Competitive Educational Research Journal (CERJ)
ISSN (Print): 2709-9784, ISSN (Online): 2709-9792
Volume 3 Issue 1
https://cerjournal.com

AN ANALYSIS OF MULTIDIMENSIONAL POVERTY IN RURAL PAKISTAN OVER TIME

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ABSTRACT

Multidimesional poverty (MP) has gained dominance over monetary poverty in literature in recent times. The current study estimates MP and its transitions in rural Pakistan across Hierarchical levels and over time. It has utilized the panel data for the years 2012, 2013 and 2014, taken from Pakistan Rural Household Survey (PRHS). The poverty has been measured using the Alkire and Foster method (AF). The results show that MP in rural regions has decreased by 2 perecent along with fluctuations during this period. The deprivation in education, cooking fuel, sanitation, dwelling and child vaccination mainly contribute to MP in all the three waves. At the provincial level, the rural Khyber Pakhtunkhwa (KPK) and Punjab has experienced a 1 to 3 percent decline in MP while poverty in rural Sindh has increased by 2%. The rural areas of northern punjab and KPK are least deprived ones while the rural region from interior Sindh and Southern Punjab has lagged behind the other regions. These findings imply the reshaping of poverty reduction policies in order to be more comprehensive and targeted ones.

Keywords: poverty. Alkire and Foster method. Panel data. Poverty transitions

INTRODUCTION

Poverty is the core phenomenon of developmental problems, identified by many acedemic researchers and policy makers. Despite huge achievements in human progress, the situation of poverty is still critical owing to COVID pandemic and rising commodity prices. The World Bank has anticipated life of around 676 million people in extreme poverty in 2022(World Bank, 2022). In developing countries like Pakistan, the situation is more alarming as poverty has increased by 5 % in 2020. Despite experiencing the decreasing trend in poverty in the last two decades, around 2 million people are under poverty line due to economic crisis during pandemic. Moreover, majority of non-poor are near poverty line that makes them vulnerable to poverty in case of any idiosyncratic or covariate shock. This dilemma is more prevalent in rural regions than urban ones and unevenly subsists across districts and provinces. High population, low education, scarcity of formal labor markets and geographical positions obstructs the country from attaining rapid reduction in poverty

(World Bank, 2021). Pakistan, being one of the pioneers to adopt the United Nations' sustainable development goals (SDGs) in its developmental program, has aimed to achieve the first goal of 'no poverty' along with other goals by 2030 (Government of Pakistan, 2016). To achieve this goal, it considers the shift of official poverty measure from monetary approach to multidimensional one as poverty is evolved as a multidimensio nal notion based on basic needs, social factors, capabilities or material dearth conceptualized by different economists (Rawls, 1971; Townseed, 1979; Sen, 1976). In the recent times, the most popular approach to measure multidimensional poverty is the multidimensio nal poverty index, based on the methodology given by Alkire and Foster (AF). This index encompasses the different dimensions of deprivation namely education, health and standard of living. In 2018, Pakistan has published its first report on multidimensio nal poverty in Pakistan by utilizing AF methodology.

Most of the literature on poverty measurement rely on the static methods of measureme nt. But the problem with these methods is limited explanation of poverty statistics. In comparison to them, the dynamic methods determine the persistence of poverty due to consideration of time changes (Hulme and Shepherd, 2003; Correa, 2017). In case of multidimensional poverty, a bulk of studies consider the repeated cross sections as pseudo panel data for the measurement. In this regard, Khan and Akram (2018) estimates national, provincial and urban-rural multidimensional poverty in Pakistan for data from 2004 to 2014 and observe the decreasing trend across all the sub divisions over the period of time. Ali et al. (2017) also discovers the decreasing poverty in urban and rural regions in Pakistan over a decade. At the provincial level, Khan et al. (2014) highlights the issue of multidimensional poverty in Sindh province of Pakistan by taking the repeated cross- sectional data for 10 years. The authors discover the fluctuating trend in poverty across urban and rural regions of Sindh. At the rural level, Khan et al. (2015) measures the rural poverty by taking the data from 26 districts of Pakistan over five time periods and exhibits the decreasing trend in the poverty.

In pseudo panel data analysis, the standard errors are high in case of high variations among cross sections. Whereas, panel data analysis has high statistical power as unit of analysis remains same over a period of time (Yee and Niemeier, 1996). Apart from its econometric benefits, the use of panel data enables to distinguish chronically poor people from transitory poor ones. Considering its benefits, there is substantial literature on the poverty measure utilizing panel data in different parts of the world. However, majority of the studies rely on the monetary approaches to measure poverty in case of Pakistan. In this regard, Arif et al. (2001) utilizes two panel data sets (1998-1999 and 2000-2001; 2001 and 2004) and find the increase in monetary poverty in the first panel and decrease in second panel. Arif and Farooq (2014) measures the monetary poverty by taking the panel data for three years and explore the fluctuation in poverty measurement in rural region of Pakistan. Both studies also distinguish the poor households among chronic, transitory and never poor

category. Regarding social dimensions, Rehman et al. (2019) measures the health poverty by using a panel data of two years.

There is hardly any study on the measurement of MP and its transitions in Pakistan utilizing panel data according to knowledge of the authors. So, the present research aims to analyze the multidimensional poverty in rural regions of Pakistan by utilizing the data from three waves (2012, 2013 and 2014) of Pakistan rural household Survey (PRHS). Along with the overall analysis of rural Pakistan, this study will identify the contributing factors to these transitions. It will also disaggregate the households in different categories namely persistent poor, transitory poor and never poor in a multidimensional way. Moreover, it will also compare provinces and their respective districts on the basis of their poverty profiles which may help in targeting poverty strategies towards more deprived districts of Pakistan.

The remaining paper contains the details on the data sources and methodology in section 2 and 3. It is followed by the empirical analysis on the poverty trends in Pakistan at the country, provincial and district level in section 4. Conclusion along with policy recommendations are presented in the final section.

DATA SOURCES

This paper has used the rural panel data for years (2012- 2014) extracted from Pakistan rural household survey (PRHS) which is carried out by joint collaboration of United States Agency for International Development (USAID) and International Food Policy Research Institute (IFPRI) (IFPRI, 2017). To highlight key ingredients of effective economic policies, this survey contains the information on various topics, i.e., education, income sources with special focus on agriculture sector, assets, household characteristics, female related issues, consumption, idiosyncratic and covariate shocks, social protection and household objectives. The data was collected from 19 districts of Punjab, Sindh and Khyber Pakhtunkhwa (KPK) by using multistage stratified sampling method. The forth province, Baluchistan was not included owing to security issues. After selecting the representative districts from each province, 76 mauzas were selected, followed by the random selection of 28 household from each mauza. The final selected ones 2090 households which were further reduced to 2089 households in the first round, 1926 in the second round and 1873 in the last round. The reason of exclusion of households were incomplete information in some sections of questionnaire, migration, refusal, unavailability of respondents and inaccessibility of dwellings. This data was further reduced to 1771 households to make it a balanced panel data for categorizing poor households in chronic, transitory and non-poor categories, also done by Pham et al. (2021).

METHODOLOGY

The paper use the methodology proposed by Alkire and Foster (2011, a) which is based on counting method by Atkinson (2003) and adjusted FGT method. This methodology has advantage on other methodologies in its simplicity, flexibility and clarity (Thorbecke, 2013; Silber, 2011). It starts from the selection of households denoted by n and dimensions denoted by d. The number of dimensions should be equal or greater than two. Let y = [yij] is the n*d matrix which shows the realization of household i in dimension j. For every dimension, there is specific deprivation cutoff represented by the row vector zj= (z1, z2… zd). By utilizing y matrix and z vector, a deprivation matrix g^0 is achieved which is equal to one if xij < zj, and equal to 0 when xij >= zj. All the dimensions were weighted based on the relative significance of dimensions confirmed by the relevant literature. The weights are

denoted by the row vector wj. The summation of weighted deprivations of dimensions leads to a deprivation scores for all the households, represented by $C_i = \sum_{j=1}^{d} g^o_{ij} w_j$.

For the identification of poor, here come the second cutoff which is denoted by k (Alkire & Foster, 2011a). It depicts the lowest minimum deprivation equal to or below which a household is considered multidimensional poor. The standard value of this cutoff is 0.33 (Alkire & Foster, 2011a). This cutoff is used by the identification method p_k. The product of p_k and deprivation matrix g^o leads to a censored deprivation matrix $g^o_{ij}(k)$ or $c_i(k)$ which shows the information on only poor households and assign zero to all the rows of non-poor households.

After this identification, the multidimensional poverty is measured. In this regard, the head count ratio (H) depicts the number of poor households (q) in all the households (n), gives the simplest measure. But, this measure does not shows the contribution of every deprivation in the poverty measurement. To solve this problem, the intensity of poverty (A) is measured which shows the mean deprivations encountered by the deprived households, depicted by $\sum_{i=1}^{q} c_i(k)$. Now, the more comprehensive measure which is known as adjusted head count ratio (M) can be calculated by taking the product of H and A. it is shown as:

$$M_0 = H*A \quad (1)$$

Here, comes the selection of dimensions and their respective indicators which is subjected to availability of data (Alkire et al., 2015). This paper uses three dimensions namely education, health and living standard which are generally utilized for poverty measureme nt. The dimension of education further includes two indicators, followed by health dimensio n with two indicators and living standard having 6 indicators. All the indicators were adjusted according to SDGs as suggested by Alkire et al. (2018). In case of health, the indicators were taken from government report on multidimensional poverty in Pakistan, collaborated by UNDP published in 2016. These health indicators are used due to non-availability of data on generally used indicators of health. The complete details of indicators and dimensions with their assigned weights are represented in a Table 1 below:

Table 1: Dimensions, indicators and their assigned weights

Dimension	indicator	Household Deprivation threshold	weights
EDUCATION	**Years of schooling**	no household member having age of 10 or above has completed six years of education	1/6
	School Attendance	any child aged between 5 and 14 is not going to school	1/6
HEALTH	**Pre-natal care**	any woman who has given birth in the last year did not receive ante-natal check-ups (no deprivation in case of absence of woman in a household)	1/6
	Child immunization	any child under the age of 2 is not fully immunized according to the vaccinations calendar (no deprivation in case of absence of child under the age of 2 in a household)	1/6
LIVING STANDARD	**electricity**	the household has no access to electricity	1/18
	Access to clean water	the household has no access to an improved source of water (less than a 30 minutes return trip): tap water, hand pump, motor pump, protected well, mineral water	1/18
	Fuel used for cooking	the household does not use gas cylinder or gas in pipeline	1/18
	Sanitation	the household has no access to adequate sanitation flush system (sewerage, septic tank and drain) or commode or it is available but used jointly with people outside the household	1/18
	Assets	The household does not have more than one small assets (radio, TV, computer, mobile or landline, bicycle refrigerator, tractor, , motorcycle) AND has no car	1/18
	walls	the household has unimproved walls (mud, uncooked/mud bricks, tent, wood, other) or roof (bamboo, wood, tent, sarkana, other) or floor (mud, other)	1/18

As this paper uses panel data, the poverty between different time periods is compared by taking the change in poverty between two time periods (Alkire, Roche & Vaz, 2017), as shown in equation (2)

$$\Delta M_o = M_o(X_t^2) - M_o(X_t^1) \quad (2)$$

This paper also separates the non-poor households from chronic and transitory poor households. The chronic poor are those people who remain poor in all the time periods, whereas transitory poor who are poor in any one or two year time period but become non-poor in other time. In other words, transitory poor experience fluctuation in their poverty status in different time periods. Moreover, never poor households are those who remained non-poor in all the time periods (Pham et al., 2021).

FINDINGS AND DISCUSSION

This section displays the cross – sectional estimates of head count ratio (H), mean deprivation across the poor (A) and multidimensional poverty (M) rural Pakistan in years 2012, 2013 and 2014 by using multidimensional threshold of 0.33. In addition, it also categorizes the poor people according to their performance in different time periods. Moreover, this section estimates MP across provinces and districts.

The analysis begin with the estimation of deprived households in all the indicators which is also known as raw headcount ratio. It can be seen that highest deprivation is prevalent in dwelling in all the three years, followed by child immunization which has declined with the passage of time but still very high. The deprivation in schooling years and sanitatio n have also decreased from 2012 to 2014. Whereas, poverty in school attendance and cooking fuel fluctuates at the decreasing trend but former is around the poverty cutoff. The deprivation rate in the electricity is higher than 0.33 in years 2013 and 2014. The ante care and drinking water show quite stable and lower deprivations in all the years. Lastly, the deprivation in household assets shows the swing at the increasing trend but it is lowest among other indicators. Overall, the households are most deprived in majority of indicators in 2012 and least deprived in 2013.

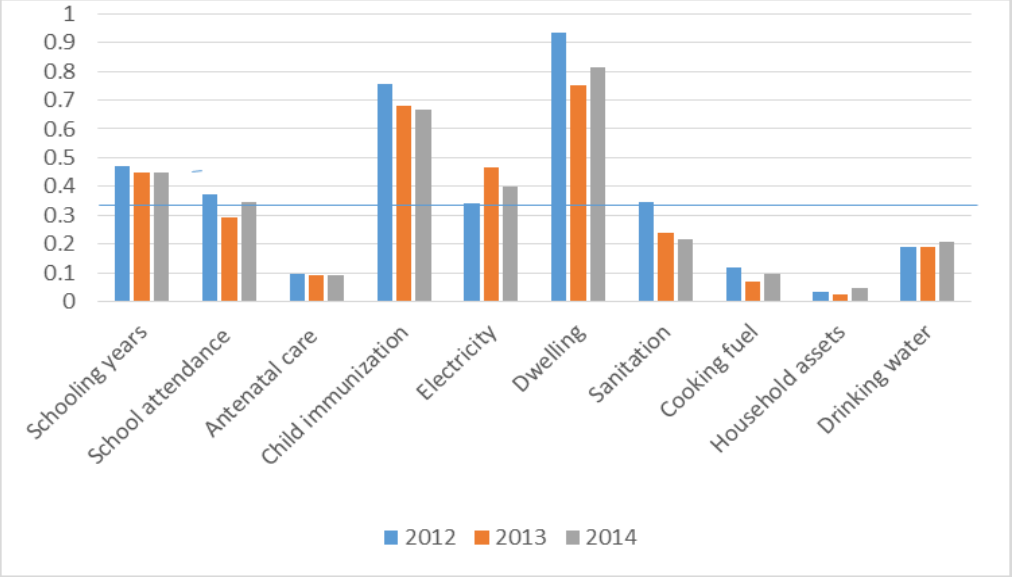

Figure 1: Percentage of deprived household in the indicators: Authors' calculations based on data from PRHS(2012-2014). The blue in the figure represents the standard poverty cutoff of 0.33, recommended by Alkire and Foster(2011,a)

Table 2 highlights the estimates of different components of poverty in rural Pakistan along with changes in different time periods. At the country level, 24.5 percent of the rural households are multi dimensionally poor in 2012, 21.27 percent in 2013 and 22.69 percentin 2014. It means that poverty decreases in 2012- 2013, but again rise by 1 percent in 2013- 2014. From 2012 to 2014, the table shows the poverty reduction of only 2 percent which is not remarkable decline. This fluctuating trend is also observed in case of H and A in all the three waves. The results are in accordance with the findings by Arif and Farooq (2014) who have observed fluctuations in monetary poverty in case of household panel analysis.

Table 2: multidimensional poverty estimates by years and at the national level along with absolute changes

Measure	Year	Country
Poverty (MPI)	**2012**	0.2450
	2013	0.2127
	2014	0.2269
Headcount ratio	**2012**	.5071
	2013	.4461
	2014	.4637
Intensity	**2012**	.4831
	2013	.4768
	2014	.4893
Δ in Poverty(ΔMPI)	**Δ2012-2013**	-0.03
	Δ2013-2014	0.01
	Δ2012-2014	-0.02

The contributions of education, health and standard of living along with their respective indicators towards the poverty rate in rural Pakistan are depicted in Table 3. It can be observed that the dimension of education is the main contributor in poverty which is around 50 percent. Although, its contribution has decreased with the passage of time, but these figures reveal the emergency for better education policies. The school attendance can improve the education situation of Pakistan but an alarming number of children are not attending school (Sial et al., 2015). The children having age between 5 and 14 are 25 percent of overall population. But sadly, out of these, around 23 million children are out of school (UNICEF, 2020)

The contribution of living standard is around 38 percent in overall poverty. It is also decreased from 2012 to 2014 like education. The dwelling, cooking fuel and sanitation are higher contributors as compared to other ones. The dwelling which includes the walls, floor and roof constructed by not using solid and concrete materials can cause malarial infect as confirmed by Florey and Taylor (2016). In addition, the deprivation in cooking fuel causes health issues related to lungs and disforestation along with poverty (Sovacool (2012); Salahuddin & Zaman, 2012; Chandrasiri et al., 2012; Thomson et al., 2017). Talking about sanitation, every tenth household suffer from water borne diseases in rural areas of Pakistan (UNICEF, 2020). Consequently, these factors also contribute to other social issues along with poverty.

Taking health dimension into consideration, the overall contribution is lowest among its counterparts but child immunization contributes around 10 percent in MP. The country is ranked third in terms of unvaccinated children, even having cases of polio infected (Imran et al., 2018). The vaccinated children are prone to severe disease, leading them towards mortality. The figures of ante-natal care are very low but increasing with the passage of time. So, this issue should also be addressed before reaching at an alarming stage.

Table 3: Contributions of dimensions and their indicators to rural poverty in Pakistan by year

Dimension/indicator	2012	2013	2014
EDUCATION	**49.73**	**49.22**	**48.88**
Schooling years	28.61	29.57	21.66
School attendance of child	21.12	19.65	27.27
HEALTH	**11.86**	**12.46**	**14.54**
Antenatal care	1.8	1.73	3.10
Child immunization	10.06	10.73	11.47
LIVING STANDARD	**38.35**	**38.32**	**36.49**
Electricity	2.06	2.29	2.20
Dwelling	10.67	10.75	10.13
Sanitation	6.48	9.00	7.96
Cooking fuel	11.22	10.52	10.70
Household assets	6.25	4.69	4.03
Drinking water	1.67	1.07	1.47

In provincial analysis as shown in table 4, it is evident that KPK shows the least but swinging deprivation ratio in all the three years followed by Punjab and Sindh. In case of Punjab, the poverty ratio is 21.42 percent which has decreased by 5 percent in 2013 but

again increased by 1 percent in 2014. In the sample data, 6 out of 12 districts of Punjab are from southern region which is least developed region of the province, ultima te ly contributes to the poverty in Punjab (Cheema, Khalid & Patnam, 2008; UNDP, 2022). Talking about Sindh, the result shows the highest and increasing but fluctuating rural poverty rate among all the three provinces over time. These results are consistent with the findings of report published by Pakistan Poverty Alleviation Fund and Sustainab le Development Policy Institute (2016) which declares the rural Sindh highly deprived area in comparison to urban Sindh. In case of KPK, two districts namely Nowshera and Manshera are selected which are among economically developed districts of KPK (KPEZDMC, 2015) so the poverty rate in KPK is lowest over time. The estimates are in accordance with the findings of World Bank (2019).

Overall, the poverty has merely decreased over a period of time with the exception of Sindh where poverty is increased by 2 percent. These figures show the need for more improved government policies towards poverty alleviation in rural areas.

Table 4: Multidimensional poverty estimates by province and year

Measure	Year	Punjab	Sindh	KPK
Poverty (MPI)	2012	0.2142	0.3847	0.1198
	2013	0.1678	0.3825	0.0953
	2014	0.1823	0.4021	0.1052
ΔMPI	Δ2012-2014	-0.03	0.02	-0.01

Table 5 shows the disaggregation of households in three categories: chronic poor, transitory poor and never poor. At the country level, 37 percent of households are living under the poverty line in all the three waves while almost same percentage of households never face poverty. 25.58 percent of households are in a transitory phase meaning that they are poor in any one or any two waves. At the provincial level, the figures are encouraging as around 44 percent of rural population of Punjab never face poverty but the households in other categories are around 28 percent. The Sindh, which is the most deprived province according to its poverty statistics also faces extremely high chronic poverty. Only 9.23 percent of rural Sindh population is out of poverty. However, KPK shows gives decent figures as around 63 percent of rural KPK are non-poor whereas 29 percent of the households are in fluctuations which can be escape out of poverty owing to short term poverty reduction policies. These findings are an addition in the existing literature on transitions in multidimensional poverty in Pakistan.

Table 5: Poverty transitions at the national and provincial levels

poverty	Country	Punjab	Sindh	KPK
Persistent	37.15	28.48	71.84	9.04
Transitory	25.58	27.60	18.92	29.02
Never	37.27	43.92	9.23	62.69

This section also reveals the ranking of 19 districts of Pakistan according to their poverty ratios, as depicted in Table 6. The districts in dark green colors are the most deprived districts, followed by the lighter ones as the poverty ratio decreases. The two districts of

Sindh namely Thatta and Hyderabad are at inter changeably first and second rank in MP statistics. While other districts of Sindh are also among the highly deprived districts over a period of time. Talking about districts of Punjab, two districts from northern Punjab are among the least deprived districts in all the three waves. Whereas D G Khan, Bhawal Nagar and Multan slightly lessen their poverty rankings from 2012 to 2014. Kasur, Khanewal, Vehari and Rahim Yar Khan consistently are in right direction of poverty reduction. In the last, Jhang and Bhakkar fails to sustain their poverty alleviation efforts as they have higher poverty rankings in 2014 as compared to ones in 2012.

In KPK, Nowshera and Mansehra are among the lesser deprived districts among all the districts. The overall findings has shown that poverty has slightly decreased with fluctuations across the districts and over the time with the exception of four districts belong to South Punjab and Sindh. This analysis reveals that country level statistics cannot be applicable for all the regions of the country. There are many contributing factors in case of poverty in south Punjab like high population, lesser education, lack of household resources and limited access to market (Chaudhry, 2009). Whereas, consistent droughts, poor socio-economic infrastructure and climatic factors has made rural Sindh to remain in severe poverty (Khan et al., 2015).

Table 6: Ranking of districts according to their poverty status by year

	2012		2013		2014	
District	**M0**	**Rank**	**M0**	**Rank**	**M0**	**Rank**
Kasur	0.253154	9	0.171911	12	0.155087	13
Bhakkar	0.232706	13	0.171005	13	0.226957	9
Khanewal	0.166333	15	0.131422	15	0.114249	16
Attock	0.040037	19	0.001602	19	0.01099	19
Vehari	0.261847	7	0.220763	9	0.214316	11
Jhang	0.255737	8	0.213765	10	0.244096	8
D G Khan	0.359093	4	0.363406	4	0.371954	5
Bahawal Nagar	0.233445	12	0.230906	8	0.217792	10
Rahim Yar Khan	0.242794	11	0.177305	11	0.178499	12
Multan	0.363897	3	0.247856	7	0.301487	6
Faisalabad	0.108347	17	0.089898	17	0.064046	17
Sargodha	0.198623	14	0.130384	16	0.140234	15
Thatta	0.549299	1	0.519897	2	0.539717	1
Dadu	0.342776	6	0.329736	5	0.388356	3
Sanghar	0.244678	10	0.248085	6	0.260597	7
Jaccobabad	0.351632	5	0.373786	3	0.378058	4
Hyderabad	0.490966	2	0.522275	1	0.531448	2
Nowshera	0.146322	16	0.132912	14	0.145175	14
Mansehra	0.064443	18	0.015928	18	0.022575	18

CONCLUSION AND POLICY RECOMMENDATIONS

The present study analyzes the multidimensional poverty transitions at the national, provincial and district levels. It also assesses the contributions of dimensions and indicators to overall poverty in rural Pakistan. A slight improvement in terms of poverty reduction is observed over the three waves at the country level. Similarly, Punjab and KPK also observes the decline in their poverty whereas the poverty in Sindh has risen during this period.

Moreover, chronic and transitory poverty are measured at the country and provincial levels. In case of chronic poverty, Sindh is far behind the other provinces in poverty reduction efforts as around a three quarter of rural Sindh is in chronic poverty. In addition, around a quarter of rural households are in a transitory poverty in Punjab and KPK while this percentage is decreased to 19 percent in case of rural Sindh. The transitory poverty is short term phenomenon which can be suppressed with the provision of social safety nets from government as well as private organizations. Whereas, reduction in chronic poverty requires effective policies for employment generation through structural changes in labor market. So, the combination of short and long term policies should be implemented for complete eradication of poverty from the country.

In district-wise rankings, the rural areas of Thatta and Hyderabad are the most deprived while the rural Attock is the least deprived region between 2012 and 2014. The persistent deprivation in rural regions of Pakistan can be addressed by improving interregio nal connections so economic progress can benefit the less privileged regions through trickledown effect.

The absence of any sixth standard passed household member, out of school children, absence of cooking fuel, poor sanitation, unimmunized children and inadequate dwelling are the main factors behind the multidimensional poverty in rural Pakistan. Strict actions should be taken regarding implementation of Article 25A of Pakistan's constitution which makes the state responsible for the free and compulsory education up to grade 10. Similarly, rural Pakistan should be provided the liquid fuel facility for cooking which may help in environmental protection and lungs related diseases control. There should be more comprehensive campaigns which can educate the people about the child immunization. The government should also suggest cost effective sanitation facilities to those households who cannot afford expensive and separate toilets.

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