CHILD IMMUNIZATION IN PAKISTAN: SOCIO-INSTITUTIONAL AND REGIONAL ASPECTS

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ABSTRACT

This paper attempted to examine the socioeconomic determinants of preventive measures of child health, i.e. child immunization, particularly focusing on the factors of social institutions and regional diversity in Pakistan economy. For the purpose micro data having 8731 observations from Pakistan Demographic Health Survey (PDHS) 2006-2007 has been utilized. Binary logistic regression is employed to determine the association between complete immunization of children (in the age group of 12 months to 5 years) and explanatory variables. The ethnicity of the households has been taken as proxy of social institution and provinces of Pakistan as regional diversity. Complete immunization of children is captured by basic vaccinations, i.e. BCG, Measles, DPT and Polio. A child is assumed as completely immunized if he/she has received all the twelve vaccinations. The results have shown that social institution represented by ethnicity of household has significant impact on the probability of immunization of children. The children of Urdu, Sindhi, Pashtu and Barohi speaking families are less likely to be immunized as compared to those of Punjabi speaking families. The children from Pashto speaking families are least likely to be immunized as compared to children from Punjabi speaking families. The children living in Sindh and Balochistan are least likely to have complete immunization as compared to those living in Punjab. The results have further shown that male children and children born in hospitals are more likely to be immunized. The probability of complete immunization of children increases with increase in educational level of mother. The children of working mothers are less likely to be completely immunized as compared to their counterparts of mothers who are not working.

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Keywords: Child vaccination, Child health, Mother's education, Household wealth, Social institutions, Regional disparity.

Contribution/ Originality

The study contributes in literature the role of social institutions in and regional diversity in health-care of children in Pakistan. In the health economics they are rarely analyzed. Public sector policy for social development may be proposed for social institutional development and declining the regional diversity.

1. INTRODUCTION

Immunization is the process by which an individual is made immune to an infective disease. By immunization most of childhood diseases may be eliminated. For instance, polio has been vanished from all over the world except

in some countries like India, Pakistan, Nigeria and Afghanistan (Duclos *et al.*, 2009). Childhood immunization is considered one of the indicators of child health because it assures the protection of children from childhood diseases, deaths and disabilities (Bofarraj, 2011). There is a strong association between immunization of children and their nutritional status. Immunization provides protection against morbidity which improves the nutritional status of children in the long-run. In the literature, there are empirical evidences showing such type of relationship. Ray *et al.* (2000) concluded that the children who are fully immunized had better nutritional status than those vaccinated partially and not-vaccinated. Das and Hossain (2008) found that among the children who had not received any vaccination, more than one-fifth and two-fifth were found severely and moderately malnourished. The proportion of the under-weight has been found significantly higher among partially immunized children (see also Abedi and Srivastava (2012)). Wang (2003) concluded that vaccination in the first year of birth significantly reduces child mortality. It suggests that immunization of children is a major intervention for reducing malnutrition, morbidity and mortality in children.

The effectiveness of immunization programmes for the children is mostly measured by the coverage. Ensuring the best coverage of the immunization programmes for the children is an important public health goal. In Pakistan Expanded Program for Immunization (EPI) was started in 1978 for the protection of children. It followed the schedule of immunization that is recommended by the WHO for lower-income countries. Until 2002, vaccination program for children was comprising of BCG/OPV at birth, three doses of DTP/OPV vaccine at 6, 10 and 14 weeks of age, and measles vaccine at 9 months of age. With the support of Global Alliance for Vaccine and Immunizations (GAVI), Hepatitus B was introduced into the EPI in 2002 and Haemophilus Influenzae type b (Hib) vaccine in 2009. Vaccination coverage for childhood diseases remained fairly steady around 70-75 per cent since 1990 with a steep dip in 2001 and an increase to 81 percent in 2011. The vaccination coverage was 71 per cent in 2005-06 and 78 per cent in 2008-09 (Unicef, 2012). The success achieved in 2011 was attributed to win over tribal and religious leaders in KP and FATA in support of the immunization campaign – a vital element in overcoming what had been a persistent pattern of refusal by parents to have their children vaccinated. Vaccine refusals had previously been on the increase in response to a disinformation campaign by militant forces in the region, who had warned the population against vaccination. In Pakistan the coverage of immunization varies by social institutions like ethnic groups as well as regions. The ethnic groups have specific characteristics, norms and culture which affect the behavior of parents regarding health-care (Mutua *et al.* (2011) for Kenya). Similarly there is diversity of regional socioeconomic and cultural characteristics which influence the probability of child immunization.

There are a number of socioeconomic factors which affect the immunization of children. The most common factors are the lack of awareness, attitude of parents, place of delivery, mother's level of education, age and parity, and image of vaccine disagreements in the public. A significant role of the decision to immunize the children is related to the knowledge and information about importance of vaccination. The parental attitude is also affected by the perception about the vaccine safety and its effectiveness (Lorenz and Khalid, 2012). For instance, parents perceive that the vaccination become the reason of cough and fever in children. Such type of perceptions are common in the traditional ethnic groups. Similarly some of the people believe that immunization makes the children infertile which may break the linkage of the family. In 2003, vaccination campaigns were hampered by Islamic extremists in Afghanistan and Nigeria (Kapp, 2003). In 2007 some of the religious controversies arise in Khyber Pakhtunkhawa (KP) and Federally Administered Tribal Areas (FATA) of Pakistan. It was propagated by the religious leaders that polio vaccine is an "Infidel Vaccine" and the main purpose of the vaccination is to sterilize Muslims. The vaccination is blamed to be a Western plot against Muslims (Ullah *et al.*, 2016). Such type of perception and lack of information and awareness in the people of KP made the 24,000 children unable to get the polio vaccine. Even to this controversy it became difficult for the government to run polio campaign in this area. In the absence of vaccination campaign 27 percent of children remained unable to get immunized in KP.

Behavior and decision of the parents are controlled by the social norms and ethnic groups. Some ethnic groups of Pakistan assume that the immunization is not necessary for the children's health. Some of the areas in Pakistan, particularly in the province of Balochistan and KP are generally away from vaccination centers. Almost 20 percent of children in the country remained unable to be immunized because they were far away from the vaccination facilities. To remove this hurdle system of Mobile Immunization Team (MIT) was introduced. Vaccination rate was sufficiently increased by such type of interventions (Lorenz and Khalid, 2012). Still after many hard struggles the rate of immunization in Pakistan is not so good. For instance, up to 2011, and even into 2012, the persistent transmission of polio in Pakistan showed no sign of abating. According to the WHO, the number of reported cases in 2011 stood at 198 in 62 districts, compared with 144 cases in 42 districts during 2010, Pakistan had the most cases of any of the four countries in the world (Pakistan Afghanistan, India and Nigeria) where polio remained endemic in 2010. In 2011 Pakistan saw two cases of wild poliovirus type 3 – a strain that was on the verge of elimination in Asia. (India's last reported case of polio was on 13 January 2011 and the country officially marked one year as "polio free" when no additional new case was reported by 12 January 2012, thus reducing the global number of endemic countries to three.) We want to examine the social institutional and regional aspect of immunization in Pakistan by using Pakistan Demographic and Health Survey (PDHS) 2006-07.

The focus of this study is to see how different ethnic groups and regions affect the immunization of children

2. MATERIAL AND METHOD

Data set: For estimating the child immunization in the perspective of social institutions and regions in Pakistan, data has been extracted from PDHS 2006-2007. The PDHS is a part of long standing worldwide demographic, socioeconomic and health survey program developed to assist developing countries in data collection on family planning, reproductive health, maternal and child health, nutrition, immunization, education and employment. The total number of observations in the data is 11,763. The data on the children in the age group of 12 months to 5 years of age was required to check the immunization status of children. So the total number of observations for the analysis has become 8731.

Measuring the Immunization of Children: The dependent variable is immunization status of children. Four vaccinations are essential for the children, i.e. BCG, Measles, DPT and Polio. Each vaccination has different doses. Data in PDHS has given information about status of each vaccination of child. The variable of immunization status of children is a dummy variable defined as whether the child received all twelve doses or not.

Model Specification: There is a number of theoretical models regarding health-care and its outcomes. Grossman (1972) introduced the demand for medical-care based on demand for good health. Andersen and Newman (1973) developed the behavioral model for health-care. Donabedian (2005) introduced the quality aspect of demand-care. Mosley and Chen (1984) proposed five categories of biological and medical proximate determinants of child mortality, i.e. maternal factors, environmental contamination, nutrient deficiency, injury and personal illness control. All these distal determinants of child mortality operate through proximate determinants and are grouped into individual characteristics, parent characteristics, demographic characteristics, socioeconomic characteristics and regional characteristics. We have used the modified proximate determinants framework for immunization of children instead of same as child mortality. It has already been used by a number of studies in health economics (see (Pande, 2003; Khan and Raza, 2013; Khan and Raza, 2014)).

The general model of the immunization status of children is given as:

Immunization of children = f (Child's individual characteristics, Parents characteristics, Demographic characteristics, Socioeconomic characteristics, Regional characteristics)

The estimation equation for immunization status of children is expressed as:

$$\text{IMMUN} = \beta_0 + \beta_1 \text{SEX} + \beta_2 \text{BORD} + \beta_3 \text{PDEL} + \beta_4 \text{MEDU} + \beta_5 \text{FEDU} + \beta_6 \text{MWS} + \beta_7 \text{FWS} + \beta_8 \text{GENHH} + \beta_9 \text{ETHNIC} + \beta_{10} \text{WINDX} + \beta_{11} \text{REG}$$

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The operational definitions of the variables are given in table 1.

Table-2. Operational Definitions of Variables

Variables	Definitions
Dependent variable	
IMMUN (Immunization status of child)	1 if the child received twelve vaccinations, otherwise 0
Independent variables	
Individual characteristics	
SEX (Sex of child)	1 for male, 0 for female
BORD (Birth-order of child)	0 for less than or equal to 2, 1 for greater than 2
PDEL (Place of delivery of child)	0 for homes, 1 for hospital
Parents characteristics	
MEDU (Mother's education)	0 for illiterate, 1 for primary, 2 for secondary, 3 for higher
FEDU (Father's education)	0 for illiterate, 1 for primary, 2 for secondary, 3 for higher
MWS (Mother's working status)	1 for working, 0 for not working
FWS (Father's working status)	1 for working, 0 for not working
Demographic characteristics	
GENHH (Gender of household head)	1 for male, 0 for female
ETHNIC (Ethnicity of household)	0 for Punjabi, 1 for Urdu, 2 for Sindhi, 3 for Pashto, 4 for Balochi, 5 for Others
Socioeconomic characteristics	
WINDX (Wealth index)	0 for poorest, 1 for poorer, 2 for middle, 3 for richer, 4 for richest
Regional characteristics	
REG (Region)	0 for Punjab, 1 for Sindh, 2 for Khyber PakhtoonKhawa, 3 for Balochistan, 4 for Gilgilt Baltistan, 5 for Islamabad

3. RESULTS AND DISCUSSION

The results of binary logistic regression have been shown in table 2.

Table-2. Results of Binary Logistic Regression for Immunization of Children

	Coefficient	Marginal effects	S.E.	*p* value
Individual characteristics				
Sex of child (female as reference)				
Male	.0751	.0157	.0469	(.091)***
Birth-order of child (less than or equal to 2 as reference)				
Greater than 2	-.0614	-.0128	.0493	(.213)
Place of delivery (homes as reference)				
Hospitals	.1946	.0407	.0544	(.000)*
Parents characteristics				
Mother's education (no education as reference)				
Primary	.2863	.0600	.0740	(.000)*
Secondary	.2046	.0429	.0976	(.026)**
Higher	.3036	.0636	.1020	(.003)*
Father's education (no education as reference)				
Primary	-.0328	-.0068	.0784	(.675)
Secondary	.0664	.0139	.0666,	(.319)
Higher	.2232	.0468	.0835	(.008)*
Mother's work status (no as reference)				
Yes	-.2565	-.0537	.0645	(.000)*
Father's work status (no as reference)				
Yes	.0861	.0180	.1678	(.608)
Demographic characteristics				
Gender of household head (female as reference)				
Male	.0167	.0035	.0922	(.856)
				Continue

Ethnicity of household (Punjab as reference category)			
Urdu	-.1162	-.0243	.1081	(.283)
Sindhi	-.2052	-.0430	.1221	(.093)***
Pashto	-.5379	-.1127	.1089	(.000)*
Balochi	-.3551	-.0744	.1407	(.012)**
Others	-.2134	-.0447	.0817	(.009)*
Socioeconomic characteristics			
Wealth index (poorest as reference)			
Poorer	.4380	.0918	.0803	(.000)*
Middle	.6563	.1375	.0849	(.000)*
Richer	.6977	.1462	.0919	(.000)*
Richest	.7442	.1560	.1069	(.000)*
Regional characteristics			
Region (Punjab as reference category)			
Sindh	-1.0957	-.2297	.0901	(.000)*
Khyber Pakhtoonkhawa	-.2889	-.0605	.1032	(.005)*
Balochistan	-1.0848	-.2274	.0990	(.000)*
Gilgit Baltistan	-.7866	-.1649	.1081	(.000)*
Islamabad	-.6320	-.1325	.1039	(.000)*

*, ** and *** represents significant at level of 1, 5 and 10 % respectively

Individual Characteristics: In the individual characteristics related with child, the sex of child was included in the analysis to see whether male or female children are more likely to be immunized. The regression results have shown that the male children are more likely to be immunized. Male children are preferred to female children in immunization (Biswas *et al.*, 2001).

Birth-order means that on what number child has taken birth. The results have shown that the probability to be immunized is low if the birth-order is greater than 2.

Place of delivery, i.e. hospital or home has been included in the analysis to see complementary effect of hospital delivery on immunization of children. The results have shown that children born in the hospital are more likely to be immunized as compare to those who were born at home. It explains the complementary effect of place of delivery of the child and its immunization (Bugvi *et al.*, 2014).

Parent's Characteristics: Mother's education has been included in the analysis to check its impact on immunization of children. All the categories of mother's education have shown positive impact on the probability of immunization of children. It explained that educated women have more awareness about the significance of immunization (Streatfield *et al.*, 1990).

Education of father also plays an important role in immunization of children. The regression results have shown that probability of immunization of children increases when the father is highly educated. The primary and secondary level of father's education has no significant effect on immunization of children.

Working status of the mother may have varying effect on child health-care depending upon the nature of the job. Formal and informal sector work may have different effect. Similarly unpaid work and subsistence level work may also have insignificant effect on child immunization. The literature evidenced that mothers who are employed in government sectors are much more likely to immunize their children (Naeem *et al.*, 2012). The results of the current regression analysis have shown that the children from working mothers are less likely to be immunized as compared to the non-working mothers. It may explain that employed women are mostly working in informal sector self-employment or at subsistence level of income. Lack of professional education, technical knowhow and illiteracy in the women signifies the fact. In the social perspective the main earning hand of the household is assumed male head of the household and females are sent into the labor market when the household has no significant income to meet the basic needs of the household. It may be presumed that majority of the working women belong to lower income households.

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Demographic Characteristics: Gender of head of household is an important factor for immunization of children. The results have shown that children are more likely to be immunized if the head of household is male.

There is diversity of the social and cultural institutions in Pakistan. The country comprised of bunch of local languages overlapping with the neighboring countries like Afghanistan, India and Iran. The ethnic groups overlap in these countries. For instance, the Pashto language is prevalent in KP and Balochistan. It is widely spoken in Afghanistan as well. Similarly the tribes of KP and Balochistan having the same language also exists in these two countries. Balochi is spoken in Balochistan as well partially in the adjacent areas of Iran. So the tribal groups and ethnic groups have specific culture and tradition. Particularly the Pushto, Balochi and Sindhi (mostly spoken in Sindh) ethnic group have strong traditions and norms. We have used languages of household in Pakistan to check the impact of different ethnic groups on the immunization of children. The estimated results has shown that Urdu, Sindhi, Pashto, Balochi and other language speaking families are less likely to make their children immunized as compared to the Punjabi speaking families. The Pushto speaking households are the most less likely to immunize their children. At the second and third position are Balochi and Sindhi respectively. Urdu speaking families are least less likely to immunize their children.

Socioeconomic Characteristics: We have used wealth index as the socioeconomic variable (Wagstaff and Watanabe, 2000; Oakes and Rossi, 2003; Fotso and Kaute-Defo, 2006) to check the effect of socioeconomic status of household on immunization of children. The regression results have shown that good socioeconomic status households have higher probability to immunize their children. As the socioeconomic status of the household increases from poorer to richest the probability of immunization of children also increases. According to Biswas *et al.* (2001) if the household economic status is good the children are completely immunized.

Regional Characteristics: We have included the variable of region in the analysis to see its impact on child immunization. The four provinces of Pakistan, capital area of Islamabad and Gilgit Baltistan are included as regional variables.

The econometric results have shown that the children from Sindh, KP, Balochistan, Gilgit Baltistan and Islamabad are less likely to be immunized as compared to Punjab. The children from Sindh are highly less likely to be immunized. Then it comes the Balochistan, Gilgit Baltistan, Islamabad and KP.

The explanation for the regional differences may be that in the province of Punjab there is comparatively higher adult literacy rate and household per-capita income. There are light social norms in the province of Punjab. The population clusters are not as scattered as in Sindh, Balochistan and KP.

4. CONCLUSION

The objective of the study was to see the socio-institutional and regional variables' effect on child immunization in Pakistan. The ethnicity of the household was taken as the social institution and provinces of Pakistan as the regional variable.

The children from Urdu, Sindhi, Pashto and Balochi speaking households are found less likely to be immunized as compared to children from Punjabi speaking households. Pashto speaking households are the most less likely to immunize their children. From the policy perspective focus should be on the ethnic group of Pashto. For the purpose the change in behavior of the household should be through the institutional actors of the society. For instance there is hold of religious leaders in this ethnic group so it may be used for changing the behavior. Similarly the seclusion of females is more prevalent in this group. The immunization of children is bonded with mother's social mobility. So keeping the tradition in mind the female vaccinators for children may be recommended. Another factor of low immunization in this ethnic group is misconception about immunization of children that is particularly related with religious misconception. To remove such type of misconception is very much necessary.

In the regional perspective, the children from the provinces of KP, Balochistan, Gilgit Baltistan and Islamabad are less likely to have immunization as compared to Punjab. The children from Sindh are least likely to be

immunized. The public health and general health of the people is responsibility of the provincial governments. The Sindh government needs hectic efforts to reach the level of immunization of children in Punjab. In the province of Sindh, Karachi is the biggest city of Pakistan. A significant part of the urban population of the province lives in this city. It has a major part of the slums. The rural areas of the province are scattered and not easy to access. For immunization of children hectic efforts are required by the government to reach the slums and far flung areas of the province. Most of all good governance and well-managed system for delivery of the health services to the people particularly the preventive measures of children' health is required. The lower probability of child immunization in KP is associated with Islamic environment, religious beliefs, lack of awareness on importance of vaccination, lack of confidence in the international health community and conflict situations in this region which negatively affect vaccine campaigns (Lorenz and Khalid, 2012). It was propagated that Polio vaccination leads to impotency. Conservative and illiterate Mullah (clerics) of Federally Administered Tribal Areas (FATA) and Khyber Pakhtunkhwa (KP) had announced in 2007 that polio vaccination is an infidel campaign (Lorenz and Khalid, 2012) to weaken Muslim strength through birth control. In KP there is need to involve the religious leaders of the area in vaccination compaign.

In the control variables, it is concluded that male children and children born in hospitals are more likely to be immunized. The educational level of the mother increases the child immunization but working status of the mother decreases the probability of child immunization. Wealth status of the household has pertinent role in enhancing the immunization of children. So to form the policy framework to enhance the child immunization these factors should be considered. Programmes targeting mothers of lower socio-economic status such as those with no education, those in most poor households are required. Such programmes may include health education and immunization campaigns at the community level to improve coverage. Awareness concerning delivery at health facilities should also be created among the population as this is associated with higher likelihood of childhood immunization.

REFERENCES

Abedi, J.A. and J.P. Srivastava, 2012. The effect of vaccination on nutritional status of pre-school children in rural and urban lucknow. Journal of Academia and Industrial Research, 1: 173-175.

Andersen, R. and J.F. Newman, 1973. Social and individual determinants of medical care utilization in the United States. Milbank Memorial Fund Quarterly: Health and Society, 51(1): 95-124.

Biswas, S.C., M.A. Darda and M.F. Alam, 2001. Factors affecting childhood immunisation in Bangladesh. Pakistan Development Review, 40(1): 57-70.

Bofarraj, M.A.M., 2011. Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida city, Libya. Egyptian Journal of Pediatric Allergy and Immunology, 9(1): 29-34.

Bugvi, A.S., R. Rahat, R. Zakar, M.Z. Zakar, F. Fischer, M. Nasrullah and R.R. Manawar, 2014. Factors associated with non-utilization of child immunization in Pakistan: Evidence from the demographic and health survey 2006-07. BMC Public Health, 14(1): 1.

Das, S. and M.Z. Hossain, 2008. Levels and determinants of child undernutrition in Bangladesh. Pakistan Journal of Statistics, 24(4): 301-323.

Donabedian, A., 2005. Evaluating the quality of medical care. Milbank Quarterly, 83(4): 691-729.

Duclos, P., J. Okwo-Bele, M. Gacic-Dobo and T. Cherian, 2009. Global immunization: Status, progress, challenges and future (Opinion). BMC International Health and Human Rights, 9(1): 1.

Fotso, J. and B. Kaute-Defo, 2006. Household and community-socioeconomic influences on early childhood malnutrition in Africa. Journal of Biosocial Science, 38(3): 289-313.

Grossman, M., 1972. On the concept of health capital and demand for health. Journal of Political Economy, 82(2): 223-255.

Kapp, C., 2003. Surge in polio spreads alarm in Northern Nigeria. Lancet, 362(9396): 1631-1632.

Khan, R.E.A. and M.A. Raza, 2013. Maternal health-care in India: The case of tetanus toxoid vaccination. Asian Development Policy Review, 1(1): 1-14.

Khan, R.E.A. and M.A. Raza, 2014. Child malnutrition in developing economies: A case study of Bangladesh. Quality & Quantity, 48(3): 1389-1408.

Lorenz, C. and M. Khalid, 2012. Influencing factors on vaccination uptake in Pakistan. Journal of Pakistan Medical Association, 62(1): 59-61.

Mosley, W.H. and L.C. Chen, 1984. An analytical framework for the study of child survival in developing countries. Population and Development Review, 10: 25-45.

Mutua, M.K., K.-M. Elizabeth and E.R. Remare, 2011. Childhood vaccination in informal urban settlements in Nairobi, Kenya: Who gets vaccinated? BMC Public Health, 11(1): 1.

Naeem, M., M.Z.I. Khan, M. Adil, S.H. Abbas, A. Khan, M.U. Khan and S.M. Naz, 2012. Coverage and causes of non-immunization in national immunization days for polio: A consumer and provider perspective study in Peshawar. Journal of Postgraduate Medical, 26(1): 48-54.

Oakes, J.M. and P.H. Rossi, 2003. The measurement of SES in health research: Current practices and steps towards a new approach. Social Science & Medicine, 56(4): 769-784.

Pande, R.P., 2003. Selective gender differences in childhood nutrition and immunization in rural India: The role of siblings. Demography, 40(3): 395-418.

Ray, S.K., A.B. Biswas, S.D. Gupta, D. Mukherjee, S. Kumar, B. Biswas and G. Joardar, 2000. Rapid assessment of nutritional status and dietary pattern in a municipal area. Indian Journal of Community Medicine, 42(1): 14-18.

Streatfield, K., M. Singarimbun and L. Diamond, 1990. Maternal education and child immunization. Demography, 27(3): 447-455.

Ullah, S.A., F.A. Deen and Y. Hussain, 2016. Genesis of polio vaccination hindrance syndrome in Pakistani society, religio-medical aspects. Open Journal of Social Sciences, 4(03): 98-103.

Unicef, 2012. Situation analysis of children and women health in Pakistan. Unicef Pakistan.

Wagstaff, A. and N. Watanabe, 2000. Socioeconomic inequalities in child malnutrition in the developing world. Policy Research Working Paper No. 2434. Washington, DC: The World Bank.

Wang, L., 2003. Determinants of child mortality in LDCs: Empirical findings from demographic and health surveys. Health Policy, 65(3): 277-299.