ORIGINAL ARTICLE

Achievements of healthcare services vis-à-vis the MDG targets: Evidence from Pakistan

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Abstract

Objective: To investigate the impact of public healthcare facilities and socio-economic circumstances on the status of child health.

Methods: The study was conducted at the School of Social Sciences and Humanities of the National University of Sciences and Technology, Islamabad, Pakistan. The human opportunity index framework was used to measure the trends in health inequalities and coverage using Pakistan Social and Living Standards Measurement dataset from year 2001-02 to 2012-13 at national and provincial levels. The health goals considered in this study were: reducing infant and child mortality rates and immunisation against measles and other major diseases such as diphtheria, polio, Bacillus Calmette-Guerin, and hepatitis. Socio-economic variables such as age, household income, gender, mother's education, housing conditions, water and sanitation facilities, awareness of health services and provision of public hospitals, distance to and cost of immunisation were used to generate quantitative estimates.

Results: The human opportunity index for reduction in child mortality rates improved for 6879(50.4%) mothers in 2001-02 to 8763(64.1%) in 2011-12. Similarly, immunisation against measles and other diseases also registered an improvement from 8430(51.6%) to 9495(69.9%) children during the period at national level.

Conclusion: Health indicators vis-à-vis the Millennium Development Goals targets showed improvement.

Keywords: Child mortality, Immunisation, Socio-economic circumstances, Health services. (JPMA 67: 1346; 2017)

Introduction

The state of child health is an important dimension of households' well-being and human development. Despite the improvements in coverage of health services, Pakistan has so far been incapable of achieving the health targets set under the umbrella of Millennium Development Goals (MDGs). According to some careful estimates, the infant mortality has reduced from 102 in 1991 to 74 deaths per 1,000 live births in 2013. Similarly, even though the mortality rate of under-five-year children has reduced from 117 in 1991 to 89 per 1,000 live births, the progress has been quite slow.[1] In fact, even with this improvement, Pakistan lies amongst the countries which have highest infant and under-five-child mortality rates, globally as well as in the South Asian region.[2]

Children with the poorest socio-economic background are most likely to be malnourished and vulnerable to diseases. The childhood immunisation campaigns are regularly launched in the country with the support of the World Health Organisation (WHO), however, the large proportion of population remains prone to malaria, measles, polio and dengue viruses and other communicable and non-communicable diseases. The prevalence of these diseases is highly correlated with low levels of education and hygienic practices on the one hand and poverty on the other. The inability to reduce the child mortality by two-thirds and attainment of universal opportunities for full immunisation can also be attributed to regional and provincial disparities and unequal access to public health services for the marginalised groups of the society.

The current study was planned to highlight the contribution of the socio-economic circumstances, which encompass regional features, parental characteristics, family attributes and the public provision of infrastructure availability, on the status of child health. The estimates were used to simulate the time for achieving the health-related MDGs and the universal access to health opportunities, envisaged as per the Vision-2025 of the Planning Commission.

Subjects and Methods

The present study was conducted at the School of Social Sciences and Humanities (S3H) of the National University of Sciences and Technology (NUST), Islamabad, Pakistan, and used historical cross-sectional Pakistan Social and Living Standards Measurement (PSLM) dataset from 2001-02 to 2012-13 of 17,000

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households at national and provincial levels to empirically analyse the patterns of health inequalities and coverage of health opportunities over time.The PSLM survey terminology was initially used in 2004-05 and continues till today with regular intervals. Prior to that similar information was available in the Pakistan Household Integrated Survey (PIHS). The current study used the relevant information of PIHS that was consistent with the available PSLM dataset of different years to derive the cross-sectional time series. To achieve the objectives, the human opportunity index (HOI) was calculated for different types of individuals to analyse the inequality of opportunity in access to basic health services necessary for reducing child mortality and full immunisation against infectious diseases. The 'type' here referred is to different groups of population that were homogeneous in terms of socio-economic circumstances variables.[3] These variables were sex of child, parental education and father's occupation, per capita income of the household, geographical location of the household, and the satisfaction level from the government-provided infrastructure to avail quality health services in terms of time and cost to reach the nearby health centre.

The HOI methodology used in the present study is standard in nature. It was developed by the World Bank in 2008 and it measures the influence of personal circumstances on the likelihood of accessing the basic services for children.[4] The value for HOI is calculated as HOI=P(1-D), where P is the average coverage of opportunity across all individuals and is the dissimilarity index. D measures weighted dispersion in the distribution of access to health services available to a type (k) in the society. D is calculated as: $D=1/(2P)\ \Sigma^{k}_{k=1} W_k |P_k - P|$, where W_k is the population weight of any type (k) and P_k measures the probability of having access to the selected health opportunity for individuals belonging to that group. The probabilities are estimated from binary data on access for selected indicator of the health service using logistic regression. The value of HOI lies between 0 to 100.If value is near 0 it implies worst situation and value closer to 100 implies best desirable outcome. Increase in average coverage rate increases the HOI and vice versa whereas increase in the dispersion D decreases the value.[5]

For this study, indicators for the fourth and sixth MDGs were taken as variables of child health. The first health opportunity variable (child mortality) took the value of 1 if responding mother had not experienced any case of still birth, infant and child mortality had been experienced by the responding mother and zero otherwise. The opportunity to get child immunised against measles was also represented by a dichotomous variable where the variable took a value of one when there was immunisation (evidence generated on the basis of availability of immunisation card or recall basis) and zero otherwise. The health variable for opportunity to combat diseases (such as diphtheria, polio, Bacillus Calmette-Guerin (BCG), and hepatitis) was constructed in two steps. As a first step a polychotomous variable ranging from one to four was constructed where "1" showed the minimum vaccination while "4" shows complete vaccination against all diseases. In second step a dichotomous variable was constructed which took value 1 if the above mentioned variable was 4 and zero otherwise. The MDG six refers to combating diseases such as diphtheria, polio, BCG and hepatitis. After the construction of variables, the role of pre-existing circumstances faced by mothers to access child healthcare opportunity was investigated. The relative importance of each circumstance was examined by decomposing HOI using Shapley inequality decomposition technique.[6,7] The variables encompassing circumstances include family background, parental features, region, gender of the child and the provision of health related infrastructure. The family background referred to the family income and family size, while the parental features included education of parents and father's occupation. Region referred to the area of residence of the household which was rural or urban. Health infrastructure was index of multiple indicators of health facilities provided by the government. Components of health infrastructure included availability of basic health units (BHUs) and family planning centres, provision of safe drinking water and availability of public transport in terms of road and bus which was expected to reduce the cost and time to access the available healthcare services. The index was constructed using the principal component analysis. The overtime data on all the mentioned variables for year 2001-13 was drawn from the PSLM cross-sectional dataset. This dataset covers 17,000 households belonging to 1,252 villages/ enumeration blocks chosen on the basis of the stratified random sampling technique. The health section on immunisation and mortality was used to generate the target sample that consisted of females belonging to the 14-49 years' age group who also had children of less than five years of age. Total number of observation on under five children and their mothers are 14343 selected every year.

Finally, based on the last estimated value of the HOI and annual point average growth of HOI, years required to achieve the desired target were simulated. Assuming a linear expansion, we estimated the years required to achieve selected denoted by TR as follows.

TR = Target value - $HOI_{2012-13}$ / Point Average Growth of HOI

The point average growth (PAG) was given by the following formula

PAG = HOI_f - HOI_0 / Total number of Years

HOI_f and HOI_0 corresponded to data of the years 2001-02 and 2012-13, respectively, in this study. The target value (TV) was revealed through the set of indicators and objectives of each health goal under the MDG umbrella. These targets had been translated through the calculation of HOI. The target value was calculated by adding the initial value of HOI and the product of current deprivation (DV) with the proportion of DV to be reduced. The proportion of deprivation to be reduced in a given indicator referred to the improvement that was desired by 2015, i.e. reducing child mortality and immunisation against measles by two-thirds of the initial value of 2001-02, and achieving the immunisation target against other diseases by 50 per cent.

$$TV = HOI_0 + (DV) (\% \text{ of DV targetted})$$

$$DV = (100 - HOI_{initial})$$

As the development agenda has extended from MDGs to Sustainable Development Goals (SDGs),[1] universal access to all opportunities have become new target for previous goals. After simulating the time of achieving the MDGs, the study calculates the time to achieve the universal access of opportunities. Such analysis is essential to guide public policy makers to reconsider the fundamental tools for enhancing the coverage of all basic health opportunities. HOI approaches the universal level when its value touches its upper boundary. Thus, the time required for universal access (denoted by TU) to health opportunities was simulated as:

$$TU = 100 - HOI_0 / PAG \text{ of HOI}$$

The required growth rate (RG) to achieve the goal by 2025 was calculated by using the HOI methodology as:

$$RG = 100 - HOI_f / 12$$

As the current value of HOI is for year 2012-13, it takes 12 years to reach 2025. If the simulated time required for achieving the universal access is less than 12 years, the existing progress is 'on track' and goal will be achieved by 2025.

Results

The HOI for both indicators of goal four improved quite

Table-1: HOI for opportunity to reduce child mortality.[1]

HOI	2001-02	2005-06	2007-8	2011-12
Pakistan	50.4	57.2	61.6	64.1
Urban	52.0	59.7	64.2	67.2
Rural	49.6	56.0	60.2	62.3
Punjab	49.9	55.7	62.9	70.8
Sindh	47.5	53.5	58.5	60.3
KPK	59.1	74.7	81.6	74.3
Balochistan	48.3	52.6	51.7	59.1

HOI: Human opportunity index
KPK: Khyber Pakhtunkhwa.

Table-2: Immunisation against diseases for children under 5 years of age.

HOI	2001-02	2004-05	2005-06	2006-7	2007-8	2008-9	2010-11	2011-12	2012-13
a. Goal 4: Immunisation Against Measles									
Pakistan	52.10	64.8	51.58	63.03	60.76	65.90	69.94	61.45	67.25
Urban	64.59	75.35	65.67	73.78	71.64	77.24	79.83	71.91	78.02
Rural	46.90	59.99	45.88	59.30	56.32	62.00	66.30	57.04	63.56
Punjab	63.03	76.45	58.94	72.96	64.57	76.27	80.31	74.76	79.60
Sindh	38.77	57.61	47.02	56.07	53.09	63.22	67.91	54.66	63.39
KPK	55.51	65.12	49.99	66.36	58.65	66.90	65.74	60.32	65.32
Balochistan	44.65	49.03	42.38	48.46	63.29	46.81	54.28	35.78	48.98
b. Goal 6: Immunisation Against all Major Diseases									
Pakistan	34.84	67.66	55.93	69.15	62.36	77.07	75.59	62.69	67.20
Urban	45.58	79.30	71.07	80.02	74.52	86.80	86.74	76.13	82.54
Rural	30.88	62.61	50.40	65.51	57.61	73.87	71.87	57.27	62.27
Punjab	41.22	80.24	63.23	79.37	67.06	87.74	87.66	76.38	67.79
Sindh	33.63	60.40	51.76	64.89	56.61	72.42	73.03	59.85	84.06
KPK	45.40	67.12	56.72	70.39	64.17	77.69	71.46	61.71	62.36
Balochistan	10.45	50.24	40.92	52.20	54.55	59.69	57.85	30.37	42.00

HOI: Human opportunity index
KPK: Khyber Pakhtunkhwa.

Table-3: Simulated time to achieve MDGs and universal access of health goals.

GOALs	Levels	HOI 2001-02	HOI 2012-13	Target Valve	Annual Point Growth Rate	Time to Achieve MDGs	Time to Universal Achievement	Required Growth Rate in HOI
Reduce Child Mortality	Pakistan	50.4	64.1	83.6	1.1	17.2	31.5	3.0
	Urban	52.0	67.2	84.2	1.3	13.4	25.8	2.7
	Rural	49.6	62.3	83.4	1.1	19.9	35.5	3.1
	Punjab	48.3	59.1	82.9	0.9	26.5	45.5	3.4
	Sindh	47.5	60.3	82.7	1.1	20.9	37.1	3.3
	KPK	49.9	70.8	83.5	1.7	7.3	16.8	2.4
	Balochistan	59.1	74.3	86.5	1.3	9.6	20.2	2.1
Immunisation against Measles	Pakistan	52.1	67.3	84.2	1.3	13.5	26.0	2.7
	Urban	64.6	78.0	88.3	1.1	9.2	19.6	1.8
	Rural	46.9	63.6	82.5	1.4	13.6	26.2	3.0
	Punjab	63.0	79.6	87.8	1.4	5.9	14.8	1.7
	Sindh	38.8	63.4	79.8	2.1	8.0	17.9	3.1
	KPK	55.5	65.3	85.3	0.8	24.4	42.3	2.9
	Balochistan	44.7	54.0	81.7	0.8	35.6	59.0	3.8
Immunisation against other diseases	Pakistan	34.8	67.2	67.4	2.7	0.1	12.1	2.7
	Urban	45.6	82.5	72.8	3.1	Achieved	5.7	-
	Rural	30.9	62.3	65.4	2.6	1.2	14.4	3.1
	Punjab	41.2	84.1	70.6	3.6	Achieved	4.5	-
	Sindh	33.6	62.4	66.8	2.4	1.9	15.7	3.1
	KPK	45.4	67.8	72.7	1.9	2.6	17.2	2.7
	Balochistan	10.5	42.0	55.2	2.6	5.0	22.1	4.8

HOI: Human opportunity index
KPK: Khyber Pakhtunkhwa
MDGs: Millennium Development Goals.

slowly. For the national level, the HOI for reducing child mortality increased from 50.4 to 64.1 between 2001-02 and 2011-12, and that of immunisation against measles from 52.1 to 67.3 over the period of 13 years. It was also evident that there was slow but consistent improvement in reducing mortality in urban and rural areas, but inter-provincial disparities were persistently prevailing. Punjab registered remarkable progress in reducing infant and child mortality rates, followed by Khyber Pakhtunkhwa (KPK) and Sindh, while the situation in Balochistan remained worrisome as it continued to lag behind even though the HOI improved from 48.3 in 2001-02 to 59.1 in 2011-12 (Table-1). The data for 2004-05, 2006-07, 2008-09 and 2012-13 were not available as PSLM was not conducted in these years. Even though the information for these years was available in PIHS, it was not used in the present study as it was not extensive enough.

An erratic pattern of immunisation success against measles and other diseases was observed for children aged below five years. The HOI value increased by 15 points in the case of former and by 32.4 points for the latter during 2001-2013. It was also evident that the immunisation effort was more intensive in urban areas as compared to rural areas. Moreover, there were startling provincial variations in achievement of health services. The momentum gained in the attainment of these objectives during 2007-11 could not be maintained in the subsequent years (Tables-2a-b).

The decomposition of health achievements in terms of HOI for the selected health indictors allowed us to estimate the contribution of each of the socio-economic circumstances in health outcomes. It was found that the most effective way of reducing infant and child mortality rates was through provision of infrastructure for health services as its contribution in total was 38.1%. It was followed by regional identity, i.e. whether you lived in urban or rural areas, with a contribution of 34.4%; parental education contributed 22% to health outcome, and family background 5.2%.

A similar decomposition for attainment of full immunisation target revealed the importance of regional identity that contributed the highest, i.e. 40.1%, followed by the provision of health infrastructure which contributed 36.7% to the target. The role of parental education cannot be ignored as its contribution was calculated as 17.4%. The contribution of family background and gender has been the lowest at 5.3% and

0.6%, respectively.

Even though the HOI related to reduction in child mortality in Pakistan increased from 50.4 in 2001-02 to 64.1 in 2012-13, the target value for this indicator was 83.6, which has been missed. According to the estimates, with an annual point growth rate, the time required to achieve the MDG target would be 17.2 years. The universal achievement of this target would take place in 31.5 years if the HOI grew by 1.1 points every year (Table-3).

Discussion

The results presented above do confirm a steady progress in Pakistan in reducing infant and child mortality and protecting children against measles and other diseases through an elaborate programme of immunisation. However, the progress remains slow and uneven across rural and urban regions on the one hand and across provinces on the other. There are two fundamental aspects to this outcome. The first one pertains to the demand for basic healthcare services and the other relates to the supply side. It has been observed with extreme disappointment that health-providers are not welcomed in certain areas and localities, their sincerity of purpose and conduct notwithstanding. Apprehensions are widespread about the entire process of immunisation and at times the lives of healthcare providers are also put on risk. However, despite these unfortunate incidents, the demand for healthcare services, in general, remains strong. The basic issue therefore reduces to the supply side of the phenomenon. The role of the private sector in healthcare provision remains dismally low due to various reasons, including the high cost of service delivery, the public sector becomes the ultimate choice for majority of the population to fill in the vacuum thus created.[8] As indicated, the government intervention plays a critical role in the improvement of nationwide health indicators.[9] The three dimensions of the intervention are: establishment of fully functional BHUs, provision of basic healthcare and awareness through a network of lady health workers (LHWs), and the country-wide programme of immunisation.

The National Health Policy and other official proclamations continuously emphasise the instrumental role of BHU in the provision of primary healthcare services as they are perceived as the foundational tiers of the healthcare infrastructure.[10] The primary responsibility of more than 5,300 BHUs in Pakistan is to provide healthcare to the poor through promotion, preventive and curative services. However, less than satisfactory progress and under-achievement of health-related indicators at regional and provincial levels clearly indicate that the BHUs have not been fully utilised, especially in rural areas of Pakistan across all provinces.[11] Be it the absence of medical doctors and other nursing staff or lack of diagnostic tools and non-availability of medicines, there are many reasons for the under-performance of the BHUs in rural areas. These inefficiencies of BHUs are somewhat compensated in the urban areas by the availability of private medical practitioners and secondary hospitals where patients queue up for basic primary health facilities. Going forward, maintaining status quo is expected to further aggravate this divergence and it will be difficult for the rural areas to catch up the urban areas.[12-14]

One of the positive contributions of BHUs is that they serve as training hub for LHWs. It is argued that improvement in health outcome is noticeable in the provinces where the LHW network is strong. The evidence cited in the above tables confirms that the situation has been better in Punjab, KPK and most of the urban areas of other provinces than rest of the country. This achievement can be attributed to the efficacy of the LHWs network, which is relatively stronger in these areas. The health workers here are allocated to facilitate population in neo- and antenatal care, counselling, and provision of essential healthcare tips related to common infectious diseases and family planning issues.[15-18] The earlier research also supports this outcome where it has been shown that in Punjab regular services of LHWs for family planning, skilled birth attendance, and neonatal care play an important role in reducing infant and child mortality rates and the occurrence of still births.[19] Compared to this, the performance of LHWs is hindered by the biradari and caste-based hierarchies in Balochistan and Sindh provinces.[20,21] Apart from that, the efficiency of LHWs is adversely affected by inadequate lucrative incentives and ad hoc policies of recruitment. Resultantly, their attitude with the patients is not satisfactory. The evidence further shows that the overall health service delivery at BHUs by the LHWs is also affected by the immunisation campaigns.[22]

Finally, even though the Extended Immunisation Programme (EPI) initiated by the World Health Organisation (WHO) has acted as a strong intervention for eradicating diseases, the results across regions and provinces are not similar and Pakistan continues to lag behind its neighbours. While the coverage rate for BCG, first dose of diphtheria, pertussis and tetanus

(DPT1) and hepatitis B virus (HBV) is the highest, it is lowest for polio. The trend analysis shows that the value of HOI is high at a time period when the vaccination campaigns, mainly for polio eradication, are at their peak level. This momentum is often lost in the off-campaign period.[23] The provincial analysis reveals that campaign effect is fairly dominant in Punjab as shown by the value of HOI that is highest in 2008-10 when the 'Mother and Child Healthcare Week' was in vogue. Besides campaign, the immunisation programme is also influenced by logistical issues for vaccinators to move and maintain the cold chain. Regional disparities are more evident when the vaccinators faced difficulties to reach the outskirts of the provinces, particularly in Balochistan.[24]

The socio-economic and cultural milieu is also important in the utilisation of healthcare services. The results of present study are in conformity with earlier research that has also shown a strong correlation between the parental education and child health outcomes.[25] We believe that education inculcates awareness and knowledge and as a result the health-seeking behaviour in parents improves. In particular, education of mother and her participation in labour market not only strengthens her decision-making power, it also positively affects children's well-being and health outcomes.[26] The present study also finds that despite the presence of gender inequalities in Pakistan, child healthcare services are equally available for all children, especially those who are under the age of five. This result yet again confirms the positive impact of public sector intervention that has reduced gender differences as far as immunisation is concerned.[27]

The current study had its limitations as well. Even though its results are not expected to change much, the updated information to more recent years from currently used data till 2013 may have a notional value.

Conclusion

Notwithstanding the progress in healthcare services and marginal achievement in the MDGs, the healthcare for infants and children continues to be a seriously deficient area in Pakistan. As a consequence, not only the infant and child mortality rates are high compared to the regional countries, the vaccination campaign against polio and measles also has limited success. Based on the estimates, it has been calculated that the authorities would require another 26 years to achieve health-related targets set out under SDGs if they persist with the current pace of the work. The healthcare-infrastructure inequality across the country, especially in rural areas, has been a major stumbling block and to address regional and provincial disparities more direct and specific public sector intervention would be required. The provision of low-cost well-functioning healthcare system equipped with appropriate human and physical resources is expected to outweigh the negative impact of children circumstances on their health.

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