DYNAMICS AND DETERMINANTS OF MULTIDIMENSIONAL POVERTY STATUS OF FARM HOUSEHOLDS

6.1. Introduction

During every five-year plan since the 1980s, India has achieved at over 5 percent on average economic growth. Further, the growth rate of the Gross National Income of India has been much higher as compared to its neighbors. However, improvement in critical social indicators has been slower especially in poorer states and rural regions in India (Dreze & Sen, 2011, 2013). Hence, additional measures would be required to understand whether economic growth results into poverty reduction and social gains, because examining progress with the help of economic growth only may not be sufficient and mislead the focus to reduce poverty. Discussion on the shortcomings of the conceptual and methodological approached of unidimensional poverty measures are increasing, which shows the need for alternative approaches for poverty measurement. Existing literature on poverty provides both theoretical and empirical studies which have been extensive investigations on the matter in different context. Following the formative efforts by (Amartya Sen, 1979, 1981) on the capability approach, there have been widespread researches in this regard, including theoretical studies by (Alkire & Foster, 2011; Atkinson, 2003; Duclos, Sahn, & Younger, 2006a; Francois & Chakravarty, 2003; Amartya Sen, 2000; Tsui, 2002), and empirical studies by (Alkire & Santos, 2014; Asselin & Anh, 2008; Baulch & Masset, 2003; Duclos, Sahn, & Younger, 2006b; Günther & Klasen, 2007; Klasen, 2000).

Based on the Amartya Sen's Capability Approach (Amartya Sen, 1979, 1981), Sabina Alkire and James Foster introduced the dual cut-off methodology to measure multidimensional poverty, which then has been used to measure multidimensional poverty at the national and global level (Alkire & Foster, 2011). Further, across 104 developing nations, a Human Development Research Paper has been published to measure acute multidimensional poverty (Alkire & Santos, 2014). In 1960s, some of the composite indicators were already introduced which focused on human resource development, a more focus upon non-monetary indicators of development came later (Alkire & Santos, 2014). To capture

poverty and other deprivations as a multidimensional concept, many countries have developed their measurements (Alkire & Foster, 2011). Though there are additional prominence non-income methods available to measure poverty, the idea of multidimensional poverty is the first that uses micro-level data where household or even individual could be the unit of measurement (Pasha, 2017).

To understand overall dynamics of poverty, it is crucial to take into consideration both poverty measures; hence, we combined unidimensional poverty with multidimensional poverty to address two research questions. First, when using multidimensional measures as compared to unidimensional approach, does the trend in poverty dynamics differ? Secondly, how do the livelihood diversification strategy, and socio-economic characteristics of farm household affects poverty dynamics differently when using different poverty measurement approaches? Further, to understand the dynamics of multidimensional poverty, we tried to address various other questions such as: Has poverty been reduced by reducing headcount ratio or by the intensity of poverty among those who are poor? Which indicator has been reported the highest reduction in deprivation score? How unidimensional poverty determines multidimensional poverty and vice versa?

Though reducing poverty has been a center of every development agenda, however, there are only a few relevant studies that estimated multidimensional poverty in India and best of our knowledge, there is no study which discussed the dynamics of poverty with comprehensive overview of farm households in rural India. This chapter can be a significant contribution in existing literature as we have provided the estimates of both unidimensional and multidimensional poverty approaches at disaggregated level; in the rural regions of major Indian states, decomposed dynamics of multidimensional poverty across dimensions, indicators and subgroups of population along with different agro ecological zones.

The rest of the chapter is organized as follows. The next (section 6.2) discusses the existing literature and the third (section 6.3) outlines the analytical strategy where conceptual

framework of measuring unidimensional and multidimensional poverty approached has been discussed along with panel regression models. In Section forth (section 6.4), we presented the results of poverty dynamics of farm households and discussed results of econometric analysis. Finally, section fifth (section 6.5) presents the conclusions.

6.2. Review of Existing Literature

The existing literature on poverty dynamics and its determinants are well-established in developing countries (Baulch & Hoddinott, 2000; Bigsten & Shimeles, 2008; Dercon & Krishnan, 2000; Haddad & Ahmed, 2003; Hulme & Shepherd, 2003; Mckay & Lawson, 2003; Swanepoel, 2005). By reviewing the studies on poverty dynamics in developing nations, (Baulch & Hoddinott, 2000) argued that large proportion is transient and the percent of households that are 'always poor' lesser than those households who are experiencing poverty for one or two periods. For instance, (Dercon & Krishnan, 2000) find that 24.8 percent rural households are 'always poor' as compared to over 30 percent that is sometimes poor.

By using education, health, and standard of living as the dimensions, several researchers have measured multidimensional poverty in different context (Alkire & Foster, 2008, 2011; Alkire & Santos, 2010; Anand & Sen, 1997; Antony & Rao, 2007; Calvo, 2008; Francois & Chakravarty, 2003; Gordon, Nandy, Pantazis, Pemberton, & Townsend, 2003; Martinetti, 2000; Mohanty, 2011; Qizilbash, 2004; Wagle, 2008), while few studies modified or changed the dimensions and used subjective well-being such as fear of facing hardship to measure multidimensional poverty (Calvo, 2008). However, these studies are different with each other, some of them differ while choosing the indicators and fixing the deprivation cut-off point of each indicator while some of them are different in assigning the weights to the dimensions. Measuring poverty seems flexible as well as sophisticated. Different researcher uses different approaches to measure poverty such as (Francois & Chakravarty, 2003) used union approach which means poor in any dimension, (Gordon et al., 2003) have used the

intersection approach which means poor in two or more dimensions or relative approach which defines the poverty line (Wagle, 2008).

In India, traditionally, poverty has been measured by unidimensional factor either income or consumption expenditure (Government, 1979, 1993, 2009, 2014). (Amartya Sen, 1992) argued that unidimensional measures do not deal with the capabilities to enjoy valuable beings as they are limited to the ability to spend on good and services. Hence, it does not replicate the multidimensional nature of poverty (Government, 2009), and subject to methodological debates (Deaton & Dreze, 2002, 2009; Government, 1993, 2009; Abhijit Sen & Himanshu, 2004; Subramanian, 2011). Further, (Ahluwalia, 2011) emphasized that the factors such as quality of education, accessibility to basic amenities, maternal and child health, and reduction of inequalities across states and social groups can play significant role for making Indian economic growth more inclusive.

Poverty is multidimensional, and deprivation in terms of income or consumption expenditure is one crucial dimension, but, one dimension does not accurately proxy other deprivations. There is a possibility that a unidimensional poor household may or may not be multidimensional poor and vice versa (Laderchi, Saith, & Stewart, 2003). Hence, there is a need to complement traditional unidimensional approach with multidimensional poverty approach for poverty measurement which can not only help us to describe poverty at national levels (Amartya Sen, 1980); but also, too decomposed poverty and its changes by subgroups of population (Alkire & Seth, 2013).

6.3. Analytical Strategy

In this study, unidimensional poor farm households have been identified based on the Tendulkar committee's recommendation, while Alkire-Foster method (Alkire & Foster, 2011) has been applied to identify multidimensional poor farm households. We compared two measurement approaches of poverty across sub-groups of the population to examine that two different measures identify the same farm households as poor or not. Joint probability matrices have been used to compare both measures of poverty and to examine which measure reported faster progress over time. Furthermore, this study also tries to investigate which indicator plays an imperative role in determining the changes in the Multidimensional Poverty Index.

6.3.1. Identification of Unidimensional Poor

Although consumption expenditure and aggregate income of farm households are available in the data set. This study identified unidimensional poor based on consumption expenditure of a household recommended by Tendulkar's committee because consumption expenditure considered better measure for poverty than income (Deaton, 1997). Therefore, consumption expenditure often used to decide poverty lines at national and international levels. (Thorat, Vanneman, Desai, & Dubey, 2017) also adopted the same procedure to identify the unidimensional poor.

6.3.2. Identification of Multidimensional Poor: Dimensions, Indicators, Deprivation Cut-offs, and Relative Weights

The multidimensional poverty index approach (Alkire & Santos, 2010, 2014) has been used to identify the multidimensional poor farm households in rural India but adjusted the indicators and their deprivation cut-offs to data available in our surveys. We prefer to identify poverty and deprivations at the household level instead of individual level. Since all individuals living in the same households share common resources, hence it is challenging to

draw individual deprivation in some indicators (especially indicators related to standard of living as they are jointly used at the household level). Therefore, all individuals are considered to be deprived if member of the household is deprived of that indicator.

The (Alkire & Santos, 2014; Dotter & Klasen, 2014) has been referred to choose indicators of education and their cut-offs. If no member of a household has completed 5 years of schooling is considered to be deprived of schooling. While, if any school-aged child (6 to 14 years old) in the household is not enrolled in the school is considered to be deprived in school attendance indicator (see Table 6.1)[3].

Under the health dimension, two indicators are chosen namely mortality and nutrition. Though, we believe that the death of a child of any age is unfortunate. However, in this chapter, we consider a household to be deprived if child of an ever-married woman under the age of five has died in the household (see Table 6.1). Further, Body Mass Index (BMI) is taken as a proxy of nutrition, and a household is considered to be deprived in terms of nutrition if any adult has less than 18 BMI. This lower cut-off, as compared to 18.5 (Alkire & Santos, 2014), was proposed by (Himes, 2000; James, Ferro-Luzzi, & Waterlow, 1988), and applied by (Baulch & Masset, 2003).

The dimension of living standards consist of six indicators, and their cut-offs are similar to the (Alkire & Santos, 2014). Electricity indicator is binary and if a household has no electricity is considered to be deprived. While a household is deprived in sanitation if it has no flush toilet or if they share toilet with other households. A household is treated as deprived if they do not have accessibility to clean drinking water or clean drinking water is available more than 30 minutes' walk in round trip. Flooring is considered as a proxy of housing condition, and a household is deprived in housing if the flooring is made of mud, sand, or dung, while a household is deprived in cooking fuel if they cook with dung, wood, charcoal.

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[3] If a household do not have any child between 6 to 14 years old, they are considered to be non-deprived in this indicator. See (Alkire & Santos, 2014; Dotter & Klasen, 2014) for a detailed discussion on this issue.

Lastly, if a household does not own more one of the following: cycle, motorcycle, television, telephone, or refrigerator, and does not own a car or tractor is considered to be deprived in assets.

The equal weights of 33.3 percent have been assigned to each dimension namely education, health, and standard of living and equivalent weights are also assigned to each indicator of the same dimension (see Table 6.1). Hence, two indicators of education and two indicators of health dimension weight 16.7 percent each, while six indicators of living standard have weights of 5.6 percent each.

6.3.3. Panel Regression

To examine the determining factors of poverty dynamics, we used panel data analysis using 2004–05 and 2011-12 survey rounds for both unidimensional and multidimensional poverty. We specify the following equation (6.1):

$$Y_{it} = \beta X_{it} + \gamma Z_{it} + \alpha_i + u_{it} \qquad (6.1)$$

where Y_{it} refers to the outcome variable observed for i^{th} farm household at time t, while X_{it} is a vector of independent variables; Z_{it} is a dummy variable which refers to whether i^{th} farm household at time t is poor in terms of another measurement approach of poverty; β and γ are the coefficients for vectors X_{it} and Z_{it} respectively; the unobserved household-specific effects which are assumed to be fixed over time are denoted by α_i and u_{it} refers to the white noise. In line with standard panel studies, we control for socioeconomic and demographic characteristics of farm households, such as participation in non-farm activities, caste, religion, education of household head, household size, land holding, and agro ecological zones.

6.4. Results

Table 6.1 represents the dimensions, indicators, and their deprivation cut-offs. Further, it also reported the uncensored headcount ratios, which refers to the household who are deprived of each indicator irrespective of their poverty status. Last two columns of table 6.1 represent changes in the uncensored headcount ratios between 2005 and 2012 in absolute and relative terms. Where absolute change refers to the difference between 2005 and 2012 while the relative change was the ratio of absolute change and initial deprivation status, i.e. deprivation in 2005. A one-tailed statistical test has been applied, and changes in all the indicators are found statistically significant. The uncensored headcount ratios of each indicator help us to understand overall deprivations across the rural population and changing process over time. Hereafter, we will be more focusing on the households who are deprived in one-third of weighted indicators, and they will be treated as multidimensionally poor.

Table 6.1: Dimensions, Indicators, and Deprivation Cut-offs of the Multidimensional Poverty Indicators

Dimension	Indicator	Deprivation Cut-offs	Deprived (uncensored headcount ratio) in percentage		Absolute change (in percentage)	Relative change (in percentage)
			2005	2012		
Education (33.3)	Schooling (16.7)	No member in the household has completed five years of schooling	67.85	53.90	13.95***	20.56
	Attendance (16.7)	Any school-aged child (6-14) in the household is not attending school in the academic year of study	1.92	0.80	1.12***	58.23
Health (33.3)	Mortality (16.7)	Any child under the age of five of ever-married women has died in the household	15.29	4.63	10.65***	69.69
	Nutrition (16.7)	Any ever-married woman with a Body Mass Index (BMI) lower than 18.5 kg/m2	16.09	19.77	-3.68***	-22.90
Standard of Living (33.3)	Electricity (5.6)	Household has no electricity	28.94	15.85	13.09***	45.23
	Sanitation (5.6)	Sanitation facility is not improved, or it is shared with other households	85.12	59.98	25.14***	29.53
	Water (5.6)	No accessibility to safe drinking water or safe water is more than a 30 mins walk (round trip)	73.37	66.88	6.48***	8.84
	Flooring (5.6)	Household flooring is made of mud, sand or dung	60.36	47.30	13.06***	21.64
	Cooking Fuel (5.6)	Cooks with dung, wood or charcoal	64.83	42.98	21.85***	33.70
	Assets (5.6)	Household does not own more than one of: cycle, motorcycle, TV, telephone, or refrigerator; and does not own a car or tractor	57.06	30.50	26.56***	46.55

6.4.1. Reduction in Rural Multidimensional Poverty and Changes Across Subgroups

We first examine the changes in rural multidimensional poverty between 2005 and 2012; then by decomposing in various subgroups, we explored where the changes have been taken place the most. Table 6.2 represents multidimensional poverty along with its two components namely headcount ratios and intensity. The result shows that there has been statistically significant reduction in absolute rural multidimensional poverty between 2005 and 2012 from 41.40 percent to 31.11 percent. Absolute reductions in terms of headcount ratios and intensity of poverty are both statistically significant; however, the magnitude of the reduction of headcount ratio is quite large. Overall, rural India reduced the headcount ratios, or we can say proportion of multidimensionally poor households by 25.17 percent. Examining the changes in multidimensional poverty at aggregate level, say all rural areas in selected states may not be enough to draw meaningful policy implications. However, it is imperative to analyze how the multidimensional poverty of population subgroups has progressed.

6.4.1.1. Across Geographical Regions – States and Agro ecological Zones

We study the multidimensional poverty progress of rural areas across 24 states. Rest of states and union territories are dropped from the study due to the insignificant sample of those households whose primary source of income in cultivation. There is a statistically significant reduction in both headcount ratio and multidimensional poverty for almost all the states, whereas headcount ratio in Tripura and intensity of poverty in Arunachal Pradesh have increased. Nagaland has been reported the most considerable absolute reduction in multidimensional poverty and second-largest in headcount ratio, while the reduction in headcount ratio has been least among comparatively well-off states such as Kerala, Tamil Nadu, and Andhra Pradesh. Hilly states like Arunachal Pradesh, Jammu & Kashmir, Meghalaya, and Nagaland reported considerable reduction in headcount ratio which ranges

about 40 percent to 58 percent. Except Madhya Pradesh, every state of the so-called BIMARU status states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and West Bengal, which has headcount ratio of more than 70 percent in 2005, had reduced poverty more than national rural average by 2012. The South Indian states namely Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu are considered to be well-off states and all these states had reported less poverty reduction as compared to national rural average.

Though, the different combinations of reduction in headcount ratio and intensity of poverty may give us a similar magnitude of reduction in multidimensional poverty. However, it is worth noticing that the large reduction in headcount ratio may not lead to large reduction in intensity of poverty and vice versa. It is very much possible that one state had a higher rate of absolute reduction in headcount ratio; whereas another state showed a higher reduction in intensity of poverty. Further, rural India has been classified into four different agroecological zones based on their rainfall and temperature. Across the subgroups of agro ecological zones in rural India, measures of multidimensional poverty and its reductions vary significantly. Humid and Semi-Arid Temperate zone seems somehow equal in both headcount ratio and multidimensional poverty, while there is a high level of mismatch from other two agro-ecological zones.

6.4.1.2. Across Household Characteristics and Social Subgroups

The changes in multidimensional poverty across social groups are reported in table 6.2. Caste and Religion are two subgroups that certainly are of interest in the Indian context. Observing across castes categories, there is a statistically significant reduction in both headcount ratio and multidimensional poverty for each caste categories. Though, reduction in both headcount ratio and multidimensional poverty for each caste category seems somehow equal; whereas scheduled tribes which were poorest in 2005 reported the slowest reduction.

While examining the changes in multidimensional poverty across religions, we find that though the reduction in poverty across religious subgroups has not been uniform, there is a statistically significant reduction in both multidimensional poverty and headcount ratio in all the religious subgroups. The incidence of poverty was largest among Muslims in 2005, and their headcount ratio and multidimensional have improved higher than the other major religions.

Further, we decomposed the multidimensional poverty in three different classifications of the population namely household size, gender and education of the household head which helped us to examine how poverty varies across household characteristics. The gender differences in multidimensional poverty can be compelled by examining the male and female-headed households separately. Female-headed households show slightly lower poverty reduction than the male-head households in terms of both headcount ratio and multidimensional poverty. As expected, there is a negative relationship between the incidence of poverty and the education level of household head. We find a statistically significant reduction in poverty among all subgroups of education category. The reduction in headcount ratio has been highest for the group of households whose heads have 1 to 5 years of education. The headcount ratio and multidimensional poverty have been the largest among households whose head has not completed any education. While those households whose head had graduation and above level of education had reported slowest absolute reduction in headcount ration because they have lowest level of headcount ratio among other subgroups and substantial absolute reduction would not be feasible. Finally, we decomposed poverty into five categories of household size. It seems a positive relationship between size of the household and absolute reduction in headcount ratio and multidimensional poverty.

6.4.1.3. Unidimensional Poverty vs. Multidimensional Poverty

To calculate official poverty status in India, per capita consumption expenditure or income has been used. The term unidimensional poverty has been used for convenience as it deals with one dimension only to measure poverty. By comparing two types of poverty measures, this section tried to address an interesting question, whether the same unidimensional poor farm households are also deprived in terms of multidimensional poverty estimates. Although, both unidimensional poor and non-poor farm households have decreased headcount ratios and multidimensional poverty level and their reductions are statistically significant. However, we find that unidimensional poor farm households of about 84.23 percent in 2004-05 and 54.95 percent in 2011-12 are also deprived in terms of multidimensional poverty headcount ratio estimates. Although the gap between unidimensional poor and non-poor farm households in multidimensional poverty has reduced over time. In 2004-05, the multidimensional poverty headcount ratios of unidimensional poor and non-poor were 84.23 percent and 57.07 percent respectively. Thus, the absolute difference in headcount ratio was 27.16 percent while it shrank to 21.25 percent in 2011-12. Tendulkar committee used relative price indices across states and across rural-urban areas to calculate national poverty which may affect the absolute difference in headcount ratios of unidimensional poor and non-poor farm households.

Table 6.2: Rural Poverty among Farm Households and across different Population Subgroups (in percentage)

	HeadCount Ratio			Intensity			MPI		
	2005	2012	change	2005	2012	change	2005	2012	change
Rural India	62.93	37.77	25.17***	46.71	41.06	5.65***	41.40	31.11	10.29***
Selected States									
Andhra Pradesh	50.00	35.69	14.31***	42.20	38.44	3.76***	36.19	29.46	6.73***
Arunachal Pradesh	52.05	11.70	40.35***	37.56	39.31	-1.75	30.61	30.53	0.09
Assam	69.15	46.11	23.04***	46.28	41.01	5.26***	41.88	32.13	9.75***
Bihar	86.21	56.72	29.49***	51.39	41.97	9.42***	48.80	34.50	14.30***
Chhatishgarh	81.79	54.38	27.41***	48.38	42.86	5.53***	43.79	34.11	9.68***
Gujarat	45.48	26.88	18.61***	43.84	39.24	4.60***	36.35	28.02	8.33***
Haryana	45.51	14.45	31.05***	40.23	38.62	1.61*	29.56	21.93	7.64***
Himachal Pradesh	42.22	18.93	23.28***	41.75	38.24	3.51***	33.22	24.72	8.49***
Jammu & Kashmir	65.57	19.10	46.47***	41.86	39.12	2.74***	34.87	25.24	9.64***
Jharkhand	85.74	62.92	22.81***	50.52	43.59	6.93***	47.30	35.32	11.98***
Karnataka	47.58	27.22	20.36***	42.18	38.34	3.84***	34.03	27.34	6.69***
Kerala	14.75	2.07	12.67***	38.15	35.72	2.43***	22.33	15.22	7.11***
Madhya Pradesh	73.90	52.82	21.08***	46.44	41.81	4.63***	41.73	32.87	8.86***
Maharashtra	47.04	21.76	25.28***	43.07	38.42	4.65***	34.56	25.94	8.62***
Meghalaya	73.68	16.06	57.62***	42.79	35.30	7.49***	39.35	28.82	10.53***
Nagaland	66.45	10.10	56.35***	41.13	34.61	6.52***	36.86	14.44	22.42***
Orissa	83.80	55.99	27.82***	49.71	42.57	7.14***	46.86	33.06	13.80***
Punjab	30.04	8.42	21.62***	40.54	38.11	2.43**	30.29	18.76	11.53***
Rajasthan	77.97	46.45	31.51***	48.34	42.43	5.90***	44.35	34.26	10.09***
Tamil Nadu	37.73	28.57	9.16**	40.77	38.28	2.49***	33.49	26.61	6.89***
Tripura	35.00	39.76	-4.76	48.65	37.55	11.10***	37.79	26.37	11.41***
Uttar Pradesh	83.94	53.88	30.06***	51.67	41.92	9.75***	48.83	31.77	17.06***
Uttaranchal	52.79	26.80	25.99***	42.60	40.56	2.04***	33.98	23.66	10.32***
West Bengal	71.52	34.42	37.10***	48.63	38.51	10.12***	44.13	28.10	16.02***

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	HeadCount Ratio			Intensity			MPI		
	2005	2012	change	2005	2012	change	2005	2012	change
Agroecological Zones									
Humid	69.52	41.71	27.82***	48.56	41.79	6.77***	44.29	32.42	11.87***
Semi-Arid Temperate	69.99	42.08	27.91***	47.77	41.16	6.60***	42.79	30.33	12.46***
Semi-Arid Tropics	57.18	35.98	21.19***	45.02	40.38	4.64***	38.85	30.64	8.21***
Arid	49.26	26.22	23.04***	45.16	42.34	2.82***	38.44	31.70	6.73***
Castes									
General	51.11	25.40	25.70***	44.95	39.41	5.55***	37.80	26.82	10.99***
Other Backward Caste	64.54	39.13	25.41***	46.76	40.71	6.05***	41.60	30.75	10.85***
Scheduled Caste	73.92	47.09	26.83***	48.16	41.67	6.49***	43.90	32.42	11.48***
Scheduled Tribes	80.49	57.31	23.18***	48.51	43.43	5.08***	45.18	36.10	9.08***
Religion									
Hindu	63.35	39.22	24.13***	46.61	41.11	5.51***	41.18	31.14	10.04***
Muslim	73.74	37.85	35.89***	49.03	41.05	7.98***	45.29	32.53	12.76***
Christian	46.24	19.38	26.86***	41.81	39.58	2.23***	36.39	28.75	7.64***
Sikh	31.49	8.52	22.97***	40.40	37.02	3.38***	31.01	18.32	12.69***
Others	82.40	39.34	43.06***	49.78	41.69	8.09***	46.99	30.92	16.07***
Head's gender									
Female	62.85	43.62	19.23***	45.51	42.02	3.49***	39.84	31.72	8.12***
Male	62.54	39.46	23.08***	46.60	41.05	5.55***	43.30	33.82	9.48***
Head's education									
No education	77.70	54.76	22.94***	46.75	41.71	5.04***	43.24	34.62	8.62***
1-5 Years	70.23	46.91	23.32***	45.32	40.47	4.85***	40.57	31.60	8.97***
6-10 Years	44.74	23.78	20.96***	48.66	40.27	8.39***	48.55	34.28	14.27***
11-12 Years	38.86	18.46	20.40***	48.89	37.55	11.35***	48.78	29.75	19.03***
Graduation and above	33.61	15.51	18.10***	47.19	36.88	10.31***	47.19	28.70	18.49***

	HeadCount Ratio			Intensity			MPI		
	2005	2012	change	2005	2012	change	2005	2012	change
Household Size									
1 to 3	61.92	43.63	18.30***	45.07	41.18	3.88***	41.31	34.81	6.50***
4 to 5	59.41	36.67	22.74***	46.44	41.48	4.96***	41.08	30.88	10.21***
6 to 7	63.93	38.94	25.00***	46.76	41.26	5.50***	41.33	30.97	10.35***
8 to 9	65.79	38.11	27.68***	47.77	40.69	7.08***	42.49	30.05	12.44***
10 & more	64.90	32.26	32.63***	46.75	39.57	7.19***	41.20	28.36	12.84***
Uni-Dimensional Poverty									
Non-Poor	57.07	33.70	23.37***	45.37	40.41	4.96***	39.09	29.67	9.42**
Poor	84.23	54.95	29.28***	49.97	42.72	7.25***	47.01	34.78	12.23***

Source: Authors' calculations, using round 1 (2004-05) and round 2 (2011-12) of IHDS Data
*Note: Significance level of the difference: * α<0.05, ** α<0.01, *** α<0.001*

6.4.2. Association among Unidimensional Poverty, Multidimensional Poverty, and its Indicators

We usually find different dimensions of household well-being are associated with each other. For example, education level of household head is examined to be associated with health (Cutler & Lleras-muney, 2006; Ross & Wu, 1995), and with household income (Becker, 1994; Berger & Leigh, 1989; Farrell & Fuchs, 1982), or for instance, household income and consumption expenditure can also be associated with conditions of house such as electricity, better water, and sanitation facilities, etc, and possession of durable assets, etc. Table 6.3 shows the association between unidimensional, and multidimensional poverty status along with each indicator of multidimensional poverty measure using partial correlation matrix.

We find a quite weak association among the indicators. Health indicators are found to be most weakly associated with other indicators. Apparently, household characteristics and wealth are not only the factors to determine body mass index of an individual, whether an individual is deprived in nutrition may also be affected by exogenous factors such as early childhood mental and physical conditions, environmental conditions like pollution, and climate, household heath practices and their genes, etc. (Gonzalez et al., 2012; Powell, Auld, Chaloupka, Malley, & Johnston, 2007). Schooling is abstemiously associated with most of the other indicators; this correlation is in line with the study of (Becker, 1994). Child school attendance which is another indicator education is weakly associated with some of the other indicators due to low deprivation ratio (see uncensored headcount ratio in Table 6.1), which may be an outcome of Mid-day meal educational scheme that was launched in 1995. All six indicators of standard of living have reported higher uncensored headcount ratios in table 6.1, hence they are abstemiously associated with each other.

Table 6.3: Association between Unidimensional Poverty, Multidimensional Poverty, and its Indicators

	Schooling	Attendance	Mortality	Nutrition	Electricity	Sanitation	Water	Flooring	Fuel	Assets	MDP	UDP
Schooling	1											
Attendance	0.111*	1										
Mortality	0.088*	0.023*	1									
Nutrition	0.124*	NA	0.024*	1								
Electricity	0.157*	0.150*	0.129*	0.039*	1							
Sanitation	0.183*	0.102*	0.087*	0.057*	0.233*	1						
Water	0.077*	0.063*	0.068*	0.016*	0.279*	0.156*	1					
Flooring	0.156*	0.103*	0.082*	0.063*	0.375*	0.341*	0.334*	1				
Fuel	0.058*	0.092*	0.075*	-0.042*	0.119*	0.052*	0.059*	0.036*	1			
Assets	0.162*	0.142*	0.082*	0.017*	0.370*	0.187*	0.089*	0.230*	0.143*	1		
MDP	0.661*	0.459*	0.451*	0.450*	0.509*	0.439*	0.357*	0.489*	0.285*	0.445*	1	
UDP	0.121*	0.080*	0.035*	0.042*	0.189*	0.157*	0.113*	0.231*	0.052*	0.159*	0.227*	1

Source: Authors' calculations, using round 1 (2004-05) and round 2 (2011-12) of IHDS Data
Notes: Fuel refers to cooking fuel; MDP and UDP refer to multidimensional poverty and unidimensional poverty respectively. Values of this table are partial correlation, and significance level of the difference has been checked at 95 percent of confidence.

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6.4.3. Transition Probabilities of Unidimensional and Multidimensional Poverty Measures:

Table 6.4 represents the transition probabilities which deals with the possible changes in unidimensional poverty status and each indicator of multidimensional poverty. Transitional probabilities are the function of sample households and the distribution of unidimensional poor and poor households. Regardless of their initial status, we find that the possibility of a farm household becoming unidimensional poor in each multidimensional poverty ranges from 20.90 percent to 28.03 percent while for the multidimensional poverty, this figure ranges from 23.60 percent to 39.83 percent. These results suggest that in both unidimensional and multidimensional poverty measures, considerable persistence in poor/deprived and non-poor/non-deprived is observed, while this persistency is moderately higher in case of multidimensional poverty as compared to unidimensional poverty. Our results are consistent with (Bigsten & Shimeles, 2008) who examined unidimensional poverty status of rural households in Ethiopia.

Looking at each indicator of multidimensional poverty, the transition probabilities for schooling indicator shows a high probability for a farm household to keep their status of non-deprived or to change their status as non-deprived if they were deprived initially. All indicators of the living standard show a parallel trend. In contrast, indicators of attendance, mortality, and nutrition show different trends which suggests that not much welfare improvement is observed in these indicators as compared to other indicators of multidimensional poverty.

A rational follow-up question would be then, what are the factors which determine such transition of farm households in unidimensional and multidimensional poverty? The existing literature (Bigsten & Shimeles, 2008; Dercon & Krishnan, 2000) suggests that idiosyncratic and covariate shocks along with socio-economic and demographic characteristics affect the changes in household welfare. These shocks can be both short and

long-run, short-lived shocks like crop failure, drought, and rainfall may result temporary mobility of farm households into poverty or unidimensional poverty in particular, while long-run shocks may have long-lasting impacts which may lead a farm household becoming permanently poor or multidimensionally poor in particular. In the following sub-section, we examine that how unidimensional poverty affects multidimensional poverty and vice-versa, and other determining factors of unidimensional and multidimensional poverty with specific focus on household income, socio-economic, and demographic characteristics of farm households in rural India.

Table 6.4: Unidimensional Poverty Status and Indicators of Multi-Dimensional Poverty – Transition Probabilities

Dimension	Indicator		Unidimensional Poverty Status	
			Non-Poor	Poor
Education	Schooling	Non-Deprived	84.62	15.38
		Deprived	74.38	25.62
		Total	78.30	21.70
	Attendance	Non-Deprived	73.06	26.94
		Deprived	60.17	39.83
		Total	71.97	28.03
Health	Mortality	Non-Deprived	78.80	21.20
		Deprived	74.08	25.92
		Total	78.30	21.70
	Nutrition	Non-Deprived	79.89	20.11
		Deprived	75.48	24.52
		Total	79.10	20.90
Standard of Living	Electricity	Non-Deprived	83.35	16.65
		Deprived	66.12	33.88
		Total	78.35	21.65
	Sanitation	Non-Deprived	89.63	10.37
		Deprived	74.60	25.40
		Total	78.32	21.68
	Water	Non-Deprived	86.71	13.29
		Deprived	75.74	24.26
		Total	78.31	21.69
	Flooring	Non-Deprived	90.25	9.75
		Deprived	70.70	29.30
		Total	78.28	21.72

Dimension	Indicator		Unidimensional Poverty Status	
			Non-Poor	Poor
Cooking Fuel		Non-Deprived	80.72	19.28
		Deprived	76.40	23.60
		Total	78.30	21.70
Assets		Non-Deprived	84.33	15.67
		Deprived	71.13	28.87
		Total	78.27	21.73

Source: Authors' calculations, using round 1 (2004-05) and round 2 (2011-12) of IHDS Data

6.4.4. Econometric Results – Panel Probit Regression

Table 6.5 represents the result of panel probit regression analysis to examine the determinants of unidimensional and multidimensional poverty for farm households in rural India. For convenience, to interpret our results in the way we usually interpret ordinary least squares (OLS) results, we reported margins of panel probit analysis instead of coefficients. Our results show that unidimensional and multidimensional poverty positively and significantly affect each other. Ignoring other determining factors, if a farm household is multidimensionally poor increases the likelihood of becoming unidimensional poor by 47.7 percent, while on the other hand, being unidimensional poor increases the likelihood of becoming multidimensionally poor by 52.2 percent. In column [2] and [5], household income in logarithm has been included in the previous models (column [1] and [4]). Transforming total household income in logarithm form helped us to minimum the variation. As expected, total income of the household is negatively associated with both types of poverty measures, though the relationships are not statistically significant. In column [3] and [6], the effects of other control variables such as participation in livestock, non-farm employment opportunities, caste, religion, education, household size, land size possessed, and agro ecological zones has been discussed.

As per our results, the participation of farm household in non-farm employment opportunities are found to have a negative but insignificant effect on both poverty measures.

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Farm household participates in non-farm economic activities have about 10.1 percent fewer chances of being unidimensional poor as compared to those who do not participate. The estimations are in the line of other studies such as (Adenuga et al., 2013; Igbalajobi, Fatuase, & Ajibefun, 2013). It is expected that farm households have more accessibility to diversify their livelihood in non-farm employment opportunities could have higher chances to earn additional income, hence less likely to be poor. We also find that household belongs to lower social groups (OBC, SC, and ST) are higher expected to be poor as compared to forward social group (general).

Table 6.5 also reported the importance of the education level of the household head on both unidimensional and multidimensional poverty. Higher education of household head decreases the likelihood of becoming unidimensional and multidimensional poor, however effect of higher education on multidimensional poverty are statistically significant. The negative signs of subgroups of education variable imply that the head of household has higher level of education, the probabilities of being poor reduces. Attainment of formal education not only enhances ability to acquire better job, increase human labor productivity, and promotes skills of entrepreneurship, it also raises awareness to diversify their dietary and expenditure patterns, and importance of better health, and education of their children which plays an essential role for reduction of unidimensional and multidimensional poverty of the household. Our results are in the line of (Akerele, Momoh, Adewuyi, Phillip, & Ashaolu, 2012) study which found that negative relationship between years of education of household head and poverty incidences. (Adekoya, 2014; Zeeshan, Mohapatra, & Giri, 2019) also reported the importance of education for enhancing the productivity of human labor and making them more aware of the income generation opportunities in non-farm sector. Larger household size is expected to decrease the likelihood of a farm household to be multidimensionally poor; however, the coefficients are not significant. While the effects of more household members on

unidimensional poverty are positive and statistically significant, hence it increases the likelihood of farm household to be unidimensional poor.

The result of agroecological zones parameter shows that farm household living in the semi-arid temperate and arid regions are less likely to be unidimensional and multidimensional poor. Amnesties, income-generating opportunities, and accessibility to better infrastructural facilities could the reasons to affect household welfare positively which are available in these zones. The margin coefficients of semi-arid temperate and arid zones indicate that farm households living in these regions are 30.9 percent and 40.5 percent less like to be poor as compared to the humid areas in terms of unidimensional poverty while it is 28.7 percent and 14.6 percent in terms of multidimensional poverty. Lastly, on land possessed by farm households, it is shown from table 6.5 that more land possession shows well-being of household, hence it does have negative and significant influence on both types of household poverty. These results are comparable to the findings of (B. A. Awotide, Awoyemi, Diagne, Kinkingnihoun, & Ojehomone, 2012; O. D. Awotide, Kehinde, & Agbola, 2010; Robaa & Tolossa, 2016) who concluded that scale of farm and non-farm income activities are linked with land possessed by the farm household which influences the overall welfare of the household.

Table 6.5: Determinants of Unidimensional and Multidimensional Poverty – Panel Probit Analysis

	Uni-Dimensional Poverty			Multi-Dimensional Poverty		
	[1]	[2]	[3]	[4]	[5]	[6]
multidimensionally deprived	0.477***	0.438***	0.386**			
	(42.33)	(15.68)	(3.19)			
unidimensional poor				0.522***	0.520***	0.447***
				(43.13)	(15.96)	(3.30)
ln total income		-0.020	-0.014		-0.003	-0.028
		(-1.69)	(-0.30)		(-0.38)	(-0.80)
own livestock			-0.0190			0.0153
			(-0.19)			(0.19)
nonfarm participation			-0.101			-0.0186
			(-0.73)			(-0.18)
Caste						
OBC			0.279*			-0.0121
			(2.14)			(-0.13)
SC			0.646***			0.176
			(4.59)			(1.51)
ST			0.889***			0.233
			(4.56)			(1.20)
Religion						
Muslim			-0.0565			-0.240
			(-0.25)			(-1.65)
Christian			-3.437			-3.981
			(-0.00)			(-0.00)
Sikh			0.161			-0.597**
			(0.56)			(-3.16)
Others			-4.375			-6.149
			(-0.00)			(-0.01)
Education						
1 to 5 years			-0.122			-0.0944
			(-0.94)			(-1.02)
6 to 10 years			-0.0940			-1.804***
			(-0.67)			(-16.70)
11 to 12 years			-0.178			-2.371***
			(-0.59)			(-6.84)
graduation and above			-0.549			-1.463***
			(-1.18)			(-6.29)

	Uni-Dimensional Poverty			Multi-Dimensional Poverty		
	[1]	[2]	[3]	[4]	[5]	[6]
Household Size						
4 to 5			0.253			-0.00543
			(1.53)			(-0.05)
6 to 7			0.560***			-0.122
			(3.44)			(-1.05)
8 to 9			0.656***			-0.0572
			(3.59)			(-0.42)
10 and more			0.794***			-0.0488
			(4.17)			(-0.34)
Agroecological Zones						
semi-arid						
temperate			-0.309			-0.287
			(-1.19)			(-1.08)
semi-arid tropics			0.176			0.567*
			(0.63)			(1.97)
arid			-0.405			-0.146
			(-1.47)			(-0.53)
Land Class						
small			-0.202			-0.00511
			(-1.49)			(-0.05)
medium			-0.0304			-0.0497
			(-0.20)			(-0.42)
large			-0.0404			-0.101
			(-0.22)			(-0.69)
cons	-1.246***	-1.449***	-2.244***	-0.205*	-0.349*	-0.227
	(-10.28)	(-6.21)	(-3.89)	(-2.28)	(-2.07)	(-0.52)
lnsig2u	-1.060***	-1.345*	-2.697*	1.655***	1.998***	-2.324***
	(-3.57)	(-2.48)	(-2.25)	(-5.68)	(-3.72)	(-3.63)
observations	81761	19222	1758	81761	19222	1758

Note: Significance level of the difference: * p<0.05, ** p<0.01, *** p<0.001
Robust standard errors clustered at the district-level in parentheses.
Omitted groups: Caste: general; Religion: Hindu; Education: illiterate; Household Size: 1 to 3; Agro-ecological Zones: humid. Land Class: marginal.
MPCE refers to monthly per capita expenditure

6.5. Concluding Remarks

This study examines the dynamics of poverty and its determining factors in rural India using unidimensional and multidimensional poverty measures. For this, we use longitudinal data from the India Human Development Surveys collected in 2004-05, and 2011-12. The significant contribution of our study to the existing literature of poverty is that common households and individuals who covered in both survey rounds were taken into consideration which controlled the household level heterogeneity, and poverty dynamics of the unidimensional nature is compared with multidimensional poverty and its indicators. Also, using both poverty measures, determinants of poverty dynamics concerning various socio-economic and demographic characteristics of farm households are examined. Further, we are also examined that which measure and indicator show faster progress and the drivers of poverty transitions over time.

The result shows that, nationally, poverty while calculating with multidimensional approach has fallen between 2004-05 and 2011-12 in rural India. However, the reduction rate is slower than the neighboring countries like Bangladesh and Nepal (Roche, Vaz, & Alkire, 2017). While decomposing rural poverty reduction across different population subgroups, we find that the reduction has generally been more substantial for the subgroups that had higher poverty in 2004-05, which are contradictory findings with (Alkire & Seth, 2015). For example, among castes, subgroup of scheduled caste has been reported the highest rate of poverty reduction. Similarly, across religious subgroups, Muslims, the poorest subgroup in 2004-05, reported the highest reduction in poverty. Further, we also find a low static association between unidimensional and multidimensional poverty. Although, good progress has been made in both the poverty measures over time. These results suggest that changes in macroeconomic condition leads higher variability in the incomes of poor farm households while on the other hand a tendency to become worse in the context of poor economic performance has been noticed in non-income indicators of the wealthy.

Further, those who have better accessibility to livelihood diversification in non-farm employment activities lesser probability of being poor in the unidimensional dimension. However, their probability in the multidimensional dimension is also negative but less impressive. The facts imply from income, and non-farm participation shows that economic variable affects more directly to the reduction of unidimensional poverty in the short-run as compared to multidimensional poverty. Hence, an increase in income is necessary but not the sufficient condition for the improvements in indicator of multidimensional poverty which are non-income in nature; thus, they require a longer time and additional efforts. These findings are in the line of arguments made by (Deaton, 1997; Dercon & Krishnan, 2000; Thorbecke, 2007; Tsui, 2002) that only income is not a good measure of poverty dynamics and may miss significant trends in broader notions of deprivation.

The results from this study suggest that to understand the dynamics, diversity, and extent of poverty over time, both measures of poverty complement each other. The study emphasizes that explicit attention needs to pay for improving non-income indicators such as health dimension where nutrition indicator negatively changed in multidimensional index. Furthermore, we urge that non-poor farm households in terms of unidimensional measure must not be ignored in poverty alleviation policies since they have significant risk of being multidimensional poor.

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