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The Relationship Between Household Welfare And Infant Mortality In Turkey: The Evidence From TDHS-2008 [1]

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Abstract:

This study tries to understand whether there is a relationship between infant 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. 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. 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 included in the model. 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. Also a model was constructed for different wealth groups. Analyses on the determinants of infant mortality in poorer hoseholds showed 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 to be significant. The explanatory power of the model for poorer households was lower than that of the general model.

[1] Ucar, B., (2011), *'The Relationship Between Household Welfare And Early-Age Mortality In Turkey: The Evidence From TDHS-2008'*, Hacettepe University Institute of Population Studies, unpublished M.A. thesis, Ankara.

1. Introduction

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).

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 main aim of this study is to investigate whether this relationship holds or not.

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 subsequently. 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.

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.

2. Infant Mortality In Turkey

Infant mortality was about 260 per thousand in the late 1940s in Turkey (Shorter and Macura, 1982). In 1967, infant mortality rate was 150 per thousand (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 per thousand according to TDHS-2008.

Although there is a considerable decline in infant mortality in Turkey in the recent years, this level is still high when it's compared with other countries which have similar or even 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 per thousand. Even if we disregard comparability in this manner and use the TDHS infant mortality rate which is 17 per thousand the rate is still higher than these countries.

Table 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 rose from 654 to 1671 (UNICEF 2009).

3. Household Welfare and Early Age Mortality

According to Flegg (1982) income indirectly affects 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.

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.

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 included detailed questions about the income of households. 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 for income. This was followed by asset index, GDP per capita, access to piped water, access to sanitation and female secondary education. (Wang 2002).

In the case of Turkey, recent literature suggests that there is a 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. Seçkin (2009) who also used a 5-category wealth index in her study found that 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).

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 completing their first birthday. (Eryurt and Koç 2009).

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 levels of wealth. For the lowest wealth quintile (poorest) infant mortality rate is 41 where for the highest wealth quintile (richest) infant mortality rate is 12.

Table 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

4. 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.

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). 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 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

5. Data

In this study, data from 2008 Turkey Demographic and Health Survey is used. 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 early age mortality rates can be computed by direct methods.

As a proxy for household welfare, the wealth index is used. Wealth index is constructed by making use of durables that are owned by the household and dwelling characteristics.

The variables that are used in the models are derived from the Mosley-Chen Framework. 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 restricts the model construction and some variables are to be dropped because theyare not available for all of the ten years period. Regarding the proximate determinants, variables related to nutritional availability of children and personal illness control cannot be used.

5. Methodology

First the descriptive statistics regarding infant mortality are presented. Then, logistic regressions are applied for different models. The dependent variable in the study is 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 is the wealth index. Other variables are used as control variables. The main aim is to detect the effect of wealth on infant mortality.

Five different models are tested starting with a simple one to test the relationship between the wealth index and the early age mortality. Then new groups of variables are introduced. Each model includes new variables that are added to the previous model. The fifth and the final model includes all variables that are 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 are 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 is derived from two different sections in the TDHS-2008. These are variables from the household ownership of consumer durables and characteristics of household dwelling. Weights are 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).

Five wealth groups pose the problem of difficulty in distinguishing the especially the three wealth quintiles that are in the middle. 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 are decided after testing for different wealth index groups. Then the relationship between wealth index and infant mortality is tested.

6. 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?

Hereby, an option for the measurement of household welfare is 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.

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 is that unearned income such as interest and rent is hard to measure.

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.

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 to 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 are listed below. Also the availability of these goods and characteristics in urban and rural areas are presented.

Table 4. Percentage distribution of households by assets used in the wealth index (%)

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

7. Results

Before starting the analyses some assumptions should be made. 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.

The analysis of infant mortality throughout time according to wealth quintiles shows us that there were great declines in the infant mortality rate. The greatest decline was experienced for the poorest group from 110,4 to 20,9.

Table 5. Infant mortality rates by 5-year birth cohorts and wealth index

	Wealth index					
	Poorest	Poor	Middle	Rich	Richest	Total
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

In this section, first the wealth index to be used in the rest of the study was 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 is 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 was chosen to be the wealth index to be used in the analyses of the infant mortality.

Table 6. 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 it is 38,5.

For testing the relationship between wealth index and infant mortality for the births ten year preceding the survey, logistic regression method iss performed. The dependent dichotomous variable iss the survival of the child. The independent variable is the wealth index. Other variables are put in the model only as control variables to test the significance of the effect of household welfare on 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.

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 thirteen 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 addition of the three maternal factors dropped out this variable from the model, but it is still 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 infant's probability of dying of 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 are 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.

Because the final model showed that there is no relationship between wealth index and infant mortality when all other control variables are in the model, further analysis is conducted by splittng the data into three subsets of data for the poor, middle and rich wealth groups. All the variables in the final model apart from the wealth index are included into the regression models.

The results of the analyzing wealth index groups seperately helps 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.

8. Conclusion

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.

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.

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. 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 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. 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 results of three recent studies, Oğuz (2006), Yüksel (2008) and Seçkin (2009), found results contradicting with the results of this study. They all concluded that wealth index was a significant determinant of infant mortality. One explanation of this situation might be 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.

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 models for middle and rich wealth groups did not produce reliable results due to low number of cases. The results for the model for the poor wealth group returned more interpretable results. 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.

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.

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