

# Socioeconomic, Environmental And Biological Factors Of Child Mortality In Pakistan

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## Abstract

Child mortality represents health care facilities, environmental, social and living status of any society. Prime objective in present study is to examine socioeconomic, environmental and biological factors of childhood mortality. Researcher used multiple indicator cluster survey (MICS) 2017-18 data set and model comprises children having ages below five years and married females of ages between 15 to 49 years. Using binary logistic regression technique outcomes showed that biological, environmental and socioeconomic aspects have significantly different influences on child mortality. Findings also show that education and well financial position of families lead to lessen mortality rate. Birth place, breast feeding and mother age are major biological issues affecting childhood mortality rate. Accessibility of gas, hygienic latrine and electricity characterizes better environmental situation of any family and ultimately lead to reducing child mortality. Study suggests mother's education, economic condition and breast feeding also helps to reduce mortality rate in Pakistan.

**Keywords:** Binary Logistic Regression, Breastfeeding, Child Mortality, MICS.

## Introduction

Child mortality usually represents wellbeing of community and reflected a sign of expansion and pecuniary position of any society. Infants and children's death is a foremost challenging issue of developing countries in health economics field. Culyer (2005) define health economics as applications of economics models and procedures to health sector. Emphasis on child's health became outline of universal development organizations. To decline child and newborn mortality is a worldwide goal as

comparatively to any other age; child's survival extremely depends upon environment circumstance (Madise et al., 2003).

Newborn mortality is a major community health problem, interventions should be done by providing more consideration to newborns who were born multiple and who are pre-term (Baraki et al., 2020). Newborn mortality rate has declined intensely throughout this century. However, despite the having higher quality and extensive availability of child intensive care expertise around the world, the child mortality

rate in Pakistan remains higher in comparison to many advanced and developing nations. Childhood health and survival is considered as long run concerns by various characteristics in different time eras. Many studies tried to scrutinize factors accountable for childhood mortality at nationwide and global level. Different researches indicated that adverse economic situation lead to increase infants and Childs mortality (Fenn et al., 2007; Moser et al., 2005; Wagstaff, 2000). Advanced countries are principally effective in falling kids passing ratio. However, in emerging countries up till now these rates remain high.

Tendencies in child mortality and its causes have been the focus of academic researchers and policy debates, literature on this area going back to early twentieth century. Encouraged by new measurement methods presented during 1960s and greater interest in change and mortality indicators between the global communities, intense researches were carried out from 1970s to 1980s. This was more facilitated by recently accessible data sets at individual and household levels, related with World Fertility Surveys (WFS) and later on Demographic and Health Surveys (DHS) that led to an emphasis on socioeconomic and demographic features, in accumulation to known biological causes of child mortality. Mosley and Chen (1984) struggled to link the methodological gaps among different approaches and established a systematic framework by combining two sets of socioeconomic and nearby (direct) determinants.

Generally it is seen that less mortality rates are among rich than poor. Because attitude of poor's about life brings high passing rate so, Ali (2001) argued that additional cause is that deprived peoples experienced dissimilar life pattern than rich. Socioeconomic situation is also linked with parental educational level and it influenced risk of disease during child care and women's education leads to describe child's survival (Chowdhury et al., 2010). Higher illiteracy among females reflects poor

status, lack of education and poverty are reasons of prior births and leads to further more poverty (Jamal-uddin et al., 2009). Literacy rate of females is low in Pakistan and said percentage is higher in rural parts because rural areas have less health and learning facilities. Female's education can positively affect in children growth their health because literate women can better care of their children and accomplish their responsibilities more proficiently.

Domestic living standard is further a main factor touching children's health. Wealth index characterizes family buying power plus access to basic amenities. Arif (2012) showed that poor nourishment lead to poor education performance and decreases productivity. Poor financial conditions make children more susceptible in comparison to grownups. Child's healthiness adversely effects by un-hygienic condition, less awareness and health services. So this indicator has manifold disgusting effects on children. Mother's age, birth place and breastfeeding are accountable biological factors affecting infant mortality. Mustafe and Odimegwu (2008) explained this mortality rate is lower within the children ever breastfeeding. One more observation is that ages of mothers and place of birth too effect childhood mortality. Barman and Talukdar (2004) argued that likelihood of death is high among age limit less than 20 or above 34 year and considered as unsafe age for producing children. Macassa (2006) claimed that children mortality rate too influenced via environment variables.

Improved sanitation structure and drinking water is indicator for falling infants' mortality. Electricity, toilet, gas facility are comforts of life however not available to all Pakistani peoples. Some studies showed that children's death is also due to severe breathing diseases. Immunization is more beneficial tool in reducing mortality of lower five years. Vaccination treatment coverage in Pakistan is lower than MDG goal of above 90% coverage. Irrespective of all struggles, child mortality rate is beyond the ground. The query raise into

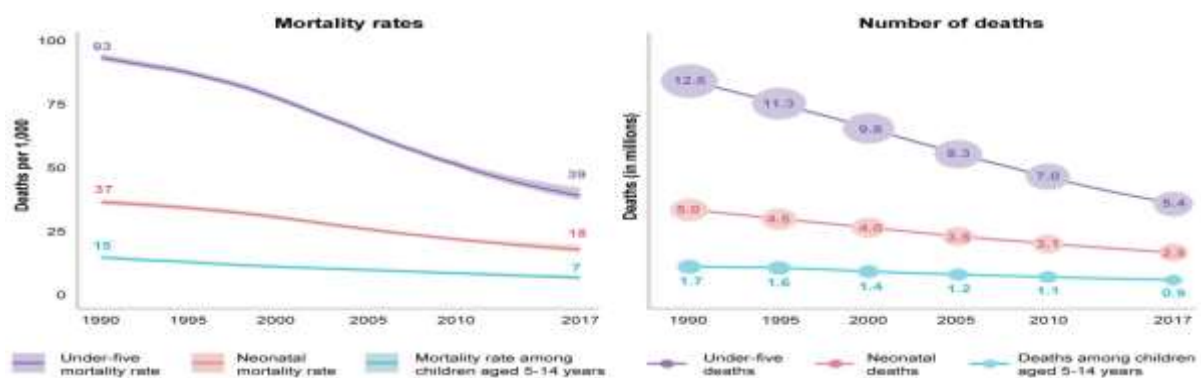
notice is modeling different causes of child mortality rate in Pakistan. General objective is to explore bases for child mortality by studying biological, environmental and socioeconomic factors effecting mortality in Pakistan.

### Overview of Child Mortality

Infant and child mortality is an important public health issue in developing countries like Pakistan. Information on child mortality is a major indicator of any country's socioeconomic development; quality of life, which help to evaluate baby's risk level and support the improvement of approaches to diminish this risk such as encouraging birth spacing. Researchers have used a number of diverse theoretical frameworks to examine the influence of different aspects on child

survival. In effects, Mosley and Chen (1984); Schultz (1984), classified determinants of infants and childhood mortality as exogenous (socioeconomic or extrinsic) like socioeconomic, cultural, regional and community determinants and endogenous (bio-medical or intrinsic) that include maternal, ecological, nourishment, injuries and personal sickness. Therefore, Abimbola and Akanni, (2012) defined child's mortality as likelihood for a child born alive to die between first and fifth birthday. Desta (2011) defined infant mortality as likelihood of dying from birth to first birth day, whereas, Child mortality is probability of dying before fifth birth day. With the passage of time child mortality is declining reported by UN Inter-Agency group of child mortality estimation.

**Figure 1 Child Mortality Decline (1990-2017)**



### Literature Review

Determinants of child mortality are investigated by many researchers in various regions and era. These studies are different regarding data, variables and methodology. As, Barman and Talukdar (2004) for Assam and Yasin et al., (2004) for Pakistan district Multan found mother age, birth order, income level, vaccination and infants weight were significant elements contributing to children mortality. Some authors used demographic and health survey to study the linkage including Macassa et al., (2006) discovered regional differences of childhood death in Mozambique. Many researchers have focused on Bangladesh using survey data including Jamal-uddin et al.,

(2009); Chowdhury et al., (2010) and Islam et al., (2013). Regarding parental education variable Abuqamar et al., (2011) found same results for Ghaza strip. Kaldewei and Pitterle (2011) examined said determinants for Jordan. These studies used logistic regression and showed higher education level, ethnicity, breastfeeding, clean water and wealth index as main factors lead to decreasing mortality rate.

Bello and Joseph (2014) recognized important elements of childhood mortality for Oyo state. Using information from 150 respondents it was shown that post-delivery care, breastfeeding, Poverty and Malaria as major issues toward kids' mortality. Rezaei et al., (2015) used time series since 1967-2012 including variables

GDP, FLFP, fertility rate, rural areas population and quantity of physician to investigate infant mortality for Iran. This work also showed positive linkage amid fertility rates, population of rural areas with IMR. Additionally, IMR shows adverse relationships with doctors and schooling years.

Singh and Tripathi (2015) observed factors linked with under five deaths for mothers involved in agriculture for India. Yaya et al., (2017) examined incidence and causes of infant mortality in Nigeria. Findings proposed that age, area, house, schooling, age at first birth, wealth index and parents religion were key factors related with child mortality. Khan et al., (2018) highlighted socioeconomic factors of child mortality using data from Demographic and Health Survey (2012-13) for Pakistan. Results revealed that childhood mortality rate declines with larger birth interval, infants weight at birth, mom's education, possession of assets and decision making at family level.

Perin et al., (2021) investigated factors responsible for mortality of neonates and children under the age of five years from 2000 to 2019 in WHO member countries. Study found that 95% of mortality was due to birth time complications, respiratory infections and diarrhea. Asif et al., (2022) used household-level data to investigate socio-economic determinants of child mortality in Pakistan. Results indicated that child mortality decreased with women's education, household wealth, and access to clean water, toilets, and media. Unmet family planning needs increased child mortality. Wealth status moderated the association between women's education and child mortality, strengthening the effect of education with increased household wealth. Prasetyoputra et al., (2022) examined the social and environmental determinants of under-five mortality in Indonesia, using the 2017 Indonesia Demographic and Health Survey. The study found that maternal smoking, age, and employment status negatively affected child survival, while higher maternal education and improved household sanitation were positively associated with child survival. The findings

highlighted the importance of living environment in child survival.

### Data and Methodology

Present investigation is based on analytical work which uses available data and evidence. The researchers relied upon secondary data. This study used MICS data for year 2017-18 to examine the causes of child mortality between reproductive females having age 15 to 49 years.

The outcome variable child mortality is defined as deaths of children having ages lower than five years. Further explanatory variables included are proxies for environmental, socioeconomic and biological aspects. Table 1 describes mentioned variables in detail. Variables selection is an imperative stage to accomplish objectives professionally. Abuqamar et al., (2011) described mother schooling and schooling of family head show great role in defining child mortality and schooling years are adversely related with mortality of children.

Index of wealth is utilized to search the association amid child mortality and financial position. According to Bello and Joseph (2014) poverty may lead toward increase in child's mortality as this further distresses child mortality via lack of schooling and health facilities.

### Methodology

To evaluate influence of independent variables current study implemented Binary Logistic regression method because outcome variable was in binary method coded as "1" and "0". General formula of logistic regression may be written like Cox (1958)

$$E\left(\frac{Y}{Z} = z\right) = \frac{e^z}{1 + e^z}$$

(1)

Here,

$$z = \alpha_0 + \alpha_1 X_1 + \dots + \alpha_k X_k$$

(2)

$\alpha_0, \alpha_1, \dots, \alpha_k$  are parameters of regression and  $X_1, \dots, X_k$  represent independent variable. Binary logistic technique is executed for three

different equations where dependent variable is identical for all three equations.

<b>Table 1 : Description of Variables</b>			
<b>Variables Name</b>		<b>Description</b>	
Dep. Variable = Y	Child mortality	Occurs (1)	If not (0)
<b>Biological Variables</b>			
X1	Breastfeeding practice	Ever (1)	Else (0)
X2	Mother's age	20-34 years (1)	If not (0)
X3	Birth place	Hospital (1)	If not (0)
<b>Environmental Factors</b>			
X4	Latrine type	If Hygienic (1)	If Unhygienic (0)
X5	Electricity availability	Available (1)	If No (0)
X6	Gas availability	Available (1)	If No (0)
<b>Socioeconomic Factors</b>			
X7	Mother's schooling	If Illiterate (1)	Otherwise (0)
X8	Schooling of family head	If Illiterate (1)	Otherwise (0)
X9	Wealth status, quintile	If Poor (1)	Otherwise (0)

**First model: Child Mortality and socioeconomic variables**

The initial model in Eq. 3 includes just socioeconomic variables like mother's education, wealth index and schooling of family head.

$$z = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \epsilon \tag{3}$$

**Second model: Child Mortality, Biological and socioeconomic variables**

Second model includes equation 3 and biological variables like breastfeeding, mother's age and child birth place). Now, model two reduces risk associated with socioeconomic dynamics by addition of three more variables.

$$z = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \epsilon \tag{4}$$

**Third model: Child Mortality, Biological Variables, Environmental Variables and Socioeconomic Variables**

Last model contains equation 4 and environmental characteristics like kind of toilet, facility of gas and electricity

$$z = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \alpha_9 X_9 + \epsilon$$

(5)

The decrease in mortality is considerably more in the lower age group comparatively to older ages. Overall, it can be said that low level of infant’s mortality is associated with lower level of overall mortality. Usually mortality rate is higher in the earlier few hours, days and weeks of lifecycle. The causes for infant deaths at early and later stage of infancy differ to a certain extent.

**Results and Explanations**

**Table 2: Results of models for effects of biological, environmental and socioeconomic variables having dep. variable as child mortality.**

Variables	Classification	Model I		Model II		Model III	
		$\alpha$	Odds Ratio	$\alpha$	Odds Ratio	$\alpha$	Odds Ratio
Mothers’ schooling(1)	Illiterate	0.841*	2.321	0.712*	2.038	0.717*	2.051
Family Head Education (1)	Illiterate	0.062*	1.064	0.085*	1.091	0.077*	1.082
Wealth index (1)	Poor	0.251*	1.252	0.291*	1.336	0.281*	1.325
Breastfeeding (1)	Ever	-	-	-1.732*	0.176	-1.731*	0.175
Mother’s Age(1)	If 20-34	-	-	-0.792*	0.452	-0.792*	0.451
Birth Place(1)	Hospital	-	-	-0.137*	0.872	-0.132*	0.875
Type of Toilet (1)	Hygienic	-	-	-	-	-0.006	0.006
Electricity (1)	Yes	-	-	-	-	-0.095***	0.908
Gas (1)	Yes	-	-	-	-	-0.057**	0.945
Constant	-	-1.736*	0.175	0.501*	1.652	0.662*	1.936

Note: \*, \*\* and \*\*\* shows 1%, 5% and 10% level of significance respectively.

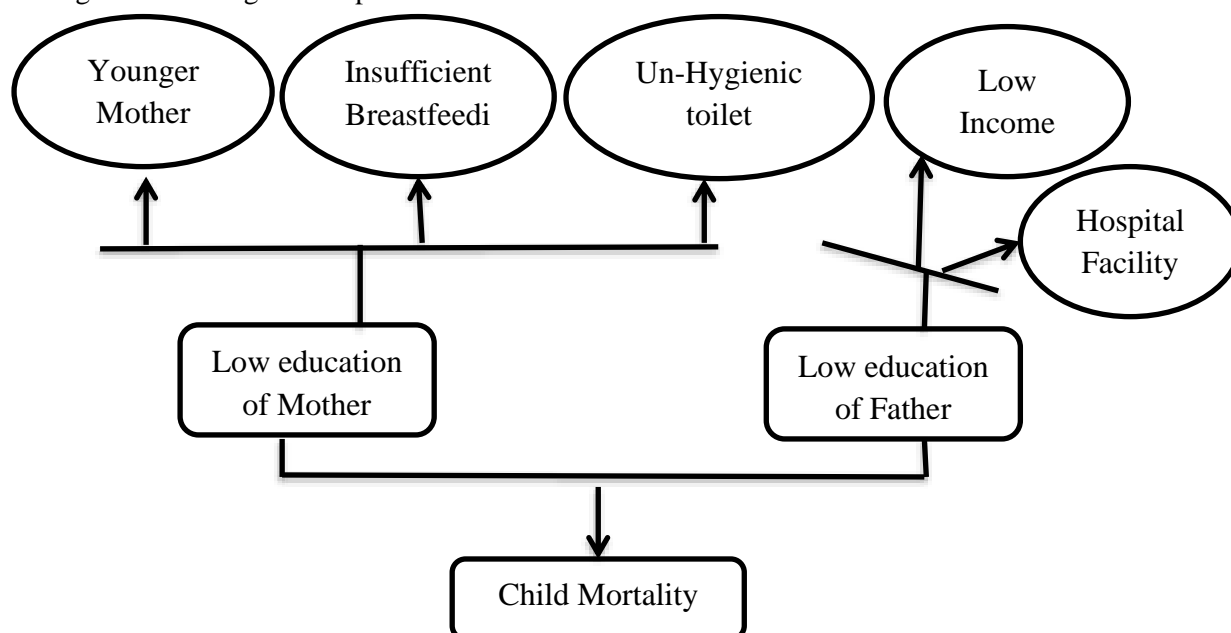
Better provisions of monetary setting and public disbursement encompass close affiliation with childhood mortality in any community. Results from binary logistic procedure are shown in second table which shows socioeconomic factors are significant to making explanation of children mortality. First model shows higher risk of mortality among the kids whose mother's and head of family are uneducated, it suggests that parental education lead to decrease in odds of happening below five mortality. Further odds ratio for wealth index showed that odds of occurrence for child mortality are greater by factor of 1.252 for female belongs to poor family as likened to non poor.

Model two includes socioeconomic plus biological variables. So, negative coefficients of Mothers Age, Breastfeeding and Delivery Place showed significance of biological characteristics in decreasing childhood's mortality consistent with findings of (Barman and Talukdar, 2004). Odds ratios of breasting 0.176 suggest that possibility of childhood mortality is 0.176 times lesser within children having breastfeeding as compared to not ever

and outcomes are in line with Mustafe and Odimegwu (2008). Odds ratios of mothers' age show that likelihoods of incidence of Childs mortality are 0.452 times lesser among women with age limit 20-34 year. Third model further decreases incidence of children mortality centered on socioeconomic plus biological features by further addition of environment variables.

Equation five by including gas and electricity availability shows significant negative effect on child mortality. Though, toilet type variable did not show significant impact. Moreover, it is showed that ratio of childhood mortality is lower among kids ever breastfeeding and delivery at hospital. At clinic appropriate care of Childs at birth time lessens risk of illnesses for equally mother and newborn babies. Likewise, clean toilet facility, safe water and accessibility of electricity characterize atmosphere setting in which family survives. A family with easily access to mentioned facilities has a lower risk for child's mortality.

**Figure 2: Socioeconomic and Biological Factors of Child Mortality`**



### Conclusion and Policy Recommendations

The prevalence and concentration of childhood death varies between dissimilar sets of peoples.

This inequality is mainly through natural basis and somewhat through socioeconomic characteristics. Current endeavor is a work to scrutinize socioeconomic, environmental and

biological bases of child mortality. Authors used survey data from MICS (2017-18) on wedded women having age between 15-49 years. Binary logistic regression method is employed using three dissimilar models. First model only comprises socioeconomic features whereas model two including socioeconomic in addition to biological variables. Model three covers all preceding variables plus environmental variables. Socioeconomic conditions were measured through mothers, education, schooling of family head and wealth index. Better education and economic status was found lead to dropping child death rates. Place of birth, females' age and breast feeding were significant biological variables effecting under five years mortality. Accessibility of electricity, gas and clean latrine signifies healthier environmental circumstance of any households and ultimately lead in reducing childhood mortality. Current study suggested increasing education of both males and females. Government should take suitable measures to diminish poverty incidence by providing better infrastructure.

### Limitations of Study

The study shares restrictions of cross-sectional studies, hence, might not be robust in founding a cause-effect association. As, researchers were not involved directly in the collection of data which makes us ambiguous about the data worth. In several countries, the informed number of children's deaths is incorrect, because there is an under registration of newborn deaths. This is mostly true of distant areas in developing countries like Pakistan.

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