimated at 5 million (Weeks, 2012). Between the years 7000 and 5500 B.C, certain groups of people left their life style, started to produce their own food and adopted some animals for benefit (Ehrlich, Ehrlich & Holdren, 1977; Solheim, 1972). This change, as a result, triggered Agricultural Revolution (Weeks, 2012) and the increase of human population rate correspondingly (Ehrlich et al., 1977). Despite of weather conditions, pestilence, famine and war between civilizations in those times (Ehrlich et al., 1977), that world population reached nearly approximately 500 million (Weeks, 2012).

In the pre-industrialization period following agricultural revolution, farming techniques improved like methods of cultivation and animal breeding (Ehrlich et al., 1977). On the other hand, people have met hygienic conditions like soap, clothing and sanitation which lead to reduction of infectious diseases (Razzell, 1974). As a

result of these changes between 1750 and 1850, acceleration of population growth has continued (Ehrlich, et al., 1977)

In the late industrialization period, birth rates and death rates started to decrease in most of the developed countries (Waldron & Ricklefs, 1973). Machines overwhelmed the farms since this change required fewer men than before. In addition to these, laws also prevented people to employ child worker. As a result, children became economic burdens, and the idea "family size" appeared. Likewise, increasing education level, employment of women and development of the transportation system also caused decrease in birth rates (Ehrlich et al., 1977). Despite of all changes, the world population has increased from 1 billion to 2.5 billion in this late industrialization period (Raven & Berg, 2006).

In the last century, HPG accelerated substantially (Weeks, 2012). Despite of decreasing HPG rate, it took 30 years to become 3 billion from 2 (Withgott & Brennon, 2011). It did not last so long to reach 4 billion, only 14 years. It continued very rapidly, and human population reached 6 billion in 1999 (Withgott & Brennan, 2006). According to Population Reference Bureau Population Datasheet 2011, today approximately 7 billion people inhabit on the Earth. Based on projections, more than 10 billion people will be expected to live on the planet in 2050 (Mackenzie, 2010). It can be easily noticed from population statistical information that the number of people reached one billion from the appearance of first "man" to 1800's and accelerated 7 billion in 2011, approximately 300 years.

2.1.2. Carrying Capacity and Overpopulation Issue

In order to understand the complex nature of HPG, the context of carrying capacity should be considered firstly. Carrying capacity means the maximum number of individuals, who can live in an area sustainably within the capacity of natural resource capacity of that area (Withgott & Brennan, 2006). Carrying capacity for any given area is not stable. It can be varied by population density and its relation to available resources; size and location of the area (Ehrlich & Ehrlich, 1972); life style,

consuming habits of people (Raven & Berg, 2006) and also technological improvements (Hardin & Baden, 1977).

When the scenarios about Earth's Carrying Capacity to support humans are examined, it can be seen that there is no consensus. It varies from 1 billion to 33 billion (Withgott & Brennon, 2011). However, when today's situation is considered, people consume, by 2006, more than needed and more than what world can renew itself (Raven & Berg, 2006). On the other hand, Raven and Berg (2006) highlighted that we do not have an idea about future technologies and its effects on carrying capacity of the Earth. In the past, when Carrying Capacity was exceeded, with the help of the technologies, human beings increased Carrying Capacity of Earth like improving agriculture (Boserup, 1965) or industry (Harrison, 1993). Nevertheless, the number of people will not expand forever (Withgott & Brennon, 2011) because the number of human population continue increasing and economy keep growing exponentially, while natural resources do not (Postel, 1994). To sum up, if the level of demand on natural resources leads to exceeding carrying capacity (Raven & Berg, 2006), *overpopulation* may arise. Accordingly, *overpopulation* is defined as (Raven & Berg,2006):

> A country is overpopulated if the level of demand on its resource base results in damage to the environment. In comparing human impact on the environment in developing and highly developed countries, we see that a country can be overpopulated in two ways. People Overpopulation occurs when the environment is worsening because there are too many people, even if those people consume few resources per person. Consumption Overpopulation, on the other hand, results from the consumption-oriented lifestyles in highly developed countries (p.7).

2.1.3. Discussions on the Effects of Population Growth

Regarding the dramatic increase in number of people and the context of carrying capacity, there are various discussions in the population literature. In the early stages of these arguments, Malthus (1826) proposed that human population grows exponentially while food increases arithmetically. This disequilibrium leads to

deficiency of food supplies if HPG continue with this trend. Malthus proposed in his writings that HPG leads to poverty in the long term. This idea is known as Malthusian perspective (Weeks, 2012). Malthusian perspective has been criticizing in many books and articles since then (Engels, 1844; Karavelioğlu, 2003; Ross, 1998). Especially three points (Weeks, 2012) were emphasized (1) food production is not enough for growing human population, (2) poverty is indispensable consequence of HPG, and (3) moral restraint is the only solution for preventive check. Apart from these critiques, Malthus's other conclusions were accepted by some others, known as neo-Malthusians (Karavelioğlu, 2003). Karavelioğlu described neo-Malthusian perspective as believing that HPG is harmful in the long run, and it can be prevented by contraceptive techniques and family planning. Paul Ehrlich, one of the famous neo-Malthusian claimed that HPG is the prominent reason for environmental degradation (Sagoff, 1993). On the other hand, there are also opponents of Malthusian perspective (Engels, 1844: Marx 1890). Karl Marx and Friedrich Engels strongly argued about ideas of Malthus and their perspective known as Marxian perspective (Weeks, 2012) in the literature. This perspective pointed out that each community has a different nature of population growth; therefore, the results of HPG will differ due to this nature. Engels (1865) claimed that poorly organized society leads to poverty, not HPG itself. In addition to this explanation, Marx exemplified that for a capitalist community, HPG brings about poverty and overpopulation, while socialist community's economy does not (1890). They also believed that improvements in science and technology will find a solution for the issue of HPG and food production (Karavelioğlu, 2003).

Based on the above-mentioned discussions, in the literature, there are different types of outlooks on the effects of HPG. The following arguments are presented to cover these points of views.

There are several biologists (Ehrlich, 1968; Hardin, 1977; Wilson, 2002) who agree with the idea that HPG brings some environmental problems (Raven & Berg, 2006). In a similar context, United Nations Population Fund (UNPFA, 1995) declared that atmospheric pollution, water pollution, soil pollution, desertification, greenhouse

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effect and deforestation are some of the examples of the adverse consequences of HPG. In addition to these, Ehrlich et. al. (1977) alleged that HPG is one of the essential factors that affect demand for natural resources, and this leads to degradation of the environment. He also added that if HPG continues with the current circumstances, environment and ecological balance continue to disturbed, and as a result, cannot support the life. Similarly, Önen (2002) reported that environmental pollution, deforestation, desertification are increasing with HPG and these have impacts on natural life and also human health correspondingly.

Economists, on the other hand, did not also reach consensus on the relationship between HPG and economic development (Kelley, 1988). There are some ideas mentioning that population growth is a solution for both economic development and employment (Alkın, 2000). For instance, Boserup (1965) and Clark (1967) claimed that HPG stimulates the economic development. They highlighted that Industrial Revolution and enhancing the production of agriculture are those times which HPG is accelerating. Similarly, Hirschman (1958) believe that if people find a way to increase production, HPG would not cause decrease in quality of human life. Moreover, some other point of view economists hold is that, population growth will lead to technological improvement and they will solve the effects of HPG on the environment in the long term (Nurick &Johnson, 1995). Contrary to these, another point of view is that, rapid population growth prevents economic development (Weeks, 2012). Weeks emphasized that, for an economy, a person means some expenses like clothing, feeding, sheltering and other goods and services. If it becomes the same or larger than national income, it will damage to economy. On the other hand, some other economists like Simon (1992) believe that the marketplace is more essential than HPG.

There are also researchers (Raven & Berg, 2006; Sagoff, 1993) who believe that consumption of over-developed countries has much more effects on the environment than HPG itself. Raven and Berg pointed out that, highly developed countries consist of 20 % of the world, but; they utilize significantly more than half its resources. Similarly, according to the UNFPA Report in 1991, 25% of the people use 75%

world energy use, 85% of the forest product consumptions and 72% of steel production. Sagoff (1993) pointed out that, despite their stable HPG, developed countries have much more harmful effects on the environment and natural resources than the increasing population growth of developing countries.

Urbanization, related with the consumption overpopulation is different concepts among arguments of HPG. Ehrlich and Ehrlich (1972) stated that urbanization accelerated in the last centuries and continues today, as well. Moreover, many people in underdeveloped countries migrate from their rural area to urban. As a result of migration and urbanization, overpopulation and also some environmental problems appear at the same time especially cities in developing countries (Ehrlich & Ehrlich, 1972). Today, 48% of the world population lives in cities who have 2000 or higher number of people living on them (Raven & Berg, 2006).

What can be inferred from the above summarized discussion on the effects of HPG is that no settlement is reached for the effects of HPG on environment, economy, and society. There are various perspectives on the reasons and solutions for exceeding carrying capacity. Nevertheless, there is a common point in all views and ideas that promotes further studies to understand the interrelatedness between man and environment.

2.2. Global Perspectives in Human Population Growth

The concern of growing population is not a new issue. In order to conceptualize the present global notion on HPG, international conferences in historical order and their outcomes are summarized in this part.

United Nations (UN) World Population Conference was firstly held in Rome in 1954 to revise scientific information on HPG, their determining factors and their impacts. The outcome of this conference presented that further information will be aggregated from developing countries and regional training centre will be constituted to deal with population issues.

Eleven years after, the Second World Population Conference was held in Belgrade in 1965 by the International Union for the Scientific Study of Population (IUSSP) and the UN. Experts in the field were the majority of the conference. The core element of the conference is fertility for development planning policy.

Another important conference was the Third UN World Population Conference held in Bucharest, Romania, in August 1974. The attribution of the conference is that it was the first intergovernmental population conference. 135 delegates discussed on the relationship between population issues and development. World Population Plan of Action was declared that;

- The indispensable aim is the development of countries in terms of social, cultural and economic
- Development and population are interrelated with each other
- Population goals and policies are fundamental components of socio-economic development policies.

Following up to these meetings, the next population conference was organized by UN in Mexico City in 1984. World Population Plan of Action was analysed and latest findings from governments were argued in details. The outcome of this conference emphasized mainly the interrelationships between population growth and human rights, health and well-being, education and employment.

One decade after, UN organized the Fifth International Conference on Population and Development held in Cairo, in 1994. In this conference, more than 180 governments were attended to share their local and global attribution to Programme of Action related to HPG and development for the following 20 years. This action programme focus on the association between HPG and development by means of providing basic needs of people considering human rights. Furthermore, this plan determined to infuse HPG into socio-economic issues to provide a better life for both present and future generation.

Five years after Cairo, the United Nation Special Session met in New York in 1999 for analysing and evaluating the Programme of Action. The outcome of the session stated that public education will be promoted in the context of sustainability, consuming habits, utilization of natural resources, and protection of environment. Moreover, HPG and health issues will be also added to formal and informal education.

2.3.   Population Indicators and Population Policies of Turkey

Turkey as a developing country has been challenging some consequences of HPG and their pressures on carrying capacity (Karavelioğlu, 2003). In this section, the current situation of population growth in Turkey will be presented based on National Development Plans and National Environmental Action Plan.

2.3.1.   Demographic Data (1927-2013)

The number of population and its statistical indicators has been measured by Turkish Statistical Institute in Turkey. In 1927, when the first population census was conducted, the number of people was approximately 13.65 million (TUIK, 2011). However, today's data (TUIK, 2013) reveal that the number of people reaches roughly 75 million. According to the projections in the Population Reference Bureau Population Datasheet (2011), in mid-2025, population in Turkey will increase 85.4 million and in mid-2050 it reaches 94.7 million. Below, population and annual rate of its growth in Turkey is shown in Figure 2.2.
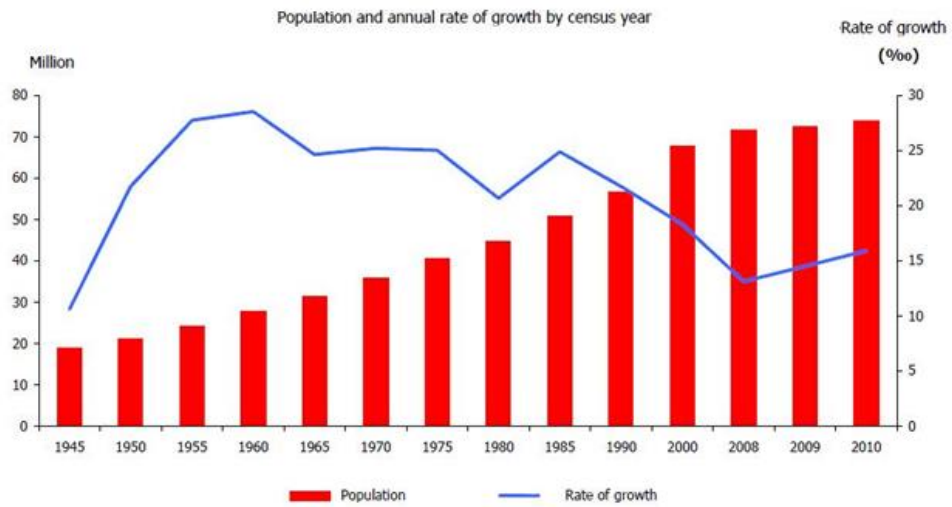
Figure 2.2: Population and Annual Rate of Growth by Census Year.

Figure 1 shows the number of people and annual rate of HPG in Turkey. Based on the graph, it can be clearly seen that despite of fluctuations in growth rate, the number of people continue increasing, especially in last decades.

The number of people in Turkey is keep growing especially in metropolitans (TUIK, 2013). Turkey has 20 cities whose population is bigger than one million and 66 % of the whole population lives in those large cities (TUIK, 2013). Migration in Turkey flows from the east to west side of the country, especially to coastal regions where job opportunities take place. According to the national development plans of Turkey, these challenges lead to adverse consequences in the country and needs to be treated (NDP, 2013).

Population Renewal Level

Any population needs to have fertility rate at least 2.10 % for its subsistence. If this rate decreases, the population started to shrink in that area. This threshold is known as *Population Renewal Level* (PRL) (Institute for Family Policies, 2007). According to TUIK data, fertility rate in Turkey decreased 2.08 in 2012 which is below PRL. In

metropolitans, this rate became less than 1.02. Population projections of TUIK in 2013 asserted that the population number of Turkey will start decreasing after 2050. In the light of these scientific data, in 13rd National Development Plan, it was announced that population policies should focus on increasing fertility rate and improving conditions for aging population.

2.3.2. Turkey's Population Policies in National Development Plans

National Development Plans in Turkey are presented every 5 years beginning with the year 1963. These plans are basically designed as covering consistent economic growth with supremacy of law, knowledge society, the power of international rivalry, human development, protection of environment, and sustainable utilization of natural resources (10th NDP, 2013). In this context, economic development and its constituents like population, environment, employment, immigration etc. are also explored in details and action plans are addressed.

Turkey has 10 National Development Plans. The first two NDPs pointed out mainly the sharp increase of population in Turkey and its effects. Economy and development indicators were manifested and HPG considered as an obstacle for economic development and quality of human life in those times. Moreover, it was reported that population policy needed to change urgently since Turkey would face excessive amount of labor force in the near future. In these two plans, it also common that the relationship between man-environment was not included. In the third NDP, there was also the same concern about the amount of population in terms of economy and social development. Comparing developed countries, the plan addressed that Turkey may have some issues in the future related with utilizing social services like health and education equally due to increasing population growth. Apart from the first two NDP, environment took into consideration in this plan since environmental problems have attracted attention among governance especially after Industrial Revolution. Moreover, it was highlighted that awareness of society about environmental protection will be increased by means of education. In the fourth plan, environmental problems due to human activities were focused in details. The plan adduced that

environmental pollution and disturbing ecological balances due to industry and agriculture could not be isolated from industrialization and development processes and should be regarded them as a whole. Fifth NDP report manifested that although population growth rate decreased comparing previous years, population continues growing and brings some problems like unemployment of young population, environmental problems due to unplanned urbanization and inefficient utilization of natural resources.

In order to provide sustainable development in Turkey, it was concluded that development policies should be included environmental problems and make provisions against these problems. Hence, in 1995 the government prepared National Environmental Action Plan (NEAP) for outlining the environmental conditions and integrating these conditions into development policies (NEAP, 1997).

NEAP mainly emphasized that environmental problems increased due to the relationship between population and its environment. HPG and its probable effects on nature, development, and quality of human life were presented in details and action plans were reported. In the action plan part of NEAP, formal education is one of the proposed focal point to solve the problems brought by HPG. The plan stated that one of the prominent issues in man-environment relationships is the level of education since both utilization of natural resources and recycling are highly correlated with educational level of populations. Hence, it was recommended that the opportunities provided by formal and informal education should be taken in order to raise awareness of society about environment and get them embrace the population policies. This plan also highlighted that demography and sustainable development should be also coordinated and involved with formal and informal education.

The last NDP is 10th NDP and encompasses the period between the years 2014-2018. In this plan, population policies covered by means of technological improvements, health care, urbanization, environment problems, and migration. To illustrate, the plan state that the changes in population number and technological improvements will have significant effects on health care, provide with a chance for diagnoses and

treatments; however, these also will promote health disparities among different income groups. It is also added that Turkey's health expenditure is low compared to developed countries due to having young population. In the event of not making adequate provisions against retirement and social security systems, health expenditures will put pressure on fiscal and social security system. In addition to these, on the rural side of Turkey, the risks brought by decreasing HPG and increasing the number of old people cause a significant difference between urban and rural areas. Hence, NDP highlighted that rural area policies and implementations should be enriched. On the other hand, it was added that human population, urbanization, economical activities, consumption patterns push the limits on natural resources and environment. In this context, "green growth" comes into prominence among global scale in order to reach sustainable development goals. Moreover, prevention of environmental pollution, protection of biological diversity and natural resources and their sustainable usage were also included in development policy.

To sum up, Turkey has a similar population trend compared with HPG patterns of developing countries. As discussed in national development plans, Turkey does not have necessary infrastructure to deal with the demands of growing population by means of social services, economic production, and utilization of natural resources. Hence, sustainable development become into prominence for meeting the demands of HPG. Besides, formal education should be reoriented by means of sustainability and population context as the plans are addressed.

2.4   Sustainable Development and Population Growth

In order to draw a clear picture on interrelationship between sustainable development (SD) and HPG, development of SD, effects of Rio Declaration and Millennium Development Goals on HPG are summarized in this section. Furthermore, the concepts of Education for Sustainable Development (ESD) and the placement of population growth in ESD are also given.

2.4.1 Sustainable Development

The development of the concept of SD is progressive phenomenon (Egelston. A. E., 2006) and its definition has been changing over time. Although there are different perspectives and definitions for SD, the widely used one is the definition declared in Brundtland Commission Report, Our Common Future (1987), *"…development that meets the need of the present without compromising the ability of future generations to meet their own needs"* (p.43). In the current study, "sustainable development" and "sustainability" are used interchangeably. In order to clarify the features of sustainable development, 18 principles of sustainability were described on the outcome of United Nations Conference on Environment and Development (UNCED), also known as Rio Declaration as following:

1. *People are entitled to a healthy and productive life in harmony with nature.*
2. *Development today must not undermine the developmental and environmental needs of present and future generations.*
3. *Nations have the sovereign right to exploit their own resources, but without causing environmental damage beyond their borders.*
4. *Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders.*
5. *Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.*
6. *In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it.*
7. *Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of people.*
8. *Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.*
9. *Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies.*
10. *Environmental issues are best handled with the participation of all concerned citizens. States shall facilitate and encourage public awareness and participation by making environmental information widely available.*
11. *Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental damage.*

Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact.

12. *Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an unjustifiable means of restricting international trade.*

13. *The polluter should, in principle, bear the cost of pollution.*

14. *Nations shall warn one another of natural disasters or activities that may have harmful transboundary impacts.*

15. *Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability.*

16. *The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.*

17. *Warfare is inherently destructive of sustainable development, and Nations shall respect international laws protecting environment in times of armed conflict, and shall cooperate in their further establishment.*

18. *Peace, development and environmental protection are interdependent and indivisible.*

These statements elucidated the constituents of sustainability in a broader range. Nonetheless, the discussions and comments about sustainable development continue differing. United Nations (2010) defined sustainable development as four dimensions (Figure 2.3).
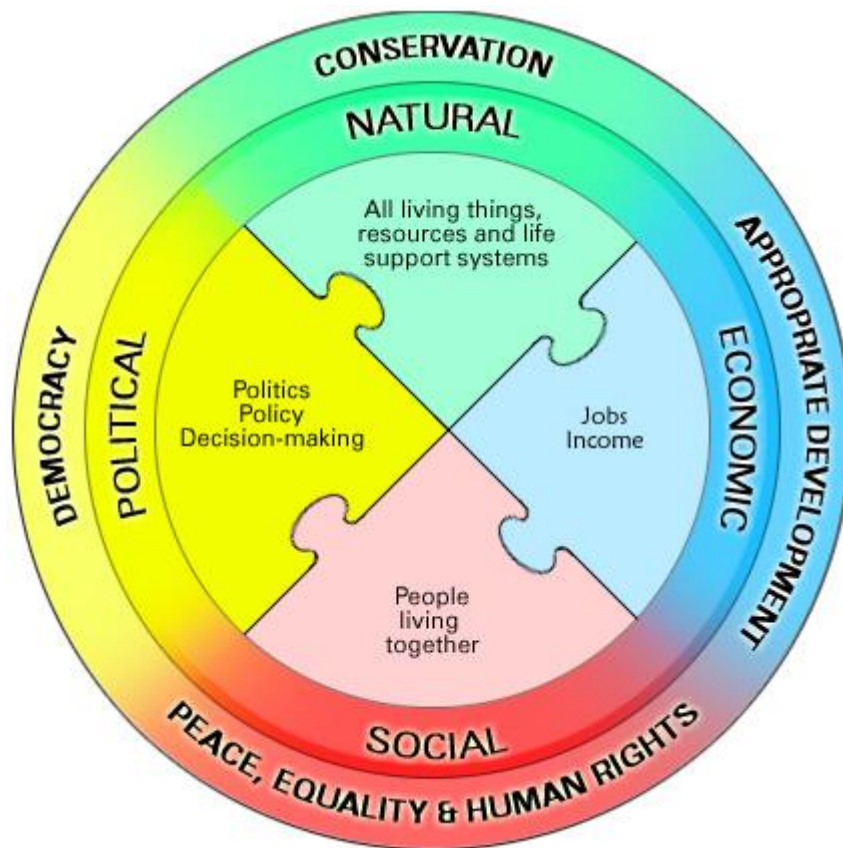
Figure 2.3 Dimensions of Sustainable Development

Although the effects of HPG were not mentioned explicitly in early sustainability conferences, in line with achieving conference outcomes, HPG will lead to affect HPG trends. For instance, in the statements of Rio Declaration, statements like 2, 3, and 8 concerned carrying capacity and some suggestions were given which can affect the birth and death rate correspondingly. Similarly, *The Millennium Development Goals* (MDGs) declared by United Nations General Assembly in 2000 had some indirect effects on population growth. MDGs had eight goals based on sustainable development framework and aimed for facilitating economic development by implementing social equity goals and targets while insuring environmental sustainability. These goals are presented following:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria, and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

Although not emphasizing growing population, MDG affects the trends of HPG. For instance, if 1, 4, 5 and 6 succeed, human death rate will also decrease and population growth will accelerate (Weeks, 2012). On the other hand, 2 and 3 help decrease birth rate implicitly.

In Rio + 20 (2012), population trends and projection including migration was taken into account directly for national, rural and urban development. Rio +20 outcomes stated that the determination for implementing the Programme of Action in Cairo continues.

2.4.2 Population Growth in Sustainable Development

In Population and Development conferences, the associations between HPG and SD are much more obvious. International Conference on Population and Development organized in 1994, population growth was taken into account in the SD program. The outcome of the conference outlined that sustained economic growth regarding sustainability help the countries deal with the negative effects of HPG and allow to stay in balance between HPG and development policies.

Eight years after, Global Science Panel was arranged in 2002. The outcome of this panel denoted that "If we do not put the human population at the core of the sustainable development agenda, our efforts to improve human well-being and preserve the quality of the environment will fail". Furthermore, in the policy statement of, the importance of interrelationship between human population and SD was explained following:

The human population matters for sustainable development in two critical ways. First, it is an agent of change, inducing many of the environmental, economic, and social changes in the world that give rise to our concern about the sustainability of our current development paths. Second, the human population and its living conditions are the ultimate objects of development, with long-term human health, wellbeing, and survival serving as criteria for judging whether development is sustainable or not. It is the human population and its individual members that ultimately will suffer the consequences of unsustainable paths of development. For these reasons, the systemic integration of population in sustainable development is essential if we are to meet the needs of present generations without sacrificing the livelihoods of future generations (p.2).

Population growth impacts human welfare and sustainability of Earth life system via socio-economic and environmental effects (Engelman, 1997). In many countries on the world face growing population rates which are already beyond the limits of carrying capacity of lands (Coffin, 1993). On the other hand, determining the maximum number of people for carrying capacity is less important than setting limits for how resources can be utilized and administrated sustainably to improve living standards without depleting them which can be continue to support life (Engelman, 1997). When the environment is managed sustainably, people can reduce our consumption and environmental degradation and future generations have also chance to live in the same conditions as today's generation have (Raven & Berg, 2006). However, the relationship between population and environment demands more studies to understand this interrelationship clearly. Moreover, these studies contribute to reaching MDGs for sustainable development because many programs, named as environmental actions, including environmental and population problem need for sustainable environment (Repetto, 1985; UNEP, 1989; Matthews, 1991).

2.5 Education for Sustainable Development and HPG

2.5.1 Education for Sustainable Development

The concept of Education for Sustainable Development (ESD) was included in the sustainability programs aimed to promoting education and public awareness during 21st century. In Agenda 21 (1992), it is denoted that education is essential part to

make generations be able to meet the solutions for the problems of present and future people to explore new directions to a better future. United Nations defined education for sustainable development as "*aims to help people to develop the attitudes, skills, perspectives and knowledge to make informed decisions and act upon them for the benefit of themselves and others, now and in the future. ESD helps the citizens of the world to learn their way to a more sustainable future.*" The goals of the ESD are;

1. Promote and improve the quality of education
2. Reorient the existing education programmes
3. Raise public awareness and understanding of the concept of sustainable development
4. Train the workforce

In 2002, it was declared that the period between 2005 and 2014 as United Nations Decade of Education for Sustainable Development. Since 2005, other UN initiatives and reports are being included the significance of ESD.

2.5.2   Population Education in ESD Curricula

UNESCO (1982) declared that education has an important role to influence students via school in order to make them conscious about national population goals. Thompson (1962) claimed that the purpose of formal education in a democratic society is to prepare students for both present and future situations; therefore, population changes should be also included in formal education in order to grasp the complex nature of interactions between HPG and environment, economy, and society.

Population and its indicators in the context of sustainable development are included in many countries' curricula especially those who have high population growth rate. Moreover, some of them have population education in schools (Mfono, 1993). Mfono reported that Asian countries were the first developing countries to attempt including population education in their schools; however, USA was the first country to develop this idea. USA added population issues in social studies curricula of American secondary schools (UNESCO, 1982). As a result of this initiative, recent

studies asserted that USA population growth rate decreased and not increase (Mfono, 1993).

When Turkey's existing national curriculum is considered, population is taught in the social studies lessons. Tanriverdi (2009) reported that, the linkages between human population growth and environmental, economic and societal problems are not included in the curriculum. In addition to these, in Turkey's school system, sustainability education is new concept introduced in national science curriculum and needs further researches, although ESD courses were offered as elective courses in colleges for years in Turkey. In addition, population growth is taught in social study lessons without emphasizing the context of carrying capacity and effects of HPG on the environment and human life. Hence, research studies embracing the cognitive and affective domain of students and teachers on HPG should be promoted in order to help policy makers and curriculum developers improve the quality of national curriculum.

2.5.3   Research Studies on Human Population Growth and Carrying Capacity

Although the context of carrying capacity and the effects of HPG has been arguing extensively in various disciplines, limited studies linked to views of people on HPG has been presented in the literature. In one study, Reeder, Allison, Bourque, Hensler, and Bailey (1974) administered public opinion surveys to identify people's views about overpopulation in United States. Nearly 2000 participants from California and Los Angeles County were interviewed in order to explore the opinions on the level of interaction between HPG and its related environmental concern. Almost 80% of the participants viewed HPG as either already problem or may lead to problem in the future. Surprisingly, only 8% of the respondents reflected that overpopulation is the major problem for their country, when it is asked to decide what the most serious problem in United States is. The researchers pointed out that more complex instrument including remarkable population issues is required to identify participants' views and attitudes and the items about feelings of respondents towards the interaction between social and economic problems should be included. Besides,

they added that HPG context may be seen as an abstract concept and therefore various techniques should be combined with survey method to acquire better information for the HPG issue. Although this study was very old, no scale was constructed based on the researchers' suggestions. Therefore, present study may contribute to the population literature in the light of recommendations of the above-mentioned research.

Population education has been implemented by populated countries; however, a few studies were conducted in terms of the effects of population education on students' perception and teacher education for population education. Bell and Odom (2013) conducted a study with secondary level students. Three lessons based on learning cycle were designed by the researcher since previous studies (National Research Council [NRC], 1996) indicated that although students may have some pre-conceptions about HPG, they have constrained understanding about the interrelatedness of HPG with environment, resource management. The learning cycle ease the complex nature of HPG and provide them to develop an understanding in the light of lessons. The results of the study revealed that as students notice the interdependence of HPG and resources and suggest solutions for socioscientific issues.

2.6 Belief Theories

Belief studies have been drawing attention to a great extent (Pajares, 1992). However, there are uncertainties and confusions about the definition of the term 'belief' in the literature. A great deal of definitions of *belief is* proposed in the literature and often used interchangeably with attitudes, perception, and opinion (Abel & Lederman, 2007). To illustrate, Hungerford, Litherland, Peyton, and Ramsey (2003) defined *belief* as "Belief is an idea which a person holds to be true. The idea may or may not be true, but the person believes it is" (p.30). Similarly, Op't Eynde, De Corte, and Verschaffel, (2002) described *belief* that person believes that it is true whether others agree or not. On the other hand, Kagan (1992) describe *teacher*

belief as "Tacit, often unconsciously held assumptions about students, classrooms, and the academic material to be taught" (p.65).

Besides the clarification of the definition, the notion of forming belief systems is quite challenging. For instance, Green (1971) formed belief system with a *quasi-logical* structure and beliefs are divided into two categories as *primary beliefs* and *derivative beliefs*. *Primary beliefs* are not based on any belief and could provide basis for other beliefs. On the other hand, *derivative beliefs* were rooted from other beliefs. On the other hand, Fishbein and Ajzen (1976) defined belief system in *The Expectancy-Value Model of Attitudes III. Beliefs* were classified in this model as *descriptive belief, inferential belief,* and *informational belief*. *Descriptive beliefs* are shaped by direct experiences of individuals, whereas *inferential belief* derived from *descriptive beliefs*. On the other hand, *informational belief* is formed from an outside source such as TV, papers, journals, books, magazines, lecturers, friends or coworkers etc. In the present study, Fishbein and Ajzens' (1976) description of the belief system was used since pre-service teachers established their beliefs on HPG from direct experiences in daily lives and also outside source. That is, outside sources listed above provided formation of belief regarding the interaction between HPG and its attributes.

Determining their beliefs toward the HPG is needed since pre-service teachers' beliefs may affect their teaching style and students' conceptions. Due to lack of existence scale, constructing and testing a valid and reliable scale in order to identify pre-service teachers' beliefs was primarily aimed in the current study

2.7. Importance of Pre-service Teacher Beliefs on Education for Sustainability and Scale Construction

Belief studies came into prominence in teacher education literature in the mid-1980's (Byran, 2012) since beliefs have a key role in how teachers classify knowledge and information (Moseley & Utley, 2008); help teachers discover and understand themselves as well as their world (Taylor, 2003; Taylor & Caldarelli, 2004) and have essential effect on their behavior in the classroom (Pajares, 1992; Richardson,

1996). In the same manner, pre-service teacher beliefs' are drawing attention for sustainability studies (Sahin, 2008) because attitudes and behaviors are coming from the beliefs and background knowledge of individuals (Hines, Hungerford, & Tomera, 1986). Due to the fact that beliefs are formed by the combination of one's conceptions, values, ideologies, and tendencies (Thompson, 1991), pre-service teachers' beliefs are required to be identified in order to develop an understanding of teachers about the contentious nature of sustainability. Nevertheless, there are not enough studies related to the pre-service teachers' beliefs about ESD (Boon, 2011; Summers, Corney, & Childs, 2004). Likewise, these types of studies about sustainable development in Turkey are limited. Although pre-service teachers' beliefs have been drawing attention in the teacher education literature, belief about sustainable development are limited (Sahin, 2008; Boon, 2011). Besides, no belief study was by means of HPG. However, scales related to attitudes towards environmental issues were included HPG dimension (Dunlap & Van Liere, 1978; Karakaya, 2009; Tosunoğlu, 1995). Nevertheless, due to being an essential element of ESD, pre-service teachers' beliefs about HPG are also needed for ESD. Hence, pre-service teachers' beliefs were intended to identify in this study. Due to not having existing HPG belief scale in the literature, constructing a valid and reliable scale is the main objective.

2.7.1. Construction of Belief Scale on ESD

United Nations (2010) described the dimensions of sustainability as natural, economic, social and political aspects. These concepts includes various aspects such as loss of biodiversity, climate change, human population growth and life support systems, poverty, income, migration, human rights, women health, and education. Due to complex and nested interactions of those concepts, it is not possible to construct a belief scale embracing all the above-mentioned issues. Hence, the researchers in this area focus on sustainability in a holistic way and construct belief scales based on general context of sustainability rather than its specific elements.

Cotton, Warren, Maiboroda and Bailey (2007) developed an attitude and belief scale in the context of SD. They constructed the scale with the closed and open-ended questions administered on the net. During the construction process, expert opinion was taken in several times to review the items of the scale. A total of 328 were participated the study. After the questionnaire a sample of academicians was invited for interview via stratified sampling technique. 20 participants were come and as a result, scale was constructed. However, no statistical techniques were used to explore the dimensionality of the scale which might be the limitation of the research. Due to not conducting factor analysis, no dimension was presented and findings are reported via frequency of responses.

Yang, Lam and Wong (2010) constructing a belief scale for describing secondary teachers' beliefs toward SD in China. They reported that constructing such a belief scale was quite difficult because of being first to develop it in the area and having no consensus ESD definition. Therefore, before starting, they defined SD an ESD with the literature review and based on the exploratory study of geography teachers' views in China. After clarifying the definitions, items were developed and applied four different cities in China. This pilot study consisted of 12 geography teacher included interview and questionnaire part. The dimensions of the items were based on two areas, namely the values teachers uphold toward the direction of development and environmental conservation; and the teaching beliefs related to curriculum content, pedagogy, and learning. After pilot study, interview results were examined in details with software named Nvivo1.3 and the results indicated that qualitative techniques could be helpful in order to construct a scale. Moreover, for their scale, most well-known instruments like NEP were guided and some of the items related were integrated into the scale. The draft items were 96 items of *Values for ESD (VSD)* and 42 items were *Teaching Beliefs on ESD (TESD).* Sample was consist of 179 secondary geography teacher. After confirmatory factor analysis, VSD were 48 items while TESD were 24 items. Finally, after the larger scale administration, valid and reliable instrument were developed by the researcher in order to be used for China about beliefs toward ESD.

As stated in the above, constructing ESD scale is quite difficult since it is newly-developing research area, have broad context and no consensus definition was proposed for ESD. As a result, there are a few number of ESD belief studies by means of scale construction. Therefore, in this study, human population growth was selected to explore pre-service teachers' beliefs as a specific topic rather than general concept of sustainability.

2.8. Summary of Review Literature

In this chapter, related literature about HPG was summarized. Figure 4.4 displayed the summary of literature review given above. Due to nature of complex interrelationship, studies are needed to clarify these interactions. As a few number of studies about teacher education are present in both ESD and HPG literature, constructing a belief scale to determine pre-service teachers' beliefs on the effects of HPG may be initial step to develop the education aspect of HPG literature.
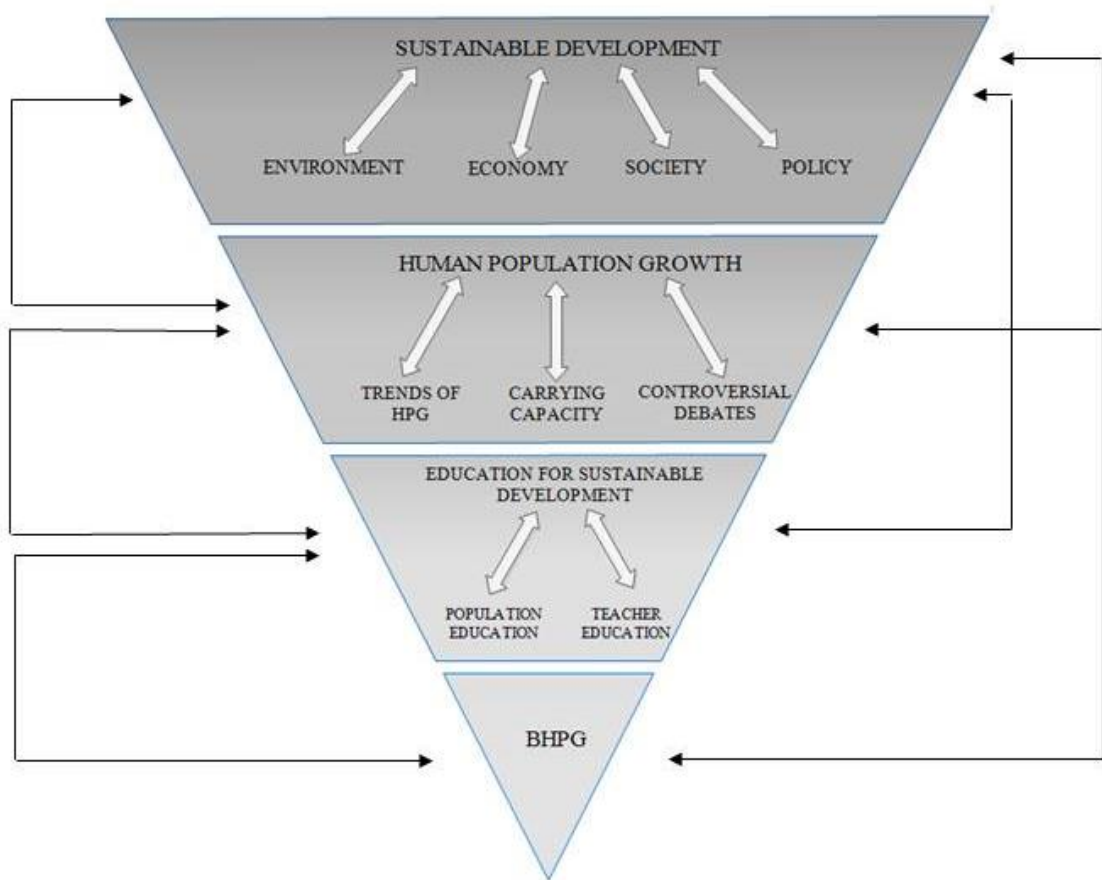
Figure 2.4. Visualization of Summary of Literature Review

CHAPTER 3

METHOD

The chapter covers research design, sampling procedure, instrumentation, data collection procedure, data analysis, internal and external validity threats, and assumptions and limitations of the present study.

3.1. Research Design

Aim of this research based on the main target of the study as stated in the former section as to construct and test a scale about beliefs on human population growth (BHPG). Moreover, it was intended to describe pre-service teachers' beliefs towards HPG. The method used in the study is survey research.

Fraenkel and Wallen (2006) defined the survey method as gathering information from a group to identify their specific attributes in quantitative studies. There are two types of survey research. The survey method used in this study, however, is cross-sectional survey method since survey was administered at single point in time (Fraenkel and Wallen, 2006).

3.2. Sampling Procedure

The target population of the study is pre-service teachers who are enrolled in Faculties of Education in Ankara, Turkey. However, accessible population was identified since it is not possible to reach the target population. Hence, all pre-service teachers enrolled in an undergraduate program at the Faculty of Education of the Middle East Technical University in Ankara were described as the accessible population for this present study. There are six departments in Faculty of Education at METU; four of them offer an undergraduate program, namely Elementary Science Education (ESE), Elementary Mathematics Education (EME), Early Childhood Education (ECE), Chemistry Education (CHED), Physics Education (PHED)

Computer Education and Instructional Technology (CEIT), and Foreign Language Education (FLE). The distribution of pre-service teachers by means of programs and grade level was given in Table 3.1. The students of CHED and PHED were grouped as Secondary Science and Math Education (SSME) since their rate of participation had the smallest percentages in the current study.

Table 3.1

Distribution of Pre-service Teachers in Undergraduate Programs at METU

| | Grade Level | | | | | |
	1st	2nd	3rd	4th	5th	Total
ESE	90	44	36	60	-	230
EME	71	38	45	53	-	207
ECE	52	42	52	32	-	178
SSME	99	47	37	36	42	261
CEIT	61	51	52	61	-	225
FLE	118	118	114	110	-	460
Total	491	340	336	352	-	1561

The accessible population of the current study was totally 1561 pre-service teachers in 2013-2014 fall academic year. Looking at the percentages by means of grade level, 491 (31.5%) first-grade pre-service teachers, 340 (21.8%) second-grade pre-service teachers, 336 (21.5%) third-grade pre-service teachers, 352 (22.5%) fourth-grade students, and 42 (2.6%) fifth-grade pre-service teachers enrolled in an undergraduate program at Faculty of Education in METU. On the other hand, considering the rate of undergraduate programs, about one-third (29.5%) of the population is FLE students, while other programs distributed as 230 (14.7%) ESE, 207 (13.3%) EME, 178 (11.4%) ECE, 261(16.7%) SSME, and 225 (14.4%) CEIT.

Participants of the study were decided according to their availability; therefore, the sampling method used is defined as convenience sampling (Fraenkel & Wallen, 2006). Characteristics of pilot and main study are given in the next section.

3.2.1 Characteristics of the Sample Participated in the Pilot Study

BHPG was piloted with 367 university students (76.8% female and 23.2% male) in three different public universities in Turkey. The mean of age of the participants in the pilot study is 22.3 years.

Participants of the pilot implementation were pursuing different undergraduate programs. However, the majority of the participants (88.7%) were from the Department of Education. Distribution of the grade level revealed that, 68 (18.8%) of the participants were freshman, 87 (24.1%) were sophomore, 84 (23.3%) were junior, 54 (15%) were senior, and 74 (18.8%) were graduate students. Moreover, as the results of demographic part of the scale demonstrated, almost half of the participants (41.9%) have families of 4 persons and the mean of the number of siblings was calculated as 2.67, which is above the *population renewal level.* The last demographic information is about the state of the respondents' childhood residence by means of migration movements. Most of the participants (51.9%) live in metropolitans where rural to urban migration takes place. The rate of the respondents who live in rural areas was quite low (10.6%).

3.2.2. Characteristics of the Sample of the Main Study

This part of the study was realized by the administration of BHPG to 658 pre-service teachers at Faculty of Education in Middle East Technical University. Majority of pre-service teachers of this study are female (77.4%), while percentage of male students are 21.6%. The mean of the age of the participants is 21.4 years. Participants of the main study were pursuing different undergraduate programs in faculty of education in METU. Distribution of respondents by means of programs and grade level were presented in Table 3.2.

Table 3.2

Sampling Distribution with respect to Undergraduate Programs and Grade Level of the Main Study

Undergraduate Programs	N	Percent
English Language Teaching (FLE)	160	24.3
Computer Education and Instructional Technology (CEIT)	111	16.9
Elementary Science Education (ESE)	135	20.5
Early Childhood Education (ECE)	117	17.8
Secondary Science and Mathematics Education (SSME)	33	5.0
Elementary Mathematics Education (EME)	102	15.5
Grade Level	**N**	**Percent**
Freshman	133	20.2
Sophomore	210	31.9
Junior	151	23.0
Senior	164	24.9

As displayed in Table 3.2, the majority of the pre-service teachers are from FLE program (24.3%), whereas SSME students have the lowest percentages (5.0%). On the other hand, the distribution of the grade level is 133 (20.2%) freshman, 210 (31.9%) sophomore, 151 (23.0%) junior, and 164 (24.9%) senior students.
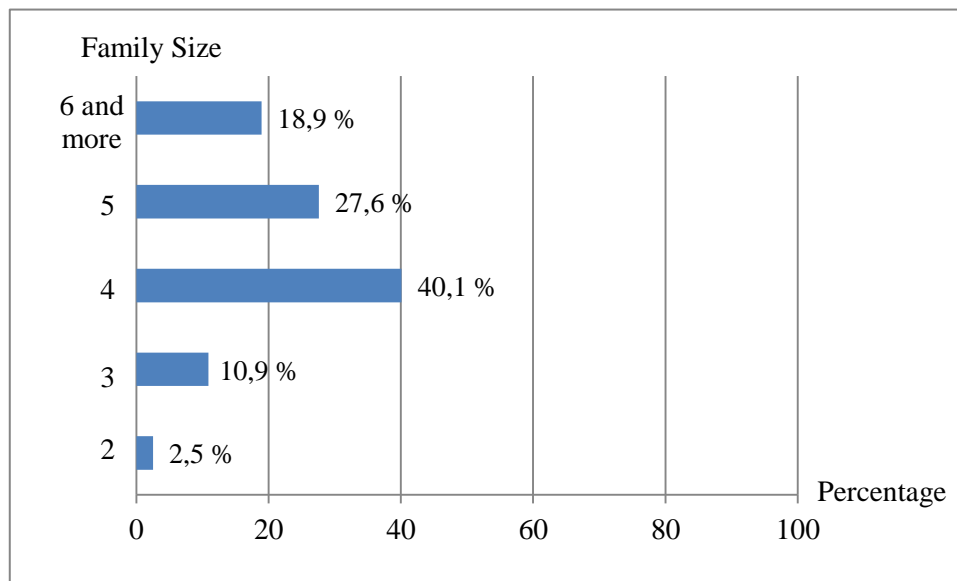
Figure 3.1 Family Sizes of the Participants

As displayed family size of the participants in Figure 4.2, most of the respondents (40.1%) live with 4 persons in the family, while 27.6% of them have family size with 5 persons. Relatively small number of respondents has small family size (2.5% of 2 person; 10.9% of 3 persons). The percentage of large families in this study was 18.9%. In addition to these, the mean of the number of siblings was calculated as 2.59, which is above the *population renewal level*. Overall, the family sizes have similar percentages both in the pilot and the main study.

Looking at the state of the respondents' childhood residence by means of migration movements, most of the participants (37.8%) live in metropolitans where rural to urban migration takes place. The rate of the respondents who live in rural areas was quite low (12.0%). The participants who live in a residence where no migration movement occurs were 29.5%. The rest of the respondents (19.5%) have lived more than one place.

3.3. Instrumentation

BHPG was developed by the researcher to determine pre-service teachers' beliefs towards the current state of population growth. The final version of BHPG scale consists of 38 items with a 5-point Likert scale. Items were constructed to explore the

dimensions of beliefs towards HPG and to identify pre-service teachers' beliefs towards this issue. High scores in this scale represent supporting beliefs for HPG, while low scores refer to opposing beliefs towards HPG. Stages for the development of BHPG scale are explained in details in the next section.

3.3.1. Scale Developmental Process of BHPG

Constructing an Item Pool

The related literature was examined and the instrument items were written by the researcher based on the literature review. In order to determine the context for the scale, The EBCOhost, ERIC, and ULAKBIM were guided as databases and journals, articles, and periodicals (Mfono, 1993; Nurick & Johnson, 1995; Orimoogunje, Adegboyega, Banjo and Funmilayo, 2011; Yang, Lam and Wong, 2010) were examined associated with HPG. In addition to these, population course books and some other scientific books covering population chapters (Ehrlich et al. 1977; Raven and Berg, 2006; Weeks, 2012) were also taken into account in details. Furthermore, statistical indicators of United Nations Population Division, National Development Plans of Turkey and Turkish Statistical Institute were also reviewed in order to acquire knowledge about the present state of HPG in the world and in Turkey. In short, such a review of broad and complex literature on HPG indicated that the emerging issues on HPG could be listed as the effects of HPG; debates on the effects of HPG regarding the environment, economy, social life, and natural resources; population policies and their outcomes; population ethics; HPG and women rights; human population control; population education; and the relationships between population, urbanization and migration.

It was also revealed that there have been many research studies in several disciplines, but neither a theoretical framework on population growth and population education nor a belief scale for teacher education has been constructed yet. For this study, the effects of HPG and the current debates regarding those effects were decided specifically to be used as a framework of the present study, the effects of HPG and the current debates around those effects provide a baseline for the other HPG related

issues. To be more specific, in order to discuss the population policies or population ethics, having awareness on the various effects of HPG is required.

Popular debates on HPG and the effects of growing population on the nature, economy and social issues were extensively investigated. These issues elaborated on various aspects like environmental pollution, economic development, climate change, unemployment, quality of human life, migration etc. Majority of the items were constructed by the researcher in the light of HPG literature. Five items were adapted from three instruments on environmental issues (Dunlap and Van Liere, 1978; Karakaya, 2009; Karakoç, 2008) and included in the item pool.

Deciding about the BHPG items- 1st Draft

As a result of evaluating the items collected in the pool, 76 Likert-type *draft* items were decided to make up BHPG (see Appendix 1). Edward's Criteria (Anderson, 1988) were considered while writing the items. Two experts from Faculty of Education reviewed the items and suggested 3 dimensions; (1) population and environment, (2) population and economy, and (3) population and society. Moreover, some items were rewritten or deleted in the light of their suggestions and 62 items were remained. Other three experts from elementary education and sociology department evaluated the items and their dimensions.

Deciding about the BHPG items- 2nd Draft

After necessary expert evaluations and revisions, 54 items were decided to use in the pilot version of the BHPG (Appendix 2). The distribution items among the dimension and sample items for the pilot version of BHPG is that there are 23 items in dimension 1 (population and environment), 19 in dimension 2 (population and economy), and 12 in dimension 3 (population and society). Response scale of the BHPG, on the other hand, was designed as a 5-point Likert type, ranged as strongly disagree (1), disagree (2), undecided (3), agree (4) and strongly agree (5). Some draft items were given in Table 3.3.

Table 3.3

Pilot Version of the Belief Scale on Human Population Growth (BHPG): Dimensions and Sample Items

Draft Items
Population and Environment
- Environmental pollution increases with population growth.
- One of the reasons for air pollution is human population growth
- Population growth contribute to the solutions for environmental problems
Population and Economy
- Population growth is essential for our country's economic development
- Population should grow since it is important for our country's welfare
- Population growth in developing countries does not promote their economic development
Population and Society
- In our country, benefitting from social services (such as education, health) is getting more difficult as the population increases.
- Population growth reduces the quality of human life for those people living in urban areas
- Population growth in an area affects human health negatively in the long term.

Pilot Testing the Scale (BHPG)

The pilot version of BHPG including 54 items was administered with 367 participants. Based on the result of Exploratory Factor Analysis (EFA) and reliability analysis, item deletion and revisions were performed. The results of pilot study are presented in details in the result section.

Final Version of the Scale (BHPG)

The final version of BHPG including 41 items (Appendix 4) was administered with 658 pre-service teachers in Faculty of Education at METU. Based on the result of

Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and reliability analysis, 38 items were decided as a final version of the scale (BHPG). The results of main study are given in the result section.

3.3.2. Validity Analysis of BHPG

In order to test the validity of BHPG scale, expert opinion was taken as content-related validity evidence and Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were conducted for construct-related validity evidence.

Content – Related Validity Evidence

For the content-related validity evidence, expert opinion was taken at some stages in the present study. In the first place, 76 *draft* items were reviewed by two experts studying on sustainability education. Based on their suggestions, 14 items were removed and some items were rewritten. A total of 62 items were sent to 3 other experts from department of elementary education and department of sociology. These experts were requested to review items by means of appropriateness for the content and to confirm their relevance within dimensions. In the light of their recommendation, 54 items were decided to use for the pilot study. Pilot version of the scale was tested by another expert by means of comprehensibility of test and its duration.

Construct Related Validity Evidence

In order to test construct-related validity evidence, EFA and CFA were conducted. Factor analysis is one of the widely used techniques to acquire construct-related validity evidence for test constructions and adaptations in social sciences (Çokluk, Şekercioğlu, &Büyüköztürk, 2012). This technique was used to propose a construct a model by using EFA and confirm the model that was estimated in EFA by CFA. EFA is a statistical technique used to determine latent variables in theoretical construct based on observed variables (Çokluk, Şekercioğlu, & Büyüköztürk, 2012). Using EFA is recommended in first stages of test construction to explore dimensions without generating a model on the data (Tosunoğlu, 1993). However, as nature of the

study is determined, EFA may not be helpful for the next stages of measurement. However, CFA confirms the model where the latent variables were defined by the researcher based on the EFA data. CFA is more powerful technique than EFA in order to detect construct-related validity evidence, develop and/of confirm a theoretical framework (Erkuş, 2003).

In pilot version of this study, EFA was administered since BHPG was constructed by the researcher and required to explore the dimensions of the scale. The statistical software, Statistical Package for the Social Sciences (SPSS) version 20 was utilized to analyze the scale's dimensionality. Kaiser-Meyer- Olkin (KMO) value was analyzed in order to measure factorability. Analysis of varimax rotation of principle component factor method was used and eigenvalues, scree plot, rotated factor loadings, communalities and item-total correlation were considered. In the main study, confirmatory factor analysis (CFA) was used confirm the dimensions as proposed in EFA. LISREL 8.8 was administered and fit indices such as Chi-Square, RMSEA, NFI, NNFI, CFI, and GFI were reported. The results of pilot study and the main study were given in results section.

3.3.3. Reliability Analysis of BHPG

Reliability analyses were utilized for each dimensions and whole scale by calculating Cronbach alpha coefficient in SPSS Statistical Software Program 20. Cronbach alpha coefficients were reported for both the results of the pilot study and the main study. According to Pallant (2007), Cronbach's alpha value between 0.6 – 0.7 shows acceptable reliability, 0.7 – 0.9 shows good reliability, and 0.9 and higher represents excellent internal consistency. Overall, the alpha value of the pilot scale produced a value of *0.95*, while alpha value for the main study is *0.9*. Besides, based on this criterion, the alpha values reflected that both the pilot and the main study version of the scale were reliable. The results of reliability analysis are given in results section.

3.4. Data Collection Procedure

The permission from Research Center for Applied Ethics at Middle East Technical University (UEAM) is required due to ethical concerns. Hence, some experts in METU Ethical Committee revised the scale regarding ethical dimensions. Following getting approval from UEAM, BHPG scale has been conducted. The data collection period began in April 2013 and completed until November 2013.

Data collection procedure has been realized in the classroom settings. All participants filled out the questionnaire voluntarily and all the data were gathered by the researcher. All participants were informed about the aim of the study. No question is included related to their identity. The questionnaire lasted approximately 10 minutes.

3.5. Data analysis procedure

The answer for the 1st research question of this study was sought by means of EFA and CFA analysis. The dimensions of the scale were formed based on the model proposed in EFA of pilot study and confirmed in CFA of main study. On the other hand, in order to answer the second research question, descriptive statistics were performed. The beliefs of the pre-service teachers were described through descriptive data.

IBM SPSS 20 Statistical Software Program and LISREL 8.8 were utilized to analyze the data of the present study collected from pre-service teachers in METU. The responses of the items which ordered from strongly disagree to strongly agree were coded as from 1 to 5, respectively. Gender is valued with 1 and 2; departments coded as from 1 to 6, and grade level were also coded with the values ranging from 1 to 4. In addition to these, "excluded cases pairwise" is selected for dealing with missing data.

3.6. Internal and External Validity

3.6.1. Internal Validity

Fraenkel and Wallen said that (2006), "When a study has internal validity, it means that any relationship observed between two or more variables should be unambiguous as to what it means rather than due to -something else-." (p.169). In the present study, internal validity threats were reported as subject characteristics, location, and instrumentation.

Subject Characteristics is one of the internal validity threats and defined as choosing of the participants for a research may leads to differences in unintended ways that are correlated one of the variables that are defined in the study (Fraenkel & Wallen, 2006). This threat may occur in this study since their beliefs towards HPG may change considering gender, department, culture, family size, and the area that they have grown up. For instance, if some of the participants live in a big city where the negative effects of HPG can be seen easily, their beliefs may differ comparing other participants who live in a smaller area that no migration movement occurs. Another example is that the beliefs on HPG may contradict regarding participants' cultural value. In some cultures, living in a big family is essential for their customs and traditions. Hence, the answers may change among participants. This threat can be a threat for internal validity and leads to a limitation for the present study.

Location threat refers to the conditions where the instrument is conducted may influence the answers of the participants (Fraenkel & Wallen, 2006). Even though all the answers were collected in classroom settings, the classroom environment may change from one class to another. However, due to conducting questionnaire in the classroom environment, location threat was minimized in this study.

Instrumentation threat is that the ways that instruments were utilized may pose a threat for internal validity like instrument decay, data collector characteristics, and data collector bias. In order to eliminate or minimize these threats, all data were collected by the researcher and instrument was constructed to administer easily.

3.6.2. External Validity

Fraenkel and Wallen (2006) defined the external generalizability as (p. 104) "… the extent to which the results of a study can be generalized determines the external validity of the study". Due to not employing random sampling, results may not be generalized to pre-service teacher population in Turkey.

According to Fraenkel and Wallen (2006) ecological generalizability refers to "… the degree to which the results of a study can be extended to other settings and conditions" (p.106). The results of the present study are more suitable for ecological generalizability since convenience sampling technique was used. Hence, it can be asserted that this study can be generalized to a population which has pre-service teachers are included in the same conditions and settings.

3.7. Ethical Issues

Every study includes human subject has some ethical regulations. Therefore, a researcher should confirm that the research that will be conducted is ethical. According to Fraenkel and Wallen (2006), there are 3 issues which should be regarded i.e., protecting participants from harm, ensuring confidentiality of research, and deception of participants. This proposed study fits the guidelines for exempt status because it comes any harm to anyone neither physical nor psychological as a result of the research. It is asked that what their beliefs about the effects of HPG are and tried to find the dimensions lying beyond these beliefs. Collecting and holding data in confidential is also regarded as an ethical dimension. Moreover, participants did not deceive all the aspects of the research topic will be explained and they will allow leaving the questionnaire any time they want.

3.8. Assumptions of Study

The assumptions of the study can be listed as following:

1. The dimensions of the belief scale that selected for this study indicate the universe of all possible aspects of HPG.
2. Participants' answers are assumed to be reliable.
3. No other extraneous variable affects the dimensions of the study.

3.9. Limitations of the Study

1. There is no belief scale towards the effects of HPG. Therefore, constructing items was challenging. Some point of views can be missed.
2. There is no consensus all the possible effects of the HPG on Earth.
3. Because of using convenience sampling technique, the results are not generalizable all the pre-service teachers in Ankara.
4. Beliefs that are evaluated depend on the usage of self-measure report.

CHAPTER 4

RESULTS

The present study aimed to construct a valid and reliable scale about the pre-service teachers' beliefs toward human population growth and identify their beliefs regarding HPG. Therefore this section has been presented in 2 parts as (1) Development of BHPG Scale and (2) Findings and evaluation of beliefs of pre-service teachers' on the human population growth (HPG).

4.1. Development of BHPG Scale

Research Question 1: What are the dimensions of BHPG Scale?

As was reported in the former section, scale development process had been realized in 4 steps as (1) item construction, (2) expert opinion, (3) pilot testing, and (4) main study. The results obtained through these steps are presented in the following sections.

The first step in developing BHPG scale was constructing an item pool depending on the review of the relevant literature. The literature review revealed that although HPG has been explored in many disciplines concerning the effects of HPG on the nature, economy and social issues, there was no attempt to construct a theoretical framework or a scale to find out beliefs. Therefore, the related literature was examined in terms of effects of HPG elaborated on various aspects like environmental degradation, economic development, climate change, unemployment, quality of human life, and migration. Moreover, popular debates in the related literature, on the effects of HPG on the above mentioned issues, (Engelman, 1997; Kelley, 1988; Nurick &Johnson, 1995; Weeks, 2012) were also guided constructing the scale.

Accordingly, five of the items in the item pool were taken and adapted from the already developed instruments (Dunlap, Van Liere, Mertig & Jones, 2000; Karakoç, 2005; Karakaya, 2009) (Table 4.1). The rest of the draft items of BHPG were written by the researcher. Edward's Criteria (Anderson, 1988), however, were the major source considered while writing the items. A total of 76 draft Likert-type items were decided as first draft of the BHPG scale (see Appendix 1).

Table 4.1

Items of the BHPG adapted from the literature

Original Items	Translation of Adapted Version
Rapid population growth has negative effects on the balance of natural systems (translated from Karakaya, 2009).	Population growth influence natural cycles badly.
Population may grow if my personal value (education, health etc.) does not decrease (translated from Karakaya, 2009).	Population may grow if usage of social services (education, health etc.) is provided by government equally.
Rapid Population Growth would not be a problem if people's welfare is provided (translated from Karakaya, 2009).	Population should grow since it is important for our country's welfare.
We are approaching the limit of the number of people the earth can support (Dunlap, Van Liere, Mertig& Jones, 2000).	We are about to limits for supporting of human life on Earth due to human population growth.
Environmental problems result from the overuse of natural resources rather than population density. (Karakoç, 2005)	Unconscious utilization of natural resources is much more harmful for the environment than HPG.

4.1.1. The Results of Expert Opinion

Research Question 1.a: How do experts classify the dimensions of the BHPG scale?

The draft items in the item pool were examined by the two experts of education for sustainability and were classified with respect to similar characteristics so as to pre-determine the dimensions of the scale. As a result, the dimensions of the scale were pre-determined as (1) population and environment (26 items), (2) population and economy (22 items), and (3) population and society (28 items).

In the light experts' suggestions, several of the items were revised and 14 items were removed from the pool. The reason for removing 14 items is that items did not fit the dimensions described by experts. For instance, the item which is "The rate of HPG should be controlled" was recommended to remove since it did not conform to the nature of proposed dimensions. After these evaluations, the 1st draft of the BHPG scale was comprised of 62 items.

The 1st draft of the BHPG scale was revised and evaluated by three experts from the Department of Elementary Science Education and Department of Sociology for the content-related evidence of validity. Based on expert revisions and feedbacks, items of the BHPG scale was improved or deleted.

As a result, two experts pre-determine three dimensions for BHPG scale and three other experts confirmed the pre-determined dimensions. The 2nd draft of the BHPG scale, before the pilot test, was comprised of 54 items (Appendix 2) and 3 dimensions as displayed in Table 4.2.

Table 4.2

Dimensions and Number of the Items in the Pilot Version of BHPG

Dimensions	Number of Items
Population and Environment	23
Population and Economy	19
Population and Society	12

4.1.2   Results of Pilot Study

Research Question 1.b: Is there any congruence between the results of expert opinion and pilot study with respect to dimensions of BHPG scale?

In order to determine the dimensions of pilot implementation, *Exploratory Factor analysis* (EFA) were administered for the BHPG. In the pilot test, EFA and reliability analysis was conducted by using IBM SPSS Statistics 20 software program. Moreover, demographic information was also requested from the participants like gender, age, department, education level of parents, the number of siblings, and the area that they live in their childhood. In the next sections, the demographic information of participants of pilot study was examined in details.

4.1.2.1 Exploratory Factor Analysis

For the construct validity of the scale, EFA was performed in two stages: factor extraction and factor rotation (Green and Salkind, 2005). In order to decide about the number of factors, principle component analysis (PCA) with unrotated solution was conducted in the initial phase. In the second phase, factors were rotated with a varimax rotation method to make meaningful interpretations for the dimensions.

Before conducting EFA, sample size, Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were tested to provide assumptions for factorability. In order to provide the assumption of sample size, Tabachnick and Fidell (2007) suggested 5 to 1 ratio; that is, five participants to each items were

required for factor analysis. In this study, there are 367 participants, which is sufficient to conduct EFA. Bartlett's test of sphericity (Bartlett, 1954) should be significant (p<.05) and Bartlett's test of sphericity produced a value (*p=.00*) indicating the suitability of the factors for the data. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1974) index should be equal to or greater than 0 .60 (Tabachnick and Fidell, 2007). KMO value was found to be 0.86 for the pilot study. Considering the assumptions, EFA was conducted and analyzed.

In EFA, based on Kaiser (1974) criteria, eigenvalues should exceed 1.0. At the first trial, factor analysis on BHPG derived 12 factors with eigenvalues greater than 1.0. Initial eigenvalues were reported in Table 4.3. Pallant (2007) denoted that scree plots are produced better results for conditions in which many components were extracted based on eigenvalues. In the study, scree plot emerged six factors (*Figure 4.1*).

Table 4.3

Initial Eigenvalues of the Dimensions

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	13,328	24,681	24,681
2	6,313	11,690	36,371
3	2,184	4,045	40,416
4	1,924	3,562	43,978
5	1,580	2,925	46,903
6	1,401	2,594	49,497
7	1,375	2,547	52,044
8	1,266	2,344	54,388
9	1,177	2,179	56,567
10	1,143	2,166	58,683
11	1,052	1,949	60,632
12	1,037	1,921	62,553
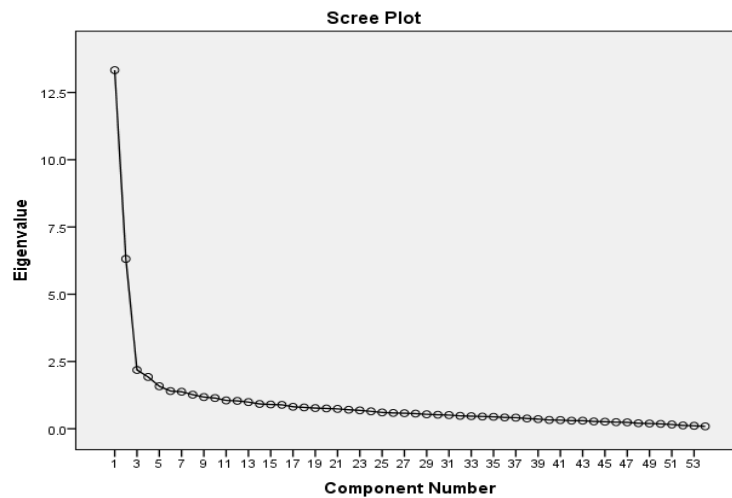
Figure 4.1 Scree Plot

EFA on BHPG produced 12 factors with eigenvalues greater than 1.0. These factors altogether explained 62.6% variance of results. According to scree plot, six factors constituted BHPG. These 6 factors explained 49.5 % of the variance with respect to eigenvalues. Overall, six of twelve factors were represented by items that factor loading higher than 0.30 (Pallant, 2007). Moreover, the proportion of explained variance by the prime factor in valid scales is estimated at least 20% (Reckase 1979). Since Factor 1 accounted for 27.77% of total variance, these results were considered as satisfactory. It suggests the presence of one major factor and thus reinforces the prior evidence pertaining the internal consistency of the HPG.

When the factors were interpreted, 5 factors out of 6 were acquired because the items of Factor 4 were also loaded factor 1 in the rotated component matrix (Appendix 3). The items of 1st factor and those of the 4th reflected beliefs opposed to HPG, so these items may load on the same factor. The only difference is that the items on 4th factor were written by specifically considering the interaction between the quality of human life and population growth. On the other hand, factor 1 considered the disadvantages of HPG more generally than 4th factor like embracing also economic, social and environmental aspects. Moreover, the rotated factor loadings of the items for factor 1 were greater than the ones for 4th factor. Therefore, it is deduced that these items were more suitable for factor 1. Nevertheless, in order to decide the final dimensions

54

of the scale, EFA will be replicated with data of the main study. Pilot items and their factor loadings were given in Table 4.4. Bivariate correlations among variables are presented in Appendix 5. Detailed explanations for deciding final version of the scale with pilot data are summarized in the next section.

Table 4.4

Items and Rotated Factor Loadings

Items	Rotated Factor Loadings	Communalities
Factor 1		
Item 16	.672	.662
Item 27	.449	.576
Item 29	.786	.708
Item 30	.684	.692
Item 32	.639	.551
Item 36	.669	.575
Item 37	.703	.656
Item 15	.563	.770
Item 23	.631	.702
Item 14	.442	.523
Item 40	.669	.739
Item 53	.591	.662
Item 54	.394	.666
Item 12	.451	.769
Item 20	.629	.564
Item 46	.602	.686
Factor 2		
Item 4	.404	.509
Item 10	.671	.641
Item 11	.600	.594

Table 4.4 (cont'd)

Item 13	.528	.658
Item 17	.649	.634
Item 19	.671	.587
Item 24	.737	.622
Item 35	.701	.626
Item 49	.732	.684
Factor 3		
Item 22	.614	.605
Item 25	.572	.668
Item 38	.313	.443
Item 43	.544	.618
Item 52	.662	.587
Factor 4		
Item 2	.631	.626
Item 26	.546	.726
Item 34	.311	.546
Item 48	.540	.618
Factor 5		
Item 28	.417	.588
Item 45	.336	.641
Item 47	.676	.645

Reviewing the BHPG Scale

As a result of pilot implementation of the scale and the EFA, BHPG was revised. Revisions include item deletion, addition, and reconstructions. As a result the final version of the scale comprised of 41 items.

After EFA, six draft items were deleted since these items did not load any of the five dimensions or did not provide consistency within their dimensions in which they loaded. Deleted items were given in Table 4.5.

Table 4.5

Items Deleted from BHPG

Deleted Items	Item Number
There is no relationship between population growth and environmental problems.	1
Preventing population growth will not be enough to solve environmental problems.	7
The economic systems of countries should be reformed regarding the relationship between the population and the environment	21
Population growth has provided economic development for only developed countries	39
Population growth prevents the disappearance of cultural values	41
There is no direct relationship between unemployment and the increasing population in our country	51

On the other hand, seven items were removed after revision since there were items having similar meanings in the BHPG. Deletion of the similar items was decided depending on factor loading values on rotated component matrix table. The items have higher value than the other retained in the final version of the scale. Removed and retained items were reported in Table 4.6.

Table 4.6

Items Removed from final BHPG

Removed Items in Pilot Scale	Retained Items
42) Decreasing the population growth rate will ease our country's economic development	2) Population growth is essential for our country's economic development
5) Population growth reduces the quality of life in our country	12) Population growth reduces the quality of human life for those people living in urban areas
8) In our country, benefitting from social services (such as education, health) is getting more difficult as the population increases.	24) Population growth is not a problem provided that all can equally benefit from the social services provided by the government (such as education, health)
9) It is not the population growth that reduces the carrying capacity of the world, but the overconsumption of natural resources.	52) Today' environmental problems are rooted in the consumption patterns of natural resources of developed countries rather than human population growth
18) Rural to urban migration in our country results in the destruction of cultural values in the areas that people migrate to.	28) Rural to urban migration leads to cultural conflicts
31) Population growth will resolve the problems it creates since it also contributes to the scientific and technological development.	3) Scientists will find solutions for the problems that population growth brings
33) Population growth contributes to the solutions for environmental problems	35) Population growth improves the quality of environment providing that people live in harmony with their environment

Four items were included to the final version of the scale although they did not produce meaningful dimensions in the rotated component matrix. Since these items have essential issues for discussing HPG, in the occasion of discarding those items, the theoretical background may be deficient. Therefore, although it is not as convenient in statistical means, these items, which are essentially be revised, used for the main study. Items are given in Table 4.7.

Table 4.7

Items Included to BHPG

Original Items in Pilot BHPG	Improved Items in Final BHPG	Proposed Factor
3) Scientists will find a solution for problems that population growth brings.	24) Population growth does not constitute a problem provided that scientific and technological developments are able to solve the problems related to population.	Dimension 2
6) Under a socialist regime, population growth does not lead to any problems (such as. environmental, economic or social problems)	3) Population growth does not lead to any problems (environmental, economic, social etc.) as long as individuals are socially equal.	Dimension 2
44) If capitalist systems continue to exist, solving the problems rooted in population growth will be impossible	33) In an economic system that consumption is encouraged, solving the problems rooted from population growth will not be possible	Dimension 4
50) The primary reason for unemployment is to have young population beyond the limits	39) The primary reason for unemployment is the large young population in our country	Dimension 1

Some items were loaded more than one factor. If difference between loadings is greater than .3 (Tabachnick & Fidel, 2007), the items remained in the factors that have greater value. The other items that loading more than two factors in a similar values were revised and rewritten since they may not be understood or have ambiguity. These revised items included for the main study for the final decision. These items were reported in Table 4.8.

Table 4.8

Revised Items for the Final BHPG

Original Version	Final Version	Dimension
12) HPG in urban areas reduces the quality of human life.	6) Population growth reduces the quality of human life for those people living in urban areas	Dimension 1
15) HPG in any area affects human health negatively.	8) Population growth in an area affects human health negatively in the long term.	Dimension 1
28) HPG rooted from migration leads to cultural conflicts.	21) Rural to urban migration leads to cultural conflicts.	Dimension 5
34) Population growth in developing countries does not promote their economic development.	27) Population growth in developing countries is essential for their economic growth.	Dimension 4
35) HPG improve the quality of environment providing that people live in harmony with environment that they live in.	28) Population growth improves the quality of environment providing that people live in harmony with their environment	Dimension 2

Table 4.8 (cont'd)

38) Dispersion patterns of population on earth have much more negative effects on the environment than HPG.	31) Inequable dispersion of human population on Earth has much more negative effects on the environment than HPG.	Dimension 3
44) If capitalist systems continue to exist, solving the problems rooted in population growth will be impossible.	33) In an economic system that consumption is encouraged, solving the problems rooted from HPG will not be possible	Dimension 4
45) Rural to urban migration in our country leads to an increase in environmental problems.	34) In our country, HPG due to rural-urban migration leads to an increase in environmental problems.	Dimension 5
53) There is a direct relationship between HPG and poverty in our country.	41) The number of poor people increase with HPG	Dimension 1
54) We are about to exceed the worlds capacity to support human life Earth.	11) Due to HPG, the world's capacity to support human life is diminishing	Dimension 3

For the final version, five factors were named according to the common characteristics of the items loaded in the same factor. The names of the dimensions and the items were given in Table 4.9.

Table 4.9

Names of Dimensions and the Items

Dimension 1: Population, Nature, and Development

16) There is a direct relationship between population growth and environmental problems

27) One of the reasons for climate change is uncontrolled population growth

29) Population growth causes non-living natural resources (water, air, minerals etc.) to run out.

30) Environmental problems caused by population growth result in economic problems in the long term

32) Education and health services provided by governments reduce its quality because of population growth

36) Immigrants bring about economic problems where they migrate

37) The amount of clean water decreases due to excessive population growth

15) Population growth in any area affects human health negatively

23) National income per capita decrease as the number of our people increase

14) Population growth in underdeveloped countries harms their economy.

40) Population growth influence natural cycles badly

53) There is a direct relationship between HPG and poverty in our country

54) We are about to limits for supporting of human life on Earth

12) Population growth in urban areas reduces the quality of human life.

20) One of the reasons for air pollution is human population growth

46) Population growth in our country increase the demands for energy and this hinders our economic development

Dimension 2: Requirements to support HPG

4) HPG has not negative effects as long as having planned urbanization

10) Countries are not affected by population growth negatively if their citizens are economically productive

Table 4.9 (cont'd)

11) Population can grow if national income per capita is sufficient

13) If a country increases its production, quality of their people's life will be improved.

17) Population can grow as long as people are careful about their consumption habits

19) The number of people can increase as long as it is not harmful for living things

24) Population can grow if usage of social services (education, health etc.) is provided by government equally

35 Population growth improve the quality of environment providing that people live in harmony with environment that they live in

49) Population do not affect the environment negatively providing the fair distribution of natural resources.

Dimension 3: Population, Resources and Environment

22) The primary reason of environmental problems is not population growth but global natural resource management.

25) Consuming natural resources for self interest is much more destructive than population growth itself.

38) Dispersion patterns of human population on Earth has much more negative effects on the environment than population growth

43) Unconscious utilization of natural resources is much more harmful for the environment than population growth

52) Today' environmental problems are rooted from consumption patterns of natural resources of developed countries rather than human population growth

Dimension 4: Population and National Economy

2) Population growth is essential for our country's economic development

26) Population growth should be supported because young population has a crucial role for our country's economic development

34) HPG in developing countries does not promote their economic development

48) Population should grow since it is important for our country's welfare

Table 4.9 (cont'd)

Dimension 5: Population and Migration

28) Rural to urban migration leads to cultural conflicts

45) Rural to urban migration leads to environmental problems in our country

47) Immigrants lose their cultural values and traditions when they move to the cities

Upon the above decisions, factor analysis resulted five independent factors with factor loadings greater than 0.30. A total of 16 items for the 1st factor, 11 items for the 2nd factor, 5 items for 3rd one, 6 items for the 4th one, and 3 items for the 5th factor were decided in the revised version of the scale.

To sum up, pilot version of the scale was 54 items. After EFA, six items were deleted because of not loading any factor, seven items were removed due to having other similar items, four items were decided to include in the main study despite of the statistically inconveniency, and ten items were essentially revised and improved since they loaded more than one factor. The revised version BHPG is composed of 41 items (see Appendix 4.)

According the results of pilot implementation, there is moderately congruence between the dimensions pre-determined by experts and ones proposed in EFA. The elaborated discussions of the dimensions were presented in discussion chapter.

Description of BHPG Dimensions in the Pilot Version of the Scale

In light of the data obtained from EFA, it was shown that items constituting HPG were grouped under 5 factors. The first factor contained belief items related to "Population, Nature and Development". The statements reflected that HPG, environmental degradation, and quality of human life are all interrelated as cited in UN Concise Report on Population, Environment, and Development in 2001. The second factor is titled as "Requirements to support HPG" and contained items related to ideal conditions for supporting population growth like planned urbanization, controlling consumption habits etc. If the conditions are suitable, population may

grow to its limits. The third factor is titled as "Population, resources, and Environment" and the items in these dimensions are linked to beliefs that environmental degradation is not just about the number of people; the management of the natural resources is more crucial determining environmental pollution and the limits for HPG as Raven and Berg cited in the course book *Environment* (2006). Factor 4, *Population and National Economy*, involves national economy and development aspect for HPG. Generally, these items supported that population should increase due to economical and developmental reasons for the countries. Finally, the last factor, *Population and Migration* composed of group of items about the migration of the people and its effects on the environment, culture, and economy.

4.1.2.3 Reliability Analysis of the BHPG

Reliability analysis was conducted by using SPSS 20. Cronbach's coefficient alpha of overall scale produced a value $r = .95$. Reliability analyses were also repeated several times by selecting items that were loaded in the same factor. The reliability values of each dimension were reported in Table 4.10.

Table 4.10

Reliability of factors of BHPG of the Pilot Study

Names of Factors	Cronbach Alpha
Population, Nature, and Development	.96
Requirements to support HPG	.89
Population, Resources, and Environment	.74
Population and National Economy	.76
Population and Migration	.63

Cronbach's alpha value between 0.60 – 0.70 shows acceptable internal consistency, 0.70 – 0.90 shows good reliability, and 0.90 and higher represents excellent internal consistency. The Cronbach's alpha coefficients in this study are between 0.63 and 0.96. Based on these criteria, it can be inferred that BHPG indicates satisfactory reliability values.

4.1.3. Results of the Main Study

Research Question 1.c: Is there any congruence between the results of pilot study and main study with respect to dimensions of BHPG scale?

In order to determine the congruence of dimensions between pilot study and main study, exploratory and confirmatory factor analyses were administered for the BHPG. EFA and reliability analysis was conducted by using IBM SPSS Statistics 20 software program and CFA was utilized by using LISREL 8.8. Demographic information was also requested from the participants like gender, age, department, education level of parents, the number of siblings, and the area that they live in their childhood. In the next sections, the demographic information of participants of main study was reported in details.

4.1.3.1. Results of Exploratory Factor Analysis for the Main Study

Exploratory factor analysis was carried out to find out congruency between the dimensions of pilot and main study before generating a model on the data of the main study. Sample size, Bartlett's test of sphericity and KMO measure of sampling adequacy were checked to provide assumptions for factorability. There were 658 participants in the main study, which is sufficient to conduct EFA. The value of Bartlett's test of sphericity (*p=.00)* indicated the suitability of the factor model for the data. KMO value was found to be 0.93 which is appropriate for EFA. Providing assumptions, EFA was conducted and analyzed.

EFA produced 8 factors with eigenvalues greater than 1.0 (Table 4.11). On the other hand, scree plot indicated six factors (*Figure 4.2*).

Table 4.11

Initial Eigenvalues of the Dimensions of the Main Study

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	10.026	24,453	24,453
2	4.261	10.392	34.845
3	1.998	4.874	39.719
4	1.558	3.801	43.520
5	1.253	3.056	46.575
6	1.145	2.793	49.369
7	1.050	2.562	51.930
8	1.004	2.448	54.379
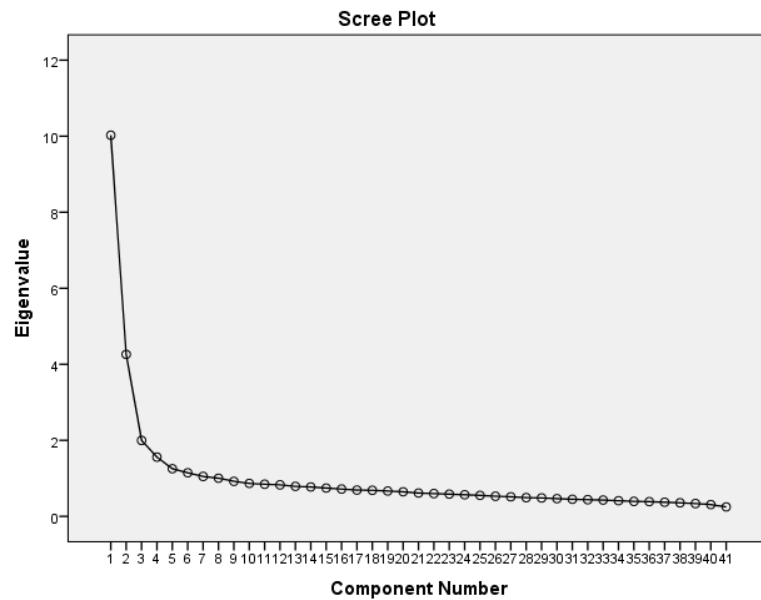
Figure 4.2 Scree Plot in Exploratory Factor Analysis for the Main Study

Principle component analysis with an unrotated solution was conducted and six factors were rotated in the second stage of factor analysis with a varimax rotation method. Besides, three items (item 9, item 25, and item 33) were deleted since they do not load any of the dimensions. Deleted items were given in Table 4.12.

Table 4.12

Deleted Items from BHPG

Deleted Items
9) Population growth in underdeveloped countries harm their economy
25) Population growth influence natural cycles negatively
33) In an economic system that consumption is encouraged, solving the problems rooted from population growth will not be possible

When the factors were compared with the dimensions proposed in pilot study, the factor "quality of human life" that is obscure in pilot study appeared in the main study. In pilot study, the first factor represented the items reflecting the beliefs on the adverse consequences of HPG. However, in the main study, this factor is divided by two meaningful sections named as Neo-Malthusian Environmentalism (Taylor & Barrios, 1999) and Quality of Human Life (Wolff, Chong and Auffhammer, 2011). The other factors *Requirements to support HPG, Population and National Economy, Population, Resources, and Environment,* and *Population and Migration* did not change in the main study. In addition of these, revised items in Table 4.7 and 4.8 loaded on the proposed dimensions in the pilot study. Besides, three items (item 9, item 25, and item 33) were deleted since the factor loadings were below 0.3. The final dimensions and their items presented in Table 4.13.

Table 4.13

Items and Dimensions of Main Study

Name of Dimensions	Item Number
Requirements to support HPG	2-3-5-7-10-12-14-17-24-28-38
Neo-Malthusian Environmentalism	4-11-13-20-22-23-30
Population and National Economy	1-19-27-37
Quality of Human Life	6-8-16-26-35-39-41
Population, Resources and Environment	15-18-31-32-40
Population and Migration	21-29-34-36

A total of 38 items were decided to final version of BHPG. To conclude, the results of main study indicated that there is a considerable congruence between the dimensions of pilot study and the main study. The formation of dimensions and item deletions were discussed in details in the discussion chapter. In the next section, CFA results proposed in EFA of main study were presented.

4.1.3.2. Confirmatory Factor Analysis of Main Study

Confirmatory factor analysis (CFA) is an advanced technique utilized in higher order levels of research in order to test the model proposed by EFA regarding latent variables (Tabachnick & Fidell, 2007). Proposed model in EFA was tested with confirmatory factor analysis. The percentage of missing values was lower than ten percent; therefore, they were replaced with mean scores (Pallant, 2007). The model of confirmatory factor analysis is presented in Figure 4.4.
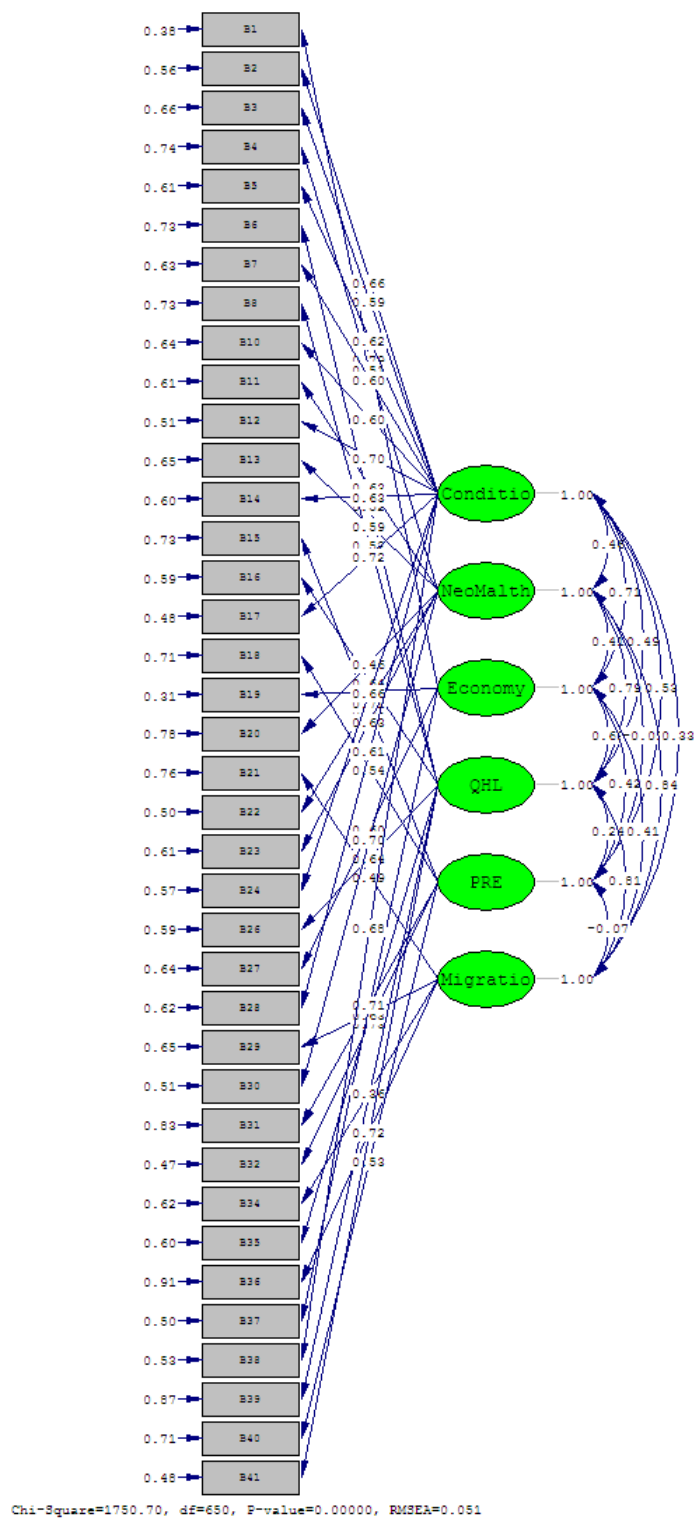
Figure 4.3 Path Diagram of BHPG Dimensions

Multiple goodness-of-fit tests were applied to test the fit between the data from the main study and proposed in EFA. The indices used to test the model were the Root Mean Square Error of Approximation (RMSEA), the Normed Fit Index (NFI), the Comparative Fit Index (CFI), Root Mean Square Residuals (RMR) and Goodness of Fit Index (GFI).

RMSEA represents the error between proposed model and predicted model (Steiger & Lind, 1980) and the value about .05 accepted as good fit, the value between .05 and .08 indicates reasonable fit of the model (Kline, 1998). The value of NFI and CFI greater than .95 indicates good fit; the value between .90 and .95 refers to reasonable fit. On the other hand, the value of RMR less than .05 represents a good fit, the value between .05 and .08 accepted as reasonable fit (Brown, 2006).

All fit indices were checked to confirm the model proposed in EFA and the data set. The RMSEA value is found to be .05 which can be accepted as good fit. The values of NFI (.95) and CFI (.97) represents also good fit. The RMR (.056) value indicates a reasonable fit. The value of Normed Chi-Square (NC) or X^2/df is calculated as 2.69 which can be accepted as a good fit. Overall, the values of the main study confirm that the six-factor model of BHPG has a good fit with the data from the LISREL output.

4.1.3.3. Reliability Analysis of the Main Study

Reliability analysis was calculated by using SPSS 20. Cronbach's coefficient alpha of overall scale produced a value *r = .90*. The reliability values for each factor were reported in Table 4.14.

Table 4.14

Reliability of each factor in BHPG

Names of Factors	Cronbach Alpha
Requirements to Support HPG	*.89*
Neo-Malthusian Environmentalism	*.79*
Population and National Economy	*.81*
Quality of Human life	*.78*
Population, Resources, and Environment	*.66*
Population and Migration	*.60*

The Cronbach's alpha coefficients in this study are between *0.60* and *0.89*. Based on the criteria, it can be inferred that BHPG indicates satisfactory reliability values.

4.5 Pre-service Teachers' Beliefs towards HPG

Research Question 2: What are the pre-service teachers' beliefs towards HPG?

In order to find out the answers, belief scores on the effects of HPG were estimated through descriptive statistics. The percentages, means, and standard deviations were reported for each dimensions of BHPG scale in Table 4.15.

Table 4.15

Descriptive Statistics of Responses with respect to Dimensions

Dimensions	Mean	Standard Deviations	Skewness	Kurtosis
Requirements to Support HPG	3.16	0.70	- 0.34	0.11
Neo-Malthusian Environmentalism	3.81	0.62	- 0.70	0.75
Population and National Economy	2.89	0.82	- 0.01	- 0.40
Quality of Human life	3.34	0.66	- 0.28	- 0.1
Population, Resources, and Environment	3.85	0.60	- 0.65	0.89
Population and Migration	3.73	0.59	- 0.61	0.86

Looking at the first dimension, the mean score of 3.16 over 5 (S.D=0.70) displayed in Table 4.16 indicated these participants could not hold a strong belief towards ideal conditions to support HPG. Figure 4.5 represents the percentages of responses to first dimension. The results revealed that more than half of the participants (58.9%) believe that HPG does not have negative effects as long as having planned urbanization in the cities (item 2) , and with a similar percentage (57.3%) they reported that countries are not affected by HPG if their citizens are economically productive (item 5). Similarly, 43.8 % of the respondents agreed with the statement that as long as citizens have equal opportunities in the community, HPG would not lead any problem in environment, economy, and society (item 3). Approximately half of the participants (47.7%) supported the idea that population may grow if national income per capita is sufficient (item 7) and they reported that (47.6%) as the country increase its production, quality of their life will be better (item 10). However, 40.8 % of the respondents opposed to the beliefs that population may increase as long as it is not harmful for other living things (item 14). On the other hand, respondents' did hardly meet on a common belief when making decision about

the limits of HPG if regulation of consumption habits (item 12), fair usage of public services like education and health (item 17), development of science and technology (item 24), living in harmony with nature (item 28), and fair distribution of natural resources (item 38) were provided. Thus, it may be inferred as a result of the responses given to items of the Dimension 1 that participants support HPG in several circumstances. These circumstances, however, are comprised mainly of the ones related to ensuring standard living conditions and major needs.

■ Disagree ▪ Undecided ▪ Agree

14) The number of people can increase as long as it is not harmful for living things

28) Population growth improves the quality of environment providing that people live in harmony with their environment

12) Population growth is not damaging as long as people are careful about their consumption habits

38) Population do not affect the environment negatively providing there is a fair distribution of natural resources

24) HPG does not constitute a problem provided that scientific and technological developments are able to solve the problems.

17) HPG is not a problem provided that all can equally benefit from the social services provided by the government (such as education, health)

3) Population growth does not lead to any problems (environmental, economic, social etc.) as long as individuals are socially equal

10) If a country increase its production, the quality of people's lives will be improved

7) Population can grow if the national per capita income is sufficient

5) Countries are not affected by HPG negatively if individuals are economically productive

2) Population growth has no negative effects as long as there is planned urbanization

0%   20%   40%   60%   80%   100%

Figure 4.5 Factor 1: Requirements to Support HPG

Figure 4.6 presents the percentage of pre-service teachers' beliefs about the relationship between HPG and environmental degradation. The mean score 3.81 out of 5 (SD=0.62) in Table 4.16 indicated that pre-service teachers were concerned about the consequences of HPG on the environment. Majority of respondents (84.4%) hold a strong belief that there is a direct relationship between HPG and environmental problems (item 4). Similarly, they indicated that HPG is one of the reasons for air pollution (80.9%) in item 13 and climate change (52.6 %) in item 20. In addition to these, more than two-third of respondents (66.7%) believe that we are at about the limit for Earth's capacity to support human life due to HPG (item 11). The results also indicated that pre-service teachers have concern about running out non-living natural resources like minerals and air (76.1%) in item 22 and clean water (71.0%) in item 30 due to HPG. Furthermore, nearly 80% reported that environmental problems caused by HPG leads to economic problem in the long term (item 23). Therefore, according to the responses given for the items of the 2nd dimension, participants of this study have a belief in line with HPG causes/accelerates environmental problems which in turn give rise to economic problems.
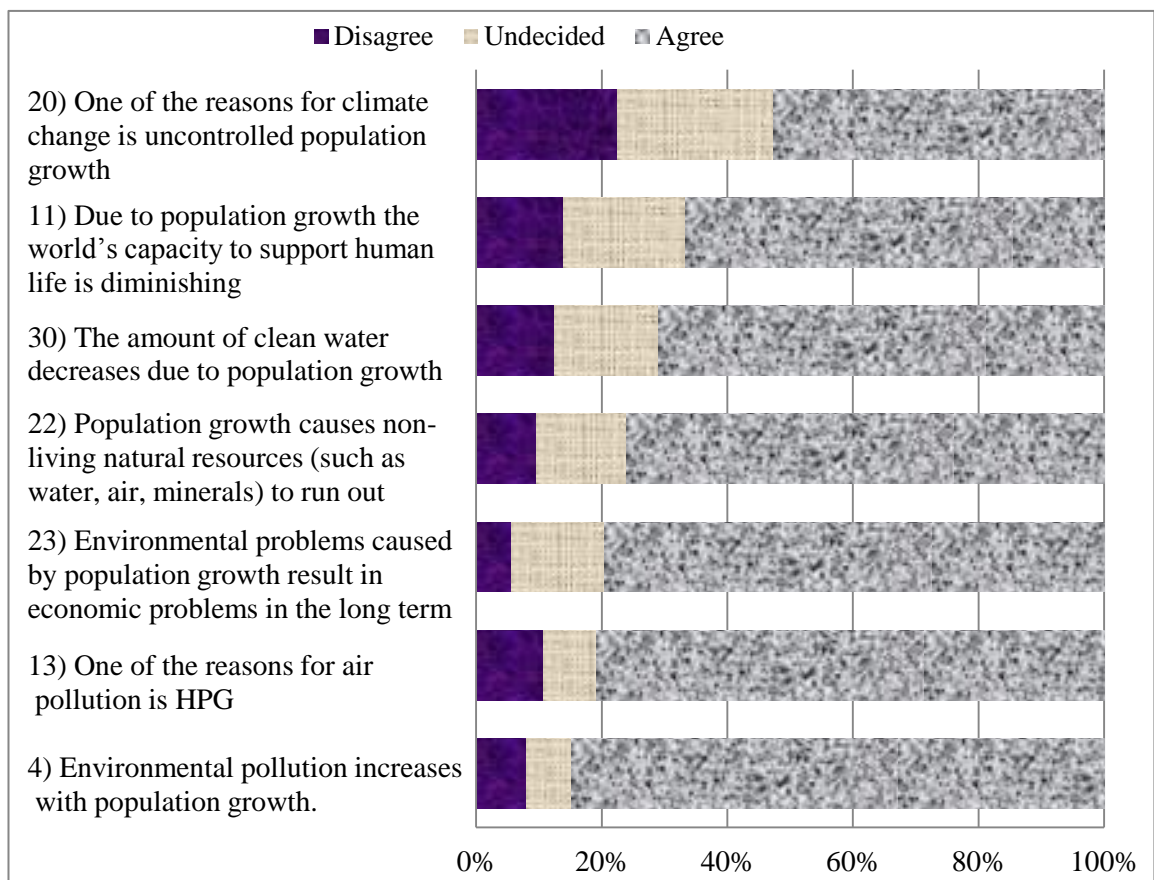
Figure 4.6 Neo-Malthusian Environmentalism

The mean score 2.90 out of 5 (SD= 0.82) in Table 4.16 revealed that the pre-service teachers opposed the beliefs that HPG is essential for national economy and economic growth. The percentages of responses in third dimension were presented in Figure 4.7. For instance, 44.5 % of the respondents disagreed that population growth is essential for national economic development (item 1). Similarly, 53.7% of the participants opposed the idea that population should grow since it is important for country's welfare (item 37). On the other hand, their beliefs were differentiated about supporting HPG since large young population has a crucial role for national development (item 19). More than one-fourth of the respondents were disagreeing with that approach, 33.9% of them were undecided, 39.1% of them were agreeing with that statement. Furthermore, more than one-third of pre-service teachers were undecided (34.2%) about the effect of HPG on economic development in developing

countries (item 27). Therefore, participants seemed as if they are confused or mostly undecided about HPG when economic development is set aside.
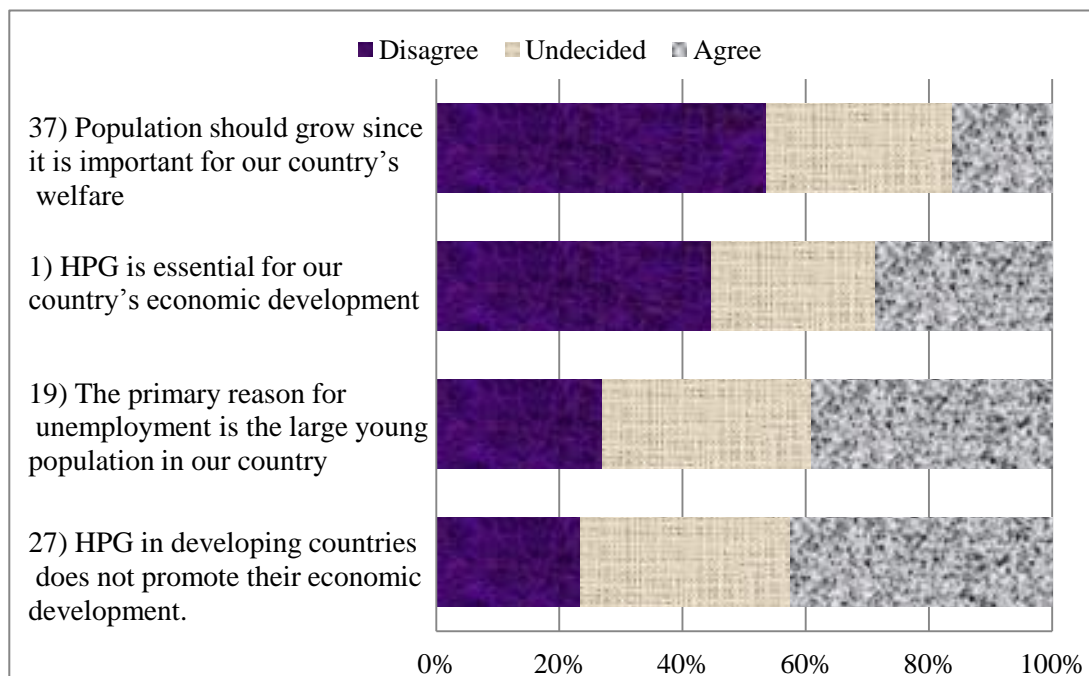
Figure 4.7 Population and National Economy

Considering the fourth dimension of BHPG scale, the mean 3.41 out of 5 (SD=0.68) in Table 4.16 indicated that pre-service teachers were generally undecided about the interaction between HPG and Quality of Human Life. Figure 4.8 presented that 63.2% of pre-service teachers reported that as the number of people increase, national income per capita decreases (item 16) and with a similar percentage, 56.9% of them reflected the quality of education and health services provided by governments reduces because of HPG (item 26). Similarly, more than a half of the participants (54.6%) supported the statement that HPG leads to increase in energy demands and this hinders the national economic development (item 35). In addition, 42.9% of them rejected the statement that the primary reason for unemployment is to have high percentage of young population in our country (item 39). The results also showed that 51.1% of them believe that there is a direct relationship between HPG and the number of poor people (item 41). Furthermore, 43.6% of the respondents reflected the idea that HPG leads to an increase in health problem (item 8). On the other hand, the beliefs of pre-service teachers diverge about that the quality of human

life decreases in urban areas with HPG. To sum up, pre-service teachers moderately believe that HPG leads to decrease in quality of human life (item 6). Furthermore, the responses of this dimensions support the answers stated in dimension *Requirements to Support HPG* by means of quality of human life. In that dimension, pre-service teachers reported that population may grow if quality of human life is provided.

■ Disagree ■ Undecided ■ Agree

39) The primary reason for unemployment is the large young population in our country

6) Population growth reduces the quality of human life for those people living in urban areas

8) Population growth in an area affects human health negatively in the long term.

41) Population growth increases poverty in our country.

35) HPG in our country increases the demands for energy and this hinders our economic development

26) HPG reduces the quality of education and health services provided by the government for the poor.

16) Population can grow if the national per capita income is sufficient for the poor.

Figure 4.8 Quality of Human Life

Looking the fifth dimension, the mean score 3.86 out of 5 (SD=0.60) in Table 4.16 revealed that participants hold a belief that the primary reason of environmental problems is not linked to HPG. In Figure 4.9, pre-service teachers reflected that global natural resource management (59.6%), consuming natural resources for self interest (88.6%), inequable distribution of human population on Earth (68.9%), unsustainable utilization of natural resources (80.4%), and consumption patterns of natural resources of developed countries (60.5%) are responsible for environmental problems rather than HPG. Nevertheless, they agree with the statement (84.0%) in *Neo-Malthusian Environmentalism* "There is a direct relationship between HPG and environmental problems". Moreover, other items in that dimension supported the direct relationship between environmental problems like air pollution, water pollution, climate change and HPG.
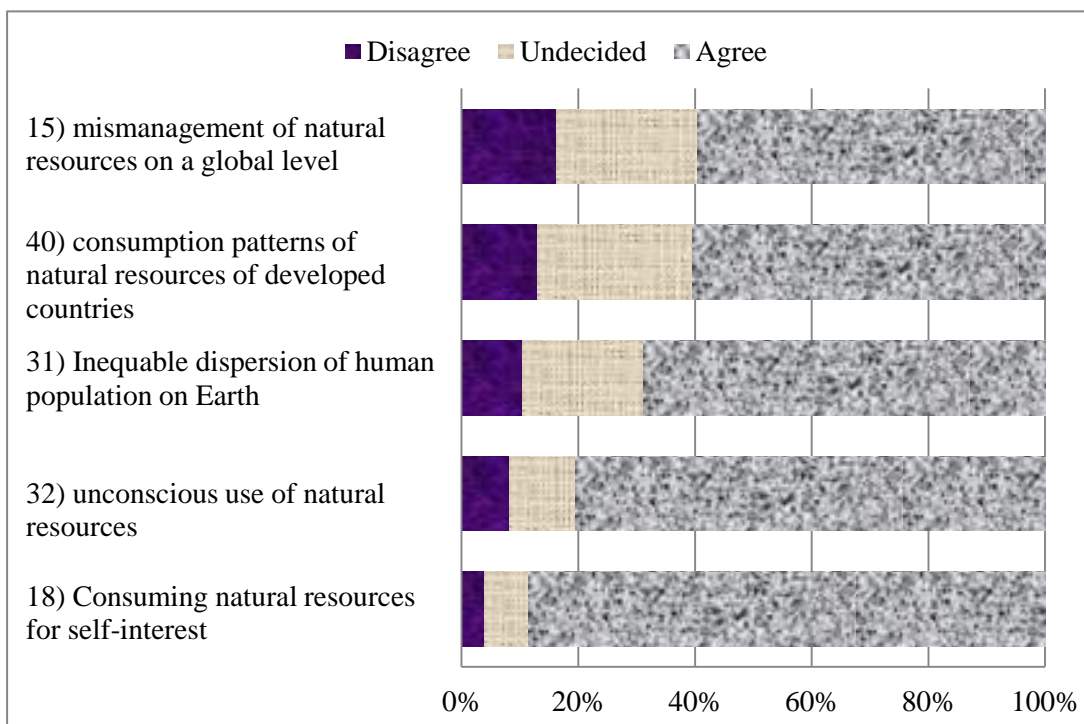
Figure 4.9 Population, Resources, and Environment

The last dimension about HPG and migration were given in Figure 4.10. The mean score 3.73 out of 5 (SD=.59) in Table 4.16 indicated that pre-service teachers hold a belief that migration bring some problems where migration takes place. For instance,

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most of the participants (78.4%) reflected that HPG rooted from migration leads to cultural conflicts (item 21), economic problems (64.5%) in item 29, and environmental problems (83.2%) in item 34. Furthermore, more than half of the pre-service teachers (51.0%) reported that immigrants lose their cultural values and traditions when they move to the cities (items 36). Therefore, according to responses of the dimension, pre-service teachers believe that migration results in environmental problems, economic problems, cultural conflicts and vanishing.
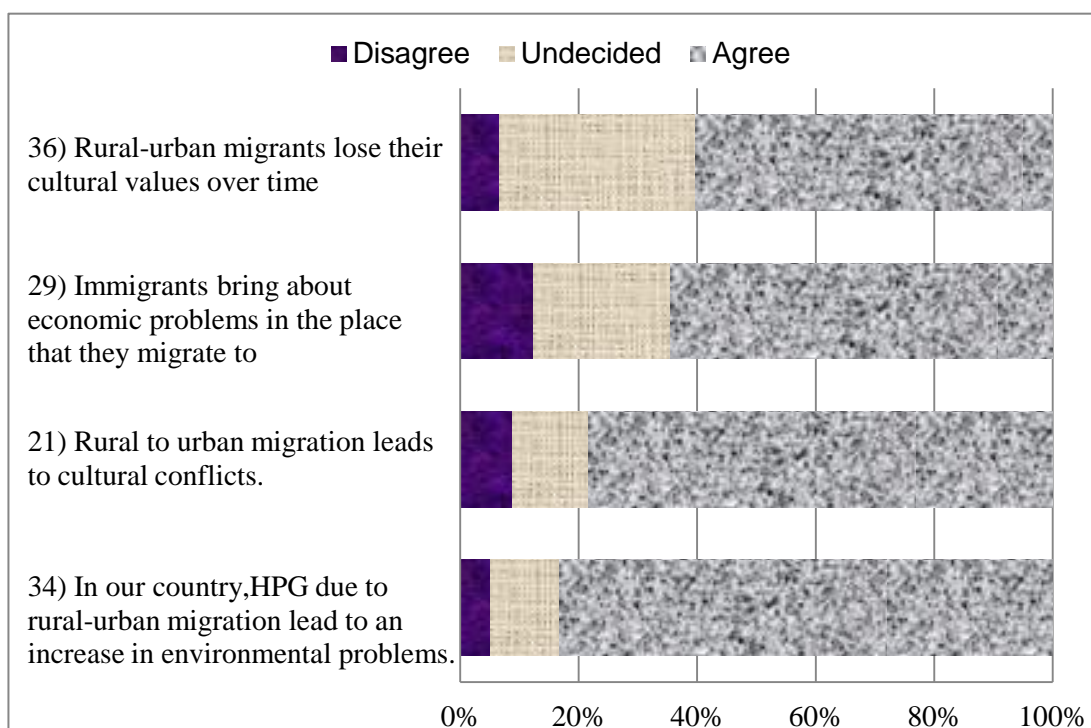
Figure 4.10 Population and Migration

4.1. Summary of Findings of the Study

The study aims to construct a valid and reliable scale about beliefs towards HPG. Moreover, identifying pre-service teachers' beliefs on HPG was another purpose of the current study.

In order to answer the first research question, BHPG scale was constructed. Expert opinions were taken for determining dimensions and item appropriateness. EFA was utilized to explore the dimensions of the pilot scale with the data collected from 367

university students from three public universities. The majority of the participants (88.7%) attained faculty of education. The results of EFA in pilot study revealed that there were six dimensions in the BHPG scale. However, the items of fourth dimensions loaded in first dimension too. Hence, the exact number of dimensions was determined after the main study. In this version, the names of dimensions were as *Population, Nature, and Development, Requirements to Support HPG, Population, Resources and Environment, Population and National Economy, and Population and Migration.* In order to affirm the factor structure of the study, EFA and CFA were conducted with the data of main study obtained from 658 pre-service teachers in METU. The vague dimension loaded in first dimension in the pilot study appeared in the main study. The factor named as *conditions to support HPG* were divided into two factors as *Neo-Malthusian environmentalism* and *quality of human life.* In order to confirm this structure, CFA was conducted. Conforming to EFA results, CFA affirmed six-factor model with multiple goodness-of-fit tests. The RMSEA value is found to be .051, the values of NFI (.95) and CFI (.97) represents also close fit. The RMR (.056) value indicates a reasonable fit. The value of Normed Chi-Square (NC) (Kelloway, 1998) or X^2/df is calculated as 2.69. Overall, the values of the main study confirm that model of BHPG has a good fit proposed in EFA of main study. Furthermore, reliability analyses also indicated that the scale is reliable. The Cronbach alpha values was found to be 0.89 for the first dimension, 0.79 for the second dimension, 0.81 for the third dimension, 0.78 for the fourth dimension, and 0.6 for the fifth dimension. The reliability of the entire scale was calculated as 0.90.

In accordance with the second research question, descriptive statistics were used to identify pre-service teachers' beliefs towards HPG. Mean scores, standard deviations, and skewness and kurtosis values were evaluated in order to identify the profile of the participants. The result of descriptive analysis revealed that the first dimension, the mean score of 3.16 reflected that these participants could not hold a strong belief towards ideal conditions to support HPG. On the other hand, the mean score 3.81 indicated that pre-service teachers have some concerns about the direct relationship between HPG and environmental degradation. The mean score 2.90 third dimension revealed that the pre-service teachers opposed the beliefs that HPG is

essential for national economy and economic growth.Likewise in the first dimension, the mean score 3.41 of fourth dimension also showed that pre-service teachers were generally undecided about the relationship between HPG and Quality of Human Life. The mean score 3.86 of fifth dimension revealed that pre-service teachers believe that the primary reason for environmental problem is not just related with HPG, but global natural resource management, consuming natural resources for self-interest, inequable dispersion of human population on Earth, unconscious utilization of natural resources, and consumption patterns of natural resources of developed countries. The last dimension about HPG and migration were given in Figure 4.9. The mean score 3.73 of last dimension indicated that pre-service teachers reported that migration bring environmental, economic, and cultural problems.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS AND IMPLICATIONS

The present study aimed to construct a valid and reliable scale for the pre-service teachers' beliefs towards HPG. Moreover, identifying pre-service teachers' beliefs were also intended specifically focusing on the effects of HPG. Within the context of the purposes of the study, this chapter covers the interpretations, discussions, and conclusions of the results reported. Furthermore, some implications and suggestions for educational practices are provided.

5.1. The Developed Scale: Beliefs on Human Population Growth Scale (BHPG)

The answer for the first research question in this study is discussed in details in this section. Validity and reliability evidences, dealing with problematic items, and description of dimensions are examined accordingly in the following sections.

5.1.1. Validity and Reliability of BHPG Scale

Valid and reliable scales are substantial elements for analysing the data of the research studies (Fraenkel & Wallen, 2006). Hence, constructing a belief scale for determining pre-service teachers' beliefs towards HPG was primarily aimed in the current study. In this part, the findings of validity and reliability are discussed.

Expert Opinion

Related literature about the effects of HPG and popular debates were examined thoroughly and items were constructed in the light of literature review. The two experts who have extensive research on education for sustainability classified the items with respect to similar characteristics so as to pre-determine the dimensions of the scale. Based on the feedbacks, three dimensions were defined as *Interactions between the Population and the Environment, Population and Economy,* and *Population and Society.* Moreover, several of the items were revised of deleted from

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the pool based on suggestions of the experts. Afterwards, the BHPG scale was revised by three other experts from the Department of Elementary Science Education and Department of Sociology to justify the dimensions and the items' appropriateness. The experts confirmed the pre-determined dimensions and evaluate the items by means of appropriateness. According to revisions, few items of the BHPG scale was improved or deleted. In addition to these, an expert from the Department of Elementary Science Education checked the items' comprehensibility and duration of the implementation of the BHPG scale. All these stages can be regarded as indicators for content-related validity evidence.

Validity and Reliability Evidences of Pilot Study

According to Gravetter and Wallnau (2009), exploratory factor analysis (EFA) was used to explore the dimensions of the newly-developed scales. In pilot version of this study, EFA was administered since BHPG was newly-constructed by the researcher and required to explore the dimensions of the scale. The statistical software, Statistical Package for the Social Sciences (SPSS) version 20 was utilized to analyze the scale's dimensionality. According to EFA results of pilot study, 5 factors emerged as *Population, Environment and Development; Requirements to Support HPG; Population and National Economy; Population, Resources, and Environment,* and *Population and Migration*. These 5 dimensions explain 49.5% of the total variance which can be considered as power of the dimension configuration of the BHPG scale (Çokluk, Şekercioğlu, and Büyüköztürk, 2012). Furthermore, all rotated factor loading values of the items are higher than 0.3 which reveal strong relationship between the items and the dimensions (Stevens, 2002). These results can be interpreted as construct-validity evidence of pilot study.

When the dimensions of pilot study were interpreted, 5 dimensions out of 6 were acquired since the items of Factor 4 were also loaded factor 1 in the rotated component matrix (Appendix 3). The items of these dimensions included belief statements against increasing population, so these items may load on the same factor. The only difference is that the items on 4th factor were written by specifically

considering the interaction between the quality of human life and HPG. On the other hand, factor 1 considered the disadvantages of HPG more generally than 4th factor like embracing also development and environmental aspects. Therefore, it is concluded that these items remained for factor 1. However, in order to decide the final dimensions of the scale, EFA replicated with data of the main study. In addition, reliability analysis of the pilot version of the BHPG scale revealed that the Cronbach's alpha values are sufficient to provide high internal consistency for the dimensions.

Validity and Reliability Evidences of Main Study

In order to determine the final version of the dimensions of the BHPG scale developed in the first part of this thesis, EFA was run with the data obtained for the main study. After the dimensions were constructed, CFA was conducted to confirm the dimensions of final BHPG scale proposed in EFA results. In the main study, confirmatory factor analysis (CFA) was used confirm the dimensions as proposed in EFA by utilizing LISREL 8.8 software program.

The dimension *Population, Environment, and Development* divided into 2 dimensions named as *Neo-Malthusian Environmentalism* and *Quality of Human Life* as predicted in the main study. Nevertheless, this was an expected division since the factor "*Quality of Human Life*" was cross-loaded on the first factor of pilot study "*Population, Environment, and Development*". Hence, 6 factors were decided for the number of dimensions according to EFA results of main study. Besides, three items of the final BHPG scale did not produce consistent structure. In fact, these items were more or less related with the dimensions like *Population and National Economy,* and *Neo-Malthusian Environmentalism* in the scale. This may be due to terms in the items such as 'underdeveloped countries', 'natural cycles', and 'economic system'. The pre-service teachers at METU may not have sufficient background knowledge about the interaction between HPG and the state of underdeveloped country, natural cycles, and economic systems. They may be familiar with these terms; however they may not perceived their interconnectedness

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of HPG. Therefore, it is recommended that these items should be piloted for different samples of other further research studies.

After the 6 dimensions of BHPG scale were established, CFA was utilized to verify the structure of dimensions proposed in EFA results of main study. Overall, the indices of the main study confirm that the six-factor model of BHPG has a good fit with the data from the LISREL output. Reliability analysis of the final version of the BHPG scale revealed that the Cronbach's alpha values are sufficient to provide high internal consistency for the dimensions.

To conclude, the analysis of EFA and CFA results revealed that the BHPG scale can be considered as a powerful evidence for the construct validity evidence of the scale (Crocker &Algina, 1986). The values of fit indices and rotated factor loadings indicated a strong relationship between the items and dimensions. The reliability value of the study revealed high internal consistency.

5.1.2 Discussions on Reviewing the BHPG Scale

A total of 54 items was present in the pilot version of BHPG scale. In the light of result of pilot study, item deletion, addition, and revisions were made. After these processes, 41 items remained for the final version of the scale.

In accordance with the results of EFA, six items were deleted since items either did not load any of the dimensions or the value of the factor loading was below 0.3. Looking at the 6 items, no meaningful clusters were observed with the dimensions of the pilot study. In the BHPG scale, high scores represent supporting beliefs for increasing population, whereas low scores refer to opposing beliefs towards HPG. On the other hand, deleted items do not represent such denotations. To be more specific, any score of item 7 "*Prevention of population growth will not be enough to solve environmental problems*" does not correspond to supporting or opposing beliefs for growing population. Hence, removing items can be regarded as an acceptable revision.

Despite of not producing meaningful dimensions in the rotated component matrix, four items were included to the final version of the scale. Items have essential issues for discussing HPG, while no consistent structure was obtained for the BHPG scale in a statistical manner. To be more specific, items included belief statement about unemployment, improvement in science and technology, and economic systems like capitalist and socialist. These aspects constitute substantial elements in the debates of increasing population. In the occasion of discarding those items, the theoretical background of the study may be deficient. Therefore, items, which are essentially be revised, used for the main study. Accordingly, in the results of main study, three items loaded in the proposed factors in Table 4.7 as expected. However, for the item 33 "*In an economic system that consumption is encouraged, solving the problems rooted from population growth will not be possible*" in the main study, no meaningful dimension was observed. This may be due to not having background about the outcomes of economic systems. Therefore, this item is eliminated from the BHPG scale. However, this item should be piloted in different sample settings where pre-service teachers are conscious about the context.

Items loaded more than one factor were revised and rewritten since they may not be understood or have ambiguity. For instance, pre-service teachers may not understand the item 38 in pilot study "*Dispersion patterns of human population on Earth have much more negative effects on the environment than HPG*" because they may not aware of that people on Earth distributed unequally. Therefore, this item revised as "*Inequable dispersion of human population on Earth has much more negative effects on the environment than HPG*". Similar items were revised and included for the main study for the final decision. In line with the expectations, the items produced meaningful dimensions. Hence, revision of the items can be considered as acceptable for the scale.

To conclude, item revisions, deletions, and additions were reasonable since in the main study, they loaded as predicted in reviewing processes. A total of 41 items was decided to be the final version of the BHPG scale.

5.1.3 Congruency between the Dimensions proposed by Experts and the Results of and Confirmatory Factor Analysis

Experts classified the BHPG items in three dimensions as *Interaction between Population and Environment, Population and Economy,* and *Population and Society*. They described these dimensions according to the similar characteristics of the items. However, the results of study indicated 6-factor model which is moderately congruent with the dimensions proposed by the experts.

The first dimension "*Population and Environment*" proposed by experts divided into two sections as *Neo-Malthusian Environmentalism* and *Population, Resources, and Environment.* The proposed dimension was a general concept regarding the interaction between the HPG and the environment. However, according to the pre-service teachers, this concept was regarded separately as the negative effects of HPG on the environment and adverse consequences of the mismanagement of natural resources on the environment. Pre-service teachers may think that these two concepts have distinctive characteristics; therefore, different dimensions may be observed in the BHPG scale. Furthermore, this separation is compatible with the HPG literature. Neo-Malthusian environmentalism (Ehrlich & Ehrlich, 1972) and mismanagement of natural resources (Raven & Berg, 2006; Weeks, 2012) are two of the most popular arguments among the debates on the effects of HPG. These two points of views are discussed by many authors (Boserup, 1965; Karavelioğlu, 2003; Postel, 1994; Weeks, 2012; and Withgott & Brennon, 2011) in the HPG literature. As defined in the previous journals, Neo-Malthusians defended the idea that HPG result in environmental deterioration and depletion of natural resources (Taylor & Barrios, 1999). On the other hand, this perspective has been criticized by many authors (Raven & Berg, 2006; Sagoff, 1993) by claiming that overconsumption of natural resources have much more detrimental effects than HPG itself. Consistent with the HPG literature, these debates show up as two separate dimensions in the scale.

The second dimension "*Population and Economy*" represents broad context on the relationship between HPG and economic indicators. Nevertheless, the responses of

pre-service teachers revealed that this context should be regarded as two different dimension as *Population and National Economy* and *Quality of Human Life.* The items including the quality of individual lives by means of economy such as national income per capita, unemployment and poverty loaded in the dimension of *Quality of Human Life*, whereas ones linked to national economy should be considered as different aspect. Nevertheless, this separation may not be observed in different sample settings. Pre-service teachers, who may have enough background knowledge about economy, may answer the items of BHPG in a different way so that distribution of items of economy may change in different studies.

The dimension "*Population and Society*" covers the issues related to social concepts such as education, health, and effect of migration. Likewise, this general concept divided into two dimensions as *Quality of Human Life* and *Population and Migration.* In national development plans of Turkey (5th NDP, 1985; and 10th NDP, 2013), unplanned urbanization and negative effects of migration are being reported. As reported in NDPs of Turkey (1963-2013), many people in the metropolitans experience negative effects of migration in the cities. Nearly 40% of the pre-service teachers reported that they live in metropolitans; hence, it is reasonable to observe the dimension *population and migration* in the current study.

Different from above-mentioned dimensions, the items linked to requirements to support the increasing population by means of environment, economy, and society constitute a different dimension rather than dispersing other related dimensions of HPG stated above. The items of this dimensions reflected that population can grow to its limits as long as requirements such as maintenance of social services, planned urbanization, regulation of consumption habits were provided.

To sum up, three dimensions pre-determined by experts are divided into specific dimensions. This BHPG scale may guide educators, curriculum developers and other researchers to explore the characteristics of pre-service teachers' beliefs towards such a controversial issue in order to prepare educational programs focusing on

improving background knowledge and attitudes/behaviours towards HPG and carrying capacity.

Although HPG is widely being discussed in different disciplines, a few studies were conducted in the education literature. Besides, limited number of studies investigated the public opinion about the effects of HPG. As Reeder et al. (1972) suggested, more detailed scales including social and economic problems are needed to identify adults' views and attitudes towards HPG. In this context, this scale may attribute to the literature to interpret beliefs towards the effects of HPG. While other scales emphasized general concern about HPG, this BHPG scale go into details covering the beliefs on the interaction between environment, economic, and social problems. However, the limitation of the current study is that no similar scale is found in the accessible literature and HPG dimensions in any sustainability or environmental scale to compare the findings of the study. Therefore, further evidences are needed to validate the dimensions to improve the quality and efficiency for BHPG scale. Moreover, the findings of the present study revealed that there is a clear need for inferential statistics techniques to identify the variables like gender, family size, etc. that might affect pre-service teachers' beliefs towards HPG.

5.2. Pre-service Teachers' Beliefs towards HPG

In this section, pre-service teacher beliefs towards HPG will be discussed based on descriptive results of the BHPG scale. The beliefs are examined with respect to dimensions.

Dimension 1: Requirements to Support HPG

As far as the descriptive results of the descriptive statistics of the 1st dimension of the BHPGS are considered, pre-service teachers of the present study hold the belief that, increasing population is not a problem, in the condition that the major needs of the people are provided and living standards are not declined. For instance, more than half of the pre-service teachers agree that HPG would not be a problem if planned urbanization exists in metropolitans and social equity is provided.

On the other hand, pre-service teachers consider their economic status by means of national per capita income, and being economically productive. They reflected that if the economic status of individuals were not affected negatively, HPG improve the quality of human life. Therefore, depending on the 2 major outcomes (national income per capita and economic production) described above, it can be inferred that economic status is the essential aspect for the pre-service teachers of this study to support human population growth. They may reject to support HPG if they see HPG as a threat for their economic situations.

The percentages of opponents and proponents are similar to support increasing population in the conditions of regulation of consumption habits, conservation of living things, and fair usage of social services provided by government. The reason for disagreement among pre-service teachers may be rooted from inadequate background knowledge. That is to say, they may not be aware of the effects of overconsumption habits on the carrying capacity of Earth. Hence, they may not reach consensus specifically on this item. Likewise, pre-service teachers of this study may not have enough knowledge about the context of social services provided by government. On the other hand, when the responses about the fair distribution of natural resources, living in harmony with environment, ability of science and technology to solve problems are examined, pre-service teachers remain undecided. This uncertainty may be interpreted as they do not believe in fair distribution of natural resources among countries, science and technology, or living in harmony with nature. They may see that these scenarios are impossible to realize in today's world situations.

Dimension 2: Neo-Malthusian Environmentalism

The pre-service teachers considered the relationship between HPG and environmental degradation as leading adverse consequences to individuals and the nature. To be more specific, majority of the pre-service teachers believe that environmental pollution increase with HPG and HPG contributes to air pollution, exhaustion of non-living natural resources, decrease in clean water, and all these

problems result in economic problems in the long term. This perspective is known as Neo-Malthusian Environmentalism in the literature (Taylor & Barrios, 1999). This approach is criticized by some authorizes (e.g. Marx, 1890) since this perspective claims that environmental degradation and exhaustion of natural resources increase with only HPG and ignore other factors that may affect this equation. In the present study, pre-service teachers may either agree with the Neo-Malthusian Environmentalism or they may not be aware of that there may be other factors stimulating the environmental degradation and exploitation of natural resources. Turkey, as a developing country, is being faced with negative effects of HPG by means of environmental pollution and economic fluctuations, as reported in most of the national development plans (NDP 1963-2013). Hence, pre-service teachers of the current study may be directly exposed to these situations and primary beliefs were constructed due to direct experiences from daily lives. Cullingford (1996) supported that the effects of direct experiences can alter adolescents' views on environmental degradation. On the other hand, the responses related to climate change and limits to support life on Earth have relatively smaller percentages than other items. This may be due to the fact that pre-service teachers may not be aware of the relation of climate change and HPG or they are not informed about the term *carrying capacity*. Unconsciousness of pre-service teachers towards global environmental issues is generally compatible with the sustainability education literature. Tuncer (2008) expressed similar concern about the awareness of university students about environmental issues are not sufficient and they do not have enough background knowledge about the complexity of the issues. To conclude, it is not possible to make inference that pre-service teachers of the present study internalized Neo-Malthusian Environmentalism approach by looking the frequencies of responses of this dimension. Pre-service teachers may be either unconscious the term carrying capacity or they have Neo-Malthusian Environmentalism approach.

Dimension 3: Population and National Economy

Different from economy items in *Requirements to Support HPG*, pre-service teachers do not hold proponent beliefs towards the national economy. Pre-service teachers

believe that population growth is not important for national economic development and country's welfare. This is an unexpected result since percentage of students favouring the economy items in the first dimension would probably support the items linked to national economy. In other words, national per capita income and being economically productive are essential components of economic development and welfare . On the other hand, their beliefs are differentiated about supporting HPG due to role of having young population in development. Similarly, they do not reach consensus about the effects of HPG on developing countries. The reason for this contradiction may be due to the fact that pre-service teachers perceive economic status of individuals as different context from economic development and welfare. That is to say, self-interest has higher priority rather than national economy according to the pre-service teachers of the present study. However, these results may differ in different sample settings if pre-service teachers have economy background knowledge. All the items linked to economy may form as unique dimension in further studies.

Dimension 4: Quality of Human Life

Pre-service teachers in the study reflected that HPG leads to decreasing the quality of human life. For instance, they agree with the idea the number of poor people increasing with HPG; benefitting from social services is getting more difficult as the number of people increases and health problems also rising. They also believe that national per capita decrease as HPG increases and quality of human life reduces in urban areas. Similarly, in national development plans, unemployment, and benefitting social services like education and health are being emphasized since they are substantial elements for quality of human life. Pre-service teachers of this study may witness the negative effects of HPG on quality of human life in Turkey. Consequently, it is acceptable to emerge this dimension since primary beliefs of the pre-service teachers support these statements.

Dimension 5: Population, Resources, and Environment

Surprisingly, majority of pre-service teachers stated the primary reason for environmental degradation is not HPG, but mismanagement of natural resources, unconsciousness and selfish consumption habits of individuals, and inequable dispersion of human population on Earth. This is another unexpected result since in the Neo-Malthusian perspective, pre-service teachers declared that environmental degradation increase with HPG. Hence, it is expected that the responses of two dimensions would not overlap each other. However, exploitation of natural resources is emphasized in national school curricula in Turkey. Therefore, beliefs of this dimension may be formed by outside source (Fishbein & Ajzen, 1976) and informational belief may be constructed by the pre-service teachers in the current study. While pre-service teachers experienced negative effect of HPG in daily life, they also acquire information from outside sources. In other words, pre-service teachers both have primary belief and informational belief on the effects of HPG and these beliefs are not consistent with each other.

Dimension 6: Population and Migration

Lastly, these pre-service teachers stated that migration brings some problems in the areas that people migrate to. While they believe that environmental and economic problems occur, they also reflected that migration leads to cultural conflicts, and immigrants lose their cultural values and traditions when they move to the metropolitans. Nearly half of the pre-service teachers of the current study live in metropolitans and they cope with these problems. Furthermore, outcomes of national development plans indicated migration problem in Turkey. Therefore, this dimension may not be formed in other settings where migration does not lead problem and managed properly.

Belief Evaluation of Sustainability Context

When the beliefs of pre-service teachers are evaluated in terms of sustainability context, it can be adduced that they may not have belief systems based on sustainability context. To be more specific, for the dimension *Requirements to Support HPG*, the items were expected to be agreed higher percentages than the ones for actual responses. The reason for this expectation is that the items in this dimension refer to maintenance of the conditions in a balanced way which pointed out implicitly sustainable development context. The other evidence that pre-service teachers may have inadequate perception on sustainable development is contradiction between responses of two dimensions *Neo-Malthusian Environmentalism* and *Population, Resources, and Environment*. On the one hand, they strongly believe that the primary reason of environmental degradation is not HPG, but management of natural resources. On the other hand, they also hold the belief that environmental pollutions increase with population growth. If they have understanding of sustainability, they may remain undecided about the items linked to interaction between HPG and environmental deterioration. In the same manner, within the context of sustainable development, the responses of economy items are expected to form consistent dimensions by sustainability experts. Nevertheless, pre-service teachers perceived the economy items related to socioeconomic status as different concept than national economy items. In case that they are aware of the interconnectedness of sustainability dimensions, these items can be expected as constituting a unique dimension and indicating consistent agreement or disagreement.

To sum up, pre-service teachers take account of the effects of HPG under six dimensions explained former sections of this chapter. However, when the frequencies of the responses are examined, it can be inferred that they may not have complex and consistent belief systems towards the HPG concept may be rooted from inadequate background knowledge. Likewise, their beliefs may lack of sustainability dimensions and may be constructed rather by direct experiences and outside sources. Moreover, their beliefs may be differentiated due to their gender, department, and

grade level. Therefore, these results may be unique for this sample in the current study.

5.3. Implications and Recommendations of the Study

In this study, pre-service teachers' beliefs towards HPG were examined by administrating BHPG scale at Faculty of Education at METU. In the light of the responses of pre-service teachers, some implications and recommendations are presented in this section.

"Population growth and carrying capacity" is one of the core elements in ESD curricula. Moreover, some of the most populated countries like China, USA have population education programs and related courses about population context (Mfono, 1993). As Turkey is one of the top 20 most populated countries in the world, reorientation of curriculum is needed to address population growth and its effects. Raising awareness of pre-service teachers about HPG may be the first step that should be taken since teachers' beliefs affected their teaching and their students correspondingly. Hence, sustainability education courses in universities should be embedded in the context of population and carrying capacity by focusing on interconnectedness of the relationships between population, environment, development, technology and society in order to improve pre-service teachers' beliefs towards this issue. At this point, BHPG scale can be used by educators to acquire readiness of pre-service teachers or examine the beliefs of pre-service teachers about HPG to construct a population course or to embed the HPG in ESD courses.

Pre-service teachers of the current study have opposing beliefs towards HPG. They believe that population growth has negative effects on the environment, economy, and society. Moreover, they may not have deep understanding of the interactions between human and environment and are not aware of the term *carrying* capacity and its contribution to the effects of HPG. For example, the responses of the pre-service teachers' beliefs indicated that there are overlapping beliefs towards HPG. At one hand, they believe that HPG increases environmental degradation, while they also

hold belief that the primary reason of environmental degradation is not HPG, but management of natural resources. According to this result, it can be deduced that pre-service teachers do not have consistent belief system toward the effect of HPG. Hence, focusing on enriching background knowledge of pre-service teacher may be initial step to change their beliefs towards that issue. Correspondingly, change in beliefs may affect students' conceptions, beliefs, and attitudes towards the effects of HPG. Moreover, emphasizing complex nature of the HPG is essential to construct consistent belief system for pre-service teachers. For this reason, focusing on the beliefs of pre-service teachers should be one of the main objectives of elective ESD courses.

For further studies, recommendations can be listed as following:

- A similar study can be administered with random sampling method from other universities in order to generalize the results in Ankara.
- Nationwide administration of BHPG may be implemented in order to acquire information about beliefs of individuals toward the effects of HPG in Turkey.
- Further study is needed to have more validity and reliability evidences for BHPG scale since it is newly-developed scale and dimensions may change with different sample settings.
- There is a strong need to identify the factors (gender, family size, socio-economic status etc.) that might affect pre-service teachers' beliefs towards HPG. Therefore, utilization of inferential statistics is highly recommended for further studies.
- Further studies including students, pre-service teachers and in-service teachers are needed to enrich the population education literature
- In a sample in which pre-service teachers are aware of the effects of HPG and carrying capacity, longitudinal studies should be conducted and additional scale (e.g. knowledge scale) may be needed.

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APPENDICES

APPENDIX 1: DRAFT VERSION OF THE SCALE

1)	Bugünkü insan nüfusu, dünyamızın insan yaşamını destekleme kapasitesinden daha fazladır.
2)	İnsan nüfusunun artışı ile çevre sorunları arasında bir ilişki yoktur.
3)	Bir bölgedeki insan nüfusu arttıkça, o bölgede çevre sorunları da artmaktadır.
4)	İnsan nüfusunun artması, çevre sorunlarını çözmeye olumlu yönde katkı sağlar.
5)	İnsan nüfusundaki hızlı artış, doğal kaynaklarımızın yok olmasına neden olur.
6)	İnsan nüfusundaki artış ile çevre kirliliği de artmaktadır.
7)	İnsan nüfusunun artmasıyla diğer canlıların tüketimi ve tahribatı artacağından nüfus kontrol altına alınmalıdır.
8)	İklim değişikliğinin nedenlerinden birisi, insan nüfusunun kontrolsüz bir şekilde artmasıdır.
9)	Hızlı nüfus artışı, doğal sistemlerdeki dengeleri olumsuz etkilemektedir.
10)	Çevre sorunlarının asıl sebebi nüfus artışı değil, insanların doğal kaynakları bilinçsizce tüketmesidir.
11)	Çevre sorunlarının asıl sebebi nüfus artışı değil, insanların doğal kaynakları doğru bi birçimde yönetilememesidir.
12)	Dünyamızın taşıma kapasitesi, bugünkü insan nüfusundan daha fazlasını destekleyebilir.
13)	İnsanların doğal kaynakları aşırı tüketimi, dünyanın yaşamı destekleme kapasitesini düşürmektedir
14)	Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.
15)	

16) Dünyada herkese yetecek miktarda doğal kaynak vardır, yeter ki bu kaynaklardan nasıl yararlanacağımızı bilelim.
17) İnsan yaşadığı çevre ile uyumlu olduğu sürece, artan nüfus artışı çevrenin kalitesini de arttıracaktır.
18) Nüfus artışı ile içilebilir temiz su oranı azalmaktadır.
19) Günümüz çevre sorunları, insan nüfusunun artması ile değil, gelişmiş ülkelerin doğal kaynakları tüketmesi sonucu oluşmaktadır.
20) İnsan nüfusunun hızlı artışı, çevre sorunlarının asıl kaynağı değildir.
21) Doğal kaynaklar adil bir biçimde paylaşıldığı sürece, nüfus artışının çevreye bir zararı olmaz
22) Hızlı nüfus artışından daha ziyade, nüfusun dünya üzerindeki yayılımı çevre üzerinde olumsuz etkilere sahiptir.
23) Şehirlerde gitgide artan nüfus artışı, hava kirliliğine önemli ölçüde katkıda bulunmaktadır.
24) Çevre sorunlarının çözümü için insan nüfus artış hızını düşürmek yeterli olmayacaktır.
25) Planlı kentleşme ile artan nüfus, çevre problemlerinin azalmasına sebep olacaktır.
26) Çevre kirliliğinin asıl sebebi nüfus artışı değil, plansız kentleşmedir.
27) Tüketim alışkanlıklarına dikkat edildiği sürece nüfus artışının bir zararı yoktur.
28) Ekonomik kalkınmanın devamlılığı için ülkeler nüfus artış hızlarını kontrol altına almalıdır.
29) Nüfus artışı, ülkemizin ekonomik kalkınması için gereklidir.
30) Ülkemizin refah düzeyinin artması için nüfus artmalıdır.
31) Nüfus artışı ile birlikte ülkemizde yoksulluk da artmaktadır
32) Ülkemizde artan nüfus ile işsizlik oranı arasında doğrudan bir ilişki yoktur.
33) Genç nüfus, ülkenin kalkınmasında önemli bir rol oynadığı için nüfus artışı desteklenmelidir.
34) İşsizlik sorununun temel sebebi, ülkemizdeki genç nüfusun fazla olmasıdır.

35) Nüfusun artması ile göç eden insan, göç ettiği yerde ekonomik sorunların artmasıNa sebep olacaktır.
36) Nüfusun hızlı artması ile birlikte oluşan çevre sorunları, uzun vadede ekonomik sorunlara yol açacaktır.
37) Ülkemizde nüfus artışı ile birlikte yükselen enerji ihtiyacı, ülkemizin ekonomik olarak gelişmesine engel teşkil eder.
38) Mevcut teknoloji ve yaklaşımlarla, ekonomik büyüme ve çevreyi koruma aynı anda mümkün olmayacaktır.
39) İnsan nüfus artışının beraberinde getirdiği sorunların, mevcut ekonomik sistem var oldukça çözülmesi mümkün değildir.
40) Mevcut ekonomik sistem var oldukça, insan nüfusunun artmasından kaynaklanan sorunların çözülmesi mümkün değildir.
41) Ülkemizin nüfus artış hızını düşürmek, ekonomik olarak kalkınmamıza katkı sağlayacaktır.
42) Nüfus artış hızı arttıkça, ülkemizin finansal kapasitesini azaltmaktadır.
43) Mevcut ekonomik sistem, nüfus ve çevre ilişkisi göz önünde bulundurularak yeniden düzenlenmelidir
44) Şu anki ekonomik sistemin çevreye olumsuz bir etkisi yoktur.
45) Ülkemizde nüfus bu şekilde arttıkça, kişi başına düşen gelir azalacaktır.
46) Eğer insanlar üretimi arttırmak için gerekli düzenlemeleri yapmazsa, nüfusun bu denli hızlı artması yaşam kalitesini düşürecektir. İnsanlar üretimi arttırdıkları takdirde nüfus artışı yaşam kalitesini yükseltir.
47) Nüfusun artması sadece gelişmiş ülkelerin ekonomik açıdan gelişmesini??? sağlamıştır.
48) Gelişmekte olan ülkelerdeki nüfus artışı, o ülkelerin ekonomik gelişmesine katkı sağlamaz.
49) Az gelişmiş ülkelerde artan nüfus, o ülkelerin ekonomisini olumsuz yönde etkiler.
50) Nüfus artışı, ülkemizde yaşam kalitesini düşürmektedir

51) Ülkemizde nüfus arttıkça, sağlık imkanlarına ulaşım azalmaktadır.
52) Ülkemizde nüfus arttıkça, eğitim hizmetlerine ulaşma azalmaktadır.
53) Ülkemizde kırsal kesimlerden şehirlere yapılan göçler, göç edilen bölgede kültürel değerlerin yok olmasına sebep olmaktadır.
54) Dünya bugünkü nüfustan daha fazlasını taşıma kapasitesine sahiptir.
55) Nüfusun kontrol edilmesi etik değildir.
56) Bir bölgedeki nüfus artışı, insan sağlığını uzun vadede olumsuz etkilemektedir.
57) Şehirlerde artan nüfus, o şehirde yaşayan insanların yaşam kalitesini düşürmektedir.
58) Kırsal kesimlerden şehirlere yapılan göçler, kültür çatışmalarına yol açmaktadır.
59) Nüfus artış hızının artması, ülkemizin fakir kesime sağladığı eğitim ve sağlık hizmetlerinin kalitesini düşürmektedir
60) Aile planlaması, nüfus kontrolü için önemlidir
61) İnsan nüfusunun artması, kültürel değerlerin korunması açısından önemlidir.
62) Ülkemizde kırsal kesimlerden şehirlere yapılan göçler, göç eden kesimin kültürel değerlerinin zaman içinde yok olmasına sebep olacaktır.
63) Ülkemizdeki insanların köyden kente göç etmesi ile artan nüfus, göç edilen yerde çevre sorunlarının artmasına sebep olmaktadır.
64) Ülkemizde anne ve çocuk sağlığının korunması için, nüfus kontrol altına alınmalıdır.
65) Gıda talebindeki artış, nüfusun artışından daha hızlı bir şekilde artmaktadır.
66) Ülkemizde sağlık imkanlarından eşit faydalanıldığı sürece, nüfus artmasının sakıncası yoktur.
67) Ülkemizde eğitim olanaklarına erişme imkanı olduğu sürece, nüfus artmalıdır.
68) Nüfusun kontrol altına alınması, gelenek ve göreneklerimize uymamaktadır.
69) Bilim insanları nüfus artışının beraberinde getirdiği çevre sorunlarına çözüm bulacaktır.

70) Nüfus artışı, bilim ve teknolojinin gelişimine katkıda bulunacağından, beraberinde getireceği sorunları da çözecektir.
71) Dünyadaki açlık sorunun asıl sebebi nüfus artışı değil, doğal kaynakların adaletsiz dağılmasıdır.
72) Dünyadaki nüfus artış hızı kontrol altına alınmalıdır.
73) Dünyanın nüfus artış hızının kontrol edilmesine gerek yoktur.
74) Nüfus artışının kontrolü sürdürülebilir kalkınma için gereklidir.
75) Sürdürülebilir Kalkınma ilkelerinin uygulanması için nüfusun kontrolü değil, tüketim alışkanlıklarının düzenlenmesi gereklidir.
76) Ülkemizde nüfus artış hızı kontrol altına alınmalıdır.
77) Ülkemizde nüfus artış hızının kontrol edilmesine gerek yoktur.

APPENDIX 2: PILOT VERSION OF SCALE

Nüfus Artışı ve Etkileri Üzerine Görüşleriniz

Aşağıdaki anket, insan nüfusunun son yıllardaki hızlı artışı ve bu artışın etkileri üzerine Orta Doğu Teknik Üniversitesi öğrencilerinin görüşlerini belirlemek amacıyla hazırlanmıştır. Ankette bu konu üzerine görüşler ile her cümlenin karşısında **Kesinlikle Katılıyorum (5), Katılıyorum (4), Kararsızım (3), Katılmıyorum (2), Kesinlikle Katılmıyorum(1)** seçenekleri yer almaktadır. Her maddeyi dikkatlice okuduktan sonra kendinize en uygun seçeneği işaretlemeniz beklenmektedir. Anket yaklaşık 15 dakika sürmektedir.Katılım gönüllülük esasına dayanmaktadır. Ankete katılmayabilir veya istediğiniz zaman anketi doldurmayı bırakabilirsiniz. Kişisel bilgileriniz ve görüşleriniz sadece araştırma amaçlı alınmaktadır ve kesinlikle gizli tutulacaktır. Araştırma ile ilgili oluşabilecek sorularınızla ilgili olarak aşağıdaki adresten iletişime geçebilirsiniz. Katkılarınızdan dolayı teşekkür ederiz.

Sinem ÇOKOĞLU

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Nüfus Artışı: Ankette geçen "Nüfus Artışı" terimi, bir bölgedeki insan sayısında olan artışı nitelemektedir. Bu artış, doğum sayısındaki artışı, ölüm oranının azalması ve bir bölgeye yapılan göçleri de kapsamaktadır.

Taşıma Kapasitesi: Bu terim, bir alanda temel ihtiyaçlarını karşılayarak yaşayabilecek maksimum birey sayısını ifade eder (Withgott & Brennan, 2006). Bir alanın taşıma kapasitesi sabit değildir. O alandaki doğal kaynaklar, yaşayan tür sayısı ve etkileşimleri, teknolojinin etkisi, iklim ve yer şekilleri gibi birçok faktör o alanın taşıma kapasitesini değiştirir. Bu ankette "*Taşıma Kapasitesi*" terimi bir alanda yaşayabilecek maksimum insan sayısını ifade etmektedir.

Çalışmanın amacı konusunda bilgilendirildim ve gönüllü olarak katılmayı kabul ediyorum.

İmza:

_____

A. KİŞİSEL BİLGİLER

1. **Yaşınız:** ……

2. **Cinsiyetiniz:**   Kadın   ☐   Erkek   ☐

3. Eğitim Durumunuz: Lisans ☐   Y. Lisans ☐

     Doktora ☐

4. Okuduğunuz Üniversite / Bölüm: ....

5. Sınıfınız:..

6. Anne ve Babanızın Eğitim Durumu:

Anne	Okuma yazma bilmiyor ☐	İlkokul ☐	Ortaokul ☐	Lise ☐	Üniversite ☐
Baba	Okuma yazma bilmiyor ☐	İlkokul ☐	Ortaokul ☐	Lise ☐	Üniversite ☐

7. Kaç kişilik bir ailede yaşıyorsunuz?...

8. Kaç kardeşsiniz?

     a. Kardeşim yok

     b. İki kardeşiz

     c. Üç kardeşiz

     d. Üçten fazla

9. Büyüdüğünüz Bölge:

a. Marmara Bölgesi   e. Doğu Anadolu Bölgesi

b. Karadeniz Bölgesi   f. İç Anadolu Bölgesi

c. Akdeniz Bölgesi   g. Güney Doğu Anadolu Bölgesi

d. Ege Bölgesi   h. Diğer: ....

C. NÜFUS ARTIŞI VE ETKİLERİ ÜZERİNE GÖRÜŞLERİNİZ

C.1. Aşağıdaki maddeleri dikkatlice okuduktan sonra kendinize en uygun seçeneği işaretleyiniz.

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
1) Nüfus artışı ile çevre sorunları arasında bir ilişki <u>yoktur.</u>	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
2) Nüfus artışı, ülkemizin ekonomik kalkınması için gereklidir.	(1)	(2)	(3)	(4)	(5)
3) Bilim insanları nüfus artışının beraberinde getirdiği çevre sorunlarına çözüm bulacaktır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
4) Planlı kentleşme olduğu sürece, artan nüfusun çevreye olumsuz bir etkisi <u>yoktur.</u>	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
5) Nüfus artışı, ülkemizde yaşam kalitesini düşürmektedir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
6) Sosyalist bir düzende, nüfus artışı herhangi bir soruna (çevresel, ekonomik, sosyal v.b.) sebep olmayacaktır.	(1)	(2)	(3)	(4)	(5)
7) Çevre sorunlarının çözümü için nüfus artışını engellemek yeterli <u>değildir</u>.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
8) Ülkemizde nüfus arttıkça, sosyal hizmetlerden faydalanma (eğitim, sağlık v.b.) zorlaşmaktadır.	(1)	(2)	(3)	(4)	(5)
9) Dünyamızın taşıma kapasitesini azaltan nüfus artışı değil, doğal kaynakların aşırı tüketilmesidir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
10) Bireyleri ekonomik açıdan üretken oldukları sürece, ülkeler nüfus artışından olumsuz etkilenmez.	(1)	(2)	(3)	(4)	(5)
11) Bir ülkede,kişi başına düşen milli gelir yeterli olduğu sürece nüfusartabilir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
12) Şehirlerde artan nüfus, o şehirde yaşayan insanların yaşam kalitesini düşürmektedir.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
13) Ülkeler üretimi arttırdıkları takdirde nüfus artışı o ülkedeki insanların yaşam kalitesini yükseltecektir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
14) Az gelişmiş ülkelerde artan nüfus, o ülkelerin ekonomisini olumsuz yönde etkiler.	(1)	(2)	(3)	(4)	(5)
15) Bir bölgedeki nüfus artışı, insan sağlığını uzun vadede olumsuz etkiler.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
16) Nüfus artışı ile birlikte çevre kirliliği de artmaktadır.	(1)	(2)	(3)	(4)	(5)
17) Tüketim alışkanlıklarına dikkat edildiği sürece nüfus artışının bir zararı yoktur.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
18) Ülkemizde kırsal kesimlerden şehirlere yapılan göçler, göç edilen bölgede kültürel değerlerin yok olmasına sebep olmaktadır.	(1)	(2)	(3)	(4)	(5)
19) Hiçbir canlıya zarar vermediği sürece, nüfusun artmasının herhangi bir sakıncası yoktur.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
20) Hava kirliliğinin nedenlerinden birisi de nüfusun artmasıdır.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
21) Ülkelerin ekonomik sistemleri, nüfus ve çevre ilişkisi göz önünde bulundurularak yeniden düzenlenmelidir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
22) Çevre sorunlarının asıl sebebi nüfus artışı değil, doğal kaynakların küresel boyutta doğru biçimde yönetilememesidir.	(1)	(2)	(3)	(4)	(5)
23) Ülkemizde nüfus arttıkça, kişi başına düşen gelir azalacaktır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
24) Devletin sağladığı sosyal hizmetlerden (eğitim,sağlık v.b) eşit faydalanıldığı sürece, nüfus artışının sakıncası yoktur.	(1)	(2)	(3)	(4)	(5)
25) İnsanların doğal kaynakları kendi çıkarları doğrultusunda tüketmesi, çevreyi nüfus artışından daha hızlı bir şekilde tahrip etmektedir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
26) Genç nüfus, ülkemizin kalkınmasında önemli bir rol oynadığı için nüfus artışı desteklenmelidir.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
27) İklim değişikliğinin nedenlerinden birisi, nüfusun kontrolsüz bir şekilde artmasıdır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
28) Kırsal kesimlerden şehirlere yapılan göçler, kültür çatışmalarına yol açmaktadır.	(1)	(2)	(3)	(4)	(5)
29) Nüfustaki artış, cansız doğal kaynaklarımızın (su,hava, madenler v.b) tükenmesine neden olur.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
30) Nüfusun artması ile birlikte oluşan çevre sorunları, uzun vadede ekonomik sorunlara yol açacaktır.	(1)	(2)	(3)	(4)	(5)
31) Nüfus artışı, bilim ve teknolojinin gelişimine katkıda bulunacağından, beraberinde getireceği sorunları da çözecektir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
32) Nüfusun artması, devletimizin fakir kesime sağladığı eğitim ve sağlık hizmetlerinin kalitesini düşürmektedir.	(1)	(2)	(3)	(4)	(5)
33) Nüfusunun artması, çevre sorunlarının çözülmesine katkı sağlar.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
34) Gelişmekte olan ülkelerdeki nüfus artışı, o ülkelerin ekonomik gelişmesine katkı sağlamaz.	(1)	(2)	(3)	(4)	(5)
35) İnsan yaşadığı çevre ile uyumlu olduğu sürece, nüfus artışı çevrenin kalitesini arttırır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
36) Nüfusun artması ile göç eden insan, göç ettiği yerde ekonomik sorunların artmasına sebep olacaktır.	(1)	(2)	(3)	(4)	(5)
37) Nüfus artışı ile içilebilir temiz su miktarı azalmaktadır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
38)Nüfus artışından ziyade, nüfusun dünya üzerindeki yayılımı çevre üzerinde olumsuz etkilere sahiptir.	(1)	(2)	(3)	(4)	(5)
39) Nüfusun artması sadece gelişmiş ülkelerin ekonomik açıdan gelişmesini sağlamıştır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
40) Nüfus artışı, doğal döngüleri olumsuz etkilemektedir.	(1)	(2)	(3)	(4)	(5)
41) İnsan nüfusunun artması, kültürel değerlerin yok olmasını engeller.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
42) Ülkemizin nüfus artışını yavaşlatmak, ekonomik olarak kalkınmamızı kolaylaştıracaktır.	(1)	(2)	(3)	(4)	(5)
43) Çevre sorunlarının asıl sebebi nüfus artışı değil, insanların doğal kaynakları bilinçsizce tüketmesidir.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
44) Kapitalist sistem var oldukça, insan nüfusunun artmasından kaynaklanan sorunların çözülmesi mümkün değildir.	(1)	(2)	(3)	(4)	(5)
45) Ülkemizdeki insanların köyden kente göçü ile artan şehir nüfusu, çevre sorunlarının artmasına sebep olmaktadır.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
46) Ülkemizde nüfus artışı ile birlikte artan enerji ihtiyacı, ekonomik olarak gelişmemize engel teşkil eder.	(1)	(2)	(3)	(4)	(5)
47) Kırsal bölgelerden şehirlere göç edenler zaman içinde kültürel değerlerini kaybederler.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
48) Ülkemizin refah düzeyinin artması için nüfus artmalıdır.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle Katılıyorum (5)
49) Doğal kaynaklar adil bir biçimde paylaşıldığı sürece, nüfus artışının çevreye bir zararı olmaz.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
50) İşsizlik sorununun temel sebebi, ülkemizdeki genç nüfusun fazla olmasıdır.	(1)	(2)	(3)	(4)	(5)
51) Ülkemizde artan nüfus ile işsizlik oranı arasında doğrudan bir ilişki yoktur.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
52) Günümüz çevre sorunları, nüfustaki artıştan ziyade gelişmiş ülkelerin doğal kaynakları aşırı tüketmesi sonucu oluşmaktadır.	(1)	(2)	(3)	(4)	(5)
53) Nüfus artışı ile birlikte ülkemizde yoksulluk da artmaktadır	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
54) Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.	(1)	(2)	(3)	(4)	(5)

APPENDIX 3: ROTATED COMPONENT MATRIX OF PILOT STUDY

Rotated Component Matrix[a]

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
c29r	.786											
c37r	.703											
c30r	.684											
c16r	.672											
c40r	.669	.332										
c36r	.669											
c32r	.639											
c23r	.631			.393								
c20r	.629							-.315				
c46r	.602					.390						
c53r	.591							.372				
c8r	.580											
c15r	.563	.404		.450								
c45r	.538					.336	.328					
c21	-.479		.329									
c33	.470	.333			.352							
c27r	.449			.312								
c54r	.394			.369								
c42r	.363						.310					-.315
c24		.737										
c49		.732										
c35		.701										
c10		.671										
c19		.671										
c17	.302	.649										
c11		.600		.314								
c26		.583			.546							
c13		.528									.450	
c31		.514			.368							
c4		.434								.304		
c52			.662									
c22		.406	.614									
c9		.373	.605									
c25			.572						.337			
c43		.413	.544									
c34r			.469		.311							
c12r	.451			.657								
c5r	.346	.379		.639								
c2		.367			.631							
c48		.473			.540							
c18r				.314		.693						.319
c47r	.329					.676						
c28r	.413					.417		.359				
c38	-.326		.313			-.378						
c44r							.786					
c6							-.396			.377		.346
c51								.596				
c7									.738			
c14r	.442								-.465			
c3										.710		
c41											.601	
c50r	.324							.358			-.409	
c1	.357											.569
c39r												-.558

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APPENDIX 4: FINAL VERSION OF THE SCALE

Nüfus Artışı ve Etkileri Üzerine Görüşleriniz (ANA ÇALIŞMA)

Aşağıdaki anket, insan nüfusunun son yıllardaki hızlı artışı ve bu artışın etkileri üzerine Orta Doğu Teknik Üniversitesi öğrencilerinin görüşlerini belirlemek amacıyla hazırlanmıştır. Ankette bu konu üzerine görüşler ve karşılarında **Kesinlikle Katılıyorum (5), Katılıyorum (4), Kararsızım (3), Katılmıyorum (2), Kesinlikle Katılmıyorum(1)** seçenekleri yer almaktadır. Her maddeyi dikkatlice okuduktan sonra kendi görüşünüzü en iyi yansıtan seçeneği işaretlemeniz beklenmektedir. Anket yaklaşık 15 dakika sürmektedir. Katılım gönüllülük esasına dayanmaktadır. Ankete katılmayabilir veya istediğiniz zaman anketi doldurmayı bırakabilirsiniz. Kişisel bilgileriniz ve görüşleriniz sadece araştırma amaçlı alınmaktadır ve kesinlikle gizli tutulacaktır. Araştırma ile ilgili oluşabilecek sorularınızla ilgili olarak aşağıdaki adresten iletişime geçebilirsiniz. Katkılarınızdan dolayı teşekkür ederiz.

Sinem DEMİRCİ

ODTÜ İlköğretim Fen ve Matematik Alanları Eğitimi

Araştırma Görevlisi

e-posta: cosinem@metu.edu.tr

Tel: 0312 210 40 59

Nüfus Artışı: Bir bölgedeki insan sayısında olan artış anlamına gelir. Bu artış, doğum sayısındaki artışı, ölüm oranının azalması ve bir bölgeye yapılan göçleri de kapsamaktadır.

Taşıma Kapasitesi: Bu terim, bir alanda temel ihtiyaçlarını karşılayarak yaşayabilecek maksimum birey sayısını ifade eder (Withgott & Brennan, 2006). Bir alanın taşıma kapasitesi sabit değildir. Doğal kaynaklar, yaşayan tür sayısı ve etkileşimleri, teknolojinin etkisi, iklim ve yer şekilleri gibi birçok faktör o alanın taşıma kapasitesini değiştirir. <u>Bu ankette "*Taşıma Kapasitesi*" terimi bir alanda yaşayabilecek maksimum insan sayısını ifade etmektedir.</u>

Çalışmanın amacı konusunda bilgilendirildim ve gönüllü olarak katılmayı kabul ediyorum.

İmza:

_____

B. KİŞİSEL BİLGİLER

10. Yaşınız: ……

11. Cinsiyetiniz: Kadın   ☐   Erkek   ☐

12. Okuduğunuz Üniversite / Bölüm: ....

13. Sınıfı / Dönem:

14. Anne ve Babanızın Eğitim Durumu:

Anne	Okuma yazma bilmiyor ☐	İlkokul ☐	Ortaokul ☐	Lise ☐	Üniversite ☐
Baba	Okuma yazma bilmiyor ☐	İlkokul ☐	Ortaokul ☐	Lise ☐	Üniversite ☐

15. Kaç kişilik bir ailede yaşıyorsunuz?...

16. Kaç kardeşsiniz?

    e. Kardeşim yok   b. İki kardeşiz   **c.** Üç kardeşiz   **d.** Üçten fazla

17. Aşağıda çocukluğunuzun geçtiği yeri tanımlayan en uygun seçeneği işaretleyiniz.

a. Göç alan bir şehirde yaşadım.

b. Göç veren kırsal bir bölgedeyaşadım.

c. Yaşadığım yerde herhangi bir göç hareketi yoktu.

d. Birden fazla şehirde ikamet ettim.

e. Diğer (lütfen belirtiniz.)

_____

C. NÜFUS ARTIŞI VE ETKİLERİ ÜZERİNE GÖRÜŞLERİNİZ

B.1. Aşağıdaki maddeleri dikkatlice okuduktan sonra kendinize en uygun seçeneği işaretleyiniz.

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1) Nüfus artışı, ülkemizin ekonomik olarak kalkınması için gereklidir.	(1)	(2)	(3)	(4)	(5)
2) Planlı kentleşme olduğu sürece, artan nüfusun çevreye olumsuz bir etkisi yoktur.	(1)	(2)	(3)	(4)	(5)
3) Bireyler sosyal açıdan eşit olduğu sürece, nüfus artışı herhangi bir soruna (çevresel, ekonomik, sosyal v.b.) sebep olmaz.	(1)	(2)	(3)	(4)	(5)
4) Nüfus artışı ile birlikte çevre kirliliği de artmaktadır.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
5) Bireyleri ekonomik açıdan üretken oldukları sürece, ülkeler nüfus artışından olumsuz etkilenmez.	(1)	(2)	(3)	(4)	(5)
6) Bir şehirde artan nüfus ile birlikte o şehirdeki insanların yaşam kalitesi de düşer.	(1)	(2)	(3)	(4)	(5)
7) Bir ülkede kişi başına düşen gelir yeterli olduğu sürece nüfus artışının bir sakıncası yoktur.	(1)	(2)	(3)	(4)	(5)
8) Bir bölgede nüfusun artması, o bölgede yaşayan insanların sağlık sorunlarının da artmasına sebep olur.	(1)	(2)	(3)	(4)	(5)
9Az gelişmiş ülkelerde artan nüfus ülke ekonomisini olumsuz etkiler.	(1)	(2)	(3)	(4)	(5)
10)) Ülkeler üretimi arttırdıkları takdirde nüfus artışı, yaşam kalitesini yükseltir.	(1)	(2)	(3)	(4)	(5)
11) Nüfus artışı sebebiyle dünyanın insan yaşamını destekleme kapasitesi dolmaktadır.	(1)	(2)	(3)	(4)	(5)
12) Tüketim alışkanlıklarına dikkat edildiği sürece nüfus artışının bir zararı yoktur.	(1)	(2)	(3)	(4)	(5)
13) Hava kirliliğinin nedenlerinden birisi de nüfus artışıdır..	(1)	(2)	(3)	(4)	(5)
14) Hiçbir canlıya zarar vermediği sürece, nüfus artışının bir sakıncası yoktur.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
15) Çevre sorunlarının asıl sebebi nüfus artışı değil, doğal kaynakların küresel boyutta doğru <u>yönetilememesidir</u>.	(1)	(2)	(3)	(4)	(5)
16) Ülkemizde nüfus arttıkça, kişi başına düşen gelir azalacaktır.	(1)	(2)	(3)	(4)	(5)
17) Devletin sağladığı sosyal hizmetlerden (eğitim,sağlık v.b) eşit faydalanıldığı sürece, nüfus artışının sakıncası yoktur.	(1)	(2)	(3)	(4)	(5)
18) İnsanların doğal kaynakları kendi çıkarları doğrultusunda tüketmesi, çevreyi nüfus artışından daha hızlı tahrip etmektedir.	(1)	(2)	(3)	(4)	(5)
19) Genç nüfus, ülkemizin kalkınmasında önemli bir rol oynadığı için nüfus artışı desteklenmelidir.	(1)	(2)	(3)	(4)	(5)
20) İklim değişikliğinin nedenlerinden birisi, nüfusun kontrolsüz bir şekilde artmasıdır.	(1)	(2)	(3)	(4)	(5)
21) Göçle birlikte artan nüfus, kültür çatışmalarına yol açar. .	(1)	(2)	(3)	(4)	(5)
22) Nüfustaki artış, cansız doğal kaynaklarımızın (su,hava, madenler v.b) tükenmesine neden olur.	(1)	(2)	(3)	(4)	(5)
23) Nüfusun artması ile birlikte oluşan çevre sorunları, uzun vadede ekonomik sorunlara yol açar.	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
24) Bilim ve teknolojinin gelişimi, nüfustan kaynaklı problemleri çözdüğü sürece nüfus artışı <u>sorun yaratmaz</u>.	(1)	(2)	(3)	(4)	(5)
25) Nüfus artışı, doğal döngüleri olumsuz etkilemektedir.	(1)	(2)	(3)	(4)	(5)
26) Nüfus artışı, devletimizin fakir kesime sağladığı eğitim ve sağlık hizmetlerinin kalitesini düşürmektedir.	(1)	(2)	(3)	(4)	(5)
27) Gelişmekte olan ülkelerdeki nüfus artışı, o ülkelerin ekonomik büyümeleri için gereklidir.	(1)	(2)	(3)	(4)	(5)
28) İnsan yaşadığı çevre ile uyumlu olduğu sürece, nüfus artışı çevrenin korunmasını sağlar.	(1)	(2)	(3)	(4)	(5)
29) Nüfusun artması ile göç eden insan, göç ettiği yerde ekonomik sorunların artmasına sebep olur.	(1)	(2)	(3)	(4)	(5)
30)Nüfus artışı ile içilebilir temiz su miktarı azalır.	(1)	(2)	(3)	(4)	(5)
31) Nüfus artışından ziyade, nüfusun dünya üzerindeki dengesiz dağılımı çevreyi olumsuz etkiler.	(1)	(2)	(3)	(4)	(5)
32) Çevre sorunlarının asıl sebebi nüfus artışı değil, insanların doğal kaynakları bilinçsizce tüketmesidir.	(1)	(2)	(3)	(4)	(5)
33) Sürekli tüketmeye teşvik edilen bir ekonomik sistemde, nüfus artışından kaynaklanan sorunların çözülmesi <u>mümkün değildir.</u>	(1)	(2)	(3)	(4)	(5)

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
34) Ülkemizde göç ile artan şehir nüfusu, o bölgede çevre sorunlarının artmasına sebep olmaktadır.	(1)	(2)	(3)	(4)	(5)
35) Nüfus ile birlikte artan enerji ihtiyacı, ekonomik olarak gelişmemize engeller.	(1)	(2)	(3)	(4)	(5)
36) Kırsal bölgelerden şehirlere göç edenler zaman içinde kültürel değerlerini kaybederler.	(1)	(2)	(3)	(4)	(5)
37) Ülkemizin refah düzeyinin artması için nüfus artmalıdır.	(1)	(2)	(3)	(4)	(5)
38) Doğal kaynaklar adil bir biçimde paylaşıldığı sürece, nüfus artışının çevreye bir zararı olmaz.	(1)	(2)	(3)	(4)	(5)
39) İşsizlik sorununun temel sebebi, ülkemizdeki genç nüfusun fazla olmasıdır.	(1)	(2)	(3)	(4)	(5)
40) Günümüz çevre sorunları, nüfustaki artıştan ziyade gelişmiş ülkelerin doğal kaynakları aşırı tüketmesi sonucu oluşmaktadır.	(1)	(2)	(3)	(4)	(5)
41) Nüfus arttıkça yoksul insanların sayısı da artar.	(1)	(2)	(3)	(4)	(5)

BIVARIATE CORRELATION BETWEEN VARIABLES

Correlations

		require	neomal	popanec	qhl	natres	mig
require	Pearson Correlation	1	.369	.603	.400	.419	.213
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	658	658	658	658	658	658
neomal	Pearson Correlation	.369	1	.326	.616	-.018	.523
	Sig. (2-tailed)	.000		.000	.000	.641	.000
	N	658	658	658	658	658	658
popanec	Pearson Correlation	.603	.326	1	.550	.328	.243
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	658	658	658	658	658	658
qhl	Pearson Correlation	.400	.616	.550[**]	1	.175	.503
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	658	658	658	658	658	658
natres	Pearson Correlation	.419	-.018	.328	.175	1	-.058
	Sig. (2-tailed)	.000	.641	.000	.000		.138
	N	658	658	658	658	658	658
mig	Pearson Correlation	.213	.523	.243[**]	.503[**]	-.058	1
	Sig. (2-tailed)	.000	.000	.000	.000	.138	
	N	658	658	658	658	658	658

APPENDIX 6

TURKISH SUMMARY

Giriş

Dünya üzerindeki bütün insanlar barınma, giyim ve sağlıklı beslenme gibi temel ihtiyaçlarını karşılamak istemektedirler. Ancak, dünyanın mevcut durumu incelendiğinde özellikle hızlı nüfus artışı olan ülkelerdeki bireylerin bu temel gereksinimlerini karşılamada bazı sorunlar yaşandığı gözlenmektedir (Raven & Berg, 2006). Bununla birlikte, nüfus, çevre, ekonomik sistemler ve insan yaşam kalitesi arasındaki etkileşimler üzerine ortak bir görüş birliğine varılamamıştır. Farklı disiplinlerdeki uzmanlar (ör. Ehrlich & Ehrlich, 1972; Hardin & Baden 1977; Wilson, 2002) insan nüfus artışının uzun vadede olası etkileri ve bu etkilerin çözümleri üzerine değişik argumanlar ortaya koymaktadır.

İnsan nüfus artışının etkileri üzerine artan endişeler tarih boyunca nüfus artışı eğilimlerinden kaynaklanmaktadır. İnsan ilk ortaya çıktığında (MÖ 8000) nüfusu yaklaşık olarak 5 milyon olarak tahmin edilmektedir (Ehrlich & Ehrlich, 1977). Dünya nüfusunun 1 milyara ulaşması milyonlarca yıl sürmesine rağmen bugün yaklaşık 7.2 milyar insan yaşamaktadır (United Nations, 1999; United Nations, 2013). Buna ek olarak, 21. yy.'da nüfus artış hızının azalmasına karşın, 2050 yılında dünya üzerinde yaşayacak insan sayısının 9 milyar civarı olması beklenmektedir (United Nations, 2004).

Nüfus artışının mevcut eğilimi, insan sayısının sonsuza kadar artamayacağı düşüncesine yol açmaktadır (Withgott & Brennon, 2011). Ancak, ortaya konulan tartışmaların karmaşık yapısını kavramak için *Taşıma Kapasitesi* tanımını göz önünde bulundurmak gerekir. Bu çalışmada *Taşıma Kapasitesi* terimi, bir alanda mevcut ve gelecek nesilleri göz önünde bulundurarak, doğal kaynakların kapasitesini

aşmadan ve herhangi bir doğal, sosyal, ekonomik ve kültürel bozulmaya sebebiyet vermeden yaşayabilecek maksimum insan sayısını ifade etmektedir (Daily & Ehrlich, 1992). Bir alanın taşıma kapasitesini teknolojik gelişmeler, ekonomik system, doğal kaynak miktarı, kültürel farklılıklar ve tüketim alışkanlıkları gibi birçok factor etkilemektedir. Bu yüzden, herhangi bir alanın taşıma kapasitesini belirlemek güçtür. Bu nedenle, Dünya'nın taşıma kapasitesi ile ilgili 1 milyar ile 33 milyar arasında değişen çeşitli senaryolar bulunmaktadır (Withgott & Brennon, 2011).

Nüfus artışı ve taşıma kapasitesi ile ilgili tartışmalar hem dünyada hem de Türkiye'de önemli bir yer tutmaktadır. Özellikle 80'li yıllardan sonra bu konularla ilgili birçok kitap ve makale basılmakta, bilimsel kongreler ve çalıştaylar düzenlenmektedir (Johnson & Nurick, 1995). Yine de, konularla ilgili herhangi bir görüş birliğine varılamamıştır. Örneğin, bazı bilim insanlarına göre insan nüfusundaki artış çevre sorunlarına sebep olmaktadır (Raven & Berg, 2006). Birleşmiş Milletler Nüfus Fonu (1995) atmosferik kirlilik, su kirliliği, toprak kirliliği, çölleşme, küresel ısınma ve ormansızlaşma gibi çevre problemlerinin insan nüfusundaki artıştan kaynaklanabileceğini işaret etmektedir. Öte yandan, ekonomistler nüfus artışı ve ekonomik kalkınma arasındaki etkileşim konusunda herhangi bir ortak noktada buluşmamaktadır (Kelley, 1988). Örneğin, Boserup (1965) ve Clark (1967) nüfus artışının ekonomik gelişme için bir önkoşul olarak görürken, bazı ekonomistler bu artışın ekonomik gelişmeyi engellendiğini savunmaktadır (Weeks, 2012). Bu anlaşmazlık dışında, Simon (1992) gibi bazı diğer ekonomistler, piyasa ekonomisinin nüfus artışından daha önemli olduğunu ve bu yüzden ekonomik gelişme ve nüfus etkileşimini tartışmanın manasız olduğunu ifade etmektedir. Bilim insanları ve ekonomistlerin dışında, bazı uzmanlar (ör. Sagoff, 1993; Raven & Berg, 2006), istikrarlı nüfus eğilimlerine rağmen gelişmiş ülkelerin tüketim biçimlerinin, çevreyi nüfus artışından daha çok tahrip ettiğini iddia etmektedir.

Dünya üzerindeki birçok ülke, belki de kendi taşıma kapasitelerini aşacak şekilde artan nüfusun etkileriyle baş etmektedir (Coffin, 1993). Bu yüzden, nüfus artışlarını kendi taşıma kapasiteleri içinde devam ettirebilmeleri için, *Sürdürülebilir Kalkınma*

(SK) önemli bir bağlam olarak düşünülebilir (Daily & Ehrlich, 1992). *Sürdürülebilir Kalkınma* tanımı incelendiğinde, nüfus artışı ve taşıma kapasitesi sürdürülebilirlik çerçevesinde önemli birer unsur olarak düşünülebilinir (Engelman, 1997). Bunlara ek olarak, bireylerin bu konu hakkında farkındalıklarını arttırmak da *Sürdürülebilir Kalkınma'nın Amaçları*'nı gerçekleştirmede önemli bir adım olarak farz edilebilir (Global Science Panel on Population in Sustainable Development, 2002).

UNESCO (1982), bireylerin ulusal nüfus hedeflerini hakkında farkındalıklarını arttırmak açısından eğitimin çok önemli bir rolü olduğunu ifade etmektedir. Benzer şekilde, 1992 yılında gerçekleşen Birleşmiş Milletler Konferansı'nın sonucu olan *Agenda 21*'de eğitimin mevcut nesil ve gelecek nesillerin sorunlarını çözebilmek için önemli katkılarının olduğu vurgulanmıştır. Bu yüzden, 21. yy. boyunca örgün ve yaygın eğitimi sürdürülebilirlik bağlamında geliştirmek adına önemli adımlar atılmıştır. Agenda 21 çıktılarına paralel olarak, 1994 yılında gerçekleşen Birleşmiş Milletler Nüfus ve Kalkına Konferansı'nda nüfus artışı konsepti SK programına entegre edilmiştir. Bu konferansta, SK çerçevesinde gerçekleşen ekonomik büyümenin, nüfus artışının olumsuz etkileri ile başa çıkılmasına yardım edeceğine ve nüfus artışı ve kalkınma politikaları arasında denge sağlayacağına vurgu yapılmaktadır (UN, 1994).

Nüfus artışı kavramı, aynı zamanda *Sürdürülebilir Kalkınma için Eğitim* (SKE) kapsamında önemli bir nokta olarak görülmekte ve özellikle nüfus artış hızı fazla olan ülkelerin müfredarında yer almaktadır (Mfono, 1993). Buna ek olarak, Dünya'nın en kalabalık ülkelerinden bazılarının spesifik olarak nüfus eğitimi bulunmaktadır (Mfono, 1993). Türkiye, Dünya nüfus sıralamasında ilk 20 ülke arasında olmasına rağmen (UNFPA, 2013) henüz nüfus eğitimi ile ilgili bir program bulunmamaktadır.

Mckeown (2002) eğitim programlarının sürdürülebilirlik çerçevesinde gözden geçirilmesi için öğretmenlerin katkılarının incelenmesine ihtiyaç olduğunu dile getirmektedir. *SKE* Türkiye'nin fen müfredatına eklenen yeni bir kavram olduğu için, öğretmenlerin bu konu ile ilgili inanış ve düşünceleri önem kazanmaktadır

çünkü öğretmenlerin fikir ve inanışları onların öğretme stillerini de etkilemektedir (Nespor, 1987). Fakat, ulaşılabilir alanyazınında öğretmen inanışları ile ilgili az sayıda çalışma bulunmaktadır (Boon, 2011; Yang, Lam & Wong, 2011). Öte yandan, nüfus artışı üzerine inanışları ile ilgili herhangi bir çalışmaya rastlanmamıştır.

Öğretmenlerin inanışlarının sınıftaki uygulamalarını önemli ölçüde etkilediği için (Pajares, 1992; Richardson, 1996), öğretmen adaylarının nüfus artışı ve etkileri ile ilgili inanışlarını saptamak bu çalışmanın odak noktası olarak belirlenmiştir. Bireylerin inanışları genel olarak onların tutum ve davranışlarını şekillendirir ve ailesel ve kültürel geçmişinden, tecrübelerinden, aldığı eğitimden ve sosyal etkenlerden etkilenir (Bloom, & Ellis, 2009).

Öğretmen adaylarının inanışları üzerine yapılan bilimsel çalışmalar çok yaygın olmasına rağmen, sürdürülebilirlik kapsamında olan inanışları konusunda kısıtlı çalışmalar bulunmaktadır (Bryan, 2012). Öte yandan, nüfus artışı ve etkileri üzerine inanışları üzerine yapılan herhangi bir çalışma ulaşılabilir alanyazınında rastlanmamıştır. Ancak, çevreye yönelik tutum ve davranışları anlamak açısından öğretmen adaylarının nüfus artışı konusundaki inanışlarını saptamak SKE kapsamında önemli bir noktadır (Hines, Hungerford, & Tomera, 1986). Bu bakış açısına parallel olarak, ulaşılabilir alanyazınında mevcut bir ölçek olmadığı için, bu çalışmanın amacı öğretmen adaylarının nüfus artışı ve etkileri üzerine inanışlarını saptayan güvenilir ve geçerli bir ölçek hazırlamak olarak belirlenmiştir. Öğretmen adaylarının bu konudaki inanışlarını belirlemek, onların derslerdeki davranışlarını izah etmek açısından ve nüfus artışı ve taşıma kapasitesi konularını SKE derslerine entegre etmek konusunda ışık tutacağı düşünülmektedir.

Çalışmanın Amacı

Alanyazı taramasında, bu çalışma öğretmen adaylarının nüfus artışı ve etkileri konusundaki inanışlarını ölçen geçerli ve güvenilir bir ölçek oluşturmayı ve öğretmen adaylarının bu konu ile ilgili inanışlarını tanılamayı amaçlamaktadır.

Önemli Terimlerin Tanımları

İnsan Nüfus Artışı: Bu terim mevcut çalışmada artan insan nüfusunun tarih boyunca süren eğilimleri ifade etmek açısından kullanılmaktadır (Raven & Berg, 2006).

Taşıma Kapasitesi: Bu çalışmada *Taşıma Kapasitesi* terimi, bir alanda mevcut ve gelecek nesilleri göz önünde bulundurarak, doğal kaynakların kapasitesini aşmadan ve herhangi bir doğal, sosyal, ekonomik ve kültürel bozulmaya sebebiyet vermeden yaşayabilecek maksimum insan sayısını ifade etmektedir (Daily & Ehrlich, 1992).

Neo-Malthusçu Çevrecilik: Mevcut çalışmada bu terim nüfus artışının çevreye ve doğal kaynakların tükenmesine doğrudan katkı sağladığını (Taylor & Barrios, 1999) ifade eden görüşü ifade etmek için kullanılmaktadır.

Betimsel İnanış: Doğrudan tecrübe ile oluşan inanışları ifade etmek için kullanılan bir terimdir (Fishbein & Ajzen, 1976).

Çıkarımsal İnanış: Mevcut çalışmada bu terim, betimsel inanışlardan türeyen inanışları anlatmak için kullanılmıştır (Fishbein & Ajzen, 1976).

Bilgisel İnanış: Bu terim, televizyon, gazete, dergi, kitap, ders, arkadaşlar gibi dış kaynaklardan elde edilen inanışları ifade etmek için kullanılmaktadır (Fishbein & Ajzen, 1976).

Öğretmen Adayı: Bu terim mevcut çalışmada, Orta Doğu Teknik Üniversitesi Eğitim Fakültesi'nde lisans programına devam eden öğrencileri tanımlamak için kullanılmıştır.

Sürdürülebilir Kalkınma: "...bugünkü neslin ihtiyaçlarını gelecek nesillerin ihtiyaçlarını da gözeterek karşılamak..." (Mackenzie, 2010, p.518)

Çalışmanın Önemi

Son zamanlardaki görüşler nüfus artışı kavramının sürdülülebilir kalkınma bağlamında önemli bir unsur olduğu üzerine birleşmektedir (Global Science Panel on

Population in Sustainable Development, 2002). Nüfusu çok kalabalık olan bazı ülkeler nüfus arışı ve taşıma kapasitesi kavramlarına kendi ulusal eğitim programlarında yer vermeye başlamıştır (Mfono, 1993). Türkiye dünya sıralamasında en kalabalık 20 ülke arasında gösterilmesine rağmen SK tanımı ilköğretim fen müfredatına yeni dahil edilmiş, (Milli Eğitim Bakanlığı [MEB], 2013) nüfus artışı ve taşıma kapasitesi kavramları ise henüz vurgulanmamaktadır. Öte yandan, sürdülebilir kalkınma için eğitim dersleri ülkenin bazı üniversitelerinde seçmeli ders olarak açılmaktadır. Ancak, sürdürülebilirlik ve nüfus artışı ile ilgili araştırmalar Türkiye'de ve dünyada oldukça kısıtlıdır. Bu yüzden, mevcut çalışma ileriteki eğitim alanındaki araştırmalar için ülkemizde SK bağlamında nüfus artışı ve etkileri için bir başlangıç noktası olarak kabul edilebilir. Ayrıca, sürdürülebilir kalkınma amaçlarını gerçekleştirme konusunda da katkı sağlayabilir. Bunların dışında, yeni geliştirilen mevcut ölçek, öğretmen adaylarının bu konudaki inanışlarını tanılayarak, SKE derslerinde öğretmen adaylarının nüfus artışı ve etkileşimlerinin karmaşık yapısını kavramalarına yardımcı olması bağlamında katkı sağlayabilir.

İnsan nüfus artışı alanyazınında, nüfus artışının ekonomi, çevre ve toplum ile etkileşimler üzerine araştırmalar bulunmaktadır (Alkın, 2000; Hirschman, 1958; Keleş, 1972). Ancak bu etkileşimler ile ilgili bir görüş birliğine varılamadığı için daha fazla çalışmaya ihtiyaç duyulmaktadır. Ek olarak, böylesine popüler bir konuda öğretmenlerin rolünü içeren herhangi bir kapsamlı çalışma bulunmamaktadır. Bu sebeple, mevcut çalışma ilgili alanyazınındaki çalışmaları eğitim bakış açısıyla birleştirerek katkıda bulunabilir. Öte yandan, öğretmen adaylarının inanışlarını belirlemek aynı zamanda öğrencilerin de bu konu ile ilgili inanışlarının şekillenmesi konusunda fikir verebilir. Uzun vadede ise, mevcut çalışma eğitimcilere, karar verici mekanizmalara nüfus artışı ve etkileri üzerine inanışlar ile ilgili detaylı bir bilgi sunabilir. Öğretmen eğitimcilerine ise nüfus artışı ve taşıma kapasitesi kavramlarının insan hayatına, ekonomiye ve doğaya etkileri üzerine bir öğretme stratejisi veya öğretim yöntemi geliştirmesine yardımcı olabilir.

Yöntem

Evren ve Örneklem

Araştırma evrenini, Orta Doğu Teknik Üniversitesi Eğitim Fakültesi'nde herhangi bir lisans programına devam eden öğrenciler oluşturmaktadır. Araştırmanın katılımcıları kolaylık örnekleme yolu ile seçilmiş ve araştırmaya gönüllü olarak katılmışlardır. Araştırmanın örneklemi 658 öğretmen adayından oluşmaktadır. Araştırmanın çoğunluğu (77.4%) kadınlardan oluşmaktadır. Öğrencilerin bölümlere göre dağılımlarına bakıldığında İngilizce Öğretmenliği 24.3% ile en fazla katılımcıya, Ortaöğretim Fen ve Matematik Alanları Eğitimi ise en düşük yüzdeye sahiptir.

Araştırma Soruları

Bu araştırmanın iki ana araştırma sorusu bulunmaktadır.

Araştırma Sorusu 1: İnsan Nüfus Artışı Üzerine İnanışlar ölçeğinin boyutları nelerdr?

1.a) Uzmanlar İnsan Nüfus Artışı Üzerine İnanışlar ölçeğinin boyutlarını nasıl sınıflandırmaktadır?

1.b) Uzman görüşü ve pilot çalışmanın sonuçları arasında ölçeğin boyutları açısından herhangi bir örtüşme var mıdır?

1.c) Pilot çalışma ve ana çalışmanın sonuçları arasında ölçeğin boyutları açısından herhangi bir örtüşme var mıdır?

Araştırma Sorusu 2: Öğretmen adaylarının insan nüfus artışı ve etkileri kousunda inanışları nelerdir?

Araştırma Yöntemi

Bu araştırmada nicel çalışmalarda kullanılan tarama yöntemi kullanılmıştır. Tarama yöntemi belirli yönlerini saptamak için bir gruptan bilgi toplama metodu olarak tanımlanmaktadır (Fraenkel & Wallen, 2006).

Veri Toplama Aracı ve Oluşum Süreci

Çalışmanın verileri, araştırmacı tarafından geliştirilen İnsan Nüfus Artışı ile İlgili İnanışlar ölçeği aracılığıyla toplanmıştır. Nüfus alanyazını araştırmalarının sonunda 76 maddeden oluşan bir madde havuzu oluşturulmuş, uzman görüşleri sonucunda 54 maddeye indirilmiştir. İlgili alanyazınında çeşitli makalelerden, ders kitaplarından, konferans çıktılarından ve Türkiye'nin kalkınma planlarından faydalanılmıştır. Uzman görüşü, pilot çalışma ve ana çalışma sonrasında gerekli düzenlemeler yapılmıştır ve ölçeğin son versiyonu 38 adet 5 seçenekli Likert tipi maddelerden oluşmaktadır.

Veri Toplama Süreci

Uygulamalı Etik Araştırma Merkezi'nden etik izinler alındıktan sonra mevcut çalışma için veriler Nisan 2013 – Kasım 2013 tarihleri arasında toplanmıştır. Katılımcılar araştırmaya gönüllü olarak katılmış ve veriler sınıf ortamında araştırmacı tarafından toplanmıştır. Anketin doldurulması ortalama 10 dakika sürmüştür.

Veri Analiz Süreci

Tarama yöntemi ile toplanan veriler nicel araştırma yöntemleri ile analiz edilmiştir. Birinci araştırma sorusu için Açımlayıcı ve Doğrulayıcı Faktör Analizi kullanılmıştır. Açımlayıcı Faktör Analizi'nde ortaya çıkan ölçeğin boyutları, Doğrulayıcı Faktör Analizi yöntemi ile doğrulanmıştır. Öte yandan, ikinci araştırma sorusu için betimsel istatistik yöntemleri kullanılmıştır.

Bulgular ve Tartışma

İnsan Nüfus Artışına Yönelik İnançlar Ölçeği'nin maddeleri, ilgili alanyazını taramasından sonra araştırmacı tarafından yazılmıştır. Ölçeğin boyutlarını saptamak için uzman görüşü alınmış ve dönütler doğrultusunda maddeler üç boyut altında

incelenmiştir: *Nüfus ve Çevre, Nüfus ve Ekonomi* ve *Nüfus ve Toplum*. Ölçeğin boyutlarını istatistiksel olarak belirlemek adına 367 gönüllü katılımcıya ölçeğin pilot versiyonu uygulanmıştır. Açımlayıcı faktör analizine göre mevcut ölçekte 6 boyut elde edilmiştir. Fakat, dördüncü boyuttaki maddeler aynı zamanda birinci boyuta da yüklendiği için pilot çalışma için 5 boyutlu bir yapısı olduğuna tespit edilmiştir. Ancak ana çalışmada, açımlayıcı faktör analizinin tekrar yapılmasına karar verilmiştir. Pilot çalışma sonrasında maddeler *Nüfus, Doğa ve Kalkınma, Nüfus Artışını Desteklemek için Gereksinimler, Nüfus, Doğal Kaynaklar ve Çevre, Nüfus ve Ulusal Ekonomi* ve *Nüfus ve Göç* adı altında 5 boyutta toplanmışlardır. Ölçeğin boyut yapısını doğrulamak adına ana çalışma sonucunda açımlayıcı ve doğrulayıcı faktör analizleri uygulanmıştır. Toplamda 658 öğretmen adayı çalışmaya gönüllü olarak katılmıştır. Pilot çalışmadaki dördüncü boyut ana çalışmada tahmin edildiği gibi tekrar ortaya çıkmıştır. *Nüfus Artışını Desteklemek için Gereksinimler* boyutu ana çalışmada *Neo-Malthusçu Çevrecilik* ve *İnsan Yaşam Kalitesi* olarak iki ayrı boyuta ayrılmıştır. Ana çalışmada elde edilen 6 boyutlu yapıyı teyit etmek adına Doğrulayıcı Faktör Analizi yapılmış ve çoklu uyuşum testleri ile 6 boyutlu yapı doğrulanmıştır. Doğrulayıcı faktör analizi sonuçlarına göre RMSEA değeri .051, NFI değeri .95, CFI değeri .97 olarak bulunmuştur. Öte yandan, RMR değeri .056 olarak hesaplanmıştır. Bütün bu değerler ana çalışmanın iyi uyuşum gösterdiğini ortaya koymaktadır. Ek olarak, güvenilirlik analizleri de ölçeğin güvenilir olduğunu göstermiştir. Ölçeğin Cronbach's alfa değeri 0.90 olarak hesaplanmıştır. Boyutların değerleri ise 0.6 ile 0.89 arasında değişiklik göstermiştir.

İkinci araştırma sorusunu yanıtlamak için betimsel istatistik teknikleri kullanılmıştır. Betimsel analiz sonuçlarına göre öğretmen adayları ideal koşullar sağlandığı takdirde insan nüfusunun artabileceğine inanmaktadır. Öte yandan, öğretmen adayları nüfus artışı ve çevre kirliliği arasında doğrudan bir ilişki olduğunu ifade etmektedir. Aynı zamanda nüfus artışı ve ulusal ekonomi arasındaki olumsuz etkileşimler hususunda olumsuz inanışlara sahip oldukları belirlenmiştir. Birinci boyutla benzer olarak, öğretmen adayları genel olarak nüfus artışı ve yaşam kalitesi ilişkisi konusunda kararsız kalmışlardır. Şaşırtıcı bir biçimde, ikinci boyutta çevre kirliliği ve nüfus

konusunda doğru orantı olduğunu söyleyen öğretmen adayları aynı zamanda bu sorunların temel sebebinin nüfus artışında ziyade doğal kaynakların yönetimi konusundaki sıkıntılardan kaynaklandığına inanmaktadır. Son olarak, öğretmen adayları göç ile birlikte artan nüfusun göç edilen bölgede çevresel, ekonomik ve sosyal sorunlara yol açtığına inanmaktadır. Özetlemek gerekirse, öğretmen adaylarının cevapları incelendiğinde karmaşık bir inanış yapısına sahip olmadıkları çıkarımı yapılmıştır.

Öğretmen adaylarının yanıtları SK bağlamında incelendiğinde bu konudaki inanışlarının yetersiz temel bilgiler yüzünden tutarlı olmadığı çıkarımı yapılmaktadır. Örneğin, *Nüfus Artışını Desteklemek için Gereksinimler* boyutundaki maddelere katılma oranı beklenenden daha az olmuştur. Bu boyuttaki maddelerde üstü kapalı olarak SK vurgulanmaktadır. Öğretmen adaylarının yeterli altyapı bilgisine sahip olmadıklarına dair bir başka kanıt ise *Neo-Malthusçu Çevrecilik* ve *Nüfus, Doğal Kaynaklar ve Çevre* boyutlarındaki katılma oranları arasındaki tutarsızlıklar olabilir. Bir yandan öğretmen adayları güçlü bir şekilde nüfus artışı ile birlikte çevre problemlerinin arttığına inanırken öte yandan doğal kaynaklarının yönetim ve tüketim biçimlerinin çevreyi nüfus artışından daha fazla tahrip ettiğine inanmaktadır. Eğer SK kapsamında bir inanış sistemleri olsaydı *Neo-Malthusçu Çevrecilik* boyutundaki maddeler için daha kararsız bir inanışa sahip olmaları gerekirdi. Aynı şekilde SK bağlamı içerisinde düşünüldüğünde, ekonomi maddelerinin uzmanlar tarafından öngördüğü şekilde ölçekte tek bir boyut oluşturmaları beklenmekteydi. Ancak, öğretmen adayları kendi sosyoekonomik statüleri ile ilgili olan maddeleri ulusal ekonomi ile ilgili etkileşimleri içeren maddelerden farklı bir kavram olarak görmektedirler. Öğretmen adaylarının SK boyutlarının birbiriyle bağlantılı olduğunu fark ettikleri bir durumda bu maddeler tek bir ekonomi boyutu altında toplanmaları gerekirdi.

Özetlemek gerekirse, mevcut çalışma öğretmen adaylarının nüfus artışı ve etkileri ile ilgili inanışları 6 boyut altında olduğunu göstermiştir. Fakat, yanıtların frekansları incelendiğinde öğretmen adaylarının yetersiz altyapı bilgisi yüzünden konu ile ilgili karmaşık ve tutarlı bir inanış sistemleri olmadığı çıkarımı yapılmıştır. Öğretmen

adaylarının inanışları onların doğrudan tecrübelerden ve bilgi edindikleri dış kaynaklardan etkilenmektedir. Bu yüzden, mevcut inanışlarını değiştirmek için altyapı bilgilerini zenginleştirmeye odaklanmak ilk adım olarak düşünülebilir. Buna bağlı olarak, öğretmen adaylarının inanışlarını değiştirmek öğrencilerin de konu ile ilgili kavrayışlarını, inanışlarını ve tutumunun da değişmesini etkileyebilir.

Araştırmanın Varsayımları

Araştırmanın varsayımları aşağıdaki gibi sıralanabilir:

4. Bu çalışma için seçilen inanış ölçeğinin boyutları bu çalışmada bütün olası açıları ele almaktadır.
5. Katılımcıların yanıtlarının güvenilir olduğu varsayılmaktadır.
6. Bu çalışmayı dışarıdan başka bir değişkenin etkilemediği varsayılmaktadır.

Araştırmanın Sınırlılıkları

5. İnsan nüfus artışı ve etkileri üzerine inanışları ölçen herhangi bir ölçeğe ulaşılabilir alanyazınında rastlanmamıştır. Bu yüzden bütün inanışlar dahil edilmemiş olabilitr
6. İnsan nüfus artışının etkileri üzerine herhangi bir görüş birliğine varılamamıştır.
7. Kolaylık Örnekleme yöntemi kullanıldığı için çalışmanın sonuçalrı Ankara'daki bütün öğretmen adaylarına genellenemez.
8. Öğretmen adaylarının inanışları onların kendi ifadeleri ile değerlendirilmiştir.

Doğurgalar

Nüfus artışı ve taşıma kapasitesi kavramları SKE müfredatının önemli unsurlarından biri olarak görülmektedir (Mfono, 1993). SKE kavramı ilköğretim müfredatına yeni eklenen bir konsept olduğu ve Türkiye dünyadaki en kalabalık 20 ülkeden biri olduğu için mevcut müfredatın SKE ve nüfus artışı ilişkisi üzerine yeniden gözden geçirilmesine ihtiyaç vardır. Bireylerin bu etkileşimle ilgili farkındalıklarını arttırmak bu bağlamda belki ilk adım olarak sayılabilir. Bu yüzden üniversitelerde SKE

dersleri nüfus artışı ve taşıma kapasitesi üzerine yoğunlaşarak nüfus, çevre, ekonomi, teknoloji ve toplumla ilişkisini irdelemesi gerekmektedir. Bu noktada, oluşturulan ölçeğin kullanılarak öğretmen adaylarının hazırbulunuşluklarını belirlemek SKE derslerinin içeriğin hazırlanması veya nüfus eğitimi müfredatı hazırlanması konusunda fikirler verebilir.

Bu çalışmada öğretmen adaylarının nüfus artışı ve etkileri ile ilgili genelde nüfus artışını desteklemeyen bir inanışa sahip olduğunu göstermektedir. Katılımcılar nüfus artışının çevreye, ekonomiye ve toplum hayatına olumsuz etkileri olduğunu savunmaktadırlar. Ayrıca, insan-doğa arasındaki ilişki hakkında derin bir bilgiye sahip olmadıkları ve taşıma kapasitesi kavramından haberdar olmadıkları çıkarımı yapılmıştır. Bu yüzden nüfus artışı ve karmaşık etkileşimlerine odaklanmak öğretmen adaylarının tutarlı ve karmaşık inanış sistemi oluşturulmasında öenmli bir yer tutar. Bu sebeple, üniversitelerdeki SKE derslerinde öğretmen adaylarının inanışları da dersin kazanımları arasında yer almalıdır.

İleriki Çalışmalar için Öneriler

İleriki çalışmalar için aşağıdaki öneriler sunulabilir:

- Benzer bir çalışma rasgele örnekleme metodu uygulanarak ülke çapında uygulanabilir.

- Bu çalışmada geliştirilen ölçek yeni bir ölçek olduğu için daha fazla geçerlik ve güvenilirlik çalışmaları yapılabilir.

- Eğitim alanında nüfus artışı ile ilgili kısıtlı çalışmalar olduğu için özellikle cinsiyet, yaş, kardeş sayısı ve yaşanan coğrafi bölge gibi faktörlerin etkisini belirlemek adına çıkarımsal istatistik analizlerine ihtiyaç vardır.

- Öğretmenleri ve öğrencileri içeren çalışmalar alanyazınını zenginleştirmek adına tasarlanabilir.

- Nüfus artışı ve taşıma kapasitesi gibi kavramların etkileri konusunda bilinçli olan bir örneklemde uzun surely çalışmalar tasarlanabilir ve ek olarak başka ölçüm araçlarına ihtiyaç duyulabilir.

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APPENDIX 7

Sayı: 28620816/ 215 - 582

10 Temmuz 2013

Gönderilen: Yrd. Doç. Dr. Elvan Şahin
İlköğretim Bölümü

Gönderen : Prof. Dr. Canan Özgen
IAK Başkanı

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz İlköğretim Bölümü Yüksek Lisans öğrencisi Sinem Çokoğlu Demirci'nin "Türkiye'de ki Nüfus Artışı ile İlgili Üniversite Öğrencilerinin Görüşleri Ve İnançları" isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

10/07/2013

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APPENDIX 8

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☒ X

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : DEMİRCİ
Adı   : SİNEM
Bölümü : İlköğretim Fen ve Matematik Alanları Eğitimi

TEZİN ADI: Development and Validation of Human Population Growth Scale in the Context of Sustainability

TEZİN TÜRÜ : Yüksek Lisans ☒ X   Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☒ X

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: