HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES
Technical Demography Program

THE RELATIONSHIP BETWEEN HOUSEHOLD WELFARE AND EARLY-AGE MORTALITY IN TURKEY: THE EVIDENCE FROM TDHS-2008

BARIŞ UÇAR

Dissertation Submitted in Partial Fulfillment of the Requirements
for the M.A. Degree
in Technical Demography

ANKARA, MAY 2011

HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES
Technical Demography Program

THE RELATIONSHIP BETWEEN HOUSEHOLD WELFARE AND EARLY-AGE MORTALITY IN TURKEY: THE EVIDENCE FROM TDHS-2008

Supervisor
Prof. Dr. İsmet Koç

ANKARA, MAY 2011

This is to certify that we have read and examined this thesis and in our opinion it fulfills the requirements in scope and quality of a thesis for the degree of Master of Arts in Technical Demography.

Jury Members:

Chair.....
Dr. İlknur YÜKSEL-KAPTANOĞLU
Hacettepe University Institute of Population Studies

Member.....
Assoc. Prof. Dr. A. Sinan TÜRKYILMAZ
Hacettepe University Institute of Population Studies

Member.....
Prof. Dr. İsmet KOÇ (Supervisor)
Hacettepe University Institute of Population Studies

This thesis has been accepted by the above-signed members of the Jury and has been confirmed by the Administrative Board of the Institute of Population Studies, Hacettepe University.

…/…/2011

Prof. Dr. Sabahat TEZCAN
Director

ACKNOWLEDGEMENTS

I would like to present appreciation to all those who contributed and made it possible for me to complete this thesis. First of all, I am thankful to my supervisor, Prof. Dr. A. İsmet KOÇ, for the advice and kind support he has provided me with throughout the preparation of this thesis. I am grateful for his supervision from the start of this thesis to the end.

I should also thank my committee members, Dr. İlknur YÜKSEL-KAPTANOĞLU and Assist. Prof. Dr. A. Sinan TÜRKYILMAZ for their expert quality evaluation and suggestions.

I wish to individually thank all of my colorful friends who sense theirselves in the long friends list of my life, especially Can YÜCESOY and Seda Nihal DİKÇINAR. I finally thank to all of the members of my family.

ABSTRACT

This study tries to understand whether there is a relationship between early age mortality and household welfare in Turkey. Data from TDHS-2008 was used in this study. Wealth index was used to measure household welfare. Besides descriptive analyses logistic regression method was realized to understand the determinants of infant mortality for the 1998-2008 birth cohort.

Although wealth index has an effect on infant mortality when no other determinant is included in the model, the results of the logistic regression showed that wealth index is not a determinant of infant mortality when other factors are controlled. This implies that when other factors are equalized wealth index does not have an effect on infant mortality.

Besides smoking in the house, some of the maternal factors such as preceeding and succeding birth intervals, and age of mother at birth were found to be effective on infant mortality in the final model.

Analyses on the determinants of infant mortality in poorer hoseholds put forward that besides the determinants of infant mortality in the general model for poorer households sex of the child, health insurance status and family type was found significant. The explanatory power of the model for poorer households was lower than that of the general model.

Keywords: Early-age mortality, infant mortality, household welfare, wealth index, Turkey

ÖZET

Bu çalışma Türkiye'de erken yaş ölümlülüğü ile hanehalkı refahı arasında bir ilişki olup olmadığını analiz etmektedir. Çalışmada TNSA-2008 verileri kullanılmaktadır. Hanehalkı refahını ölçmek için varlık endeksi kullanılmıştır. 1998-2008 doğum kuşağı için bebek ölümlerini etkileyen faktörleri tespit etmek için tanımlayıcı analizlerin yanı sıra lojistik regresyon yöntemi kullanılmıştır.

Varlık endeksi modelde tek başına iken bebek ölümlülüğü üzerinde bir etkiye sahip olmasına rağmen lojistik regresyon sonuçlarına göre diğer değişkenlerin kontrolü altında modele dahil olmadığı, dolayısıyla bebek ölümlülüğü üzerinde bir etkisi olmadığı görülmüştür. Bu diğer koşullar eşitlendiğinde varlık endeksinin bebek ölümlülüğü üzerinde bir etkisinin olmadığını göstermektedir.

Son modelde evde sigara içilme durumunun yanı sıra doğum aralıklarının ve doğum sırasında annenin yaşının bebek ölümlülüğü üzerinde etkisi olduğu görülmüştür.

Varlık endeksi daha düşük olan haneler için yapılan analizde, bu hanelerde genel modelde yer alan faktörlerin yanı sıra bebeğin cinsiyetinin, sağlık sigortası durumunun ve aile tipinin etkin olduğu görülmüştür. Ayrıca bu için yapılan modelin açıklayıcılığının genel modelden daha düşük olduğu görülmüştür.

Anahtar Kelimeler: Erken yaş ölümlülüğü, bebek ölümlülüğü, hanehalkı refahı, varlık endeksi, Türkiye

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

CMI	Child Mortality Index
DHS	Demographic and Health Survey
GDP	Gross Domestic Product
HUIPS	Hacettepe Institute of Population Studies
IMR	Infant mortality rate
PPP	Purchasing Power Parity
PRB	Population Reference Bureau
SEAR	South East Anatolia Region
SIS	State Institute of Statistics
TDHS	Turkey Demographic and Health Survey
TDS	Turkish Demographic Survey
TURKSTAT	Turkish Statistical Institute
WDI	World Development Indicators
WI	Wealth Index

1. INTRODUCTION

Early age mortality is regarded as an important indicator of development of a country. Corteguera and Henríquez assert that (2001) Louis-René Villermé was the first one to relate health information to social problems like crime and poverty in the beginning of the 19th century. In 1822, Villermé described the relationship between average income and crude mortality rate.

''Drawing upon Parisian vital records, Villermé demonstrated that class and wealth influenced rates of sickness and mortality. For example, the average mortality among the Parisian middle classses remained 1/50 per year. By contrast, people who lived in the poor and densely populated and impoverished twelfth arondissement died at a rate of 1/14 per year'' (Quinlan 2007).

Throughout the twentieth century life expectancy at birth significantly increased. On the other hand, the differences of mortality between different socio-economic groups didn't disappear (Jusot 2003). In the middle of the nineteenth century crude mortality rate was accepted as an indicator of poverty and miserable environmental conditions. At the end of the century crude death rate was replaced with infant mortality rate as indicator of health and social well-being. Since the beginning of the 20th century infant mortality rate is at the center of the efforts of every country for ameliorating health conditions and well-being of populations (Corteguera and Henríquez 2001).

Early age mortality rates are generally regarded as the main indicators of health status of a country (Wang 2002). These rates appear in international reports such as the World Development Report of World Bank and Human Development Report of the United Nations Development Programme which target to compare development levels among countries (Koç et al 2010). Infant mortality is included in most of the composite indicators which aim to

measure welfare and it is mostly included twice, as itself and then in life expectancy of which it is a component (DaVanzo et al 1983).

Sen (1998) argues that mortality is an indicator of economic development. Although economic growth has an impact on life expectancy, the mechanisms through which it processes are more important. These mechanisms are mostly the public expenditure on health and poverty removal. Countries like China, Sri Lanka and Indian State Kerala had low GNP per capita, on the other hand the life expectancy in these countries were higher than countries such as South Africa, Brazil and Gabon where the GNP per Capita were higher. The former countries had rapid reductions in mortality rates contrary to their slow economic growths. Sen suggested that these reductions were because of increasing social services such as health care and basic education.

Besides economic development, the relationship between income distribution and early age mortality was also analysed. Chaktaborty and Das (2005) argues that inequality in early childhood leads to poorer health which in turn through different mechanisms leads to less productivity, less income and thus less wealth transfer to offsprings. High early age mortality indicates poor health and this poor health in return causes intergenerational transfer of poverty. Thus the importance of early age mortality as an indicator of economic success is once more demonstrated. By improving health status of lower income groups which is best monitored by decreasing early age mortality, the intergenerational poverty link can be attenuated.

Before continuing, it would be appropriate to define infant and child mortality which are two basic components of early age mortality. **Infant mortality** is the probability of dying in the first year of life. **Child mortality** is the probability of dying between the first and fifth birthday. Another concept used in this context is the **under-five mortality** which is the probability of dying in the first five years of life. Infant mortality and under-five mortality are

expressed as deaths per 1000 live births. On the other hand, child mortality is expressed as deaths per 1000 children surviving to age one (HUIPS 2009).

The significance of infant and child mortality rates are also indicated in the United Nations Millenium Development Goals as important indicators of a country's development. The goal is to reduce under five mortality by two-thirds between 1990 and 2015. According to 2008 TDHS, Turkey has already accomplished this goal with a level of 24 as under-five mortality rate.

For many years, high infant and child mortality rates in Turkey were considered as a phenomenon which was difficult to explain. The development level of the country is not in line with these high early age mortality rates. Countries with lower and similar GDP per capita have lower infant and child mortality rates. Moreover, the mortality pattern of Turkey is also out of line. Shorter and Macura assert that a country with a similar life expectancy after early childhood should have half of the infant mortality rate of Turkey (Shorter and Macura 1982). In literature it was seen as an awkward situation and was addressed as the 'Turkish Puzzle' (Gürsoy-Tezcan 1992).

In the middle of 1960s infant mortality rate in Turkey was 163 ‰ and child mortality rate was 253 ‰, in 1980s these figures were 121 ‰ and 152 ‰ respectively and in the 1990s they were 66 ‰ and 84 ‰ (Koç et al 2010). Today, after a great decline in early age mortality rate (infant mortality rate is 17 ‰ per 1000 live births and child mortality rate is 6 ‰ according to TDHS-2008), the situation is less problematic, but this relatively high rate still requires some explanation.

In the literature, there are three major determinants of early-age mortality which are the medical, socio-economic and cultural determinants. The utmost emphasized determinants are mother's and father's education levels, mother's age at birth, birth intervals, birth orders, utilization of health services, standard of living and consanguineous marriages.

Among the studies carried out to undercover reasons causing infant and child mortality, the framework suggested by Mosley and Chen (1984) to understand these causalities was widely accepted and utilised by researchers. Mosley and Chen brought together two approaches which affect child survival, namely the medical science and social science approaches, in a comprehensive framework and this framework serves as a starting point for researchers studying infant and child mortality.

According to the framework, the socioeconomic determinants of child mortality are working through biological processes which cause mortality. These biological factors which are also called the proximate determinants are classified in five broad categories, namely the maternal factors, environmental contamination, nutrient deficiency, injury and personal illness control (Mosley and Chen 1984).

The relationship between early age mortality and development leads us to question another relationship which is the relationship between early age mortality and welfare. Welfare of the household is one of the socioeconomic determinants of child mortality which operates through biological factors. In this study household welfare is regarded as the economic status of the household. The question here is whether welfare or economic status by itself is a determinant of child mortality regardless of other factors. The aim of this study is to investigate whether this relationship holds or not.

This relationship can be interrogated internationally and also within a country. There are various studies held out to examine this relationship in both aspects. This study will focus on a country level examination and will examine the existence and dimension of the relationship between household welfare and early age mortality in Turkey.

It is necessary to point out the relationship between early age mortality and household welfare if exists any. The importance of early age mortality as an indicator of a country's development level is evident as mentioned previously. When early age mortality falls under a certain limit, it becomes more important to detect the influences of low household welfare. In such a case early age mortality is more closely related to specific groups (economic or ethnic). In this case it can be said that early age mortality is selective for some groups in the country. Thus, to implement policies to fight early age mortality the policy makers need to know which social groups are exposed more to early age mortality and target those groups.

There are many determinants of early age mortality studied by researchers. Among these, household welfare is one of the least studied. One reason the relationship between household welfare and early age mortality is not studied as much as the relationship between other determinants of early age mortality and early age mortality is because it's mostly believed that there are not many policy options that can be utilised by public decision makers. The followers of this view suggest that if such a relationship exists the policies that would be used will be the ones that target to eliminate poverty, so undercovering this relationship wouldn't do any help in terms of implementing policies.

Household welfare can be compared by using different measures. Household income, household consumption expenditures and household wealth are among such variables. These measures can be used as a proxy for household welfare. Wealth is a more stable measure compared to income and consumption expenditures. Income and consumption expenditures might be unstable, on the other hand wealth is more stable over time thus a better measure of welfare. There are other shortcomings regarding household income and household consumption expenditures which will be discussed in the related section. This study employs wealth index as measure of household welfare. The wealth index is constructed according to the

ownership of different durables by households and characterictics of dwellings that the households live in.

In Turkey, early-age mortality has been a very popular subject among researchers. Various researchers have dealt with different aspects of the matter. Although many studies dealt with the socio-economic aspects underlying the early-age mortality there is no in depth study dealing with household welfare and early-age mortality relationship. In Turkey the effect of household welfare by itself was not analysed except for two studies. One of these studies was performed by Özdemir et al (2003) and the other is a recent study performed by Eryurt and Koç (2009).

Objectives of this study are as follows:

1. To determine the linkage between early age mortality and household welfare under the control of all possible covariates
2. To present policy implications and prospects in the research agenda

There are various limitations of the study that should be mentioned. Some of these limitations stem from the use of the wealth index that will be utilised in this study. The index can be regarded as differentiating the poor and middle wealth groups quite well. On the other hand, because most of the households in middle wealth group own the household durable goods that are on the list, the index doesn't serve adequately to differentiate the middle and upper wealth groups. Also the response rate among the upper wealth groups are expected to be lower, so they may be underepresented in the sample. This may be another weak point regarding the index (Eryurt and Koç 2009).

One shortfall of the study is due to the impossibility of synchronizing the demographic events and welfare of the household. Both are fluctuating through time and no exact point in time or a time interval can be set to to get perfectly accurate results of the analysis. In this context, the effects ruling

over demographic events and welfare over time cannot be differentiated. So it's better to use the wealth index as a proxy for welfare keeping in mind these shortfalls which give the possible results in examining the relationship between welfare and early age mortality.

The study will utilise the most recent TDHS data which was conducted in 2008. Here the study is confronted with another shortfall. In 2008 as mentioned before infant mortality rate is 17‰ and under five mortality rate is 24 ‰. These relatively low figures show us that low number of cases in the data set will cause problems and limit the study.

Although there are such shortfalls limiting the study the contribution of the study would be considerable. The contribution of this study to the literature is that this subject is studied for the first time at thesis level in Turkey.

The organisation of the study is as follows. In the second section literature will be reviewed as well as history of early age mortality in Turkey and the analytical framework of the study will be put. In the third section the data that will be used in the study will be introduced and the methodology will be discussed. In the fourth section the results of the analysis of linkage between welfare and mortality will be presented. The first part of this section will present the results of the descriptive analysis and the second part will present the results of the multivariate analysis. The final section will discuss the results and the policy implications.

2. LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

In this chapter firstly the history of early age mortality in Turkey will be presented. Then literature regarding early age mortality in Turkey and literature regarding the link between household wealth and early-age mortality will be summarized and finally the analytical framework of the study will be demonstrated.

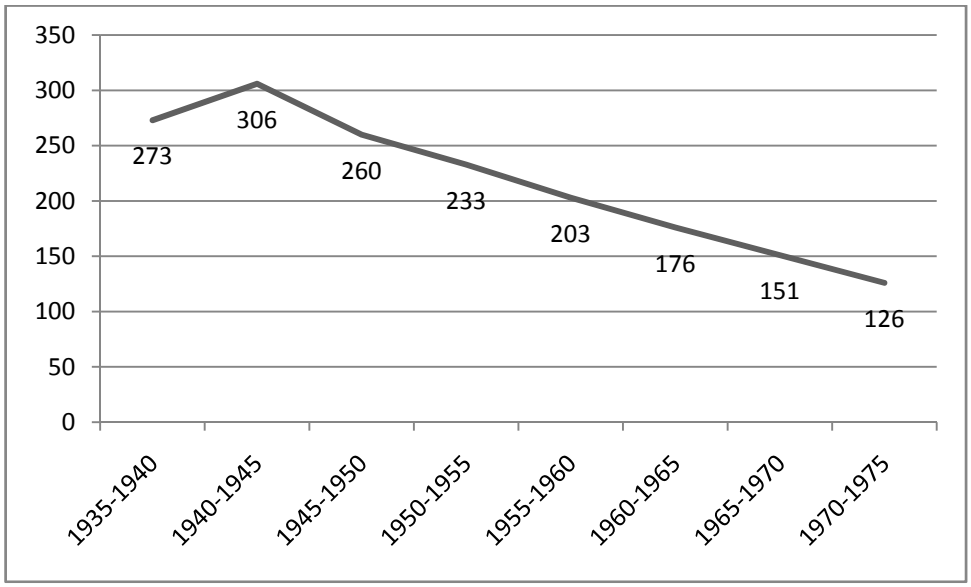
2.1. LITERATURE REVIEW OF EARLY AGE MORTALITY IN TURKEY

For many years Turkey had an early age mortality pattern contradicting with its development level. The development level of Turkey was not in line with the high early age mortality which it was experiencing. In literature this was referred as the Turkish puzzle and some researchers carried out studies to understand this unusual experience.

Shorter and Macura (1982) claimed that for most populations with similar duration of expectance of life after early childhood, the infant mortality would be about half the rate it is in Turkey. The mortality patterns of male and female infants did not show much difference than the other countries.

In the absence of vital registrations Shorter and Macura (1982) used an indirect method to estimate the early age mortality rates between 1945 and 1975. In their study they used the data of previous censuses, Turkish Demographic Survey which was conducted in 1966-1967, and Demographic Surveys conducted by Hacettepe University Institute of Population Studies in 1968 and 1973. Using of these data and Coale-Demeny model tables they concluded to some national infant mortality figures. According to the study, IMR was 273 for the 1935-1940 period, and IMR has declined to 126 for the 1970-1975 period.

Figure 2.1. Trends in infant mortality rate in Turkey, 1935-1975



Source: Shorter and Macura (1982)

The first field study, the Turkish Demographic Survey (TDS), which aims at determining the child mortality rate in Turkey as well as other demographic events was carried out by Hıfzısıhha Institute in 1966-1967. Since 1968 Hacettepe University Institute of Population Studies has been conducting surveys every five years which allow estimation of child mortality rates.

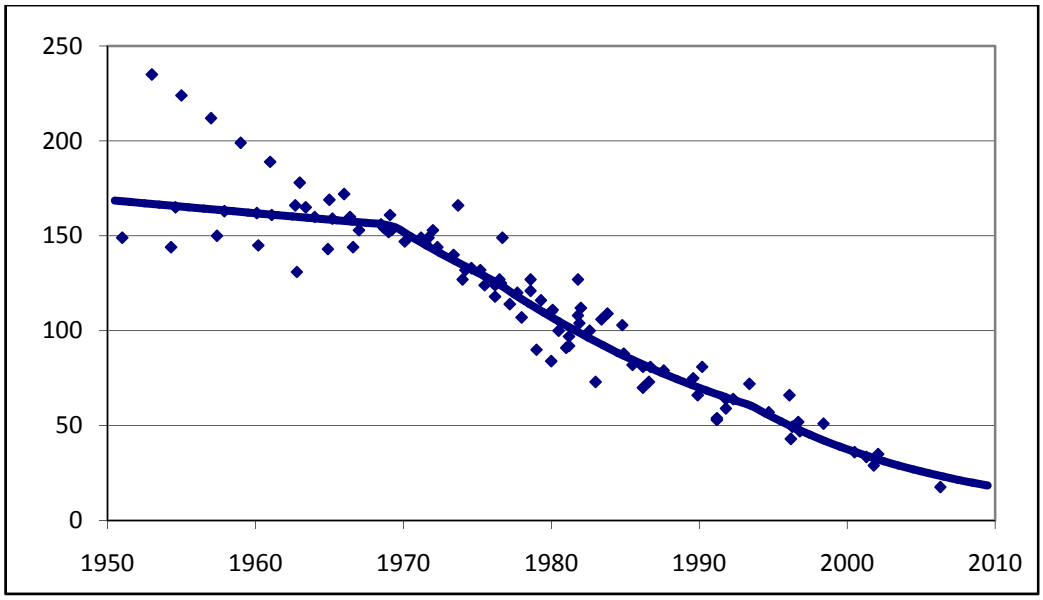
Infant mortality was about 260 ‰ in the late 1940s (Shorter and Macura, 1982). In 1967 infant mortality rate was 150 ‰ (SIS 2003). Although this rate continued to decrease by time, it was still high. After about 40 years this number is as low as 17 ‰ according to TDHS-2008.

Although the decline is evident not all regional, ethnic or welfare groups are at the same level. There is considerable differences among such groups. For the ten year period preceding the TDHS-2008 survey the figures for infant and child mortality rates obtained from the survey are 26 ‰ and 8 ‰ respectively. There are apparent regional differences regarding infant and child mortality. For example, for rural infant mortality rate is 33 ‰ where it is

22 ‰ for urban. Also the figure for West region is 16 ‰ where it is 39 ‰ for East region.

A recent, unpublished study of UNICEF (2010), demonstrates the evolution of infant mortality in Turkey from 1950's till 2009. In this study emprical data from surveys and censuses were plotted. Also infant mortality rates for each mid-year starting from 1950 and ending in 2009 were estimated. These estimates were plotted along with the emprical data. The emprical data depicts large differences between different data sources in the 1950s and 1960s. Especially after the second half of the 1960s Turkey has more reliable infant mortality data thanks to Demographic and Health Surveys.

Figure 2.2. Trends in infant mortality rate in Turkey, 1950-2010



Source: UNICEF (2010)

There is a considerable decline in early age mortality in Turkey in the recent years. However this level is still high when it's compared with other countries which have lower levels of economic development. According to Population Reference Bureau (PRB), Turkey's infant mortality rate is higher than most of the countries with lower Gross National Income Per Capita. It has a higher infant mortality rates compared with all the countries which it falls together in

the same league regarding economic development. Venezuela, Romania and Argentina can be regarded as in the same economic development level as Turkey where the indicator of economic development here is the income per capita. According to PRB data Turkey has a infant mortality rate of 28 ‰. Even if we disregard comparability in this manner and use the TDHS infant mortality rate which is 17 ‰ the rate is still higher than these countries.

Table 2.1. Gross National Income at Purchasing Power Parity per capita and Infant Mortality Rate in some of the selected countries

	GNI PPP Per Capita, 2008 (US$)	Infant Mortality Rate (infant deaths per 1,000 live births)
Syria	4 350	16,0
Paraguay	4 820	32,0
Tunisia	7 070	18,0
Azerbaijan	7 770	11,0
Algeria	7 940	28,0
Albania	7 950	18,0
Peru	7 980	20,0
Bosnia-Herzegovina	8 620	5,0
Brazil	10 070	24,0
Serbia	11 150	6,7
Bulgaria	11 950	9,0
Venezuela	12 830	15,8
Romania	13 500	10,3
Turkey	**13 770**	**28,0**
Argentina	14 020	13,3
Mexico	14 270	17,0
Russia	15 630	8,2
Poland	17 310	5,6
Hungary	17 790	5,0
Croatia	18 420	5,6
Turkey*	**13 770**	**17,0***

Source: PRB 2010 World Population Data Sheet
* TDHS-2008

Between 1990 and 2007 under five mortality decreased by 72 percent in Turkey. In this context Turkey was the fifth throughout the world (UNICEF 2009). The improvements in early age mortality are to some extent because of high increase in GDP per capita and improvements in health policies and

reforms lately. GDP per capita was $8 724 in 2000 and reached $12 993 in 2007. In the 2000s many efforts were made to increase vaccination and antenatal care. Between 1993 and 2008 antenatal attendance rate increased from 62 percent to 92 percent and the percentage of women delivering in a health facility raised from 60 percent to 90 percent. The number of newborn centers and the number of health care personnel in these centers rised drastically. In 2002 there were only 39 newborn centers of the ministry of health. In 2008 the number was 106. Also the number of nurses in these centers rised from 654 to 1671 (UNICEF 2009).

On the other hand regional discrepancies are still high. For instance, in the East region physician attended deliveries are 33 percent where it is 83 percent in the West region.

According to the results of TDHS-2008, Turkey has an infant mortality rate of 26 for the ten-year period preceding the survey. There is significant difference between households with high and low level wealth. For the lowest wealth quintile infant mortality rate is 41 where for the highest wealth quintile infant mortality rate is 12. But for the third and fourth wealth quintiles this relationship does no hold. This relationship between wealth quintiles and infant mortality is not exact. Keeping in mind that first wealth quintile is the poorest, for the third wealth quintile infant mortality rate is 16 and for the the fourth wealth quintile infant mortality rate is 18.

Table 2.2. Infant mortality rates for the 10-year period preceeding the TDHS-2008 by wealth quintiles

Wealth	Infant Mortality
Poorest	41
Poor	30
Middle	16
Rich	18
Richest	12
Total	26

Source: Hacettepe University Institute of Population Studies, 2009

In 1985, Tezcan carried out a research in Etimesgut regarding infant mortality. In this research mother's and father's age, father's occupation, place of residence, pregnancy order, sex of infants, previous child death, place of delivery, accessibility to health care, medical causes of infant deaths were the variables in question. On the basis of variable analyses, the most effective variable was father's occupation which was followed by previous child experience, distance to a health centre and type of community of residence. (Tezcan, 1985 cited from Oğuz, 2006). The limitation of this research was that it was only applied in one district.

A Hacettepe University Institute of Population Studies publication edited by Ergül Tunçbilek, 'Infant Mortality in Turkey – Basic Factors' was dealing with the same issue asserting that '*However, infant and child mortality in Turkey is at such a level that, it is not possible to explain these high rates through the young age structure of the country*' (Tunçbilek, 1988).

Akşit and Akşit (1989) reviewed and integrated international and Turkish researches on infant and child mortality. Goldberg and Adlakha (1969) and Adlakha (1970) by a survey conducted in Ankara, tried to explain infant mortality by parent's socio-economic characteristics, mother's life style, and location of the household whether the house is in "gecekondu" areas of the city or not. Cerit (1975) conducted an analysis of the determinants of infant mortality which concluded that the education level of parents, their occupation and the characteristics of community of residence were the most significant factors determining infant mortality. Ergöçmen (1991) studied the social and demographic determinants of infant mortality in Turkey. She found that the existence of sewerage system, hygienic toilet conditions and practices, and uncontaminated water supply were the significant factors of the infant deaths due to contagious diseases. (cited from Oğuz, 2006)

Gürsoy-Tezcan (1992) named the problem as the Turkish puzzle when she was dealing with the *Turkey's unexpectedly high infant and child mortality*

rates. In the study the focus was on cultural practices and conditions as determinants of infant mortality. The study did not have a representative sample, but it was conducted in a chosen area in İstanbul which was assumed to be representative in the context of rapidly increasing urbanization in Turkey. This area was small and relatively poor. A household survey was conducted besides in-depth interviews. In the multiple regression analysis, child mortality index (CMI) which denotes the proportion of deceased infant to the live births of a mother, was the dependent variable. The most important determinants of infant mortality were found to be the husband's education, household composition, the woman's attitude towards abortion and the amount of alcohol and smoking in the households. It was noteworthy that one of these determinants was related to the mother and the other three were related to the household structure in general and other individuals living in the household.

Riddle (1997) followed the path of Gürsoy-Tezcan. By using the TDHS-1993 data he tested the available variables of the Gürsoy-Tezcan study. Moreover he added some other variables which were not used by that study, but were available in the TDHS data. He conducted OLS regressions for testing significance of variables and explanatory power of the models. He concluded with similar results with Gürsoy-Tezcan. The variables in the Gürsoy-Tezcan model, except for smoking and drinking behaviour in the household, turned out to be significant. Contrary to Gürsoy-Tezcan's study mother's education was found as a significant determinant of child mortality index. Also other maternal variables, such as television viewing habits, abortion, miscarriage and still birth experiences were found to be significant contrary to Gürsoy-Tezcan's study. Although many variables were significant in the model, only 28 percent of the variability in the child mortality index can be explained by the model which makes Riddle to conclude that *the Turkish Puzzle continues*.

Cem Behar, Youssef Courbage and Akile Gürsoy (1999) asserted the uniqueness of Turkey regarding infant and child mortality. Turkey is a country

which is demographically unclassifiable because its persistently high infant mortality is out of line with its socio-economic indicators and its low fertility (Behar et al. 1999). They put Syria as a control country to understand the reasons for high early age mortality in Turkey and compared the results from 1993 PAPCHILD survey of Syria with 1993 TDHS. For the five years period preceding the surveys, infant mortality rate was 52.6 per 1000 live births in Turkey and 34.6 in Syria. In the neonatal period the gap was highest (29.2 to 18.0). Among women with similar characteristics the infant mortality rates were still higher in most of the cases. In their study, unconventional sources: ethnology, literature, cinema, were also deployed to construct an impression of the cultural environment of the mothers, fathers and families of dead children in order to explain high figures for infant and child mortality. The study was interested in cultural aspects that affected early age mortality. For instance several films were examined to understand the family structure and value of children. The study also emphasized another issue regarding the 'Turkish puzzle'. In Turkey the fertility transition is almost completed with a value which is barely above 2, and this is also not in line with the high infant mortality rate. This is *a combination encountered nowhere else*. (Behar et al. 1999)

Tuğ (2005) conducted a study regarding early age mortality at regional level. He studied the socio-economic determinants of early age mortality in the Southeast Anatolia Region. Besides putting the early age mortality pattern and factors underlying the early age mortality in the SEAR he also examined the difference of SEAR from the rest of the country according to early age mortality. His study was constructed on Mosley-Chen framework. His source of data was TDHS-2003. The dependent variable in the model was a computed index called the Child Mortality Index and he made multiple regression analyses as well as descriptive analysis. *According to the study socio-economic and cultural variables were found foremost variables that explain the variation in early age mortality relatively.* However the total effect of the variables was very low. Unexpectedly, children of non-smoking

mothers were found to experience higher mortality. Duration of breastfeeding was the most important factor in the SEAR. Also existence of qualified health personnel was a determinant, both in the SEAR and Turkey. Education and wealth index were found to be effective. Children of Kurdish women were more at risk. Payment of bride price and first degree consanguinity were the most effective determinants for Turkey. The early age mortality was also found to be higher for children of working mothers.

One of the most extensive studies recently is the M.A. thesis of Oğuz, (2006). Her study deals with the relationship between health insurance coverage and infant mortality in Turkey. In her study she used TDHS-2003 data. The study suggested that controlling for the other variables, assisting delivery by nurse/midwife, preceding birth interval, mother's age at birth of the child and household wealth index were the most effective determinants of infant mortality. Unexpectedly, the relationship between delivery assistance by nurse/midwife and infant mortality was found to be positive. In this study the wealth index was divided into three categories as poor, middle and rich. The analysis for the poor did not suggest any relationship between health insurance coverage and infant survival. Thus, it was concluded that health insurance coverage was not an effective tool for fighting against infant mortality among the poor.

Yüksel (2008) examined the cultural factors affecting early age mortality in Turkey. She utilised both quantitative and qualitative methods. The quantitative analysis was based on 1993, 1998 and 2003 TDHS data. For the qualitative analysis a field research was conducted in Ankara and Diyarbakır. In this field research a total of 14 women were interviewed.

The results of the macro analysis asserted that the number of persons per doctor was the most effective determinant of infant and child mortality. Insured population and unit of drinking water in villages were other related factors to infant mortality. No relationship was found between infant morality

rate and Gross Domestic Product (GDP) per capita which can be used as a proxy for welfare.

The multivariate analysis demonstrated that total children ever born to a mother, single or multiple births and consangineous marriages were effective on child mortality. No relationship was found between the wealth index, which was constructed on the household possesion of durables and household characteristics, and child mortality in the multivariate analysis. On the other hand, in the descriptive analysis part of the study, child mortality index (CMI) was found 0,36 for the richest wealth group and 1,25 for the poorest wealth group which suggested a difference in child mortality regarding the wealth index.

The qualitative analysis supported the earlier findings that in the East mothers are less likely to go to the doctor due to negative behaviours of health staff. Another finding of the qualitative research was that the mothers seeked for emotional support as well as medical support. The autonomy of women is seen as an important factor to decrease infant mortality in the literature. Conditions of women, formation of their marriages influence women's autonomy. The lack of autonomy affect women's behaviours such as on health seeking, induced abortion, etc. In Yüksel's study the mothers who experienced infant losses were mostly lacking autonomy.

According to the study although there is valuable information for the explanation of infant mortality in general, the 'Turkish puzzle' is still there for subgroups which calls for further qualitative studies for understanding the infant mortality pattern in Turkey.

Arik and Arik (2009) searched for the infant mortality determinants across the 81 provinces of Turkey. The provinces were ranked according to their socioeconomic development levels by principal component analysis. Socioeconomic and health indicators utilised in the study were categorized in

six groups which are income and income distribution, social characterictics, education, health, public presence in the region and economic structure. These indicators were obtained from the Turkish State Planning Organization. 34 indicators were included in the study. The dependent variable used in the model was infant mortality in Turkey in 2000. The effect of income on infant mortality was found to be significant but when controlled by income distribution, this effect was less significant. Percentage of people with medicaid was used as a proxy for income distribution in the study and it was one of the robust indicators of infant mortality which suggested that *economic growth policies targeting the economically disadvantaged population would have a decisive impact on infant mortality rate* (Arik and Arik 2009).

A recent study of Seçkin (2009), targeted to research determinants of infant mortality in Turkey. In her study she made use of TDHS-2003 data. The analysis was limited to births in the last five years period preceding the survey because for the births before 1999 duration of breastfeeding, prenatal care received by the mother and place of delivery data doesn't exist. The study was carried out by survival analysis and logistic regression. This choice was assumed to be appropriate for the analysis because it is formed to model time to event data. The age of the infant in months was the dependent variable in the model. The study concluded that breastfeeding, maternal age at birth, place of delivery, prenatal care and birth year are correlated with infant mortality. The affect of wealth index was significant only for the difference between poorest and richest categories. When other factors such as place of delivery, prenatal care and inter-birth intervals were introduced in the model, the significance of the wealth index has diminished.

A recent study which utilises TDHS-2003, directly addresses the relationship between household welfare and child mortality. The findings of this study of Eryurt and Koç demonstrate that the children of the poorest experience more risk of dying than the children of the richest. The mortality risk of the children

of the poorest is 4.7 times higher than the children of the richest before completeing their first birthday. And it is 3.5 times higher before completing their fifth birthday (Eryurt and Koç 2009).

Karatepe (2010) studied the relationship between socioeconomic differences and economic uncertainty by analysing infant and child mortality. His study was based on pooled data of TDHS-1993, 1998 and 2003. He used the education level of the husband as an indicator of socioeconomic status. Cost of living, which is a theoretical index that measures relative cost of living time was used to measure economic fluctuations. When primary education was set as reference for socioeconomic status it was found that for no education group the risk of infant mortality was 20 percent higher. For secondary level education group the risk was 20 percent lower; for the high school level education group the risk was 30 percent lower and for the university level education group the risk was 51 percent lower. No significant relationship was found between economic fluctuations and socioeconomic status in terms of infant mortality, but the relationship between socioeconomic status and infant mortality was demonstrated.

2.2. LITERATURE REVIEW FOR OTHER PARTS OF THE WORLD

There are many studies carried out to examine the relationship between household welfare and early age mortality worlwide.

According to Flegg (1982) income indirectly effects infant mortality through consumption made for health care, sanitation, food, etc. He analysed data from 51 countries and found that the effect of gini coefficient, literacy of mother, number of physicians and nurses per head were significant on infant mortality while income was not significant. On the other hand, gini coefficient is the the indicator of income distribution in a country, so its significance demonstrates the effect of income distribution on infant mortality. He also found that a redistribution policy decreasing the share of the richest group is

much more effective on infant mortality than increasing the share of the poorest group, which might be showing that the magnitude of resources (health care, food, etc.) devoted to the richest group truncates the accessibility of the poorest to these resources.

Rozenweig and Schultz (1982) examined child survival in rural India. They made use of census data and also conducted a household survey. The intrafamily resource allocation was the main factor in question. The exmination asserted that children who are expected to be more economically productive adults receive larger share of family resources and have a greater propensity to survive. This, also to some extent explained the improved survival as wealth increases.

In their study analysing infant mortality in Malaysia DaVanzo et al (1983) suggested that *even the simple correlation between income and infant mortality was not statistically significant*. They suggest that in general household income was a less important determinant than education of mother and that when mother's education was taken into account it was even unimportant. In the study mother's age, parity, breastfeeding, place of delivery and toilet sanitation were found to be important determinants of infant mortality.

Tekçe and Shorter (1984) carried out a survey to determine the factors that have affect on child mortality in a squatter settlement area in Jordan. The survey was conducted for children of three years old or less. In the study four socio-economic variables were tested for significance which were, mother's education, housing quality, head's occupation and household income. Housing quality and mother's education was significant and had a strong effect on child mortality. On the other hand the effect of head's occupation and household income was weak.

Merrick (1985) examined the early childhood mortality in urban Brasil. He made use of 1970 census data and 1976 survey data. The findings asserted that education of mothers and husbands were the most effective factors on child mortality. Access to piped water was also effective but to a lesser extent. Husband's earnings was used as a proxy for household income in the study, but it was found to be insignificant.

Stockwell et al (1988) asserted that the inverse association between family incomes and infant mortality was obvious in their study in which they examined Ohio cities in the USA for the years 1979-1981. There were three income groups in the study. The differences were obvious for both, the neonatal and the post neonatal mortality. For the post neonatal period the gap was wider because exogenous variables are more effective in this period. When looked at the subgroups, the highest gap in infant mortality between income groups were those that are because of sudden infant death syndrome.

In their study which concentrates on the relationship between household income and child survival in Egypt, Casterline et al. (1989) used the Egyptian Fertility Survey (EFS) which is conducted in collaboration with the World Bank and which is found out to be reliable by other studies. The survey included detailed questions about the income of households. This income data was compared with national accounts estimates. The result was that there was underreporting in the income data of the EFS which was estimated to be about one third. The study assumed that there is no particular reason to think that the underreporting would be different for different groups, so that the distribution of income groups wouldn't be affected by this underreporting. They found out that income has little effect on infant mortality, but is inversely related to mortality in early childhood (Casterline, et al. 1989).

There are also studies which shed light on the relationship between income distribution and infant mortality. Waldmann (1992) studied 41 countries with

equal incomes. The income here was the real per capita GDP. He defined the rich as the top 5 percent in income level in the country. The poor was defined as the bottom 20 percent and the rest 75 percent was the middle category. He looked at the share of the rich in total income. When the share of the rich is higher, the poor are left with less resources to survive with. He found that when share of the rich is higher infant mortality is higher. According to Wald possible reasons that this relationship holds may be that *changes in the relative accessibility of health care with increased income inequality, lower literacy rates with increased income inequality and that the relative prices of medical care, and pure water or food could be positively correlated with income inequality across countries* (Waldmann 1992).

Filmer and Pritchett (1997) studied early age mortality cross-nationally. They found that approximately 95 percent of the variation in under-5 mortality was explained with income, its distribution, female education, and other cultural factors. Although income alone was a powerful determinant (84 percent of mortality differences could be explained by income alone), other factors were significant determinants of under-5 mortality.

Wang studied the determinants of child mortality in low-income countries. He made use of DHS data from 60 countries including Turkey. He used some World Development Indicators such as GDP per capita, share of health expenditure in GDP and per capita health expenditure as well as the asset index derived from the DHS data in order to measure income. The most significant determinant was found to be access to electricity even after controlling income. This was followed by asset index, GDP per capita, access to piped water, access to sanitation and female secondary education. On the other hand dissaggrating the data as urban and rural resulted differently. In urban areas access to electricity was the most significant determinant of early age mortality whereas in rural vaccination coverage was significant (Wang 2002).

Bhalotra (2007) studied the relationship between health expenditures and infant mortality in India. Her findings asserted that health expenditures were not effective on infant mortality in urban areas, but in rural areas a correspondance existed. One reason for the lack of significant relationship could be the fail in monitoring lagged effects of health expenditure and other unobservable factors. When the data was disagregated, it was observed that the effect of health expenditure was less effective in more vulnerable segments of the population.

2.3. ANALYTICAL FRAMEWORK

Mosley and Chen (1984) aimed to bring together methods utilized by social and medical scientists to identify child survival and created a framework. Social scientists mostly made efforts to determine the socio-economic causes of child mortality but the mechanisms how these causes worked were unexplained. On the other hand, medical scientists mostly studied the biological determinants of child mortality. According to the Mosley-Chen framework the socio-economic factors are processing through biological factors which are also called the proximate or intermediate determinants. The proximate determinants have direct effects on child mortality and morbidity and they are presented in five groups. These proximate determinants are as follows:

1. Maternal factors: age, parity, birth interval
2. Environmental contamination: air, food/water/fingers, skin/soil/inanimate objects, insect vectors
3. Nutrient deficiency: calories, proteins, micronutrients (vitamins and minerals)
4. Injury: accidental, intentional
5. Personal ilness control: personal preventive measures, medical treatment

As mentioned previously socio-economic determinants of child mortality operate through the intermediate determinants. The socio-economic determinants are studied in three groups as follows:

1. Individual level: education level of parents, occupation level of parents, social security coverage, etc.
2. Household level: quality of drinking water, income/wealth, information through media
3. Community level: political economy, institutions, health system, cost subsidies

One advantage of the model is that it combines all possible determinants of child mortality. This combination enables to study child mortality in a consistent and integrated structure. Moreover, *use of the model facilitates specification of the different orders of casuality and possible interactions among the socio-economic determinants* (Mosley and Chen 1984). For a better understanding the framework is demonstrated in the following chart. The lefthand side demonstrates the subgroups of intermediate variables and the individual factors; the righthand side demonstrates the subgroups of socio-economic variables and the individual factors.

Table 2.3. Factors and variables in Mosley-Chen framework

Intermediate variables		Socio-economic variables	
Maternal factors	Maternal age	**Individual level**	Educational level of parents
	Parity		Occupation level of parents
	Birth interval		Employment sector
	Birth order		Social security / health insurance
	Succeeding birth order		First and last time for antenatal care
	Preceding birth order		Attendance of baby clinic
Environmental contaminations	Air		Power relations within the household
	Food		Beliefs and attitudes about disease causation and treatment
	Water		Food preferences
	Skin or soil		Taboos and restrictions during pregnancy, lactation, weaning, illness
	Inaminate objects		Sexual taboos
	Insect vector		Beliefs about contraceptive use
	Smoking	**Household level**	Food, water
	Incidence of diarrhea disease		Clothing
	Prevalence of round-worn parasites		Cleaning
	Absence of toilet facilities		Quality of drinking water, food preparation
Nutrient deficiency	Calories		Energy for heating and cooking
	Proteins		Transportation
	Vitamins		Preventive care, sickness care
	Minerals		Vehicles to obtain information
	Weight of children		Income
	Size of children		Information through media
	Duration of breastfeeding	**Community level**	Ecological setting
	Additional food		Political economy
	Body-mass index		Institutions
Injury	Accidental		Organisation of production
	Intentional		Physical infrastructure
Personal illness control	Place of delivery		Institutionalized actions
	Assistance of medical staff during delivery		Health system
	Immunisation		Cost subsidies
	Traditional practices of treatment		Public information / education / motivation
			Technology

3. DATA AND METHODOLOGY

In this study, data from 2008 Turkey Demographic and Health Survey will be used. The survey consists of questions of proprietorship that would be used in the construction of the wealth index. The wealth index which is a proxy for household welfare will be derived from two different parts in the TDHS-2008. These will be variables from the household ownership of consumer durables and characteristics of household dwelling.

Also if there were any early age deaths that occured in the household, the time when children have died are gathered in the Questionnaire for Married Women. The age when the children have died is taken in days, months and years. Thus, it is also possible to calculate two components of infant mortality which are neonatal and post neonenatal mortality.

The wealth index which is a proxy for household welfare will be introduced and utilized in order to realize the tests regarding the relationship between household welfare and early age mortality.

3.1. DATA

In Turkey Demographic Surveys have been conducted by Hacettepe University Institute of Population Studies every five year since 1968. These surveys provide valuable data for nationwide policies.

In this study data from TDHS-2008 survey will be used. When there is need, data from previous TDHSs will be utilized as secondary data. Since these surveys have a similar sampling and questionnaire designs, they can be used in a comparative way.

A weighted, multistage, stratified cluster sampling method was applied for the selection of the survey sample. The sample was designed to give results for the categories:

- Turkey as a whole
- Urban and rural areas
- The conventional five regions (West, South, Central, North, and East regions)
- The 12 NUTS1 regions for selected indicators
- The seven metropolitan areas with population more than one million (İstanbul, Ankara, İzmir, Bursa, Adana, Konya and Gaziantep)

In TDHS-2008 a total of 10 525 households were interviewed. The eligibility rule to continue with the women questionnaire stated that the women should be married at least once and should be between ages 15 and 49. In these households 7 405 of the eligible women were interviewed. These women have given birth to 19 768 children.

The survey gathers the data in a retrospective way. The women between ages 15 and 49 are interviewed about their births and birth related experiences preceding the survey. Regarding mortality, age of the deceased is gathered. From TDHS data we have the opportunity to compute early age mortality rates by direct methods.

As a proxy for household welfare the wealth index will be used. Wealth index is constructed by making use of durables that are owned by the household and dwelling characteristics. A complete list of these durables are presented in the 3.2.1.1 Wealth Index section. Until 2008 ownership of these durables were also questioned for visitor women. Visitors are those who don’t belong to the household but were present during the survey and were interviewed. In 2008 there are no such questions for the visitors. The welfare level of the

visitor women are assumed to be the same with the household they are visiting.

The variables that will be used in the models are derived from the Mosley-Chen Framework. The framework is categorized into two subgroups. The proximate determinants and the socio-economic determinants. The socio-economic-determinants are processing via the proximate determinants. The proximate determinants are categorized into four subgroups. These are the maternal factors, environmental contamination, nutritional availability of children and personal illness control.

For the models the data of births for the ten year period preceding the survey will be used. The use of further data would cause evaluation of mortality for very different birth cohorts and time periods. Thus when the period is longer the evaluation would be less accurate. On the other hand, data for the last five years cannot be used because there are very few number of cases. For this study use of data for the last ten years seems appropriate.

The use of last ten years data will restrict the model construction and some variables will have to be dropped because these variables are not available for all of the ten years period. Regarding the proximate determinants variables related to nutritional availability of children and personal illness control will not be used.

For TDHS-2008 the proximate determinants and the associated variables that exist in the data set that will be used in the model are listed below.

1. Maternal Factors
    - MAT_AGE_GROUP: Age of mother at birth computed into age categories as below 20, between 20 and 35 and over 35
    - BORD_CAT2: Birth order (rank of the child) categorized as first born child, second or third and fourth or more

- PRE_BIRTH2: Preceding birth interval in months grouped as months below 24, over 24 and no preceding birth
- AFT_BIRTH: Succeding birth interval in months grouped as months below 24, over 24 months and no succeding birth

2. Environmental contamination

- WATER: Source of drinking water is grouped as sanitary or not
- TOILET: Type of toilet facility is computed as flush or not
- PPROOM_GRP: Persons per sleeping room grouped as 1 or less person per sleeping room, 1-2 persons per sleeping room, more than 2 persons per sleeping room
- S115C: Ever married women have ever regularly smoked cigarette or not
- S115G: Anyone smokes at home or not

3. Nutritional availability of children

This group includes variables such as duration of breastfeeding, the time when the infant was first put to breast and additional feeding. Especially duration of breastfeeding was found to be an important determinant of early age mortality. In this study we will not put these variables in our models because the data regarding these variables are only available for the last five years.

4. Injury

Since there do not exist any data regarding injury in TDHS-2008, injury is not introduced into our models.

5. Personal illness control

Variables regarding antenatal care were not introduced in the model because the TDHS-2008 data doesn't contain such variables for the ten years period. The antenatal care variables are only avaliable for the last five years period which is not adequate for making analyses for the whole ten years period.

For TDHS-2008 the socio-economic determinants and the associated variables that exist in the data set that will be used in our model are as follows:

1. Individual level variables
   - SEDUC: Educational categories of the woman as no education/primary incomplete, first level primary, second level primary, high school and higher
   - SMEDUC: Partner's education level no education/primary incomplete, first level primary, second level primary, high school and higher
   - Work3: Woman's working status as doesn't work, works and is insured, works but isn't insured
   - Pwork3: Partners working status doesn't work, works and is insured, works but isn't insured
   - INS: Woman is covered by any health insurance as no insurance, insured other than green card and green card
   - SOC3: Social participation index as participant, middle category and non-participant

Social participation index was derived from four variables. Three categories were formed. When a woman was participating regularly in at least two of the activities in parathesis, (going to holiday, going outside for a meal, organizing home meetings and using internet), social participation index was coded as participant, if she doesn't do any of the activities regularly then she is coded as non-participant. And the others were coded as the middle category.

- REL: Religious attitude as religious, middle category and not religious

Religous attitudes index was derived from three variables. Three categories were formed. When a woman regularly fasts, performs namaz and wears scarf when going out she is coded as religious, if she doesn't perform any of them regularly she is coded as not religious, and the others are coded as the middle group.

- S762H: Watches women's programs on TV as no, regular and irregular
- FAMILY_TYPE3: Family type as nuclear and extended.
- MAR_ARR2: Marriage arranged by whom as theirselves, family (with consent), family (without consent), eloped/abducted, other
- S164: Type of marriage as civil marriage or not
- W146: Dowry or bridewealth given
- S170: Anyone else in the household at the beginning of marriage
- S171: Woman's relation to her husband as no relation, second degree and first degree (consanguinity)

2. Household level variables
   - WI: Wealth index (assets of household)

3. Community level variables
   - S116A: Mother tongue of woman as Turkish, Kurdish, and Arabic
   - S741A: Mother tongue of her husband as Turkish, Kurdish, and Arabic
   - V025: Type of place of residence as urban and rural
   - V101: Region as west, south, north, central and east

3.2. METHODOLOGY

First the descriptive statistics regarding early age mortality will be presented. The early age mortality rates which are given as point estimates should be assessed attentively. The confidence intervals might be overlapping thus the results should be carefully approached.

In the multivariate analysis section of this study, logistic regression method will be utilised. The dependent variable in the study will be whether the infant is dead or alive at the time of survey, which is defined as a dichotomous variable. Therefore the utilisation of logistic regression method will be appropriate. The independent variable to be questioned will be the wealth index. Other variables will be used as control variables. The main aim is to detect the effect of wealth on infant mortality.

Since TDHS-2008 has a complex sample, logistic regression for complex samples will be used. The software program used for this study is SPSS which has a feature for execution of logistic regression for complex samples. The syntax for the regression is provided in the appendices section.

Five different models will be tested starting with a simple one to test the relationship between the wealth index and the early age mortality. Then new groups of variables will be introduced. Each model will include more variables than the previous model. The fifth and the final model will include all variables that will be tested.

In the data for the five years period preceeding the survey there are a total of 82 under-five deaths and 46 infant deaths. These figures are very low considering the different variables that will be used in the models. Thus, it would be better to use infant deaths that occurred in the ten-year period preceding the survey. The children born between 1998 and 2008 are included in the data. A total of 8 139 children were born in this period. Of

these, 232 died before reaching their first age and 277 died before reaching their fifth age.

The wealth index which is a proxy for household welfare will be derived from two different sections in the TDHS-2008. These will be variables from the household ownership of consumer durables and characteristics of household dwelling. Weights will be assigned to these variables by using statistical procedure of principal components. Principal components is a technique for extracting from a set of variables those few orthogonal linear combinations of the variables that capture the common information most successfully (Filmer and Pritchett, 2001).

As previously mentioned the five wealth groups pose the problem of difficulty in distinguishing the richest groups and the middle group. Taking this and the limitation with number of cases into consideration it seems appropriate to divide the population into three welfare groups, as poor, middle and rich. The reason for using the terms ‘poor’ and ‘rich’ is to mention that these households are poor or rich in these durables; it is not to mention that the terms ‘poor’ and ‘rich’ specify income levels. Instead they are levels which work as a proxy of household welfare.

The share of the groups will be decided after testing for different wealth index groups. Then the relationship between wealth index and infant mortality will be seen and tested.

3.2.1. THE WEALTH INDEX

The primary aim of this study is to discover the probable relationship between household welfare and early age mortality. Here the question is: What would be the means for measuring household welfare?

> *The orthodoxy in estimating the welfare of household is to collect information on income, or more preferably on consumption expenditures, usually by using data collection strategies other than single-round surveys* (Diamon et al., 2001).

Hereby, an option for the measurement of household welfare would be to make use of data regarding consumption expenditures or incomes of the households . Unfortunately TDHS is not designed to supply such information on household consumption expenditures or income. Still, although there is no household consumption expenditure data available in the TDHS, these two otherwise potential data sources will be discussed briefly.

Although it can be mentioned that consumption expenditures measure household welfare quite well there exists some flaws. Taste is always an important variable. A household who is better off in wealth might choose to consume less luxury goods. Also households living in rural areas might have difficulty in reaching some of the goods which are available in big cities. Newly introduced goods might be not known to some households. Cultural codes might play a significant role in consumption patterns of households.

Rutstein and Kirsten (2004) demonstrated some other flaws. Since expenditures are made by different members of the household, it's hard to determine all the expenditures. Some of the large expenditures are made less frequently such as vehicle, house, etc. Therefore depending on the period of the data collection timing of such expenditures might be affecting the overall expenditure and the period of data collection on expenditures are hard to decide in this case. A final flaw of the expenditure data can be said tha there is always debate on which expenditures are to be included in the expenditure data (Rutstein and Kirsten 2004).

For measuring household welfare, another option would be to make use of household income data. In 2008 TDHS, there is no question concerning

income in contrast to previous TDHSs. Even if there were questions to detect hosehold income, it wouldn't be appropriate to make use of income data for estimating the household welfare level because there are some shortcomings of this approach.
First of all there is underreporting in some cases. One reason for this underreporting might be because the respondent has concerns about tax or other administrative issues that would lead him to deliberately misreporting. Another reason might be unintended misreporting. The respondent might have difficulty in remembering the exact income especially when there are many sources of income in the household. (Øvensen 2006).

Rutstein and Kirsten (2004) also put some drawbacks in using income data as a proxy for welfare. Some members of the household don't share or inform about their income the rest of the household, so the respondent might be uninformed about the income of all household members. There might be several sources of income and this might cause underreporting. Furthermore income is variable throughout time which makes it hard to determine for a long period of time. The income of a household might not be stable during a period of time. It might be depending on seasonal effects. The hardship in measuring home production and unpaid production are other reasons that limit the quality of income data. One final point demonstrated was that unearned income such as interest and rent is hard to measure (Rutstein and Kirsten 2004).

Also there might be other arrangements in the household in general and in the pattern how the household members are participating in the labor force. Whatever the case is, it can be concluded that current income is not an adequate indicator of income in the long run and thus the household welfare. After listing all these drawbacks it can be concluded that income data is not a good measure. It's not accurate and it's very hard to measure.

It's obvious that a more stable and permanent welfare measure is required. For this another option might be the use of wealth index as a proxy for household welfare.

In 1997, Rutstein introduced an indicator of welfare (economic status) called the wealth index which was produced by ownership of assets by making use of 1996 Zambia DHS data. It's necessary to know about the economic status of different groups of people in order to secure equity in access to health services. And this can be done by determining the economic status. This was the point of departure for contructing a measure of economic status for the DHSs (Rutstein and Kirsten 2004).

Afterwards, this index was developed based on suggestions from Lant Pritchett and Deon Filmer and were used in many countries (Rutstein and Kirsten 2004). In this study the asset index developed by Filmer and Pritchett (2001) will be utilized as a proxy for household welfare. Filmer and Pritchett has first introduced this index in their study in 1998. They introduced this asset index in order to realize their study which examines household wealth and school enrolment relationship in India.

Although this index was named as the asset index by Filmer and Pritchett, the index used in DHSs are called the wealth index. To prevent any confusion it should be kept in mind that these two terms are different names given to the same index and can be used interchangeably. However most of the time the choice will be to use the wealth index because this is the original name given to the index by its primary developer and also it is how the index is addressed in the DHS data.

The wealth index consists of ownership of household goods and household characteristics available in the DHS data. The primary reason for the availability of all of the household goods' ownership and household characteristics data is not the production of the wealth index. Some of the

items in the DHS questionnaire are not collected to measure wealth. For instance, type of flooring is collected to analyse its relationship with diarrhea in children, television and radio ownership is related to reach to mass media to receive information on health, etc. But all this data is used to construct the wealth index (Rutstein and Kirsten 2004).

There were different studies that were held aiming to test the validity and usefulness of Filmer Prittchet Asset Index. Johson concluded that when using the Filmer Pritchett Asset Index, increasing the number of household assets enhances the performance of the index and increases the variability of index scores across households (Johnson, 2001).

Also there was a study held by Hancıoğlu (2002). In Hancıoğlu's study, the main question examined was whether using a sophisticated statistical analysis tool like the one that is utilised by Filmer-Pritchett approach leads to the production of a more powerful (proxy) indicator of economic status / wealth. Hancıoğlu made use of the 1998 TDHS results for his study. In the study he compared two simpler indexes with the Filmer-Pritchett index. One of the indexes was called the asset count index (ACI) and the other was called the asset prevalance index. The ACI is constructed by allocating equal weights to each household asset. The API takes into consideration the abundance of the asset. For example if 95 percent of the households own a TV then a score of 5 is given to this asset and the index is constructed with these weight.

Hancıoğlu concluded that simpler indexes has given as good results as the Filmer Prittchet Asset Index. He argued if simple and easily constructed indexes are as good then they could be used instead of Filmer and Prittchet Asset Index in order to get rid of the burden of constructing a this index.

But, once the software for the index is ready there is no extra burden of making use of the Filmer Prittchet Asset Index. This index was used in many studies and was proved to be useful.

Also there were other alternative index efforts to create a proxy for household wealth which are realized by others. Amongst these are the studies of Montgomery et al. (2000), Bonilla-Chacin and Hammer (1999), Gwatkin et al. (2000), Stecklov, Bommier and Boerma (1999) and Sahn and Stifel (1999).

But this study will no more argue on uses of different indexes and will focus on the construction and use of the Filmer and Prittchet Asset Index. So for the moment there is no reason for further questioning of the index and search for other indexes.

3.2.2. CONSTRUCTION OF THE WEALTH INDEX

The construction of the wealth index requires succeding phases. First, the variables that would be utilised in the index should be selected attentively. Then the weights should be assigned to the variables.

In our case the variables that would be used in the index are from the housing characteristics section of the questionnaire. The variables regarding the propertyship of several objects and characteritics of housing are included in the index.

The weights can be assigned to variables by different methods. One option would be to use the simple additive method. In this method equal weights are assigned to all of the variables. This method has an evident flaw that the assets in the index have different values. Another method would be to use a multivariate regression. All the assets are entered in the multivariate equation and the weights are computed by solving the equation. This method also has shortcomings. The direct and indirect effects of assests are not

indifferenciable in this method. Also the weights can be assigned according to the prices of the assests included in the index. But such a data is not avaliable, thus this is not a solution to solve the problem either.

To overcome of assigning the weights to the assets in the index, Filmer and Pritchett suggested using the principal components method.

> *Principal components analysis (PCA) involves a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. (Øvensen 2006)*

Further mathematical clarifications of the wealth index are beyond the scope of this study. The wealth index is constructed by the syntax provided by the DHS and thus only the construction of the categories will be discussed.

Normally the wealth index is formed of five quintiles. But in this study, when five quintiles are used the number of observations for each category is very low. Therefore it is better have less categories to increase the number of observations for each category. Thus it is preferable to have three categories instead of five.

One important point to be decided while constructing the wealth index is the establishment of the poverty line. The poverty line is the point where the persons below this level are the poor. The position of the poverty line enables the user to determine the differences between the poor and the rest and thus aid in determining the differentiations in infant mortality. The division of the categories is to be decided after testing.

Rutstein and Kirsten (2004) assert that poverty line is mostly drawn at the 20th, 33th or 40th percentile. But it should be kept in mind that this classification is not formed according a definition of poverty in literature. The aim is to rank the household population by wealth index to analyse the differences between poorer and richer households.

In this study three different wealth indexes will be created each with three categories. The one in which the poor category and rich category has the highest difference regarding infant mortality will be decided as the wealth index to be used in the study.

The wealth indexes to be tested are categorized form poor to rich as follows:

- 40 percent – 40 percent – 20 percent
- 33 percent – 33 percent – 33 percent
- 20 percent – 40 percent – 40 percent

Before constructing the wealth indexes to be tested another point should be clarified. The DHS wealth index categories are formed according to household populations rather than number of households because most of the analyses are concerned with poor people and not poor households (Rutstein and Kirsten 2004). So the percentage of households in each category will be different than the percentage of the categories by itself.

The household goods and characteristics used in the wealth index is listed below. Also the availability of these goods and characteristics in urban and rural areas are presented.

Table 3.1. Percentage distribution of households by assets used in the wealth index

	Urban	Rural	Total
Number of HH Members Per Total Room (at least one room for two persons)	87,8	74,5	84,2
Number of HH Members Per Sleeping Room (at least one room for two persons)	36,8	24,6	33,5
Bathroom as Seperate Room	98,1	84,1	94,5
Kitchen as Seperate Room	98,0	84,3	94,5
Main Floor Material (Parquet/polished wood, karo, etc)	69,2	61,9	67,2
Type of Toilet (Flush)	94,0	36,9	78,5
Type of Heating (central or flat heating)	33,2	2,9	25,0
Source of Drinking Water)piped into residence, bottled, etc)	88,2	24,2	70,9
Telephone	65,6	58,4	63,8
Cellular Phone	94,8	83,0	91,8
Refrigerator	98,5	95,2	97,6
Microwave Oven	14,9	5,1	12,4
Gas or Electric or Oven	83,0	59,3	77,0
Dishwasher	43,5	10,8	35,2
Mixer	58,4	26,2	50,3
Garbage Grinder	0,7	0,3	0,6
Washing Machine	95,4	81,0	91,8
Drying Machine	0,8	0,3	0,7
Vacuum Cleaner	91,3	66,7	85,1
Iron	92,6	73,2	87,7
Television	96,3	94,8	95,9
LCD/Plasma TV	7,7	2,1	6,2
Pay TV	15,4	2,7	12,2
Satellite TV	54,2	61,2	56,0
DVD/VCD Player	44,7	22,3	39,1
Video Camera	13,2	3,8	10,8
Camera	38,8	17,2	33,4
Computer	35,0	10,4	28,8
Laptop	14,0	3,4	11,4
İnternet	32,8	9,0	26,8
Indoors Sport Equipment	6,4	0,9	5,0
Air Conditioner	14,0	4,6	11,7
Car	34,3	26,2	32,3
Taxi/Minibus	4,0	5,5	4,4
Tractor	1,8	22,2	7,0
Motorcycle	4,4	11,2	6,1

When constructing the wealth index the guests in the respondent house are regarded as members of those households. These guests are not questioned about their ownership of household goods and household characteristics. So there is no way to determine their wealth levels. Thus it can be assumed that such guests are more likely to be hosted by households with similar wealth level. Among the 44 498 persons, 1 062 were not household members but were guests. In the construction of the wealth index, this 2,4 percent of the total is considered within the household.

4. ANALYSIS OF THE LINKAGE BETWEEN HOUSEHOLD WELFARE AND EARLY AGE MORTALITY

In this study the main research question is as follows:

Is wealth a significant determinant of infant mortality when all other determinants are controlled?

Before starting the analyses we should make some assumptions to make use of the data. As discussed earlier there are timeliness problems regarding the data. The current situation of the characterictics of the household and household members might be different than the time when the child was born or died. Since it is not possible to make such differentiations, the analyses will be made under the following assumptions.

Assumptions:

1. The household is assumed to be in the same wealth group throughout time.
2. The household characteristics such as usual residence, availability of sanitary water and availability of sanitary toilet facilities are assumed to be constant throughout time.
3. The mother and her partner are assumed to have the same characteristics throughout time.
4. Guests are assumed to be in the same wealth group with the household where they were surveyed.
5. The children who survived until the interview date and haven't completed the infancy or childhood period are kept in the data to make use of the recent data.

4.1. DESCRIPTIVE ANALYSES

This section is organized as two subsections. In the first subsection, the TDHS-2008 data is introduced. Here descriptive analyses are made for three different subgroups. First, the characteristics of the women are analysed, then the children are analysed and finally early age mortality rates for different birth cohorts are presented. All the components of early age mortality are examined. Neonatal, post-neonatal, infant, child and under-five mortalities are displayed for different periods and wealth groups.

In the second subsection, descriptive analyses are made for all variables that exist in the models. Infant mortality rate for categories of variables are presented here.

4.1.1. THE TDHS-2008 DATA

This subsection introduces the dataset. Here the data regarding women, children and early age mortality rates are presented. The five quintile categories of wealth index is used in this subsection to demonstrate the differences between wealth groups better.

4.1.1.1. DESCRIPTION OF THE WOMEN

In TDHS-2008 a total of 10 525 households were surveyed. In 3 106 households there weren't any eligible women for the survey. In 526 households there were more than one women eligible for the survey. Among the eligible women 7 405 were interviewed. Of these women 29,5 percent lived in the eastern region and 11,7 percent lived in the north.

Table 4.1. Number of eligible women in the survey households

Number of Eligible Women	Number of Households
0	3 106
1	6 893
2	476
3	44
4	4
5	2
Total	10 525

Tabel 4.2. Numerical and percentage distribution of eligible women by regions

Region	Number	Percent
West	1 876	25,3
South	1 013	13,7
Central	1 460	19,7
North	868	11,7
East	2 188	29,5
Total	7 405	100,0

In the rich and richest groups there are more women living in the 45-49 age group compared with poor groups. The poorest and poor groups contain more women in the 15-19 age group compared with rich groups.

When marital status is considered the rich and richest groups include more divorced or seperated women in proportion.

The higher is the wealth the more likely is the woman to live in urban area. 96,5 percent of the richest group lives in urban area where only 29,8 percent of the poorest group lives in urban area.

The women in rich groups are more educated than the ones in poor groups. In the poorest group only 5,8 percent of women are secondary level primary or higher graduates whereas in the richest group 58 percent are high school and higher graduates.

The distribution of wealth groups according to regional differences are very apparent. The rich and richest groups are mostly living in the western and central regions. 62,3 percent of the richest are living in the western region, but only 3,9 of this group is living in the eastern region.

The smoking status is categorized as smoked in the past, currently smoking and never smoked. As wealth increases more women are smokers. 34,7 percent of the richest category are currently smoking. In the poorest group only 13,3 percent is smoking and 81,9 never smoked.

Table 4.3. Percentage distribution of women by wealth index and basic characteristics

	Wealth index					
Age Group	Poorest	Poor	Middle	Rich	Richest	Total
15-19	4,2	4,0	2,5	1,6	0,8	2,5
20-24	14,2	13,7	15,1	10,9	3,9	11,3
25-29	18,8	18,4	18,9	18,8	16,7	18,3
30-34	16,8	18,7	15,9	17,0	24,0	18,6
35-39	16,8	17,8	18,3	17,8	19,1	18,0
40-44	16,8	13,5	15,2	17,6	17,8	16,2
45-49	12,3	13,9	14,1	16,2	17,8	15,1
Total	100,0	100,0	100,0	100,0	100,0	100,0
Marital Status						
Married	94,8	95,6	94,6	93,4	94,4	94,5
Widowed	2,5	2,1	2,1	2,4	1,7	2,1
Divorced/seperated	2,7	2,3	3,4	4,1	4,0	3,3
Total	100,0	100,0	100,0	100,0	100,0	100,0
Type of place of residence						
Urban	29,8	65,9	80,9	91,6	96,5	75,8
Rural	70,2	34,1	19,1	8,4	3,5	24,2
Total	100,0	100,0	100,0	100,0	100,0	100,0
Educational categories						
No education/ Primary incomplete	47,7	27,9	15,3	8,5	2,0	18,3
First level primary	46,5	61,0	64,3	57,2	30,6	51,9
Second level primary	4,2	7,5	10,7	10,2	9,4	8,7
High school and higher	1,6	3,5	9,7	24,1	58,0	21,1
Total	100,0	100,0	100,0	100,0	100,0	100,0
Region						
West	18,7	31,0	43,8	54,8	62,3	43,9
South	19,4	17,5	11,6	9,0	5,7	12,1
Central	14,9	22,0	23,9	23,2	24,1	22,0
North	6,7	7,7	8,4	5,8	4,0	6,4
East	40,3	21,8	12,3	7,3	3,9	15,5
Total	100,0	100,0	100,0	100,0	100,0	100,0
Smoking Status						
Smoked the Past	4,8	6,2	7,7	7,2	9,2	7,2
Currently Smoking	13,3	15,2	18,6	26,5	34,7	22,4
Never Smoked	81,9	78,7	73,7	66,3	56,0	70,4
Total	100,0	100,0	100,0	100,0	100,0	100,0
Number of Women	7405	1 529	1 542	1 586	1 485	1 263

Except for women in the richest group women in all other groups have similar working experience. Nearly 60 percent of these women have worked. But the women in the richest group demonstrate a different structure. 70 percent of these women have worked.

Only 34,9 percent of women in the richest group are working, but in the total 26,3 percent of women in richest group are working and are insured. On the other hand within the total women the poorest group only 0,9 percent are working and are insured.

The poor groups are more likely to work in the agriculture sector. In the rich groups the tendency is towards service sector. Almost every working women in the poorest group are working in agriculture and almost all women in the richest group are working in the service sector.

Table 4.4. Percentage distribution of women by wealth index and working status of women

	Wealth index					
Ever worked	Poorest	Poor	Middle	Rich	Richest	Total
Yes	58,0	57,0	58,0	58,6	70,0	60,6
No	42,0	43,0	42,0	41,4	30,0	39,4
Total	100,0	100,0	100,0	100,0	100,0	100,0
Working Status						
Doesn't work	60,4	69,0	74,3	75,3	65,1	69,3
Works and is insured	0,9	2,1	4,7	9,0	26,3	9,3
Works without insurance	38,7	28,9	21,0	15,7	8,6	21,4
Total	100,0	100,0	100,0	100,0	100,0	100,0
Working Status According to Sector						
Never worked	60,4	69,0	74,2	75,3	65,1	69,3
Agriculture	35,0	22,1	10,7	4,6	0,9	13,2
Industry	0,5	1,7	2,8	3,5	1,5	2,1
Service	4,0	7,2	12,2	16,6	32,4	15,4
Total	100,0	100,0	100,0	100,0	100,0	100,0
Number of Women	7 405	1 529	1 542	1 586	1 485	1 263

4.1.1.2. DESCRIPTION OF THE CHILDREN

The interviewed women had given birth to a total of 19 678 children among which 18 361 survived and 1 317 didn't survive. 1 019 of all the deaths were infant deaths.

In the dataset there are 3 934 children that were born in the five years preceding the survey. Among these 82 didn't survive and of these 74 were infant deaths. 74 observations as a total is very few to implement models with several variables. So use of the births of last five years preceding the survey is not possible.

A total of 8 139 children were born in the last ten years precedind the survey. Of these 287 had died. And 232 of them were infant deaths. When compared with the 74 infant deaths in the last five years, 232 is about three times higher. The selection of the last ten years period will increase the number of observations and will facilitate further analysis.

Table 4.5. Numerical and percentage distribution of children by survival status

Survival	Number of Children	Percent
All periods		
All deaths		
Died	1 317	6,7
Survived	18 361	93,3
Total	19 678	100
Infant deaths		
Died	1 019	5,2
Survived	18 659	94,8
Total	19 678	100,0
In the Five-Year Period Preceding the Survey		
All deaths		
Died	82	2,1
Survived	3 852	97,9
Total	3 934	100,0
Infant deaths		
Died	74	1,9
Survived	3 860	98,1
Total	3 934	100,0
In the Ten-Year Period Preceding the Survey		
All deaths		
Died	287	3,5
Survived	7 852	96,5
Total	8 139	100,0
Infant deaths		
Died	232	2,9
Survived	7 907	97,1
Total	8 139	100,0

4.1.1.3 EARLY AGE MORTALITY RATES

In this section, early age mortality is studied in five categories. Neonatal mortality is the mortality in the first 30 days after birth. Post neonatal mortality is the mortality between the first and twelveth months after birth. Neonatal mortality and post neonatal mortality are sub categories of infant mortality which is the mortality before reaching first age. Child mortality is the probability of dying between first and fifth ages. It's calculated for children who reach their first age. Under five mortality is the probability of dying before reaching fifth age. All these indicators are expressed per 1000.

For births within five years preceding the survey there is no apparent effect of wealth on early age mortality. Although early age mortality is lower for the richest group regarding most of the indicators, child mortality is the highest in this group. At this point it should be well kept in mind that there are too few cases of early age mortality for the data of births between 2004 and 2008.

When data for ten year period is considered the relationship between early age mortality and wealth is more evident. Except for child mortality this relationship is striking especially between the poorest and richest groups. Neonatal mortality is about three times and post neonatal mortality is about four times higher for the poorest group. Although the relationship is obvious, mortality is not always higher, the higher is the wealth index. Especially the middle quintile and the rich quintile break the one way relationship. For the rich group early age mortality is higher than the middle group. For the twenty year period the differences between the poorest and richest groups are less severe regarding neonatal and postneonatal mortalities. This is due to the fact that decline in neonatal and postneonatal mortalities were greater for the richest group. Also for the twenty year period data the early age mortality rates are lower for the rich group than the middle group except for child mortality.

Table 4.6. Early age mortality rates by birth cohort and wealth index

	Wealth index					
	Poorest	Poor	Middle	Rich	Richest	Total
2003-2008						
Neonatal	13,2	20,1	9,3	12,4	8,7	13,2
Post Neonatal	7,7	2,5	2,9	5,5	1,2	4,2
Infant	20,9	22,6	12,1	17,9	9,9	17,4
Child	8,2	6,3	4,8	0,8	10,4	6,4
Under Five	29,0	28,8	16,9	18,7	20,2	23,6
1998-2008						
Neonatal	22,4	19,0	10,2	11,2	7,2	15,0
Post Neonatal	19,0	11,1	6,1	7,0	4,4	10,4
Infant	41,4	30,2	16,3	18,2	11,6	25,5
Child	10,5	8,5	4,3	4,4	9,0	7,7
Under Five	51,4	38,4	20,6	22,5	20,5	33,0
1988-2008						
Neonatal	30,9	21,5	18,8	17,1	13,5	21,2
Post Neonatal	31,8	19,9	14,7	7,1	6,7	17,4
Infant	62,7	41,4	33,5	24,2	20,1	38,5
Child	16,6	10,8	5,7	5,8	6,1	9,5
Under Five	78,2	51,8	39,0	29,8	26,1	47,6

For the 1998-2003 period child and under-five mortality rates do not follow a downward trend as wealth increases. In the rich and richest groups the share of child mortality in infant mortality is higher than the middle wealth group. Neonatal mortality is 5 times higher in the richest group compared to the poorest group.

In the 1993-1998 period the downward trend is seen only in child mortality. Neonatal mortality is even higher fot the richest group compared to the poor group. Still, neonatal mortality is the highest for the poorest group, but for neonatal mortality there is no big difference between wealth groups. When poorest and richest groups are compared regarding post neonatal mortality the difference is 3,4 times.

Regarding early age mortality between 1988 and 1993 there isn't a downward trend for post neonatal and child mortality while wealth is increasing. Post neonatal and child mortality are higher for rich group compared to richest group. For this birth cohort, infant mortality is 6 times higher in the poorest group than the richest group.

Table 4.7. Early age mortality rates by birth cohort and wealth index (2)

	Wealth index					
	Poorest	Poor	Middle	Rich	Richest	Total
1998-2003						
Neonatal	30,6	18,2	11,4	10,0	6,1	16,8
Post Neonatal	28,9	19,2	9,4	8,5	6,9	16,2
Infant	59,5	37,4	20,7	18,6	13,0	33,0
Child	14,9	12,1	3,8	7,6	10,2	10,3
Under Five	73,6	49,0	24,5	26,0	23,0	42,9
1993-1998						
Neonatal	35,0	22,5	25,6	22,4	28,7	27,2
Post Neonatal	36,4	32,8	28,0	6,5	10,7	24,2
Infant	71,5	55,4	53,6	28,9	39,4	51,4
Child	24,3	9,6	7,6	4,9	1,5	10,2
Under Five	94,0	64,4	60,8	33,7	40,8	61,1
1988-1993						
Neonatal	47,4	26,8	32,0	22,8	8,8	28,4
Post Neonatal	63,0	29,8	23,0	7,8	9,5	27,8
Infant	110,4	56,6	55,0	30,5	18,3	56,3
Child	31,8	20,3	7,1	9,4	3,9	14,6
Under Five	138,7	75,7	61,7	39,6	22,1	70,1

When neonatal mortality is considered by birth cohorts, the greatest decline was in the poorest group. For 1988-1993 birth cohort neonatal mortality was as high as 47,4, but this rate has decreased to 13,2 in the 2003-2008 birth cohort. In the poor group the decline was very small and in the richest group there was hardly a decline after all, following a high increase passing from 1988-1993 to 1993-1998 birth cohort.

For 2003-2008 birth cohort post neonatal mortality has almost diminished for the richest group. It is only 1,2 for the cohort. Post neonatal mortality also declined considerably for other wealth groups. Except for the rich wealth group the drops are very considerable.

There were great declines in the infant mortality rate. The greatest decline was experienced for the poorest group from 100,4 to 20,9.

Probably because of low number of cases the child mortality rate doesn't demonstrate a good picture. Here, the greatest decline was in the rich and poorest groups. The rate dropped to 0,8 for the rich group, on the other hand for the richest group 2003-2008 birth cohort experienced the highest rate with 10,4.

The decline in the under five mortality is mostly in favor of the poorest group. While the total decline between the 1998-2003 and 2003-2008 birth cohorts is 79 percent for the poorest group. The decline is only 9 percent for the richest group.

Table 4.8. Early age mortality rates by 5-year birth cohorts and wealth index

	Wealth index					
	Poorest	Poor	Middle	Rich	Richest	Total
Neonatal						
2003-2008	13,2	20,1	9,3	12,4	8,7	13,2
1998-2003	30,6	18,2	11,4	10,0	6,1	16,8
1993-1998	35,0	22,5	25,6	22,4	28,7	27,2
1988-1993	47,4	26,8	32,0	22,8	8,8	28,4
Post Neonatal						
2003-2008	7,7	2,5	2,9	5,5	1,2	4,2
1998-2003	28,9	19,2	9,4	8,5	6,9	16,2
1993-1998	36,4	32,8	28,0	6,5	10,7	24,2
1988-1993	63,0	29,8	23,0	7,8	9,5	27,8
Infant Mortality						
2003-2008	20,9	22,6	12,1	17,9	9,9	17,4
1998-2003	59,5	37,4	20,7	18,6	13,0	33,0
1993-1998	71,5	55,4	53,6	28,9	39,4	51,4
1988-1993	110,4	56,6	55,0	30,5	18,3	56,3
Child Mortality						
2003-2008	8,2	6,3	4,8	0,8	10,4	6,4
1998-2003	14,9	12,1	3,8	7,6	10,2	10,3
1993-1998	24,3	9,6	7,6	4,9	1,5	10,2
1988-1993	31,8	20,3	7,1	9,4	3,9	14,6
Under Five Mortality						
2003-2008	29,0	28,8	16,9	18,7	20,2	23,6
1998-2003	73,6	49,0	24,5	26,0	23,0	42,9
1993-1998	94,0	64,4	60,8	33,7	40,8	61,1
1988-1993	138,7	75,7	61,7	39,6	22,1	70,1

4.1.2. INFANT MORTALITY RATES BY DIFFERENT FACTORS

In this section, first the wealth index to be used in the rest of the study will be determined. As mentioned previously, three wealth indexes were prepared. Each had three categories, namely the poor, middle and rich. The first index was categorized as the poor 33 percent, middle 33 percent and rich 33 percent. The other two indexes were categorized as 40 percent, 40 percent, 20 percent and 20 percent, 40 percent, 40 percent respectively from poor to rich groups.

The criteria for the determination of the wealth index will be the extent of difference of infant mortality rates between the poor and rich groups. Infant mortality for each category of the wealth indexes were calculated and the infant mortality rate of the poor was divided by the infant mortality of the rich group. As follows, the greatest difference is in the 40 percent, 40 percent, 20 percent wealth index. For this wealth index the difference of infant mortality rate for the poor category and the rich category is 3,1 times. So, this will be the wealth index to be used in the analyses of the infant mortality rates according to categories of variables and the in the regressions.

Table 4.9. Infant mortality rates by different wealth indexes

	Wealth index			
	Poor	Middle	Rich	Total
Wealth Index Type				
33-33-33	38,3	17,6	15,3	25,5
40-40-20	***35,8***	***17,3***	***11,6***	***25,5***
20-40-40	41,1	24,0	15,0	25,5

Infant mortality rate is higher for lower wealth index groups as expected. For the richest 20 percent infant mortality rate is 11,6, for the middle group 17,3 and for the poorest group 38,5. Infant mortality among males is 28,0 and among females it is 22,7. Mortality of the infants living in rural areas are about 1,5 times more compared to infants living in urban areas. There are big discrepancies between five regions regarding infant mortality. Infant mortality

rate is the highest in the East and lowest in the West. The difference is almost 2,5 times. In the West infant mortality rate is 16,3 and in the East it is 38,9. When mother tongue of the mother and father is considered there are evident differences between infants of mothers or their husbands whose mother languages are different. Probability of dying of infants whose mothers' mother tongue is Kurdish or Arabic is more than two times compared to infants whose mothers' mother tongue is Turkish. For mothers with Kurdish mother tongue infant mortality rate is 44,0 and for the Arabic it is 37,7. On the other hand infant mortality rate is 18,4 for infants whose mothers' mother tongue is Turkish. This result demonstrates the extent of ethnic differences regarding infant mortality. Kurdish and Arabic infants are exposed to mortality more than Turkish infants.

Table 4.10. Infant mortality rates for 1998-2008 birth cohort by wealth index, sex of child, region and mother tongue

	Infant Mortality Rate
Total	25,5
Wealth Index	
Poor	35,8
Middle	17,3
Rich	11,6
Sex of child	
Male	28,0
Female	22,7
Type of place of residence	
Rural	33,5
Urban	22,2
Region	
South	30,0
Central	21,8
North	24,0
East	38,9
West	16,3
Mother tongue of woman	
Kurdish	44,0
Arabic	37,7
Turkish	18,4
Mother tongue of husband	
Kurdish	40,9
Arabic	38,0
Turkish	19,1

According to Mosley-Chen framework socio-economic factors of infant mortality are analysed in three subgroups. These are individual, household and community levels. In the table below, all socioeconomic variables axcept for the community level variables are demonstrated.

Mother's and husband's education level shows large discrepancies regarding infant mortality. For husbands this discrepancy poses a larger gap. The husband's education level seems to have higher differences infant mortality. Infant mortality rate for the husbands category who haven't completed primary school is four times higher than the infant mortality rate for the high school and higher education category. For mothers who have graduated from second level primary school infant mortality rate is less than mothers who have graduated from high school or higher. Altough the difference is very small this shows that for mothers after second level primary school, education doesn't pose much difference for infant mortality.

The results say that for different insurance status there are bigger differences of infant mortality compared to working status. There's no big difference between mothers or husbands who don't work and who work but is not insured. On the other hand the for those who work and are insured infant mortality is much lower. For mothers who don't work infant mortality rate is 25,6, for those who work, but aren't insured it is 30,9 and for those who work and are insured infant mortality is only 8,3. Also, health insurance of mother is an important factor in demonstrating discrepancies in infant mortality. In Turkey there is a card which is called the green card in the national health system. Green card, is a card given to people who are uninsured, whose incomes are below some certain level and who document this and apply for the card. Mothers who are insured with green card have more infant mortality compared with those who are not insured or who are insured with some other way than green card. Mothers with green card have infant mortality almost 2,5 times compared to those who are insured, but not with green card.

For this study, two indexes were produced to analyse social factors such as social participation and religious attitudes. Social participation index was formed according to participation of mothers in four social activities. These social activities are going to holiday, going outside for a meal, organizing home meetings and using internet. If the woman participated in at least two

of the activities she was considered as participant. If she didn't do any of these activities regularly she was considered as non-participant. The results indicate that infants of mothers who are active in social life according to this index are less exposed to infant mortality compared to infants of mothers who are not active. For the non-participant group infant mortality rate is 2,3 times higher than the participant group.

The other index which was formed according to religious practices of mothers is called the religous attitudes index. This index is formed by making use of three religious practices, which are fasting, performing namaz and wearing scarf when going. She was regarded as religious if she performed all the three practices regularly and not religious if she did not perform any of these practices regularly. Here again, as it was in the social participation index there are large discrepancies between different groups. The infants of mothers who are considered as non-religious are exposed to mortality 3,3 times compared to infants of mothers who are considered as non-religious.

The construction of these two indexes can be argued and different indexes can be constructed by making use of different variables. Also regular or irregular practices can be pooled and different categories can be formed. Especially regarding social participation index further efforts may develop different results. In this study, before deciding on this social index some other indexes were formed with other variables. For example, doing sport was among the activities included in the index. Because of very low frequency of women who do sports, this activity was dropped from the index.

Table 4.11. Infant mortality rates for 1998-2008 birth cohort by individual level variables

	Infant Mortality Rate
Total	25,5
Mother's Education Level	
No education/Primary incomplete	41,0
First level primary	23,6
Second level primary	12,4
High school and higher	13,5
Husband's Education Level	
No education/Primary incomplete	55,7
First level primary	27,9
Second level primary	20,4
High school and higher	13,8
Woman's Working Status	
Doesn't work	25,6
Works but isn't insured	30,9
Works and is insured	8,3
Husband's Working Status	
Doesn't work	32,9
Works but isn't insured	35,1
Works and is insured	18,0
Health Insurance Status	
No insurance	26,8
Green card	43,6
Insured, other than green card	17,9
Social Participation Index	
Non-participant	32,0
Middle	23,6
Participant	14,0
Religious attitudes of mother	
Religious	31,7
Middle	21,1
Not religious	9,5

Whether the mother watches wome's programs on TV or not does not show a big difference regarding infant mortality. According to literature it is expected that infants of mothers who watch women's programs would be less exposed to mortality because watching women's programs would make the mother more informed. Although there are not big differences the results indicate the opposite. Further analysis on this variable should be made to understand the situation. There is no information on the programs. Different programs might be in question for different people. More educated and working women might be reluctant to watch such programs or they might not have the opportunity to watch because these programs are mostly published in the working hours. Different results might be get when this information is differentiated for mothers with different age groups, working status, education level or other socio-economic variables.

Family type shows different infant mortality rates for different family types. Infants living in extended families are 1,4 times exposed to mortality compared to infants living in nuclear families. The arrangement of marriage also shows differences regarding infant mortality. If the marriage was arranged by the bride and her broom infant mortality rate is 23,0. If the marriage was arranged by the families by taking the consent of the bride infant mortality rate is 25,6. On the other hand, for marriages arranged by families without the consent of the bride infant mortality rate is 37,3. Here the high infant mortality for the mothers who lack autonomy is evident. Type of marriage displays a bigger gap between different groups. In the absence of civil marriage infant mortality rate is 2,3 times higher. Another similar factor is the presence of dowry or bridewealth. If dowry or biredewealth is given infant mortality rate is 1,7 times higher.

The presence of other people in the household at the beginning of the marriage is another factor showing the level of autonomy of the mother. In the case that someone is present in the household infant mortality is 2,1 times higher. Mother's relationship to her husband is analysed in three

categories, which are no relation, first degree relation and second degree relation. It is expected that if there is a relationship this would increase the probability of dying of the infant. Unexpectedly infant mortality is higher if there is no relation compared to second degree relation. Although the difference is very small the result is unexpected. For marriages with first degree relatives the infant mortality is 1,6 higher compared to marriages with non-relatives.

Table 4.11. Infant mortality rates for 1998-2008 birth cohort by individual level variables (continued)

	Infant Mortality Rate
Total	25,5
Watches women's programs on TV	
No	21,4
Irregular	28,7
Regular	25,9
Family Type	
Extended	32,4
Nuclear	23,0
Marriage arranged	
Family (with consent)	25,6
Family (without consent)	37,3
Theirselves	23,0
Type of marriage	
No civil marriage	54,6
Civil marriage	24,1
Dowry or bridewealth given	
Yes	38,8
No	22,3
Anyone else in the household	
Yes	31,0
No	14,9
Woman’s relation to her husband	
First degree	38,8
Second degree	20,1
No relation	23,7

Environmental factors are among those which are called the proximate determinants of infant mortality. The effect of source of drinking water on infant mortality shows that infants growing in a house without sanitary drinking water are 1,4 times more likely to die compared to infants who grow in a house where sanitary drinking water is available. Availability of sanitary toilet facility is even a more effective factor. In houses without a flush toilet infant mortality rate is 1,8 times higher compared to houses where flush toilet is available. Number of persons per sleeping room is used as a proxy for air contamination in the house. Here there weren't any big differences between categories when infant mortality is considered.

The smoking habits of mother didn't show different infant mortality patterns, either. But here it should be kept in mind that this variable is formed according to whether the mother has ever smoked regularly or not. There are other questions in questionnaire which investigate smoking habits of mothers. These questions ask whether the mother currently smokes or not, how much she smokes/smoked and the age when she started smoking regularly. Even with these questions it's hard to understand the effects of smoking. There is no question which would help in understanding for how long the mother smoked. Also the smoking period is unknown which makes it impossible to relate the infants' growing environment and smoking habit of the mother.

In the absence of high quality information from the smoking habit of mother another question regarding smoking gives valuable information about air contamination in the house. This question investigates whether smoking is a usual practice within the house or not. The results demonstrate that in houses where smoking within is a usual practice, infant mortality rate is 2,3 times higher compared to houses where smoking is not practiced. Again there is a problem with periodicity, because the period of smoking in the house is only questioned for the survey time and the periods of growing or dying of the infant cannot be matched fully with this practice. On the other

hand, this is a common problem for most of the factors and this was indicated when the limitations of the study was discussed.

Table 4.12. Infant mortality rates for 1998-2008 birth cohort by environmental contamination

	Infant Mortality Rate
Total	25,5
Source of drinking water	
Not sanitary	32,2
Sanitary	22,6
Type of toilet facility	
Not flush	38,1
Flush	21,6
Number of persons per sleeping room	
1-2 persons per sleeping room	25,0
More than 2 persons per sleeping room	25,6
1 or less person per sleeping room	21,6
Mother Ever Smoked	
Yes	25,3
No	25,5
Smoking in the House	
Yes	33,9
No	14,5

The last group of factors to be discussed are the maternal factors. When age of mother at birth is questioned it is expected that infant mortality would be higher for mothers younger than 20 years old and older than 35 years old. The results are in line with these expectations. For mothers who were younger than 20 years old at birth infant mortality is 1,4 times higher compared to mothers who were between 20 and 35 at the time of birth. Birth order of the infant also displayed notable differences. Infants who were born in the fourth or more order were exposed to death in infancy period 2 times more than those who were first born.

The results assert that preceeding birth interval and succeeding birth interval demonstrate notable differences regarding infant mortality. The discrepancies are more striking for the succeeding birth interval. If there is no preceeding birth, in other words if this is the first born or if the preceeding birth was more than 24 months ago, the infant mortality rates are almost the same which are 20,5 and 20,2 respectively. On the other hand, infant mortality is 48 for infants who were preceeded by another birth within the 24 months of their birth. The difference between this category and the others is about 2,3 times.

As mentioned above, succeding birth interval demonstrates immense differences regarding infant mortality. If there is no succeeding birth following the birth of the infant, infant mortality rate is 12,4. If there is a birth after 24 months following the birth, infant mortality rate is 40,5 which is 3,3 times higher. When there is a birth within 24 months following the birth infant mortality rate of the previously born is 82,3 which is 6,6 times higher compared to infants which were not succeeded with another birth.

Table 4.13. Infant mortality rates for 1998-2008 birth cohort by maternal factors

	Infant Mortality Rate
Total	25,5
Age of mother at birth	
Younger than 20	33,4
Between 20 and 35	23,8
Older than 35	30,0
Birth order	
First born child	20,5
Fourth or more	41,7
Second and third	21,6
Preceding Birth Interval	
No preceding birth (first child)	20,5
24 months or less	48,0
More than 24 months	20,2
Succeding Birth Interval	
24 months or less	82,3
More than 24 months	40,5
No succeeding birth	12,4

4.2. MULTIVARIATE ANALYSES

The analyses were made for the births in the ten year period preceding the survey. 8 139 children were born in this period. Among these 232 died before their first age and 277 died before reaching fifth age. Going further back than ten years period would pose recall problems. Also by limiting the period the effects of changes by time may be reduced. The data regarding antenatal care will not be included in our analyses because the data is only available for the last five years. Use of the births in the last five years preceding the survey is not applicable either. Doing so would lead to a data set with very low number of observations.

In this section the **focus will be on infant mortality**. No further examination will be pursued for components of infant mortality (neonatal and post neonatal mortality) or child mortality. The components of infant mortality will not be examined because such an effort would limit the study because of low number of cases. The child mortality will not be examined because of the case number problem as well as the will to focus on the infant mortality which is the main concern regarding the ‘Turkish puzzle’.

As mentioned earlier in this section, to test the relationship between wealth index and infant mortality for the births ten year preceding the survey, logistic regression method will be performed. The dependent dichotomous variable is the survival of the child. The independent variable is the wealth categories. Other variables will be put in the model only as control variables to test the significance of the effect of household welfare on infant mortality.

Before constructing and testing the models the relationship between the wealth index and infant mortality for births of different periods will be looked over. First the relationship for all births included in the data will be tested, then the relationship will be tested for last five years, last ten years (which is also the first model) and last twenty years.

The wealth groups are named as poor, middle, and rich from bottom to top. For the logistic regression of wealth index against infant mortality, the reference category for the wealth groups is the rich group.

Finally different models will be constructed for the rich and the poor group to see the difference between these groups in an other way.

In TDHS-2008 a weighted, multistage, stratified cluster sampling method was used. Weighting, stratification and clustering calls for the need to use complex sample regression instead of regular regression.

A brief information how to read the regression tables would be helpful for understanding. R^2 (Nagelkerke) denotes how much of the variance in the dependent variable is explained by the independent variables that exist in the model. In other words how much of infant mortality is explained by these determinants. The significance of each variable is also important to understand the model. The significance level should be lower than 0,05 to conclude that the variable is significant in the model.

In the models the reference categories of the variables are the ones which are least likely to encounter infant mortality. This helps in reading the results.

4.2.1. MULTICOLLINEARITY TEST

A multicollinearity test was executed in order to detect the related variables. The cut off point of the VIF value was decided to be 10. The variables with more then a VIF value of 10 are exposed to multicollinearity. The results of the test showed that multicollinearity exists for religion index, person per room, birth order and preceeding birth interval. Person per room is also a component of the wealth index. For the other variables which are also components of the wealth index, toilet and water, multicollinearity did not exist. Religion index and person per room were directly dropped from the

model. Then a decision was made for birth order and preceeding birth interval. These two variables have a colliding category. For birth order the first category is the first child and for preceeding birth interval the first category is no preceeding birth which also means the first child. Among these two variables exclusion of one would be enough. And it was decided to exclude birth order.

Among the cases, a total of 6,9 percent had missing categories. The number of missing cases are not as many for need to put in practice imputation.

4.2.2. MODELS FOR THE LINKAGE BETWEEN HOUSEHOLD WEALTH AND INFANT MORTALITY

In the first model the relationship of infant mortality and the chosen wealth index is tested.

In the second model besides the wealth index, sex and community level variables are added.

The third model consists of the wealth index, sex, community level variables and other socio-economic variables which are grouped in Mosley-Chen framework as household and individual levels.

In the fourth model environmental factors are added to the variables included in the third model.

The fifth model is the final model is the most comprehensive one. Maternal factors are included to the variables in the fourth model.

Table 4.14 Models List

Model 1	Model 2	Model 3	Model 4	Model 5
Wealth index	Wealth index	Wealth index	Wealth index	Wealth index
	Sex of child	Sex of child	Sex of child	Sex of child
	Type of place of residence	Type of place of residence	Type of place of residence	Type of place of residence
	Region	Region	Region	Region
	Mother tongue of woman	Mother tongue of woman	Mother tongue of woman	Mother tongue of woman
	Mother tongue of her husband	Mother tongue of her husband	Mother tongue of her husband	Mother tongue of her husband
		Mother's education level	Mother's education level	Mother's education level
		Husband's education level	Husband's education level	Husband's education level
		Mother's working status	Mother's working status	Mother's working status
		Husband's working status	Husband's working status	Husband's working status
		Health insurance status	Health insurance status	Health insurance status
		Social participation index	Social participation index	Social participation index
		Watches women's programs on TV	Watches women's programs on TV	Watches women's programs on TV
		Family type	Family type	Family type
		Marriage arranged by	Marriage arranged by	Marriage arranged by
		Type of marriage	Type of marriage	Type of marriage
		Dowry or bridewealth given	Dowry or bridewealth given	Dowry or bridewealth given
		Anyone else in the hh at the beginning of marriage	Anyone else in the hh at the beginning of marriage	Anyone else in the hh at the beginning of marriage
		Woman's relation to her husband	Woman's relation to her husband	Woman's relation to her husband
			Source of drinking water	Source of drinking water
			Type of toilet facility	Type of toilet facility
			Mother have ever regularly smoked cigarette	Mother have ever regularly smoked cigarette
			Anyone smokes at home or not	Anyone smokes at home or not
				Age of mother at birth
				Preceding birth interval in months
				Succeding birth interval in months

The results indicate that when only wealth index is in the model, it has a significant effect on infant mortality. But this is only true for the poor and rich categories. The middle category is not significant. According to the first model the probability of dying in the first year of life is 3,4 times higher in the poor compared to the rich. In the middle category it is 1,6 times higher compared to the rich, but this relationship is insignificant. The explanatory power of the model is also very low. Only 2,2 percent of the variation in infant mortality is explained by the wealth index. But for just one variable this percentage is not very small.

Even in the second model, the wealth index drops out. It is no more significant in any of the other models. In the second model among the six factors the only significant one is the mother tongue of the mother. The infants of Kurdish speaking mothers are 3 times more likely to die in the first year of life compared to infants of Turkish speaking mothers. Mothers whose mother tongue is Arabic were not found to be significant, therefore weren't included in the model. In this model wealth index was dropped out and mother tongue of mother has entered the model. With this model 3,8 percent of the variability in infant mortality can be explained.

Inclusion of thirrteen other socioeconomic variables makes the formation of the third model. Strikingly, none of these newly introduced factors have an effect on infant mortality. The only significant determinant available in the model is the mother tongue of the mother. At variable level even this variable is not significant, but it's significant at category level. In this model Kurdish speaking mothers' infants are 2,6 times more likely to die compared to infants of Turkish speaking mothers. This model has the power to explain 5,2 percent of the variability in infant mortality.

The fourth model was formed by inclusion of some environmental contamination factors to the third model. Also in this model, mother tongue of mother is significant. This time it is significant also at variable level. But

besides this factor, one other factor is significant in the model which is the smoking in the house. As was in the second and third models infants of Kurdish speaking mothers are more likely to die infancy period compared to infants of Turkish speaking mothers. In this model the difference is 2,9 times. Smoking in the house increases the probability of dying of infants 2,3 times. The explanatory power of the model is 6,9 percent.

The fifth model composes all the determinants in the fourth model as well as maternal factors. When looked at variable level, controlled with maternal factors, mother tongue of the mother is no more existing in the model. The entrance of the three maternal factors dropped out this variable from the model. But it is significant at category level. Smoking in the house is still significant along with the maternal factors. All the three maternal factors are significant determinants of infant mortality.

In this model infants of Kurdish mothers are 2,6 times more likely to die compared to infants of Turkish mothers. Smoking in the house increases the probability of dying of the infants 2,4 times. In the age of mother at birth variable, age at birth younger than 20 category is not significant. Infant mortality is 1,9 times higher for age at birth more than 35 compared to age at birth between 20 and 35. For preceeding birth interval the no preceeding birth category is not significant. If there is a preceeding birth within 24 months, the probability of dying of the infant is 1,5 times higher compared to the situation if there is a preceeding birth after 24 months. All the categories of the succeeding birth interval is significant. Compared to no succeeding birth probability of infant mortality is 4,1 times higher for succeeding birth interval after 24 months and 8 times higher for succeeding birth interval within 24 months. The maternal factors have contributed to the explanatory power of the model a lot. Before introduction of the maternal factors only 6,9 percent of the variability of the infant mortality could be explained by the model. After the maternal factors were introduced the new results indicate that 15,5 of the variability of the infant mortality can be explained by the fifth model.

Table 4.15. Results of multivariate analyses

	Model 1	Model 2	Model 3	Model 4	Model 5
Wealth index	*				
Poor	3,366*	-	-	-	-
Middle	1,586	-	-	-	-
Rich	1,000	-	-	-	-
Sex of child					
Male	MD	-	-	-	-
Female	MD	-	-	-	-
Type of place of residence					
Rural	MD	-	-	-	-
Urban	MD	-	-	-	-
Region					
East	MD	-	-	-	-
South	MD	-	-	-	-
Central	MD	-	-	-	-
North	MD	-	-	-	-
West	MD	-	-	-	-
Mother tongue of woman		*		*	
Kurdish	MD	2,997*	2,563*	2,926*	2,587*
Arabic	MD	1,696	1,138	1,266	1,383
Turkish	MD	1,000	1,000	1,000	1,000
Mother tongue of husband					
Kurdish	MD	-	-	-	-
Arabic	MD	-	-	-	-
Turkish	MD	-	-	-	-
Mother's education level					
No education/Primary incomplete	MD	MD	-	-	-
First level primary	MD	MD	-	-	-
Second level primary	MD	MD	-	-	-
High school and higher	MD	MD	-	-	-
Husband's education level					
No education/Primary incomplete	MD	MD	-	-	-
First level primary	MD	MD	-	-	-
Second level primary	MD	MD	-	-	-
High school and higher	MD	MD			
Woman's working status					
Doesn't work	MD	MD	-	-	-
Works but isn't insured	MD	MD	-	-	-
Works and is insured	MD	MD	-	-	-

Table 4.15. Results of multivariate analyses (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
Husband's working status					
Doesn't work	MD	MD	-	-	-
Works but isn't insured	MD	MD	-	-	-
Works and is insured	MD	MD	-	-	-
Health Insurance Status					
No insurance	MD	MD	-	-	-
Green card	MD	MD	-	-	-
Insured, other than green card	MD	MD	-	-	-
Social participation index					
Non-participant	MD	MD	-	-	-
Middle	MD	MD	-	-	-
Participant	MD	MD	-	-	-
Watches women's programs on TV					
No	MD	MD	-	-	-
Irregular	MD	MD	-	-	-
Regular	MD	MD	-	-	-
Family Type					
Extended	MD	MD	-	-	-
Nuclear	MD	MD	-	-	-
Marriage arranged					
Family (with consent)	MD	MD	-	-	-
Family (without consent)	MD	MD	-	-	-
Other	MD	MD	-	-	-
Theirselves	MD	MD	-	-	-
Type of marriage					
No civil marriage	MD	MD	-	-	-
Civil marriage	MD	MD	-	-	-
Dowry or bridewealth given					
Yes	MD	MD	-	-	-
No	MD	MD	-	-	-
Anyone else in the household at the beginning					
Yes	MD	MD	-	-	-
No	MD	MD	-	-	-
Woman’s relation to her husband					
First degree	MD	MD	-	-	-
Second degree	MD	MD	-	-	-
No relation	MD	MD	-	-	-
Source of drinking water					
Not sanitary	MD	MD	MD	-	-
Sanitary	MD	MD	MD	-	-

Table 4.15. Results of multivariate analyses (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
Type of toilet facility					
Not flush	MD	MD	MD	-	-
Flush	MD	MD	MD	-	-
Mother have ever regularly smoked cigarette					
Yes	MD	MD	MD	-	-
No	MD	MD	MD	-	-
Anyone smokes at home or not				*	*
Yes	MD	MD	MD	2,308*	2,427*
No	MD	MD	MD	1,000	1,000
Age of mother at birth					*
Younger than 20	MD	MD	MD	MD	1,025
Older than 35	MD	MD	MD	MD	1,894*
Between 20 and 35	MD	MD	MD	MD	1,000
Preceding birth interval					*
No preceeding birth	MD	MD	MD	MD	0,698
Within 24 months	MD	MD	MD	MD	1,533*
More than 24 months	MD	MD	MD	MD	1,000
Succeding Birth Interval					*
Less Than 24 Months	MD	MD	MD	MD	7,976*
More Than 24 Months	MD	MD	MD	MD	4,116*
No succeeding birth	MD	MD	MD	MD	1,000
R2 (Nagelkerke)	0,022	0,038	0,052	0,069	0,155
Wald F	868,591*	203,932*	112,272*	118,566*	81,390*

Notes:

MD the variable is not in the model
\- the variable is not significant in the model
* the category is significant

4.2.3 MODELS FOR THE POOR, MIDDLE AND RICH GROUPS TO ASSESS THE FACTORS IMPACT ON INFANT MORTALITY

In the previous section the final model showed that there is no relationship between wealth index and infant mortality when all other control variables are in the model. This section analyzes further relationship between wealth index categories and infant mortality. For this purpose, the data is splitted into three data sets for the poor, middle and rich wealth groups. All the variables in the final model of the previous section apart from the wealth index are included into the regression models.

The results of the analyzing wealth index groups seperately will help in understanding how the determinants of infant mortality differentiate between wealth groups.

After the logistic regression was applied for the poor wealth group it was seen that besides the determining factors in the fifth model of the previous section, which were the mother tongue of the mother, smoking in the house and maternal factors, sex of the child, health insurance status and family type was found significant. Male infants are 1,4 times more likely to die compared to female infants. Infants of women who have green card, which is given to people under a certain level of income, are 1,6 times more likely to die when compared to infants of women who are insured with some other type of insurance. Infants in extended families are 1,4 times more likely to die compared to infants in nuclear families. This model explains 13,4 percent of the variation in infant mortality.

The models for the middle and rich groups don’t give reliable results because there are very few number of infant deaths in these groups. For the poor wealth group there are 168 deaths in infancy period. For the middle and rich wealth groups there are 53 and 11 deaths respectively. Still, the results for these wealth groups are given. Significance at variable level is given for both

groups. At the category level only the values which are meaningful and interpretable are given. The results for these last two models should be approached carefully.

In the model for the middle wealth group sex of the child and family type are not significant contrary to the model for the poor wealth group. On the other hand mother tongue of woman, mother tongue of husband, husband's working status, woman’s relation to her husband and source of drinking water variables which are not significant in the poor wealth group model are significant for the middle wealth group model.

In the model for the rich wealth group mother tongue of woman, source of drinking water and preceding birth interval are not significant contrary to the model for the middle wealth group. On the other hand type of place of residence, mother’s education level, husband’s education level, marriage arrangement, type of marriage, dowry or bridewealth given and type of toilet facility variables which are not significant in the middle wealth group model are significant for the rich wealth group model.

Table 4.16. Results of multivariate analyses for poor, middle and rich wealth groups

	Model for Poor	Model for Middle	Model for Rich
Sex of child	*		
Male	1,436*	-	-
Female	1,000	-	-
Type of place of residence			*
Rural	-	-	-
Urban	-	-	-
Region			
East	-	-	-
South	-	-	-
Central	-	-	-
North	-	-	-
West	-	-	-
Mother tongue of woman		*	
Kurdish	3,140*	-	-
Arabic	2,610	-	-
Turkish	1,000	-	-
Mother tongue of husband		*	*
Kurdish	-	-	-
Arabic	-	4,427*	-
Turkish	-	1,000	-
Mother's education level			*
No education/Primary incomplete	-	-	-
First level primary	-	-	3,798*
Second level primary	-	-	-
High school and higher	-	-	1,000
Husband's education level			*
No education/Primary incomplete	-	-	-
First level primary	-	-	-
Second level primary	-	-	-
High school and higher			
Woman's working status			
Doesn't work	-	-	-
Works but isn't insured	-	-	-
Works and is insured	-	-	-
Husband's working status		*	*
Doesn't work	-	-	-
Works but isn't insured	-	-	-
Works and is insured	-	-	-

Table 4.16. Results of multivariate analyses for poor, middle and rich wealth groups (continued)

	Model for Poor	Model for Middle	Model for Rich
Health Insurance Status	*	*	*
No insurance	1,286	-	-
Green card	1,571*	-	-
Insured, other than green card	1,000	-	-
Social participation index			
Non-participant	-	-	-
Middle	-	-	-
Participant	-	-	-
Watches women's programs on TV			
No	-	-	-
Irregular	-	-	-
Regular	-	-	-
Family Type	*		
Extended	1,399*	-	-
Nuclear	1,000	-	-
Marriage arranged			*
Family (with consent)	-	-	-
Family (without consent)	-	-	-
Other	-	-	-
Theirselves	-	-	-
Type of marriage			*
No civil marriage	-	-	-
Civil marriage	-	-	-
Dowry or bridewealth given			*
Yes	-	-	-
No	-	-	-
Anyone else in the household at the beginning			
Yes	-	-	-
No	-	-	-
Woman's relation to her husband		*	*
First degree	-	-	-
Second degree	-	-	-
No relation	-	-	-
Source of drinking water		*	
Not sanitary	-	-	-
Sanitary	-	-	-
Type of toilet facility			*
Not flush	-	-	-
Flush	-	-	-

Table 4.16. Results of multivariate analyses for poor, middle and rich wealth groups (continued)

	Model for Poor	Model for Middle	Model for Rich
Mother have ever regularly smoked cigarette			
Yes	-	-	-
No	-	-	-
Anyone smokes at home or not	*	*	*
Yes	2,094*	2,393*	9,319*
No	1,000	1,000	1,000
Age of mother at birth	*	*	*
Younger than 20	1,265	0,224*	-
Older than 35	1,767*	3,883*	-
Between 20 and 35	1,000	1,000	-
Preceding birth interval	*	*	
No preceeding birth	0,896	0,666	-
Within 24 months	1,616*	2,050*	-
More than 24 months	1,000	1,000	-
Succeding Birth Interval	*	*	*
Less Than 24 Months	5,147*	16,443*	-
More Than 24 Months	3,065*	5,088*	-
No succeeding birth	1,000	1,000	-
R2 (Nagelkerke)	0,134	0,269	0,637
Wald F	51,596*	249,190*	*

5. CONCLUSION AND POLICY IMPLICATIONS

There are various studies in literature which try to link welfare and infant mortality. Arık and Arık (2009) state that there are four widely used methods used in research area regarding the relationship between economic growth and socioeconomic development with infant mortality. These methods are as follows: (1) survey-based studies that aim at measuring individual-level characteristics, (2) international cross-sectional comparisons, (3) time-series international cross-sectional studies, and (4) cross-sectional studies within a country. Among these four methods this study utilised the first one which is the survey-based study that aims at measuring individual-level characteristics. In the study data from 2008 Turkey Demography and Health Survey was used.

There are contradicting views to handle the relationship between welfare and infant mortality if exists any. Filmer and Prittchet (1997) assert that GDP per capita is an important determinant of infant mortality rate. Thus, the main aim should be to increase income. (Filmer and Prittchet 1997). On the other hand, income distribution should also be taken into account. There are studies which assert that high income distribution imbalances lead to higher infant mortality. Flegg (1982) found that a redistribution policy decreasing the share of the richest group is much more effective on infant mortality than increasing the share of the poorest group. When income distribution is one of the determinants of infant mortality the economic growth policies should target economically disadvantaged people (Arık and Arık 2009).

The policy implications become more important as infant mortality decreases. First whether infant mortality is selective among different socio-economic groups should be determined and afterwards policies should be implemented for these specific groups. In other words, if there are differences between

certain socio-economic groups selective policies deliberately targeting these groups should be put forward. Maternal and child health services should be directed to these groups and thus accessibility of health services should be increased. These policy implications would be based on research which aims to determine such socio-economic groups.

The main target of this study was to determine whether welfare of a family was a determinant of infant mortality when all other probable determinants are controlled. There are various tools for differentiating household welfare. Mainly, household income, household consumption expenditures and household wealth are used as a proxy for household welfare. The TDHS-2008 data set doesn't contain information on household income and household consumption expenditures. On the other hand, there are variables regarding house characteristics and possesion of some household goods that can be used for construction of a wealth index. Even in the presence of household income and household consumption expenditures data wealth index would be a preferable proxy of household welfare. Wealth is a more stable measure compared to income and consumption expenditures. Income and consumption expenditures might be unstable, on the other hand wealth is more stable over time thus a better measure of welfare. Also there are problems in collecting good quality income and consumption expenditure data due to underreporting. In this study three wealth groups were defined which were the poor, middle and rich wealth groups.

The wealth index also gives way to shortcomings for the study. The wealth index is a composite variable and it's use in a multivariate model causes a flaw. Also, it should be once more mentioned that the wealth index shows the welfare level of the household at the survey time but cannot be perfectly related to the infant survival throughout time.

In the descriptive analyses it was seen that infants were more likely to die in the poor households. While infant mortality rate is 11,6 in the rich

households, it is 17,3 in the middle wealth group households and as high as 35,8 in the poor households. But for the descriptive analysis it should be taken into consideration that the infant mortality rates are given as point estimates. The confidence intervals might be overlapping. Therefore these results should be assessed attentively. The results of the descriptive analysis are in line with the recent studies. Eryurt and Koç (2009) found that in the lowest quintile infant mortality rate was 4,7 times greater than the highest quintile for the TDHS-2003 data. Also in Yüksel's study (2008) the child mortality index for the richest group was 0,36 and it was 1,25 for the poorest group.

The results of the multivariate analysis state that although wealth index is effective on infant mortality when only wealth index is in the model, it is not effective when other determinants are introduced. When other factors are equalized the effect of wealth index is insignificant. Although this is the case, in the first model wealth index alone explains 2,2 percent of the variation in child mortality. For just one variable this can be regarded as quite a high percentage. So the effect of the wealth index is not negligible.

The final model in this study showed that there's no relationship between infant mortality and wealth index. Yüksel (2008) found that there was a relationship between wealth index and infant mortality for the poorest and richest categories. Moreover, Seçkin (2009) who also used a 5-category wealth index in her study found that at 10 percent significance level the probability of survival of infants in the richest group was 3 times higher compared to the infants in the poorest group. Wealth index was also found to be a significant determinant of infant mortality in Oğuz (2006) and Tuğ (2005) concluded that wealth index was one of the variables which was effective on early age mortality. The results of all of these four studies found results contradicting with the results of this study. One explanation of this situation might be that the sharp decrease in infant mortality between 2003 and 2008 which narrowed the gap between wealth groups in favor of the poor. Infant

mortality rate dropped from 59,5 per 1000 live births to 20,9 in the poorest group where it dropped from 13,0 to 9,9 in the richest wealth group. Another important point here is that this study didn't utilise some of the proximite determinants because there was very few number of infant mortality cases within the births which occurred in five years preceeding the survey and that these variables were only available for that period.

Karatepe's study (2010) also found that there is relationship between socio-economic groups and infant mortality. But in his study the proxy used for measuring socio-economic-status was the education of the father.

Because no relationship was found between infant mortality and wealth index in this study, another approach was employed. The dataset was splitted into three sub-datasets for poor, middle and rich wealth groups and logistic regression was applied for each. The results showed that for each group the determinants were different. For all groups health insurance status, smoking at home, age of mother at birth and succeeding birth interval were significant. Mother tongue of mother and preceeding birth interval which were significant in the general model were not significant in the rich model, but this also should be approached carefully because there are too few infant deaths in this group. The poor differs from the general final model that for the poor wealth group sex of the child, health insurance status and family type are significant in addition to the determinants for the general model. The explanatory power of the model for the poor wealth group was lower than that of the general final model. For the general model it was 15,5 and for the model for the poor wealth group it was 13,4.

Behar et al. (1999) put Syria as a control country to understand the reasons for high early age mortality in Turkey. Infant mortality rate was 52.6 per 1000 live births in Turkey and 34.6 in Syria which had a lower GDP per capita than Turkey. Analysing the early age mortality by its components showed that in the neonatal period the gap was highest (29.2 to 18.0). For women with

similar characteristics the infant mortality rates were still higher in most of the cases which showed there is something unexplained in Turkey regarding infant mortality.

In the multivariate analysis the final model showed that besides three maternal factors only smoking in the house was found to be effective on infant mortality at variable level. The three maternal factors were age of mother at birth, preceeding birth interval and succeeding birth interval.

The mother tongue of the mother was also significant at category level in the final model. It was entered in the second model and it was significant in all the models.

According to the final model the determinants of infant mortality are mostly factors which are based on decisions made by mothers or others. The interval of births, giving birth at certain age and smoking in the house are all based on decisions and can be changed. Whether these decisions were made by the free will of the mother were not analyzed in this study except for some variables which can be used as a proxy for autonomy of the mother such as the way how the marriage was decided. In another study the autonomy level of the mother can be analyzed further and can be linked to infant mortality. The results of the multivariate analyses suggest that birth interval and age of mother at birth are important factors, thus understanding the source of the decision on birth interval and giving birth at certain ages would do help in understanding how these determinants process.

Smoking and alcohol use in the household was one of the most important determinants of infant mortality according to Gürsoy-Tezcan (1992). In this manner the findings of this study is in accordance with her finding. This study also concluded that smoking in the house is one of the determinants of infant mortality.

The results suggest that extending the birth intervals, not giving birth after the age 35 and not smoking in the house will contribute to the decrease in infant mortality. This can be achieved to some extent by informing the people on these results. Informative posters can be produced and displayed in health centers emphasizing on these issues. Also the family physicians can provide information on these issues to fight against infant mortality.

The final model explains 15,5 percent of the variation in child mortality. Riddle (1997) asserted that the model he constructed in his study explained 28 percent and for this reason he concluded that the 'Turkish Puzzle' continued. Following the footprints of Riddle this study can conclude the same.

The study was limited in by various boundaries. One was regarding the available data source. Since IMR rates in Turkey decreases under 20 per 1000 live births, in TDHS-2008 there weren't enough cases for analysing the mortality of infant who were born in the last five years preceeding the survey. This made it impossible to analyze some factors such as nutrient deficiency because these variables were only available for the births five years preceeding the survey. The sharp decrease in infant mortality in Turkey which is a very well improvement, on the other hand makes it more difficult to understand the determinants of infant mortality which would aid in further development.

For further analysis for understanding infant mortality in Turkey mortality records would do the best contribution. For the moment, there is lack of accurate mortality records in Turkey. Not all of the infant deaths are recorded. According to TDHS-2008, infant mortality is 17 per 1000 live births. According to TURKSTAT (2009) number of births in 2008 is 1 281 302. Roughly there are 22 000 infant deaths in 2008. This figure is expected to decrease further in the following years. In order to keep tracking of determinants of infant mortality in Turkey there is urgent need for full

mortality records. After improving the registry system further analyses can be made to improve understanding on determinants of infant mortality. Samples can be drawn from the registry for different types of studies. Another option might be to increase the sample size of the next TDHS. If the sharp decrease in infant mortality continues it will be even harder to analyze the determinants of infant mortality.

In this study two indexes, the social participation index and religious attitudes index were introduced as determinants of infant mortality. In the descriptive analyses both proved well. They were able to show the differentiation between different categories. Religious attitudes index was dropped from the model after the multicollinearity test. In the future studies these indexes can be revised and maybe new indexes can be developed by gathering variables that represent similar cultural practices.

In another study, the wealth index can be constructed at household level instead of individual level. The poor households are mostly more populated which leads to proportionately more cases for the poor category. When wealth index is constructed according to the number of households the difference will be lower. Also different results for different wealth indexes can be examined comparatively.

6. REFERENCES

Arık, H., Arık, M., (2009), **'Is It Economic Growth or Socioeconomic Development?: A Cross-Sectional Analysis of the Determinants of Infant Mortality'**, The Journal of Developing Areas, Volume 42, Number 2.

Adlakha, A. L. (1970) **'A Study of Infant Mortality in Turkey'**, unpublished Ph.D. thesis, Ann Arbor: University of Michigan cited in Akşit and Akşit (1989)

Akşit, B. and Akşit B., (1989), **'Socio-cultural Determinants of Infant and Child Mortality in Turkey'**, Social Science Medicine, 28 (6), pp. 571-576

Behar, C., Courbage Y., Gürsoy A., (1999), **'Economic Growth or Survival? The Problematic Case of Child Mortality in Turkey'**, European Journal of Population, Volume 15, Number 3 / September, pp. 241-278.

Bhalotra, S., (2007), **'Spending To Save? State Health Expenditure And Infant Mortality In India'**, Health Economics, UK.

Casterline, J. B., Cooksey, E. C., Ismail, A. F. E., (1989), **'Household Income and Child Survival in Egypt'**, Demography, Vol. 26, No. 1, pp. 15-35.

Cerit, S., (1975), **'Factors Affecting the Level and Trend of Infant Mortality in Turkey since World War I'**, unpublished Ph. D. thesis, London School of Economics, London cited in Akşit and Akşit (1989).

Cerit, S. and Akadlı, B., (1988), **'An Overview of Infant Mortality in Turkey'**, in E. Tunçbilek, (ed.), Infant Mortality in Turkey: Basic Factors, Hacettepe University Institute of Population Studies, Ankara.

Chakraborty, S., Das, M., (2005), **'Mortality, Human Capital and Persistent Inequality'**, Journal of Economic Growth, Vol. 10, pp. 159–192.

Corteguera , R. R., Henríquez, P. A., (2001), **'Mortalidad Infantil En Cuba 1959-1999'**, Rev Cubana Pediatr, 73(3), pp. 143-157, Habana.

DaVanzo J., Butz W. P., Habicht J.-P., (1983), **'How Biological and Behavioural Influences on Mortality in Malaysia Vary during the First Year of Life, Population Studies'**, Vol. 37, No. 3, pp. 381-402, Great Britain.

Ergöçmen, B. A., (1991), **'Social and Demographic Determinants of Infant Mortality in Turkey'**, Hacettepe University Institute of Population Studies unpublished Ph. D. thesis, Ankara.

Eryurt, M. A., Koç, İ., (2009), **'Yoksulluk ve Çocuk Ölümlülüğü: Hanehalkı Refah Düzeyinin Çocuk Ölümlülüğü Üzerindeki Etkisi'**, Çocuk Sağlığı ve Hastalıkları Dergisi, 52: 113-121.

Flegg, A. T., (1982), **'Inequality of Income, Illiteracy and Medical Care as Determinants of Infant Mortality in Underdeveloped Countries'**, Population Studies, Vol. 36, No. 3.

Filmer, D. and Pritchett, L. (1997), **'Child Mortality and Public Spending on Health; How Much Does Money Matter ? '**, The World Bank Policy Research Working Paper 1864, Washington DC.

Filmer, D. and Pritchett, L. (2001), **'Estimating Wealth Effects Without Expenditure Data-Or Tears: With an Application to Educational Enrollments in States of India'**, Demography 2001, 38:1, pp. 15-32.

Gürsoy-Tezcan, A. (1992), **'Infant Mortality: a Turkish Puzzle?'**, Health Transition Review, 2 (2), pp. 131-149.

Gwatkin, D.R., S. Rutstein, K. Johnson, R. Pande, and A. Wagstaff., (2000), **'Socio-Economic Differences in Health, Nutrition, and Population'**, HNP/Poverty Thematic Group, World Bank, Washington, DC.

Hancıoğlu, A., (2002), **'Performance Of Alternative Approaches For Identifying The Relatively Poor And Linkages To Reproductive Health',** paper presented at the CICRED Seminar on 'Reproductive Health, Unmet Needs, and Poverty: Issues of Access and Quality of Services', Bangkok, Thailand.

Hacettepe University Institute of Population Studies, (2009), **'Turkey Demographic and Health Survey, 2008'**, Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Family Planning, T.R. Prime Ministry Undersecretary of State Planning Organization and TÜBİTAK, Ankara, Turkey.

Jusot, F., (2003), **'Revenu et Mortalité : Analyse Economique des Inégalités Sociales de Santé en France'**, thèse de doctorat en sciences économiques de l'Ecole des Hautes Etudes en Sciences Sociales, Paris.

Karatepe, Z. S., (2010), **'The Relationship Between Socioeconomic Differences and Economic Uncertainty: Analysis of Infant and Child Mortality in Turkey'**, unpublished master's thesis, Lund University, Sweden.

Koç, İ., Eryurt, M. A., Adalı, T. ve Seçkiner, P., (2010), **'Türkiye'nin Demografik Dönüşümü: Doğurganlık, Aile Planlaması, Anne-Çocuk Sağlığı ve Beş Yaş Altı Ölümlerdeki Değişimler 1968-2008'**, HÜNEE, Sağlık Bakanlığı, DPT ve TÜBİTAK, ISBN 978-975-491-285-2, Ankara.

Merrick, T. W., (1985), **'The Effect of Piped Water on Early Childhood Mortality in Urban Brazil, 1970 to 1976'**, Demography, Vol. 22, No. 1.

Montgomery, M.R., M. Gragnolati, K.A. Burke, and E. Paredes, (2000), **'Measuring Living Standards With Proxy Variables'**, Demography, Vol. 27, pp. 155–74.

Mosley, W. H., Chen, L. C., (1984), **'An Analytical Framework for the Study of Child Survival in Developing Countries'**, Population and Development Review, Vol. 10, Supplement: Child Survival: Strategies for Research, pp. 25-45

Oğuz, G., (2006), **'The Influence of Health Insurance Coverage on Infant Mortality in Turkey'**, Hacettepe University Institute of Population Studies unpublished master's thesis, Ankara.

Øvensen, G., (2006), **'An Asset Index for the 2003 Syrian Unemployment Survey'**, Fafo-paper, available at:
http://www.fafo.no/pub/rapp/792/792.pdf

Özdemir E., Yüksel-Alyanak İ., Koç, İ. and Hancıoğlu, A., (2003), **'Göreli Refah Düzeyinin Erken Yaş Ölümlülüğü Üzerindeki Etkisi'**, 3. İstatistik Kongresi, Antalya, pp. 269-272.

Quinlan, S., M., (2007), **'The Great Nation in Decline – Sex, Modenity and Health Crises in Revolutionary France c. 1750-1850'**, Ashgate Publishing Limited, Hampshire, England.

Riddle, L. (1997), **'The Turkish Child Mortality Puzzle Continues: Evidence From the 1993 Demographic and Health Survey'**, Population Research Center.

Rozenweig, M. R., Schultz, T. P., (1982), **'Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Child Survival in Rural India'**, The American Economic Review, Vol. 72, No. 4.

Rowland, D. T., (2003), **'Demographic Methods and Concepts'**, Oxford University Press, New York.

Rutstein, S. O., Kirsten, J., (2004), **'The DHS Wealth Index'**, DHS Comparative Reports No. 6., Calverton, Maryland: ORC Macro.

Shorter, F. C., Macura, M., (1982), **'Trends in Fertility and Mortality in Turkey, 1935-1975'**, Washington D. C.

State Institute of Statistics, (2003), **'2000 Census of Population – Social and Economic Characteristics of Population'**, Ankara.

Seçkin, N., (2009), **'Determinants of Infant Mortality in Turkey'**, Middle East Technical University, unpublished master's thesis, Ankara.

Sen, A., (1998), **'Mortality as an Indicator of Economic Success and Failure'**, The Economic Journal, Vol. 108, Malden, USA.

Tekçe, B., Shorter, F. C., (1984), **'Determinants of Child Mortality: A Study of Squatter Settlements in Jordan'**, Population and Development Review, Vol. 10, Supplement: Child Survival: Strategies for Research.

Tezcan, S., (1985), **'Medico-Social Causes and Preventability of Infant Deaths in Etimesgut Health District'**, Turkish Journal of Population Studies, No: 7: 43-59 cited in Akşit and Akşit (1989).

Tuğ, K., (2005), **'Socio-demographic Analysis of Early Age Mortality in the Southeast Anatolian Region'**, Hacettepe University Institute of Population Studies, unpublished master's thesis, Ankara.

Tunçbilek, E., (1988), **'Infant Mortality in Turkey'**, Hacettepe University Institute of Population Studies, Ankara.

TURKSTAT, (2009), **'Press Release on Births'**, available at: http://www.tuik.gov.tr/PreHaberBultenleri.do?id=6346&tb_id=1

UNICEF, (2009), **'Decline in the Under-5 Mortality Rate (U5MR) in Turkey'**, Ankara.

UNICEF, (2010), **'Under Five Mortality in Turkey'** (unpublished study).

Yüksel, İ., (2008), **'Quantitative and Qualitative Analysis of Cultural Factors Affecting Early Age Mortality in Turkey'**, Hacettepe University Institute of Population Studies, unpublished Ph. D. thesis, Ankara.

Yüksel İ., Koç İ., (2010), **'Is Infant Mortality Rate Still A Puzzle In Turkey?'**, Çocuk Sağlığı ve Hastalıkları Dergisi, 53, pp. 87-97.

Waldman, R., (1992), **'Income Distribution and Infant Mortality'**, The Quarterly Journal of Economics, Vol. 107. No. 4, pp. 1283-1302.

Wang, L., (2002), **'Determinants of Child Mortality in Low-Income Countries: Emprical Findings from Demographic and Health Surveys'**, World Bank.

APPENDICES

APPENDIX 1
SUMMARY LITERATURE ON THE WELFARE STATUS AND EARLY AGE MORTALITY

YEAR	AUTHOR(S)	GEOGRAPHICAL COVERAGE	COUNTRY	PROXY FOR WELFARE/ECONOMIC STATUS	RESULTS
1982	Flegg	Cross-national	51 countries	GDP per capita	The effect of gini coefficient, literacy of mother, number of physicians and nurses per head were significant on infant mortality while income was not significant.
1982	Rozenweig and Schultz	National	India (rural)	Income	Children who are expected to be more economically productive adults receive larger share of family resources and have a greater propensity to survive.
1983	DaVanzo et al	National	Malaysia	Income	Even the simple correlation between income and infant mortality was not statistically significant. Mother's age, parity, breastfeeding, place of delivery and toilet sanitation were found to be important determinants of infant mortality.
1984	Tekçe and Shorter	National	Jordan	Income	Housing quality and mother's education was significant and had a strong effect on child mortality. On the other hand the effect of head's occupation and household income was weak.
1985	Merrick	National	Brazil	Husband's earnings	Education of mothers and husbands were the most effective factors on child mortality. Access to piped water was also effective but to a lesser extent. Husband's earnings wasn't found to be significant.
1987	Pebley and Stupp	National	Guatemala	Income	In a relatively poor and highly fertile population maternal age, birth order, previous and following birth intervals have significant impact on child mortality.
1988	Stockwell et al	City	Ohio / USA	Income	Inverse association between family incomes and infant mortality is obvious.
1989	Casterline et al	National	Egypt	Income	Income has little effect on infant mortality, but is inversely related to mortality in early childhood
1992	Gürsoy-Tezcan	Area in İstanbul	Turkey	Consumer goods available in the household	The most important determinants of infant mortality were found to be the husband's education, household composition, the woman's attitude towards abortion and the amount of alcohol and smoking in the households. Consumer goods available in the household was not found to be a significant determinant of infant mortality.
1992	Waldmann	Cross-national	41 countries	GDP per capita	When share of the rich in income is higher infant mortality is higher.
1997	Filmer and Pritchett	Cross-national	109 countries	GDP per capita	Approximately 95 percent of the variation in under-5 mortality is explained with income, its distribution, female education, and other cultural factors. Although income alone is a powerful determinant (84 percent of mortality differences can be explained by income alone), other factors are significant determinants of under-5 mortality.

YEAR	AUTHOR(S)	GEOGRAPHICAL COVERAGE	COUNTRY	PROXY FOR WELFARE/ECONOMIC STATUS	RESULTS
2002	Wang	Cross-national	60 countries	GDP per capita	The most significant determinant is found to be access to electricity even after controlling income. This is followed by asset index, GDP per capita, access to piped water, access to sanitation and female secondary education.
2005	Tuğ	South East Anatolia Region	Turkey	Wealth Index	Socio-economic and cultural variables were found the most important variables in the manner that they explain much of the variation in early age mortality which was still quite low. Wealth index was one of the effective variables.
2007	Bhalotra	National	India	Health expenditures	Health expenditures are not effective on infant mortality in urban areas, but in rural areas a correspondance exists.
2006	Oğuz	National	Turkey	Wealth Index	Assisting delivery by nurse/midwife, preceding birth interval, mother's age at birth of the child and household wealth index are determinants of infant mortality. Assisting delivery by nurse/midwife has a positive relationship with infant mortality.
2008	Yüksel	National	Turkey	Wealth Index	Number of persons per doctor was the most effective determinant of infant and child mortality. Insured population and unit of drinking water in villages were other related factors to infant mortality. Total children ever born to a mother, single or multiple births and consanguineous marriages were also effective on child mortality. In the multivariate analysis there's relationship between wealth index and child mortality index for the poorest and richest categories. In the descriptive analysis there was also difference between the poorest and richest wealth groups.
2009	Eryurt and Koç	National	Turkey	Wealth Index	In the lowest quintile IMR is 4,7 times greater than the hishest quintile. In lowest group IM is mostly experienced in the pors-neonatal period where in the highest group neonatal mortality is higher.
2009	Seçkin	National	Turkey	Wealth Index	Birth interval for lower wealth quintiles, breastfeeding for infants younger than 3 months, place of delivery, source of water and maternal age at birth were found to be determinants of infant mortality. A 5-category wealth index was used in the study and it was found that at 10 percent significance level the probability of survival of infants in the richest group was 3 times higher compared to the infants in the poorest group.
2009	Arık and Arık	Province	Turkey	GDP per capita	The effect of income on infant mortality was found to be significant but when controlled by income distribution, this effect was less significant.
2010	Karatepe	National	Turkey	Father's education	Socioeconomic status and infant mortality are negatively related. No significant relationship was found between economic fluctuations and socioeconomic status in terms of infant mortality.

APPENDIX 2
COMPLEX SAMPLES LOGISTIC REGRESSION SYNTAX

```
CSLOGISTIC  EVENT1(LOW) BY Excel_40_40_20

B4 V025 V101 S116A S741A

SEDUC SMEDUC Work3 Pwork3 INS SOC3 S762H FAMILY_TYPE3
MAR_ARR2 S164 W146 S170 S171

WATER TOILET S115C S115G

Mat_Age_Group PRE_BIRTH2 AFT_BIRTH

  /PLAN FILE='C:\Documents and
Settings\User\Desktop\planfile23042011.csaplan'

  /MODEL Excel_40_40_20

B4 V025 V101 S116A S741A

SEDUC SMEDUC Work3 Pwork3 INS SOC3 S762H FAMILY_TYPE3
MAR_ARR2 S164 W146 S170 S171

WATER TOILET S115C S115G

Mat_Age_Group PRE_BIRTH2 AFT_BIRTH

  /INTERCEPT INCLUDE=YES SHOW=YES

  /STATISTICS PARAMETER EXP SE CINTERVAL TTEST

  /TEST TYPE=F PADJUST=LSD

  /MISSING CLASSMISSING=EXCLUDE

  /CRITERIA MXITER=100 MXSTEP=5 PCONVERGE=[1E-006 RELATIVE]
LCONVERGE=[0] CHKSEP=20 CILEVEL=95

  /PRINT SUMMARY VARIABLEINFO SAMPLEINFO.
```