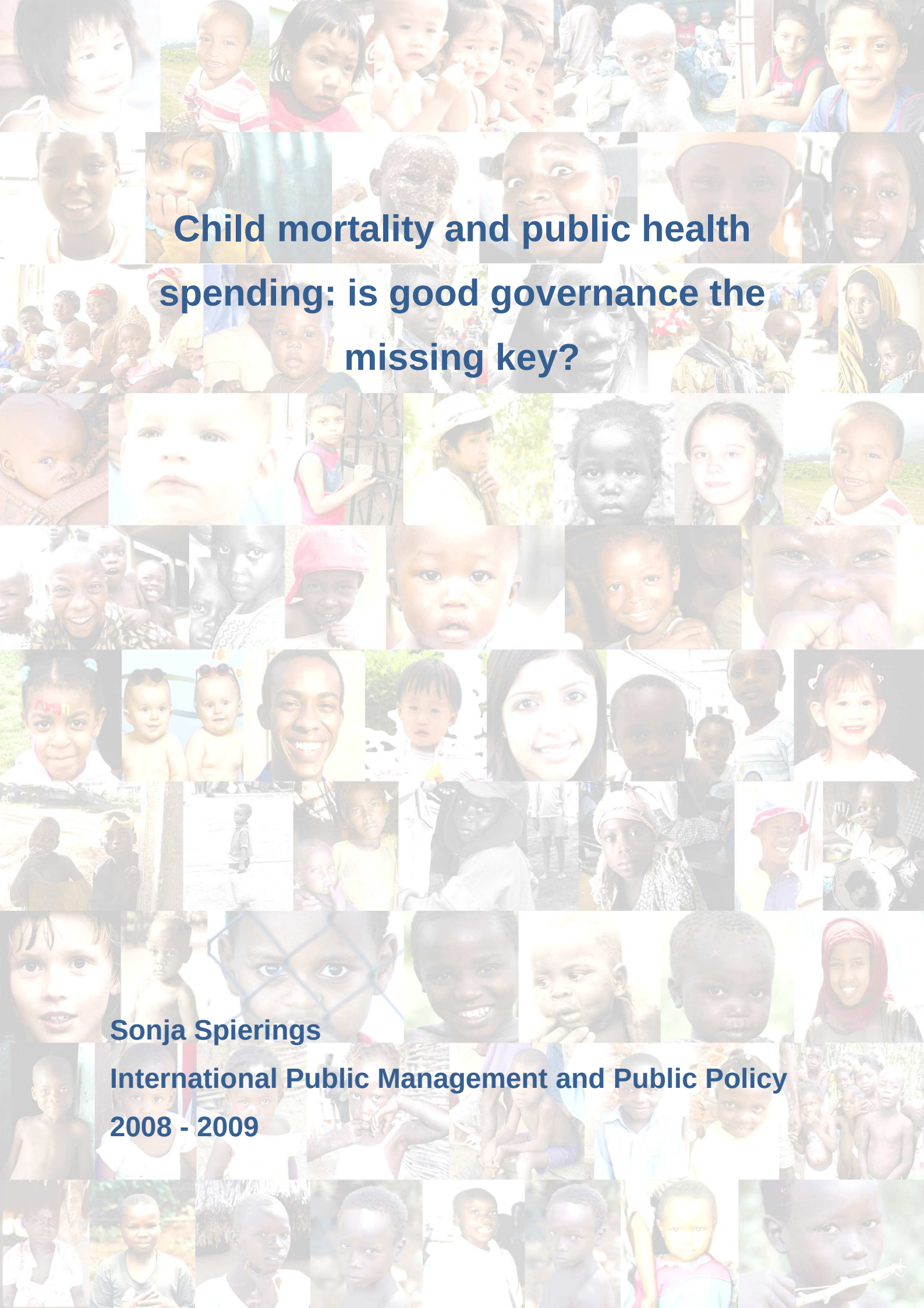

Child mortality and public health spending: is good governance the missing key?

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Foreword

Throughout my study years, I developed a sincere interest in developing countries and it was unavoidable that the subject of my master thesis would comply with this interests. However, writing about developing countries is a major challenge as you write about situations that are too horrible to even imagine them and at the same time you are restrained by practical difficulties, like the collecting of data.

However, as I learned from my parents, '*Where there is a will, there is a way'* and I decided to follow my heart and search for a subject within my interests. Writing about this subject was probably my most daring decision in the last two years. My sudden nomination to work 7 months for the World Food Program in Zambia increased the speed of writing significantly. Also, because I combined writing this thesis with a internship at FairFood in Amsterdam, I had to follow a tight study schedule.

Completing this project on time would never have been possible without the support of the following persons that I would like to thank here. A special thanks is for my supervisor Dr. A.G. Dijkstra for her faith in my research and for her time and commitment to my thesis. This process would not have been possible without her quick answers to all my questions. I also want to thank my second supervisor Dr. S. van Thiel for her useful feedback that really improved the quality of my thesis.

Furthermore, special thanks are for Wendy for her devotion to teaching me the ins and outs of statistics. I want to thank Freek for his patience with me during every stressful period and Florine for her time devoted to reading every line of my thesis.

Looking back at the 7 years of my students life, I see unforgettable moments and experiences that changed me as a person. Therefore, I am very thankful to the people that made this process possible and so much fun. A special thanks is for my parents and my sisters for making it possible for me to enjoy every moment of my students life. Also, I want to thank the many friends I made during these years for making my student years an unforgettable and fantastic period in my life.

Looking at the further, I am happy that I get the chance to bring all my theoretical knowledge into practice for the World Food Program in Zambia. I do not know where I will go from there, but I know that I will always be happy that I got the chance to write my master thesis about a subject I am personally attached to.

Abstract

Until this day, child mortality rates are strikingly high and severe inequalities between countries and population groups exist. The direct cause of child mortality are strongly influenced by underlying, socioeconomic factors. The literature shows much potential for public health spending to decrease child mortality through government programs. However, in practice is the effect of public health spending very disappointing. This gap between the potential of public health spending and the actual results could be due to the ineffectiveness of public health spending. This ineffectiveness could be attributable to a low quality of governance. Therefore, is the main hypothesis of this thesis: the better quality of governance a country has, the more influence public spending on health has on decreasing the under-5 mortality rate. The quality of governance is measured as the score on four different good governance indicators, namely control of corruption; government effectiveness; voice and accountability; and political stability and absence of violence. The main hypothesis is tested by including moderator variables of all the good governance indicators into a base model of factors influencing the child mortality rate. However, the empirical results show that the influence of the different good governance indicators on the relationship between public health spending and child mortality rate is rather low and most of the times insignificant. Also, public health spending does not have a significant influence on the child mortality rate. Furthermore. this thesis shows that income, access to sanitation and female education are the most important factors influencing child mortality rates. Therefore should policies from the national governments and from the international community be aimed at stimulating the economic development of a country. However, because public health spending is vital for providing equity in health care, this thesis suggests that more research most be conducted on the effectiveness of public health spending for decreasing child mortality.

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1. Introduction

1.1 Introduction

'Avoidance of early deaths is a necessary condition for anything else we might wish to achieve' (McGuire, 2005, p. 411). Nevertheless, 9.5 million children under five years old died in 2006, which are 21 children every minute (UNICEF, 2007). This amount is not only very high; it is also extremely unequal distributed throughout the world. 90% of these children die in only 42 countries, 95% even in 75 countries (Bryce et al., 2005(2)). The difference in surviving chances between children in developed and in developing countries is striking. In Iceland, a child born has a chance of 3 on 1,000 not to reach the age of five. This is approximate the same in all the western, industrialized countries. However, a child born in Sierra Leona, at the same time, has a chance of 282 on 1,000 not the reach the age of five. This is equal to 94 times more chance to die before the age of 5 years.

Moreover, the inequalities between population groups are striking. Poor children have lower surviving chances and die mostly due to diseases that are easy to prevent or treat. This is partially because a large proportion of children from poor households are undernourished and therefore have less resistance to infectious diseases (Rutstein, 200).

In 2000-2003, six causes accounted for 73% of the 10.6 million deaths in children under- 5 years of age, namely pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth (Bryce et al., 2005(2)). Research and experience show that 6 million of the 11 million children that died in a given year, could be saved by using low-tech, evidence-based, cost-effective measures such as vaccines, micronutrient supplementation and insecticide-treated bed nets (UNICEF, 2007). Before explaining how this thesis wants to contribute to the ambitious goal of decreasing child mortality, it is important to provide more information on the specific subjects addressed in this thesis. Therefore, first an overview of the discussion on the factors that influence child mortality is provided in this section. This chapter continuous with the problem statement of this thesis and a summary of the research design that is needed to gain results that are necessary to solve the problem statement. At the end an overview of the subsequent chapters of this thesis is provided.

1.2 Child mortality

The introduction of this chapter showed the strikingly high numbers and inequalities in child mortality that are present in the world today. This observation has led many researches to study the factors that influence child mortality. As is stated before, the most important factors that directly influence child mortality are pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth. These direct causes however are influenced by underlying socioeconomic determinants (Mosley and Chen, 1984). The influence of the socioeconomic determinants partly explains the difference in mortality rates between the poor and the better off population. An extensive research on the underlying factors of child mortality conducted by Filmer and Pritchett (1999) concludes that 95% of the cross-national variation in child mortality can be explained by the following socio-economic factors: country's per capita income; distribution of income; extent of woman's education; level of ethnic fragmentation; and the predominant religion. The study by Rajkumar and Swaroop (2007) adds to this list of factors, among others, the degree of urbanization; and percentage of the population that is Muslim. Hanmer, Lensink and White (2003) add the importance of access to safe water and sanitation. All of these factors explain, to different extents, the cross-country variation in child mortality rates. A similarity between these studies is that they all include the factor public health spending in their research. Public health spending can potentially decrease the child mortality rates through the making of sound policies and adequate and targeted funding. The study of Wagstaff et al. (2004) shows that policy design can reduce the inequalities in child mortality by lowering financial barriers, improving health provisions and stimulating changes in the behavior of the population. Furthermore, programs specifically targeted to the poor population can have substantial effects on decreasing child mortality rates, because the worse socioeconomic status of the poor population increases their need for interventions.

However, the potential influence of public health spending on child mortality in the literature is not supported with empirical results. Filmer and Pritchett (1999) concluded that only 0.15 percent of the child mortality variations were explained by a difference in public spending on health (p.19). Their study gives two explanations for the low influence of public health spending on the child mortality rate. The first reason is that an increase of public spending can 'crowd out' private spending on health. The second reason is that public health spending on health is ineffective, because it is, for example, poorly targeted or the institutions are not

capable of making sound policies. This second line of reasoning has been adapted by many researchers (e.g. Lewis, 2006; Pritchett and Summers, 1996). Schultz (1993, p.19) defines the problem as governments in developing countries being unable to take enough action and the action they do take is inefficient and corrupt. Furthermore, research shows that governments are unable in reducing the problems of inequality, because most interventions are not reaching the children that need them the most (Bryce et al., 2003, p.159; Jones et al., 2003, p.65; Victora, 1997, p.225). However, if basic governance principles are not met, well-intentioned spending may have no impact in health care delivery, because institutions that do not function properly cannot meet priorities and resources will be wasted (Lewis, 2006, p.3). Research on how the problems of the ineffectiveness of public health spending show two important factors. The first is that public health spending could be more effective if the governance of a country is good (e.g. Rajkumar and Swaroop, 2007; Wagstaff and Claeson, 2004). The second factor is that increasing the amount of public health spending is also very important (Wagstaff and Claeson, 2004; Mehrotra and Delemonica, 2002).

1.3 Research question

The problem presented here is that it is not evident whether or not and under which circumstances public health spending influences child mortality. This problem makes it impossible to design sound policies that reduce child mortality as the absence of information makes policy design a situation of guessing and relying on common sense.

The main question of this thesis is: **Does better governance increases the effect of public health spending on reducing the child mortality rate?**

In order to examine this, the following sub-questions need to be answered:

1. Which factors have an influence on child mortality?
2. What is, according to the literature, the influence of public health spending on child mortality?
3. What is, according to the literature, the effect of good governance on the effectiveness of public health spending?
4. Does better governance lead to a more significant influence of public health spending on child mortality?

The first three sub- questions are examined through a literature study conducted in chapter 2 of this thesis. The fourth sub-question and the main question are answered through statistical

analyses. The methods for analyses are described in chapter 3 and the results are described in chapter 4.

The policy relevance of this thesis is to provide adequate information for the design and implementation of sound policies for reducing child mortality. After all, having adequate information is a vital condition for making sound policies. If it turns out that public health spending has no influence on child mortality, even combined with good governance indicators, it is necessary to design policies that do not include public health spending. This can, for example, mean that private parties need to be encouraged to take action. On the other hand, if the results show that public health spending can have a reasonable influence on child mortality, but only when the quality of governance is improved, policies can be designed to improve certain dimensions of the governance of a country. If, for example, it turns out that corruption is *the* dimension that limits the influence of public health spending on child mortality, it is necessary that governments become more aware of the devastating impact of corruption. In addition, the international community can put more pressure on governments to reduce their corruption. The content of this thesis is relevant from a societal point of view, because decreasing child mortality is a necessary condition for improving the human and economic development of countries. Decreasing the inequalities in the world is very important, not only from a humanitarian perspective, but also because these inequalities raise the chance of violence and instability and negatively influence the happiness of people in the world.

This thesis is furthermore relevant in the scientific field as this study aims to clarify the conflicting results on the influence of public health spending on child mortality and provides more knowledge on the possible influence of public health spending on child mortality. Rajkumar and Swaroop (2007) studied the effect of corruption and the effectiveness of the bureaucracy on the effectiveness of public health spending on child mortality rates. However, their study is limited in that it only investigates two dimensions of governance. This thesis tries to strengthen their conclusion that good governance is a necessary condition for making public health spending an effective tool for decreasing child mortality, by including more dimensions of good governance in the research. Additionally, the individual effect of each of the dimensions is studied.

1.4 Research design

The main hypothesis of this thesis is: the better governance a country has, the more effect public health spending has on decreasing the under-5 mortality rate.

The unit of analysis is the country and therefore this hypothesis is tested with a cross-country analysis. A cross-country analysis makes it possible to formulate statements that are generally true for all countries. It does however not include specific national problems or regional differences. There are 158 countries selected for this analysis. The selection criteria are availability and quality of the data. The analyses have a non experimental, large N design. The method is a secondary analyses, because the data is not collected specifically for this research.

The empirical analyses start with the creation of a base model, which contains all the variables that have a significant influence on the child mortality rate. The variables included in the analyses for the base model are the socioeconomic factors that are identified in chapter 2 in answering sub-question 1. Preceding this multiple regression is a correlation matrix made in order to examine how the variables are related with each other.
This base model is used in order to examine the influence of the good governance indicators on the relationship between public health spending and the under-5 mortality rate. This is tested with the creation of a moderator variable. In a causal relationship, x is the predictor variable (public health spending), y is the depended variable (under-5 mortality rate), and z is the moderator variable that affects the relationship of x and y (a dimension of good governance). The moderator effect is tested with a multiple regression according to the method described by Baron and Kenny (1984) for two quantitative variables. The good governance indicators are separately included in the base model created by the first multiple regression. Which good governance indicators are important is identified in the second chapter and is the answer to sub- question 3. The advantage of starting the empirical testing with separate moderator analysis is that it gives more insight in the actual affect of each dimension of governance. If the moderator variable has a significant influence on the child mortality rate, the direction of the moderator variable is calculated according to method further explained in chapter 3.

The results of the empirical analyses give an indication of which factors have a significant influence on the child mortality rate. Therefore, this results should be used to define priorities in policy making.

Data must be collected for the under-5 mortality rate, public health spending, the good governance indicators and the other predictors of under-5 mortality. The data is researched for 1 year, namely 2006. The *under-5 mortality rate* is the probability that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates. The probability is expressed as a rate per 1,000. The data is obtained from the Child Mortality Database, constructed by Inter-agency Group for Child Mortality Estimation of UNICEF. *Public health spending* consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds (WDI, 2008). The data is collected from the World Development Indicators Online, constructed by the World Bank. The *good governance* indicators are obtained from the Governance Indicators Database produced by Kaufmann, Kraay and Mastruzzi from the World Bank. These indicators are used to measure the perception of experts on the quality of different dimensions of the governance in a country.
The methodology and data used are described in more detail in chapter 3 on data and methodology. That chapter also includes explanations of the data used for all the predicting variables.

1.5 Thesis overview

The remainder of this thesis is organized as follows. The second chapter is used to provide more detailed information on the subjects addressed in this thesis. It starts with a description of which factors influence child mortality and to what extent. This is followed by a description of the effect public health spending could potentially have on child mortality rates. This section described the discussion of the effectiveness of public health spending by describing both the factors that increase and the factors that decrease the effectiveness of public health spending. After that, more detail is provided on the influence the good governance indicators potentially have on the effectiveness of public health spending. In order to do this, a description of the term good governance is given and the influence of governance on public health spending and on child mortality. This chapter therefore answers the first three

sub-questions of this thesis, namely: which factors have an influence on child mortality? What is, according to the literature, the effect of public health spending on child mortality? What is, according to the literature, the effect of good governance on the effectiveness of public health spending?

The third chapter describes the methodology and data that are necessary to answer the main questions of this thesis: does better governance increase the effect of public health spending on the child mortality rate? This chapter includes a description of the steps that need to be taken in order to perform several multiple regressions and to create and use moderator variables. It also includes an overview of the data used for the dependent, the moderator and all the predicting variables. This includes description of the data, the sources used for obtaining the data and the possible limitations of the data.

The fourth chapter provides a detailed description of the results of the empirical tests performed. It provides the output of the statistical analysis and a description of the results. This includes the output of the multiple regressions including the moderator variables and, when applicable, the calculations made in order to determine the direction of the regression lines. It also includes the results of the correlation matrix and the results necessary in order to answer sub-question 4.

The fifth chapter describes how these statistical results need to be interpreted. It provides an answer to the main question and to the fourth sub-question of this thesis. The main question of this thesis is: does better governance increases the effect of public health spending on decreasing the child mortality rate? The fourth sub-question of this thesis is: does better governance lead to a significant influence of public health spending on reducing child mortality? This chapter furthermore provides an overview of the effect of the results from the literature study and from the empirical results on the design and implementation of policies.

2. Theoretical framework

2.1 Introduction

The aim of this chapter is to provide an overview of the discussions in the literature on child mortality, public health spending and good governance. Through an extensive literature review are the three sub-questions are answered.

The second part of this chapter starts with a description of the situation of child mortality in the world today and the proximate and underlying determinants that influence child mortality. The goal of this section is to answer the sub-question: which factors have an influence on child mortality? It is observed that the literature is vey conclusive on most factors that influence the child mortality rate. However, there are no conclusive results regarding the influence of public health spending on child mortality.

Therefore, the third section of this chapter discusses the literature on the possible effect of public health spending on child mortality. The aim of this section is to answer the second sub-question of this thesis: what is the effect of public health spending on child mortality? This section starts with a description of the features of the health sector and provides more detail on the two funding methods for health care: private and public health spending. After that, the discussion on the ineffectiveness of public health spending is provided, followed by conditions under which public health spending is effective for reducing child mortality. It seems that ineffectiveness of public health spending could explain its low effect on child mortality. This ineffectiveness of public health spending could be due to a low quality of governance in the country.

Therefore, the fourth section of this chapter examines the potential role that governance plays in public health spending. The aim of this section is to answer the third sub-question of this thesis: what is the influence of good governance on the effectiveness of public health spending? In order to do this, first the term governance is described, as well as the different types of measurement of the quality of governance. Subsequently, the different dimensions of governance are described including their potential influence on the effectiveness of public health spending. Next, the influence of governance on child mortality is discussed.

The final section of this chapter contains the conclusion, which provides a summary of the answers to the sub-questions.

2.2 Child mortality

In 2006, 21 children died every minute, which are 9.5 million children under five years old died in total (UNICEF, 2007). Not only the amount of children dying is striking, but the inequalities between countries are also substantial. Child mortality is 'the death of a child younger than 5 years old and it is measured by the under-5 mortality rate. This is the probability that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates' (WDI, 2008). The probability is expressed as a rate per 1000. In 2005, 151 per 1000 children died in Sub- Saharan Africa. In that same year only 7 per 1000 children died on average in the high income countries (WDI, 2008). In fact, 90% of the children died in only 42 countries, 95% even in 75 countries (Bryce et al., 2005(2)). Next to inequalities between countries, the inequalities of child surviving chances between population groups are also remarkable; child mortality rates are much higher under the poor population than among the rich population.

The high number of children dying and the unequal distribution of surviving chances between countries and population groups leads to the first sub question of this thesis: which factors have an influence on child mortality?

2.2.1 Factors contributing to child mortality

A great deal of research is done on the factors that influence child mortality. Most studies use the framework made by Mosley and Chen (1984) that provides an overview of the social, economic, biological and environmental factors that influence child mortality. This framework consists of proximate and underlying determinants of child mortality. The proximate determinants affect child health directly and include maternal factors, like birth interval, and environmental factors, like air pollution. The underlying, socioeconomic, determinants indirectly influence child mortality through the proximate determinants. For example, a higher income (socioeconomic variable) raises the chance for a child of getting better medical treatment (proximate determinant) and therefore increases the survival chances of a child. The socioeconomic variables include household factors, like income, and individual level variables, like the level of education the mother has received. The following paragraphs give an overview of the important proximate and underlying determinants of child mortality and provide examples of actions influencing those determinants.

2.2.2 The proximate determinants

In 2000-2003, six causes accounted for 73% of the 10.6 million deaths in children under- 5 years of age, namely pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth (Bryce et al., 2005(2)). The probability of dying is to a great extent increased when the child has a poor nutritional status (Rustein, 2000, p.1263). In fact, 53% of all child deaths can be attributed to being underweighted. Malnutrition decreases a child's chances to survive, because a malnourished child is less able to fight infections. For example, 35%, of the 53% of all child deaths that can be attributed to underweight, could be attributed to the effect of underweighted status on other diseases like diarrhea, pneumonia, measles and malaria. Vitamin A and zinc deficiency also contribute to higher child mortality rates (Black et al., 2003, p.2229).

Some actions can be taken in order to influence the direct causes of child mortality. For example, measles vaccinations and being fully vaccinated significantly increases the surviving chances of a child (e.g. Wang, 2003, p.126; Hanmer et al., 2003, p.112). McGuire (2006) found that under- 5 mortality rates are strongly associated with maternal and infant health program efforts and the share of births attended by trained personnel. Furthermore, bringing a sick child to a medical facility is significantly correlated with lower mortality caused by the three main proximate determinants of child mortality (diarrhea, acute respiratory infection and fever).

2.2.3 Underlying determinants

The conditions mentioned in the previous section are to a great extent influenced by underlying, socioeconomic factors. The most important socioeconomic factors and their influence on child mortality are described in this section.

First, the *income of households* is strongly related with all of the conditions mentioned above. Poor children have lower resistance to infectious diseases because they are undernourished, have diet deficient and have a lower birth weight (Victora et al., 2003, p.233). Additionally, the chances of poor children are decreased because the care seeking behavior of the family is lower and the probabilities that the child will receive adequate treatment is also lower (Victora et al., 2003, p.235). Health care is a normal good which means that household spending on health care and the use of health facilities increases with income (Castro-Leal, 1999, p.78). Furthermore, poor children are more exposed to risk factors for disease through poor water and sanitation facilities, indoor air pollution caused by the use of stoves, poor

housing conditions and high exposure to disease vectors (Victora et al., 2003, p.233). With an increase in average income, the population can have greater command over important goods like food, health care and medical services, which improves their health and nutrition and therefore reduce child mortality rates (Andand and Ravallion, 1993, p.139). A study by Rutstein (2000, p.1268) explains that during the 1990s the two most important factors explaining the decrease in mortality among children were the decline in the proportions of children who were malnourished and a decline in children who were living in poor environmental conditions. Both conditions are significantly influences by household's income.

An increase in income can also lead to an increased a*ccess to safe water and a flush toilet or latrine* in the house. The positive influence of improved access to safe water and sanitation on child mortality is recognized by many researchers (e.g. Wagstaff and Cleason, 2004; Hanmer et al., 2003; Shi, 2000) Access to safe water and sanitation lowers child mortality rates, because it makes hygienic behaviors easier (Wagstaff and Cleason, 2004, p.729). The safe disposal of feces and hand washing after defecation and before food preparation can protect children from diarrhea (Wagstaff et al., 2004, p.727) which is one of the most important causes of child deaths. Lack of sanitation contributes to about 1.5 million child deaths per year and around 88% of the deaths from diarrhea (Black et al., 2003, p.2227). Not only an increase in income increases populations' access to safe water and sanitation, but government programs can also have a substantial effect. For example, Hanmer, Lensink and White (2003) argue that the importance of access to safe water and sanitation shows that greater government involvement is necessary in water service management, especially at the local level. Therefore, in most studies these factors are measured separately from income.

Most studies (e.g. Rajkumar and Swaroop, 2008; Wang, 2003; Filmer and Pritchett, 1999) use the variable *income per capita* in their studies on child mortality rates as the indicator for households income, as this variable measures the average income of the population. However, it is also very important how the income of a country is divided among its' population, the *income distribution*. It is, for example, possible that the richest 10% of the population receives 20% of the country's income, while the poorest 10% receives only 5% of the country's income. This income distribution is important as it explains the inequalities between population groups. The higher the share of a country's income that is received by the richest

10% of the nation, the less income remains to be divided under the other 90% of the population. Higher inequalities in the income distribution indicate a worse socioeconomic level for a larger proportion of the population.

The previous section showed that hygienic behaviors are very important for decreasing child mortality. Next to access to safe water and sanitation, hygienic behaviors are increased with a higher *level of education of the mother*. Female education has shown to be a significant explanation for the cross-country variance in child mortality in numerous studies (e.g. Rajkumar and Swaroop, 2008; Hamner, et al., 2003; Filmer and Pritchett, 1999; Caldwell, 1986). If the mother is educated, the knowledge of a family about hygienic behaviors is increased (Wagstaff and Claeson, 2004, p.728). This knowledge is, for example, necessary to know the effect of washing hands with piped water instead of with natural water (Victora et al., 2003 p.235). Furthermore, it increases knowledge about nutrition, food preparation and symptoms of illness. Next to increased knowledge, a higher level of female education also decreases child mortality because educated women mostly marry at an older age, therefore they have fewer children and are also more likely to provide better psychical care for their children than women without any education. The better care taking for the children is expressed by appropriate breastfeeding, births space and the timely resort to medical help (Mehrotra and Delamonica, 2002).

There are also several studies on the influence of the *urbanization rate* on child mortality (e.g. Rajkumar and Swaroop, 2008; Wang, 2003; Schultz, 1993). Urbanization can have a positive influence on child mortality, because safe water and sanitation are easier accessible in urban environments (Wang, 2003, p.278). Furthermore, there is more access to infrastructure, electricity and health care. Wang (2003) was one of the first to empirically prove the importance of access to electricity for child survival. Electricity makes the use of refrigeration and boiling water possible and both actions reduce the chance of infectious diseases for young children (Wang, 2003, p.293).

A supplementary factor identified by many researchers as having an influence on child mortality is *ethnolinguistic fractionalization* (e.g. Rajkumar and Swaroop, 2008; Filmer and Pritchett, 1999). Ethnolinguistic fractionalization is the probability that two randomly selected persons are from a different ethnic group. Ethnolinguistic minorities have worse socioeconomic outcomes than the majority group has. The larger the group of minorities, the

higher the fractionalization and the higher the average mortality levels (Filmer and Pritchett, 1999, p.15). The lower mortality levels for the majority are related with economic privileges. Furthermore, La Porta et al. (1999, p.245) shows that ethnolinguistic fractionalization has a consistent adverse effect on government performance. This study shows that ethnolinguistic fractionalization is, among others, associated with higher infant mortality rates, because of the inferior provision of public goods. Easterly and Levine (1997) find that ethnolinguistic fractionalization is correlated with bad policies and poor growth. Ethnolinguistic fractionalization also has an impact in policy capacity, because the need for representation of various groups may alter decision-making and slow down the process (Polidano, 2000).

Next to ethnolinguistic fractionalization the *dominance of a religion* has also been studied for its influence of child mortality rates (e.g. Rajkumar and Swaroop, 2008; Filmer and Pritchett, 1999). Rajkumar and Swaroop (2008) and Filmer and Pritchett (1999) both found a significant influence for the *percentage of the population that is Muslim*. However, the theoretical knowledge about this relationship is limited. Rajkumar and Swaroop (2008) refer to the study of La Porta et al. (1999) that shows that Muslim affiliation has an adverse effect on government performance and therefore a negative effect on child mortality rates.

Another factor often studied for its' impact on child mortality is *public health spending* (e.g. Rajkumar and Swaroop, 2008; McGuire, 2006; Filmer and Pritchett, 1999; Anand and Ravallion, 1993). Public health spending is used in order to finance public measures, among others aimed at reducing child mortality rates. Preston (1996, p.533) describes the role of public policy as 'the pivotal role government programs play in speeding mortality improvements'. The importance of the government is also shown in the case of Ceara, one of the poorest states in Brazil. In this state, the infant mortality rate was reduced with 36 percent in just a few years, through an aggressive government program (Zarzur and Tendler, 1994). Government programs should be aimed at measures known for their reducing effect on child mortality rates, like small pock vaccination and the purification of milk (Hanmer et al., 2003, p.103). Additionally, government programs should be aimed at reaching the people who are most needy for interventions. Many poor people lack access to effective and affordable drugs and to surgery and other interventions, largely because of weaknesses in the financing and delivery of health care (Preker et al., 2002, p.143). Interventions aimed at making health care affordable for the poor population, like lowering financial barriers, can increase the overall

health of the poor population and therefore reduce the child mortality rate (Wagstaff et al., 2004). The public sector can furthermore improve social outcomes and equity in child health through providing clean drinking water, sanitation and health care (Victora et al., 2003, p.237; Anand and Ravallion, 1993, p.140).

In order to implement the public policies, resources need to be correctly targeted and allocated. The study of Mehrotra and Delamonica (2002) provide evidence that public resources can reduce child mortality, by allocating more resources to basic social services and therefore subscribes an important role to the state, who must ensure the survival and development of all children through universal access to a package of basic social services. However, the empirical research of McGuire (2006) and Filmer and Pritchett (1999) shows that the actual effect of public health spending in practices is very low and in combination with other factors even insignificant. Wang (2003, p.292) concludes that increasing the share of health expenditure in GDP only reduces the under- 5 mortality rate in rural areas, but not in urban areas.

2.2.4 Summary of child mortality

Based on the existing literature it is concluded that the most important direct causes of child mortality are pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth. However, these factors are to a large extent determinant by socioeconomic factors. The socioeconomic factors that seem to explain nearly all of the cross-country variation in child mortality are: income per capita; income inequality; access to safe water; access to sanitation; female education; urbanization; ethnolinguistic fractionalization; and percentage of the population that is Muslim. Public health spending seems, in theory, to have a strong influence on child mortality rates, as it can be used for effective measures improving the health status of especially the poor population and lower inequalities in access to health care. However, it is also shortly mentioned that empirical results does not support this influence in practice. This gap between the high potential influence in theory, and the low influence in practice is interesting to examine. Therefore, the second sub-question of this thesis: what is, according to the literature, the effect of public health spending on child mortality?

2.3 Public health spending

The literature reveals a substantial gap between the potential of public health spending in theory and the actual results in practice. This section further examines the effect of public health spending on child mortality. This section starts with an explanation of the term effectiveness. Furthermore, this section describes the complicated context in which public health spending is used. This includes a description of the public health sector and the two funding methods for health care. Furthermore, this section provides more detail on the problems of public health spending as the composition and the low resources for public health spending are discussed. A table is included providing an overview on the important literature on the relationship between public health spending and child mortality rates. This table provides an overview of both the ineffectiveness of public health spending, as the possible solutions that exists to make public health spending more effective.

2.3.1 The term effectiveness

In general, effectiveness describes to what extent the objectives of a program or action are achieved and the extent to which the targeted problems are resolved. Therefore, it can be measured by the input of resources needed to produce the desired effect. This is, for example, how many children received vaccinations through the national immunization plan. Efficiency on the other hand describes how much input was required to achieve a certain goal. In the health sector this is, for example, how much money was needed to set up a national immunization program. This thesis is focused on the influence of public health spending on decreasing child mortality rates. Therefore this thesis is focused on the effectiveness of public health spending, namely to what extent does it decrease the child mortality rate.

2.3.2 Public health spending

In order to determine whether or not public health spending can have an effect on decreasing child mortality rates, it is necessary to provide further detail on public health spending. This section describes the complexity of the public health sector and in detail the two main funding methods for the health sector: private and public health spending. Next, the empirical discussion on why public health spending is not effective is described. Finally, suggestions from the literature on how the effectiveness of public health spending could be improved are discussed.

Health sector

An adequate working health system is a fundamental condition for improving the health of the population and for decreasing child mortality rates. The government has a key responsibility in providing a good health system that is accessible for the entire population. A good health system includes, among others, a sufficient amount of trained nurses and doctors that receive appropriate salaries; a sufficient amount and quality of drugs and knowledge on how to use the drugs; and appropriate health care facilities on strategic locations. Most importantly, a good health system ensures equity among the population in receiving appropriate health care.

However, the health sector is one of the most complex sectors there is. Some of the complicating features of the health sector are described by Lewis (2006), Siebert (2006) and Wagstaff and Cleason (2004). Lewis (2006, p.4) describes that first of all, unlike other goods and services, health care services have some unique characteristics that complicate the system, like the asymmetry of information, existence of an uninsured population and over-consumption by the insured population. In most countries, market failures translate into publicly financed and delivered care and/or regulation from public and private bodies. This is the case in many developing countries where public health care systems are predominant. Also, Siebert al. (2006, p.7) lists some characteristics of the health sector that increases its complexity. First, over 100 major organizations are involved in the health sector, which is more than in any other sector. Second, the private sector plays a substantial, and often even predominant, role in both the financing and the delivering of health care services, but is often not involved in the policy debates. Finally, the costs of financial protection, for example through insurance, are very high and the health sector needs funds for long-term recurrent investments. Wafstaff and Cleason (2004, p.64) describe how the behavior of households also complicate the health sector, as they play two roles in the health system. Their first role is as demanders of health interventions and their second role is the delivery of home-based intervention. Their role should not be neglected as poor or delayed care seeking has been identified as a contributor in up to 70% of child deaths (Wagstaff et al., 2004, p.727).

Funding methods for the health care

There are two main sources for the funding of the health sector, namely private and public spending. The effective targeting and allocation of both sources is a vital condition for a good functioning health system, which in turn is a necessary condition for decreasing child

mortality rates. In this section, the composition of both sources of funding and their features that influence the effectiveness of public health spending are discussed.

Private health expenditure mainly consist of out-of-pocket payments, which are 'any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups' (WDI, 2008). Siebert et al. (2006, p.4) marks it as 'one of the most regressive and ineffective sources of health sector financing for the poor because it denies individuals the benefits of income redistribution, risk pooling, and financial protection'. In low- income countries, 85% of private health spending is out-of-pocket spending. In contrast to high-income countries where this is only 37%.
Although exact numbers are not know, a large proportion of out-of-pocket spending consists of informal payments. Informal payments are payments made by individuals to state health workers of institutions, but are not sanctioned by the authorities (Thompson and Witter, 2000). So, not only has the government no control over the amount of informal payments, the government also does not receive tax over these payments.

The direct burden of out-of-pocket payments on households and the low control of the government on private health spending makes it undesirable that a large proportion of the health sector is financed through private spending. Private spending furthermore constitutes the problem that it does not contain incentives to ensure equity in health care and a proportional distribution of costs.

Public health spending is the second source of funding for the health sector. In low-income countries the average public expenditure on health in 2006 was 37% of total health expenditure. For high income countries this was 62% (WDI, 2008). Although the percentage that is financed with public health spending is lower in developing countries, it is still a significant part of the health sector funding. Public spending on health consists of 'recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds' (WDI, 2008). The World Health Report (WHO, 2000) defined three intrinsic goals of health systems which should be accomplished

through public health spending, namely improving health; increasing responsiveness to the legitimate demands of the population; and ensuring that financial burdens are distributed fairly.

One of the components of public health spending is social health insurance. Social health insurance aims at protecting the entire population, rich and poor, against financial risks that occur due to illness. The financing of the insurance consists of contributions of the members (the population) and contributions of enterprises, households and government (Carrin, 2002). The government part comes from general tax incomes. Social health insurance plays a crucial role, as it lowers the financial barriers of the poor population for seeking care. However, it can also have an adverse effect as it is very difficult to set up an insurance system that has an equal distribution of the expenses.

Development assistance is another important source for the public resources financing the health sector, mostly in developing countries. However, the heavy reliance on development assistance can have negative consequences for the sustainability of the health financing and the ability to plan for the long term, because donor funding mostly consists of short-term investment costs (Siebert et al., 2006, p.7). Also, countries are limited in the amount of aid they can absorb, which Siebert et al. (2006, p.7) dictates to the consequences of 'poor governance, inadequate public sector management, weak institutions, shortages of trained health workers, insufficient policies and a limited ability to raise domestic revenues'. Furthermore, countries are not able to use the received assistance in any way they like: on average only 20 percent of the development assistance is in the form of general budget support, where the rest is for specific causes. For example, the global fund to fight AIDS, tuberculosis and malaria solely supports programs that prevent and treat these three diseases. This topic is further explored by Polidano (2000) who describes that the need for aid can even lead to a decision-making vacuum, meaning that the decisions are solely based on which project will receive the most aid funding. Also, Siebert et al. (2006, p.8) claims that if the aid delivery is not made more efficient, the massive investments in the health sector will not lead to the improvements of the health of the poor population. In order to make aid delivery more efficient, health sector management should be improved, for example through improving the policies and the financial management systems (Siebert et al., 2006, p. 8).

Low resources for public health spending

Developing or low-income countries spend on average 5% of their GDPs on health. Middle and high- income countries spend respectively 6% and 10% of their GDPs on health (Siebert et al., 2006, p.2). This means that per capita public spending on health is around $22 in developing countries and over $3,000 in high income countries (Siebert et al., 2006, p.2). Although 93% of the global burden of diseases falls on 84% of the world's poor, only 11% of global health spending occurs in low- and middle income countries (Preker et al., 2002, p.143). In addition, resources for public spending are low in developing countries, because often a large proportion of the population works in the rural and informal section, which limits the possibilities for governments to obtain revenues from tax income (Preker et al., 2002, p.144). The research of Mehrotra and Delamonica (2002) shows that in countries with low under five mortality rates, meaning below 70 per 1000, the poorest 20 percent of the population receives more than 25 percent of the benefits of public spending on primary health care. However, in countries with high under 5 mortality rates, above 140, the poorest 20 percent of the population receives less than 15 percent of the public health spending.

Ineffective public health spending

The previous sections show that the complexity of the health sector, the composition of the funding methods and the low resources for public health spending make it more difficult to effectively spend the public health budget. Filmer and Pritchett (1999) provide two more explanations for the low effectiveness of public health spending. The first explanation is that an increase of public spending can 'crowd out' private spending on health. The second explanation is that public health spending is ineffective, because it is, among others, poorly targeted or the institutions are not capable of making sound policies.

This second line of reasoning has been adopted by many studies. Several examples of the outcomes of government actions and the effective use of public budgets are listed below. For example, Schultz (1993, p.19) states that governments in developing countries do not take enough action and the actions they do take are inefficient and corrupt. Also Lewis (2006, p.25) describes that in many places bureaucratic problems, corruption and mismanagement lead to inadequate public funds for services. Bad budgets have frequently been cited as one of the main reasons why governments in developing countries find it difficult to translate public spending into effective services (World Bank, 2000). Another problem present in many developing countries is the absorption of the public health budget by public hospitals. Budgets

are frequently used for expensive trainings of doctors, who in turn mostly treat the richer population (Filmer, Hammer, Pritchett, 1999, p.2). Pritchett and Summers (1996) note that all of the negative or ambivalent findings on public spending could potentially be a reflection of differences in the efficacy of spending. Bad governance leads to higher informal payments, because patients need to compensate for inadequate salaries of health works and budgets deficits (Lewis, 2006, p.25).

Furthermore, it seems that governments are unable to reduce the problems of inequality, because the interventions are not reaching the children who need them the most (Bryce et al, 2003, p.159). The study of Jones et al. (2003, p.65) finds that about two-thirds of child deaths could be prevented by interventions of which the knowledge and instruments are available, but the problem is that these instruments are not reaching the children who need them. The study of Victora (2003, p.225) describes that most ill health in less developed countries may be ascribed to poverty, resulting from the lack of resources, or more frequently, to their unfair distribution both between and within countries. The results of Hanmer et al. (2003) are also consistent with the view that the effect of public spending is small because it is poorly targeted. Preker et al. (2002, p.144) describes the dilemma of governments in developing countries as follows: 'faced with overwhelming demand and very limited resources, many governments find it difficult to ration health care so that public expenditures is targeted on the poor'.

Effective public health spending

Because public resources for health care are low, it is even more important that governments purchase health services efficiency. Efficiency gains constitute an additional source of revenue (Sieber et al., 2006, p.2). This issue is also addressed by Evans et al. (2001, p.307) who describe that, increasing the resources for the health system is crucial for improving health in poor countries, but important gains can also be made by using existing resources more effectively. In addition, the study of Mehrotra and Delamonica (2002) finds that the allocated efficiency of public health spending is especially important when the level is very low (p.1108).

Public health spending needs to be equitable, both in collection of the resources and in the spending of the public health budget. Furthermore, funds must be correctly targeted at the people who need them the most. The literature shows that there are many problems with

achieving effective public health spending. Table 1 provides an overview of the important literature on the effectiveness of public health spending on child mortality rates.

This literature shows that the direct effect of public health spending on child mortality is low. Especially the studies of McGuire (2006) and Filmer and Pritchett (1999) conclude that an increase in public health spending does not lower child mortality rates. This is unfortunate, as the potential influence of public health spending in theory seems to be very high.
However, the table also shows that there are also researchers that have found that public spending on health could have a positive impact. Most researchers conclude that this is only possible when the country is well governed (Rajkumar and Swaroop, 2008; Lewis, 2006; Wagstaff and Claeson, 2004). The research of Rajkumar and Swaroop (2008) shows the importance of the quality of the government by concluding that public spending on health can reduce child mortality provided that the government is not corrupt and has an efficient bureaucracy. The research by Lewis (2006) also concludes that return on investments in health is low when governance issues are not addressed, meaning that good governance, measured by government effectiveness; control of corruption and voice and accountability, is important in ensuring effective health care delivery. Wagstaff and Claeson (2004) have similar results as they find that public health spending only reduces under 5-mortality when the quality of policies and institutions is high. It is important that improvements are made in countries that have poor governance, including weak policies and institution, because otherwise additions to the public health budget have no impact (Wagstaff and Claeson, 2004, p.56).

Most researchers also note the importance of increasing the amount of public health spending (Wagstaff and Claeson, 2004; Mehrotra and Delemonica, 2002). Also, Feachem (2000, p.715) describes that it is impossible for developing countries to improve their health sector if the amount of resources spend in the health sector is low.

Table 1

Overview of Literature on Effectiveness of Public Health Spending for Decreasing Child Mortality

Auteur	Year of publication	Main question	Type of research	Conclusion	Recommendations
Rajkumar and Swaroop	2008	Public spending and outcomes: Does governance matter?	Statistical analysis- ordinary least square regression	Public health spending has a stronger negative impact on child mortality in countries that have a higher score in the corruption index and the bureaucratic quality. However, the influence is still below its true full potential.	For development assistance: simply increasing public health spending is unlikely to lead to better outcomes if countries have poor governance. The inefficiency of spending could be due to a variety of reasons, including the possible substitutability between public and private spending.
Lewis	2006	What factors affect health care delivery in the developing world?	Cross-country regression	From the good governance indicators has government effectiveness the best correlation with child mortality rates, than control of corruption and voice and accountability has the least explanatory power.	Good governance is important in ensuring effective health care delivery, and returns on investments in health are low where governance issues are not addressed.
McGuire	2006	Which actions are necessary to decrease child mortality rates without public health spending?	Statistical analysis- ordinary least square regression	Developing countries with more health care spending do not have systematically lower levels of under-5 mortality rates, whereas countries with better maternal and infant health care services do.	Attention must be shifted from the influence of factors like democracy and globalization on health care spending, and instead must be devoted to their effects on the quality, accessibility, and utilization of basic health care services.

Wagstaff and Cleason	2004	Is low government spending or are weak links in the chain the cause of poor health indicators?	Statistical analyses	In well-governed countries (measured by the quality of the bureaucracy) additions to the government health budgets will by themselves lead to reductions in malnutrition and mortality.	Adding to the government health budgets and scaling up all government health programs has an impact in well-governed countries. Extra government health spending is necessary, but not sufficient- health sector strengthening is also required, and spending needs to be better targeted.
Wang	2003	What are the determinants of child mortality in low-income countries?	Correlation matrix and a multivariate regression	As child mortality declines, the gap in mortality between the poor and the better-off widens. Child mortality is substantial higher in rural than in urban areas. Reduction of child mortality is much slower in rural areas where the poor are concentrated.	At the national level access to electricity, incomes, vaccinations in the first years of birth and public health expenditure significantly reduce child mortality. Therefore, it is much easier to reduce child mortality by choosing direct policy intervention than focusing on increasing GDP growth. Increasing the health expenditure in GDP reduces child mortality in rural areas, but not in urban areas.

Mehrotra and Delamonica	2002	How is the allocation of public health spending to basic social services?		While public spending for basic social services is at already low levels in developing countries, lack of allocative efficiency and equity in the distribution of public spending further undermines its impact in the well-being of children and the poor.	Reforms must be taken place in order to reduce the inequity and inadequacy of the public spending pattern for social services. Furthermore, the level of public health spending could be increased in low-income countries by increasing the fiscal space through enhance the debt cancellation.
Filmer and Pritchett	1999	Child mortality and public spending on health: How much does money matter?	Statistical regression	Ninety-five percent of cross-national variation in child and infant mortality can be explained by: a country's per capita income, the distribution of income, extent of female education, level of ethnic fragmentation and predominant religion.	Reforms must be made in order to increase the cost effectiveness of public health spending, the net impact of additional public supply and public sector efficacy.
Anand and Ravallion	1993	What is the role of private incomes and public services in human development in poor countries?	Statistical analysis	For basis health, average affluence matters to the extent that it delivers lower income poverty and better public services. The observed positive correlation across countries between life expectancy and affluence vanishes once controls for incidences of poverty and public spending on health.	Certain components of public health spending can matter greatly in enhancing human development in poor countries. This shows the importance of the human development approach for policy implications in stead of the income-centered approach.

2.3.3 Summary of public health spending

The effectiveness of public health spending is measured as its' influence on the reduction of child mortality. As section 1 showed that public health spending can in theory have a strong influence in reducing child mortality rates, this sections described some of the complicating features of public health spending that must be taken into account. This includes the complexity of the health sector, the existence of private spending for health and the composition of public health spending. As resources for public health spending are already low in most developing countries, it is even more important that spending is conducted in an effective way. Reasons why public health spending is ineffective include mismanagement and inadequate targeting of resources towards the people that need them the most. However, it can also be concluded for the literature that public health spending could be effective, namely when the country has a good quality of governance. This leads to the third sub-question of this thesis: what is, according to the literature, the effect of good governance on the effectiveness of public health spending? This question is answered through a literature study provided in the following section.

2.4 Good Governance

The literature described in the former section shows that the quality of governance could have an influence on the effectiveness of public health spending. This influence could explain, at least to some extent, the gap between the potential effect of public health spending on child mortality in the literature and the disappointing low effect of public health spending in practice.

In order to determine what the effect of good governance on public health spending, according to the literature, is, the following topics are addressed in this section. First, the term governance is discussed, followed by an overview of the ways in which the quality of governance can be measured. This is followed by a description of the influence governance can have on public health spending and on child mortality. This section ends with a short summary of the influence of good governance on the effectiveness of public health spending.

2.4.1 The term governance

Until the 80's, the term governance was not frequently used in the development community (Alcantara, 1998). The notion of governance first came to the surface in the 1989 World Bank report on Sub-Saharan Africa, in which the region was defined as a 'crisis of governance' (World Bank, 1989). From that period till today, the term governance has grown into a multi-faced concept (Santiso, 2001, p.2). In the literature, there seems to be the small agreement that governance refers to the development of governing styles in which boundaries between and within public and private sectors have become blurred. However, there is no consensus about the exact definition of governance. Therefore, several definitions are listed here. Kaufman et al. (2004, p.254) define governance broadly as 'the traditions and institutions by which authority in a country is exercised'. Stoker (1998, p.17) distinguishes government from governance as he describes government as the formal institutions of the state and their monopoly of legitimated coercive power. Governance on the other hand does he describe as ultimately concerned with creating the conditions for ordered rule and collective action. According to the World Bank, governance encompasses 'the process by which authority is exercised in the management of a country's economic and social resources for development; and the capacity of governments to design, formulate and implement policies and discharge functions' (World Bank, 2000). However, the World Bank sometimes reduces this definition to a commitment to an efficient and accountable government. The article of Weis (2000, p.795) lists some more definitions of governance, of which three are described here. The

United Nations Development Program views governance as 'the exercise of economic, political and administrative authority to manage a country's affairs at all levels'. The OECD relates governance to 'the use of political authority and exercise of control in a society in relation to the managements of its resources for social and economic development'. The Institute of Governance in Ottawa mainly focuses on the distribution of decision making power as it defines governance as 'compromising the institutions, processes and conventions in a society which determine how power is exercised, how important decisions that affect the society are made and how various interests are accorded a place in such decisions'.

The inability of academics, politicians and international institutes to define governance complicates the decision-making on what 'good' governance is and how the quality of a country's governance can be measured. The role of good governance has been emphasized in recent years as key to development effectiveness (Swaroop and Rajkumar, 2002, p.1) and the term has become crucial in development cooperation. It is used by the IMF, the World Bank and the United States for the distribution of the loans and grants. For example, the United States promotes that the resources for the Millennium Challenge Account (MCA) are directed towards countries with sound policies and institutions (Kaufman and Kraay, 2002). This is inspired by the world wide consensus that aid works best when is it directed to countries with relatively good institutions and policies. For instance, the research by Burnside and Dollar (2000) finds that aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies, and only has little effect in countries with poor policies. It is also assumed that the quality of democratic institutions affect the effectiveness of aid by providing accountability mechanisms in the management of external resources (Santiso, 2001, p.8). This consensus has initiated a shift in making governance indicators one of the most important criteria for aid allocation (Kaufman and Kraay, 2002).

2.4.2 The measurement of governance

It is important to use a workable measure of governance, in order to determine the possible influence of good governance on the effectiveness of public health spending. There are several sources that can be used in order to determine the quality of a country's governance. For example, the International Country Risk Guide is a privately owned database that contains a financial, political and economic risk assessment for 140 countries. Transparency International on the other hand is famous for its' Corruption Perception Index. Another well-used database is the Country Policy and Institutions Assessment of the World Bank, which includes criteria on four different clusters, namely: economical management; structural

policies; policies for social inclusion; and public sector management and institutions. The countries score range from 1 to 6 on every cluster. This assessment is one of the sources that is used in order to calculate the country scores in the World Wide Governance Indicators Database constructed by Kaufmann et al. for the World Bank. This database constructs 6 different indicators of good governance, namely regulatory quality; rule of law; control of corruption; government effectiveness; voice and accountability; and political stability and absence of violence. The country scores for the aggregate indicators are calculated with the use of over 30 experts working on behalf of commercial risk-rating agencies and NGO's. This database is well used, because is publically available and contains information for a great number of countries. Arndt and Oman (2006, p. 29) describe this database as 'probably the most carefully constructed and certainly among the most widely used governance indicators'. Lewis (2006, p.8) describes that this database adds value, because the indicators are built on perceptions and perceptions are very powerful in shaping behavior. If, for example, investors perceive corruption in a public sector, it discourages private investment in this public sector. Kaufman et al. (2004, p.271) describes their two reasons for using perception based data as follows. First of all, objective data are almost by definition impossible to obtain, so there are few alternatives to subjective data. Second, perceptions can add helpful information regarding the governance indicators, for example because a country may have extensive formal protection of property rights, but little or no enforcement.

However, there are also certain limitation of this database, described among other by the creators themselves. Most of the critique on the governance indicators is clustered around four issues: the problem of contested concepts; the problem of scope; the problem of comparison; and the problem of measurement (Minogue, 2005). The problem of contested concepts is also raised by Kurtz and Schrank (2008, p.563) as they are worried that 'perception based indicators of governance in general, and the indicator of government effectiveness in particular, suffers from systematic measurement error, selection bias, and halo effects'. This implies that the indicators do not measure the concept that is introduced. This is in line with the view that the governance indicators are created in light of liberalization of markets, while this does not have to be the correct viewpoint for developing countries. For example, environmental regulations can be interpreted as market unfriendly policies and therefore they lower a country's score on regulatory quality. However, in the light of human development, environmental regulations can be regarded as very good.

The problem of scope is that it is difficult to tell what actions are included in which governance indicator. This includes, for example, the difficulty of separating the normal state activities and regulation from each other (Minogue, 2005).
The problem of comparison is often mentioned in the literature, for example by Arndt and Oman (2006). One of the problems of cross-country analysis with these indicators is that the primary sources differ between countries in their composition and in their weight and consequently in their influence on the composition of the country scores.
The problem of measurement is also well know. The country scores are based on measured perceptions from experts working for commercial risk-rating agencies and NGO's. However, the perceptions of the majority of the population are not included in the scores. This is mainly due to the fact that perceptions of the majority of the population, if they are available, are mostly obtained from households survey's. These survey's are not available for all countries and moreover are their not a lot cross-country comparable household surveys (Arndt and Oman, 2006). Although this measurements errors are unavoidable in the construction of governance indicators (Arndt and Oman, 2006, p.29) it does decrease the reliability of this research.

Despite these problems, the database of Kaufmann, Kraay and Mastruzzi from the World Bank is used in this thesis for the measurement of the quality of governance. Because governance is a much debated and very complex term, the division of governance into six different indicators in this database is highly valued.
The next section describes the influence of good governance of the effectiveness of public health spending by using the governance indicators as defined and measured by Kaufman et al.

2.4.3 The influence of good governance on public health spending

As mentioned before, the six different governance indicators used in this thesis are: regulatory quality, rule of law, control of corruption, government effectiveness, voice and accountability and political stability and absence of violence.

Regulatory quality measures 'the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development' (Kaufman et al., 2004, p. 255). This dimension is focused on policies and includes, for example, to what extent policies are perceived as being market-unfriendly or not

in favor of international trade. A country's score on this indicator is mainly important for private actors and therefore this dimension does not have a large influence on the effectiveness of public health spending.

Rule of law measures 'perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence' (Kaufman et al., 2004, p.255). This indicator is also mostly important for the private sector, as it reflects the perceptions of the extent to which the country is solid for private investments. These perceptions do not necessarily reflect whether or not public health spending is effective.

Control of corruption measures 'the perceptions of corruption, conventionally defined as the exercise of public power for private gain' (Kaufman et al., 2004, p.255) and is at the core of the governance agenda (Santiso, 2001, p.17). Perceptions about corruption reflect how stakeholders view public systems and their effectiveness in producing acceptable outcomes (Lewis, 2006, p.13). Less corrupt countries tend to have fewer bureaucratic layers and higher tax compliance (La Porta et al., 1999, p.293), which increases government's revenues from tax incomes and simplifies decision-making. A high degree of corruption probably lowers the effectiveness of public health spending, as it could mean that a (large) amount of money is used for causes that do not directly influence health indicators. Furthermore, higher corruption can lead to lower tax compliance, which means that there are less revenues for the government. Therefore, it is expected that the higher a country scores on the control of corruption indicator, the higher the effectiveness of public health spending is.

Government effectiveness measures 'perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies' (Kaufman et al., 2004, p.255). It combines the quality of public service provisions, the quality of the bureaucracy, the competence and independence of the civil service and the credibility of the government's commitment to policies (Kaufman et al., 2004, p.255). This indicator focuses on inputs the government needs in order to produce and implement good policies and deliver public goods. Therefore, the better the country scores on government effectiveness, the higher effectiveness of public health spending is expected.

Voice and accountability measures 'perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and a free media' (Kaufman et al., 2004, p.254). This dimension contains indicators on the political process, civil liberties and political rights. It includes indicators measuring the independence of the media, because the media plays an important role of holding the people with authority accountable for their actions (Kaufman et al., 2004, p.254). In the health sector, factors like the independence of the media and the confidence the population has in their government, reflect the degree to which citizen can influence government decisions that influence them (Lewis, 2006, p.7). Furthermore, participation helps to build coalitions supporting policy reform while the involvement of civil society helps to build social capital. Restricting participation in policy making often weakens the legitimacy, accountability and the quality of decisions made (Santiso, 2001, p.17). An open governance system could make the government more responsible and responsive, because in such a system politicians can be held accountable by the public for the decisions they take. Therefore, it is more in their own interest (for example re-election) to take decisions that are regarded as positive by the population. Consequently, it is expected that the higher a country scores on the voice and accountability indicator, the higher the effectiveness of public spending on health is.

The indicator *political stability and absence of violence* measures 'perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism' (Kaufman et al., 2004, p.254). Political leaders with insecure powers do not want strong governing institutions to emerge and therefore there are weaker institutions in politically instable countries (Polidano, 2000). As a result, political instability leads to politicization of the public sector, which means that the public sector becomes a source of political and material resources used by leaders (Polidano, 2000). This has devastating consequences for the problem-solving capacity of the public sector. Governments that fear to be overthrown in the near future are not likely to make long-term investments in the health sector. However, decreasing child mortality requires long-term investments and therefore the effectiveness of the public health spending decreases as a large amount of the public budget is spent on short-term investments. As a result, it is expected that the higher a country scores on the political stability and absence of violence indicator, the higher the effectiveness of public spending on health is.

2.3.4 The influence of good governance on child mortality

Good governance does not only influence the effectiveness of public health spending, but it also influences other measures that influence child mortality. For example, the study of Lewis (2006) researched the effect of good governance indicators on health care services that directly influence child mortality, like vaccination programs. She measures the correlation of three governance indicators, namely voice and accountability, government effectiveness and control of corruption, with child mortality rates. This study shows that without a high quality of governance, the health system will not work effectively and therefore the child mortality rate will be higher. An ineffective health care systems includes, for example, a higher absent of health workers, payment of illegal fees by patients and not handling corruption (Lewis, 2006, p.44).

2.4.5 Summary of good governance

The purpose of this section was to explain what, according to the literature, the effect of good governance on public health spending is. Answering this question is hindered by the observation that there is no worldwide consensus on the definition of governance and therefore it is more difficult to determine what 'good' governance is and how to measure the quality of a country's governance. In this thesis good governance is divided into six dimensions, along the work of Kaufmann et al., because they entail different aspects of good governance. Four of these six dimensions potentially influence the effectiveness of public health spending. First, a high score on the control of corruption indicator could potentially have a positive influence on the effectiveness of public health spending. Low corruption ensures that a large proportion of money is spent on projects and programs that directly influence child mortality, instead of being wasted on ineffective measures as bribery. Second, a high score on government effectiveness is expected to lead to a higher effectiveness of public health spending, as it ensures that the quality of policy formation and implementation is high. This means, for example, that programs exist that are specifically designed for the poor population and that these programs reach the poor population. Third, a high score on voice and accountability could increase the effectiveness of public health spending, because a government that is being held accountable probably has a more efficient government programs and a more effective allocation of resources. Fourth, a higher score on political stability and absence of violence could potentially increase government's effectiveness, because it could mean that governments are more willing to make the long term investments necessary for a good health system.

The research by Lewis (2006) show that good governance also has a positive influence on the delivery of health care services necessary to decrease child mortality rates. This is not only through more effective public health spending, but also by decreasing corruption and informal payments.

2.5 Conclusion

Until this day, child mortality rates are strikingly high and severe inequalities between countries and population groups exist. The first sub-question of this thesis therefore was: which factors have an influence on child mortality? It is concluded that the most important direct, proximate, factors are pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth. These factors are influenced through underlying, socioeconomic, determinants. The most significant socioeconomic factors are income per capita; income inequality; access to safe water; access to sanitation; urbanization; school enrolment; ethnolinguistic fractionalization; and percentage of the population that is Muslim. Another factor however provides an interesting dilemma. From the literature it seems that public health spending could potentially be used in order to decrease child mortality rates. For example, because public policies can be used in order improve the health sector and decrease inequalities between population groups. However, research has shown that the actual effect of public health spending on child mortality in practice is very low. This has led to the second sub-question of this thesis: what is the effect of public health spending on child mortality? The effectiveness of public health spending is first of all hampered by the complexity of the health sector, private health care spending and the composition of public health spending. Furthermore, especially in developing countries there is only a low amount of resources available for public health spending. Additionally is the effectiveness of public health spending decreased by ineffective management and targeting of the resources. Some researchers claim that the amount of public health spending must be increased in order to make it more effective. However, most researchers claim that the quality of governance influences the effectiveness of public health spending for decreasing child mortality. Moreover, it seems that four dimensions of good governance potentially have a very significant impact on this relationship. These four dimensions are: control of corruption; government effectiveness; voice and accountability; and political stability and absence of violence.

The observations made from the literature in this chapter stimulate to empirically test if the different dimensions of governance influence the relationship between public health spending and child mortality. Furthermore, it encourages to determine the importance of public health spending in influencing child mortality combined with the other factors that predict the child mortality rate. The following chapter describes the statistical analysis through which this is tested.

3. Methodology and data

3.1 Introduction

The goal of this thesis is to provide an explanation for the gap between the potential influence of public health spending on child mortality and the actual influence of public health spending in practice. The previous chapter shows that good governance potentially has an influence on the effectiveness of public health spending for reducing child mortality rates. However, because the literature is not conclusive on this relationship, it is necessary to empirical test this relationship. An empirical analysis makes it possible to base conclusions not only on the existing theory, but also on evidence. The aim of this chapter is to provide an adequate overview of the methodology and data used in order to assess the believability of the results.

This chapter start with a description of the hypotheses that need to be tested. After this the methodology that is used in order to tests the hypotheses is described. The statistical methods used are described, including the different steps that need to be taken in order to perform these analyses. The statistical methods used in this thesis are a correlation matrix and several multiple regressions. After these analyses are described, the process of country selection is described. Also, a broad description is given of the data used for the statistical analyses. This includes definitions of the variables, the validity and reliability of the data, the validity of measurement and data limitations.

3.2 Hypotheses

A hypothesis is a statement proposing a relationship between two or more variables. According to chapter 2 of this thesis, the main hypothesis (*H1*) of this thesis is: *the better governance a country has, the more effect public health spending has on decreasing the under-5 mortality rate.*

Consistent with the literature in chapter 2, four good governance indicators are chosen of which the influence on the relationship between public health spending and the under-5 mortality rate is examined. These indicators are: control of corruption; government effectiveness; voice and accountability; and political stability and absence of violence. This leads to the following four hypotheses:

> *H2*: The better a country scores on control of corruption, the more influence public health spending has on reducing child mortality rates.

H3: The better a country scores on government effectiveness, the more influence public health spending has on reducing child mortality rates.

H4: The better a country scores on voice and accountability, the more influence public health spending has on reducing child mortality rates.

H5: The better a country scores on political stability and absence of violence, the more influence public health spending has on reducing child mortality rates.

3.3 Methodology

3.3.1 The test for normality

In this thesis several multiple regressions are used in order to learn more about the relationship between the independent or predicting variables and the depend variable child mortality. A multiple regression uses the average of every variable in order to determine the correlation of the variables. Therefore, it is necessary that all variables have a normal distribution. A normal distribution means that the values of the variable are symmetrically distributed around an average value. There a several ways to test for normal distribution, the methods used in this thesis are described below.

The chapter on empirical results starts with a statistical description of the variables, which provides the mean and the median of all the variables. The mean is the mathematical average of all terms of the variable. It is calculated by adding up all values and then divided them by the number of terms. The median is the value of the term in the middle if there is an odd number of terms. When there is a even number of terms, the median is the average of the two terms in the middle. When the variable has a normal distribution, the mean and the median of each variable is approximately the same. Therefore, the statistical description of the variables is the first indication if the variable has a normal distribution.

Furthermore, the skewness test is used in order to determine if the variable has a normal distribution. The standard rule used for this test is, if the skewness is $\geq |1|$, the variable has no normal distribution (Vocht, 2008). Histograms showing the distribution of the variables are used in order make an interpretation of the outcomes of the skweness tests. Three different methods are used in order to create a normal distribution for the variables, namely calculating the logarithmic, taking the root of a variable or a power transformation (Mukherjee et al., 1998). If the variable has a significant positive skwesness, a logarithmic of the variable is calculated or the root of the variable is taken. If the skewness is significantly negative, a

power transformation is used in order to generate a normal distribution. To which power the variable needs to be transformed is determent by trial and error.

3.3.2 The correlation matrix

An important factor that needs to be taken into account is the correlation between the different predicting variables. For example, it is easily argued that per capita income is correlated with female education, as higher income makes it possible to pay school fees. A correlation matrix is constructed in order to determine how strongly related each of the items in the measurement scheme is to all the other items.

3.3.3 The implementation of the multiple regressions

The goal of this thesis is to test if public health spending in combination with a good governance indicator has a significant effect on the reduction of the child mortality rate. In order to test this, it is necessary to test the relationship between public health spending in combination with good governance on child mortality, in a model in which the other predicting variables for child mortality are kept constant. These tests are performed using multiple regression analyses.

The literature of chapter 2 is used in order to define which other variables effect the under-5 mortality rate. Knowledge on these variables is necessary, because they need to be used to make the model including the good governance variables as close to reality as possible. The other predicting variables included in the multiple regression are identified in the literature in chapter 2 and are: income; income inequality; female primary school enrolment; ethnolinguistic fractionalization; and percentage of the population that is Muslim. Chapter 2 shows that urbanization is very important, although this is mainly because urban areas provide better access to safe water and to sanitation. Therefore in this thesis the percentage of the population that lives in urban areas is not used, but the percentage of the population that has access to safe water and sanitation is.

The first step is to create a base model including the predicting variables as defined in chapter 2 and public health spending. The good governance indicators and the moderator effects are not yet included. The function described here assumes that all the variables have a normal distribution. The test for normality will prove if this assumption is correct.

The function used for this model is:

$$UMR = \alpha + \beta 1\ (PHS) + \beta 2\ (IPC) + \beta 3\ (GINI) + \beta 4\ (SANITATION) + \beta 5\ (WATER) + \beta 6\ (FE) + \beta 7\ (ETHNO) + \beta 8\ (MUSLIM) + \mu$$

α is a regression constant and is the value of UMR when all the independent variables have score or values of zero.
UMR is the value of the under-5 mortality rate.
β is the standardized regression coefficient. It is calculated by multiplying the regression coefficient B with the quotient of the standard deviation of the independent variable. It indicates the relative importance of each independent variable (Aron et al., 2006).
PHS is the value of public health spending, measured as the % of GDP.
IPC is the value of income per capita.
GINI is the value of the GINI-coefficient which measure the income inequality in a country.
SANITATION is the percentage of the population that has access to sanitary facilities.
WATER is the percentage of the population that has access to safe water.
FE is the value of total primary female enrollment.
ETHNO is the value of the ethnolinguistic fractionalization.
MUSLIM is the percentage of the population that is Muslim.
μ is the error term

Next, four models are created that include a good governance indicators and a moderator variable. A fifth model includes all good governance indicators and moderator variables. In order to do this, first the moderator variables need to be created. This is done according to the method of Siero et al. (2004).

The moderator variable is calculated with the function:

MVar = Z(PHS) * Z(GG)

MVar is the moderator variable. This variable affects the relationship between the dependent (under-5 mortality rate) and the independent variable (public health spending).
Z(PHS) is the standardized value of public health spending.
ZGG is the standardized value of a good governance indicator. Four different good governance indicators are use, namely:
Z(CC) is the standardized value of control of corruption.
Z(GE) is the standardized value of government effectiveness.
Z(VA) is the standardized value of voice and accountability.
Z(PS) is the standardized value of political stability and absence of violence.

The moderator variables are calculated for each of the four governance indicators individually. This, first of all, adds value to the research because it makes it possible to determine the individual effect of each moderator variable. Second, it makes it possible to determine the regression line of each good governance indicator individually. Third, it is done for practical reasons, as a factor analysis of the good governance indicators is discouraged by Arndt and Oman (2006) because, as they quote Kaufmann et al. (2005), 'non-trivial issues originate when constructing one composite governance indicator for a country'. The six different good governance indicators identified by Kaufmann et al. are aggregated indicators. Every indicator is constructed by calculating scores on many underlying, individual indicators. For example, government effectiveness is calculated by the quality of bureaucracy, but also the satisfaction with the public transportation system, policy consistency and many more. The indicators therefore already reflect many aspects of governance and combining the six dimensions into one good governance dimension entails numerous problems. To start, one should question what does the score of one good governance indicator reflect? For example, in the case that one good governance indicator is calculated by taking the average of all six indicators. A country that score extremely high on three indicators, but extremely low on the other three indicators, will have an average score on the good governance indicator. On the other hand, a country that scores semi-high on two indicators, semi-low on two other indicators and average on the remaining two indicators will have the same score as the

country that only has extreme scores. Moreover, the usefulness of one good governance indicator can be questioned if it is considers which factors are added. What does a country's average score on, for example, government effectiveness and voice and accountability measure? The dimension voice and accountability includes the freedom of the press, where the dimension government effectiveness includes the capacity of the tax administration. An average score on this two dimensions has no explanatory value as it could several things. For example, that the country has a very good tax system, but no freedom of the press. However, it could also mean that the tax system is lacking capacity, but there is a lot of freedom of the press. Therefore, in this thesis, the six different dimensions of governance as defined by Kaufmann et al. are treated separately and not combined into one factor.

The good governance indicator and the moderator variable are included in the base model created by the first multiple regression. The method used for this analysis is the enter method. The enter multiple regression is performed according to the method described in Aron et al. (2006) and executed with the use of the SPSS computer program. This method is used because it produces the B values of correlation. In this analysis the moderator variable is included and therefore the standardized values of public health spending and the good governance indicator are included. Resulting in the need to use the B correlations instead of the Beta values used in the first multiple regression. The beta-values only show the interaction between the standardized variables.

The function used for this model is:

UMR = α + *b*1 (ZPHS) + *b*2 (IPC) + *b*3 (GINI) + *b*4 (SANITATION) + *b*5 (WATER) + *b*6 (FE) + *b*7 (ETHNO) + *b*8 (MUSLIM) + *b*9 (ZGG) + *b*10 (MVar) + μ

Three variables are different from the variables used in the function for the base model. These variables are:
Z(PHS) which is the standardized value of the logarithmic of public health spending.
ZGG is the standardized value of a good governance indicator.
MVar is the moderator variable that affects the relationship between public health spending and the under-5 mortality rate.
b is the multiple regression coefficient and indicates how much one-unit change in an independent variable changes the dependent variable when all other variables in the model are held constant or controlled.

If the results for the multiple regression show that the moderator effect has a significant influence on the relationship between public health spending and child mortality, the next step is to determine the direction of the moderator effect. For this step the method of Siero et al. (2004) is used. This method entails that three different values for the good governance indicator are inserted in the function. These values are -1; 0; and 1. Because the standardized variables are used, a value of -1 reflects a low score on the good governance indicator; the value 0 reflects an average score; and the value 1 reflects a very good score on the governance indicator.

3.3.4 Country selection

A cross-country analysis is used in order to determine if a proposition is generally true for all countries. It is therefore necessary to include as many countries as possible in this analysis. Since most data is obtained from the World Development Indicators Online, the country selection used the countries listed in this database as the basis for the country selection. This databases contains information on 226 countries.
The first selection of countries is based on national income. There are significant differences in child mortality rates throughout the world, as is shown in chapter 2 of this thesis. Because a multiple regression uses the average of each variable, the high-income countries can have a substantial effect on the average of each variable. For example, the average child mortality

rate is lower, income per capita higher and the scores of the good governance indicators, female education and access to safe water and sanitation are also higher. Therefore, the high income countries can be regarded as collective outliers. Furthermore, the child mortality rates are especially high in low- and middle income countries and therefore this thesis is aimed at designing policies for these countries. Consequently, some high-income countries are removed from the dataset, namely the 30 countries that are members of the OECD[1]. The OECD is the Organization for Economic Co-operation and Development and its' members are countries that accept the principles of representatives democracy and a free-market economic (OECD, 2008).

Additionally, considerations regarding the availability and quality of the data have guided the country selection. 16 countries were eliminated from the dataset, because there was no data on the child mortality rate. 9 countries were eliminated because there was no data available for the variable public health spending. 9 more countries were eliminated, because data was available for only four or less of the 13 variables. The final dataset includes 158 countries from the world regions Oceania, Europe, Asia and Africa (see appendix B). For these 158 countries data is available on child mortality, public health spending and at least three more variables.

A cross-country design has certain limitations that must be taken into account. The results of a cross-country design are useful in order to make general remarks on a relationship, but regional differences are overlooked by measuring only the average of the country as a whole. Therefore no statements can be made about specific national and regional problems

3.4 Data

The quality of the data must be assessed in order to determine if the quality is sufficient for conducting a multiple regression. Because this is a secondary analyses, data is not specifically collected for this research, but data collected for other studies are used. Performing a secondary analyses has some advantages and disadvantages as described in Jansen (2005). The main advantage is that it saves both money and time and therefore it is the most feasible method of data collection for this research. However, evaluating the quality of the data is

[1] The 30 member countries of OECD are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States. Source: www.oecd.org

more difficult with this method of analyses, because sometime information on how the data is collected is missing. Therefore, some features of data that determine the quality are listed below and include the definition of the data, data sources and data limitation. In order to create the moderator variables, data had to be collected for the public health spending, under-5 mortality rate and the good governance indicators. In order to construct the base model, data also had to be collected for the predicting variables: income; income inequality; access to safe water; access to sanitation; female primary school enrolment; ethnolinguistic fractionalization; and percentage of the population that is Muslim.

Appendix A provides an overview of the variables used.

3.4.1 Description of the data

The *under-5 mortality rate* is 'the rate that measures the death of a child younger than 5 years old. This is the probability that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates' (WDI, 2008). The probability is expressed as a rate per 1000. The data is obtained from the Child Mortality Database, constructed by Inter-agency Group for Child Mortality Estimation of UNICEF. This database is publically accessible online. The data is collected from the year 2006. The data ranges from 2,7 (Andorra) to 263,6 (Sierra Leone).

The reliability of data on child mortality is much debated as it is measured with substantial error (Lewis, 2006, p.9). Reliability concerns the extent to which an measuring procedure yields the same results on repeated trials. The data on child mortality is constructed by UNICEF and calculated through a methodology developed by UNICEF in coordination with WHO, the World Bank and UNDP (UNICEF et al., 2006). This methodology is used to minimize the errors of each estimation and to harmonize trends over time. However, it must be noted that reliability rates still can be low, because in a majority of developing countries, the estimations of the child mortality rate are calculated with the use of household surveys which contains measurement errors. Furthermore, the estimates are affected by non-sampling errors that may influence recent levels and trend of child mortality (UNICEF et al., 2006). This problem is also addressed by Bryce et al. (2005(2), p.1149) that shows that a problem with using mortality rates is that they require a adequate registration system and the presence of a registration system is associated with higher socioeconomic levels and urbanization rate.

Public health spending consists of 'recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international

agencies and nongovernmental organizations), and social (or compulsory) health insurance funds' (WDI, 2008). It is measured as the percentage of GDP that is used as public health spending. The data is collected from the World Development Indicators Online, constructed by the World Bank. This database is accessed through the library of the Erasmus University Rotterdam. The data is obtained for the year 2006. The data ranges from 0,29 (Myanmar) to 15,22 (Timor-Leste).

The *Good Governance indictors* are obtained from the World Wide Governance Indicators Database produced by Kaufmann, Kraay and Mastruzzi from the World Bank. This database is publically available. The indicators are composed from hundreds of existing perception indicators derived from 37 different data sources produced by 31 different organizations (Arndt and Oman, 2006). The data is obtained for the year 2006. As is noted in chapter 2, the use of the governance database from Kaufmann et al. is not undisputed, because the database has some limitations. The main disadvantage of using this database is that the data contains measurement error. Although this measurements errors are unavoidable in the construction of governance indicators (Arndt and Oman, 2006, p.29) it decreases the reliability of this research. Furthermore, the perception based indicators constitute the problem that perception based questions can be vague and open to interpretation. However, Arndt and Oman (2006, p. 29) describe this database as 'probably the most carefully constructed and certainly among the most widely used governance indicators'. More detail on the advantages and limitations of this database, as well as a short description of other databases that could be used is included in chapter 2 of this thesis.

Income per capita is measured as GDP per capita, PPP (constant 2005, international $). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. 'GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources' (WDI, 2008). For the purpose of cross-country comparison, income per capita is converted into 2005 constant international dollars. The data rang is between 272 (Democratic Republic Congo) and 51586,22 (United Arab Emirates).

The *income inequality* is measured with the GINI-index. The GINI-coefficient indicates the degree of income inequality. The data on the measure is obtained from the World Income Inequality Database, constructed by United Nations University, World Institute for Development Economic Research. This database uses several sources for the calculation of the GINI-coefficient, including the Deininger and Squire database from the World Bank, the Luxembourg Income Study and Transmonee. This database is publically available. The data ranges for 0 (perfectly equal) to 100 (perfectly inequality). In this dataset the data ranges from 26,5 (Turkmenistan) to 73,1 (Zimbabwe). The data is obtained from different years, namely 1995 till 2006, according to availability in the World Income Inequality Database.

Access to improved water sources refers to 'the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling' (WDI, 2008). The data of this indicator is obtained for the World Development Indicators Online, composed by the World Bank. The database is access through the library of the Erasmus University Rotterdam. The data is obtained for the year 2006. The data ranges from 22 percent of the population (Afghanistan) to 100 percent (several countries, for example Israel).
Access to improved sanitation facilities refers to 'the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained' (WDI, 2008). The data of this indicator is obtained from the World Development Indicators Online, composed by the World Bank and access through the library of the Erasmus University Rotterdam. The data is obtained for the year 2006. The data ranges from 5 percent of the population (Eritrea) to 100 percent (several countries, for example Singapore).

There are numerous ways to measure *female education*. One is the literacy rate, which measures 'the percentages of female aged 15 or above who can, with understanding, read and write a short, simple statement on their everyday life' (WDI, 2008). It can also be measured

by total enrollment rate, which is 'the number of pupils of the school-age group for primary education, enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group' (WDI, 2008). For this study a very practical approach is used in order to determine which indicator should be used, namely the indicator for which for most countries data is available. The dataset of total female primary enrolment obtained the most data on female education and is therefore selected. The data is obtained from the World Development Indicators Online, composed by the World Bank and access through the library of the Erasmus University Rotterdam. The data is obtained for the year 2006. The data ranges for 34 percent (Djibouti) to 100 percent (several countries like Croatia and Belize).

Ethnolinguistic fractionalization is the probability that two randomly selected people are from a different ethnic group. The data on this indicator is obtained from the research of LaPorta et al. (1999). This study uses 4 different sources in order to compute the ethnolinguistic fractionalization, namely Atlas Narodov Mira, Muller, Roberts and Gunnmark (La Porta,1999, p.238). Access to this article is obtained through the library of the Erasmus University Rotterdam, which obtains a subscription on the Journal of Law, Economic and Organization Online. Because the data on ethnic diversity does not change much over time, this dataset can be used in this research (Burnside and Dollar, 2000, p.850). The data ranges from as high as 1 (Comoros) to as low as 0 (several countries).

The *percentage of the population that is Muslim* is obtained from the CIA World Factbook. They ordered the listing of religions by adherents starting with the largest groups. This database is publically accessible. The data is obtained for the year 2006 and ranges from 0 (several countries) to 100 (several countries).

The precision of measurements is that the measurement should contain as much information as possible about the attribute or behavior being measured. An adequate description of the content of every variable is listed in appendix A and clarifies what is precisely measured. All variables have a ratio measurement. All the data that was missing is treated as 'missing values' in the computer program SPSS.

4. Empirical results

4.1 Introduction

This chapter provides the empirical results of the different statistical analysis that are executed in order to examine if the main hypothesis can be confirmed or not and to answer the fourth sub-question of this thesis. The main hypothesis (*H1*) of this thesis is: the better governance a country has, the more effect public spending on health has on decreasing the under-5 mortality rate. The fourth sub-question of this thesis is: does better governance lead to a significant influence of public health spending on child mortality?

This chapter starts with a description of all variables used for the empirical analyses in this thesis. Subsequently, the process of gaining a normal distribution for every variable is described. This is followed by the section about the multiple regressions. This includes a correlation matrix, which is created in order to examine how the variables relate to each other. After that, the results of the multiple regressions are provided. The results of the first multiple regression are used in order to create a base model, which is used for the remaining multiple regressions. The results of the remaining multiple regressions are listed in order to examine the influence of the different moderator variables and good governance indicators. Then the fourth sub-question of this thesis is answered. Furthermore, based on the theory from chapter 2, two alternative models are included in this thesis. At the end, a short summary of this chapter is provided. The following chapter addresses the policy implementation of these results, in this chapter only a description of the results is given.

4.1.1 Descriptive statistics

The following table provides the statistical description of all the variables used for the creation of the base model and for the creation of the four moderator variables.

Table 2

Descriptive Statistics

Variable	*N*	*Minimum*	*Maximum*	*Mean*	*Median*
Under-5 mortality rate	158	2,70	263,60	60,1291	81,91
Public health spending	158	0,29	15,22	3,3680	2,74
Voice and accountability	158	-2,30	1,35	-0,2984	-0,2074
Political stability	157	-2,89	1,39	-0,2460	-0,0257
Government effectiveness	158	-1,85	2,22	-0,3366	-0,4125
Control of corruption	155	-1,71	2,20	-0,3423	-0,4854
Income per capita	142	272,27	51586,22	7235,022	2100,34
Access to sanitation	131	5	100	62,2748	510
Access to safe water	135	22	100	81,1407	81,5
Percentage Muslim	135	0	100	28,7844	15,5
Female Education	82	34	100	84,7683	90
GIN-Index	107	26,50	73,90	43,4116	40,79
Ethnolinguistic fractionalization	120	0	1	0,388487	0,622

The final dataset contains 158 countries. On the under-5 mortality rate and public health spending data is available for every country. On the four good governance indicators data is available for almost every country. On female education, measured by total enrolment primary female, data is available for the least amount of countries. Although this number is low, this variable contains most data in comparison with other variables that measure female education, as explained in chapter 3. The table also shows that there are on average more people in the selected countries that have access to safe water, than that there are people that have access to sanitation.

Furthermore, this table provides an first insight of the normal distribution of the variables. This is only the first indication of normality and it will be tested in more detail in the following section. This table shows that three of the four good governance indicators seem to have a normal distribution, namely: voice and accountability, political stability and absence of violence and government effectiveness. There is a substantial difference between the mean and the median of control of corruption and this needs to be further examined. The variables under-5 mortality rate and public health spending also have some differences between the

mean and median, which must be examined in the following section. Also, for the variable income per capita (GDP per capita) a large difference between the mean and the median exists. Access to sanitation and the GINI-index seem to have a normal distribution contrary to the distribution of access to safe water and ethnolinguistic fractionalization. Female education and percentage of the population that is Muslim have the worst normal distribution. The following section examines the normal distribution of these variables in more detail, using the skweness test and histograms.

4.1.2 Tests for normality

Multiple regression is the main statistical analysis used in this thesis. As it uses the average value of every variable to determine the correlation between variables, it is important that all the variables have a normal distribution. A normal distribution means that the values of a variable are symmetrically distributed around an average value. The descriptive statistics of all variables shows that a couple of variables do not have a normal distribution.

In this thesis, the skewness test (Mukherjee et al., 1998) and histograms are used in order to determine if the variables have a normal distribution. The skewness of a variable measures the asymmetry of the probability distribution of a real-valued variable. The standard rule of skewness is that when the skewness $\geq |1|$ the variable has no normal distribution (Vocht, 2008). Histograms are used in order to make an interpretation of the values. If the skewness is large and positive, a normal distribution can be obtained by calculating the logarithmic of the variable or by calculating the root of a variable (Mukherjee et al., 1998). The logarithm of a value is the power or exponent to which the base value must be raised in order to produce the number. If the skewness is large and negative, a power transformation is used in order to obtain a normal distribution (Mukherjee et al., 1998).

Table 3 provides an overview of the skewness and normal distribution of every variable and which actions are undertaken in order to make a normal distribution. Some variables that had a normal distribution are still transformed in order to improve the distribution. The histograms are submitted in appendix C and graphically show the distribution of every variable before and after transformation.

Table 3

Test For Normality

Variable	*Skewness*	*Normal distribution (Yes/No)*	*Action*	*New skewness*
Under-5 mortality	1,288	No	Logarithmic	-0,174
Public health spending	1,244	No	Logarithmic	-0,370
Voice and accountability	-0,111	Yes	None	
Political stability	-0,366	Yes	None	
Government effectiveness	0,535	Yes	Add constant + root (^0. 5)	-0,002
Control of corruption	0,790	Yes	Add constant + root (^0. 3)	0,291
GDP per capita	2,821	No	Logarithmic	-0,050
Access to sanitation	0,260	Yes	None	
Access to water	-0,904	Yes	^4.5	-0,016
Percentage Muslim	0,968	Yes	Root (^0.5)	0,073
Female education	-1,577	No	^5	-0,497
GINI-index	0,943	Yes	Logarithmic	0,263
Ethnolinguistic fractionalization	0,159	Yes	None	

9 of the 13 variables are transformed in order to create a normal or to improve the distribution. As the variables government effectiveness and control of corruption contain true values below 1, a constant needs to be added before taking the root of these variables. The constant is the minimum value of the indicator plus 1. Therefore, for government effectiveness the constant is 2,85 and for control of corruption it is 2,71. The distribution of access to safe water and female education had a very high skewness and therefore a high power transformation was necessary. The best distribution is obtained with a power transformation of 4.5 for access to safe water, and 5 for female education.

4.2 The multiple regressions

4.2.1 Introduction

The literature study shows that the effectiveness of public health spending on under-5 mortality could, in theory, be increased if the country performs well on the good governance indicators. This section empirically tests this statement. Therefore, four different moderator variables are created, namely one for each important good governance indicator. Second, a base model is created including the predicting variables of child mortality. The summary of

the base model is provided in table 4. Third, the four different good governance indicators and the moderator variables are added in the base model. First, only one good governance indicator and the corresponding moderator variable are included each time. After this, all good governance indicators and moderator variables are simultaneously included in the base model. The summary of all good governance models is provided in table 5.

4.2.2 The correlation between the different variables

In order to examine the correlation between the different variables, a correlation matrix is created (appendix D). All predicting variables are included, as well as the good governance indicators. This correlation matrix shows, first of all, that all the variables included in the model have a significant correlation with under-5 mortality rate. Public health spending has a significant negative correlation with the under-5 mortality rate, indicating that an increase in public health spending will lead to a decrease in the under-5 mortality rate. However, the correlation is rather low (-0,314).

All four good governance indicators are also negatively related with the under-5 mortality rate. Furthermore, this correlation matrix shows that the good governance indicators have a strong bilateral correlation. Especially control of corruption and government effectiveness have a high correlation (0,897). Furthermore, the matrix shows that control of corruption has, on average, the highest correlation with the other good governance indicators. This indicates that when all four good governance indicators are included in the model, the outcomes can be distorted. Political stability and absence of violence on the other hand has, on average, the lowest correlation with the other good governance indicators.

The literature described in chapter 2 explains that a high correlation is expected between income and access to sanitation and safe water. The correlation matrix shows that this correlation is indeed rather high between income and access to sanitation (0,751) and between income and access to safe water (0,761). Furthermore, a high correlation was expected between income and female education, but the correlation matrix shows that this is lower (0,618).

The correlation matrix also shows that income, access to sanitation and access to safe water have a high correlation with the under-5 mortality rate, meaning $r \geq |0{,}8|$. Income explains 67,7% of the variance in the under-5 mortality rate, which is the same for access to sanitation. The determinant coefficient of water is lower (0,661), which means that access to safe water explains 66,1% of the variance in the under-5 mortality rate. The variables GINI,

ethnolinguistic fractionalization and percentage of the population that is Muslim only have small correlations with the other variables.

4.2.3 The base model

The first multiple regression is performed in order to determine which of the other predicting factors have a significant influence on the under-5 mortality rate. The outcome of this regression analysis is used in order to create a base model, which only includes the variables that have a significant influence on the under-5 mortality rate. The enter method for multiple regression is used. The variables in the base model do not change when the good governance variables are entered in order to be able to examine the effect of the good governance and moderator variables.

The results of the first multiple regression are listed in the first column of table 4 as Base model 1. The statistical output of the multiple regression is submitted in appendix D.
The outcome of this multiple regression shows that only three variables have a statistical significant influence on the under-5 mortality rate, namely income, access to sanitation and percentage of the population that is Muslim. This result is very conflicting with the existing literature that identified all the variables used in the regression as very relevant. A stepwise multiple regression is performed in order to gain more insight in the results of the analysis. A forward stepwise multiple regression means that the computer program SPSS first picks out the predictor variable that accounts for the most variance in the depend variable. Then, it picks out the variable that, in combination with the first variable, explains the most of the variance (R^2). If this combination is a significant improvement, the computer goes on to including the next variable and so on. This process continues until either all the predicting variables are included or if adding an additional variables makes no significant improvement. The outcome of the stepwise multiple regressions are summarized in table 4 as Base model 2 (appendix D).

Table 4

Base Models

	Base model 1	*Base model 2*
Constant	7,607***	9,193***
PHS	-0.035	
Income	-0,609***	-0,568***
Sanitation	-0,257**	-0,007**
Female Education	-0,114	-4,577E-11**
Water	0,022	
GINI	0,081	
Ethno	0,092	
Muslim	0,029*	
R^2	0,899	0,874
F-value	34,458***	82,867***

Note: * Sig. ≤ 0,10; ** Sig. ≤ 0,05; *** Sig. ≤ 0,01

Table 4 shows that, first of all, percentage of the population that is Muslim no longer has a significant influence on the under-5 mortality rate, but female education does. Furthermore, the outcome shows that ethnolinguistic fractionalization has a significant influence on the child mortality rate when it is combined with income per capita and in a model with income per capita and access to sanitation. However, when it is placed in a model including income per capita, access to sanitation and female education, it is no longer a significant explanation for the cross-country variance in the child mortality rates.

If the outcome from the second model is used to complete the function of the under-5 mortality rate, the following function originates:

Ln(UMR) = 9,193 -0,568 Ln(IPC) - 0,007 (SANITATION) - 4.577E-11 (FE^5)

This function explains 87,4% of the cross-country variation in child mortality rates. This means that this model already explains a large proportion of the cross-country variance in the under-5 mortality rate.

The outcomes of these two multiple regressions also show that public health spending has no significant influence on the variation in child mortality rates when it is combined with the other predictor variables for child mortality. It is therefore interesting to analyze the effect of combining public health spending with an indicator of good governance.

4.2.4 The good governance models

First, the moderator variables are included one by one to examine their individual effect on the relationship between public health spending and the under-5 mortality rate, in order to examine hypotheses 2, 3, 4 and 5 of this thesis. These hypotheses reflect the expected relationship between public health spending and the good governance indicators. For every good governance indicator, the hypothesis and the results of the tests are described below. Second, three of the four moderator variables and their accompanying good governance indicator are included in the base model to examine the effect of this on child mortality. The moderator variable of control of corruption is not included in this model, because it has too much correlation with the other moderator variables, especially with government effectiveness.

As explained in chapter 3, in this model the *B*-values of the variables are compared instead of the *Beta*- values, because standardized variables are included in the mode.

Table 5

The Good Governance Models

	Model CC	*Model GE*	*Model VA*	*Model PS*	*Model GG*
Constant	8,331**	8,615***	8,754***	9,182***	8,735***
ZPHS	-0,058	-0,073	0,061	-0,052	-0,77
ZCC	-0,157				
ZGE		-0,083			-0,143
ZVA			-0,057		-0,020
ZPS				0,070	0,098
Moderator CC	-0,110				
Moderator GE		-0,137*			-0,144
Moderator VA			-0,096		-0,015
Moderator PS				-0,014	0,25
Income	-0,456***	-0,495***	0,514***	-0,581***	-0,522***
Sanitation	-0,010**	-0,010**	-0,009**	-0,007**	-0,008**
Female Education	-4,434E-11*	-3,892E-11	-4,043E-11	-4,447E-11	-3,734E-11
R^2	0,843	0,846	0,841	0,847	0,862
F-value	50,027***	51,252***	49,289***	50,756***	31,815***

Note: * Sig. ≤ 0,10; ** Sig. ≤ 0,05; *** Sig. ≤ 0,01

The output listed in table 5 reveals some interesting results. First of all, income and access to sanitation are very significant in all models examined. Female education on the other hand, is only significant in the second base model and in the base model combined with control of corruption. In the other models it is no longer significant. This result is further explored in the section “alternative models”. Public health spending has no significant correlation with the udner-5 mortality rate in all five models. Furthermore, the R^2, which indicates which percentage of the cross-country variance is explained by this model, is larger for the two base

models, than for the four good governance models, although the difference is only a few percent. The explanatory power of the model including three good governance indicators and three moderator variables has the largest explanatory power (86,2%). The model voice and accountability has the least explanatory power, although it still explains 84,7% of the cross-country variance in the under-5 mortality rate.

All four good governance indicators have no significant correlation with the under-5 mortality rate. The correlation matrix already showed that the correlation of both voice and accountability and political stability with the under-5 mortality rate was low. However, the correlation matrix showed a rather high correlation of both control of corruption and government effectiveness with the under-5 mortality rate, which is not established in the good governance model.

The most interesting result though, is that the moderator variable for government effectiveness is significant at 10% in the government effectiveness model. This result is further examined in the section of hypothesis 3 below.

The second hypothesis of this thesis is: (*H2) The higher a country scores on control of corruption, the more influence public health spending has on the cross-country variation in child mortality rates.*

The results of this multiple regression are shown in table 5, as Model CC (appendix D). In this model income, access to sanitation and female education are the only variables that have a significant effect on the under-5 mortality rate. The direct effect of public health spending on child mortality rate is low (-0,058) and insignificant. The effect of the moderator variable is also low and insignificant (-0,110). Thus, hypothesis 2 *cannot be confirmed*: A higher country score on control of corruption, does not necessarily increase the influence of public health spending on the cross-country variation in child mortality rates.

Hypothesis 3 is: (*H3) The higher a country scores on government effectiveness, the more influence public health spending has on the cross-country variation in child mortality rates.*

The results from the statistical analysis are shown in table 5 as Model GE (appendix D). These results show that the effect of public health spending is again very low (-0,073), as well as the effect of the good governance indicator (-0,083) and both are insignificant. However, the moderator variable including the good governance indicator government effectiveness has a significant relationship with the under-5 mortality rate. This is a very interesting result as it

indicates that the better government effectiveness a country has, the lower the under-5 mortality rate is. Therefore hypothesis 3 *can be confirmed:* The higher a country scores on government effectiveness, the more influence public health spending has on the cross-country variation in child mortality rates.

Next, it is interesting to examine in which direction the good governance indicator influences the relationship between public health spending and the under-5 mortality rate. This is done through the method of Siero (see chapter 3 methodology and data). This entails that three different values are entered for the variable government effectiveness in the function of this model, namely -1; 0; and 1. The value of -1 reflects a low score on the good governance indicator; 0 reflects an average score; and 1 reflects a very good score on the governance indicator. In this function also the variables public health spending and government effectiveness are included, because the moderator variable is the multiplication of these two variables. Income and access to sanitation are also included, due to their significant influence on the under-5 mortality rate. Female education is not included in this function as it has no significant relationship with the under-5 mortality rate in this model.
This function is used centeris paribus, meaning that only the values of the variables public health spending and government effectiveness change. In order to keep the variables income and access to sanitation equal, there mean is used in all three functions. The mean of income is 8,72; the mean of access to sanitation is 62,27.

Including the correlations from the output, the mean for the variables income and access to sanitation and rewriting the moderator variable creates the following function:
Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) – 0,083 (ZGE) – 0,137 (Ln(ZPHS) * ZGE) – 4,32 – 0,62

This function is used in order to calculate the direction of the moderator variable:

First, the score on government effectiveness is set on low (-1). This leads to the following function:

(1) Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) - 0,083 * -1 – 0,137 (Ln(ZPHS) * -1) – 4,85

(2) Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) + 0,083 + 0,137 Ln(ZPHS) – 4,85

(3) Ln(UMR) = 3,848 + 0,064 Ln(ZPHS)

Second, the score on government effectiveness is set on average (0). This leads to the following function:

(1) Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) – 0,083 * 0 – 0,137 (Ln(ZPHS) * 0) – 4,85

(2) Ln(UMR) = 3,765 - 0,073 Ln(ZPHS)

Third, the score on government effectiveness is set on high (1). This leads to the following function:

(1) Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) - 0,083 * 1 – 0,137 (Ln(ZPHS) * 1) – 4,85

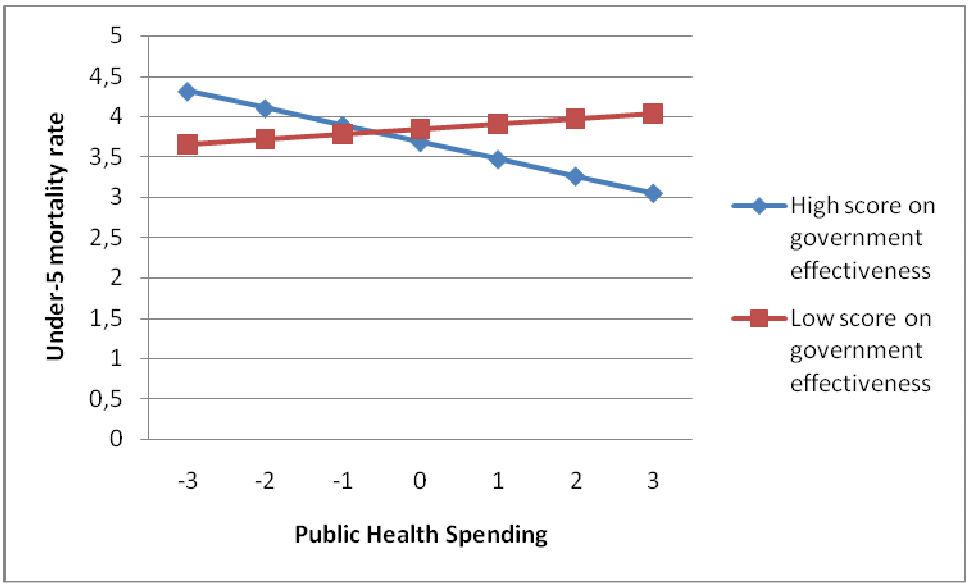
(2) Ln(UMR) = 8,615 - 0,073 Ln(ZPHS) - 0,083 – 0,137 Ln(ZPHS) – 4,85

(3) Ln(UMR) = 3,682 – 0,21 Ln(ZPHS)

The graphical transformation of the functions for the high and low score is:

Graph 1

Direction Moderator Government Effectiveness



Government effectiveness measures perceptions of 'the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies' (Kaufman et al., 2004, p. 255).
This graph clearly shows that the under-5 mortality rate decreases, when public health spending increases, but only when the country has a high score on government effectiveness. On the other hand, if the country has a low score on government effectiveness, the child mortality rate seems to have an opposite reaction and increases when public health spending increases.

The graph can be explored in further detail. First, the distribution of public health spending is examined. The lowest possible value of the standardized value of the public health spending variable is -3,59. This equals a public health spending of 0,28% of GDP and is present in Myanmar. Only 4 countries have a score on the variable public health spending between -3,590 and -2. The highest possible value is 2,69, which equals 15,22% of GDP and is present in Timor-Leste. Also, only 4 countries have a score between 2 and 2,69.
If the country has a high score on government effectiveness, but a low percentage of public health spending, the child mortality rate is 74,6[2]. A country with a low score on government effectiveness and a low percentage of public health spending, could have a child mortality rate of 38[3]. This is opposite to the expected effect, namely that the child mortality rate would be lower if the country has a higher score on government effectivenes. The expected relationship exists for a public health spending of 2% of GDP[4] or higher. With a high amount of public health spending, a country with a high score on government effectivness can have a child mortality rate 23,4 per 1000[5], while a country with a low score on government effectivness has a child mortality rate around 55 per 1000[6].

Hypothesis 4 is: (*H4) The higher a country scores on voice and accountability, the more influence public health spending has on the cross-country variation in child mortality rates.*
The results of the statistical analysis are shown in table 5 as Model VA (appendix D). Again the correlations of public health spending and the good governance indicator are very low and

[2] Standardized value PHS is -3; value LnUMR is 4,31
[3] Standardized value PHS is -3; value LnUMR is 3,65
[4] Standardized value PHS is -0,51
[5] Standardized value PHS is 2,5; value LnUMR is 3,15
[6] Standardized value PHS is 2,5; value LnUMR is 4,00

insignificant (0,061 and -0,057 respectively). The correlation of the moderator variable is also low and insignificant (-0,096). This means that hypothesis 4 *cannot be confirmed*: A higher country score on voice and accountability, does not necessarily increase the influence public health spending has on the cross-country variation in child mortality rates.

Hypothesis 5 is: (*H5) The higher a country scores on political stability and absence of violence, the more influence public health spending has on the cross-country variation in child mortality rates.*

The results of the statistical analysis are shown in table 5 as Model PS (appendix D). Again the correlations of public health spending and the good governance indicator are very low and insignificant (-0,052 and 0,070 respectively). A very low and insignificant correlation is also found for the moderator variable (-0,014). This means that hypothesis 5 is *cannot be confirmed*: A higher country score on political stability and absence of violence, does not necessarily increase the influence public health spending has on the cross-country variation in child mortality rates.

The good governance model

The good governance model includes three of the four good governance indicators and three moderator variables. The explanatory power of this model is larger than it is for the other models including a good governance indicator, namely 0,862. However, in this model none of the moderator variables is significant. Also, the influence of public health spending and the influence of each good governance indicator is insignificant. Again, only the variables income and access to sanitation have a significant influence on the cross-country variance in child mortality rates.

4.2.5 The main hypothesis

The four good governance models show conflicting results. The good governance indicators control of corruption; voice and accountability; and political stability and absence of violence do not affect the relationship between public health spending and the under-5 mortality rate in these model. The good governance indicator government effectiveness on the other hand does increase the effect of public health spending on the child mortality rate. However, in the model including three moderator variables also the effect of the indicator government effectiveness is insignificant. The main hypothesis (*H1*) of this thesis is: *the better governance a country has, the more effect public health spending has on decreasing the*

under-5 mortality rate. This hypothesis *cannot be confirmed*, as the effect of three of the four good governance indicator is not confirmed.

4.2.6 The influence of public health spending

The correlation matrix showed a significant, negative relationship between public health spending and the under-5 mortality rate. However, this correlation is very low. This observation is confirmed in the multiple regressions, as public health spending has no significant influence in all the models. This is in compliance with the existing literature that already concluded that public health spending has no significant relationship with the under-5 mortality rate. The fourth sub-question of this thesis is: does better governance lead to a significant influence of public health spending on child mortality? All the models show that the answer to this question is negative: better governance does not lead to a significant influence of public health spending on the child mortality rate. Only two socioeconomic factors explain a significant part of the cross-country variance in child mortality, namely income and access to sanitation. Furthermore, only the moderator variable government effectiveness has a significant relationship with the under-5 mortality rate.

4.3 Alternative models

The literature described in chapter 2 explains the income can have a substantial influence on access to sanitation and female education. For many people in developing countries, one of the most important restraining factors for access to proper education is the high costs of school fees. The correlation matrix shows that this high correlation between income and female education (0,618), although it is lower than expected.

Furthermore, the literature described in chapter 2 shows a strong correlation between income and access to sanitation, as an increase in income enables a household to increase the quality of housing. Access to sanitation is a very important improvement for a household as it immediately effects the health of every member of the household. The correlation matrix confirms this expected relationship (0,751).

The high correlations between the variables in the base model, could indicate that including both variables distorts the outcomes of the multiple regressions. This correlation is called multicollinarity. The standard rule is that if $r \geq |0{,}9|$ one of the variables must be excluded from the model (Vocht, 2008). Although the correlation between these three variables is not as high as 0,9; the explanatory power of the different models shows the multicollinarity. The

R^2 of the base model including income, access to sanitation and female education is 0,874. The model only including income and access to sanitation has an R^2 of 0,854, while including only income and female education leads to an R^2 of 0,830. A model including only female education and access to sanitation has a lower R^2, namely 0,713. Although the model including all three variables has the largest explanatory power, there are no remarkable differences in the explanatory powers of the two models including income and excluding one of the other variables. This shows that there is a high correlation between these variables, which may distort the outcomes. Therefore, it is interesting to analyze the change in the correlation of the moderator variables when one of these two variables is eliminated from the model. Because access to sanitation has the highest correlation with income, this variable is the first to be excluded from the model. Following, the change in results when female education is excluded from the base model is examined.

4.3.1 Excluding access to sanitation

The results of the models excluding access to sanitation show very interesting results. For the analyses, again first a base model is made using a stepwise multiple regression analysis in SPSS including all the predictor variables, except for access to sanitation. The output shows that income and female education are the most significant variables, as expected. Ethnolinguistic fractionalization also has a significant correlation with the under-5 mortality rate, but due to its insignificant contribution to the explanatory power of the base model (measure by R^2), it is not included in the base model. This base model is used for the creation of four good governance models. The results are listed in table 6 (appendix E).

Table 6
Alternative Models, Excluding Access to Sanitation

	Base Model	*Model CC*	*Model GE*	*Model VA*	*Model PS*	*Model GG*
Constant	10,275***	9,401***	9,434***	9,548***	9,955***	9,382***
ZPHS		-0,107*	-0,097*	-0,107	-0,111*	-0,105
ZCC		-0,125				
ZGE			-0,102			-0,159
ZVA				-0,077		-0,014
ZPS					0,091	0,081
Moderator CC		-0,200***				
Moderator GE			-0,174**			-0,134
Moderator VA				-0,161**		-0,036
Moderator PS					-0,046	-0,017
Income	-0,757***	-0,653***	-0,659***	-0,672***	-0,727***	-0,652***
Female Education	-5,001E-11**	-5,853E-11**	-5,572E-11***	-5,640E-11***	-5,383E-11**	-5,151E-11**
R^2	0,863	0,853	0,855	0,849	0,851	0,873
F-value	127,418***	81,436***	82,301***	78,482***	78,874***	49,704***

Note: * Sig. ≤ 0,10; ** Sig. ≤ 0,05; ** Sig. ≤ 0,01

This table shows some remarkable results. First of all, public health spending has a significant correlation with the under-5 mortality rate in three of the four models. The relationship is negative, as expected, and indicates that the child mortality rate decreases when public health spending increases. However, when three good governance indicators and three moderator variables are included in the model, public health spending no longer has a significant influence. Also, are these results opposite to the former models in which public health spending has no significant correlation with the under-5 mortality rate. Also, three of the four moderator variables do have a significant relationship with the under-5 mortality rate in the

separate models, namely control of corruption; government effectiveness; and voice and accountability. The results of government effectiveness are less surprising as this relationship is already revealed in the former section. Especially control of corruption seems to have a very significant relationship with the under-5 mortality rate. However, in the good governance model are the moderator variables no longer significant. All four good governance indicators have no significant relationship with the under-5 mortality rate in all of the models presented in table 6, just as in the former models. .

The explanatory power of the base model is lower than for the two base models including all predicting variables, as R^2 is 0,863 instead of 0,899 or 0,874 for base model 1 and 2 respectively. The explanatory power is largest for the base model including three good governance indicators and three moderator variables.

4.3.2 Excluding female education

For the completeness of the analyses, it is checked if excluding female education instead of access to sanitation would lead to significantly different results. The conclusion is negative. Excluding female education leads to a base model that only includes income and access to sanitation. Including the public health spending variable, the good governance indicators and the four moderator variables into this base model produces the same results as above. Again, the variable public health spending is significant in the models control of corruption, government effectiveness and voice and accountability. Yet again, it is not significant in the model of political stability and absence of violence. Furthermore, have the same three moderator variables a significant relationship with the under-5 mortality rate, namely control of corruption, government effectiveness and voice and accountability. All four good governance indicators remain insignificant. However, although the results of the significance are approximately the same, the explanatory power of these model is much lower than the explanatory power of the models excluding access to sanitation. The R^2 of the base model is 0,766. The largest R^2 is of the good governance model, which again includes all the good governance indicators and moderator variables expect those of control of corruption. This model has an explanatory power of 79,5%. Although it is higher than the other models excluding female education, it is much lower than the R^2 of the models including all variables and the models excluding access to sanitation.

4.4 Summary

The correlation matrix shows that all predicting factors have a significant bilateral correlation with the under-5 mortality rate. Public health spending is negatively correlated with the under-5 mortality rate, although the correlation is rather low. The correlation matrix also shows that income, access to sanitation and access to water have a high bilateral correlation. Furthermore, all good governance indicators are negatively related with the under-5 mortality rate. The first statistical analyses show that income, access to sanitation and female education are the most important variables explaining the cross-country variations in child mortality rates and are therefore included in the base model. In this model, public health spending has no significant relationship with the under-5 mortality rate. The good governance models show that the moderator variables of the good governance indicators control of corruption; voice and accountability; and political stability and absence of violence have no significant influence on the child mortality rate, when they are put in the base model. Furthermore, the variable female education is insignificant in the good governance models. However, the moderator variable of the good governance indicator government effectiveness does have a significant correlation with the under-5 mortality rate. The direction of the moderator variable indicates that the under-5 mortality rate lowers when public health spending increases, when a country has a high score on government effectiveness. However, once it is placed in a model with two other moderator variables, the effect becomes insignificant.

However, because three of the four hypotheses of the good governance indicators separately could not be confirmed, the main hypothesis cannot be confirmed. Furthermore, the answer to the fourth sub-question is that better governance does not lead to a significant influence of public health spending on the child mortality rate.

The effect of the moderator variables is further examined by adjusting the base model. By excluding access to sanitation from the base model remarkable results are obtained. Three of the four moderator variables have a significant influence on the child mortality rate, namely control of corruption; government effectiveness; and voice and accountability. Furthermore, the variable public health spending has a significant influence in three of the four good governance models. These outcomes are comparable when the variable female education is excluded and access to sanitation is included.

5. Conclusion

5.1 Introduction

The former chapters describe the existing literature and the empirical results of the relationship between public health spending and child mortality. These results, however, have little meaning if they are not used in the right context. The aim of this chapter is to contribute to the scientific knowledge on child mortality and to improve the design and implementation of policies.

This chapter starts with a summary of the answers to the first three sub-questions: which factors have an influence on child mortality; what is, according to the literature, the effect of public health spending on health; and what is, according to the literature, the effect of good governance on public health spending? Then, the empirical results described in chapter 4 are further explored and the fourth sub-question of this thesis is answered. This thesis ends with a list of the limitations of this study and implications for further research.

5.2 Answers to the first three sub-questions

The inspiration for this research came from the strikingly high amount of children dying before the age of 5 and the unequal distribution of child deaths, both between countries and between population groups. The first task was to find out which factors influence child mortality.

5.2.1 Factors that influence child mortality

For most factors, the literature is very conclusive about their influence on child mortality. These factors are divided into proximate, direct, determinants and underlying or socioeconomic determinants. The most important direct causes of child mortality are pneumonia, diarrhea, neonatal pneumonia or spies, preterm delivery and asphyxia at birth. However, the chance a child dies from this direct causes substantially increases when the child has a lower score on the socioeconomic determinants. The most important socioeconomic determinants defined in the literature are income per capita; income inequality; access to safe water; access to sanitation; female education; ethnolinguistic fractionalization; and percentage of the population that is Muslim. Income per capita is very important, for example, for obtaining a sufficient amount of food. Malnutrition has a large adverse effect on child health as undernourished children are less able to fight infectious

diseases. Income inequality is very important as it indicates how the GDP of a country is distributed between the households. Access to safe water and sanitation has an effect on child mortality as it is necessary for the implementation of hygienic behaviors, like washing hands before diner. Not conducting hygienic behaviors increases the chance of getting diarrhea, one of the most important direct causes for child mortality. Education of the mother also increases the knowledge on hygienic behavior, but it is also important for the recognition of illness symptoms and for knowledge on, for example, food preparation. Ethnolinguistic fractionalization is an important determinant, because it can lead to the inferior provision of public goods. The literature concerning the relationship between percentage of the population that is Muslim and child mortality is very limited. It could be that a higher percentage of the population that is Muslim has an adverse effect on government performance. Furthermore, the effect of public health spending on child mortality is often examined, because public health spending can be used to finance public health measures aimed at decreasing child mortality rates. These programs should constitute interventions known for their decreasing influence on child mortality. Furthermore, the programs must be targeted at the part of the population that needs them the most. However, empirical results show that the influence of public health spending on child mortality is very low in practice. This leads to the second sub-question of this thesis, namely: what is the effect of public health spending on child mortality?

5.2.2 The effect of public health spending on child mortality

The effect of public health spending on child mortality is determined by its ability to decrease the under-5 mortality rate. Public health spending should be used by governments in order to provide an adequate health system, but is subjected to complicating factors. These complicating factors could lower the effect of public health spending on the child mortality rate. For example, the health sector is one of the most complex public sectors there is. Furthermore, the amount of private health spending can reduce equity in health care. Decisions on policies funded through public health spending are influenced by the reliance of public health spending on development assistance. Furthermore, in most developing countries are the resources for public health spending, which increases the necessity of using the resources more effective.

The literature provides two more explanations for the low effectiveness of public health spending. The first is that an increase in public health spending could crowd out private health spending. The second reason is that public health spending is made in an ineffective way, meaning that it is for example poorly targeted or that the government is not capable of making

sound policies. However, research also shows that public health spending could be effective in reducing child mortality rates, but only if the country is well-governed. This has led to the third sub-question of this thesis, namely: what is the effect of governance on public health spending?

5.2.3 Effect of governance on public health spending

There is an extensive debate of what actually entails governance, and, more important, how it can be determined if a country has 'good' governance. In this thesis, the division of governance in six measurable indicators from Kaufmann et al. is used in order to determine the quality of a country's governance.

The literature shows that four indicators of good governance could potentially affect the effectiveness of public health spending. First, a high degree of control of corruption could increase the effectiveness of public health spending. A high degree of control of corruption means that power is not used for private gains, but for the provision of public goods. Second, a high degree of government effectiveness could increase the effectiveness of public health spending. A high score on government effectiveness indicates that the country has a high quality of, among others, policy formation and implementation. This indicates that the country is able to produce and implement good policies for the health sector. Third, a high score on voice and accountability can increase the effectiveness of public health spending as a high score on voice and accountability indicates that citizens are to a large extent able to participate in selecting their government as well as exercise full freedom of expression and participation. Fourth, more political stability and absence of violence can increase the effectiveness of public health spending, because a government that has a lower likelihood of being overthrown by unconstitutional means has a greater incentive for making long-term investments. These long-term investments are vital for ensuring a good working health system.

5.3 Answer to the main-question

The main question of this thesis is: does better governance increase the effect of public health spending on decreasing child mortality? Four indicators were identified in the literature for potentially having a positive influence on the effectiveness of public health spending, namely: control of corruption; government effectiveness; voice and accountability; and political stability and absence of violence. With several statistical analyses the effect of the good

governance indicators on the relationship between public health spending and child mortality is examined.

Influence of socioeconomic factors

The correlation matrix shows that all factors identified in the literature have a significant influence on child mortality. The effect of some factors, including public health spending, however is rather low. Furthermore, a base model for the child mortality rate is created including all the underlying socioeconomic determinants identified in chapter 2. Through a multiple regression analysis it is determined that only income, access to sanitation and female education have a significant influence on the child mortality rate. Public health spending has no significant influence on the child mortality rate in this model. Both results are consistent with the existing literature described in chapter 2, which shows that the significance of public health spending is very low. This means that simply increasing public health spending will not lead to a significant reduction of the under-5 mortality rate.

Knowledge about which factors have a strong influence on the under-5 mortality rate is a vital condition for designing and implementing adequate policies. The results of this thesis support the existing knowledge that income, access to sanitation and female education are important factors influencing child mortality rates. The other predictor variables, as defined in chapter 2, have a significant relationship with the under-5 mortality rate in the correlation matrix. However, once combined with these three factors, the relationships become insignificant. It is very important to note that since income is strongly correlated with both access to sanitation and female education, the creation of the base model most importantly shows the strong effect of income on child mortality. It is interesting to see that access to safe water is not submitted into the base model, although it also has a strong correlation with the under-5 mortality rate. One explanation for this observation is that the average score on water was higher than the average score on access to sanitation.

The base model furthermore shows that increasing income, access to sanitation and female education can have a substantial effect on decreasing child mortalities. As income seems to be the most important variable, efforts must be targeted towards the economic development of population groups and of the entire country. However, economic development is not easily achieved and will require the cooperation of the national governments and the international community. The international community could, for example, stimulate trade with these

countries by lowering trade barriers. The economic development of a country will furthermore lead to more resources that can, among others, be used for public health spending.
Increased income will already improve the access to sanitation and the percentage of female education in a country. The alternative model excluding female education has a much lower explanatory power than the models excluding access to sanitation. This is not so surprising, because the correlation matrix already showed that access to sanitation is stronger related to income than female education is. However, these results must be taken into account for policy formations as it means that the level of female education can change independently from an increase in income. This leave more room for different kind of policies, instead of only economic policies. The international community is already focused on improving female education, for example, through the Millennium Development Goal of ensuring universal education by the year 2015. The knowledge on the importance of these variables makes it possible for countries and international organizations to combine their efforts for improvement.

Influence of moderator variables

Four moderator variables were created, which were used in order to determine the effect of the good governance indicators on the relationship between public health spending and the child mortality rate. These moderator variables were first separately included in the base model. The results show that, first of all, the effect of public health spending on child mortality is low and insignificant. Second, the effect of three of the four moderator variables is insignificant. Third, when three of the moderator variables are at the same time included in the base model, none of the moderator variables is significant. This means that the answer to the main question of this thesis is negative: *Better governance does not necessarily increases the effect of public health spending on child mortality rates*.

Three of the four moderator variables have no significant correlation with the under-5 mortality rate. This means that the proposed relationship cannot be confirmed. These results could be due to the high influence of some socioeconomic variables on child mortality. It therefore again shows the importance of policies aimed at the overall development of the country.
The effect of income on the other two predicting variables is reduced in the creation of the alternative models. The results from the alternative models show that also the moderator

variables with control of corruption and voice and accountability could also have a significant relationship with the under-5 mortality rate. Also, the results from these models show that public health spending could indeed have a significant influence on the child mortality rate. These results are not as contradicting to the former results as they might appear at first sight. These results show that good governance is only important when the model controls for the very strong effect of income. This could indicate that only when income is less significant, the quality of good governance is important. This means that both the amount of public health spending as the quality of governance is important. The policy implications of these results are explained below.

It is furthermore interesting to notice that all good governance indicators do not have a significant influence on the child mortality rate in all models examined. These results are somewhat unexpected as the study by Lewis (2006) shows that good governance would lead to a more effective health system and therefore decrease the child mortality rate. However, this thesis shows that once this relationship is adjusted for the influence of the socioeconomic determinants, the relationship becomes insignificant.

The moderator variable of government effectiveness however, does have a significant influence on the under-5 mortality rate, meaning that the effect of public health spending does increase as the country has a better score on government effectiveness. A high score on government effectiveness increases the effectiveness of public health spending as it indicates a higher quality of public services and a higher quality of policy formation and implementation. The graphical transformation of the moderator variable shows that the under-5 mortality rate decreases when public health spending increases and the country has a high score on government effectiveness. However, if the country has a low score on government effectiveness, the child mortality rate increases when public health spending increases. This reverse relationship could indicate that, the influence of the good governance indicator is smaller at a lower amount of public health spending and higher at a high amount of public health spending. Furthermore, it shows that the influence of the socioeconomic factors is high, especially at a lower amount of public health spending. The graph also shows that an increase in public health spending does not lead to a reduction of child mortality, if the country does not have a good score on government effectiveness. The lowest possible value of child mortality is obtained when a country has a high score on government effectiveness and a high amount of public health spending. Policies from the national government and the international

community should therefore be focused on both factors: increasing the amount of public health spending and improving the government effectiveness of a country.

Influence of public health spending

The literature from chapter 2 shows that there are also other factors that could lower the effectiveness of public health spending apart from the quality of governance. One reason mentioned more often is that the amount of public health spending might be too low in order to make the necessary improvements in child mortality rates. Although this thesis does not study this statement, it can most certainly be true. It is without difficulty argued that there should be at least a minimum amount of money available for making improvements in the health sector. If a country has low resources, the money tends to be spent mostly on direct care, instead of long term investments in the health sector. A higher amount of money available could, for example, be achieved by increasing the development assistance by the international community or by increasing debt relieves for highly-in debt countries.
However, as already mentioned in the literature in chapter 2, development assistance also complicates effective public health spending, as governments are restricted in the way they can use the money. One of the restrictions for receiving development assistance is that it is mostly targeted at countries that have a high quality of good governance. This thesis shows that, in practice, the effect of the good governance indicators might be lower than expected. Furthermore, the conditionality of aid could have an reverse effect by targeting less aid to countries with a low quality of governance, although money is one of the necessary conditions for improvement. Moreover, it is very important to apply the good governance indicators as a mean for human development, instead of an end in it selves. As this thesis only focuses on the effect of the good governance indicators on the relationship between public health spending and child mortality, no conclusions can be made for their effects in different sectors or circumstances.

Although the literature and the empirical results clearly show that, in practice, public health spending only has a very low and mostly insignificant influence on child mortality rates; this thesis does not stimulate that other funding methods should be increasingly used in order to decrease the child mortality rate instead of public health spending. For example the vertical private funds, only target their efforts and resources to the main goal of the organization. For example, the fund to fight AIDS, tuberculosis and malaria, only targets its efforts and

resources towards decreasing and eliminating the existence of these three diseases. This means that other parts of the health sector (other diseases, but also other features, like the amount of trained nurses) are neglected by these funds. Furthermore, there is less incentive for private health spending to provide equity in health care as this would increase the costs of health care. Additionally, private health resources are based on private revenues which make them unstable and subjected to economical fluctuations. Public health spending is financed with government revenues and therefore it is more stable and it provides more security for long-term investments. Hence, public health spending remains a vital condition for a good health system and it must be further examined how the effectiveness of public health spending could be increased.

5.3.1 Answer to the fourth sub-question

The fourth sub-question of this thesis was asked in order to determine if it was possible for public health spending to have a significant effect on the child mortality rate. The fourth sub-question of this thesis is: does better governance lead to a more significant influence of public health spending on child mortality? The results from the first base model show that public health spending does not have a significant relationship with the under-5 mortality rate. The results from the alternative base models however, show that public health spending only becomes significant once the strong influence of income is controlled. These results are consistent with the results from previous studies as it indicates that the influence of public health spending is not insignificant, but it is very low.

As noted above, this has two implications for policy formation. First, this does not mean that other funding methods for the health care should be increased, but rather that it should be examined further what causes the ineffectiveness of public health spending. This could for example be the low amount of resources available.

Second, this does mean that both national governments and the international community should be fully aware of the influence of the socioeconomic status of a child on its survival chances. Therefore, efforts should be combined in order to improve the socioeconomic status of the children.

The results of this thesis should be used as a partial explanation for the ineffectiveness of public health spending. This thesis shows the important influence of socioeconomic factors on the child mortality rates. These results are not surprising, as child mortality is a complex phenomenon that is influenced by many factors. This thesis clarifies, to a certain extent, the

influence of public health spending, the good governance indicators and the socioeconomic indicators. It therefore makes it possible to design policies that are targeted at specific factors influencing child mortality.

5.4 Limitations of the study

Several limitations should be taken into account when reading this thesis. First, it is very important to keep in mind that certain data limitations are present, especially for child mortality rate and for the good governance indicators. This topic has been explored in chapter 3.

Second, the literature in chapter 2 describes the complex situation of factors influencing child mortality. As this thesis is mainly focused on the influence of public health spending, other important factors are somewhat overstepped.

Third, the use of the results from this thesis for national governments are low. Regional and country specific problems have not been taken into account and therefore this thesis is mostly useful for making general international policies concerning child mortality.

5.5 Implications for further research

This thesis was aimed at explaining, to some extent, the gap between the potential of public health spending on decreasing child mortality rates and the disappointing influence in practice. This thesis investigated if good governance could be the explanation for the gap. By researching four different dimensions of good governance, this thesis does contribute to the understanding of the influence of good governance. However, as it was not feasible in this thesis to create one good governance indicator (instead of four different) it could be that the combined effect of different good governance indicators is stronger than the effect of the four separate dimensions. Therefore, further research could contribute to the knowledge on the influence of good governance, by creating one good governance indicator.

However, the results of this thesis also show that it is well possible that differences in the quality of governance is not the explanation for the low influence of public health spending on the under-5 mortality rate. Another factor often mentioned, but not researched in this thesis, is the effect of increasing public health spending, regardless the quality of governance. Researching this relationship is very important for policy implications as a positive answer

could stimulate the international community to proceed in relieving debts and increasing development assistance.

This thesis has a strong preference for using public health spending as a tool for decreasing child mortality rates. However, it should not be forgotten that the most important goal is decreasing child mortality rates and the existing inequalities in surviving chances. Therefore, it must be encouraged that all possible solutions for decreasing child mortality are researched, even if this does not include public health spending.

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Row 5:

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Appendixes

Appendix A: Description of the variables

Variable	Description	Database	Website	Lowest value	Highest Value
Under-5 mortality ratio	The probability that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates. The probability is expressed as a rate per 1,000.	World Development Indicators Online	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	2,6	263,30
Public health spending	Measured by recurrent and capital spending from government (central, state and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health funds.	World Development Indicators Online	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	0,29	15,22
Good Governance- Control of Corruption	Measuring perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Governance Indicators	www.govindicators.org	-1,71	2,58
Good Governance- Government Effectiveness	Measuring perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and	World Governance Indicators	www.govindicators.org	-1,85	2,32

	the credibility of the government's commitment to such policies.				
Good Governance- Voice and Accountability	Measuring perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Governance Indicators	www.govindicators.org	-2,30	1,62
Good Governance- Political Stability and the absence of violence	Measuring perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	World Governance Indicators	www.govindicators.org	-2,89	1,60
Per capita GDP	Gross Domestic Product per capita based on purchasing power parity.	World Development Indicators	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	272,27	70762,46
Income inequality/ GINI	The degree of inequality in households income	UNU- income inequality database	http://www.wider.unu.edu/research/Database/en_GB/database/	23	73,9
Access to safe water	The percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as	World Development Indicators Online	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	22	100

	the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling				
Access to sanitation	The percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained	World Development Indicators Online	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	5	100
Total female primary enrolment (% net)	The number of pupils of the school-age group for primary education, enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group.	World Development Indicators Online	http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=6	34	100
Ethnolinguistic fractionalization	The probability that any two individuals are not for the same ethnolinguistic group	La Porta et al. (1999)	http://jleo.oxfordjournals.org/cgi/content/abstract/15/1/222	0	1
Percentage of the population that is Muslim	Percentage of population that is Muslim	CIA World Factbook	https://www.cia.gov/library/publications/the-world-factbook/	0	100

Appendix B: Dataset

Country	Under-5 mortality rate	Health expenditure public (% GDP)	Voice and accountability	Political stability and absence of violence	Government effectiveness	Control of corruption	GDP per capita, PPP	Access to sanitation	Access to safe water
AFGHANISTAN	257.000	2.981	-1.239	-2.279	-1.374	-1.455	-99.000[7]	-99.000	22.000
ALBANIA	16.150	2.425	0.031	-0.413	-0.425	-0.677	6345.417	97.000	97.000
ALGERIA	38.000	3.406	-0.934	-1.003	-0.420	-0.478	7196.357	94.000	85.000
ANDORRA	2.700	5.210	1.352	1.393	1.425	1.273	-99.000	100.000	100.000
ANGOLA	158.000	2.257	-1.199	-0.436	-1.247	-1.207	4297.563	50.000	51.000
ANTIGUA AND BARBUDA	11.400	2.894	0.599	0.831	0.403	1.273	18023.319	-99.000	-99.000
ARGENTINA	16.800	4.596	0.333	0.053	-0.089	-0.397	11614.512	91.000	96.000
ARMENIA	25.700	1.936	-0.673	-0.263	-0.223	-0.567	4724.080	91.000	98.000
AZERBAIJAN	42.600	1.070	-1.157	-1.007	-0.690	-0.978	5981.348	80.000	78.000
BAHAMAS	14.200	3.604	1.054	0.877	1.116	1.369	-99.000	100.000	-99.000
BAHRAIN	10.400	2.455	-0.803	-0.389	0.297	0.465	-99.000	-99.000	-99.000
BANGLADESH	64.100	1.018	-0.504	-1.451	-0.785	-1.262	1119.183	36.000	80.000
BARBADOS	11.800	4.184	1.146	1.050	1.188	1.202	-99.000	99.000	100.000
BELARUS	13.900	4.794	-1.822	0.142	-1.215	-0.765	9436.322	93.000	100.000
BELIZE	25.800	2.571	0.697	0.187	-0.227	-0.307	6417.796	-99.000	-99.000
BENIN	126.200	2.359	0.272	0.395	-0.502	-0.586	1220.407	30.000	65.000
BHUTAN	86.800	2.524	-0.735	1.305	0.251	0.893	3885.871	52.000	81.000
BOLIVIA	61.200	4.019	0.079	-0.934	-0.712	-0.514	3865.424	43.000	86.000
BOSNIA-HERZEGOVINA	14.600	5.244	0.206	-0.528	-0.613	-0.295	6627.372	95.000	99.000
BOTSWANA	40.400	5.432	0.504	0.963	0.618	0.860	12350.141	47.000	96.000

[7] -99 indicates a missing value and is treated as such in the SPSS program for the execution of the analyses

BRAZIL	22.900	3.593	0.434	-0.137	-0.096	-0.203	8673.308	77.000	91.000
BRUNEI	8.800	1.533	-1.082	1.218	0.757	0.239	48014.903	-99.000	-99.000
BULGARIA	12.600	4.082	0.592	0.430	0.116	-0.090	9863.660	99.000	99.000
BURKINA FASO	190.600	3.585	-0.279	-0.084	-0.796	-0.395	1050.588	13.000	72.000
BURUNDI	180.200	0.748	-1.046	-1.386	-1.262	-1.122	322.834	41.000	71.000
CAMBODIA	93.000	1.534	-0.874	-0.403	-0.969	-1.169	1571.712	28.000	65.000
CAMEROON	148.600	0.975	-0.965	-0.315	-0.836	-1.003	1979.674	51.000	70.000
CAPE VERDE	33.600	3.837	0.834	0.999	0.181	0.603	2745.370	-99.000	-99.000
CENTRAL AFRICAN REPUBLIC	173.900	1.532	-1.010	-1.786	-1.425	-0.996	658.420	31.000	66.000
CHAD	209.000	2.641	-1.405	-1.867	-1.324	-1.203	1424.976	9.000	48.000
CHILE	9.300	2.793	0.981	0.694	1.135	1.336	12595.531	94.000	95.000
CHINA	23.600	1.872	-1.695	-0.332	0.041	-0.581	4523.829	65.000	88.000
COLOMBIA	21.100	6.234	-0.216	-1.672	0.011	-0.209	7635.186	78.000	93.000
COMOROS	68.400	1.763	-0.239	-0.196	-1.714	-0.646	1116.861	35.000	85.000
CONGO	124.000	1.506	-1.056	-0.966	-1.289	-1.079	3440.033	20.000	71.000
Congo, Dem. Rep.	163.500	1.272	-1.550	-2.389	-1.680	-1.436	272.266	31.000	46.000
COSTA RICA	11.800	5.267	0.868	0.928	0.235	0.393	9635.555	96.000	98.000
COTE D'IVOIRE	127.800	0.897	-1.345	-2.147	-1.371	-1.216	1598.163	24.000	81.000
CROATIA	6.200	7.060	0.472	0.507	0.541	0.028	13941.873	99.000	99.000
CUBA	6.700	7.053	-1.961	0.157	-0.642	-0.262	-99.000	98.000	91.000
CYPRUS	4.700	2.778	1.115	0.478	1.220	0.819	22758.184	100.000	100.000
DJIBOUTI	130.200	5.039	-0.960	-0.243	-0.989	-0.618	1904.675	67.000	92.000
DOMINICA	11.900	3.717	1.030	0.969	0.728	0.646	7453.906	-99.000	-99.000
DOMINICAN REPUBLIC	37.500	2.072	0.168	0.115	-0.391	-0.630	5904.490	79.000	95.000
ECUADOR	23.600	2.311	-0.334	-0.898	-1.073	-0.801	6924.547	84.000	95.000
EGYPT	38.000	2.608	-1.256	-0.941	-0.509	-0.543	4800.537	66.000	98.000
EL SALVADOR	25.400	4.079	0.070	-0.145	-0.272	-0.139	5308.111	86.000	84.000
EQUATORIAL GUINEA	152.400	1.688	-1.842	-0.085	-1.339	-1.524	26322.078	51.000	43.000
ERITREA	74.200	1.652	-2.009	-0.926	-1.284	-0.316	601.962	5.000	60.000
ESTONIA	6.200	3.812	1.025	0.812	1.220	0.902	18150.706	95.000	100.000
ETHIOPIA	122.800	2.313	-1.173	-1.716	-0.616	-0.653	678.714	11.000	42.000
MICRONESIA	41.100	12.768	1.007	1.135	-0.286	-0.281	2740.978	25.000	94.000
FIJI	17.860	2.583	-0.496	-0.022	-0.108	-0.333	4374.590	71.000	47.000

GABON	91.000	3.285	-0.834	0.126	-0.692	-0.897	13769.809	36.000	87.000
GAMBIA	111.600	2.840	-0.884	-0.025	-0.777	-0.712	1117.083	52.000	86.000
GEORGIA	30.900	1.806	-0.147	-0.896	-0.225	-0.258	3885.494	93.000	99.000
GHANA	114.700	1.744	0.459	0.261	-0.021	-0.096	1208.871	10.000	80.000
GRENADA	20.000	4.382	0.751	0.468	0.116	0.570	6741.102	97.000	-99.000
GUATEMALA	41.000	1.665	-0.279	-0.724	-0.642	-0.763	4174.246	84.000	96.000
GUINEA	154.800	0.818	-1.153	-1.758	-1.385	-1.000	1083.142	19.000	70.000
GUINEA-BISSAU	200.700	1.525	-0.402	-0.413	-1.202	-0.985	452.175	33.000	57.000
GUYANA	61.600	5.062	0.054	-0.589	-0.139	-0.613	2406.097	81.000	93.000
HAITI	80.000	5.678	-0.918	-1.401	-1.378	-1.428	1075.087	19.000	58.000
HONDURAS	25.700	3.059	-0.237	-0.496	-0.578	-0.766	3437.834	66.000	84.000
INDIA	74.730	0.900	0.405	-0.941	-0.064	-0.248	2416.292	28.000	89.000
INDONESIA	33.600	1.263	-0.198	-1.248	-0.437	-0.785	3335.774	52.000	80.000
IRAN	34.400	3.448	-1.517	-1.326	-0.725	-0.535	9721.132	-99.000	-99.000
IRAQ	44.800	2.734	-1.390	-2.894	-1.849	-1.501	-99.000	-99.000	77.000
ISRAEL	5.300	4.480	0.777	-1.226	1.265	0.932	23981.506	-99.000	100.000
JAMAICA	31.200	2.496	0.588	-0.227	0.180	-0.400	6220.547	83.000	93.000
JORDAN	25.200	4.200	-0.624	-0.641	0.186	0.283	4510.730	85.000	98.000
KAZAKHSTAN	33.200	2.315	-1.104	0.133	-0.518	-0.884	9528.576	97.000	96.000
KENYA	120.600	2.199	-0.112	-1.020	-0.681	-0.892	1398.072	42.000	57.000
KIRIBATI	64.000	11.384	0.722	1.393	-0.497	0.079	1222.211	33.000	65.000
KOREA, NORTH	55.000	2.996	-2.298	-0.182	-1.683	-1.506	-99.000	-99.000	100.000
KUWAIT	11.400	1.720	-0.282	0.241	0.315	0.734	45151.769	-99.000	-99.000
KYRGYZSTAN	40.900	2.752	-0.707	-1.278	-0.773	-1.104	1764.669	93.000	89.000
LAOS	74.600	0.744	-1.643	0.010	-0.857	-1.072	1928.506	48.000	60.000
LATVIA	9.300	3.907	0.865	0.849	0.747	0.337	14716.313	78.000	99.000
LEBANON	29.700	3.898	-0.461	-1.885	-0.464	-0.768	9455.507	-99.000	100.000
LESOTHO	89.100	4.005	0.232	0.160	-0.346	-0.054	1395.243	36.000	78.000
LIBERIA	136.300	1.238	-0.555	-1.304	-1.240	-0.659	324.230	32.000	64.000
LIBYA	18.400	1.591	-1.956	0.257	-0.841	-0.874	12949.139	97.000	-99.000
LITHUANIA	8.500	4.340	0.910	0.914	0.795	0.166	15231.225	-99.000	-99.000
MACEDONIA	16.600	5.648	0.147	-0.659	-0.147	-0.338	7956.609	89.000	100.000
MADAGASCAR	115.400	2.010	-0.072	0.071	-0.334	-0.238	851.686	12.000	47.000

MALAWI	118.100	8.901	-0.288	-0.005	-0.846	-0.721	683.080	60.000	76.000
MALAYSIA	11.600	1.918	-0.545	0.324	0.992	0.300	12204.595	94.000	99.000
MALDIVES	32.900	6.456	-1.013	0.731	-0.039	-0.518	4679.063	59.000	83.000
MALI	198.600	2.877	0.297	-0.026	-0.525	-0.423	1025.469	45.000	60.000
MALTA	5.600	6.468	1.186	1.217	1.213	1.199	21386.666	-99.000	100.000
MARSHALL ISLANDS	56.000	14.026	1.173	1.108	-0.952	-0.527	-99.000	-99.000	-99.000
MAURITANIA	119.000	1.529	-0.749	-0.132	-0.749	-0.600	1831.672	24.000	60.000
MAURITIUS	15.100	1.993	0.818	0.673	0.566	0.360	10254.036	94.000	100.000
MOLDOVA	18.900	4.409	-0.434	-99.000	-0.855	-0.683	2321.579	79.000	90.000
MONACO	4.300	3.335	0.817	-0.475	0.366	-99.000	-99.000	-99.000	-99.000
MONGOLIA	45.700	4.201	0.155	1.050	-0.437	-0.493	2798.126	50.000	72.000
MONTENEGRO	10.700	5.968	0.129	0.742	-0.292	-0.470	9329.729	91.000	98.000
MOROCCO	37.200	1.389	-0.612	-0.322	-0.047	-0.251	3822.240	72.000	83.000
MOZAMBIQUE	171.300	3.540	-0.084	0.516	-0.367	-0.654	719.723	31.000	42.000
MYANMAR	104.000	0.288	-2.199	-0.815	-1.552	-1.709	-99.000	82.000	80.000
NAMIBIA	71.000	3.785	0.490	0.806	0.154	0.136	4670.969	35.000	93.000
NEPAL	58.300	1.556	-1.119	-2.086	-0.818	-0.673	976.395	27.000	89.000
NICARAGUA	35.800	4.627	-0.147	-0.409	-0.967	-0.729	2365.994	48.000	79.000
NIGER	182.500	3.227	-0.330	-0.332	-0.870	-0.953	593.283	7.000	42.000
NIGERIA	191.400	1.129	-0.485	-2.055	-0.885	-1.142	1795.260	30.000	47.000
OMAN	12.250	1.893	-0.862	0.728	0.450	0.721	21546.382	-99.000	-99.000
PAKISTAN	92.500	0.328	-1.021	-1.979	-0.550	-0.783	2272.184	58.000	90.000
PALAU	10.880	8.484	1.217	1.108	-0.619	-99.000	-99.000	67.000	89.000
PANAMA	23.100	5.022	0.496	0.121	0.098	-0.341	9799.333	74.000	92.000
PAPUA NEW GUINEA	66.500	2.624	0.058	-0.783	-0.812	-1.042	1889.671	45.000	40.000
PARAGUAY	29.400	2.911	-0.402	-0.602	-0.855	-1.119	3989.459	70.000	77.000
PERU	21.900	2.565	0.009	-0.930	-0.522	-0.326	6873.902	72.000	84.000
PHILIPPINES	29.300	1.250	-0.108	-1.328	-0.062	-0.775	3057.577	78.000	93.000
QATAR	15.400	3.363	-0.634	0.825	0.442	0.822	-99.000	100.000	100.000
ROMANIA	16.000	3.461	0.496	0.150	-0.068	-0.153	10122.792	72.000	88.000
RUSSIA	15.700	3.350	-0.974	-0.797	-0.474	-0.794	12797.231	87.000	97.000
RWANDA	128.500	4.633	-1.242	-0.528	-0.384	-0.105	794.198	23.000	65.000
ST. KITTS AND NEVIS	19.000	3.555	1.101	1.143	0.754	0.934	13346.328	96.000	99.000

ST. LUCIA	18.600	3.641	1.221	1.108	0.942	1.113	9061.037	-99.000	98.000
SAMOA	28.000	4.150	0.652	0.371	0.014	0.232	3996.639	100.000	88.000
SAN MARINO	3.900	6.149	1.173	-0.654	-0.266	-99.000	-99.000	-99.000	-99.000
SAO TOME AND PRINCIPE	98.900	5.355	0.386	-0.273	-0.879	-0.535	1486.650	24.000	86.000
SAUDI ARABIA	25.400	2.541	-1.659	-0.683	-0.221	-0.034	21372.226	-99.000	-99.000
SENEGAL	116.200	3.300	0.083	1.082	-0.209	-0.447	1543.173	28.000	77.000
SERBIA	8.400	5.715	0.126	-0.459	-0.272	-0.317	9381.236	92.000	99.000
SEYCHELLES	13.100	4.731	-0.009	1.287	-0.037	0.071	14638.629	-99.000	-99.000
SIERRA LEONE	263.600	1.456	-0.428	0.769	-1.082	-1.101	610.859	11.000	53.000
SINGAPORE	2.800	1.092	-0.374	1.064	2.222	2.200	45430.092	100.000	100.000
SLOVENIA	4.000	6.065	1.085	-2.746	1.093	0.939	24766.010	-99.000	-99.000
SOLOMON ISLANDS	72.850	4.667	0.200	0.053	-0.898	-0.290	1512.157	32.000	70.000
SOUTH AFRICA	61.700	3.016	0.756	-1.621	0.749	0.436	8850.812	59.000	93.000
SRI LANKA	20.750	1.995	-0.270	0.921	-0.309	-0.134	3775.908	86.000	82.000
ST. VINCENT AND THE GRENADINES	13.500	3.494	1.034	1.081	0.851	0.934	6838.650	-99.000	-99.000
SUDAN	109.500	1.398	-1.740	-2.126	-1.119	-1.153	1828.542	35.000	70.000
SURINAME	29.700	2.641	0.288	0.119	-0.026	-0.211	7043.881	82.000	92.000
SWAZILAND	94.100	4.145	-1.086	-0.123	-0.692	-0.411	4400.960	50.000	60.000
SYRIA	17.600	1.864	-1.752	-0.671	-1.009	-0.805	4094.584	92.000	89.000
TAJIKISTAN	70.600	1.125	-1.324	-1.346	-1.016	-0.933	1560.188	92.000	67.000
TANZANIA	119.800	3.699	-0.199	-0.104	-0.405	-0.420	1091.600	33.000	55.000
THAILAND	7.600	2.258	-0.599	-0.933	0.249	-0.285	7378.366	96.000	98.000
TIMOR-LESTE	100.900	15.222	-0.284	-1.166	-0.749	-0.877	647.779	41.000	62.000
TOGO	103.100	1.272	-1.311	-0.703	-1.593	-1.092	749.791	12.000	59.000
TONGA	23.500	3.655	-0.021	0.526	-0.647	-1.283	3562.193	96.000	100.000
TRINIDAD AND TOBAGO	35.300	2.486	0.563	-0.115	0.260	-0.145	21115.110	92.000	94.000
TUNISIA	22.600	2.254	-1.205	0.332	0.504	0.020	6743.003	85.000	94.000
TURKMENISTAN	52.600	2.527	-1.996	-0.304	-1.440	-1.274	-99.000	-99.000	-99.000
UGANDA	132.800	1.778	-0.461	-1.287	-0.440	-0.732	958.329	33.000	64.000
UKRAINE	16.300	3.823	-0.167	-0.059	-0.504	-0.649	6031.629	93.000	97.000
UNITED ARAB EMIRATES	8.200	1.760	-0.915	0.724	0.713	0.960	51586.216	97.000	100.000
URUGUAY	14.330	3.567	0.950	0.812	0.445	0.828	9887.983	100.000	100.000
UZBEKISTAN	43.300	2.359	-1.913	-1.697	-1.082	-0.988	2121.193	96.000	88.000

VANUATU	36.100	2.665	0.633	1.393	-0.417	0.179	3373.373	-99.000	-99.000
VENEZUELA	19.900	2.426	-0.471	-1.187	-0.716	-0.979	10767.439	-99.000	-99.000
VIETNAM	16.500	2.132	-1.584	0.419	-0.381	-0.749	2290.654	65.000	92.000
YEMEN	75.600	2.070	-1.046	-1.335	-1.006	-0.681	2191.959	46.000	66.000
ZAMBIA	171.700	3.763	-0.326	0.306	-0.737	-0.708	1233.393	52.000	58.000
ZIMBABWE	95.200	4.529	-1.498	-1.060	-1.360	-1.318	-99.000	46.000	81.000

Country	Percentage Mulsim	Total enrollment, primary, female (%net)	GINI-index	Ethnolinguistic fractionalization
AFGHANISTAN	99.000	-99.000	-99.000	0.448
ALBANIA	70.000	-99.000	31.100	0.002
ALGERIA	99.000	97.000	35.400	0.294
ANDORRA	0.000	85.000	-99.000	-99.000
ANGOLA	0.000	-99.000	-99.000	0.773
ANTIGUA AND BARBUDA	0.000	-99.000	-99.000	0.000
ARGENTINA	0.000	-99.000	48.292	0.177
ARMENIA	0.000	93.000	40.000	-99.000
AZERBAIJAN	93.400	-99.000	50.800	0.000
BAHAMAS	0.000	90.000	43.000	0.000
BAHRAIN	81.200	-99.000	-99.000	-99.000
BANGLADESH	83.000	-99.000	34.100	0.000
BARBADOS	6.000	96.000	-99.000	0.073
BELARUS	10.000	89.000	32.100	-99.000
BELIZE	8.000	100.000	-99.000	0.409
BENIN	20.000	75.000	36.478	0.683
BHUTAN	0.000	80.000	-99.000	0.438
BOLIVIA	0.000	97.000	50.454	0.599
BOSNIA-HERZEGOVINA	40.000	-99.000	35.790	-99.000
BOTSWANA	0.000	-99.000	45.100	0.378
BRAZIL	0.000	-99.000	56.432	0.056
BRUNEI	67.000	98.000	-99.000	0.500
BULGARIA	12.200	94.000	31.000	0.116
BURKINA FASO	50.000	43.000	39.510	0.547
BURUNDI	10.000	73.000	41.815	0.013
CAMBODIA	-99.000	-99.000	41.710	0.134
CAMEROON	20.000	-99.000	43.953	0.852
CAPE VERDE	0.000	88.000	-99.000	0.375
CENTRAL AFRICAN REPUBLIC	15.000	38.000	61.400	0.786
CHAD	-99.000	-99.000	-99.000	0.666
CHILE	-99.000	-99.000	54.562	0.051
CHINA	-99.000	-99.000	46.900	0.233
COLOMBIA	5.000	92.000	55.267	0.056
COMOROS	98.000	-99.000	-99.000	1.000
CONGO	-99.000	55.000	-99.000	0.669
Congo, Dem. Rep.	-99.000	-99.000	-99.000	-99.000
COSTA RICA	0.000	-99.000	49.168	0.053
COTE D'IVOIRE	37.000	-99.000	44.548	0.857
CROATIA	1.300	100.000	29.030	-99.000
CUBA	0.000	97.000	-99.000	-99.000
CYPRUS	-99.000	100.000	29.000	0.300
DJIBOUTI	94.000	34.000	40.900	0.714
DOMINICA	6.000	85.000	-99.000	0.500
DOMINICAN REPUBLIC	2.000	81.000	51.864	0.011

ECUADOR	-99.000	-99.000	53.444	0.325
EGYPT	-99.000	94.000	34.410	0.023
EL SALVADOR	-99.000	96.000	48.390	-99.000
EQUATORIAL GUINEA	0.000	-99.000	-99.000	0.625
ERITREA		44.000	-99.000	-99.000
ESTONIA	5.000	97.000	33.000	-99.000
ETHIOPIA	47.000	63.000	29.486	0.677
MICRONESIA	1.000	-99.000	-99.000	-99.000
FIJI	8.000	94.000	44.067	0.800
GABON	1.000	-99.000	44.080	0.797
GAMBIA	90.000	66.000	72.200	0.780
GEORGIA	9.900	92.000	40.800	-99.000
GHANA	16.000	65.000	40.685	0.706
GRENADA	0.000	-99.000	-99.000	0.000
GUATEMALA	0.000	94.000	49.397	0.477
GUINEA	85.000	67.000	38.600	0.760
GUINEA-BISSAU	35.000	-99.000	44.300	0.850
GUYANA	10.000	-99.000	44.200	0.238
HAITI	1.000	-99.000	59.207	0.064
HONDURAS	0.000	98.000	55.275	0.097
INDIA	13.400	92.000	36.800	0.742
INDONESIA	88.000	-99.000	39.410	0.691
IRAN	98.000	-99.000	38.350	-99.000
IRAQ	97.000	-99.000	41.500	-99.000
ISRAEL	16.000	98.000	38.900	0.327
JAMAICA	0.000	-99.000	45.508	0.013
JORDAN	92.000	95.000	38.838	0.030
KAZAKHSTAN	-99.000	99.000	41.400	-99.000
KENYA	10.000	77.000	62.500	0.827
KIRIBATI	0.000	-99.000	-99.000	0.500
KOREA, NORTH	-99.000	-99.000	31.600	0.000
KUWAIT	85.000	88.000	-99.000	-99.000
KYRGYZSTAN	-99.000	93.000	39.700	-99.000
LAOS	0.000	81.000	34.649	0.250
LATVIA	0.000	-99.000	39.000	-99.000
LEBANON	-99.000	83.000	-99.000	0.114
LESOTHO	0.000	74.000	60.000	0.210
LIBERIA	20.000	39.000	-99.000	0.803
LIBYA	-99.000	-99.000	-99.000	0.121
LITHUANIA	0.000	92.000	35.000	-99.000
MACEDONIA	33.300	-99.000	39.400	-99.000
MADAGASCAR	7.000	96.000	47.400	0.063
MALAWI	12.800	95.000	39.000	0.622
MALAYSIA	-99.000	-99.000	40.300	0.610
MALDIVES	100.000	98.000	-99.000	0.033
MALI	90.000	54.000	40.100	0.809
MALTA	0.000	-99.000	28.000	0.103
MARSHALL ISLANDS	0.000	-99.000	-99.000	-99.000
MAURITANIA	100.000	82.000	39.000	0.270
MAURITIUS	16.600	96.000	37.100	0.709
MOLDOVA	0.000	91.000	38.500	-99.000
MONACO	-99.000	-99.000	-99.000	-99.000

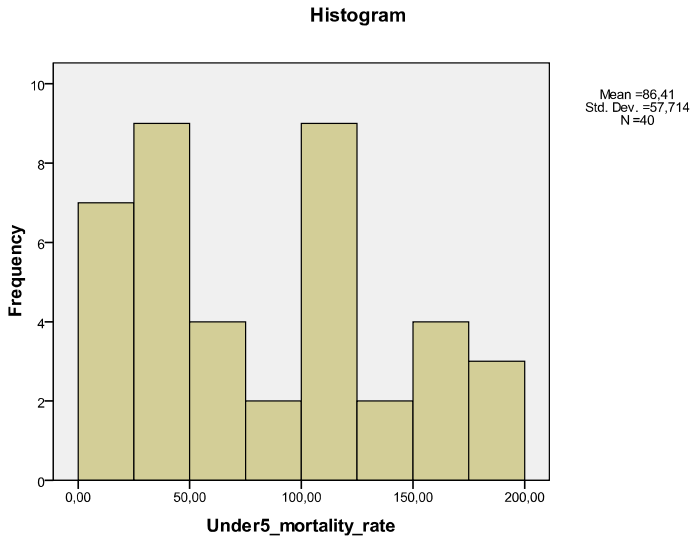
MONGOLIA	4.000	99.000	32.800	0.074
MONTENEGRO	-99.000	-99.000	-99.000	-99.000
MOROCCO	98.700	86.000	39.400	0.348
MOZAMBIQUE	17.800	73.000	47.290	0.786
MYANMAR	-99.000	-99.000	-99.000	0.384
NAMIBIA	0.000	88.000	73.900	0.728
NEPAL	4.200	-99.000	47.170	0.450
NICARAGUA	-99.000	92.000	52.269	0.099
NIGER	80.000	37.000	-99.000	0.733
NIGERIA	50.000	-99.000	43.700	0.857
OMAN	75.000	77.000	-99.000	-99.000
PAKISTAN	97.000	57.000	31.180	0.622
PALAU	0.000	-99.000	-99.000	-99.000
PANAMA	0.000	99.000	54.816	0.191
PAPUA NEW GUINEA	0.000	-99.000	50.400	0.803
PARAGUAY	0.000	-99.000	53.905	0.411
PERU	0.000	-99.000	47.693	0.432
PHILIPPINES	5.000	93.000	44.530	0.724
QATAR	95.000	99.000	-99.000	-99.000
ROMANIA	4.000	96.000	40.200	0.122
RUSSIA	12.000	-99.000	45.100	-99.000
RWANDA	4.600	-99.000	45.425	0.061
ST. KITTS AND NEVIS	0.000	-99.000	-99.000	0.000
ST. LUCIA	0.000	98.000	-99.000	0.583
SAMOA	0.000	-99.000	-99.000	0.051
SAN MARINO	0.000	-99.000	-99.000	-99.000
SAO TOME AND PRINCIPE	0.000	-99.000	-99.000	0.000
SAUDI ARABIA	100.000	-99.000	-99.000	-99.000
SENEGAL	94.000	71.000	41.250	0.779
SERBIA	-99.000	99.000	38.800	-99.000
SEYCHELLES	1.100	-99.000	-99.000	0.000
SIERRA LEONE	60.000	-99.000	39.000	0.813
SINGAPORE	14.900	-99.000	48.100	0.322
SLOVENIA	2.400	97.000	30.700	-99.000
SOLOMON ISLANDS	0.000	-99.000	-99.000	0.571
SOUTH AFRICA	0.000	-99.000	56.507	0.831
SRI LANKA	-99.000	-99.000	40.170	0.326
ST. VINCENT AND THE GRENADINES	0.000	-99.000	-99.000	0.000
SUDAN	70.000	-99.000	-99.000	0.512
SURINAME	19.600	98.000	52.809	0.750
SWAZILAND	10.000	-99.000	50.397	0.000
SYRIA	90.000	-99.000	-99.000	0.095
TAJIKISTAN	90.000	95.000	33.590	-99.000
TANZANIA	35.000	97.000	36.700	0.890
THAILAND	4.600	-99.000	41.978	0.357
TIMOR-LESTE	4.000	-99.000	-99.000	-99.000
TOGO	20.000	77.000	-99.000	0.729
TONGA	0.000	-99.000	-99.000	0.000
TRINIDAD AND TOBAGO	5.800	-99.000	-99.000	0.231
TUNISIA	98.000	98.000	40.600	0.070
TURKMENISTAN	89.000	-99.000	26.500	-99.000

UGANDA	16.000	-99.000	45.700	0.836
UKRAINE	0.000	91.000	41.000	-99.000
UNITED ARAB EMIRATES	96.000	95.000	-99.000	0.000
URUGUAY	0.000	-99.000	44.962	0.067
UZBEKISTAN	88.000	-99.000	39.700	-99.000
VANUATU	0.000	88.000	-99.000	0.544
VENEZUELA	0.000	94.000	47.633	0.053
VIETNAM	0.100	-99.000	34.400	0.118
YEMEN	90.000	-99.000	37.700	0.012
ZAMBIA	24.000	95.000	50.800	0.829
ZIMBABWE	1.000	89.000	73.100	0.599

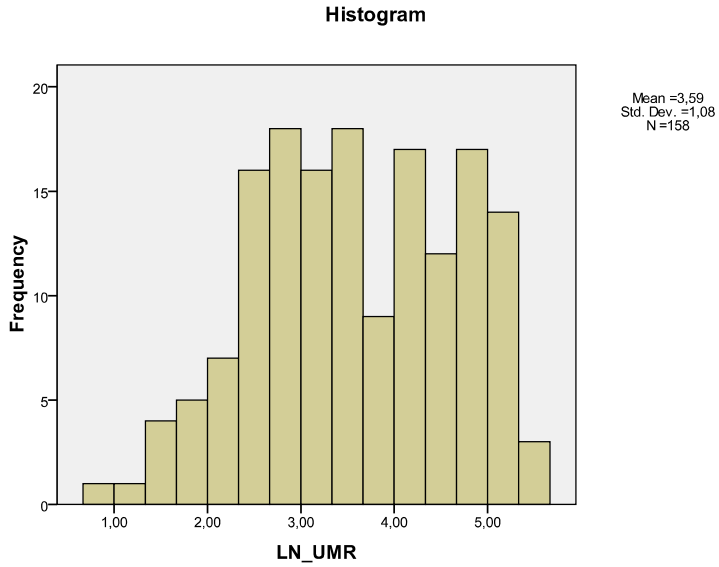
Appendix C: Tests for normality

Under-5 mortality rate

Skewness was 1,288 = to the right.

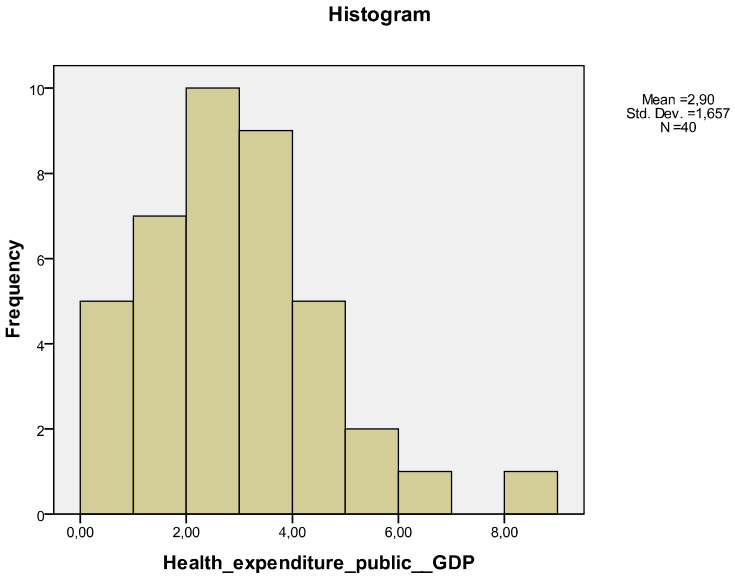


The skewness is to the right, so the logarithmic is calculated. The new skewness is -0,174

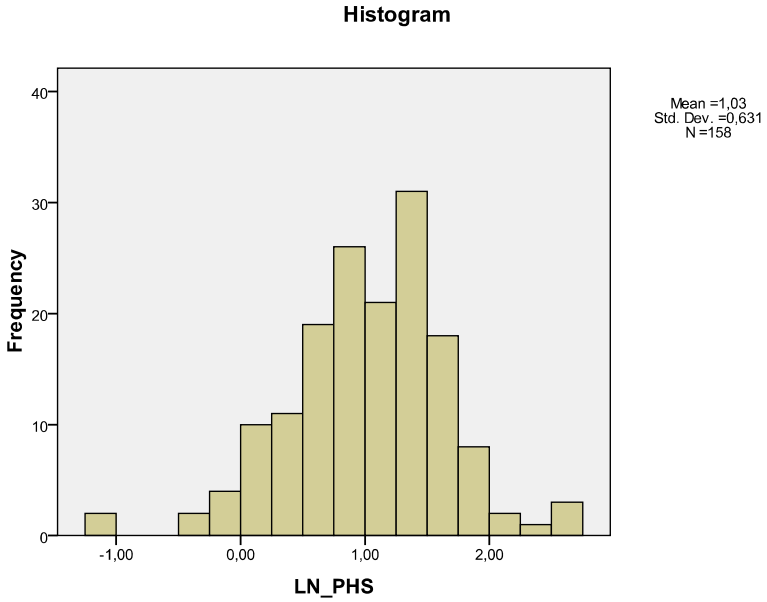


Public health spending

Skewness is 2,411 = no normal distribution

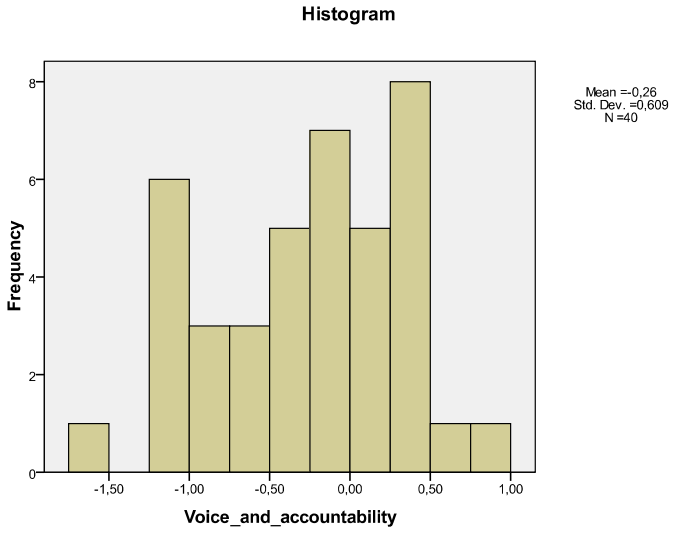


Skewness is to the right (positive), so logarithmic. New skewness is -0,370.



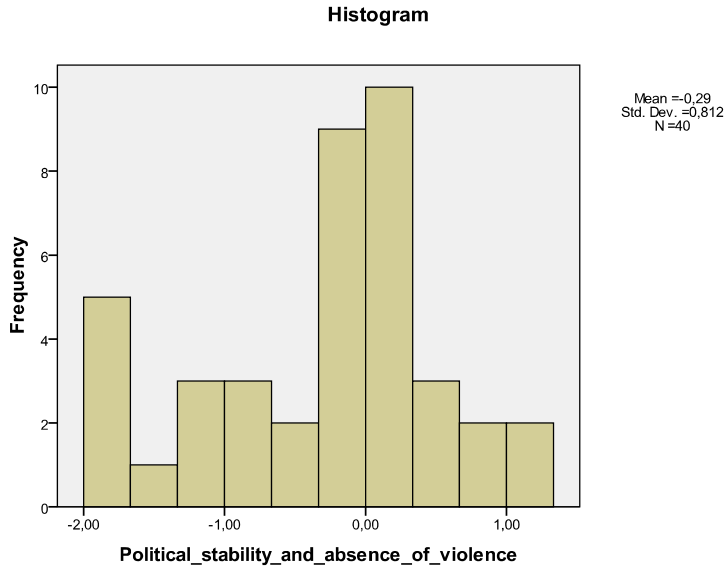
Voice and accountability

The skewness is -0,111 = normal distribution



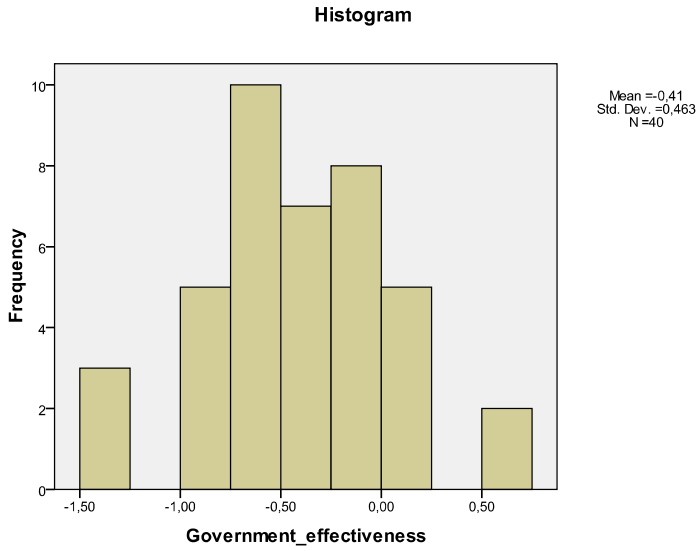
Political stability and absence of violence

The skewness is -0,366 = normal distribution

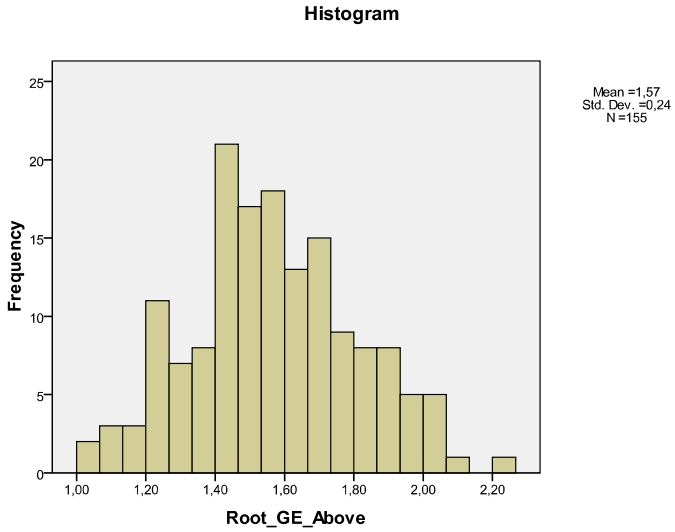


Government effectiveness

The skewness is 0,535 = normal distribution.

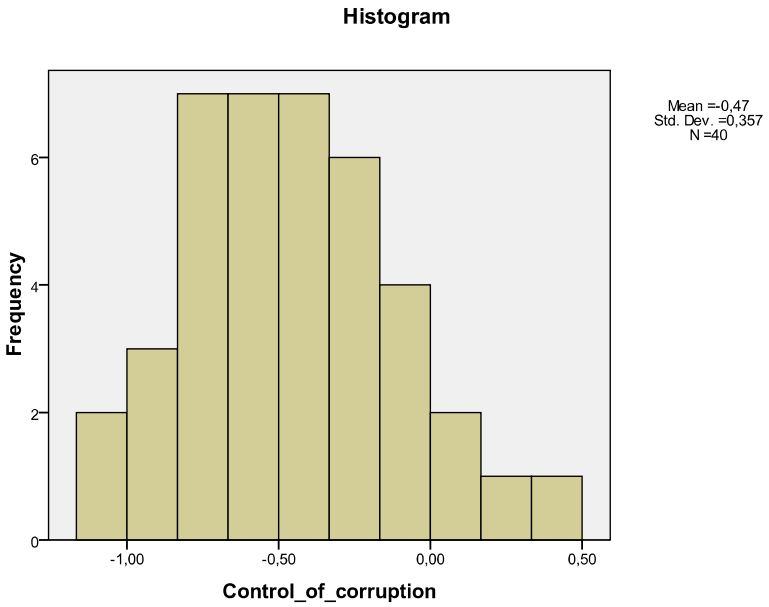


In order to calculate the root, first a constant must be added in order to make sure that no value is below 1. The minimum value of government effectiveness is -1,85 and therefore the constant added is 2,85. After that, the root is calculated by a power transformation of 0.5. The new skewness is 0,160.

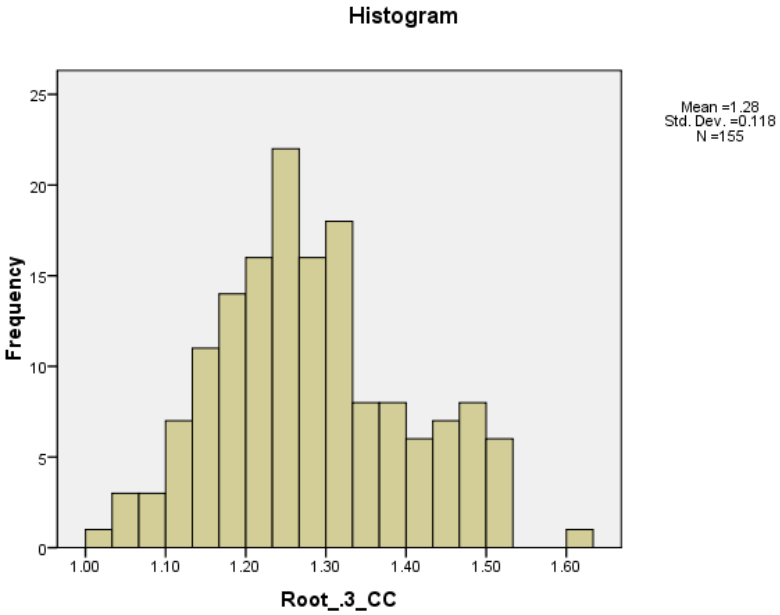


Control of corruption

The skewness is 0,790.

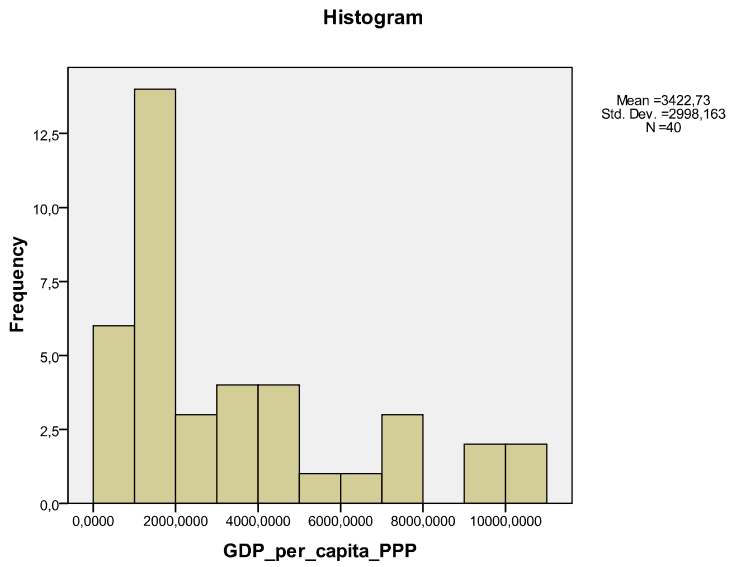


Again, the root could make a substantial improvement. As the minimum value of control of corruption is -1,71, the constant added is 2,71. Root 3 is taken. The root has a skewness of 0,291. The new histogram is:

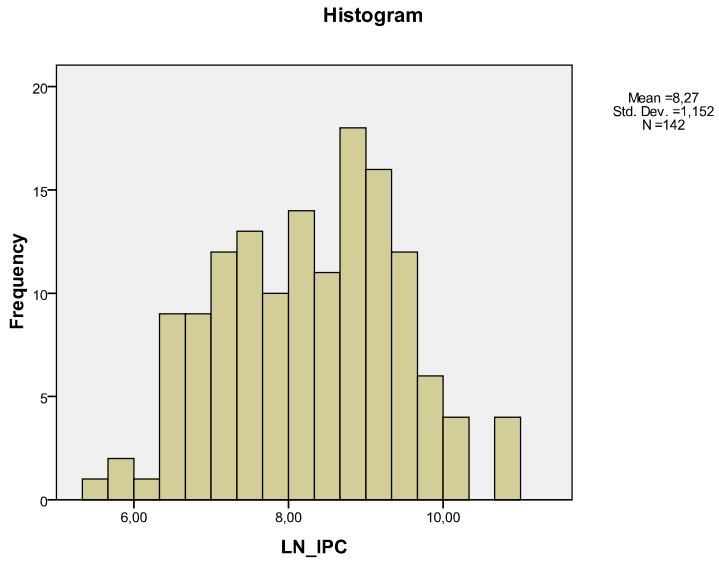


Income per capita

Skewness is 2,821 = no normal distribution.

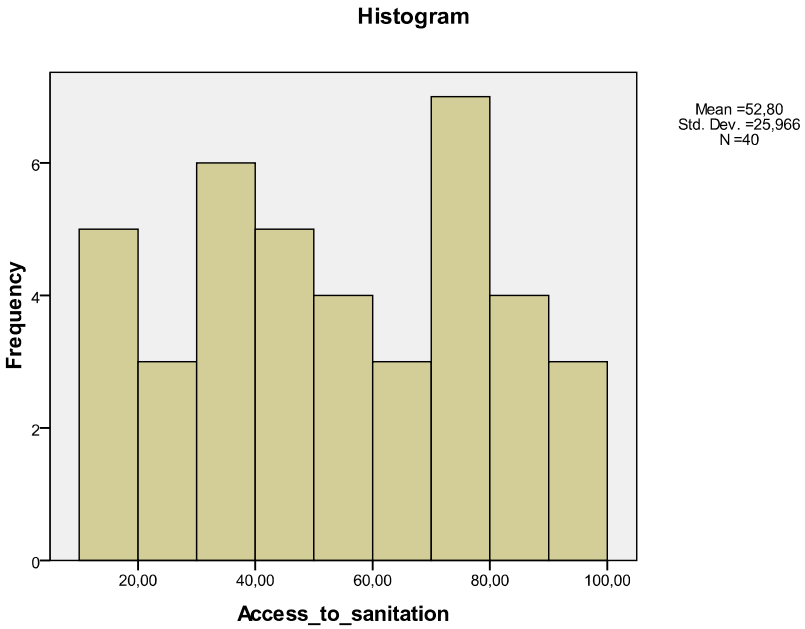


Skewness is to the right, solution is logarithmic. New skewness is -0,050.



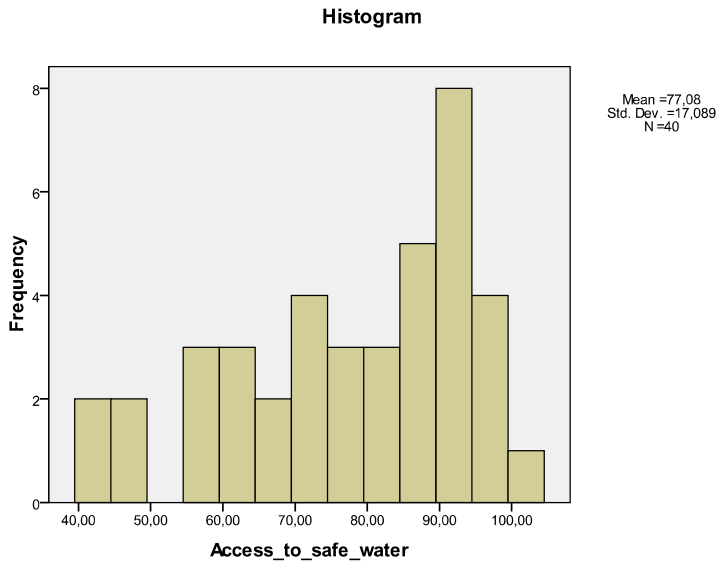
Access to sanitation

The skewness is -0,260 = normal distribution.

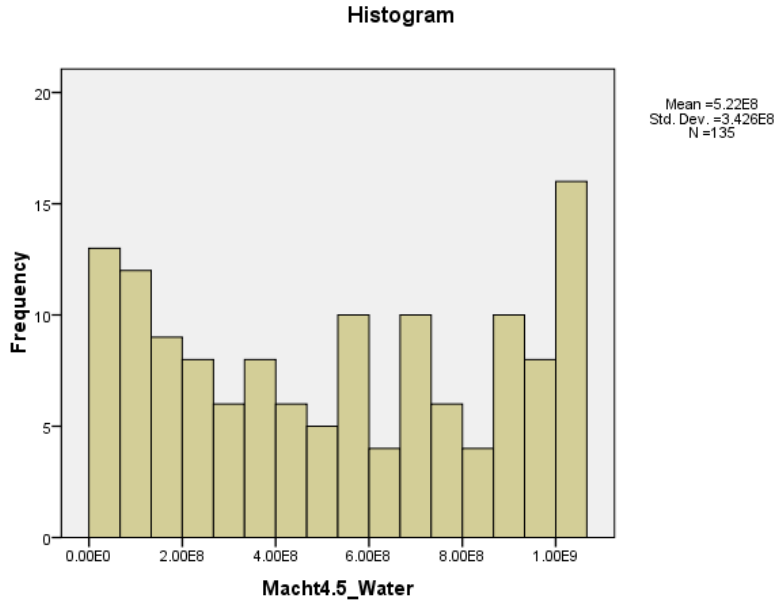


Access to safe water

Skewness is -0,904. Histogram:

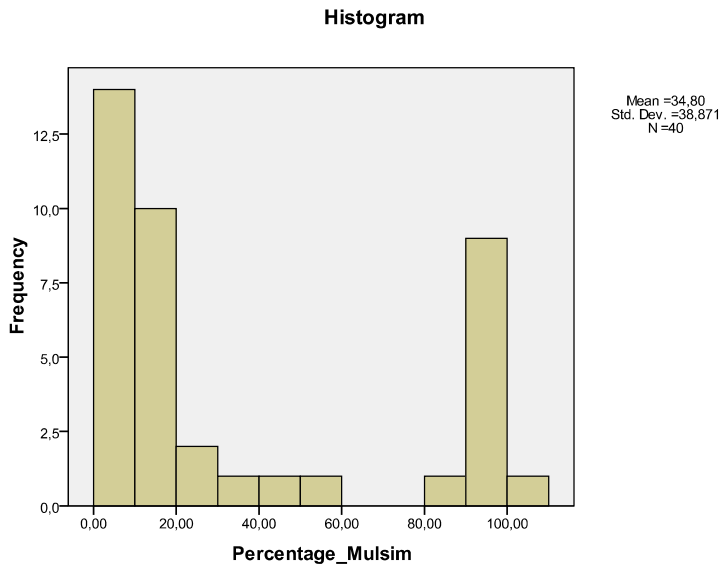


Historgram shows skewness to the left (negative). Solution is power transformation. With some trial and error the best power transformation seems to be 4.5. The new skewness is -0,016.

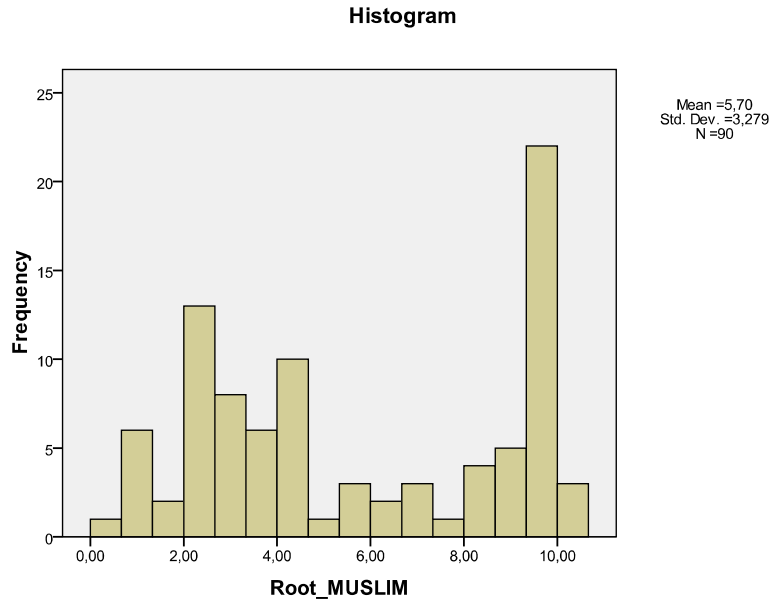


Percentage of the population that is Muslim

The skewness is 0,968. This is a normal distribution, but the histogram shows a different picture.

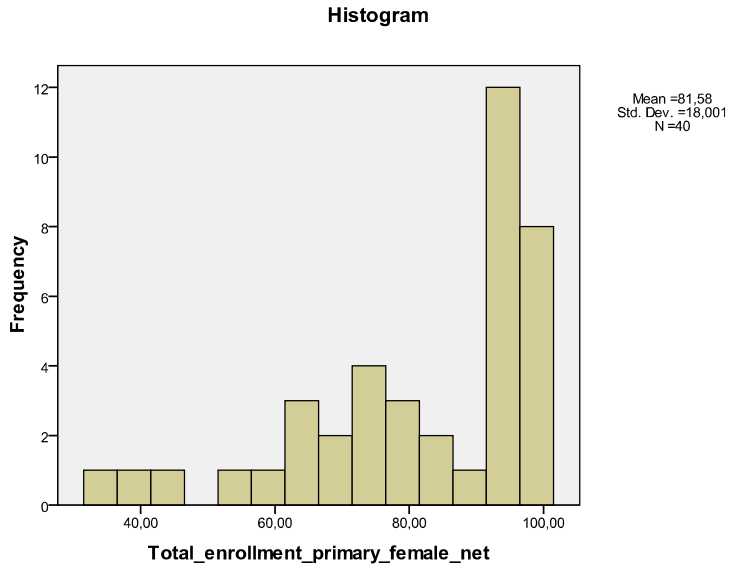


For a positive skewness (to the right) two solutions are available: the logarithmic and the root (a transformation with p=0.5).
For this variable, a power transformation of 0,5 led to a skewness of 0,073. The logarithmic led to a skewness of =-0,876. The best improvement towards normal distribution is therefore made with the power transformation. New histogram:

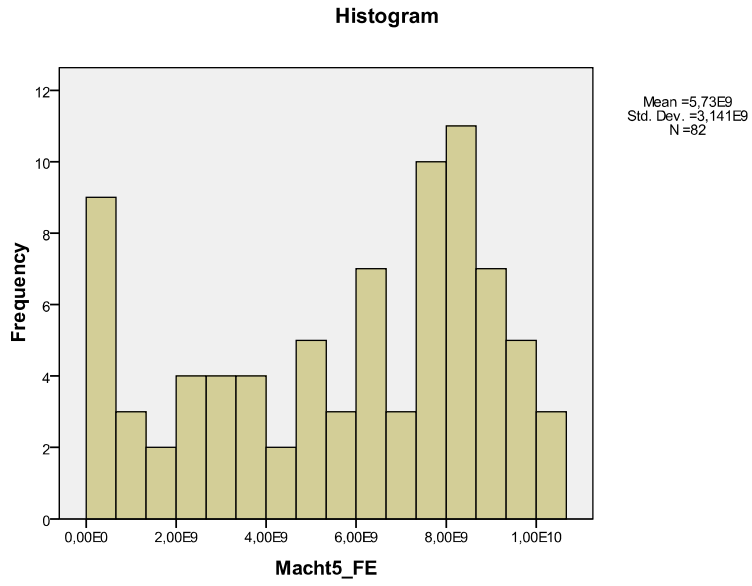


Female education

The skewness is -1,577 = no normal distribution.

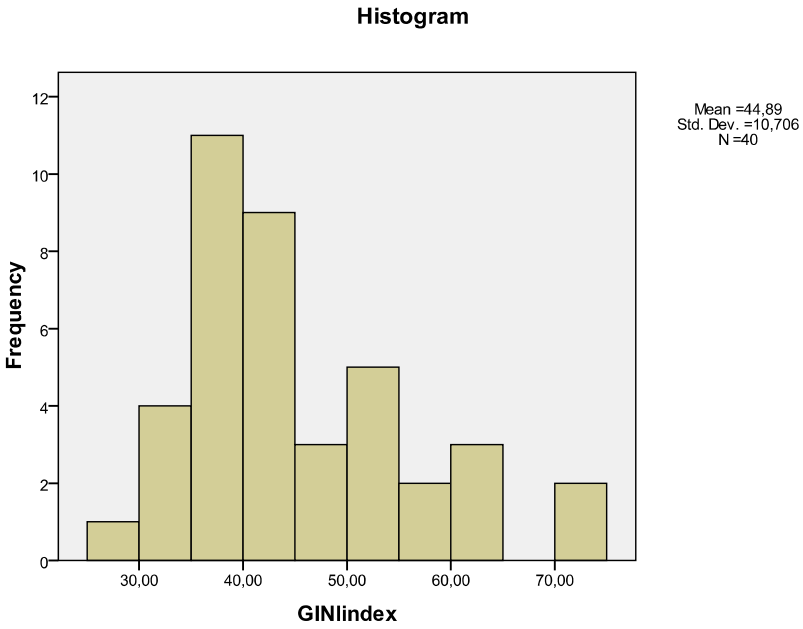


The skewness is negative (to the left) for which the solution is a power transformation. After some trial and error the best one is to the power of 5. This leads to a skweness of -0,497. The new histogram is:

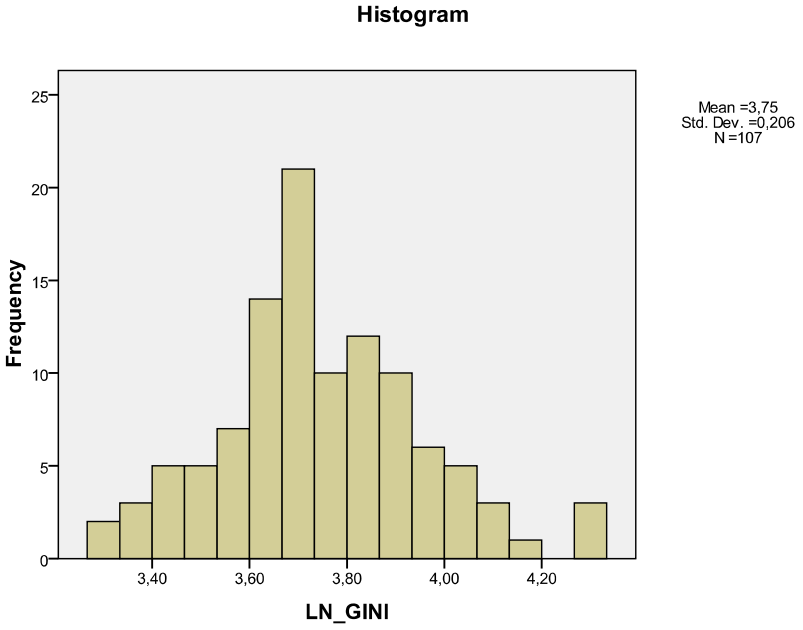


GINI

The skewness is 0,943. The histogram is:

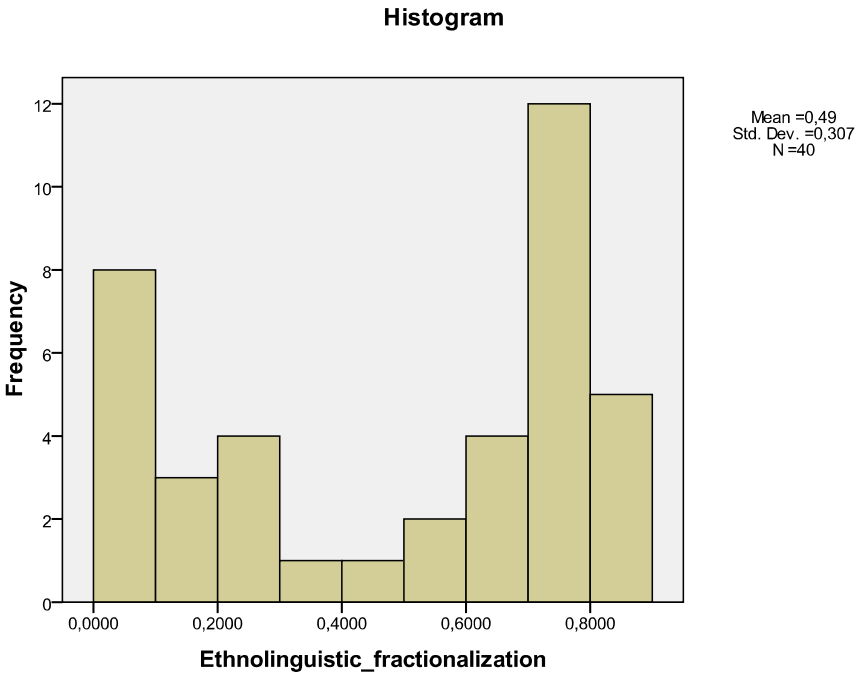


The histogram shows a mild skewness to the right. Therefore the logarithmic is calculated. The new skewness is 0,263.



Ethnolinguistic fractionalization

The skewness is 0,159 = normal distribution



Dataset variables with normal distribution

	Ln(UMR)	Ln(PHS)	Ln(IPC)	CC+2,71^0.03	GE+2,85^0.5	VA	PS	SANITATION	WATER^4.5
AFGHANISTAN	5,55	1,09	-99	1,07	1,21	-1,24	-2,28	-99	1098758
ALBANIA	2,78	0,89	8,76	1,24	1,56	0,03	-0,41	97	871912300
ALGERIA	3,64	1,23	8,88	1,27	1,56	-0,93	-1	94	481265983
ANDORRA	0,99	1,65	-99	1,51	2,07	1,35	1,39	100	1000000000
ANGOLA	5,06	0,81	8,37	1,13	1,27	-1,2	-0,44	50	48313199
ANTIGUA AND BARBUDA	2,43	1,06	9,8	1,51	1,8	0,6	0,83	-99	-99
ARGENTINA	2,82	1,53	9,36	1,29	1,66	0,33	0,05	91	832186275
ARMENIA	3,25	0,66	8,46	1,26	1,62	-0,67	-0,26	91	913097893
AZERBAIJAN	3,75	0,07	8,7	1,18	1,47	-1,16	-1,01	80	326908123
BAHAMAS	2,65	1,28	-99	1,52	1,99	1,05	0,88	100	-99
BAHRAIN	2,34	0,9	-99	1,41	1,77	-0,8	-0,39	-99	-99
BANGLADESH	4,16	0,02	7,02	1,12	1,44	-0,5	-1,45	36	366357377
BARBADOS	2,47	1,43	-99	1,51	2,01	1,15	1,05	99	1000000000
BELARUS	2,63	1,57	9,15	1,22	1,28	-1,82	0,14	93	1000000000
BELIZE	3,25	0,94	8,77	1,3	1,62	0,7	0,19	-99	-99
BENIN	4,84	0,86	7,11	1,25	1,53	0,27	0,39	30	143916340
BHUTAN	4,46	0,93	8,27	1,47	1,76	-0,74	1,3	52	387420489
BOLIVIA	4,11	1,39	8,26	1,27	1,46	0,08	-0,93	43	507274499
BOSNIA-HERZEGOVINA	2,68	1,66	8,8	1,3	1,5	0,21	-0,53	95	955780962
BOTSWANA	3,7	1,69	9,42	1,46	1,86	0,5	0,96	47	832186275
BRAZIL	3,13	1,28	9,07	1,32	1,66	0,43	-0,14	77	654163435
BRUNEI	2,17	0,43	10,78	1,38	1,9	-1,08	1,22	-99	-99
BULGARIA	2,53	1,41	9,2	1,34	1,72	0,59	0,43	99	955780962
BURKINA FASO	5,25	1,28	6,96	1,29	1,43	-0,28	-0,08	13	228032230
BURUNDI	5,19	-0,29	5,78	1,15	1,26	-1,05	-1,39	41	214122630

CAMBODIA	4,53	0,43	7,36	1,14	1,37	-0,87	-0,4	28	143916340
CAMEROON	5	-0,03	7,59	1,17	1,42	-0,96	-0,31	51	200882072
CAPE VERDE	3,51	1,34	7,92	1,43	1,74	0,83	1	-99	-99
CENTRAL AFRICAN REPUBLIC	5,16	0,43	6,49	1,18	1,19	-1,01	-1,79	31	154151484
CHAD	5,34	0,97	7,26	1,13	1,24	-1,41	-1,87	9	36777785
CHILE	2,23	1,03	9,44	1,52	2	0,98	0,69	94	793882491
CHINA	3,16	0,63	8,42	1,25	1,7	-1,7	-0,33	65	562564114
COLOMBIA	3,05	1,83	8,94	1,32	1,69	-0,22	-1,67	78	721395234
COMOROS	4,23	0,57	7,02	1,24	1,07	-0,24	-0,2	35	481265983
CONGO	4,82	0,41	8,14	1,16	1,25	-1,06	-0,97	20	214122630
Congo, Dem. Rep.	5,1	0,24	5,61	1,08	1,08	-1,55	-2,39	31	30367584
COSTA RICA	2,47	1,66	9,17	1,4	1,76	0,87	0,93	96	913097893
COTE D'IVOIRE	4,85	-0,11	7,38	1,13	1,22	-1,34	-2,15	24	387420489
CROATIA	1,82	1,95	9,54	1,35	1,84	0,47	0,51	99	955780962
CUBA	1,9	1,95	-99	1,31	1,49	-1,96	0,16	98	654163435
CYPRUS	1,55	1,02	10,03	1,46	2,02	1,12	0,48	100	1000000000
DJIBOUTI	4,87	1,62	7,55	1,25	1,36	-0,96	-0,24	67	687139988
DOMINICA	2,48	1,31	8,92	1,44	1,89	1,03	0,97	-99	-99
DOMINICAN REPUBLIC	3,62	0,73	8,68	1,25	1,57	0,17	0,11	79	793882491
ECUADOR	3,16	0,84	8,84	1,21	1,33	-0,33	-0,9	84	793882491
EGYPT	3,64	0,96	8,48	1,26	1,53	-1,26	-0,94	66	913097893
EL SALVADOR	3,23	1,41	8,58	1,33	1,61	0,07	-0,14	86	456306639
EQUATORIAL GUINEA	5,03	0,52	10,18	1,05	1,23	-1,84	-0,09	51	22418577
ERITREA	4,31	0,5	6,4	1,3	1,25	-2,01	-0,93	5	100387728
ESTONIA	1,82	1,34	9,81	1,47	2,02	1,02	0,81	95	1000000000
ETHIOPIA	4,81	0,84	6,52	1,24	1,49	-1,17	-1,72	11	20166095
MICRONESIA	3,72	2,55	7,92	1,31	1,6	1,01	1,14	25	756964201
FIJI	2,88	0,95	8,38	1,3	1,66	-0,5	-0,02	71	33453408

GABON	4,51	1,19	9,53	1,2	1,47	-0,83	0,13	36	534363317
GAMBIA	4,71	1,04	7,02	1,23	1,44	-0,88	-0,03	52	507274499
GEORGIA	3,43	0,59	8,27	1,31	1,62	-0,15	-0,9	93	955780962
GHANA	4,74	0,56	7,1	1,33	1,68	0,46	0,26	10	366357377
GRENADA	3	1,48	8,82	1,43	1,72	0,75	0,47	97	-99
GUATEMALA	3,71	0,51	8,34	1,22	1,49	-0,28	-0,72	84	832186275
GUINEA	5,04	-0,2	6,99	1,17	1,21	-1,15	-1,76	19	200882072
GUINEA-BISSAU	5,3	0,42	6,11	1,18	1,28	-0,4	-0,41	33	79696060
GUYANA	4,12	1,62	7,79	1,25	1,65	0,05	-0,59	81	721395234
HAITI	4,38	1,74	6,98	1,08	1,21	-0,92	-1,4	19	86183866
HONDURAS	3,25	1,12	8,14	1,22	1,51	-0,24	-0,5	66	456306639
INDIA	4,31	-0,11	7,79	1,31	1,67	0,41	-0,94	28	591909118
INDONESIA	3,51	0,23	8,11	1,22	1,55	-0,2	-1,25	52	366357377
IRAN	3,54	1,24	9,18	1,26	1,46	-1,52	-1,33	-99	-99
IRAQ	3,8	1,01	-99	1,06	1	-1,39	-2,89	-99	308466683
ISRAEL	1,67	1,5	10,09	1,47	2,03	0,78	-1,23	-99	1000000000
JAMAICA	3,44	0,91	8,74	1,29	1,74	0,59	-0,23	83	721395234
JORDAN	3,23	1,44	8,41	1,39	1,74	-0,62	-0,64	85	913097893
KAZAKHSTAN	3,5	0,84	9,16	1,2	1,53	-1,1	0,13	97	832186275
KENYA	4,79	0,79	7,24	1,2	1,47	-0,11	-1,02	42	79696060
KIRIBATI	4,16	2,43	7,11	1,36	1,53	0,72	1,39	33	143916340
KOREA, NORTH	4,01	1,1	-99	1,06	1,08	-2,3	-0,18	-99	1000000000
KUWAIT	2,43	0,54	10,72	1,45	1,78	-0,28	0,24	-99	-99
KYRGYZSTAN	3,71	1,01	7,48	1,15	1,44	-0,71	-1,28	93	591909118
LAOS	4,31	-0,3	7,56	1,16	1,41	-1,64	0,01	48	100387728
LATVIA	2,23	1,36	9,6	1,4	1,9	0,86	0,85	78	955780962
LEBANON	3,39	1,36	9,15	1,22	1,54	-0,46	-1,89	-99	1000000000
LESOTHO	4,49	1,39	7,24	1,34	1,58	0,23	0,16	36	326908123

LIBERIA	4,91	0,21	5,78	1,24	1,27	-0,55	-1,3	32	134217728
LIBYA	2,91	0,46	9,47	1,2	1,42	-1,96	0,26	97	-99
LITHUANIA	2,14	1,47	9,63	1,37	1,91	0,91	0,91	-99	-99
MACEDONIA	2,81	1,73	8,98	1,3	1,64	0,15	-0,66	89	1000000000
MADAGASCAR	4,75	0,7	6,75	1,31	1,59	-0,07	0,07	12	33453408
MALAWI	4,77	2,19	6,53	1,23	1,42	-0,29	0	60	290844707
MALAYSIA	2,45	0,65	9,41	1,39	1,96	-0,54	0,32	94	955780962
MALDIVES	3,49	1,86	8,45	1,27	1,68	-1,01	0,73	59	432365881
MALI	5,29	1,06	6,93	1,28	1,52	0,3	-0,03	45	100387728
MALTA	1,72	1,87	9,97	1,51	2,02	1,19	1,22	-99	1000000000
MARSHALL ISLANDS	4,03	2,64	-99	1,26	1,38	1,17	1,11	-99	-99
MAURITANIA	4,78	0,42	7,51	1,25	1,45	-0,75	-0,13	24	100387728
MAURITIUS	2,71	0,69	9,24	1,4	1,85	0,82	0,67	94	1000000000
MOLDOVA	2,94	1,48	7,75	1,24	1,41	-0,43	-99	79	622431112
MONACO	1,46	1,2	-99	-99	1,79	0,82	-0,47	-99	-99
MONGOLIA	3,82	1,44	7,94	1,27	1,55	0,15	1,05	50	228032230
MONTENEGRO	2,37	1,79	9,14	1,27	1,6	0,13	0,74	91	913097893
MOROCCO	3,62	0,33	8,25	1,31	1,67	-0,61	-0,32	72	432365881
MOZAMBIQUE	5,14	1,26	6,58	1,24	1,58	-0,08	0,52	31	20166095
MYANMAR	4,64	-1,24	-99	1	1,14	-2,2	-0,82	82	366357377
NAMIBIA	4,26	1,33	8,45	1,37	1,73	0,49	0,81	35	721395234
NEPAL	4,07	0,44	6,88	1,24	1,43	-1,12	-2,09	27	591909118
NICARAGUA	3,58	1,53	7,77	1,23	1,37	-0,15	-0,41	48	346195893
NIGER	5,21	1,17	6,39	1,18	1,41	-0,33	-0,33	7	20166095
NIGERIA	5,25	0,12	7,49	1,14	1,4	-0,49	-2,05	30	33453408
OMAN	2,51	0,64	9,98	1,45	1,82	-0,86	0,73	-99	-99
PAKISTAN	4,53	-1,11	7,73	1,22	1,52	-1,02	-1,98	58	622431112
PALAU	2,39	2,14	-99	-99	1,49	1,22	1,11	67	591909118

PANAMA	3,14	1,61	9,19	1,3	1,72	0,5	0,12	74	687139988
PAPUA NEW GUINEA	4,2	0,96	7,54	1,17	1,43	0,06	-0,78	45	16190862
PARAGUAY	3,38	1,07	8,29	1,15	1,41	-0,4	-0,6	70	308466683
PERU	3,09	0,94	8,84	1,3	1,53	0,01	-0,93	72	456306639
PHILIPPINES	3,38	0,22	8,03	1,22	1,67	-0,11	-1,33	78	721395234
QATAR	2,73	1,21	-99	1,46	1,81	-0,63	0,83	100	1000000000
ROMANIA	2,77	1,24	9,22	1,33	1,67	0,5	0,15	72	562564114
RUSSIA	2,75	1,21	9,46	1,22	1,54	-0,97	-0,8	87	871912300
RWANDA	4,86	1,53	6,68	1,33	1,57	-1,24	-0,53	23	143916340
ST. KITTS AND NEVIS	2,94	1,27	9,5	1,47	1,9	1,1	1,14	96	955780962
ST. LUCIA	2,92	1,29	9,11	1,5	1,95	1,22	1,11	-99	913097893
SAMOA	3,33	1,42	8,29	1,38	1,69	0,65	0,37	100	562564114
SAN MARINO	1,36	1,82	-99	-99	1,61	1,17	-0,65	-99	-99
SAO TOME AND PRINCIPE	4,59	1,68	7,3	1,26	1,4	0,39	-0,27	24	507274499
SAUDI ARABIA	3,23	0,93	9,97	1,34	1,62	-1,66	-0,68	-99	-99
SENEGAL	4,76	1,19	7,34	1,28	1,63	0,08	1,08	28	308466683
SERBIA	2,13	1,74	9,15	1,3	1,61	0,13	-0,46	92	955780962
SEYCHELLES	2,57	1,55	9,59	1,36	1,68	-0,01	1,29	-99	-99
SIERRA LEONE	5,57	0,38	6,41	1,15	1,33	-0,43	0,77	11	57443569
SINGAPORE	1,03	0,09	10,72	1,61	2,25	-0,37	1,06	100	1000000000
SLOVENIA	1,39	1,8	10,12	1,47	1,99	1,09	-2,75	-99	-99
SOLOMON ISLANDS	4,29	1,54	7,32	1,3	1,4	0,2	0,05	32	200882072
SOUTH AFRICA	4,12	1,1	9,09	1,41	1,9	0,76	-1,62	59	721395234
SRI LANKA	3,03	0,69	8,24	1,33	1,59	-0,27	0,92	86	409413667
ST. VINCENT AND THE GRENADINES	2,6	1,25	8,83	1,47	1,92	1,03	1,08	-99	-99
SUDAN	4,7	0,34	7,51	1,14	1,32	-1,74	-2,13	35	200882072
SURINAME	3,39	0,97	8,86	1,32	1,68	0,29	0,12	82	687139988
SWAZILAND	4,54	1,42	8,39	1,28	1,47	-1,09	-0,12	50	100387728

SYRIA	2,87	0,62	8,32	1,21	1,36	-1,75	-0,67	92	591909118
TAJIKISTAN	4,26	0,12	7,35	1,19	1,35	-1,32	-1,35	92	164944034
TANZANIA	4,79	1,31	7	1,28	1,56	-0,2	-0,1	33	67862851
THAILAND	2,03	0,81	8,91	1,3	1,76	-0,6	-0,93	96	913097893
TIMOR-LESTE	4,61	2,72	6,47	1,2	1,45	-0,28	-1,17	41	116348986
TOGO	4,64	0,24	6,62	1,16	1,12	-1,31	-0,7	12	93075216
TONGA	3,16	1,3	8,18	1,11	1,48	-0,02	0,53	96	1000000000
TRINIDAD AND TOBAGO	3,56	0,91	9,96	1,33	1,76	0,56	-0,12	92	756964201
TUNISIA	3,12	0,81	8,82	1,35	1,83	-1,2	0,33	85	756964201
TURKMENISTAN	3,96	0,93	-99	1,11	1,19	-2	-0,3	-99	-99
UGANDA	4,89	0,58	6,87	1,23	1,55	-0,46	-1,29	33	134217728
UKRAINE	2,79	1,34	8,7	1,24	1,53	-0,17	-0,06	93	871912300
UNITED ARAB EMIRATES	2,1	0,57	10,85	1,48	1,89	-0,92	0,72	97	1000000000
URUGUAY	2,66	1,27	9,2	1,46	1,82	0,95	0,81	100	1000000000
UZBEKISTAN	3,77	0,86	7,66	1,18	1,33	-1,91	-1,7	96	562564114
VANUATU	3,59	0,98	8,12	1,37	1,56	0,63	1,39	-99	-99
VENEZUELA	2,99	0,89	9,28	1,18	1,46	-0,47	-1,19	-99	-99
VIETNAM	2,8	0,76	7,74	1,22	1,57	-1,58	0,42	65	687139988
YEMEN	4,33	0,73	7,69	1,24	1,36	-1,05	-1,33	46	154151484
ZAMBIA	5,15	1,33	7,12	1,23	1,45	-0,33	0,31	52	86183866
ZIMBABWE	4,56	1,51	-99	1,1	1,22	-1,5	-1,06	46	387420489

	Female Education^5	LnGINI	ETHNO	MUSLIM^0.5
AFGHANISTAN	-99	-99	0,4484	9,95
ALBANIA	-99	3,44	0,0017	8,37
ALGERIA	8587340257	3,57	0,2937	9,95
ANDORRA	4437053125	-99	-99	0
ANGOLA	-99	-99	0,7728	0
ANTIGUA AND BARBUDA	-99	-99	0	0
ARGENTINA	-99	3,88	0,1769	0
ARMENIA	6956883693	3,69	-99	0
AZERBAIJAN	-99	3,93	0	9,66
BAHAMAS	5904900000	3,76	0	0
BAHRAIN	-99	-99	-99	9,01
BANGLADESH	-99	3,53	0	9,11
BARBADOS	8153726976	-99	0,0733	2,45
BELARUS	5584059449	3,47	-99	3,16
BELIZE	1E+10	-99	0,4091	2,83
BENIN	2373046875	3,6	0,6831	4,47
BHUTAN	3276800000	-99	0,4375	0
BOLIVIA	8587340257	3,92	0,5994	0
BOSNIA-HERZEGOVINA	-99	3,58	-99	6,32
BOTSWANA	-99	3,81	0,3775	0
BRAZIL	-99	4,03	0,0558	0
BRUNEI	9039207968	-99	0,5	8,19
BULGARIA	7339040224	3,43	0,1157	3,49
BURKINA FASO	147008443	3,68	0,5467	7,07
BURUNDI	2073071593	3,73	0,0133	3,16
CAMBODIA	-99	3,73	0,1335	-99

CAMEROON	-99	3,78	0,852	4,47
CAPE VERDE	5277319168	-99	0,375	0
CENTRAL AFRICAN REPUBLIC	79235168	4,12	0,7856	3,87
CHAD	-99	-99	0,6662	-99
CHILE	-99	4	0,0506	-99
CHINA	-99	3,85	0,2333	-99
COLOMBIA	6590815232	4,01	0,0558	2,24
COMOROS	-99	-99	1	9,9
CONGO	503284375	-99	0,6693	-99
Congo, Dem. Rep.	-99	-99	-99	-99
COSTA RICA	-99	3,9	0,0532	0
COTE D'IVOIRE	-99	3,8	0,8565	6,08
CROATIA	1E+10	3,37	-99	1,14
CUBA	8587340257	-99	-99	0
CYPRUS	1E+10	3,37	0,3	-99
DJIBOUTI	45435424	3,71	0,7143	9,7
DOMINICA	4437053125	-99	0,5	2,45
DOMINICAN REPUBLIC	3486784401	3,95	0,0108	1,41
ECUADOR	-99	3,98	0,3254	-99
EGYPT	7339040224	3,54	0,0231	-99
EL SALVADOR	8153726976	3,88	-99	-99
EQUATORIAL GUINEA	-99	-99	0,625	0
ERITREA	164916224	-99	-99	-99
ESTONIA	8587340257	3,5	-99	2,24
ETHIOPIA	992436543	3,38	0,6771	6,86
MICRONESIA	-99	-99	-99	1
FIJI	7339040224	3,79	0,8	2,83
GABON	-99	3,79	0,7967	1

GAMBIA	1252332576	4,28	0,7804	9,49
GEORGIA	6590815232	3,71	-99	3,15
GHANA	1160290625	3,71	0,7061	4
GRENADA	-99	-99	0	0
GUATEMALA	7339040224	3,9	0,4767	0
GUINEA	1350125107	3,65	0,7598	9,22
GUINEA-BISSAU	-99	3,79	0,85	5,92
GUYANA	-99	3,79	0,2378	3,16
HAITI	-99	4,08	0,0644	1
HONDURAS	9039207968	4,01	0,0974	0
INDIA	6590815232	3,61	0,7422	3,66
INDONESIA	-99	3,67	0,6906	9,38
IRAN	-99	3,65	-99	9,9
IRAQ	-99	3,73	-99	9,85
ISRAEL	9039207968	3,66	0,3271	4
JAMAICA	-99	3,82	0,0125	0
JORDAN	7737809375	3,66	0,0297	9,59
KAZAKHSTAN	9509900499	3,72	-99	-99
KENYA	2706784157	4,14	0,827	3,16
KIRIBATI	-99	-99	0,5	0
KOREA, NORTH	-99	3,45	0	-99
KUWAIT	5277319168	-99	-99	9,22
KYRGYZSTAN	6956883693	3,68	-99	-99
LAOS	3486784401	3,55	0,25	0
LATVIA	-99	3,66	-99	0
LEBANON	3939040643	-99	0,114	-99
LESOTHO	2219006624	4,09	0,2098	0
LIBERIA	90224199	-99	0,8031	4,47

LIBYA	-99	-99	0,1214	-99
LITHUANIA	6590815232	3,56	-99	0
MACEDONIA	-99	3,67	-99	5,77
MADAGASCAR	8153726976	3,86	0,0627	2,65
MALAWI	7737809375	3,66	0,6224	3,58
MALAYSIA	-99	3,7	0,6104	-99
MALDIVES	9039207968	-99	0,0333	10
MALI	459165024	3,69	0,8086	9,49
MALTA	-99	3,33	0,1033	0
MARSHALL ISLANDS	-99	-99	-99	0
MAURITANIA	3707398432	3,66	0,27	10
MAURITIUS	8153726976	3,61	0,7085	4,07
MOLDOVA	6240321451	3,65	-99	0
MONACO	-99	-99	-99	-99
MONGOLIA	9509900499	3,49	0,0737	2
MONTENEGRO	-99	-99	-99	-99
MOROCCO	4704270176	3,67	0,348	9,93
MOZAMBIQUE	2073071593	3,86	0,7863	4,22
MYANMAR	-99	-99	0,384	-99
NAMIBIA	5277319168	4,3	0,7283	0
NEPAL	-99	3,85	0,45	2,05
NICARAGUA	6590815232	3,96	0,0992	-99
NIGER	69343957	-99	0,7329	8,94
NIGERIA	-99	3,78	0,8567	7,07
OMAN	2706784157	-99	-99	8,66
PAKISTAN	601692057	3,44	0,6216	9,85
PALAU	-99	-99	-99	0
PANAMA	9509900499	4	0,1908	0

PAPUA NEW GUINEA	-99	3,92	0,8027	0
PARAGUAY	-99	3,99	0,4111	0
PERU	-99	3,86	0,4316	0
PHILIPPINES	6956883693	3,8	0,7238	2,24
QATAR	9509900499	-99	-99	9,75
ROMANIA	8153726976	3,69	0,122	2
RUSSIA	-99	3,81	-99	3,46
RWANDA	-99	3,82	0,0609	2,14
ST. KITTS AND NEVIS	-99	-99	0	0
ST. LUCIA	9039207968	-99	0,5833	0
SAMOA	-99	-99	0,0514	0
SAN MARINO	-99	-99	-99	0
SAO TOME AND PRINCIPE	-99	-99	0	0
SAUDI ARABIA	-99	-99	-99	10
SENEGAL	1804229351	3,72	0,7789	9,7
SERBIA	9509900499	3,66	-99	-99
SEYCHELLES	-99	-99	0	1,05
SIERRA LEONE	-99	3,66	0,813	7,75
SINGAPORE	-99	3,87	0,3215	3,86
SLOVENIA	8587340257	3,42	-99	1,55
SOLOMON ISLANDS	-99	-99	0,5714	0
SOUTH AFRICA	-99	4,03	0,831	0
SRI LANKA	-99	3,69	0,3257	-99
ST. VINCENT AND THE GRENADINES	-99	-99	0	0
SUDAN	-99	-99	0,5122	8,37
SURINAME	9039207968	3,97	0,75	4,43
SWAZILAND	-99	3,92	0	3,16
SYRIA	-99	-99	0,0948	9,49

TAJIKISTAN	7737809375	3,51	-99	9,49
TANZANIA	8587340257	3,6	0,8902	5,92
THAILAND	-99	3,74	0,3569	2,14
TIMOR-LESTE	-99	-99	-99	2
TOGO	2706784157	-99	0,7285	4,47
TONGA	-99	-99	0	0
TRINIDAD AND TOBAGO	-99	-99	0,2313	2,41
TUNISIA	9039207968	3,7	0,0703	9,9
TURKMENISTAN	-99	3,28	-99	9,43
UGANDA	-99	3,82	0,8358	4
UKRAINE	6240321451	3,71	-99	0
UNITED ARAB EMIRATES	7737809375	-99	0	9,8
URUGUAY	-99	3,81	0,0667	0
UZBEKISTAN	-99	3,68	-99	9,38
VANUATU	5277319168	-99	0,5441	0
VENEZUELA	7339040224	3,86	0,0525	0
VIETNAM	-99	3,54	0,1176	0,32
YEMEN	-99	3,63	0,0122	9,49
ZAMBIA	7737809375	3,93	0,8294	4,9
ZIMBABWE	5584059449	4,29	0,5986	1

Appendix D: Output base and good governance models

Correlation matrix

		LN_UMR	LN_PHS	LN_IPC	Root0.3_CC_Above	Root_GE_Above	Voice_and_accountability	Political_stability_and_absence_of_violence	Access_to_sanitation	Macht4.5_Water	Macht5_FE
LN_UMR	Pearson Correlation	1	-.314**	-.823**	-.655**	-.703**	-.417**	-.377**	-.823**	-.813**	-.646**
LN_PHS	Pearson Correlation	-.314**	1	.202*	.329**	.265**	.476**	.366**	.183*	.274**	.398**
LN_IPC	Pearson Correlation	-.823**	.202*	1	.586**	.694**	.293**	.365**	.751**	.761**	.618**
Root0.3_CC_Above	Pearson Correlation	-.655**	.329**	.586**	1	.897**	.652**	.598**	.429**	.556**	.329**
Root_GE_Above	Pearson Correlation	-.703**	.265**	.694**	.897**	1	.645**	.540**	.549**	.623**	.489**
Voice_and_accountability	Pearson Correlation	-.417**	.476**	.293**	.652**	.645**	1	.484**	.235**	.392**	.282*
Political_stability_and_absence_of_violence	Pearson Correlation	-.377**	.366**	.365**	.598**	.540**	.484**	1	.319**	.352**	.219*
Access_to_sanitation	Pearson Correlation	-.823**	.183*	.751**	.429**	.549**	.235**	.319**	1	.787**	.681**
Macht4.5_Water	Pearson Correlation	-.813**	.274**	.761**	.556**	.623**	.392**	.352**	.787**	1	.530**
Macht5_FE	Pearson Correlation	-.646**	.398**	.618**	.329**	.489**	.282*	.219*	.681**	.530**	1
LN_GINI	Pearson Correlation	.243*	0,075	-0,135	-0,081	-0,101	0,053	-0,06	-0,173	-.199*	-0,17
Ethnolinguistic_fractionalization	Pearson Correlation	.536**	-.265**	-.411**	-.262**	-.304**	-0,106	-.219*	-.508**	-.445**	-.435**
MUSLIM	Pearson Correlation	.260**	-.404**	-0,177	-.236**	-.262**	-.522**	-.337**	-0,146	-.233*	-.265*

** Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

	LN_GINI	Ethnolinguistic_fractionalization	MUSLIM
LN_UMR	.243*	.536**	.260**
LN_PHS	0,075	-.265**	-.404**
LN_IPC	-0,135	-.411**	-0,177
Root0.3_CC_Above	-0,081	-.262**	-.236**
Root_GE_Above	-0,101	-.304**	-.262**
Voice_and_accountability	0,053	-0,106	-.522**
Political_stability_and_absence_of_violence	-0,06	-.219*	-.337**
Access_to_sanitation	-0,173	-.508**	-0,146
Macht4.5_Water	-.199*	-.445**	-.233*
Macht5_FE	-0,17	-.435**	-.265*
LN_GINI	1	0,121	-.318**
Ethnolinguistic_fractionalization	0,121	1	.222*
MUSLIM	-.318**	.222*	1

Output Base Models

	Base model 1	**Base model 2**
R^2	0,899	0,874
F-value	34,458	82,867
Sig. F	0,000	0,000
Constant	7,607	9,193
Sig. Constant	0,000	0,000
PHS	0.035	0,060
Sig. PHS	0,586	0,880
Income	-0,609	-0,568
Sig. Income	0,000	0,000
Sanitation	-0,257	-0,007
Sig. Sanitation	0,017	0,022
Female Education	-0,114	-4.577E-11
Sig. Female Education	0,203	0,024
Water	0,022	0,016
Sig. Water	0,827	0,348
GINI	0,081	0,053
Sig. GINI	0,239	0,998
Ethno	0,092	0,119
Sig. Ethno	0,165	0,834
Muslim	0,029	0,098
Sig. Muslim	0,089	0,830

Output Good Governance Models

	Model CC	Model GE	Model VA	Model PS	Model GG
R^2	0,843	0,846	0,841	0,847	0,862
F-value	50,027	51,252	49,289	50,756	31,815
Sig. F	0,000	0,000	0,000	0,000	0,000
Constant	8,331	8,615	8,754	9,182	8,735
Sig. Constant	0,000	0,000	0,000	0,000	0,000
ZPHS	-0,058	-0,073	0,061	-0,052	-0,077
Sig. ZPHS	-,403	0,244	0,366	0,469	0,316
ZCC	-0,157				
Sig. ZCC	0,154				
ZGE		-0,083			-0,143
Sig. ZGE		0,397			0,257
ZVA			-0,057		-0,020
Sig. ZVA			0,469		0,833
ZPS				0,070	0,098
Sig. ZPS				0,389	0,276
Moderator CC	-0,110				
Sig, Moderator CC	0,291				
Moderator GE		-0,137*			-0,144
Sig. Moderator GE		0,064			0,136
Moderator VA			-0,096		-0,015
Sig. Moderator VA			0,221		0,878
Moderator PS				-0,014	0,025
Sig. Moderator PS				0,828	0,697

	Model CC	**Model GE**	**Model VA**	**Model PS**	**Model GG**
Income	-0,456	-0,495	0,514	-0,581	-0,522
Sig. Income	0,000	0,000	0,000	0,000	0,000
Sanitation	-0,010	-0,010	-0,009	-0,007	-0,008
Sig. Sanitation	0,003	0,002	0,004	0,026	0,014
Female Education	-4.434E-11	-3.892E-11	-4.043E-11	-4.447E-11	-3,734E-11
Sig. Female Education	0,071	0,113	0,104	0,067	0,124

Appendix E: Output alternative models

	Base Model	Model CC	Model GE	Model VA	Model PS	Model GG
R^2	0,863	0,853	0,855	0,849	0,851	0,873
F-value	127,418	81,436	82,301	78,482	78,874	49,704
Sig. F	0,000	0,000	0,000	0,000	0,000	0,000
Constant	10,275	9,401	9,434	9,548	9,955	9,382
Sig. Constant	0,000	0,000	0,000	0,000	0,000	0,000
ZPHS	0,042	-0,107	-0,097	-0,107	-0,111	-0,105
Sig. ZPHS	0,869	0,080	0,094	0,102	0,096	0,130
ZCC		-0,125				
Sig. ZCC		0,129				
ZGE			-0,102			-0,159
Sig. ZGE			0,225			0,145
ZVA				-0,077		-0,014
Sig. ZVA				0,249		0,867
ZPS					0,091	0,081
Sig. ZPS					0,112	0,196
Moderator CC		-0,200				
Sig, Moderator CC		0,009				
Moderator GE			-0,174			-0,134
Sig. Moderator GE			0,005			0,133
Moderator VA				-0,161		-0,036
Sig. Moderator VA				0,024		0,700
Moderator PS					-0,046	-0,017
Sig. Moderator PS					0,417	0,765

	Base Model	**Model CC**	**Model GE**	**Model VA**	**Model PS**	**Model GG**
Income	-0,757	-0,653	-0,659	-0,672	-0,727	-0,652
Sig. Income	0,000	0,000	0,000	0,000	0,000	0,000
Female Education	-5,001E-11	-5,853E-11	-5,572E-11	-5,640E-11	-5,383E-11	-5,151E-11
Sig. Female Education	0,022	0,005	0,007	0,008	0,011	0,011