DECOMPOSING SOCIOECONOMIC INEQUALITIES IN INFANT MORTALITY IN PUNJAB, PAKISTAN

Thesis

Submitted By

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CERTIFICATE

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Dedication

Dedicated to the silent and unjustified suffering of millions of individuals

for whom the right to health remains unrealized- and whose lives

I strive and aspire to touch.

Acknowledgment

Foremost, I am extremely grateful to my parents for their unparallel support, encouragement, and patience throughout this research project.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
BHU	Basic Healthcare Unit
CC	Concentration Curve
CI	Concentration Index
DOLS	Dynamic Ordinary Least Squares
FMOLS	Fully Modified Ordinary Least Squares Method
GDP	Gross Domestic Product
GNP	Gross National Product
IMR	Infant Mortality Rate
KP	Khyber Pakhtunkhwa
LHW	Lady Health Workers
LMIC	Low and Low Middle Income Countries
MICS	Multiple Indicator Cluster Survey
NIPS	National Institute of Population Studies
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
PDHS	Pakistan Demographic and Health Survey
PK	Pakistan
RHC	Rural Health Centers
SDG	Sustainable Development Goals
U5MR	Under-5 Mortality Rate

UNDP	United Nations Development Programme
UNICEF	The United Nations Children's Fund
WHO	World Health Organization

ABSTRACT

The objective of this study was to quantify the pure contribution of each determinant to socioeconomic inequality in infant mortality in Punjab province. In other words, to identify the major factors which contribute to a greater extent, in inequality in infant mortality, in the Punjab province. The current research has used the secondary data. As a measure of social and economic inequality of child mortality, the concentration index has been used. Concentration index was decomposed into its determining factor. The largest contribution to inequality in infant mortality in the Punjab province is attributed to household economic status (42.35%), maternal education (35.52%), rural residence (11.45 %) and mother's age (10.44%). The findings indicate that socioeconomic inequality in infant mortality in Punjab is determined not only by health system functions but also by factors beyond the scope of health authorities and healthcare delivery system.

Keywords: Infant Mortality, Mortality Inequality, Health Disparities, Concentration Index, Decomposition Analysis

CHAPTER 1

INTRODUCTION

1.1. Background and Introduction

"The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (WHO const.). More than 70 years ago, these words were added to the Constitution of the World Health Organization, but after 70 years, millions around the globe still wait for this promise to be fulfilled.

Health disparities are a question of life and death, of well-being and suffering. The idea that individuals with diverse socioeconomic conditions are facing preventable disparities in health, and quality of life in the world today is, put clearly, unjust. Despite the overall improvement in living standards and health of the population, inequality in child health persist in developing countries. The importance of socioeconomic level as a determinant of child health is well established (Mosley,W,H and Chen, L, 2003) . So socioeconomic inequality can result in inequality in child health (Chalasani, 2012). If high health inequalities persist in the low-income countries, then goal 3 of Sustainable Development Goals which envisages "health and wellbeing for all" will remain a distant dream. Infant and child mortality rate provides a good picture of overall population health (Chukwu A.U et.al 2019). Moreover, inequalities in child health can indicate the overall health equality, in the population.

Several different indicators are used across the globe to assess child health. One of those indicators is infant mortality. Infant mortality refers to "the mortality of newborns under the age of one year". In other words, it refers to "the probability of

dying between birth and the first year of age expressed per 1,000 live births". Another parameter used to gauge child health is the under-5 mortality rate, which can be defined as the "number of deaths of children between birth and five years of age, per 1000 thousand live births". Both the infant mortality rate and the under-5 mortality rate indicates the overall health of the children (WHO, 2020).

Literature suggests that low-income countries around the world, have higher infant and child mortality rates in comparison to high-income countries, as one can expect. There are many reasons for it. Endemic poverty in lower-income countries, lack of education, poor living standards, massive population, poor governance, corrupt political institutions, lack of access to health care facilities are a few of the many reasons for high mortality rates in these countries (The World Bank, 2018). Since 1990, a significant decline has been observed in preventable infant mortality. However, despite the overall improvement in children's health, still large number of under-five mortality exists in the world mostly from preventable causes. (UNICEF, Child Mortality Statistics 2018).

In Pakistan, infant and child mortality decreased steadily since the late sixties. However, neonatal and infant mortality rates are much higher in Pakistan than neighboring countries (Pakistan Economic Survey 2019-20). Urban-rural dichotomies have persisted consistently in favor of urban regions having low infant and child mortality. Moreover, progress in the improvement of health of children in the country has been also the lowest in the region. Which makes the investigation of this issue more important.

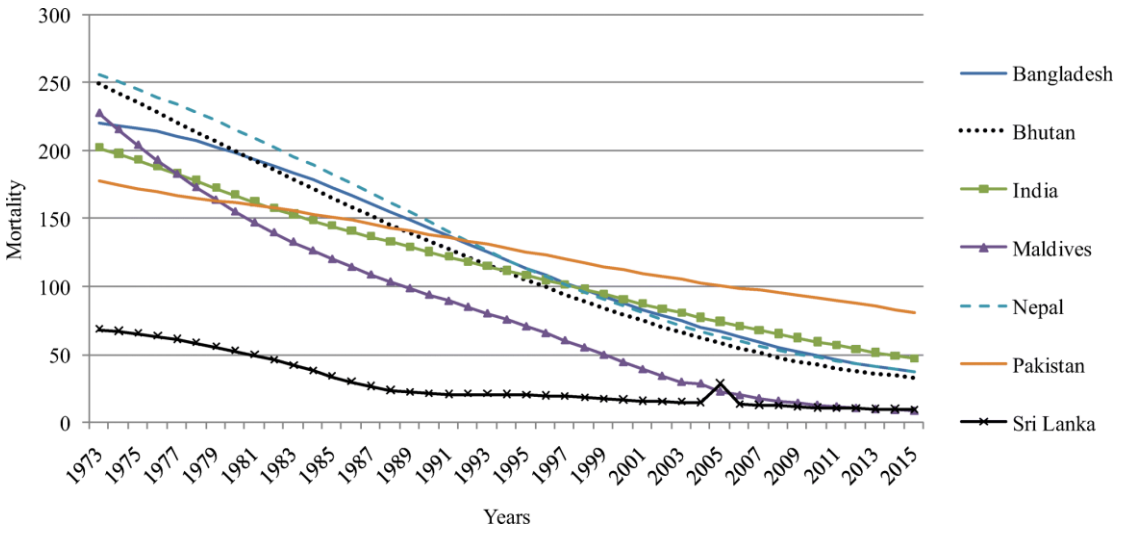

Figure 1. 1: Child mortality rates in South Asian countries. Source: World Bank

Pakistan's total infant mortality rate has gradually declined from 194.4 fatalities per 1,000 live births in 1969 to 69.3 fatalities per 1,000 live births in 2018. (The World Bank, 2018). In the South Asian country, Pakistan has one of the highest child mortality rates. (Pakistan Economic Survey 2019-20). (Zakaria et al., 2019) .

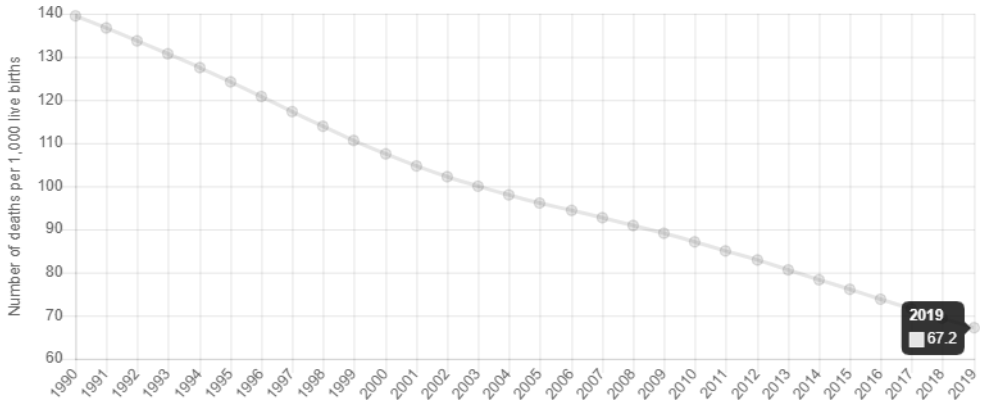

Figure 1. 2:Trend of child mortality in Pakistan (source: UNICEF)

For thousands of infants around the world, poverty, and lack of access to decent health care facilities are hampering appropriate care. Pakistan allocates less than one

percent of its GDP to health, stopping the large rate of child mortality from reducing. (UNICEF, 2018). As per the 2017-18 Pakistan Demographic and Health Survey (PDHS), one in every 14 children dies within the first year of birth while one in every 11 dies before reaching the age of five years (Pakistan DHS,2017-18).

1.2. Socioeconomic Inequality and Infant Mortality

Socio-economic inequalities are defined as inequalities that relate to differences in income, social class, occupational background, educational achievement, and neighborhood deprivation. These are distinguished from socio-demographic differences, which relate to factors such as age, gender, ethnicity, marital status, number of children, household composition, and living arrangements.

Great socio-economic disparities exist in infant and child mortality in Pakistan. For instance, under-5 mortality rates are 100 deaths for every 1,000 live births among young people born to women in the very lowest wealth quintile compared to 56 deaths for those born in high-income households for every 1,000 live births, a disparity of 44 deaths (PDHS, 2017-18). Similarly, those who have educated mothers, have better health outcomes as compared to those Infants who were born to mothers with no or little formal education (Hyochol Ahn, et al, 2017).

Socioeconomic conditions are an important determinant of child health as socioeconomic inequality can result in inequality in overall child health (Chalasani, 2012). Socioeconomic inequality in Pakistan has intensified from 1988 to 2005. Moreover, income distribution has worsened from 1988 to 2005. Income inequality in provinces for 1987-88 and 2004-05, was the highest for the province of Punjab. Following Punjab were Sindh and KP. While Baluchistan had the lowest income

inequality in the country (UNDP, 2009). Moreover, in a more recent study, it was found that socioeconomic inequality is higher in two provinces i.e. Sindh and Punjab, as compare to other provinces of Pakistan (Hamid & Akram, 2014). So, due to the high socioeconomic inequalities in the province, high health inequalities are a possible outcome. In addition to high socioeconomic inequality, under-5 mortality rate is also highest in Punjab as shown in fig. 3.

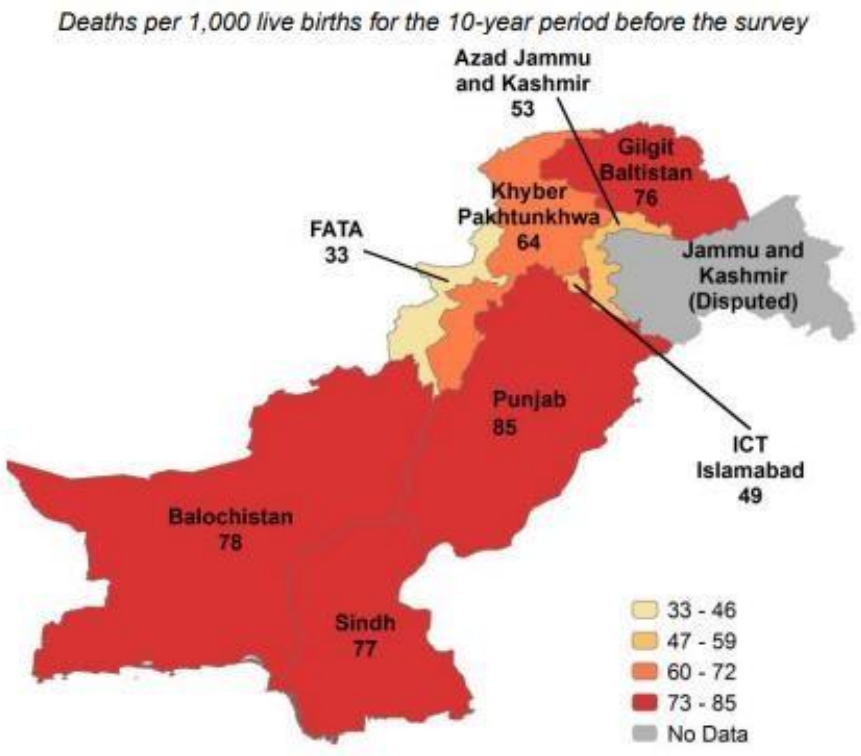

Figure 1. 3: Under-5 mortality by region in Pakistan (source: PDHS 2017-18)

1.3. Problem Statement

High socioeconomic inequality results in health inequalities, which results in poor health of infants particularly belonging to poor socioeconomic strata of the population

and unnecessary loss of precious lives which can be prevented by evidence-based and targeted policies.

1.4. Research Gap

Determinants of infant mortality are established in the literature and also the evidence of inequality in infant mortality is documented, but research on the relative contribution of different determinants to inequality in childhood mortality in Punjab is not available. To redress the root causes of inequality, quantifying the major determinants of social inequality is more relevant for policy purposes. This void will be filled by the current study.

1.5. Objectives of the Study

The objective of this study is:

- To quantify the pure contribution of each determinant to socioeconomic inequality in infant mortality in Punjab province. In other words, to identify the major factors which contribute to a greater extent, in inequality in infant mortality, in the Punjab province.

1.6. Research Question

- How much contribution, each determinant has, in the inequality in infant mortality, in comparison to other determining factors, in the province?
- What are the major determinants of inequality in infant mortality in the province?

1.7. Significance of the Study

Literature suggests that socioeconomic disparity results in health disparities in Infants from families with lower socioeconomic status, and consequently higher mortality

rates. Therefore, most of these deaths are premature and inequitable. In the case of Punjab, there is a higher socio-economic disparity in the province relative to other provinces in the country, so health inequality is a likely outcome. Study of infant mortality disparities in the province of Punjab using the most recent MICS data available (2017-2018) will help to better understand the degree of inequality and eventually direct the selection of different types of policies. Besides, it will help to clarify where resources can be targeted at remediating the root causes of inequality.

Also, disparities in child mortality can be used as a direct indicator of inequality in the population's overall health. No recent published research on health inequalities in the Punjab province is available. This research would fill this void and this study would help to improve the population's overall health.

Finally, the assessment of social disparity in infant mortality can create intelligence that can be used by the public and decision-makers for education, advocacy, and increased transparency.

1.8. The Framework of the Study

The theoretical framework of the study presented in fig.4 is the Mosley & Chen framework for studying the survival of children in less developed countries (Mosley, W, H and Chen, L, 2003). This framework would provide the basis for understanding the multiple factors that affect child health.

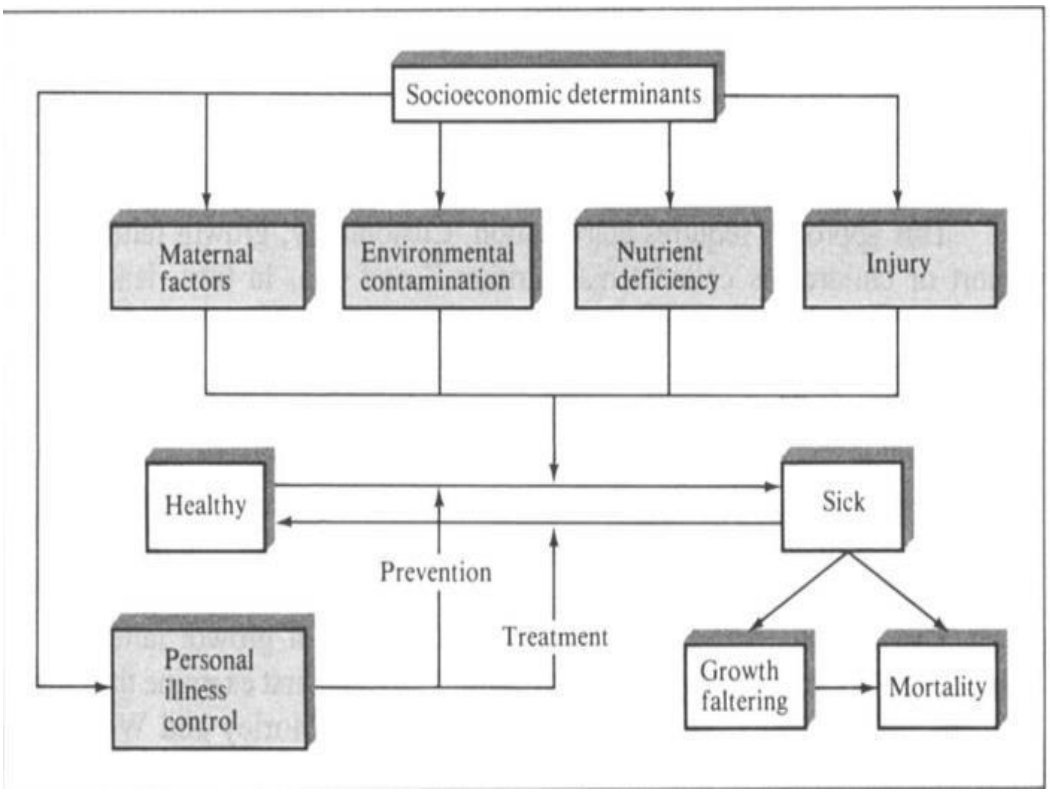

Figure 1.4. Mosley & Chen Framework for Child Health

1.9. Organization of the Study

There are five chapters of this study. The first chapter consists of the introduction of the study which includes background, problem statement, research gap, objectives, research questions, and significance of the study. The second chapter contains a brief and comprehensive detail of international and national level literature review on the topic. The next chapter provides the data sources and methodological framework of the present study. The results and discussion part is in the fourth chapter. The fifth and final chapter contains the conclusion of the present study and provides policy recommendations.

CHAPTER 2

LITERATURE REVIEW

An extensive body of research shows that maternal mortality and infant mortality not only highlight the economic and social welfare conditions of mothers and newborns but also illustrate the success of any health system. A serious discussion has taken place in the socio-economic literature on the topic of childhood mortality and its possible determinants, and a variety of important observational research has consequently been made, covering both single-country and cross-country studies.

Concerning single-country surveys, Mutunga (2007) used data from the Kenyan Demographic and Health Survey to analyzed ecological and social, and economic factors of infant and child mortality using a survival research system for households (including maternal schooling, access to clean drinking water, sanitation facilities and others). In wealthier families with improved living standards, access to nutritious food, and better nutrition, infant survival rates are higher. This suggests that families who can manage to access sufficient health care facilities are expected to raise the likelihood of child and baby survival. Agha (2000) also draws similar assumptions.

Pandey, Choe, Luther, Sahu, and Chand (1998) examined for unadjusted consequences (not adjusting for other demographic factors) of socio-economic characteristics of infant and child mortality in India using survival research. In this research, it was observed that among those children born to mothers with no formal education, born in rural areas, and without access to sanitation facilities, mortality appears to be greater. The authors indicated, however, that when other demographic variables are used in their models, the influence of these socio-economic influences becomes negligible.

A variety of researchers (e.g., Watson, 2006) concluded that in developing countries, the availability of proper sanitation and secure drinking water services led to major health changes. Gamper-Rabindran et al. (2010) indicated that the availability of piped water offers a substantial decrease in the incidence of child mortality while other public health inputs have been placed in place. Kumar and Vollmer (2013) argued that diarrhea in developed countries is known to be the second-largest cause of under-five mortality and that the occurrence of diarrhea has only substantially decreased in households that pay greater attention to water treatment before consuming.

To successfully improve a community, health and wellbeing are one of the required aspects. For several low and middle-income nations around the globe, reliable and accessible healthcare facilities remain one of the most critical problems. A close connection has also been built between the level of social care and health spending. Erdogan, Ener, and Arica (2013) established an essential and negative association between the rate of child mortality and actual per capita GDP using panel data analysis techniques. Renton, Wall, and Lintott (2012) have stated that improvements in socio-economics enhance health potential in developing countries, and similarly, Kalipeni (1993) discovered demographic and socio-economic variables such as age at first marriage, total fertility rates, rates of female literacy, and several home craft centers that decide infant mortality rates.

Agha's (2000) studies have shown that socio-economic conditions and proximity to better water and sanitation services play an important role in child mortality. In the case of 53 low-and-middle-income countries (LMICs), Hajizadeh, Nandi, and Heymann (2014) argued that the fundamental status of child deaths among socio-economically deprived households remains a significant health and social policy

problem in most LMICs. Relative socioeconomic disparities in child mortality can be mitigated by measures intended to minimize adolescent pregnancy concentrations among mothers in lower socio-economic classes. Another research, Rammohan, Iqbal, and Awofeso (2013), found that supply-side health factors play an important role in reducing the rate of infant mortality in India, particularly hospital proximity and the availability of obstetric emergency care facilities.

Infant mortality represents not just the health of the infants and children, but also the overall health of the community. The distal socioeconomic and associated proximate child mortality determinants were analyzed by (Khadka et al., 2015), and evidence was given for targeted interventions. The determinants of infant mortality were, for the most part, focused on various elements, such as growth in the economy, living standards, social prosperity, and environmental characteristics. Social progression and economic growth have been an important explanation of the decline in newborn child mortality in developing nations. In this way, various social, demographic, and economic variables assume a significant role in the reduction of infant and child mortality. The study concluded that distal and proximate socioeconomic determinants are related to infant and child mortality in Nepal. In impoverished people and working classes, child mortality was larger than in the wealthy classes. There was a high risk of infant mortality for the population of the Mountain environmental district and Far Western improvement locale. For babies, whose birth size was lower, as provided by mothers, and who had a higher birth rank and a short birth interval, infant and child mortality was essentially greater.

As a predictor of public health, the infant mortality rate (IMR) and disability-adjusted life expectancy (DALE) were contrasted by (Reidpath & Allotey, 2003), by examining data from 180 countries and found that these metrics can be used as a

population health indicator. Besides, precisely, the child mortality rate (IMR) may be used as an indicator of the health of the overall population.

According to, (Mosley, W, H and Chen, L, 2003) social and economic variables at the community, household, or individual level function through five proximate determinants per the and are the channels through which socioeconomic factors impact children ’s health. (Schell et al., 2007), using a multiple regression model of five IMR predictors, the country-level social and economic determinants of infant mortality were evaluated in 152 countries which included public health expenditure, Gross national product (GNP) per capita, female illiteracy, poverty levels, and wealth distribution. The study concluded that in middle- and lower-income countries, potential health advantages from increased female education and economic development should be recognized.

Similarly, (Iram & Butt, 2008), using a sequential probit model, the social and economic determinants of childhood mortality in Pakistan analyzed and established that the main aspects of child health are breastfeeding by mother and maternal education. (Babayara & Addo, 2018), utilizing multiple statistical methods, analyzed the risk factors for child mortality in a district of Northern Ghana, and concluded that the maternal educational attainment, mother's age, and the mother's household economic and social status were directly correlated to infant and child mortality. (Ferrarini & Norström, 2010), by analyzing time data from 1970 to 2000, assessed the effect of family planning legislation and economic growth on child mortality and found that economic development lowered infant mortality globally in the post-war era of the 20th century. Also, family planning policy has led to an overall gain in the wellbeing of children.

Ayele et al., (2017) using the Cox regression analysis for survival research, analyzed early childhood mortality in Ethiopia. With the help of survival analysis, the article concluded that children living in Addis Ababa (which is a more developed locality, comparatively) had a lower risk of dying relative to the country's rural communities and remote areas, primarily because of improved healthcare facilities. Besides, the age of the mother also influenced the infant's risk of mortality.

Chukwu A. U et al. (2019) in Nigeria analyzed infant mortality by using the Hazard approach for the study of event duration data and the multilevel model for the analysis of the three layers of hierarchically clustered data. The paper addressed the determinants of infant and child mortality through this method. The Study concluded that childhood life depends primarily on variables at the community and family level instead of just individual factors.

In a related way, Antani et al. (2009) used the Longitudinal and Health Study of Nigeria (2003) to investigate the role of faith in the mortality of children under five. With the use of multivariate modeling methods, the research reveals that the faith or social association of mothers substantially influences the mindset of mothers towards prenatal and postnatal health care, causing disparity in infant mortality. The research shows that, regardless of the moral views of women, the provision of preventive facilities and maternal care must be guaranteed.

The disparity in infant mortality is calculated by Bathacharaya and Chikwama (2012) and induces this inequality in separate districts of India. The study recognizes that decreasing infant mortality, access to clean water, the share of farm labor in the overall labor force are significant factors. Moreover, to the gain of developing

districts, proximity to pediatric services raises disparities in infant mortality by 20 percent.

McKinnon et al. (2014) calculate absolute inequality (using the slope index of inequality) and relative inequality (using the relative index of inequality) about two socio-economic conditions: maternal schooling and household income index. The research used two DHS surveys with a ten-year difference to do a comparative review. The study results describe a reduction in absolute and relative mortality in most low- and middle-income countries dependent on household resources and education levels.

Hosseinpoor et al. (2006), studied the social and economic disparity in Iran's early childhood mortality. To evaluate the social and economic status of the family, the research used principal component models to develop a wealth index. The concentration index of childhood mortality was used to calculate social and economic disparity. For determining the determinants of infant mortality, the multiple logistic regression model was used. Finally, concentration indices were broken down into determinant variables. The paper concluded that household economic status, maternal schooling, and residence in rural city environments, and birth interval were the major contributors to disparities in early childhood mortality.

Chalasani (2012), studied income inequities in childhood health in India. A regression-based decomposition method was used in the analysis. To calculate inequality, the concentration index was used. Besides, the index of concentration for each result is then further broken down. The authors noted that wealth disparity and mother’s education inequality are the major causes of inequalities in child health in India.

De & Dhar (2013), contrasted the differences in childhood survival and health among various states of India. Using child and under-five mortality data categorized under various wealth index quintiles, the paper used concentration curves and indices. These indicators of inequality show that infant death inequality is more prevalent in the relatively developed regions than in the poorer states in India. Authors observed that there is substantial proof of multi-dimensional child health disparities, including socioeconomic background, maternal educational attainment, caste, religion, gender, rural/urban residence, area, and state.

Wagstaff et al. (2003) researched the roots of health inequality in Vietnam by measuring disparities in malnutrition. To assess health sector disparities, the study utilized the concentration index, regression analysis, and decomposition analysis. The study concluded that while the proportional disparity in malnutrition increased with increasing income levels. In addition, the predictors of malnutrition at the population level have changed, but the change was not dispersed uniformly between poor and rich populations.

Vapattanawong et al. (2007), calculated Increases in early childhood mortality disparities by the family socioeconomic strata of Thailand's population between 1990 and 2000. Using households' properties and features, they calculated shifts in the distribution of the U5MR by economic strata. The study observed that the average economic condition of households increased, with inequality declining between the two censuses in Thailand and a slightly greater decrease in U5MR in the deprived parts of the population.

Wagstaff (2000), has examined disparities in infant and child mortality due to consumption in nine poor countries, including Pakistan. The distribution of mortality

was contrasted between countries using concentration indices. The paper concluded that there was reasonably little disparity in childhood mortality in Pakistan compared to other low-income countries. In another study, (Wagstaff & van Doorslaer, 2004), The basis for quantitatively contrasting general health disparity and socio-economic health inequality has been outlined. The system developed for both individual-level data and clustered data was demonstrated using data from Vietnamese children on malnutrition and Canadian adults on health utilities. The extent of socio-economic disparity was calculated at about 25 percent of the total disparity in each of these instances.

(LAYTE, 2004), examined the degree of equality in health service provision through the distribution of wealth in Ireland, i.e., the degree to which fair care for equal needs was provided regardless of wealth. The study showed that, aside from oral and optometrist services, most such services were used predominantly by those at the lower tail of the distribution of wealth, but the community also had the highest need for health care. Without standardizing for confounding variables, the relation of health need to health care delivery across the income spectrum indicated that those in the richest quintile obtain more health care for a particular state of health, suggesting inequity. Nevertheless, among the aged, the need for medical coverage was greatest and this category often had to be at the end of the distribution of income. After standardizing the analysis for age, sex and place, it was found that hospital services were equally spread through the distribution of income, whereas medical services appear to be pro-poor (used more by those with lower incomes for given health status) and dental and optical services tend to be pro-rich (used more for a given health status by those with relatively higher incomes).

(Kakwani et al., 1997), The relation between different frequently used health inequality indices (the relative inequality index (Rll) and the concentration index (CI)) was described and demonstrated why they are preferable to other measures used throughout the publications. For their variances, the paper also established asymptotic estimators and explained the role that demographic standardization plays in the study of social and economic health disparities.

The socio-economic inequality in Iran's infant mortality was measured by (Hosseinpoor et al., 2005). The paper analyzed data from the regional Population and Health Study carried out in Iran in 2000. The research analyzed the inequalities in child mortality using the odds ratio of infant mortality between the lowest and highest socioeconomic quintiles at both regional and national levels and the concentration index, an indicator of disparities focused on the overall economic and social dispersion. In terms of socio-economic quintiles, a marginal decline in child mortality rates was noticed in the study. The analysis showed that the inequality in child mortality in both the lowest and highest classes in most provinces was important and favored the well-off. Interestingly, this difference has been shown to differ between provinces.

(Van Doorslaer et al., 2002), provided in 12 European Union Countries, multinational comparative research on the factors underlying differences in the usage of general practitioners and specialty services. The research found that high pro-rich inequality occurs regarding the likelihood of contacting a medical professional in virtually every region. Given their lower demands for such treatment, it seems that affluent and better-trained people are much more likely than a less well-off to see a doctor. This pattern is universal in Europe, but greater in countries where opportunities for purchasing faster and/or exclusive access were provided, either for

health insurance cover or private practice. In subsequent visits, pro-rich disparity added to this access inequity, however, appears to be more connected than other variables to regional inequalities in usage.

Research studies globally clearly indicate that there are higher death rates among Infants belonging to families with a lower socioeconomic level. Any of these accidents are triggered by factors that we know how to stop, but they are needless and inequitable. Measuring socioeconomic disparities, frequent analysis of child health gaps, and the use of the resulting knowledge is needed for awareness, activism, and enhanced transparency among the general public and policymakers. These steps alone would, however, not be adequate to bring about sustainable progress. Unraveling and quantifying the attributes of child mortality determinants to the calculated social disparity in infant mortality is more useful for policy purposes. Such research will then suggest the form of policy more precisely and where money can be focused to redress the root causes of child mortality disparities.

To begin with, (Agha, 2000), Contributing factors in infant mortality in Pakistan have been studied. The research used statistics from a nationwide representative sample survey of the Government of Pakistan, sponsored by the World Bank, the Pakistan Integrated Household Survey 1991. Till the mid-nineties, the child mortality rate was high in Pakistan, at 100 fatalities per 1000 live births. The analysis found that throughout the 1980s, there was no sign of a secular decrease in infant mortality. Wide gaps in infant survival based on social and economic factors and access to safe drinking water suggested that the underlying reason for stagnant growth in infant mortality in Pakistan was social and gender inequality. In previous decades, economic plans have contributed to enormous inequalities in wealth and access to services in Pakistan. The results revealed that women's low social, economic, and legal status is

intimately related to their children's well-being. Moreover, it was important to design health programs in Pakistan to hit the most under-served: women and children.

(Mahmood, 2002), Studied, in Pakistan, early childhood mortality. The research used the theoretical framework suggested by Mosley and Chen (1984) utilizing statistics from the Pakistan Demographic and Health Survey (PDHS), carried out in 1990, with modifications based on the limitations and structure of the data. The analysis revealed that behavior factors that seek demographic, nutritional, and health are responsible for higher early childhood mortality in Pakistan. In Sindh, the higher neonatal mortality observed was due to the increased number of premature babies and the reduced use of healthcare services. The study found that a more significant determinant of infant mortality is mother education than father education.

(Iram & Butt, 2008) attempted to classify and measure the relative significance of various socioeconomic variables and patterns of maternal treatment that play an important role in deciding infant mortality in Pakistan at different levels of child age. The paper also explored the function of household, socioeconomic, and environmental variables in Pakistan as determinants of early childhood mortality.

The determinants of infant mortality in Pakistan have been investigated by (Rabbani & Qayyun, 2015). The study indicates that Pakistan is among the five countries with the highest rates of infant mortality in the world. Extensive variance in the causes of infant mortality has been identified in the literature on the topic. This research used micro-data gathered by the National Institute of Population Studies from the Pakistan Demographic and Health Survey (PDHS) 2006-07 (NIPS). The descriptive study showed that the incidence of neonatal mortality in Pakistan is strong. The binary logit model was calculated in econometric research using the

Maximum Likelihood Approach (MLM). The study places special focus on the influence of income, schooling for mothers, media attention, and ethnicity. Important determinants of infant mortality in Pakistan have been identified in the influence of mothers' schooling, wealth, and media attention. Awareness of a topic at the national and local level provides a prerequisite for shaping successful problem-solving policies.

Furthermore, F. Murtaza et al. (2015), Utilizing data from Pakistan Integrated Household Survey/Household Integrated Economic Survey 2001-2002, the health deprivation of children in Pakistan was examined. As markers of child wellbeing, coverage of diarrhea and immunization have been used. The study revealed that there are many factors linked to child health disparities in Pakistan, like extreme poverty, illiteracy, lack of information and understanding of child health care, insufficient health care access, and weak institutions.

(Rabbani & Qayyun, 2015), analyzed the factors of infant mortality in Pakistan. The paper used micro-data collected by the National Institute of Population Studies (NIPS) from the Pakistan Demographic Health Survey (PDHS) 2006-07. The descriptive statistic observed that the proportion of neonatal mortality in Pakistan is significant. The binary logistic analysis was performed using the Maximum Likelihood Method (MLM) in econometric analysis. The research paper placed particular emphasis on the impact of wealth, the schooling of mothers, media exposure, and ethnicity. Significant determinants of child mortality in Pakistan have been found in the impact of mothers' education, wealth, and media exposure.

(Aslam & Kingdon, 2014), provided that the relationship between maternal education and infant health outcomes (height and weight) and behavior seeking

parental health (child immunization status) was investigated. The research explored the processes by which maternal education, using specific data from Pakistan, facilitates enhanced infant wellbeing and health-seeking actions.

Finally, (Jehan & Sherbaz, 2018), By separately estimating the inequality for each constituency, the disparity in infant mortality rate was calculated based on the relative wealth of households across Pakistan and different regions within the country. Using 2012-13 Demographic and Health Survey (DHS) data, research using Concentration Index (CI), Concentration Curves (CC), and Dissimilarity Index (DI) techniques has measured inequality in infant and child mortality. The findings of this study provide validity to the hypothesis that social inequalities may be the result of non-economic factors. Furthermore, the report concluded that income disparity has led to the rise of health inequalities in Pakistan.

In conclusion, evidence indicates that in communities with greater income-related inequalities, inequality in infant mortality is very possible. In addition to this, Child health is influenced by numerous factors, including the education of the mother, variables associated with the household, etc. Infants in households with high incomes have a better chance of survival than those who live in households with low incomes. In addition, there is a shortage of literature on inequality in child health and mortality in Pakistan especially in Punjab, where socio-economic inequality is higher compared to other provinces, according to recent estimates. The determinants of the province's infant mortality are already established. Literature has revealed that there is a disparity in health in Punjab. But no literature on the relative contribution of determinants to the disparity in infant mortality is available. This void will be filled by the proposed study.

CHAPTER 3

DATA AND METHODOLOGY

3.1. Data Source

The current research has used data from the Multiple Indicator Cluster Survey (MICS 2017-2018). Following the World Summit for Children Declaration (1990), MICS was established and provides timely data on most measures for measuring the well-being of mothers and children. It enables countries to produce data for use in development plans, strategies, initiatives, and programs, and to monitor progress towards the Sustainable Development Goals (SDGs) and other globally agreed commitments. A district-based survey covering over 210 parameters is the MICS Punjab, 2017-18. In Punjab, the latest MICS was carried out in 2017-18 and has more than 51000 households in the sample. Around 74,010 respondents were interviewed, and 93.1 percent was the response rate. Data on infant mortality was gathered from the birth records of individual married women (16-49 years) of reproductive age.(Hosseinpoor et al., 2006).

To estimate infant mortality, two major types of mortality prediction are widely used: direct estimation methods and indirect estimation methods. Direct predictive methods use registered or confirmed mortality figures for children, including details for those who died on the day of birth, survival status, and date of death or age of death. For cumulative data on the number of children ever born and children who lived or died, indirect calculation approaches apply modeling techniques identified by the mother's age group, the length of the mother's marriage or the duration since her first birth.

This study has used the direct estimation method to calculate infant mortality. In WFS (Hobcraft et al., 1985) (KING, 1983)and DHS publications, procedures for the direct estimate of infant mortality from household survey data have been published (Sullivan et al., 1990; Sullivan et al., 1994;(Ahmed et al., 1990);(Mahy, 2003);(Rutstein, S O & Rojas, 2006)). Usually, household survey-based direct calculation methods use retrospective birth or maternity history to gather the data required for the estimation of mortality indicators. Birth or pregnancy records offer facts that after either birth or pregnancy the person has had and wants at a minimum.

In the MICS this type of data is present in the birth history section. That section of the dataset contains information about the total number of births, the total number of live births, the number of boys and girls who died, and the age of the child upon death. By using this information, infant mortality is calculated. Finally, data analysis software used for this analysis were Excel and STATA.

3.2.1 Dependent Variable

A binary outcome variable is a dependent variable for this analysis, such as whether each of the live-born babies even survived or not in the 12 months after birth.

3.2.2. Independent Variables

Following six predictors were taken for the analysis on the basis of literature.

1. Household wealth index or Index of Household Economic Status (is the main independent variable for this study) is available in the data. Otherwise, an index of economic status could also be constructed using principal component analysis by using household characteristics from the survey. To decomposition analysis, the household in the bottom 40% of the economic status is considered as low economic status, hence a binary variable for economic status was formed.

2. Sex of the Child: either male or female: Literature indicates that the child's sex influences the infant's survival solely because of the desire for a child of a certain sex.
3. Mother’s age at the time of birth: Seven age ranges (< 15 years old; 15-19 years old; 20-24 years old; 25-29 years old; 30-34 years old; 35-39 years old; > 40 years old) are classified.
4. Mother's educational level is considered as a categorical variable with these four levels: illiterate, primary school, high school, university. To decomposition analysis, a binary variable was constructed which provided if the mother is literate or have no formal education, only.
5. Place of residence: rural or urban: In several ways, the health result of the child will be influenced by the place of residence, one of which is access to a health service. During pregnancy, before and after birth, access to healthcare leads to improved outcomes for the newborn.
6. District of residence: There are 36 districts of the province of Punjab. To support the health needs of people in every country, a stronger and sound health system is of vital importance. The inter-district inequalities in health facilities in Punjab have been recorded in several studies.

3.3. Methodology

As a measure of social and economic inequality of child mortality, the concentration index has been used. It can be defined as the twice co-variance between the health variable (infant mortality) and the relative economic condition of a person, divided by the mean variable according to equation 1. The concentration index value range from -1 to +1 as shown in fig. 3.1.

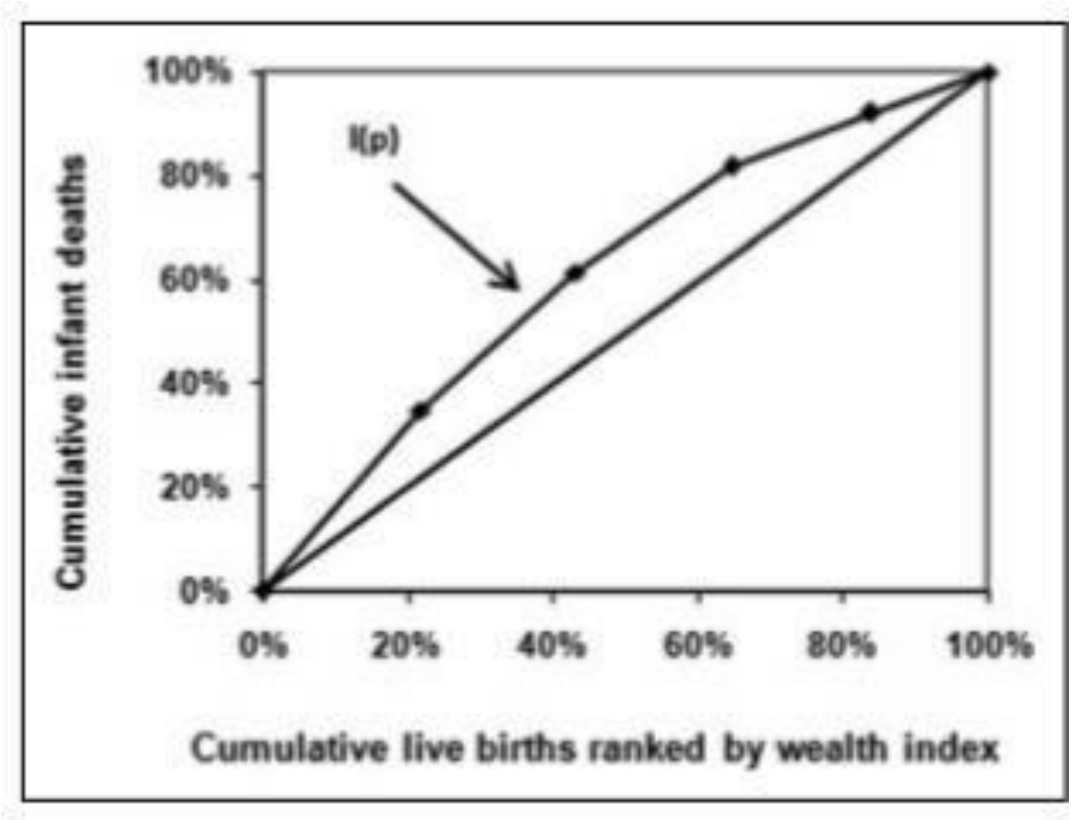

Figure 3. 1: Mortality concentration curve.

Its negative values mean that a factor is prevalent among oppressed communities, while the reverse is suggested by its positive values. In the event where there is no difference, the concentration index is 0.

$$C = \frac{2}{\mu}\operatorname{cov}_{w}(y_i, R_i) \quad (1)$$

In the equation provided above, y_i and R_i are the health status of the ith individual and the fractional rank of the ith individual (for weighted data) respectively, in terms of the index of household economic status; while μ is the mean of the health of the sample and cov_w represents the covariance. Wagstaff et al. provided a linear regression model that would link any health variable (variable of interest), y_i, to a set of k health determinants, x_k :

$$y_i = \alpha + \sum \beta_k x_{k_i} + \varepsilon_i \qquad (2)$$

where ε_i is the error term. Based on relationship between y_i and x_{k_i} in Equation (2), the concentration index for y (C) can be written as:

$$C = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k + \frac{GC_\varepsilon}{\mu} = C\hat{}_y + \frac{GC_\varepsilon}{\mu} \qquad (3)$$

In the above-mentioned equation, μ represents the mean of y_i, while $\bar{x}_k$ is actually the mean of x_k , C_k represents the concentration index for x_k . In the last term (which can be computed as a residual), GC_ε represents the generalized concentration index for error term.

Wagstaff et al. (2003) for the first time, offered the technique to decompose the concentration index of any health variables into its determining factor. This study used the same method of decomposing concentration index to its determining factors, to decompose socioeconomic inequality into its determinants. This method also helps in understanding how these determining factors add to disparity in child mortality with respect to each other.

To decompose concentration index, these forthcoming steps are performed.

1. Infant mortality is regressed against its determining factors by using logistic regression model (because health variable was dichotomous variable, and it has two outcomes: dead or alive). This has provided the coefficients of independent variables (βk).

2. Means of the health variable and each of its determining factor was computed (μ and $\overline{x}_k$).

3. Concentration indices for infant mortality (health variable) and its determining factors were estimated. (C and C_k) using Equation (1). When all the variables which were in the Equation (3) became known, the part of each determining factor in the model was calculated via these steps.

4. The complete part of each one of the determining factors was obtained by Multiplicating the elasticity of our health variable pertaining to that determining factor and its concentration index. $\left(\left(\frac{\beta_k \overline{x}_k}{\mu}\right) C_k\right)$.

5. The percentage contribution of each determining factor was obtained by dividing its absolute contribution by the concentration index of the health, $\left(\frac{\beta_k \overline{x}_k}{\mu}\right) C_k / C$.

CHAPTER 4

RESULTS and DISCUSSION

4.1. Results

Descriptive Results

Table 4.1 presents the percentage distribution of infant mortality and other socioeconomic and demographic characteristics in Punjab, Pakistan. In our sample, 3552 infant deaths occurred which is 2.25 percent of the total births that occurred in the era. Around 51 percent of all the newborns who were born alive, were males in the sample. Majority of the births (81%) were among mothers of 20-34 years of age. While around 11% of the births were among the mothers from the age below age 20 years and 8% of births were among mother with age above 35.

Almost 55% of mothers did not have any formal education. Around 73% lived in rural areas as far as the place of their home is concerned, while 27 % were from urban areas. In case of socioeconomic status, around one-fourth of households in our sample falls in lowest wealth quintile (ESQ1) while 14% belong to highest wealth quintile (ESQ5). Table 4.1 also shows the percentage of households in the sample from every district of the province.

Table 4. 1: Summary of the infant mortality and possible determinants

Variable	Frequency	Percentage/Mean
Infant Death	3552	2.25
Child sex		
Boy	81304	51.49
Girl	76595	48.51
Mother's age		
Below 20	17954	11.37
20-34	127796	80.94
Above 35	12149	7.69
Mother's educational level		

Illiterate	86071	54.51
Primary	30314	19.2
Middle	13285	8.41
Secondary	15825	10.02
Illiterates	86071	54.51
Literates	71828	45.49
Location of residence		
Urban	42552	26.95
Rural	115347	73.05
Household socioeconomic status		
ESQ1	38448	24.35
ESQ2	35677	22.59
ESQ3	32740	20.73
ESQ4	28816	18.25
ESQ5	22218	14.07
Health insurance	5297	3.35
District of residence		
Bahawalpur	4163	2.64
Bahawalnagar	3899	2.47
RY Khan	5477	3.47
DG Khan	4234	2.68
Layyah	3293	2.09
Muzaffargarh	5743	3.64
Rajanpur	3266	2.07
Faisalabad	8342	5.28
Chiniot	2601	1.65
Jhang	4366	2.77
T T Singh	3533	2.24
Gujranwala	6575	4.16
Gujrat	4492	2.84
Hafizabad	2978	1.89
Mandi Bahauddin	4928	3.12
Narowal	3110	1.97
Sialkot	5059	3.20
Lahore	8797	5.57
Kasur	4011	2.54
Nankana-Sahib	2913	1.84
Sheikhupura	4438	2.81
Multan	7641	4.84
Khanewal	4269	2.70

Lodhran	3049	1.93
Vehari	4226	2.68
Rawalpindi	6754	4.28
Attock	4063	2.57
Chakwal	3387	2.15
Jhelum	2749	1.74
Sahiwal	3576	2.26
Okara	3890	2.46
Pakpattan	2554	1.62
Sargodha	4348	2.75
Bhakkar	4462	2.83
Khushab	2473	1.57
Mianwali	4240	2.69

Multivariate Logistic Regression

Table 4.2 shows the association between infant mortality and its determining factors in Punjab Pakistan. Infant mortality was regressed against its determining factors by using the logistic regression model (because the health variable was a dichotomous variable, and it has two outcomes: dead or alive) (Table 2).

Being a male child reduces the odds of infant mortality by 12% as compared to a female child. Infants born to younger mothers (age less than 20 Years) have higher likelihood of experiencing infant mortality as compared to infant born to mother aged 35 and above (1.75). Moreover, mother's education has also a significant impact on the infant mortality, as expected. Infants of mothers with no formal education (illiterate) have nearly 42% more odds of death as compare to infants of mothers with formal education.

In case of household economic status, the odds of infant mortality are 3 times as high for infant born in the households with lowest quintile than the infant born in the highest wealth quintiles. Moreover, households in 2nd lowest wealth quintile have nearly 2 times more chances of dying in the first year of their age in comparison to

infants of highest socioeconomic status in our sample. Our results show that household socioeconomic status have significant impact on infant mortality. Hence the odds of infant mortality decrease with the increase in socioeconomic status, as expected.

Risk of infant mortality varies profoundly across districts. Infants born in district like Muzaffargarh, Jhang, Toba Tek Singh, Hafizabad, Mandi Bahauddin, Narowal, Sialkot, Vehari and Sargodha have higher odds of dying in their first year in comparison to district Mianwali.

In short, multivariate logistic regression results suggest the risk of infant mortality is decreased by Infant being male, born in households with a higher socioeconomic status, and having an educated mother. On the other hand, the following factors raise the risk of infant mortality: delivery at either end of the reproductive period of the mother, born in a household with low socioeconomic status, residency in rural areas, and mother illiteracy. The table also reveals Punjab Pakistan's district-wise risk of infant mortality. The odds ratio for the district of residence shows the association of the district of residence with infant mortality. The odds ratio of 1 means that the district of residence does not affect infant mortality. Infants in the districts with an odds ratio greater than 1 are at a higher risk of mortality.

Table 4. 2: Adjusted associations between the death of infants and its determining factors.

Variable	**Mean**	**Coefficients**	**P-value**	**Adjusted Odds Ratio**
Boy	0.515	-0.126 ***	0.000	0.884
Girl	0.485	Ref.		
Mother's age				
Below 20	0.114	0.556 ***	0.000	1.755
20-34	0.809	0.085	0.158	1.099
Above 35	0.077	Ref.		

Mother's education				
No formal education	0.545	0.46 ***	0.000	1.423
Literate	0.455	Ref.		
Household economic status				
ESQ1	0.244	1.112 ***	0.000	3.039
ESQ2	0.226	0.922 ***	0.000	2.513
ESQ3	0.207	0.594 ***	0.000	1.811
ESQ4	0.183	0.458 ***	0.000	1.581
ESQ5	0.141	Ref.		
Location of residence				
Rural	0.270	0.098†	0.052	1.103
Urban	0.731	Ref.		
Health Insurance	0.034	0.048	0.336	1.049
Districts of residence				
RY Khan	0.035	-0.037	0.597	0.928
DG Khan	0.027	0	0.616	0.929
Layyah	0.021	-0.009	0.650	0.930
Muzaffargarh	0.036	0.317	0.062	1.274
Rajanpur	0.021	-0.044	0.433	0.884
Faisalabad	0.053	0.303	0.005	1.433
Chiniot	0.017	0.019	0.971	0.994
Jhang	0.028	0.25	0.115	1.248
TTSingh	0.022	0.35	0.007	1.493
Gujranwala	0.042	-0.042	0.690	1.061
Gujrat	0.028	0.124	0.164	1.244
Hafizabad	0.019	0.608	0.000	1.977
MandiBahauddin	0.031	0.252	0.025	1.372
Narowal	0.020	0.235	0.040	1.393
Sialkot	0.032	0.305	0.004	1.522
Lahore	0.056	0.073	0.304	1.160
Kasur	0.025	0.038	0.580	1.088
NankanaSahib	0.018	0.272	0.036	1.392
Sheikhupura	0.028	-0.079	0.926	1.015
Multan	0.048	0.248	0.045	1.293
Khanewal	0.027	0.482	0.000	1.638
Lodhran	0.019	0.158	0.425	1.130
Vehari	0.027	0.184	0.138	1.238
Rawalpindi	0.043	-0.12	0.988	0.998
Attock	0.026	-0.11	0.950	0.990
Chakwal	0.022	-0.322	0.170	0.775
Jhelum	0.017	0.001	0.643	1.090
Sahiwal	0.023	-0.039	0.903	0.981

Okara	0.025	0.154	0.249	1.185
Pakpattan	0.016	0.182	0.309	1.180
Sargodha	0.028	0.185	0.137	1.241
Bhakkar	0.028	0.153	0.324	1.150
Khushab	0.016	0.015	0.829	0.963
Mianwali	0.027	Ref.		

† (p<0.10), * (p<0.05), ** (p<0.01), *** (p<0.001).

Decomposition Analysis

The results of the decomposition of the concentration indices are presented in Table 3. To quantify the 'contributions' of each of the factors to the total projected socioeconomic inequality, decomposition analysis integrates the estimated logit coefficients with details on the means and concentration indices of the independent variables.

The concentration index value will range from -1 to +1. For example, in case of socioeconomic status +1 would mean that health variable (infant mortality) is concentrated among the Infants born in household with highest socioeconomic status while its -1 value would mean that infant mortality is concentrated more among lowest socioeconomic status. This study has used the technique of decomposition analysis to decompose concentration index of infant mortality into its determining factor.

Decomposition analysis reveals that the highest contribution to infant mortality inequality in Punjab Pakistan is attributed to household economic status (42.35%) followed by maternal literacy (35.52%), place of residence (11.45 %) and mother's age (10.44%).

Table 4. 3: A decomposition analysis of concentration index of infant mortality by economic status.

Variable	Mean	Coefficients	C	Contribution to C	Contribution to C (%)
Boy	0.515	-0.126	-0.06	0.172	2.22%
Mother's age (Ref: 35 and above)					
Below 20	0.114	0.556	0.126	0.353	10.44%
20-34	0.809	0.085	-0.113	-0.344	
Mother's educational status (Ref: Literate)					
No formal education	0.545	0.46	-0.288	3.212	35.52%
Location of residence (Ref: Urban)					
Rural	0.731	-0.006	-0.135	-0.009	11.45%
Low SES	0.677	0.625	-0.236	4.44	42.35%
Health insurance	0.034	0.048	0.019	0.019	0.24%
District of residence					
RY Khan	0.035	-0.037	-0.003	0.000	
DG Khan	0.027	0	0.003	0.000	
Layyah	0.021	-0.009	-0.002	0.000	
Muzaffargarh	0.036	0.317	0.033	0.017	
Rajanpur	0.021	-0.044	0.001	0.000	
Faisalabad	0.053	0.303	0.002	0.002	
Chiniot	0.017	0.019	-0.001	0.000	
Jhang	0.028	0.25	0.013	0.004	
TT Singh	0.022	0.35	0.008	0.003	
Gujranwala	0.042	-0.042	-0.026	0.002	
Gujrat	0.028	0.124	-0.012	-0.002	
Hafizabad	0.019	0.608	0.023	0.012	
Mandi Bahauddin	0.031	0.252	0.005	0.002	
Narowal	0.02	0.235	0.001	0.000	
Sialkot	0.032	0.305	-0.003	-0.001	
Lahore	0.056	0.073	-0.037	-0.007	
Kasur	0.025	0.038	-0.002	0.000	
NankanaSahib	0.018	0.272	0.006	0.001	
Sheikhupura	0.028	-0.079	-0.013	0.001	
Multan	0.048	0.248	0.014	0.008	
Khanewal	0.027	0.482	0.028	0.016	
Lodhran	0.019	0.158	0.008	0.001	
Vehari	0.027	0.184	0.007	0.002	
Rawalpindi	0.043	-0.12	-0.034	0.008	

Attock	0.026	-0.11	-0.013	0.002	
Chakwal	0.022	-0.322	-0.018	0.006	
Jhelum	0.017	0.001	-0.009	0.000	
Sahiwal	0.023	-0.039	-0.006	0.000	
Okara	0.025	0.154	0.006	0.001	
Pakpattan	0.016	0.182	0.005	0.001	
Sargodha	0.028	0.185	0.003	0.001	
Bhakkar	0.028	0.153	0.009	0.002	
Khushab	0.016	0.015	-0.001	0.000	
Mianwali	0.027				

4.2. Discussion

Infant mortality refers to "the mortality of newborn under the age of one year". In other words, it refers to "the probability of dying between birth and the first year of age expressed per 1,000 live births". Pakistan has one of the highest infant and under five mortality rate in the region (Pakistan Economic Survey 2019-20). As per the 2017-18 Pakistan Demographic and Health Survey (PDHS), one in every 14 children dies within the first year of birth while one in every 11 dies before reaching the age of five years (Pakistan DHS,2017-18). Massive socioeconomic disparities exists in infant mortality in Pakistan. For instance, in the case of Punjab, there is a higher socio-economic disparity in the province relative to other provinces in the country, so health inequality is a likely outcome. Determinants of infant mortality are established in literature and also the evidence of inequality in infant mortality is documented, but research on the relative contribution of different determinants to inequality in childhood mortality in Punjab is not available. This study is, therefore, an attempt to quantify the relative contribution of different factors in inequality in infant mortality.

In this study, we employed decomposition based on concentration index technique to quantify socioeconomic inequality in child mortality into its determinants. Results show that infants with lower socioeconomic status are less

likely to survive their first year of life as expected. In the Punjab Pakistan context, several of the determinants suggest a positive link to socioeconomic inequalities in child deaths.

Decomposition analysis shows that family's economic position is one of the biggest contributors of inequality in infant mortality. Nearly 42.35% of infant mortality disparity is defined by the economic status itself and not by other variables used in the regression model. Further, mother's education contributed around 35% in explaining inequality in infant mortality followed by mother's age at birth (10.4%). Being in the low ranks of the economic class, mother lack of education, age and rural residence are associated with a rise in the rate of child mortality. By contrast, greater economic status is correlated with a decrease in the infant mortality rate.

The findings of this research are consistent with the outcomes of earlier studies in Pakistan on infant mortality. The Wealth Index has a powerful and negative relationship with infant mortality and is comparable to much earlier research (Ali (2001), Susuman (2012), Harthgen and Misselhorn (2006)). These studies, like present study, shows that families with lower wages and poor living conditions are more likely to have higher infant mortality because such mothers or households are less likely to enjoy the necessities of life, such as no clean drinking water, proper sewerage system, no gas and electricity etc. Therefore, infants born to deprived households and families have higher likelihood of dying before they reached the age of five. The rate of child motility is negatively correlated with the wealth index; with a higher infant mortality rate for Infants belonging to disadvantaged families.

Similarly, the results of the study suggest that odds of infant mortality are significantly higher for Infants born to mothers with no formal education. Around

35% of the disparity in infant mortality is explained by mother's education. Mothers who are literate in this sample are more likely to have low infant mortality. Infants are more likely to have improved health and better odds of success if their mother is well educated. And as parental education progresses to secondary and higher education, this decline in infant mortality rises.

One of the reasons of low infant mortality among educated mothers could be their access and knowledge of prenatal care (Rabbani & Qayyun, 2015). This is possible because pregnant mothers who are well educated, have experience, and are in a better place than mothers who are not educated, take care of their newborns, and take care of themselves. Educated mothers can read and use these resources more easily to take care of their Infants by information and prescriptions provided to them (Rabbani & Qayyun, 2015).

Moreover, mother's age and mother's education are very closely linked because highly educated mothers marry late and have higher age at birth (and if they were married younger and they were less likely to be well educated)(Rabbani & Qayyun, 2015). s

The major contribution of this study is decomposition based on concentration indices. Its strong point is that it permits us to determine which determining factors have a larger part in inequality and how. This means that this method empowers us to compute the pure contribution of each determining factor of a health variable—controlled for the other determinants—to socioeconomic inequality in that health variable. For instance, the contribution of the economic status variable itself represents the 'actual effect', so that it is 'cleaned' of the other underlying effects of the other factors examined. However, one should also be cautious in attaching a

causal explanation to the results of this analysis, as estimations are obtained from cross-section observational data and it is well established that problems of causation might be well explained with longitudinal or experimental data.

Finally, through this exercise, we may infer that wealth disparity has contributed to the development of health disparities in Punjab Pakistan. Compared to disadvantaged ones, the better-off groups have better life prospects. Although, determinants of infant and child mortality were known but it was not known that what are those factors which are causing inequality in infant mortality. This study has filled this gap by identifying the major factors among the overall determinants, which are actually causing inequality.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1. Summary and Conclusions

While it is important to quantify socioeconomic disparity in public health measures such as childhood mortality rates, trying to understand infant mortality inequality is more relevant for policy purposes. This study was aimed at measuring the contributions of the determinants of socioeconomic disparity in childhood mortality in Punjab Pakistan. The present study has employed logistic regression, concentration index, and decomposition analysis to understand inequality in infant mortality in the Punjab province of Pakistan. The findings of the study suggest that the probability of infant mortality is lessened by infant being male, born in households with a higher socioeconomic status, and having an educated mother. On the other hand, the likelihood of child mortality increases with mothers on either end of the reproductive age spectrum, residency in rural areas, and mothers lack of education. In comparison, the highest contributor to child mortality disparity in Punjab Pakistan is attributed to household economic status (42.35%), maternal education (35.52%), place of residence (11.45 percent), and mother's literacy (10.44%).

In South Asia, Pakistan has the highest child and under-five mortality, in the region. The advantages of reducing inequalities in wellbeing are both economic and social. The effect of health inequality can be calculated by the cost to the economy of additional sickness in human terms, years of life loss and years of healthy life lost; and in economic terms. The advantages of reducing inequalities in wellbeing are both economic and social. The effect of health inequality can be calculated by the cost to the economy of additional sickness in human terms, years of life loss and years of

healthy life lost; and in economic terms. Economic prosperity would not eliminate health disparity without addressing relative inequality.

Inequalities in health generates inequalities in early childhood growth and schooling, jobs and working environments, housing, and community conditions, living standards, and, more broadly, the freedom to share fairly in the rewards of society.

The findings of this study indicate that socioeconomic inequality in infant mortality is not only due to the function of the health system but there are several factors beyond the health care system. Reducing inequality in infant mortality would require a concerted effort from different departments of the government.

5.2. Recommendations

Following are the few Strategies to alleviate the socioeconomic disparity in infant mortality and raise the proportional wealth of the poorer segments of the country:

(i) Resources should be diverted to education and awareness of young women particularly around mother and child health. Though RHCs and BHUs are present at most of the places but they are either not functional or operating without a qualified doctor.

(ii) Lady Health Worker (LHW) is one of the most successful program in the world. The indicators of mother and child health are much improved in the area served by LHWs. However, it is losing its efficiency due to many problems faced by LHWS particularly low salary. Government should this expand this program as well as try to solve the issues faced by LHWs.

(iii) Moreover, legislation regarding the minimum age of marriage for girls, to discourage early marriages, is also a need of the hour.

(iv) Establishing a comprehensive system of social safety nets and social protection. Programs like “Ehsaas-Punjab” built on the model of the federal “Ehsaas Program” which is aimed at expanding human development and social protection in the province spearheaded by the Punjab Social Protection Authority (PSPA), is a step in the right direction. This program is targeted towards the underprivileged and vulnerable part of the population.

(v) Identifying and addressing the demographic and socioeconomic features of communities who are disproportionately disadvantaged and insecure.

(vi) Invest in health literacy to ensure mother and child survival. This program will aware families to enable progressive changes in the development of early childhood, including prioritizing prenatal and postnatal measures as well as proper immunization that reduce harmful effects in birth and infancy.

(vii) In conclusion, socioeconomic inequality in infant mortality exists in the Punjab province and it can be reduced by policies that target the lower strata of the society. Reducing inequalities in health outcomes is imperative as it would help in reducing the unnecessary and unjust loss of precious lives that would be prevented otherwise. Policies to achieve these goals can involve civil society, governments, and global institutions. All we need now is consistency in such policies and increased recognition of the human development approach in the planning and policy-making process.

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