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SOCIO-ECONOMIC DETERMINANTS OF CHILD HEALTH IN PAKISTAN*

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ABSTRACT

The present study uses the 2004-05 PSLM Survey to determine the economic, demographic, environmental and geographical factors of child morbidity among the sampled children. This sample is restricted to children under five years of age (0-4) years and the PSLM has identified 13540 children in this age group. The sample is divided into nine agro-climatic zones of rural areas and it also includes two classifications of urban areas: MUCs and OUCs. Findings of this study have confirmed the positive role of economic factors including land and livestock with respect to child health. Both the ownership of land and livestock are means of livelihood for peoples of rural areas. They contribute to better child health by increasing income of household. With respect to prevalence of child morbidity, multivariate analysis show that younger children, particularly under the age of two, are relatively at a greater risk to suffer from child sickness. The findings of this study suggest that mothers should be given awareness about personal hygiene, and specially of preparing supplementary food for children. This study also revealed that total number of children born and immunization are more helpful to control child sickness across rural geographical zones.

Keywords: child morbidity, children born, and immunization

1. INTRODUCTION

This study focuses on child health because health is a prerequisite for increase in productivity, while successful education relies on adequate health. Thus both social indicators can be seen as vital components of growth and development. Child health is assessed as the outcome of different socio-economic factors. Poverty plays a central role in almost all the health related problems as it directly contributes to poor nutrition, which in turn results in poor school performance, reduced productivity, and even permanent disabilities and thus leaves little hope for economic advancement of the poor segment of the population.

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Similarly children are also more vulnerable than adults and the household's poor economic status impacts child health adversely through malnutrition, poor hygienic conditions, lack of awareness and lack of health services. Poor child health can lead to morbidity. Since the turn of the twentieth century infant and child mortality in more developed countries has steadily declined and currently has been reduced to almost minimal levels. However, in Pakistan, this situation is not promising, infant mortality around 70 per 1000 live births in 2005-06, was considerably far short of the desired targets set for the Millennium Development Goals (MDGs).

To bridge this gap one first needs to determine the factors responsible for such high rates of infant and child mortality. Empirical evidence shows that a large percentage of children under the age of five died due to acute respiratory infections and diarrhoea (Chakrabarti, 2003). Immunization is the most cost effective health intervention that reduces under- five child mortality and in Pakistan at the national level, the coverage of fully immunized children in the 12-23 month age increased from 53 in 2000-01 to 77 percent in 2004-05. However, it is low in relation to the national MDG target of greater than 90% coverage set for 2015. With more recent information available on child morbidity under five years of age, this paper aims to examine the prevalence of morbidity among children as mentioned by Mahmood and Mahmood (1995).

The two diseases most prevalent among children in Pakistan are acute respiratory infections, indicated by cough with fast or difficult breathing and diarrhoea. Whereas according to Mahmood and Ali (2002) fever, malaria, viral diseases, respiratory infections and intestinal infection are more common among children less than five years of age. However Ahmad (1990), reports that a relatively higher proportions of male children are affected by respiratory infections, diarrhoea and other diseases. Findings by Cebu study team (1992) showed that improper feeding practices by the mothers, contamination caused via water or exposure to faeces and excreta, overcrowded living conditions and smoke pollution significantly increase the chances of an infant contracting diarrhoea, cough, cold and fever. However determinants differ according to the type of disease.

This study makes a useful contribution to the existing evidence on the relationship between child health and socio-economic determinants by focusing on variation across geographical zones, as these differ significantly in terms of economic status or prevalence of poverty. The rise in poverty in Pakistan since the nineties is likely to have adversely influenced the nutritional status of children and their health, but little work has been done to study this phenomenon. The objective of this study is to analyze the relationship between economic status and overall child health (morbidity). The specific research objectives are: to examine the geographical variation in disease incidence that how child health varies across different ecological zones, which are different in term of economic status or poverty; to examine the relationship between child health and economic factors; to assess the impact of preventive health care especially child immunization on child morbidity (illness).

The rest of paper is organized as follows; section 2 presents the review of literature; data source, methodology and estimation technique are discussed in section 3;section 4 presents sample characteristics and poverty among children, while the prevalence of child morbidity and its differentials are discussed in sections 5 and 6. Finally section 7 concludes the study.

2. LITERATURE REVIEW

Arif and Ibrahim (1998) using the 1995-96 Pakistan Integrated Household Survey determine the socio-economic, demographic and environmental covariates of both prevalence and duration of diarrhoea among children under five in Pakistan. This study shows that child's age to be a strong determinant of both prevalence and duration of diarrhoea, for both males and females diarrhoea morbidity rate peaked at age 1. However the rate in this age group is higher for males than for females. The effect of mother's education, however, was limited to those mothers who at least

had 10 years of schooling and were residing in urban areas. Household income also appears to be a strong determinant of diarrhoea morbidity. Children living in household having piped water or motor pump inside the house were less likely to be sick than children in households having other sources of water including hand pump, well or river. Measles immunization and season had independent effects on diarrhoea morbidity in most parts of the country.

Prevention and effective treatment of respiratory infection and diarrhoea under the age of five depends on individual, household and community level behavioral factors. Chakrabarti (2003) has tried to estimate the role played by such factors in determining the utilization of formal health care to cure diarrhoea and certain respiratory illness plaguing young children. He shows that the bivariate probit estimate of cough care and cough and diarrcare and diarrhoea correlation coefficient is positive. Other results in this study show that birth order has a significant impact, the ethnic and religious background of the child plays an important role, and educational attainment of the child's father has a significant negative impact on the child morbidity status. Senauer and Kassouf (2000) have tried to analyze the effects of breast feeding on child health and the effect of health on the demand for medical care. For children up to 2 years old, the impact of current breastfeeding on the child's health is analyzed and for infants up to 6 months old, the effect of exclusive breast feeding is studied. Although the focus is on the impact of breast feeding, the analysis is multivariate. Binomial probit is used to estimate the equations in which the dependent variable is whether the child was ill during the previous two weeks. In this study breastfeeding variable is significant and has beneficial effects on reducing illness and improving growth among infants and young children. Exclusive breastfeeding reduced the probability of illness by about 15% among infants age 0-5 months. The probability of illness was some 10% lower among currently breast-fed children age 0-20 months versus those who were not breast fed.

Jalan and Ravallion (2001) has analyzed whether child health gains from access to pipe water. Households living in larger villages, village with a high school, a pucca road, a bus stop, a telephone, a bank, and a market were more likely to have piped water. The results indicate that access to piped water significantly reduces diarrhoea incidence and duration. There are little overall differences in the impact on incidence of diarrhoea between households with piped water inside the home versus those using a public tap. However illness durations were nearly 40% higher where the source of drinking water is public tap rather than a tap within the household premises.

Mahmood and Ali (2002) have examined the disease incidence among different sub-groups of population. About 12 percent of the population is reported ill during the past two weeks preceding the survey and the incidence is higher among females (13.3 percent) than males (10.5percent). The pattern of illness varies by age with younger children 0-4 years and older population 60+ exhibiting higher rates of morbidity. Male children under 10 years of age and older adults have shown higher disease incidence than their female counterparts. About 23 percent of those reported ill do not seek any health services with the two major reasons cited as 'no money' (44 percent) and 'no need '(33 percent) to visit a facility. This suggest that it is not merely the access or availability of services that affect people's health seeking behavior, it is more due to poverty that restrains them from visiting any health facility. Poverty closely associated with low levels of literacy, poor sanitation, and lack of awareness about the benefits of being healthy contribute towards non use of health care services even in case of suffering from some type of illness.

Arif (2004) has examined the health status of Pakistani children using two important indicators, morbidity and malnutrition measured by weight for age and height for age. **I**mmunized children were less likely to be sick compared to those who did not have immunization. Infants of working mothers were at greater risk of being sick implying these mothers had less time for child care.

Distance to the nearest health facility had significantly negative influence on child morbidity, implying that longer the distance lesser the probability of being sick. Reporting of the incidence of child morbidity was based on the mother's perception. In the case of longer distance to nearest health facility, the child is less likely to be taken there unless he/she had some serious illness or the household had sufficient resources. This may in turn had influenced the reporting of sickness. Children living in Balochistan were more likely to be sick than children living in the Punjab. For the analysis of the determinants of child malnutrition, Z scores of two anthropometric measures, weight for age and height for age have been used as the dependent variables in the OLS regression. The effect of birth order is significant with children from later birth orders being worse nourished. Mother's education has a positive and significant effect on children's nutritional status, but father's education is not significant. The analysis shows that having access to flush toilet has a significant positive effect on the nutritional outcome of children perhaps due to smaller incidence of diseases. In this study demand for the medical care equation is also estimated. Immunized children's have lower odds of receiving medical care during two weeks preceding the survey. There is also a significant and negative relationship between the need for visiting health facility and availability of the piped water inside the residential house. The analysis also shows that larger the family size the lower the probability of visiting a health facility. It seems to be an issue of allocation of limited resources available to the household for the child's medical care.

It appears from this brief review of the recent literature that the relationship between child health (morbidity) and economic status of households has not been thoroughly measured except in the last study by Arif (2004). The present study aims to examine the relationship between child health and economic, demographic, environmental and geographical factors. This study has two unique features that distinguish it from earlier literature. Firstly, this study has focused on the geographical variations in child morbidity. Secondly, this study has introduced ownership of land, livestock and housing as economic variables. Both land and livestock are a means of employment and source of income for peoples of rural regions and housing represents better economic status of a household. Thus this study is a useful addition to the existing literature on child health. The following hypotheses are presented as a basis for examining some important relationships; a) variations in terms of economic status of geographical zones influence the child health; b) preventive health care leads to improvement in health status of children, and c) better economic status of household helps to improve the health status of children.

3. DATA SOURCE, METHODOLOGY AND ESTIMATION TECHNIQUE

3.1. Data Sources

The present study is based on "The Pakistan Social and Living Standard Measurement Survey 2004-05" conducted by Federal Bureau of Statistics. The PSLM Survey is based on Core Welfare Indicators Questionnaire (CWIQ) approach which intends to provide data for formulating the poverty reduction programme initiated under poverty Reduction Strategy Program (PRSP) and Medium Term Development Framework (MTDF) in the overall context of MDGs. For the present analysis, a child file is created and the sample is restricted to 13540 children under five years (0-4 years) covering both rural and urban areas.

3.2. Data Variables

The following variables are included in this analysis:

Child's characteristics: age and sex of child; Parent's characteristics: mother's age at the time of birth, education and working status of mother; Household's characteristics: total number of children born and housing construction material; Economic factors: poverty status like poor

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Vol. 2, No. 1, January 2012

and non poor, ownership of agriculture land and livestock; Environmental factors: source of drinking water like motorized pump or piped water, toilet facilities and access to electricity; Regional characteristics; Health seeking behavior: child immunization.

3.3. METHODOLOGY

3.3.1. Data Description.

For the present study, the 2004-05 PSLM sample is divided into different geographical zones of rural and urban areas. Rural areas are divided into nine agro-climatic zones: rice/wheat Punjab, mixed Punjab, cotton/wheat Punjab, low-intensity Punjab, barani Punjab, cotton/wheat Sindh, rice/other Sindh, NWFP and Balochistan while the urban sample is classified into two categories Major Urban Centers (MUCs) and Other Urban Centers (OUCs) (Appendix Table 1).

Among 4762 urban children 1921 are located in the MUCs and 2841 are located in the OUCs. Out of 8778 rural children 733 are located in rice/wheat Punjab, 697 in mixed Punjab, 1061 in cotton/wheat Punjab, 443 in low-intensity Punjab, 241 in barani Punjab, 1077 in cotton/wheat Sindh, 1046 in rice/other Sindh, 2200 in NWFP and 1280 in Balochistan as shown in Table 1. This division is made in order to see any variation in morbidity across different ecological zones, which differ in climate, environmental setting, and socio economic factors.

3.3.2. Data limitations

Three caveats of the data set are as follows: First, this study is based on the self reported morbidity which has several limitations. Women's self reported morbidity generally tends to exaggerate the presence of infection compared to etiological diagnosis (Nayab, forthcoming). Secondly, the PSLM has identified 1823 children which have different types of child illnesses/injuries but it has not clearly mentioned the kinds of diseases included in child illness. Finally, in the PSLM questionnaire reference periods for child illness and for diarrhoea are different. For diarrhoea, reference period is past 30 days whereas for child illness it is past two weeks. It has also identified 693 children of the diarrhoel infection which are also included in child morbidity. It is not known whether these children had only a single episode of diarrhoel infection or were also affected with some other common child episodes such as respiratory infection. This study has included these children in the models of child morbidity on equal footing, ignoring the differences in reference period.

3.3.3. The Models

Just like in linear regression we assume that some set of X variables is useful for predicting the Y values, but we are claiming that this set predicts the probability that Y=1 (assuming we have coded the dependent variable as [0,1]). The basic formula for estimating Y=1 consists of transforming the regression equation to look like equation 1.

$$P(Y=1) = 1/1+\exp [-(\alpha + \beta 1X1 + \beta 2X2 + \ldots\ldots\ldots + \beta kXk] \qquad (1)$$

The whole function is called the logistic distribution function and it is estimated by maximum likelihood (ML) techniques. An advantage of this function is that it guarantees that the probability ranges from 0 to 1 as the regression equation predicts values from negative infinity to positive infinity [Gujrati, (1995), Cameron and Trivedi, (2005)]. Another name for the logit is log-odds so we can also write logistic function as

$$\text{Logit } [p(y=1)] = \alpha + \beta 1X1 + \beta 2X2 + \ldots\ldots\ldots + \beta kXk \qquad (2)$$

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Where the logit [p(y=1)] = loge| p(y=1)/1-p(y=1)| i.e. log-odds (3)

This fits the model

Ln [(p)/ (1-P)] =a + ∑bixi (4)

Where p is the probability of a child having the illness/sickness during the past two weeks preceding the survey, a and bi are estimated regression coefficients, and xi are the background characteristics, consisting of child's age and gender, his/her mother's age and educational attainment, sources of drinking water, toilet facilities, measles immunization, and ecological zones. As stated earlier, the main objectives of the present study is to determine the covariates of prevalence of child morbidity. To accomplish this purpose this study has constructed several models for child morbidity. Model 1, which is the full model, includes all the children less than five years selected for the present study. Model 2 to 12 has been estimated separately by focusing on geographical zones of rural areas and classifications of urban areas. All models are additive and has been summarized through odd ratios.

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Table 1. Distribution of under –five children identified in the 2004-05 PSLM, by Province and type of rural and urban areas.

Urban/Rural	Urban Areas			Rural Areas										Total Sample
Province	MUCs	OUCs	All	Rice wheat Punjab	Mixed Punjab	Cotton Wheat Punjab	Low Intensity Punjab	Barani Punjab	Cotton wheat Sindh	Rice-other Sindh	NWFP	Balochistan	All	
Punjab	952	933	1885	733	697	1061	443	241	-	-	-	-	3175	5060
Sindh	594	517	1111	-	-	-	-	-	1077	1046	-	-	2123	3234
NWFP	255	868	1123	-	-	-	-	-	-	-	2200	-	2200	3323
Balochistan	120	523	643	-	-	-	-	-	-	-	-	1280	1280	1923
Pakistan	1921	2841	4762	733	697	1061	443	241	1077	1046	2200	1280	8778	13540

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

4. SAMPLE CHARACTERISTICS AND POVERTY AMONG CHILDREN

4.1. Sample characteristics

Information on age and gender of the selected children, their mother's characteristics, the proportion of children being immunized, sanitation facilities, source of drinking water, poverty status, ownership of agricultural land and animals, and geographical zones is reported in Appendix Table 2. An operational definition of these variables is also presented in Appendix Table 3. Selected children were evenly distributed; about 16 percent of them were less than one year old when PSLM was conducted, while 17 percent of the children had completed their first birthday. The share of 2-year old children was about 22 percent, for the 3-year old it was 23 percent and for 4-year old it was 21 percent.

Appendix Table 2 shows that more than 68% of children born to mothers aged between 20 and 35 years, and only16% born to mothers aged between 35 to 39 years. Another 11% of children were born to mothers above 40 years of age. A large proportion of mothers were illiterate (73%) and a considerable proportion of the mothers (45%) of the sampled children gave birth to more than five children. Coverage of immunization was somewhat universal: about 78 percent of children had been immunized while 19% of children did not receive any child immunization.

Only thirteen percent of the selected children lived in a household that had the facility of toilet with flush system. Sixty percent of children lived in households which had different types of toilet facilities such as, flush connected to open drain, pit latrine etc., Forty six percent of the children lived in a household that had the facility of piped water or motorized pump and 53 % of children belonged to households who has other sources for drinking water like hand pump etc. Appendix Table 2 also sets out data on economic characteristics. It shows that 71% of children belong to non poor household and 28% of children belong to poor households while sixty four percent of the children belong to households who owned agriculture land, another sixty two percent of the children belong to households who owned livestock.

Distribution of children by different geographical zones has also been presented in Appendix Table 2. Eight percent of children belong to rice/wheat Punjab zone, 7 percent belong to areas of mixed Punjab, 12 percent belong to areas of cotton/wheat Punjab, 5 percent belong to areas of low-intensity Punjab, 2 percent belong to areas of barani Punjab, 12 percent children belong to areas of cotton/wheat Sindh, 11 percent children belong to areas of rice/other Sindh, 25 percent children belong to areas of NWFP and 14 percent children belong to areas of Balochistan. Urban cities were classified into Major Urban Centres (MUCs) and Other Urban Centres (OUCs). Fourteen percent of children belong to households who were residing in MUCs and 21 % of children belong to household who were residing in OUCS.

4.2. Poverty status of children under five years in 2004-05.

The PSLM identified 13540 children in this age group covering both rural and urban areas. Data on the poverty incidence presented in this chapter is based on the official poverty line with a threshold of 2350 calories per adult equivalent per day. Based on the official poverty line Appendix Table 4 gives the poverty incidence in 2004-05 for the sampled children. It shows that overall children in rural areas are poorer than children in urban areas and within urban areas the poverty incidence is higher for Other Urban Centers (OUCs) than for Major Urban Centers (MUCs).

Across the rural areas poverty among children is higher in cotton wheat Punjab zone (45.9%), followed by NWFP (37.9%), low-intensity Punjab (34.3%) and mixed Punjab (34.1%). Child poverty is observed to be lowest in barani Punjab (9.1%). In other words, according to Appendix

Table 4, Cotton/wheat zone of Punjab, low-intensity zone of Punjab and NWFP as the poorest zones while barani Punjab is the richest zone. Other zones particularly cotton/wheat Sindh, rice/wheat zones of Punjab and Sindh are relatively better off than the poorest zones. Mixed Punjab has the medium level of poverty. Balochistan is also among the poor zones. The estimated poverty figures for the sampled children are very close to poverty estimates for the whole population, as carried out by earlier studies. [see Malik (1992), Arif and Ahmed (2001) and Irfan (2008)].

This variation in poverty levels across the rural zones has been expained by earlier studies. Arif and Iqbal (2008) attribute the consistently low levels of poverty in barani Punjab to certain socio-economic characteristics of the barani areas including relatively high levels of literacy, particularly among females; the lowest dependency ratio probably because of low fertility; and lowest number of unpaid family workers. Furthermore, rural areas of barani districts are well integrated with the prosperous urban centers with strong linkages to the services sectors and this factor has also attributed for lower level of poverty in these areas. According to Arif and Iqbal rural infrastructure has played a role in poverty differentials across the rural zones. There seems to be negative relationship between poverty and infrastructure investment. Rural regions with low levels of poverty like barani Punjab, rice/wheat Punjab and mixed Punjab have better access to infrastructure e.g. roads, electricity, soling of street, access to piped water, drain underground, access to educational institutions and health facilities. Rural regions with medium poverty have medium level of infrastructure while the regions with high poverty have low access to infrastructure. Amjad, Arif and Mustafa (2008) argue that high incidence of overseas migration and the resulting inflow of remittances contributes a significant proportion of the total household income in barani areas of Punjab.

5. CHILD MORBIDITY AND ITS DIFFERENTIALS

5.1. Gender differentials across zones.

The prevalence rate of child morbidity among the sampled children while controlling for gender and zones are shown in Appendix Table 5. The overall child morbidity or sickness in 2004-05 is 13.5 percent.

The overall child morbidity rate is also higher for males than for females in both rural and urban areas. This pattern persists while controlling for gender in all geographical zones of rural areas except in Balochistan (Appendix Table 5). The rate for rural areas is higher than for urban areas. This pattern also remained unchanged when gender morbidity rate is controlled by classification of urban areas. The highest prevalence rate of child morbidity in the rural geographical zones is found in the zone of barani Punjab. This is unexpected since the barani zone is economically better- off than other zones and the education level of adult population is also better in this zone. There could be several reasons, but it could largely be attributed to better awareness and reporting of child sickness in barani zone.

5.2. Age/Gender Differentials

The age/gender-child morbidity rates of the sampled children are shown in Appendix Table 6. The gender differentials fluctuated across age groups. Child morbidity rates for males peaked at age 1 and for females, child morbidity rate peaked at less than 1 year. The rate in this age group is also higher for males than for females, but after age 1 it declined steadily for both sexes (Appendix Table 6). This pattern also remained unchanged when the age/gender morbdity rates were controlled by geographical zones (Appendix Table 7 and 8). These findings regarding the age pattern of morbidity are consistent with studies conducted in Pakistan as well as other developing countries, which showed relatively high prevalence of illness in the first two years of

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Vol. 2, No. 1, January 2012

life[(Martorrell (1995), Gragnolati (2003) and Arif (2004)]. This could be due to reduction of exclusive breastfeeding in the second year of life. It is well established that breast-feeding provides young children protection against several diseases. Print and electronic media have been used in Pakistan in this regard to encourage mothers to breast-feed their babies for two years.

5.3. Environmental factors and Child Morbidity

The relationship between child morbidity among children under five and the three indicators of environment; sources of drinking water, types of toilet facilities shown in Appendix Table 9. Children living in households having piped water or a motor pump are less likely to be sick than children in households having other sources of water including hand pump, well or river. In urban areas the prevalence of morbidity is less in households having piped water than in households having other sources of water. This difference has also been observed when urban areas are classified into MUCs and OUCs. This difference persisted in the rural areas though at a relatively lower scale. This difference is also observed at rice/ wheat Punjab, cotton/wheat Punjab and barani Punjab zone when rural areas are further divided into different geographical zones of rural areas. The prevalence of illness among children who lived in households that had a flush connected to sewerage is lower than among those who lived in households with other sources of toilet facility (Appendix Table 9). This difference persisted when controlling for urban areas and MUCs/OUCs whereas quite surprisingly in rural areas prevalence rate is almost same in both flush toilet connected to sewerage and in other sources of toilet facility and this difference fluctuated among different zones of rural areas. In cotton/wheat Punjab zone the children who belong to households having flush toilets connected to sewerage are less likely to become sick than children who belong to households with other sources for sanitation. In rice wheat Punjab zone, barani Punjab, cotton/wheat Sindh, rice/other Sindh and Balochistan the children who belong to households having flush toilet connected to sewerage were more likely to become sick. It might be due to poor sanitation conditions in these areas.

5.4. Mother's Age, Education and Child Morbidity

Appendix Table 10 shows no consistent relationship between the occurrence of child sickness and the age of mother. Similarly the level of maternal educational attainment does not show much association with child morbidity. The prevalence of sickness incidence is almost same for both primary and higher maternal education. When prevalence rate of sickness is observed in the rural areas, children of mothers with higher education were less likely to become sick than children of uneducated or less educated mothers. Similar pattern has been observed in the geographical zones of rural areas except in mixed Punjab, low-intensity Punjab and cotton wheat Sindh zone. In urban areas prevalence rate of child morbidity is almost same for children having mothers either with primary/middle or higher education. The same pattern is observed when the urban areas are further classified into MUCs and OUCs. The most likely reason seems to be that an educational difference causes behavioral differences that affect the transmission of enteric pathogens. But there is also the possibility that mothers with a lower educational attainment or higher educational attainment in urban areas may be those with poor housing and worse sanitary facilities. These confounding variables can promote the transmission of enteric pathogens. Thus, to see the independent effect of mother's education and other variables on the occurrence of Sickness in children, the confounding variables must be controlled.

5.5. Economic Factors and Child Morbidity

The relationship between child morbidity among children under five and the economic factors, ownership of agricultural land and ownership of livestock controlling for rural /urban areas and ecological zones is shown in Appendix Table 11. The children living in households owning agricultural land are less likely to become sick than children living in households not owning agricultural land. This difference persisted in different zones of rural areas except in cotton/wheat

Punjab and low-intensity Punjab zone. This is the expected pattern because ownership of land represents economic position of households; as the economic position of a household improves, there are less chances of child sickness because better economic position of households improves nutritional status of children and it further provides protection against several infections in children. It also helps to afford the expenses of medical care, signaling the importance of the availability of resources and confirming the relationship between poverty and child health. Appendix Table 11 also shows that children living in households who owned animals were less likely to become sick than children living in households that did not own animals. This difference persisted when controlling for rural areas except in low-intensity Punjab zone, barani Punjab and Balochistan. The ownership of livestock, like the agricultural land, could be the source of better resources available to provide better nutrition to children.

6. CHILD MORBIDITY DIFFERENTIAL: LOGISTIC REGRESSION ANALYSIS

The relative influence of different variables on the probability of a child being sick in the two weeks prior to the 2004-05 PSLM is assessed in this section by multivariate techniques. The logit equation specified in section 3.3.3 of this study provides the basis for this assessment. Child morbidity is defined as a dichotomous variable (had or did not have a child sickness during the reference period). Several explanatory variables (child's age and gender, its mother's age, education and working status, total number of children born, sources of drinking water, toilet facilities, child immunization, ownership of animals, agricultural land, electricity, material used in the roof of house, material used in the walls of house and ecological zones) discussed in section 3.2 are used in the analyses. Model 1, which is the full model, includes all the children less than five years age selected for the present study. Several other models are estimated separately for different zones and classification of rural and urban areas respectively. All models are additive and have been summarized through odd ratios in Appendix Table 12-14.

Results of Model 1 show the child's age to be strongly associated with child morbidity. There is a steady decline in the odds of child morbidity with child's age (Yohannes et al, 1992): three year old children are 49 percent less likely than infants to become sick, and this percentage further declined to 34 percent for four year old children. The gender variable has a positive and significant (at 5 percent level of confidence) effect on the probability of child illness suggesting that compared to females, males under five are more likely to get sick (Sathar,1994; Ali, 2000). The total number of children born to mothers of sampled children has a positive effect on the probability of the child being sick, suggesting that as the total number of children born increases it exerts negative pressure on children's health as parents find less time for child care (Saksena and Srivastava, 1984). But this association is not statistically significant.
Appendix Table 12 shows that mother's age has a negative relationship with probability of child being sick, suggesting that as mother's age increase, probability of child being sick decrease. Alam and Cleland (1984) established a strong association between the age of the mother and child mortality in Pakistan. Although mother's education shows a negative association with child morbidity but this association is almost the same for children having mother either with primary or higher education. It has been argued that education of mother is presumed to exert its influence through greater autonomy on the part of women, to more effectively take care of their children's health (Caldwell and Caldwell, 1988). Mother's working status shows a significant and positive effect on child morbidity suggesting that working mothers face greater risk of child's illness because they do not have enough time for the proper care of children (Arif, 2004).

Quite surprisingly child immunization is significant (at 10 percent level of confidence) but with positive effect on child morbidity, suggesting that children having immunization are more likely to become sick than children who are not being immunized. This may be due to ambiguous

construction of the variable since it is composite of many type of immunizations i.e., DPT, Polio, BCG etc and does not indicate whether the complete series was followed (Garcia and Alderman, 1989). Furthermore it is also possible that households which have reported for child vaccination are misreporting.

The toilet facility and relatively safe source of drinking water piped/ motor pump inside the house, which are used as environmental factors, do not show significant association with child morbidity, although they bear the expected negative sign (Mahmood, 2001). It may be the quality and usage pattern of water in home, not the purity of water at its source that largely determines the impact on morbidity (Arif and Ibrahim, 1998).

The ownership of agricultural land proved to be a very strong determinant of child morbidity. Ownership of agricultural land has shown significant negative effect on child morbidity suggesting that households with ownership of agriculture land probably have more resources for child care so odds of child morbidity declined. Ownership of livestock showed a negative and significant association with child morbidity. Material used in the roof of house has shown negative association with child morbidity although it was not significant. Surprisingly material used in the walls of house and access to electricity have shown significant but positive association with child morbidity. Finally, all zones except mixed Punjab zone show positive relationship with child morbidity. Highest odds of child morbidity are in barani Punjab zone, whereas lowest odds of child morbidity are in mixed Punjab zone. This is unexpected since the barani zone is economically better-off than other zones and educational level of adult population is also better in this zone.

The results of Models 2-12, which examined the likelihood of children being sick for residing in rice/wheat Punjab zone, mixed Punjab zone, cotton/wheat Punjab zone and low-intensity Punjab zone, barani Punjab, cotton/wheat Sindh zone, rice/other Sindh Zone, NWFP, Balochistan, MUCs and OUCS separately are presented in Appendix Table 12, 13 and 14. These models reveal some important points. Child gender and age appears to be an important determinant of child morbidity. Child's gender is positively associated with the child morbidity when urban areas are further classified into MUCs and OUCs; male children are more likely to become sick than females. The same pattern is also observed in the geographical zones of rural areas except in the low-intensity Punjab and Balochistan zone of rural areas. Child's age is negatively associated with the child morbidity in all the zones of rural and urban areas (Marotell, 1995; Marini and Gragnolati, 2003). Similarly the total number of children born to mothers of the sampled children has much more importance for the geographical zones of rural areas than the urban areas, suggesting that as the total number of children born increases in a household, child morbidity also increases, particularly in rural areas (Sathar and Kazi, 1987; Cochrane et al, 1990; Trussell and Pebley, 1984)

Mother's age is negatively associated across geographical zones (Trussell and Pebley, 1984) except in rice/wheat Punjab, low-intensity Punjab, cotton/wheat Sindh and OUCs. Mother's education is important for the zones of rural areas but within urban areas only MUCs have shown strong importance for mother's education (Cochrane, 1980; Alam and Cleland, 1984). Mother's working status is positively associated with child morbidity except in zones of cotton/wheat Sindh and rice/other Sindh (Arif, 2004). When we have analyzed importance of child immunization across the geographical zones of rural and urban areas then it is observed that it is relatively more important for the geographical zones of rural areas (Arif, 2004; Arif and Ibrahim, 1998). Relatively safe source of drinking water is negatively associated with child morbidity only in rice/wheat Punjab, cotton/wheat Punjab, MUCs and OUCs but it does not show any significant relationship. The ownership of agriculture land has negative relationship with child morbidity

across zones except in cotton/wheat Punjab, low-intensity Punjab, rice/other Sindh and Balochistan and the corresponding negative impact has also shown significant relationship for several regions. Similarly the ownership of livestock has shown negative relationship with child morbidity across zones except in barani Punjab, rice/other Sindh, Balochistan and MUCs but the corresponding negative impact is in general insignificant. Finally, Housing conditions (material used in roof of house and material used in walls of house) has also shown negative relationship with child morbidity across geographical zones although the corresponding impact is in general insignificant (Mahmood, 2001). In housing condition material used in the roof of house is much more important than material used in the walls of house. Better economic position of household improves nutritional status of children and it also provides protection against several infections in children. Besides, it also helps to afford the expenses of medical care to protect child for relatively longer episodes of infections, signaling the importance of the availability of resources and confirming the relationship between economic status and child health.

7. CONCLUSION

The present study used the 2004-05 PSLM Survey to determine the economic, demographic, environmental and geographical factors of child morbidity among the sampled children. This sample is restricted to children under five years of age (0-4) years and the PSLM has identified 13540 children in this age group. For the present study, the 2004-05 PSLM sample is divided into nine agro-climatic zones of rural areas and it also includes two classifications of urban areas: MUCs and OUCs. Beside, rural-urban differentials the rural areas also vary in term of irrigation facilities, cropping pattern, economic status, infrastructure and access to non-farm sources of income. These variations are responsible for significant differences among the rural areas of Pakistan. This study has examined the child morbidity differentials by focusing on the rural geographical zones and classifications of urban areas.

This paper attempts to make a useful contribution to the existing literature in understanding the relationship between child health (morbidity) and economic status of households by focusing on variations across geographical zones. Ownership of agriculture land appears to be strong determinant of child health and its positive impact can clearly be seen in relatively better, rich geographical zones of rural areas and within the two classifications of urban areas. Ownership of livestock is also a very important determinant of child health. In models of child morbidity, the ownership of animals comes across as a very significant variable in all geographical zones of rural areas, whereas in the urban areas, only OUCs have shown importance of ownership of livestock with respect to child morbidity. The other major findings of this study are: The gender and age of the children appears to be the most important determinants of child morbidity across all geographical zones of rural areas and within both classifications of urban areas; male children are more likely to become sick than females, however as the age of the child increases the morbidity risk tends to decrease. Mother's education appears to be a very important determinant to explain child morbidity across rural geographical zones and within classifications of urban areas. Mother's education is seen to be helpful in improving child health; however in some models of child morbidity its impact was not significant. Total number of children born has an impact on child morbidity, particularly in rural areas. Similarly, immunization appears to be helpful in geographical zones of rural areas of the country. Finally housing construction material especially roof material appears to be an important determinant of child health.

In this paper we see that the importance of different variables for child morbidity varies across the regions but probably this might be due to the reason that poverty incidence of geographical zones differs significantly. Infrastructure investment also varies across the rural regions, and this factor might also be responsible for child health differentials across geographical zones. The findings of this study have confirmed the positive role of economic factors including land and livestock with

respect to child health. These economic variables are important for child health almost in all zones of rural areas and within urban classifications which are different in terms of economic status. Increased access to ownership of land, livestock and housing directly benefit the poor. Both the ownership of land and livestock are means of livelihood for the people of rural areas, and they contribute to better child health by increasing incomes of the households. As the economic position of a household improves the chances of child sickness are reduced considerably. Better economic position of a household improves nutritional status of children and it further provides protection against several infections in children. Besides, it also helps to afford the expenses of medical care to take measures to protect child from relatively longer episodes of infections, signaling the importance of the availability of resources and confirming the relationship between economic status and child health.

POLICY GUIDELINES

- Different diseases have different sets of exogenous variables which emerge as significant determinants (Cebu, study team 1992). The implication of this becomes important while formulating polices. Particularly if the polices are programme specific then it will be a useful measure to target any particular disease.
- Government of Pakistan may take measures to increase ownership of land and livestock in rural regions to improve child health, a sort of proxy for preventive health care.
- Government of Pakistan may take measures to decrease poverty incidence of poor rural regions by increasing infrastructure investment. Equal economic status in term of geographical variations may be helpful to focus on important determinants of child health.
- There is a need to add a few more questions in the future surveys concerning breast feeding practices, which will be helpful in further research (Arif, 1998).

BIBLIOGRAPHY

Ahmed, Ambreen (1990), *"Gender differentials in access to health care for Pakistani children"*, study conducted for UNICEF. Pakistan.

Alderman, Harold., Jere R. Behrman., Victor Lavy and Rekha Menon (1997), *Child Nutrition Child Health and School Enrollment*. The World Bank Policy Research Working Paper 1700.

Amjad, Rashid., G. M. Arif and Usman Mustafa (2008), "Does the labor market structure explain differences in poverty in rural Punjab?" (forthcoming) *Lahore Journal of Economics*.

Arif, G. M., and Sabiha Ibrahim (1998), "Diarrhoea Morbidity Differentials among children in Pakistan". *The Pakistan Development Review* 37:3, 205-230.

Ali, Salman Syed., and Sayyid Tahir (1999), "Dynamics of growth, poverty and inequality in Pakistan", *The Pakistan Development Review* 38:4,837-858.

Anwar, Talat. "*Measurement of absolute poverty and Governance in Pakistan: 1998-99 and 2004-05*" paper presented at the 22nd Annual General Meeting of PSDE at PIDE held in 2006-07.

Arif, G. M (2004), "Child Health and poverty in Pakistan", *The Pakistan Development Review* 43:3, pp 211-238.

Arif, G. M ., and Munir Ahmad (2001), "*Poverty across the agro-ecological zones in rural Pakistan*", Paper presented at the National workshop on pro-poor intervention strategies in

irrigated agriculture in Asia at the Pakistan, International Water Management Institute,Lahore,12 March

Arif, G. M., and Nasir Iqbal (2008), "*Infrastructure and Poverty Nexus: the case of rural Pakistan*" forthcoming

Amjad, Rashid., and A.R. Kemal (1997), "Macroeconomic Polices and their impact on poverty alleviation in Pakistan", *The Pakistan Development Review* 36:1 PP39-68.

Ali, Mubashir, S. (2000), "Gender and health care utilization in Pakistan. *The Pakistan Development Review* 33:4, 759-771.

Alam, I., and J. Cleland (1984) Infant and Child Mortality :Trends and Determinants. I. Alam and B. Dineson (eds) Fertility in Pakistan: A Review of Findings from the Pakistan Fertility survey. Voorburg, Netherlands: International Statistical Institute.

Benett, Jennifer (1999), "Correlates of child mortality in Pakistan: A Hazard Model Analysis", *Pakistan Development Review* pp 85-118, volume 38.

Boerma, J. T., and J. K. Van Ginneken (1996), *Comparison of substantive results from demographic and epidemiological survey methods. In J. t. Boerma child survival in developing countries: can demographic and child health survey help to understand the determinants? Amsterdam:* Royal Tropical Institute.

Caldwell, J. C. (1979) Education as afactor in Mortality Decline: an Examination of Nigerian Data. *Population Studies* 33: 395-413.

Cameron, A. Colin., and Pravin K. Trivedi (2005), "*Micro econometrics methods and applications*", Cambridge university press.

Caldwell, J. and P. Caldwell (1988), *"Women's Position and child mortality and morbidity in LDCs",* Paper presented at IUSSP conference on women's position and demographic change in the cense of development, Oslo.

Cebu study team (1992),"A child health production function estimated from longitudinal data", *Journal of Development Economics*, 38, 323-51.

Chakrabarti, Anindita (2003), "*Determinants of child morbidity and factors governing utilization of child health care: Evidence from rural India*", unit for child and youth research Tata institute of social sciences Deonar, Munbai-400 088 and centre for Economic studies and planning Jawahrlal Nehru University. New Dehli -110067.

Cochrane, S.et al (1990), *"Household consequences of high fertility in Pakistan"*. World Bank Paper.

Cochrane, S. (1980), "*The effects of education on health"*. Washington, D. C: The World bank.(World Bank Staff Working Paper No.405)

Duraisamy, P., and M.Duraisamy (1995), "Determinants of investments in health of boys and girls: Evidence from rural households of Tamil Nadu, India"*, Indian Economic Review*, 30, 51-68.

Feachem, R.G. (1984), "Interventions for the control of diarrhoel diseases among young children: promotion of personal and domestic hygiene", *Bulletin of world health organizations*. 62:3, 467-476.

Garcia, Marito., and Harold Alderman (1989), "Patterns and Determinants of malnutrition in children in Pakistan: Impact of community health", *The Pakistan Development Review*, 28(4) pt II , PP 891-902.

Gujrati, Damodar N (1995), "*Basic Econometrics*", Third Edition.

Horton, Susan (1988), "Birth Order and child nutritional Status: Evidence from the Philippines", *Economic Development and Cultural Change*, PP 341-354.

Handa, Sudhanshu (1999), Maternal and Child Height. *Economic Development and Cultural Change* 47:2, 421-439.

Haq, Rashida., and Nabeela Arshad (2007), "*Poverty and Access to Maternal Health Care Services in Pakistan: Evidence from perception based data*", Presented at the eight annual population research conference 2007, Population and regional development Nexus. Dec17-18, 2007.

Hill, Kenneth., and Anne R. Pebley (1989), "Child Mortality in developing world", *Population and Development Review,* volume 15, PP 657-687.

Hobcraft, J. N., J. W. McDonald., and S. O. Rutstein (1984), Socio-economic factors in infant and child mortality: A cross-national comparison. *Population Studies*: 38: 363-385.

Irfan, Mohammad (2008), "*Poverty and Natural Resources Management in Pakistan",* Paper presented in the 23rd Annual General Meeting and conference, Pakistan Institute of Development Economics, Islamabad, March 12-14, 2008.

Jelliffe, D. B., and E. FP. Jelliffe (1978), "*Human milk in the modern world: psychosocial, nutritional and economic significance*", Oxford university press.

Jamal, Haroon (2003), "Poverty and inequality during the adjustment decade: Empirical findings from household Surveys", *The Pakistan Development Review* 42:2, 125-136.

Jalan, Jyotsna., and Martin Ravallion.(2001), "*Does Piped water reduce Diarrhoeal Disease for children in Rural India?"* Indian statistical institute and World Bank, January 11, 2001; revised July 5, 2001.

Kwon, E. K (2000), "*Infrastructure, Growth and poverty reduction in Indonesia: A cross section analysis*", Asian Development Bank, Manila. Processed.

Khan, M.R. (1994), *Sickness Disease, Treatments and Medical costs by Socioeconomic Variables in Bangladesh*. (Research Monograph15) 6-18.

Krupnick A., A. Alberini, G. McGranahan and G. S. Eskeland (1996), " *Determinants of Diarrhoel Disease in Jakarta"* World Bank Policy Research Papers, No.1568, 1-3.

Mosley, W., and Lincoln C. Chen (1984) "An analytical framework for the study of child survival in developing countries". *Population Development Review*. A supplement to 10: 25-45.

Malik, Sohail J. (1992), "Rural poverty in Pakistan: Some recent evidence", *The Pakistan Development Review* (31) 4, PP 975-95.

Mahmood, Naushin., and Mir Annice Mahmood (1995), "Gender differences in child health care practices: Evidence from the Pakistan Demographic and health Survey 1990-91", *The Pakistan Development Review* PP 693-707, 34(II).

Mahmood, Naushin and Syed Mubashir Ali (2002), 'The disease Pattern and utilization of health care services in Pakistan" *The Pakistan Development Review*, PP 745-757, 41(II).

Mahmood, M. Arshad (2002), "Determinants of Neonatal and post neonatal Mortality in Pakistan" *The Pakistan Development Review*, PP 723-744, 41(II).

Mahmood, M. Arshad (2001), "Determinants of Growth Retardation in Pakistani children under five years of age", *The Pakistan Development Review* 40:4, PP 1009-1032.

Marini, Alessandra., and Micheal Gragnolati (2003), *Malnutrition and poverty in Guatemala,* the world Bank Policy Research Working Paper No 2967.

Martorell, Reynaldo (1995), *Promoting Healthy Growth: Rationale and Benefits*. In P. Pinstrup-Anderson, D. Pelletier and Harold Alderman (eds.) Child health and Nutrition in Developing countries: Priorities for Action. London: Cornell University Press.

Martorell, Reynaldo and Teresa J. Ho (1984), "Malnutrition Mortality and Morbidity", *Population and Development Review,* volume 10, PP 49-68.

Nayyab, Durr-e (forthcoming). *Self-reported symptoms of reproductive tract infection. The question of accuracy and meaning*.

National Institute of Population Studies (1998), Pakistan fertility and Family Planning survey Islamabad.

Omran (1981), an overview of the study. In Omran and Standley (eds) Family Formation Patterns and Health. Geneva: WHO.

Pakistan Economic Survey (2006-07).

Pakistan Millennium Development Goals Report (2005-06).

Pakistan, Government of (2005), "Pakistan Social & Living Standard Measurement survey" Federal Bureau of Statistics.

Picnkney, Thomas C (1989), "*The demand for public storage of wheat in Pakistan*", Research Report 77. IFPRI, Washington, DC

Preston, S. H. (1978), *Mortality, Morbidity and Development. UN Economic Commission for western Asia.* Population Bulletin 15:63-75.

Pande, Rohini P (2000), "*Family composition effects on gender differentials in nutrition and immunization in rural India"* paper presented at the 2000 annual meeting of population association of America held in Los Angeles.

Qureshi, Sarfraz Khan., and G. M. Arif (2001), *"Profile of Poverty in Pakistan ,1998-99*", Pakistan Institute of Development Economics , Islamabad, (MIMAP Technical Papers Series No.5)

Sathar, Zeba A (1991), Changes in Mortality in Pakistan, 1960-88, *Pakistan Development Review,* 30(4) Pt II, PP 669-679.

Saksena, D. N., and J. N. Srivastava (1984), Impact of Child Mortality and Socio-demographic attributes on family size desires: some data from urban India. *Journal of Biosocial Science* 16: 119-126.

Sathar, Zeba A (1992), "Child survival and changing fertility Patterns in Pakistan", *Pakistan Development Review,* 31 (4) Pt II, 699-713.

Sathar, Zeba A. (1994) *Infant Mortality in Pakistan: uneven Risks in urban and rural areas?* Paper presented at Agha Khan Workshop on maternal and Infant mortality polices and interventions, Karachi.7-9.

Sathar, Z., and S. Kazi (1987), "*Variations in Demographic Behavior by levels living in Pakistan*". GENUS 43:3.

Senaur, Benjamin., and Ana L. Kassouf (2000), "The effect of breast feeding on health and the Demand for medical Assistance among children in Brazil", *Economic Development and Cultural Change* ,volume 48, No.4.

Trussell, j and A. Pebley (1984), "*The potential impact of change in fertility on infant, child and maternal mortality*" Washington, D.C. The World Bank (World Bank Staff Working Paper No.698).

Tarrozi, Alassandro and Aprajit Mahajan (2005), "Child Nutrition in India in the Nineties: A story of increased gender inequality?" JEL: I12, J13, O53.

World Bank (1995), "*Poverty Profile for Pakistan*", Washington, D.C.

Yohannes, A. G., K. Streatfield and L.Bost (1992), "Child Morbidity patterns in Ethiopia" *Journal of Biosocial Science* 24:2 143-155.

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 1
Agricultural zone in Pakistan

Agro-climatic Zones (Rural)	Districts
1.Rice/wheatPunjab	Sialkot, Gujrat, Gujranwala, Sheikhupura, Lahore and Kasur
2. Mixed Punjab	Sargodha, Khushab, Jhang, Faisalabad, Okara and Toba Tek Singh
3.Cotton/wheatPunjab	Sahiwal, Bahawalpur, Bahawalnagar, Rahim Yar Khan, Multan, Vehari and Khanewal
4.Low-intensity Punjab	Dera Ghazi Khan, Rajanpur, Muzaffargarh, Leiah, Mianwali, Bhaker and Dera Ismial Khan.
5. Barani Punjab	Attock, Jhelum, Chakwal, Rawalpindi and Islamabad
6. Cotton/wheat Sindh	Sukkur, Khairpur, Nawabshah, Hyderabad, Tharparkar and Sanghar
7. Rice/other Sindh	Jacobabad, Larkana, Dadu, Thatta, Badin, Shikarpur, Nasirabad and Karachi
8. NWFP	Swat, Dir, Peshawar, Kohat, Karak, Mansehra, (Except DI Khan) Abbottabad, Kohistan, Mardan and Bannu
9. Balochistan	Quetta, Sibi, Kalat and Mekran (Except Nasirabad)
Urban Centers	
1. MUCs	Islamabad, Lahore, Gujranwala, Faisalabad, Rawalpindi, Multan, Bahawalpur, Sargodha, Sialkot, Karachi, Hyderabad, Sukkur Peshawar and Quetta, have been considered as large sized cities.
2.OUCS	The remaining urban population in each district in all the provinces has been considered as other urban centers.

Source: For rural agro-climatic zones Pinckney (1989) and for urban classification PSLM 2004-05.

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table: 2
Percentage (%) Distribution of under-five children by selected characteristics

Characteristics	N	(%)
Child's Characteristics		
Child's Gender		
Female	6675	49.3
Male	6865	50.7
Child's Age		
<1	2146	15.8
1	2355	17.4
2	3002	22.2
3	3112	23.0
4	2925	21.6
Mother's Characteristics		
Mother age at the time of birth		
15-19 years	248	1.8
20-24 years	2535	18.7
25-29 Years	3537	26.1
30-34 years	3203	23.7
35-39 years	2195	16.2
> 40 Years	1616	11.9
No Response	205	1.5
Mother Education		
Illiterate	9826	72.6
Primary	1906	14.1
Matric and above	1603	11.8
No Response	205	1.5
Mother's working status		
No	11680	86.3
Yes	1860	13.7
Total No of Children born		
1-2	3165	23.4
3-4	4563	33.7
5-6	3428	25.3
7 and more	2084	15.4
No Response	300	2.2
Immunization		
Child Immunization		
Yes	10595	78.2
No	2624	19.4
No response	321	2.4
Characteristics	N	**continued (%)**
Environmental Characteristics		
Type of Toilet Facility		
No toilet in house	3581	26.4
Flush system(B)	1784	13.2
Others	8175	60.4

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Source of Drinking Water		
Others	7280	53.8
Piped water within the House / Motorized Pump	6241	46.1
Economic Characteristics		
Poverty Status		
Non Poor	9642	71.2
Poor	3898	28.8
Own Agriculture Land		
No	8752	64.6
Yes	4788	35.4
Own Animals		
No	8398	62.0
yes	5142	38.0
Ecological Zones (Rural)		
Rice Wheat Punjab	733	8.4
Mixed Punjab	697	7.9
Cotton-wheat Punjab	1061	12.1
Low Intensity Punjab	443	5.0
Barani Punjab	241	2.7
Cotton Wheat Sindh	1077	12.3
Rice-other Sindh	1046	11.9
NWFP	2200	25.1
Balochistan	1280	14.6
Urban Areas		
Major Urban Centres	1921	14.2
Other urban Centres	2841	21.0

Source: computed from 2004-05 PSLM

(A) Primary category include primary and middle (till 8th class)

(B) The Flush system includes flush system connected to public sewerage

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 3
Definition of Variables

Variables	Definitions
Child's Gender	
Female	Reference category
Male	=1,otherwise
Child's Age	
0	Reference category
1	=1,otherwise 0
2	=1,otherwise 0
3	=1,otherwise 0
4	=1,otherwise 0
Total No of Children born	
1-2	Reference category
3-4	=1,otherwise 0
5-6	=1,otherwise 0
7 and more	=1,otherwise 0
Mother Education	
Illiterate	Reference category
Primary	=1,otherwise 0
Matric and above	=1,otherwise 0
Mother working Status	
No	Reference category
Yes	=1,otherwise 0
Child Immunization	
No	Reference category
Yes	=1,otherwise 0
Measles Immunization	
No	Reference category
Yes	=1,otherwise 0
Type of Toilet Facility	
No toilet in house	Reference category
Flush system(B)	=1,otherwise 0
Others	=1,otherwise 0
Source of Drinking Water	Reference category
Others	=1,otherwise 0
Piped water within the House / Motorized Pump	

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Poverty Status Non Poor Poor	 Reference Category =1,otherwise o
Own Agriculture Land No Yes	 Reference category =1,otherwise 0
Own Animals No Yes	 Reference category =1,otherwise 0
Material used in roof of House Others RCC/RCB	 Reference category =1,otherwise 0
Material used in walls of house Others Brick	 Reference category =1,otherwise 0
Source of light Others Electricity	Reference category =1,otherwise 0
Ecological Zones (rural) Rice /wheat Punjab Mixed Punjab Cotton/ wheat Punjab Low- Intensity Punjab Barani Punjab Cotton/ wheat Sindh Rice/ Other Sindh NWFP Balochistan MUCs OUCs	 Reference category =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0 =1,otherwise 0
Child Sickness No Yes	 Reference category =1,otherwise 0
Diarrhoea Morbidity No Yes	 Reference category =1,otherwise 0

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table: 4
Prevalence rate (%) of poverty Incidence in 2004-05 for the sampled children

Agro-climatic zones	Poverty Headcount
	2004-05
Rural Areas	**33.0**
Rice/wheat Punjab	24.7
Mixed Punjab	34.1
Cotton/Wheat Punjab	45.9
Low-Intensity Punjab	34.3
Barani Punjab	9.1
Cotton/wheat Sindh	27.5
Rice/other Sindh	28.7
NWFP	37.9
Balochistan	29.9
Urban Areas	**21.1**
MUCs	14.3
OUCs	25.7

Source: computed from PSLM 2004-05.

Appendix Table: 5
Prevalence rate (%) of child morbidity by geographical zones and gender

Geographical zones	Male	Female	Total
Rice wheat Punjab	9.6	8.2	8.9
Mixed Punjab	6.6	5.5	6.0
Cotton wheat Punjab	12.0	9.5	10.7
Low intensity Punjab	13.1	13.1	13.1
Barani Punjab	23.2	19.8	21.6
Cotton wheat Sindh	18.1	13.6	16.0
Rice other Sindh	16.8	15.9	16.3
NWFP	16.8	14.6	15.7
Balochistan	11.6	13.3	12.4
Overall rural areas	14.3	12.6	13.4
Urban Areas			
MUCs	14.1	13.2	13.7
OUCS	14.5	12.2	13.4
Overall urban areas	14.4	12.6	13.5
All areas	14.3	12.6	13.5

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 6
Prevalence rate (%) of child morbidity among children under five, by age controlling for gender

Child's Age (years)	Male	Female	Total
<1	19.9	18.0	19.0
1	20.5	16.1	18.3
2	14.0	13.9	14.0
3	12.4	9.3	10.9
4	8.0	7.7	7.8

Source: computed from PSLM 2004-05

Appendix Table: 7
Prevalence rate (%) of child morbidity by child gender and age while controlling for urban zones

Child age	MUCS		OUCS		Urban	
years	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
<1	21.7	20.6	20.8	19.7	21.2	20.1
1	18.4	12.1	20.3	14.2	19.5	13.4
2	13.2	13.3	14.2	15.6	13.8	14.7
3	12.8	10.6	11.4	7.3	12.0	8.6
4	7.2	10.0	8.3	6.7	7.9	8.0
Total	**14.1**	**13.2**	**14.5**	**12.2**	**14.4**	**12.6**

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table: 8

Prevalence rate (%) of child morbidity by child gender and age while controlling for rural zones

Child age	Rice Wheat Punjab		Mixed Punjab		Cotton Wheat Punjab		Low Intensity Punjab		Barani Punjab	
years	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<1	14.1	9.3	10.0	10.4	18.2	8.2	13.8	13.7	18.8	36.8
1	17.1	11.4	13.6	4.2	19.1	15.4	24.2	19.5	33.3	20.8
2	9.0	9.2	5.4	3.8	11.8	13.0	15.2	11.6	28.6	17.4
3	6.0	4.4	2.8	7.2	9.0	8.4	10.5	13.0	23.3	15.8
4	1.4	7.9	4.1	2.6	4.9	3.4	7.1	7.3	11.1	12.9
Child age	Cotton/ Wheat Sindh		Rice/ Other Sindh		NWFP		Balochistan		Total (RURAL)	
years	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<1	26.3	24.2	25.7	23.4	19.9	16.4	19.2	31.4	19.1	16.7
1	24.0	19.8	28.2	24.7	22.9	20.7	14.5	16.5	21.1	17.4
2	14.5	16.3	14.0	19.8	19.2	12.1	11.0	15.3	14.1	13.5
3	18.8	7.5	14.6	9.9	12.7	13.6	14.0	8.7	12.6	9.7
4	11.9	6.1	9.8	8.3	11.2	11.3	5.1	7.1	8.0	7.5

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 9
Prevalence Rate (%) of child morbidity among children under five, by environmental conditions controlling for rural/urban and ecological zones

Environmental Characteristics	Urban Areas			Rural Areas									Total Sample
	MUCs	OUCs	All	Rice/ wheat Punjab	Mixed Punjab	Cotton/ Wheat Punjab	Low/ Intensity Punjab	Barani Punjab	Cotton /wheat Sindh	Rice /other Sindh	NWFP	Balochistan	All	
Water source														
Piped water within house/Motor Pump	13.0	13.2	13.1	7.5	6.6	9.1	13.7	21.1	22.6	17.4	16.3	12.5	13.0	13.1
others	17.0	14.0	14.8	10.8	5.6	11.8	12.9	22.3	14.5	16.2	15.4	12.4	13.6	13.8
Toilet Facility														
None	10.4	13.4	12.6	8.9	6.6	12.8	12.1	17.5	14.2	15.6	14.0	13.5	12.6	12.6
Flush to Sewerage	13.0	12.0	12.7	16.7	4.2	1.9	9.1	33.3	42.9	28.0	15.2	13.0	13.7	12.8
Others	15.4	13.7	14.1	8.3	5.7	9.2	15.1	24.3	16.4	16.2	16.3	11.6	13.9	14.0

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table: 10
Prevalence rate (%) of child morbidity among children under five, by mother's characteristics controlling for rural /urban areas and ecological zones

Mother's Characteristics	Urban Areas			Rural Areas										Total Sample
	MUCs	OUCs	All	Rice/ wheat Punjab	Mixed Punjab	Cotton/ Wheat Punjab	Low/ Intensity Punjab	Barani Punjab	Cotton/ wheat Sindh	Rice/other Sindh	NWFP	Balochistan	All	
Mother's age														
15-19	34.6	28.2	30.8	-	33.3	8.7	10.0	100.0	22.2	6.1	26.1	10.7	16.4	20.2
20-24	11.3	15.3	13.7	9.0	9.9	12.2	12.2	13.5	20.4	19.2	14.2	14.2	14.5	14.2
25-29	14.9	13.1	13.9	10.4	2.1	9.5	7.3	27.4	12.9	16.3	15.7	15.1	13.0	13.3
30-34	14.3	12.1	13.0	9.9	9.1	10.3	19.3	21.1	17.2	15.1	17.8	8.9	14.2	13.7
35-39	10.6	15.2	13.5	7.0	2.2	11.4	13.4	22.5	10.2	20.1	16.3	11.9	12.5	12.8
40 and above	13.2	10.0	11.0	6.8	6.4	10.9	10.6	-	18.1	9.9	12.7	11.1	11.9	11.6
No Response	20.7	5.6	12.3	-	16.7	12.0	25.0	50.0	21.4	27.3	13.9	9.5	16.5	15.2
Mother's Education														
Illiterate	16.0	12.5	13.5	10.5	6.0	11.6	13.0	11.0	15.2	16.0	15.7	12.2	13.5	13.5
Primary	11.9	15.4	13.8	6.8	5.7	8.6	10.6	32.4	20.7	16.9	16.9	23.7	13.3	13.5
Matric and above	11.8	15.4	13.3	4.4	6.0	2.2	15.0	30.0	22.9	16.7	14.8	9.5	12.1	13.0
No Response	20.7	5.6	12.3	-	16.7	12.0	25.0	50.0	21.4	27.3	13.9	9.5	16.5	15.2

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table: 11
Prevalence rate (%) of child morbidity among children under five, by economic characteristics controlling for rural /urban Areas and ecological zones

Economic Characteristics	**Urban Areas**			**Rural Areas**										Total Sample
	MUCs	OUCs	All	Rice/ wheat Punjab	Mixed Punjab	Cotton/ Wheat Punjab	Low /Intensity Punjab	Barani Punjab	Cotton/ wheat Sindh	Rice /other Sindh	NWFP	Balochistan	All	
Have You own an Agriculture land														
Yes				8.1	4.6	11.4	15.2	16.8	13.0	16.4	13.7	12.6	12.6	12.3
No				9.4	7.1	10.3	9.8	25.0	18.1	16.3	18.6	12.2	14.2	14.1
Have You own an Animal														
Yes				7.8	5.4	9.1	13.3	22.9	14.3	16.4	14.2	13.7	12.7	12.7
No				9.9	6.9	12.4	12.4	20.6	18.8	16.2	17.6	11.7	14.2	14.0

Source: computed from PSLM 2004-05

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 12
Logistic regression effects of predictors on child morbidity among children under five, 2004-05 PSLM (Odd Ratios)

Characteristics	Model 1 (Full)	Model 2 Rice/ Wheat Punjab	Model 3 Mixed Punjab	Model 4 Cotton/wheat Punjab
Child Characteristics				
Child's Gender				
Female	1.00	1.00	1.00	1.00
Male	1.174*	1.154	1.436	1.474**
Child's Age				
<1	1.00	1.00	1.00	1.00
1	0.933	1.574	1.133	1.259
2	0.679*	0.829	0.579	0.863
3	0.492*	0.422**	0.437**	0.524**
4	0.348*	0.449**	0.403**	0.259*
Total No of Children born				
1-2	1.00	1.00	1.00	1.00
3-4	0.942	0.829	1.485	0.961
5-6	1.053	0.535**	1.895	0.892
7 and more	1.027	0.232*	2.215	2.366*
Mother's Characteristics				
Mother's age	0.997	1.016	0.965	0.983
Mother's Education				
Illiterate	1.00	1.00	1.00	1.00
Primary	0.985	0.479**	0.948	0.718
Matric and above	0.912	0.324*	1.392	0.191**
Mother's working Status				
No	1.00	1.00	1.00	1.00
Yes	1.190*	1.138	1.736**	1.076
Immunization				
Child Immunization				
No	1.00	1.00	1.00	1.00
Yes	1.135**	0.836	0.488**	1.060
Environmental Characteristics				
Type of Toilet Facility				
No toilet in house	1.00	1.00	1.00	1.00
Flush system(B)	0.903	2.439**	1.069	0.136*
Others	0.976	1.517	1.011	0.696**
Source of Drinking water				
Others	1.00	1.00	1.00	1.00
Piped water within the House / Motorized Pump	0.964	0.659	1.520	0.884

continued

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Characteristics	Model1 Full	Model 2 Rice/ Wheat Punjab	Model 3 Mixed Punjab	Model 4 Cotton/wheat Punjab
Economic Characteristics				
Own Agriculture Land				
No	1.00	1.00	1.00	1.00
Yes	0.839*	0.912	0.688	1.297
Own Animals				
No	1.00	1.00	1.00	1.00
yes	0.898**	0..848	0.882	0.589*
Material used in roof of House				
Others	1.00	1.00	1.00	1.00
RCC/RBC	0.940	1.091	0.786	1.116
Material Used in walls				
Others	1.00	1.00	1.00	1.00
Brick	1.209*	1.656	1.136	1.567**
Source of Light				
Others	1.00	1.00	1.00	1.00
Electricity	1.279*	0.896	0.605	1.028
Geographical zones				
Ecological Zones (Rural)				
Rice wheat Punjab	1.00	1.00	1.00	1.00
Mixed Punjab	0.680**	-	-	-
Cotton Wheat Punjab	1.336**	-	-	-
Low Intensity Punjab	1.868*	-	-	-
Barani Punjab	3.016*	-	-	-
Cotton Wheat Sindh	2.524*	-	-	-
Rice Other Sindh	2.683*	-	-	-
NWFP	2.267*	-	-	-
Balochistan	2.073*	-	-	-
Ecological zones (urban)				
MUCS	1.678*	-	-	-
OUCS	1.692*	-	-	-
N	12729	701	642	985

SOURCE: Computed from the 2004-05 PSLM
(A)Primary category include primary and middle (till 8th class)
(B)The flush system includes Flush system connected to Public Sewerage.
* Shows significance at 5 percent or lower level of confidence.
** Shows significance at 10 percent or lower level of confidence.

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 13
Logistic regression effects of predictors on child morbidity among children under five, by rural ecological zones, 2004-05 PSLM (Odd Ratios)

Characteristics	Model 5	Model 6	Model 7	Model 8
	Low/intensity Punjab	Barani Punjab	Cotton /wheat Sindh	Rice/ Other Sindh
Child Characteristics				
Child's Gender				
Female	1.00	1.00	1.00	1.00
Male	0.938	1.030	1.414*	1.179
Child's Age				
<1	1.00	1.00	1.00	1.00
1	1.477	0.808	1.031	0.977
2	0.785	0.364**	0.626**	0.618**
3	0.560	0.542	0.495*	0.395*
4	0.358**	0.244*	0.312*	0.310*
Total No of Children born				
1-2	1.00	1.00	1.00	1.00
3-4	0.997	0.452**	0.979	0.991
5-6	1.508	0.729	0.794	1.060
7 and more	0.903	1.182	1.385	0.866
Mother's Characteristics				
Mother's age	1.003	0.980	1.003	0.996
Mother's Education				
Illiterate	1.00	1.00	1.00	1.00
Primary	0.654	3.934*	1.248	0.922
Matric and above	0.863	2.730**	1.151	1.035
Mother's working Status				
No	1.00	1.00	1.00	1.00
Yes	3.813*	2.735**	0.895	0.739
Immunization				
Child Immunization				
No	1.00	1.00	1.00	1.00
Yes	0.700	0.630	1.589*	1.115
Environmental Characteristics				
Type of Toilet Facility				
No toilet in house	1.00	1.00	1.00	1.00
Flush system(B)	1.810	1.914	2.906	2.361**
Others	1.790**	1.625	1.074	1.006
Source of Drinking water				
Others	1.00	1.00	1.00	1.00
Piped water within the House / Motorized Pump	1.064	1.331	1.495**	1.114

Continued

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Characteristics	Model 5	Model 6	Model 7	Model 8
	Low/intensity Punjab	Barani Punjab	Cotton /wheat Sindh	Rice/ Other Sindh
Economic Characteristics				
Own Agriculture Land				
No	1.00	1.00	1.00	1.00
Yes	1.349	0.415*	0.749**	1.032
Own Animals				
No	1.00	1.00	1.00	1.00
yes	0.633	1.519	0.786	1.150
Material used in roof of House Others	1.00	1.00	1.00	1.00
RCC/RBC	0.390*	0.784	0.998	0.781
Material Used in walls				
Others	1.00	1.00	1.00	1.00
Brick	1.673**	0.891	0.669**	1.102
Source of Light				
Others	1.00	1.00	1.00	1.00
Electricity	1.081	0.724	1.469**	1.418**
N	416	226	1030	986

SOURCE: Computed from the 2004-05 PSLM
(A)Primary category include primary and middle (till 8th class)
(B)The flush system includes Flush system connected to Public Sewerage.
* Shows significance at 5 percent or lower level of confidence.
** Shows significance at 10 percent or lower level of confidence.

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Appendix Table 14
Logistic regression effects of predictors on child morbidity among children under five, by ecological zones, 2004-05 PSLM (Odd Ratios)

Characteristics	Model 9	Model 10	Model 11	Model 12
	NWFP	Balochistan	MUCs	OUCs
Child Characteristics				
Child's Gender				
Female	1.00	1.00	1.00	1.00
Male	1.176**	0.839	1.109	1.235**
Child's Age				
<1	1.00	1.00	1.00	1.00
1	1.309**	0.578**	0.685**	0.796**
2	0.976	0.474*	0.522*	0.681*
3	0.759**	0.350*	0.491*	0.390*
4	0.637*	0.193*	0.322*	0.307*
Total No of Children born				
1-2	1.00	1.00	1.00	1.00
3-4	0.889	0.889	1.143	0.816**
5-6	1.188	1.684*	1.195	0.803**
7 and more	1.005	0.946	1.038	0.724**
Mother's Characteristics				
Mother's age	0.991	0.993	0.995	1.008
Mother's Education				
Illiterate	1.00	1.00	1.00	1.00
Primary	0.969	2.434*	0.645*	1.188
Matric and above	0.758	0.681	0.690*	1.162
Mother's working Status				
No	1.00	1.00	1.00	1.00
Yes	1.330	1.100	1.131	1.108
Immunization				
Child Immunization				
No	1.00	1.00	1.00	1.00
Yes	1.176	0.985	1.070	1.132
Environmental Characteristics				
Type of Toilet Facility				
No toilet in house	1.00	1.00	1.00	1.00
Flush system(B)	0.862	1.065	1.630**	0.784
Others	0.937	0.740**	1.699**	0.951
Source of Drinking water				
Others	1.00	1.00	1.00	1.00
Piped water within the House / Motorized Pump	1.044	1.011	0.839	0.907

Continued

ISSN-L: 2223-9553, ISSN: 2223-9944
Vol. 2, No. 1, January 2012

Characteristics	Model 9	Model 10	Model 11	Model 12
	NWFP	Balochistan	MUCs	OUCs
Economic Characteristics				
Own Agriculture Land				
No	1.00	1.00	1.00	1.00
Yes	0.704*	1.069	0.626**	0.747**
Own Animals				
No	1.00	1.00	1.00	1.00
yes	0.849	1.185	1.081	0.895
Material used in roof of House				
Others	1.00	1.00	1.00	1.00
RCC/RBC	0.815	1.242	1.117	0.885
Material Used in walls				
Others	1.00	1.00	1.00	1.00
Brick	1.370*	1.335	0.999	1.176
Source of Light				
Others	1.00	1.00	1.00	1.00
Electricity	1.857*	1.180	1.449	1.241
N	2037	1201	1808	2697

SOURCE: Computed from the 2004-05 PSLM
(A)Primary category include primary and middle (till 8th class)
(B)The flush system includes Flush system connected to Public Sewerage.
* Shows significance at 5 percent or lower level of confidence.
** Shows significance at 10 percent or lower level of confidence.