Original Article

Epidemiological Analysis of Infant Mortality in Rural Punjab of Pakistan

Rehan Ahmad Khan Sherwani[1], Muhammad Ali Raza[2], Sajjad Haider Bhatti[2], Muhammad Aftab[2], Tanvir Ahmad[2] and Malik Shahid Shaukat[3]

ABSTRACT

Objective: The objective of the present study was to determine the factors affecting the child mortality in Rural Punjab, Pakistan.

Study Design: Descriptive / observational study.

Place and Duration of Study: This study was conducted at the College of Statistical and Actuarial Sciences, University of the Punjab, Lahore from 20th November 2016 to 15th April, 2017.

Materials and Methods: To assess the contribution of selected socio-economic and bio-demographic variables on child mortality in Rural Punjab, Pakistan, binary logistic regression for the PDHS (2006-07) data was used. For this, married women were selected; with total sample size 10466.

Results: Maternal occupation, maternal education, breastfeeding, sex of child, mass media, age at 1st birth, age at 1st marriage, cousin marriage, child is twin, preceding birth interval, birth order, number of family members, parental education, parental occupation and wealth index had significant effect on child mortality ($P<0.05$).

Conclusion: Increase in awareness of health care of infant and children among the people in rural areas are required. New health centers should be established in rural areas to provide information about health care of children. Preceding birth interval must be more than two years. Early age marriages should be condemned.

Key Words: Mortality, Morbidity, Odds Ratio, Logistic Regression

INTRODUCTION

Infant and child mortality had turned into a terrifying issue far and wide, particularly in low resourced nations like Pakistan, India, Bangladesh and Sri Lanka[1]. During the recent decades rate of overall child mortality had declined across the world but the developing nations still possessed high rate[2]. According to WHO, Pakistan ranks 47th among the countries that have highest mortality rates for the children under-five years of age [3]. Several factors affect the child mortality. Some of them are biological and some relate to socioeconomic issues. In addition, religious disparities also had significant effect on child mortality[4].

Organic elements incorporate high fertility, birth dividing, birth weight, maternal age and wellbeing, various births and irresistible ailments[5]. Socioeconomic components include the economic wellbeing of the family, breast feeding, culture, religion, poor cleanliness and less maternal wellbeing education[6].

From last few decades, Pakistan remained a victim of child mortality. Although child mortality rate had declined since 1980's from 153 to 86 per 1000 live births but still persist on a high note. Approximately, more than four hundred thousand child died each year and 97 per 1000 are under the age of five[7,8]. The main sources of death reported among children under-five years include pneumonia and diarrhea trailed bymalaria, measles, birth trauma, hemolytic diseases, congenital anomalies, malnutrition and maternal infections, all of which can be vetoed through proper nutrition, hygiene, and better medical facilities. Roughly, 38% of children under five are accounted for to be tolerably or seriously underweight and 59% of rural Pakistanis don't have entry to satisfactory sanitation places which expands the odds of contracting irresistible maladies [9]. Pakistanis is still among the four nations where Polio stays endemic[10].

In October 2004 USAID set up a program Pakistan Initiative for Mothers and Newborns (PAIMAN) through which it financed Pakistan 56.2 million dollars for enhancing maternal and baby well being[11]. Generally speaking, in Pakistan, more than 26 percent of mothers were accounted for by the occurrence of child mortality. The patterns are increasing in rural areas than in urban areas[12]. The goal of current study was to focus the components influencing the child mortality in provincial territory of Punjab in Pakistan.

1. Department of Statistics, College of Statistical and Actuarial Sciences, University of the Punjab Lahore.
2. Department of Statistics, Government College University, Faisalabad Pakistan.
3. IPH Lahore.

Correspondence: Rehan Ahmad Khan Sherwani, Assistant Professor, College of Statistical and Actuarial Sciences, University of the Punjab Lahore.
Contact No: 0334 4118684
Email: rehan.stat@pu.edu.pk

MATERIALS AND METHODS

In current study, we utilize the "Pakistan demographic and health survey (PDHS-2007)"data published by National Institute of Population Studies (NIPS), Pakistan. Pakistan's first demographic and wellbeing overview was attempted in 1990-91. From that point forward, different overviews concentrating on richness & family arranging, conceptive wellbeing and status of ladies led. The present demographic and wellbeing review (2006-07) had uncommon elements, including maternal mortality and infant & child death, mortality, and morbidity, nevertheless the routine territories which covers demographic and wellbeing overviews. In the present study women's of child bearing age were selected. Selected sample covers both urban and rural areas of Punjab. The data was analyzed using Statistical Product and service solutions (SPSS). Variables associated with child mortality were investigated using logistic regression. Continuous variables were categorized by using Quartile analysis. Odds ratios and 95% confidence intervals (C.Is) were calculated [13].

RESULTS

Descriptive and inferential statistics is used to access the silent features of the study. Descriptive statistics includes the crosstabs and percentages of the dependent variable with respect to independent variables. Table 1, indicated that breastfeeding factor provides significant effect on child mortality. The findings of the study indicated child mortality rate among the children was 46.3% whose mothers were not presently breastfeeding and 38.6% were those mothers who were currently breastfeeding. The results of significant variable like sex of child indicated that child mortality rate among male and female children were 43.1% and 45.6% respectively. Mass media also shows significant effect on child mortality. In bio-demographic variable, age at first birth found significant effect on child mortality. The results indicates that child mortality rate of the children whose mothers age less than or equal to 16 years was 60.2% and for the children whose mothers age was greater than 16 years was 40.7 %. Age at first marriage indicates that child mortality rate was 50.5% for the mothers whose age at first marriage is less than or equal to 18 years and 32.6% for those mothers whose age at first marriage was more than 18 years. Child mortality was 38.4% for the children of the respondents who have no relationship with their husbands before marriage and 47.4% for the children of the respondent who have relationship with their husbands before marriage. Training is the most impacted element in separating the newborn child and kid mortality levels inside of all the financial elements. Mothers with no education had 51.3% chance of child mortality. Rate of child mortality for twin babies was 43.9%.

Table No.1: Distribution of Child Mortality According to Selected Variables

Selected Variables	Child mortality		Total	chi-sq
	Yes (%)	No (%)		
Currently breastfeeding				
No	3541(46.3)	4103(53.7)	7644	49.521
Yes	1090(38.6)	1732(61.4)	2822	***
Sex of child				
Male	2359(43.1)	3120(56.9)	5479	6.631*
Female	2272(45.6)	2715(54.4)	4987	
Mass media				
No	2469(50.8)	2389(49.2)	4858	158.89
Yes	2162(38.6)	3446(61.4)	5608	6***
Age at 1st birth				
<=16	1147(60.2)	759(39.8)	1906	239.73
>16	3484(40.7)	5076(59.3)	8560	2***
Age at 1st marriage				
<=18	3431(50.5)	3359(49.5)	6790	309.27
>18	1200(32.6)	2476(67.4)	3676	***
Maternal occupation				
Not working	2437(37.5)	4057(62.5)	6494	313.33
Working	2194(55.2)	1778(44.8)	3972	5***
Cousin marriage				
No relationship	1410(38.4)	2261(61.6)	3671	78.142
Cousin	3221(47.4)	3574(52.6)	6795	***
Maternal education				
No education	3903(48.1)	4209(51.9)	8112	
Primary	531(34.9)	990(65.1)	1521	246.16
Secondary & Above	197(23.6)	636(76.4)	833	6***
Preceding birth interval				
First Birth	763(32.7)	1571(67.3)	2334	
<=12	520(64.6)	285(35.4)	805	314.10
13-24	1570(50.3)	1552(49.7)	3122	4***
>25	1771(42.3)	2416(57.7)	4187	
Child is twin				
Single birth	4525(43.9)	5773(56.1)	10298	24.585
child is twin	106(63.1)	62(36.9)	168	***
Birth order				
1st child	763(32.7)	1571(67.3)	2334	387.44 4***
2-3rd child	1433(38.6)	2283(61.4)	3716	
4+	2435(51.1)	1981(44.9)	4416	
Household members				
1-4 small family	303(44.6)	377(55.4)	680	
5-7 medium	1793(45.0)	2191(55)	3984	1.68
8 and over	2535(43.7)	3267(56.3)	5802	
Parental education				
No education	2361(51.3)	2245(48.7)	4606	
Primary	818(42.7)	1096(57.3)	1914	184.92
Secondary & Above	1445(36.7)	2494(63.3)	3939	3***
Parental Occupation				
Pro.Tec.Mng.Cler. Sale.Srvcs.Skill	2455(59.7)	1656(40.3)	4111	
Didn't work., h.hold& domestic	170(42.6)	229(57.4)	399	66.072
Agric-self employ.agric-employ	1706(52.8)	1526(47.2)	3232	***
Laborer	1501(55.2)	1220(44.8)	2721	

P< 0.05*, P< 0.01**, P< 0.001***

Table-2: Multiple Logistic Regression Analysis of Child Mortality

Variables	B	S.E.	Wald	P-value	Exp(B)	95% C.I for EXP(B) Lower	Upper
Currently Breastfeeding							
Yes					1		
No	0.285	0.049	33.899	0.000	1.33	1.208	1.464
Sex of Child							
Male					1		
Female	0.095	0.042	5.039	0.025	1.099	1.012	1.194
Mass Media							
Yes					1		
No	0.195	0.049	15.645	0.000	1.215	1.103	1.338
Age at 1st Birth							
>16					1		
<= 16	0.431	0.058	55.337	0.000	1.539	1.374	1.724
Age at 1st Marriage							
> 18					1		
<= 18	0.450	0.048	87.1	0.000	1.568	1.427	1.723
Maternal Occupation							
Not Working					1		
Working	0.501	0.045	123.96	0.000	1.65	1.511	1.802
Cousin Marriage							
No					1		
Yes	0.283	0.045	39.008	0.000	1.327	1.214	1.451
Maternal Education							
Secondary and higher					1		
No Education	0.412	0.096	18.378	0.000	1.51	1.251	1.823
Primary	0.265	0.104	6.517	0.011	1.304	1.064	1.599
Child is Twin							
Single					1		
Twin	0.866	0.184	22.151	0.000	2.377	1.658	3.41
Parental Education							
Secondary and higher					1		
No Education	0.108	0.055	3.877	0.049	1.114	1	1.241
Primary	-0.034	0.063	0.294	0.588	0.967	0.855	1.093
Parental Occupation							
Pro.Tec.Mng.Cler.Sle.Srvcs.Skll					1		
Didn't work., h.hold& domestic	0.4	0.114	12.413	0.000	1.492	1.194	1.864
Agric-self employ.agric-employ	-0.025	0.054	0.223	0.637	0.975	0.878	1.083
Laborer	-0.097	0.057	2.934	0.087	0.907	0.812	1.014
Wealth Index							
Rich					1		
Poor	0.244	0.067	13.164	0.000	1.276	1.119	1.456
Middle	0.011	0.063	0.032	0.858	1.011	0.894	1.145
Preceding birth interval							
25 months and over					1		
First birth	-0.541	0.06	80.08	0.000	0.582	0.517	0.656
<12 months	0.915	0.084	117.92	0.000	2.496	2.116	2.944
13-24 months	0.344	0.05	46.537	0.000	1.411	1.278	1.557
Birth order number							
1st child					1		
2-3rd child	0.211	0.058	13.269	0.000	1.235	1.102	1.384
4+	0.755	0.056	180.56	0.000	2.128	1.906	2.376

P< 0.05*, P< 0.01**, P< 0.001***

The results showed clearly that child twin variable had significant effect on child mortality [x^2 =24.585, p<0.001].Babies of the higher birth order have more chances of death. The analyses demonstrate that birth order has significant effect on child mortality. Number of household member's variable had not significant effect on child mortality [x^2 = 1.68]. Father's education indicates as significant effect on child mortality. Parental occupation is an important predictor of infant and child mortality. Occupation was taken as an index of socio-economic status. Child mortality is significantly related to parental occupation [x^2 = 66.072]. Child mortality rate among the poor, middle and rich families were 50.2%, 40.5% and 33.8% respectively.

Table 2 indicates the estimated coefficients, Standard errors, odds ratio and 95% confidence intervals. The odds ratio of breastfeeding is 1.330 which means that for no breastfeeding the odds of child mortality is 1.33 times than yes breastfeeding and 95% confidence interval of odds ratio (1.208, 1.464). Sex of child has significant effect on child mortality but it is not more affective variable [AOR= 1.099]. Child mortality without watching TV is 1.215 times more likely than watching TV.

The age at first marriage has significant effect on child mortality with [AOR= 1.568]. Analysis of this study highlights that child mortality with working respondents is 1.650 times more likely than the respondent who did not work. The odds ratio of cousin marriage is 1.327 and confidence interval (1.214, 1.451) which clearly demonstrates the significant effect on child mortality. The odds ratio of mother with no education is 1.510 and confidence interval is (1.251, 1.823) which does not include the value of 1. It means that child mortality with no education of mother 1.510 times more likely than secondary & higher education. The odds ratio of primary education is 1.304 and confidence interval (1.064, 1.599) which also does not include the value of 1. The result also confirms that maternal education has significant effect on child mortality. Table 2 shows that the odds ratio of the twin child is 2.377 and confidence interval (1.658, 3.410). It observes that child mortality with twin child 2.377 times more likely than the single children. The results indicate that type of birth has significant effect on child mortality. The odds ratio of parental occupation (agric employee / agric-self employee) is 0.975 and confidence interval is (0.878, 1.083) which shows insignificant. The odds ratio of the parental occupation (laborer) is 0.907 and confidence interval (0.812, 1.014) which is also insignificant.

Theodds ratio of the wealth index (poor) is 1.276 and 95% confidence interval of odds ratio is (1.119, 1.456). It observes that the wealth index (poor) has significant effect on child mortality. The odd ratio of the wealth index (middle) is 1.011 and 95% confidence interval is (0.894, 1.145) which is insignificant. Current study

indicated that the child mortality with the first baby 1.718 times less likely than the children whose birth interval more than 25 months. The odds ratio of children who's preceding birth interval greater than 12 months is 2.496 and 95% confidence interval (2.116, 2.944). It observes that child mortality with proceeding birth interval greater than 12 months 2.496 times more likely than children whose birth interval is more than 25 months. The odds ratio of the children whose proceeding birth interval 13 to 24 months is 1.411 and confidence interval is (1.278, 1.557) does not include the value of 1. It observes that child mortality with children whose birth interval 13 to 24 months is 1.411 times more likely than children whose preceding birth interval is more than 25 months. The result shows that preceding birth interval has significant effect on child mortality. Child mortality with more than 4 children is 2.128 times more likely than the child of first order. The result shows that birth order has significant effect on child mortality.

DISCUSSION

Breastfeeding, sex of child, mass media, age at 1st birth, age at 1st marriage, maternal occupation, cousin marriage, maternal education, parental occupation, parental education, child is twin, preceding birth interval and birth order shows significant effect while number of family member's variable indicates insignificant effect on child mortality by univariate analysis in rural area of Punjab, Pakistan. Feeding practices were vital determinants of kids' dietary status and numerous studies have demonstrated the useful impacts of breastfeeding on healthful status, grimness and mortality of newborn children[14]. Mother's age plays a key component for child survival at the time of child birth. Infants born to mothers who were less than 16 years of age, at high risk of dying while infants.

Parental education, parental occupation and wealth index demonstrates insignificant effect on child mortality by the help of logistic regression analysis. Many studies sustained a direct causal relationship between wealth index and child mortality [15].Education of mothers may be attributed to the children of better diets and better overall care than the children of non-educated mothers[16]. Results depicted that child mortality with primary education was 1.304 times more likely than secondary & higher. Birth interval played significant role on infant and child mortality as indicated in previous studies[17]. Another study showed that in first pregnancies the childhood mortality was highest, in 2nd and 3rd. pregnancies that were lowest[18].

CONCLUSION

The present study strongly recommended that women should be motivated to complete their education at least up to the secondary level. Parents should give equal preference to daughters as well as sons in health care

matters. Efforts should make to improve the women education by the government of Punjab, Pakistan using media, workshops and seminars. Government must increase awareness of health care of infant and children among the people in rural areas. New health centers should be established in rural areas to provide information about health of children. Preceding birth interval must be more than two to three years. Early age marriages should be condemned. These all recommendations are strongly amplified by the government of Punjab, Pakistan to decrease the mortality rate especially in rural area of Punjab, Pakistan.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Agha S. The determinants of infant mortality in Pakistan. Soc Sci Med 2000;51: 199-208.
2. You D, Hug L, Ejdemyr S, Idele P, Hogan D, Mathers C, et al. Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. Lancet 2015;386: 2275-2286.
3. Midhet F, Becker S, Berendes HW. Contextual determinants of maternal mortality in rural Pakistan. Soc. Sci. Med. 1998; 46(12): 1587-1598.
4. Surkan PJ, Patel SA,Rahman A. Preventing infant and child morbidity and mortality due to maternal depression. Best Practice & Research Clinical Obstetrics and Gynaecology 2016; 36: 156-168.
5. Kabir M, Amin R. Factors influencing child mortality in Bangladesh and their implication for the National Health Programme. Asia Pac Popul J 1993; 8(3): 31-46.
6. Akhtar N, Zafar MI, Nighat S, Safdar A, Rasheed S, Sadique S, et al. Factors affecting child health: a study of rural Faisalabad. J Agri Soc Sci 2005;1(1): 50-53.
7. Azeem MM, Mugera AW, Schilizzi S. Poverty and vulnerability in the Punjab, Pakistan: A multilevel analysis. J Asian Econ 2016;44:57-72.
8. United Nations Development Programme. Work for human development. Human Development Report 2015; 978-92.
9. Aslam M, Kingdon GG. Parental education and child health-understanding the pathways of impact in Pakistan. World Development 2014;40(10): 2014-2032.
10. Mushtaq A, Mehmood S, Rehman MA, Younas A, Rehman MS, Malik MF, et al. Polio in Pakistan: Social constraints and travel implications. Travel Med Infec Dis 2015;13: 360-366.
11. Nasrullah M, Zakar R, Zakar MZ,Kreamer A. Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a Nationally-Representative sample of Pakistan. J Pediatr 2014;164(3): 639-646.
12. Chowdhury QH, Islam R, Hossain K. Socio-economic determinants of neonatal, post neonatal, infant and child mortality. Int J Soc Anthropol 2010;2(6):118-125.
13. Agresti A. Categorical Data Analysis. Wiley: New York; 1996.
14. Zahid GM. Mother's health-seeking behaviour and childhood mortality in Pakistan. The Pak Develop Rev 1996;719-731.
15. Bairagi R. Is income the only constraint on child nutrition in rural Bangladesh? Bull World Health Organ 1980;58(50):767-772.
16. Gubhaju BB. The effect of previous child death on infant and child mortality in rural Nepal, Stud Fam Plann 1986;16(4):231-236.
17. Miller JE. By birth outcome mother's age at first birth in the Philipines. Int Fam Plann Persp 1993; 98-102.
18. Chen LC, Huq E, D'Souza S. Sex bias in family Allocation of Food and Health Care in Rural Bangladesh. Popul Dev Rev 1981; 7(1): 55-70.