

An analysis of poverty among the informal workers of India

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Abstract. *This paper using 68th round National Sample Survey of India data on Employment and Unemployment for 2011-2012 wants to investigate the incidence of poverty, acuteness of poverty and their determinants among the informal workers of India. It is shown that percentage of poverty has been lowest among the self-employed workers and highest among the informal workers in the formal sector in the rural area, while in the urban area the result is just the opposite. Although percentage of poverty-stricken workers has been higher in the rural area compared to that of the urban, acuteness of poverty has been the other way round. The determining factors of incidence of poverty and acuteness of poverty among the informal workers are general educational qualification, social groups, and sectors. These determining factors can be considered as important policy variables to reduce the incidence and acuteness of poverty among the informal workers of India.*

Keywords: Informal sector, labour market, poverty, India.

JEL Classification: I32, J40, O17.

1. Introduction

Indian labour market is dominated by informal employment⁽¹⁾ and the incidence of employment has enhanced leaps and bounds in the post reform period (Marjit et al., 2007; Sanyal et al., 2008 and Narayana, 2015). What is much more striking that, there has been rapid proliferation of informal employment not only in the informal sector but also in the formal sector during this period (Sanyal et al., 2008). Apart from them, informal sector also consists of large number of self-employed (SE) workers (Mukhopadhyay, 1998). Thus, informal employment is vastly heterogeneous in nature (Unni, 2005; Sahoo et al., 2015). The heterogeneity of informal employment is classified into three major types: (i) self-employed workers (SE), (ii) employees of the informal sector (EIS) and (iii) informal employees of the formal sector (IEFS).

Post reform period witnessed informalization of employment due to flexibility of labour market (Unni et al., 2008) leading to wage cut by the employers to withstand international competition. Moreover, in order to implement structural adjustment programme and fulfill International Monetary Fund (IMF) conditionality, public enterprises became privatized. In the process, there has been enhancement of casual, contractual and informal employment (Das et al., 2012). Needless to say, these workers are "working poor"⁽²⁾ with worse working conditions. Thus, it would be an absolute necessity to discuss about the incidence and depth of poverty of these Indian informal workers.

The paper is organized as follows: Section 2 provides a brief discussion on the available literature related to incidence of poverty among the informal workers during the post reform period in India. The research gap and objectives of the study are spelled out in Section 3. Section 4 talks about the source of data used in the study. Section 5 provides summary estimates of incidence of poverty among the informal workers. Determinants of poverty among the informal workers with the help of Heckman's 2 step regression model will be discussed in section 6. Section 7 shows the estimates of mean poverty gap among poor informal workers across major dimensions; Section 8 describes the determinants of acuteness of poverty among the poor informal workers and the results of the regression analysis. Section 9 summarizes the above discussions and concludes.

2. Brief review of literature

Sundaram (2008) presented estimates of employment in the organized non-agricultural sector in India using 55th to 61st round NSSO data. He found out that head count ratio is highest among the unorganized sector workers than the corporate segment of the organized sector who have lowest head count ratio and head count ratio for the non-corporate factory sector workers which lies between the above two sectors of workers. Papola (2008) based on NSSO employment and unemployment survey concluded that incidence of poverty is highest among the casual workers followed by self-employed workers and least among regular wage earners. Similar picture is also found in the writing of Heintz et al. (2007). He concluded that informal workers are much more impoverished than the formal and regular salaried employees. Wages of the latter are not only considerably higher than the casual workers during the post reform period (Unni, 2005) but also this discrepancy

enhanced further during the post reform period (Dutta, 2005). Thus, all these evidences point out that incidence of poverty is very high among the informal workers in comparison to that of the formal workers.

By contrast, Post reform period enhanced the employment opportunities for the unemployed poor people. Thus, deprivation of the informal workers reduced during this time (Marjit et al., 2009). It is further shown that trade liberalization in import competitive sector increases informal wage across occupational types and expands production and employment in urban informal sectors with or without sufficient capital mobility between formal and informal sector which reduces head count ratio of the urban informal workers (Marjit et al., 2007). Furthermore, it is also revealed that real wage and value added of the informal sector have also increased in different states during the post reform period, which in turn reduces incidence of poverty among the informal workers. Marjit (2003) with the help of a general equilibrium framework explained that enhancement of informalization of the workforce and reduction of the formal sector hardly caused impoverishment of the informal workers. Rather, informal workers are better off because of the increased informalization of the employment during the post reform period. In Pakistan, informal workers are significantly better off in comparison to that of the government employees (Burki et al., 1981). Kazi (1987) also claimed that standard of living of skilled informal self-employed workers is better than the formal sector workers in Pakistan.

Thus, there has been clear contrast of opinion among the researchers and policy makers regarding the deprivation of informal workers⁽³⁾ which demands further research and study. This study aims to put some light on this contrasting result.

3. Research gap and objective of the study

The above-mentioned literatures only highlighted the incidence of poverty among the informal workers but hardly focus on the incidence and depth of poverty among heterogeneous groups of informal workers. Additionally, the available literatures hardly talk about the possible factors responsible for incidence and acuteness of poverty among the poor informal workers. Based on the research gaps, the objectives of the study are listed below:

- i) To investigate the percentages of poor across different types of informally employed people of India.
- ii) To investigate the possible factors responsible for the incidence poverty of the informal workers.
- iii) To investigate the acuteness of poverty across different types of poor informal workers.
- iv) To investigate the determinants of acuteness of poverty across poor informal workers.

These determinants of the acuteness of poverty can give policy prescriptions which are essential to reduce the acuteness of poverty among marginal poor (their poverty gap is very low), middle poor (their poverty gap is medium) and chronic poor (their poverty gap is sufficiently large) informal workers.

4. Sources of data

This study uses the 68th round NSSO data on employment and unemployment for the period 2011-2012 which is the latest available data till date. The extract contains only own account workers (SE), regular salaried workers and casual workers in public as well as private sectors (indicating IEFS and EIS). To do this we have subtracted all samples whose principal activity status is employer (because this is formal in nature), student, housewife, beggar, retired and handicapped. Thus, the total number of extracted samples is 117,172. Total extracted samples are sub-divided into three types of informal workers, SE, EIS and IEFS, and then want to find out the incidence and depth of poverty among those chosen types of workers. SE workers are own account workers in our data set. EIS are workers of proprietary enterprises, partnership enterprises, domestic enterprises⁽⁴⁾ and other enterprises where number of workers are less than 10. On the other hand, in our data set, IEFS are workers of public enterprises, private enterprises and co-operative enterprises who hardly get any social security benefits⁽⁵⁾. The distributions of these three types of informal workers in our data set during 2011-2012 are such that 28.30 percentages are SE, 61.34 percent are EIS while 10.36 percent are IEFS.

5. Discussion of poverty line across states

We briefly represent poverty line and overall poverty percentages across states both rural and urban area. Here incidence of poverty has been measured according to the poverty line estimates prescribed by the Tendulkar Committee report for the year 2011-2012 for respective states as well as union territories. Not only standard of living of different states are different but also it is different across rural and urban area. Therefore, poverty line is different across states and across rural and urban area. Poverty line is highest in Pondicherry both in rural and urban area while it is lowest in Orissa in the rural area and Chattisgarh in the urban area. In the rural as well urban area, percentage of poverty of the informal workers is highest in Manipur, while this percentage is nil in Daman and Diu and islands in the rural area and only in islands in the urban area. Overall percentage of poverty has been highest in Chattisgarh.

Table 1. Poverty line and percentages of poor of the informal workers across states

States	Poverty line (Rs.) (Rural)	Poverty line (Rs.) (Urban)	Total Sample of the above-mentioned informal workers (R+U)	Total sample (Rural)	Total sample (Urban)	Poverty Per-centage (R+U)	Poverty Per-centage (Rural)	Poverty Per-centage (Urban)
Jammu and Kashmir	891	988	17,691	11,031	6,660	18.44	21.38	8.69
Himachal Pradesh	913	1064	8,612	7,245	1,367	15.69	16.62	8.21
Punjab	1054	1155	14,380	7,571	6,809	14.26	14.67	13.54
Chandigarh	1054	1155	1,218	295	923	19.74	4.75	15.93
Uttaranchal	880	1082	7,884	4,830	3,054	18.23	16.44	23.21
Haryana	1015	1169	12,623	7,450	5,173	13.14	14.63	9.75
Delhi	1145	1134	3,981	284	3,697	8.34	4.38	8.67
Rajasthan	905	1002	20,172	12,995	7,177	24.62	26.96	17.10
Uttar Pradesh	768	941	49,513	33,738	15,775	38.67	40.57	31.80
Bihar	778	923	23,508	17,363	6,145	41.32	42.19	33.25

States	Poverty line (Rs.) (Rural)	Poverty line (Rs.) (Urban)	Total Sample of the above-mentioned informal workers (R+U)	Total sample (Rural)	Total sample (Urban)	Poverty Percentage (R+U)	Poverty Percentage (Rural)	Poverty Percentage (Urban)
Sikkim	930	1226	2,967	2,431	536	15.25	17.26	6.23
Arunachal Pradesh	930	1060	7,600	5155	2,445	41.29	45.13	24.82
Nagaland	1270	1302	4,879	3,273	1,606	22.32	23.13	20.82
Manipur	1118	1170	12,567	7,040	5,527	43.17	46.53	33.80
Mizoram	1066	1155	7,002	2,824	4,178	23.02	36.04	9.62
Tripura	798	920	7,197	5,277	1,920	14.14	15.74	5.86
Meghalaya	888	1154	6,246	4,306	1,940	12.15	12.47	10.92
Assam	828	1008	15,803	12,455	3,348	33.43	34.72	22.79
West Bengal	783	981	25,521	15,268	10,253	25.57	29.04	16.18
Jharkhand	748	974	12,992	8,682	4,310	37.24	41.05	23.80
Orissa	695	861	17,149	13,031	4,118	36.46	38.75	23.15
Chhattisgarh	738	849	10,075	7,037	3,038	45.49	49.92	29.37
Madhya Pradesh	771	897	21,869	12,952	8,917	38.88	43.47	25.45
Gujarat	932	1152	15,710	8,498	7,212	25.19	33.42	12.98
Daman and Diu	861	1000	575	258	317	2.83	0	9.07
Dadra Nagar Haveli	861	1000	851	470	381	26.47	41.92	7.38
Maharashtra	967	1126	35,364	18,460	16,904	23.39	34.13	10.55
Andhra Pradesh	860	1009	25,658	14,991	10,667	13.40	16.17	7.80
Karnataka	902	1089	18,092	9,561	8,531	26.44	31.78	17.14
Goa	1090	1134	1,813	683	1,130	10.31	13.12	7.46
Lakshadweep			967	325	642	11.67	7.90	15.69
Kerala	1018	987	17,957	10,659	7,298	13.82	15.65	8.86
Tamil Nadu	880	937	24,281	12,669	11,612	16.83	24.77	6.96
Pondicherry	1301	1309	2,135	509	1,626	11.66	17.22	8.33
Islands	861	1000	2,147	1,147	1,000	0	0	0

Source: Calculated by the authors on the basis of NSSO data.

6. Analysis of the incidence of poverty of the informal workers of India

Here a brief estimate of the incidence of poverty among the SE, EIS as well as IEFS are given. We find out the percentages of poor and non-poor informal workers attached with three kinds of employment across major dimensions. We have identified those workers as poor whose MPCE is less than the poverty line estimates based on the Tendulkar Committee report as prescribed for the year 2011-2012 for respective states⁽⁶⁾ and union territories as well as rural and urban area. That is instead of taking a single poverty line estimates for all India level, we have taken different poverty line estimates for different states, union territories and sector as prescribed by the Tendulkar committee report during 2011-2012⁽⁷⁾.

6.1. Incidence of poverty among the informal workers

Table 1 has displayed the percentages of poor informal workers during 2011-2012 in rural, urban as well as all India level. It is found that concentration of poor people has been higher in the rural areas compared to the urban areas across all types of informal workers. This is due to lack of sufficient employment opportunity in the rural areas. It is further revealed

that in the rural areas IEFS contains highest percentages of poor people, which is followed by EIS. SE are the least poor category in the rural area. On the other side in both the urban area and all India level, highest percentages of poverty-stricken people work as SE, while lowest percentages of poverty-stricken people work in IEFS in the urban area and a EIS.

Table 2. Percentages of poor and non-poor informal workers across rural, urban as well as all India level

Type of employment	Rural		Urban		All India	
	Poor	Non poor	Poor	Non poor	Poor	Non poor
SE	24.96	75.04	18.94	81.06	24.74	75.26
EIS	26.29	73.71	17.06	82.94	21.87	78.13
IEFS	29.57	70.43	9.81	90.19	22.98	77.02

Note: Poor and non-poor workers add up to 100.

Source: Calculated by the authors on the basis of NSSO unit level data.

6.2. Incidence of poverty among the informal workers across different states

Table 2 indicates incidence of poverty across all the states and union territories of India. The top five most poverty-stricken states are Manipur, Jharkhand and Chhattisgarh. In Manipur more than 57 percent, 41 percent and 48 percent of SE, EIS and IEFS are poverty stricken respectively. Jharkhand follows Manipur in terms of incidence of poverty where percentages of poor SE, EIS and IEFS are 41.29, 31.34 and 30.3 respectively. In Chhattisgarh, 38.57 percent of SE, 38.55 percent of EIS and 37.73 percentages of IEFS live below the poverty line estimates. In this state, percentages of poor among the SE workers have been lower compared to the other two states while that of EIS and IEFS have been higher than Jharkhand. On the other hand, in the states of Chandigarh, Delhi, Daman and Diu, Lakshadweep, Pondicherry and islands, percentages of poor SE workers are nil. Apart from that, among the EIS and IEFS, incidence of poverty has been lowest in the Islands. In fact, among these workers, incidence of poverty is zero in the islands. Incidence of poverty has been highest among the SE in the states of Sikkim, Arunachal Pradesh, Nagaland, Manipur, Tripura, Meghalaya, Assam, Chhattisgarh, Gujarat, Dadra Nagar Haveli and Maharashtra. While incidence of poverty has been highest among the EIS in the states of Punjab, Chandigarh, Uttaranchal, Haryana, Delhi, Uttar Pradesh, Bihar, Meghalaya, Daman and Diu, Goa and Kerala. Again, incidence of poverty has been highest among the IEFS in the states of Jammu and Kashmir, Himachal Pradesh, Rajasthan, Mizoram, West Bengal, Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka, Lakshadweep, Tamil Nadu and Pondicherry.

Table 3. Percentages of poor and non-poor informal workers across different states

States	SE		EIS		IEFS	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Jammu and Kashmir	14.99	85.01	16.22	83.78	20.96	79.04
Himachal Pradesh	13.4	86.6	12.49	87.51	14.14	85.86
Punjab	2.26	97.74	16.48	83.52	6.9	93.1
Chandigarh	0	100	22.08	77.92	15.21	84.79
Uttaranchal	12.59	87.41	19.16	80.84	12.38	87.62
Haryana	4.75	95.25	17.29	82.71	7.91	92.09
Delhi	0	100	8.78	91.22	6.48	93.52
Rajasthan	17.7	82.3	20.14	79.86	29.85	70.15
Uttar Pradesh	27.7	72.3	37.06	62.94	30.41	69.59
Bihar	27.32	72.68	35.94	64.06	34.84	65.16
Sikkim	26.87	73.13	7.56	92.44	10.66	89.34
Arunachal Pradesh	50.24	49.76	26.79	73.21	41.81	58.19

States	SE		EIS		IEFS	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Nagaland	34.24	65.76	23.51	76.49	4.97	95.03
Manipur	57.13	42.87	40.52	59.48	48.53	51.47
Mizoram	31.9	68.1	10.77	89.23	39.52	60.48
Tripura	16.13	83.87	10.1	89.9	15.65	84.35
Meghalaya	8.5	91.5	9.84	90.16	5.26	94.74
Assam	30.6	69.4	28.38	71.62	23.27	76.73
West Bengal	13.83	86.17	20.97	79.03	21.48	78.52
Jharkhand	41.29	58.71	31.34	68.66	30.3	69.7
Orissa	32.03	67.97	29.83	70.17	38.58	61.42
Chhattisgarh	38.57	61.43	38.55	61.45	37.73	62.27
Madhya Pradesh	31.08	68.92	34.06	65.94	45.35	54.65
Gujarat	28.72	71.28	15.51	84.49	10.64	89.36
Daman and Diu	0	100	6.34	93.66	0.9	99.1
Dadra Nagar Haveli	34.54	65.46	26.52	73.48	9.64	90.36
Maharashtra	26.28	73.72	15.13	84.87	10.73	89.27
Andhra Pradesh	11.61	88.39	11.06	88.94	16.12	83.88
Karnataka	25.04	74.96	21.84	78.16	28.11	71.89
Goa	3.6	96.4	11.98	88.02	8.27	91.73
Lakshadweep	0	100	6.62	93.38	8.82	91.18
Kerala	5.32	94.68	14.08	85.92	10.53	89.47
Tamil Nadu	13.24	86.76	11.23	88.77	24.99	75.01
Pondicherry	0	100	9.54	90.46	92.26	7.74
Islands	0	100	0	100	0	100

Note: Poor and non-poor workers add up to 100.

Source: calculated by the authors on the basis of NSSO data.

6.3. Incidence of poverty among the informal workers across heterogeneous groups

In order to grasp the heterogeneity of the informal employment and incidence of poverty among them, we try to estimate the incidence of poverty among the informal employment across workers' status as well as location of work. Status of the informal employment may be subdivided into self-employed employed (SE), regular salaried workers (RS), casual workers in the public sector (CP) and casual workers in another sector (CO). Again, location of the workers may be subdivided into workers working without any fixed location (WWFL), workers working in own household (WWIOH), workers working in own office (WWIOF), workers working in employers' household (WWIEH), workers working in employers office (WWIEF), workers working in street with fixed location (WWISFL) and workers working in other location (WWIOL). Tables 4 and 5 provide information on the incidence of poverty across informal workers based on their status of employment and location of employment.

It is found that incidence of poverty has been higher in the rural area compared to that of urban area. Needless to say, that incidence of poverty among the casual workers has been highest while that of regular salaried workers has been lowest. More specifically, incidences of poor workers have been highest among the casual workers in the public workers. This is true for rural, urban as well as all India level. Furthermore, it is also found that incidence of impoverishment among the SE workers has been higher than the RS workers but it is lower than that of the casual workers in both public and other sectors.

Additionally, informal employment has been measured on the basis of location of the workers. It is found that incidence of poverty among the informal workers has also been different on the basis of location of the workers. In the rural area, incidence of poverty has

been highest among the WWFL while in the urban area and in the all India level, incidence of poverty has been highest among the WWIOL. On the other hand, incidence of poverty has been lowest among the WWIOF. This is true for all the rural, urban as well as all India level. Just like before, irrespective of all locations, incidence of poverty has been higher in the rural area than urban area.

Table 4. Percentages of poor informal workers across status of employment

Status of employment	Rural		Urban		All India	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
SE	24.27	75.73	16.11	83.89	22.21	77.79
RS	17.4	82.6	10.97	89.03	13.18	86.82
CP	47.71	52.29	39.94	60.06	46.99	53.01
CO	38.99	61.01	34.34	65.66	38.33	61.67

Note: Poor and non-poor workers add up to 100.

Source: Calculated by the authors on the basis of NSSO data.

Table 5. Percentages of poor informal workers across location of employment

Location of employment	Rural		Urban		All India	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
WWFL	33.45	66.55	24.64	75.36	27.61	72.39
WWIOH	21.76	78.24	17.07	82.93	19.99	80.01
WWIOF	17.73	82.27	11.19	88.81	13.98	86.02
WWIEH	26.89	73.11	18.61	81.39	21.67	78.33
WWIEF	24.77	75.23	13.85	86.15	18.71	81.29
WWISFL	27.65	72.35	24.89	75.11	26.17	73.83
WWIOL	33.09	66.91	25.17	74.83	31.3	68.7

Note: Poor and non-poor workers add up to 100.

Source: Calculated by the authors on the basis of NSSO data.

7. Determinants of incidence of poverty among the informal workers in India

Initially we want to find out the determining factors of incidence of poverty among the informal workers in India. Here we consider both household specific and individual specific factors. Sample is drawn from the NSSO 68th round where we have the information of both formal and informal workers. But here we want to identify the factors which are responsible for the incidence of poverty among the informal workers only. Hence there may be some quantitative or qualitative factors responsible for a factor to be informal in nature according to our definition. So, for this investigation we have to take the help of Heckman 2 step regression model to tackle the sample selection bias situation. We have to consider two equations simultaneously; the original equation and the selection equation. In the original equation, the dependent variable y_i^* is taking binary values 1 and 0 where 1 indicates that the informal worker is poor while 0 indicates that the informal worker is non-poor⁽⁸⁾. However, statistical analysis based on non-randomly selected samples consisting of informal workers only can lead to erroneous conclusions and poor policy. Thus, we use Heckman corrections which is a two-step statistical approach provides a means of correcting the non-randomly selected samples and sample selection bias.

It is true that we have subdivided informal employment into three major types viz. SE, EIS and IEFS and would like to focus on the determinants of poverty among these three types of informal workers. However, this paper also aims to capture the heterogeneity of informal

employment in Indian labour market. To do so, we have further subdivided informal employment based on work status and work location. Based on work status informal employment is divided into four major types viz. RS, SE, CP and CO. Based on work location informal employment is divided into WWFL, WWIOH, WWIOF, WWIEH, WWIEF, WWISFL and WWIOL. This paper aims to endeavor the determinants of poverty among different types of informal workers based on work status and work location as well. However, the problem of multicollinearity would arise if we accommodate these three divisions of informal employment in a single model. In order to avoid this problem, we use Model 1, Model 2 and Model 3⁽⁹⁾ separately after considering informal employment based on workers types, status and location respectively. Besides, we do not consider the regression analysis separately for rural and urban area. Rather workers' sector has been considered as an explanatory variable in the following models.

Model 1

$$y_i^* = F(\text{techedu}_i, \text{age}_i, \text{hh}_i, \text{caste}_i, \text{finan}_i, \text{satisfied}_i, \text{rural}_i, \text{informal workers types}_i) \quad (\text{Eq. 1})$$

Model 2

$$y_i^* = F(\text{techedu}_i, \text{age}_i, \text{hh}_i, \text{caste}_i, \text{bank}_i, \text{satisfied}_i, \text{rural}_i, \text{informal workers status}_i) \quad (\text{Eq. 2})$$

Model 3

$$y_i^* = F(\text{techedu}_i, \text{age}_i, \text{hh}_i, \text{caste}_i, \text{bank}_i, \text{satisfied}_i, \text{rural}_i, \text{informal workers location}_i) \quad (\text{Eq. 3})$$

Here "techedu_i" represents the technical education among the *i*th informal worker. It is treated as dummy variable. Incidence of poverty of a technically educated people may be less because technical education helps a prospective worker to work as a skilled formal worker in his working age and earn better wage.

The second explanatory variable is the "age_i" of the *i*th informal workers. Age, which is generally considered as a proxy of experience, is found to have a negative relationship with the poverty. Thus, this paper endeavors to find out whether experiences reduce incidence of poverty

"Hh_i" represents household head of the *i*th informal worker. We create its dummy variable. This paper thus aims to investigate the influence of poverty among the *i*th female-headed household, where male headed household is the reference group.

"Caste_i" represents the social group of the *i*th informal worker. This paper thus seeks to investigate the incidence of poverty among different social groups. Three dummy variables are separately constructed for scheduled tribe (ST), scheduled caste (SC) and other backward classes (OBC). General category worker is in the reference group.

"Finan_i" represents financial inclusion of the *i*th worker. We shall try to investigate whether financial inclusion has any impact on poverty of the *i*th worker.

"Satisfied_i" represents the *i*th informal workers who hardly seek for alternative job where "Unsatisfied"⁽¹⁰⁾ worker is the reference group. Our aim is to find out that whether "Satisfied" informal workers have lower incidence of poverty.

"Rural_i" represents rural sector in which the i^{th} informal worker works. Urban area is the reference group. Since there are lesser employment opportunities in the rural area, incidence of poverty is presumed to be higher in the rural area. This paper thus aims to investigate incidence of poverty among the i^{th} informal worker who lives in the rural area compared to that of the urban area.

"Informal workers types_i" represents of types of informal employment of the i^{th} informal worker. We have constructed dummy variables each for SE and IEFS whereas EIS is the reference. Since informal worker is not homogeneous, incidence of poverty among different groups of informal workers may vary a lot.

"Informal workers status_i" represents heterogeneity of the i^{th} informal workers in terms of their work status. Three dummy variables are constructed. These are RS, CP and CO while regular salaried SE is the reference group. Our objective is to find out incidence of poverty among the i^{th} informal workers who are working as SE, or CP or CO compared to RS workers.

"Informal workers location_i" again represents heterogeneity of the i^{th} informal workers in terms of location of work. We have constructed six dummy variables. These are WWIOH, WWIOF, WWIEH, WWIEF, WWISFL and WWIOL. The reference group is WWFL. This paper endeavors to find out the incidence of poverty among the i^{th} informal workers working in each of the location compared to the reference groups.

Now we present the selection equation that helps to identify the determining factors for the workers to join informal employment. The selection equation is given by

$$I_i^* = F(\text{Edu}_i, \text{rel}_i, \text{voc}_i) \quad (\text{Eq. 4})$$

Where I_i^* represents type of employment (i.e. formal/informal) of the i^{th} worker which is dummy in nature.

Here "Edu_i" represents years of education among the i^{th} worker. "rel_i" represents religion of the i^{th} worker. "voc_i" represents vocational training of the i^{th} worker.

Initially we have to estimate the selection equation on the basis of Probit model, On the basis of the estimation, we can have estimated value of Inverse Mill's ratio represented by $\hat{\lambda}_i$ of each sample 'i'. In the Heckman two step estimation, this $\hat{\lambda}_i$ is to be treated another explanatory variable of the original Equation, mentioned in Model-1, Model-2, Model-3. If it is observed that the parameter estimates of $\hat{\lambda}_i$ is statistically significant, then we can become sure that Heckman two step estimation procedure is appropriate to address our research problem.

Table 6. Factors responsible for poverty of the informal workers (Heckman 2step procedure)

Dependent variable: Poor informal workers			
	MODEL 1	MODEL 2	MODEL 3
	Co-efficient	Co-efficient	Co-efficient
Constant	0.01 (0.01)	0.02* (0.01)	0.06*** (0.01)
No technical worker	0.16*** (0.01)	0.14*** (0.01)	0.15*** (0.008)
Age	-0.002*** (0.0001)	-0.002*** (0.0001)	-0.002*** (0.0001)

Dependent variable: Poor informal workers			
Female headed household	0.001 (0.01)	0.005 (0.01)	-0.01 (0.01)
Scheduled Tribe	0.14*** (0.005)	0.12*** (0.005)	0.12*** (0.004)
Scheduled caste	0.09*** (0.004)	0.12*** (0.004)	0.13*** (0.004)
Other backward classes	0.05*** (0.003)	0.07*** (0.003)	0.07*** (0.003)
Workers without bank account	0.06*** (0.01)	0.05*** (0.01)	0.06*** (0.01)
Alternative job seekers	0.05*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
Rural workers	-0.04*** (0.003)	-0.05*** (0.003)	-0.05*** (0.003)
IEFS	-0.03** (0.004)		
SE	-0.03*** (0.003)		
Regular salaried workers		-0.05*** (0.004)	
Casual workers in public sector		0.14*** (0.01)	
Casual workers in another sector		0.12*** (0.004)	
WWIOH			-0.02*** (0.004)
WWIOO			-0.09*** (0.004)
WWIEH			0.02*** (0.008)
WWIEO			-0.06*** (0.004)
WWISWFL			0.02 (0.009)
WWIOL			0.04*** (0.005)
$\hat{\lambda}$	0.06*** (0.007)	0.06*** (0.007)	0.06*** (0.007)
Dependent variable: Informal worker			
Constant	-1.27*** (0.004)	-1.27*** (0.004)	-1.27*** (0.004)
Years of education	-0.04*** (0.0009)	-0.04*** (0.0009)	-0.04*** (0.0009)
Muslim	0.07*** (0.01)	0.07*** (0.01)	0.07*** (0.01)
Christian	-0.16*** (0.01)	-0.16*** (0.01)	-0.16*** (0.01)
Other religions	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
No vocational training	0.52*** (0.005)	0.52*** (0.005)	0.52*** (0.005)
rho	0.14	0.16	0.12
sigma	0.42	0.41	0.43
Number of Observations:	456,992	456,992	456,992
Wald χ^2	2771.46	4230.74	3560.02
Prob> χ^2	0.00	0.00	0.00

* => significant at 10 percent level ** => significant at 5 percent level ***=> significant at 1 percent level.

Source: Calculated by the authors from NSSO data.

7.1. Results and discussions

We have used Heckman 2 step regression model in order to identify the factors which can influence incidence of poverty of the i^{th} informal workers in Indian labour market. In all the models the parameter estimates of $\hat{\lambda}$ is statistically significant which establishes the fact that Heckman Two step estimation procedure is appropriate for our investigation.

Model 1 is a basic model, which considers the personal characteristics of the workers including types of informal employment. It is found that compared to EIS, IEFS and SE face significantly less probability of being poor. Furthermore, technical education, reduces the chance of being poverty-stricken. Moreover, compared to the workers without bank account and unsatisfied workers, i^{th} workers with financial inclusion as well as that of satisfied workers have significantly lower chances of remaining poverty-stricken respectively. Besides, compared to that of the general workers, i^{th} workers with all other social groups have significantly higher chances of remaining impoverished. STs are the most deprived social groups followed by SCs and OBCs. Furthermore, it is also found that compared to that of the urban area, i^{th} informal workers residing in rural areas have lower chances of being poor. This is undoubtedly due to the lack of sufficient income earning opportunities in the rural area.

To check the validity of this result across different types of heterogeneous informal workers we have used **Model 2**. We have substituted types of the informal workers with status of the informal workers. It is observed that compared to that of the i^{th} SE workers, chance of impoverishment among the i^{th} CP and CO has been significantly higher while that of i^{th} RS workers have been significantly lower. What is much more interesting is that probability of impoverishment is the most among the i^{th} CP workers. This only signifies that during the post reform there has been major deterioration in the quality of jobs in the public sector.

In **Model 3**, we have substituted status of the i^{th} informal workers by location of the workers. This again captures the heterogeneity of the informal workers in terms of their place of work. In other words, the informal workers hardly have a homogeneous place of work. A SE worker might be working in the street with or without any fixed location. Besides, a RS worker might have a place of work in the employers' household or employer's office or even street with or without fixed location. Compared to WWFL, which is the reference group, chance of remaining poor is significantly lower across WWIOH, WWIOO and WWIEO while higher across WWIEH and WWIOL.

So far as the determinants of informal employment are considered, we find that compared to Hindus, Muslims face significantly higher chance and Christians face significantly lower chances of being informally employed. Enhancement of years of education and increase in vocational training reduces the chances of being informally employed.

8. Analysis of the depth of poverty among the poor informal workers

Besides identifying the responsible factors for the incidence of poverty among informal workers, our next objective is to investigate the causes of poverty gap (acuteness of poverty) among the poor informal workers. In order to do so, we deal with the poor informal workers only. Initially we have deleted all non-poor informal workers from our samples.

Poverty gap for i^{th} individual residing in any particular state 's' (G_{is}) is defined as the difference between the official estimates of poverty line (p_s) for that state minus MPCE for i^{th} individual residing in states ($MPCE_{is}$). That is $G_{is} = (p_s - MPCE_{is})$, ($MPCE_{is} < p_s$). Clearly G_{is} shows the depth of poverty of the i^{th} worker residing in s^{th} state. Clearly, G_{is} is positive for all the poor informal workers because $MPCE_{is} < p_s$. Higher the value of G_{is} , higher is the acuteness of poverty among the poor informal workers.

8.1. Mean poverty gap among the informal workers

We shall now measure the mean poverty gap across different types of informal workers in order to compare the acuteness of poverty across SE, EIS as well as IEFS and the results are displayed in Table 7. It is found both in the rural as well as urban areas; acuteness of poverty is almost same among the workers working as SE and in EIS. However, acuteness of poverty among the IEFS is lower than the SE and EIS in the urban area and the other way around in the rural area. Unlike the incidence of poverty, acuteness of poverty has been higher in the urban area as compared to that of the rural area for all types of workers. In all India level on the other hand, acuteness of poverty has been lowest among the SE, while that among the workers working in EIS and IEFS has been more or less same.

Table 7. Mean poverty gap across types of poor informal workers

Poverty gap among types of informal worker (in Rs.)	Rural	Urban	All India
SE	159.78	193.01	160.71
EIS	159.92	192.3	172.01
IEFS	174.93	189.06	176.94

Source: calculated by the authors on the basis of NSSO data.

9. Determinants of acuteness of poverty among marginal, medium as well chronic poor informal workers

Apart from finding out possible factors which can influence poverty of the informal workers, this paper further endeavors to illustrate the determinants of G_{is} among the i^{th} poor informal workers. We have to identify the possible factors, which can reduce acuteness of poverty (G_{is}) among the poor informal workers of India. Initially using OLS it is tried to find out the factors which influences G_{is} among the Indian informal workers. Here, the dependent variable is G_{is} and all the explanatory variables are almost same of the previous model. However, unlike the previous model this regression also considers a quadratic relationship between age and depth of poverty. The model of OLS is given below:

$$G_{is} = F(\text{edu}_i, \text{age}_i, \text{age}_i^2, \text{hh}_i, \text{caste}_i, \text{finan}_i, \text{satisfied}_i, \text{rural}_i, \text{informal workers types}_i) \quad (\text{Eq. 5})$$

As there has been wide disparity of G_{is} , the effectiveness of a certain policy variable will not create equal influence on G_{is} . That is the poor informal workers whose MPCE is far below the official estimates of poverty line may be regarded as chronic poor while some of the poor workers whose MPCE is just below the poverty line may be regarded as marginal poor. On the other hand, the poor informal workers who MPCE is between the marginal poor as well as chronic poor may be regarded as medium poor. Thus, our analysis would be incomplete if we aim to investigate the determinants of G_{is} for all the poor informal workers as a whole. Rather we can get a complete picture of G_{is} if we separately discuss

the determinants of G_{is} for marginal, middle and chronic poor informal workers. The reason is that the policy variables which are required to reduce G_{is} might significantly create different types of influence across marginal, medium and chronic poor people. Hence, we use "Quantile Regression"⁽¹¹⁾ to detect whether the partial effect of a regression on the conditional quantiles is same for all quantiles and differ across quantiles. We use Quantile regression for 25th, 50th and 75th quantiles respectively. Clearly 25th quantile represents marginal poor, 50th quantile represents middle poor and 75th quantile represents chronic poor. Actually, this regression allows the possibility that how important predictors may be different depending on the quantiles of the outcome variables i.e. G_{is} . It is also to be remembered that mean of the G_{is} has been consistently above than that of the median G_{is} , which undoubtedly indicates that the distribution of poverty gap has been rightly skewed. Hence, there has been an absolute necessity to investigate changes in G_{is} at different points of the distribution. It is easily understandable that it would not be enough to investigate the changes in mean when the entire shape of the distribution changes dramatically. This paper therefore provides empirical estimation G_{is} at 25th, 50th and 75th quantiles.

Model of the Quantile regression

$$y_i = \alpha_\theta + \beta_\theta \text{edu}_i + \delta_{\theta 1} \text{age}_i + \delta_{\theta 2} \text{age}_i^2 + \text{III}_\theta \text{hh}_i + \epsilon_\theta \text{caste}_i + \eta_\theta \text{finan}_i + \lambda_\theta \text{satisfied}_i + \epsilon_\theta \text{rural}_i + \mu_\theta \text{informal types}_i + u_i \quad (\text{Eq.6})$$

Where $i = 1, \dots, N$ (N being total number of informal workers lying below poverty line), $\theta = .25, .50, 0.75$ quantiles where $\theta \in (0,1)$.

Table 8. Determinants of poverty Gap: Estimated results using quantile regression and ordinary least square

MODEL1	25% quantile	50% quantile (median)	75% quantile	OLS
Workers' characteristics	Coefficient	Coefficient	Coefficient	Coefficient
Constant	72.3*** (15.75)	172.70*** (31.36)	291.71*** (22.6)	199.27*** (13.67)
Years of education	-2.37*** (0.69)	-5.22*** (0.92)	-6.49*** (1.21)	-4.38*** (0.4)
Age	-0.46 (0.61)	-1.23 (0.1)	-2.43* (0.89)	-1.34*** (0.31)
Age square	0.00001 (0.01)	0.01 (0.01)	0.03* (0.01)	0.01*** (0.0001)
Female headed household	5.3 (9.22)	15.50*** (4.16)	-5.03 (14)	4.34 (4.55)
ST	36.67*** (5.42)	61.74*** (5.2)	85.15*** (9.74)	57.31*** (2.85)
SC	7.23 (4.41)	24.76*** (5.49)	25.96*** (7.71)	18.27*** (2.55)
OBC	5.4 (4)	20.41*** (4.66)	26.79*** (6.6)	14.72*** (2.33)
Workers without bank account	-3.4 (8.22)	1.79 (14.45)	-9.95 (20.37)	0.44 (3.47)
Alternative job seekers	-7.42 (7.56)	-5.07 (8.19)	-2.72 (8.9)	-3.36 (3.1)
Rural	-20.64*** (2.97)	-29.83*** (4.15)	-42.47*** (5.29)	-30.39*** (2.12)
Self employed worker	-1.42 (4.46)	-14.56*** (4.45)	-23.28*** (5.8)	-10.93*** (3.03)
IEFS	-2.2 (4.28)	-2.98 (6.27)	-1.49 (12.33)	-0.12 (2.15)

MODEL1	25% quantile	50% quantile (median)	75% quantile	OLS
Workers' characteristics	Coefficient	Coefficient	Coefficient	Coefficient
Number of observations	24896	24896	24896	24896
Pseudo R ²	0.01	0.02	0.02	
R ²				0.18
Root MSE				125.72
F(13,24882)				65.1***

* => significant at 10 percent level ** => significant at 5 percent level ***=> significant at 1 percent level.

Source: calculated by the authors on the basis of NSSO data.

9.1. Results and discussions

The results of the Quantile regression as well as ordinary least square regression have been displayed in Table 8. The results of 25th, 50th and 75th quantile regression and ordinary regression differs a lot which indicates that acuteness of poverty has not been homogeneous across marginal, medium as well as chronic poor workers. It is found that in all the three situations of Quantile regression, increase in the years of education is associated with lower depth of poverty among the i^{th} worker. More specifically, with the increase of education, depth of poverty among the i^{th} worker is reduced in a greater extent among the higher quantiles i.e. among the chronic poor. Overall depth of poverty also falls with the increase in years of education. It is also observed that age of the informal worker is a cause of his/her acuteness of poverty. Illiterate workers have significantly higher depth of poverty among the i^{th} marginal poor, chronic poor and overall poor. Compared to the male-headed household, depth of poverty has been significantly higher among the i^{th} middle poor informal workers coming from female-headed households. Compared to the general workers, depth of poverty among the i^{th} poor is significantly higher among all other castes. More specifically, for all social groups, acuteness of poverty is highest among the i^{th} chronic poor followed by medium poor and least among the marginal poor. Among the scheduled caste and other backward classes, depth of poverty has been more or less same among the i^{th} chronic poor and middle while insignificant among the marginal poor. ST effect is stronger among ultra-poor informal workers i.e. at highest quantiles. Furthermore, it is also found that compared to that of the urban area, depth of poverty among the i^{th} poor has been lower in the rural area among all types of poor informal workers.

Lastly, compared to the EIS, i^{th} SE face significantly lower acuteness of poverty among the middle, chronic as well as overall poor. But the result is insignificant among the marginal poor workers. Not only is that, compared to that of EIS, depth of poverty among the IEFS is also insignificant. Therefore, these significant determining factors may be treated as important policy variables to reduce the acuteness of poverty.

10. Conclusions and policy prescriptions

This paper shows that incidence of poverty among the informal workers of India is more in the rural area as compared to that of urban area. This is also true for all the social groups. Unlike the incidence of poverty, acuteness of poverty has been higher in the urban area as compared to that of the rural area. Furthermore, it is also observed that Manipur is the most poverty-stricken state where percentages of poor workers across SE, IEFS and EIS are the highest.

It is also found that technical education, social groups, financial inclusiveness, workers satisfaction, status of employment, types of employment and location of employment are important determinants of incidence of poverty. More specifically, it is found that compared to that of the EIS, IEFS and SE have significantly lower incidence of poverty. Besides, compared to that of the SE, CP and CO workers have significantly higher incidence of poverty while RS workers have significantly lower incidence of poverty. Furthermore, compared to WWFL, higher incidence of poverty is observed among WWIEH and WWIOL while lower among workers with all other types of location excepting WWISWFL.

In both the rural and urban area, mean poverty gap has been more or less same across SE and EIS while the mean poverty gap has been highest among the IEFS. Furthermore, the acuteness of poverty has been highest among the ST followed by SC and OBC workers in the rural area while in the urban area depth of poverty of the general workers is higher than the OBC workers.

Lastly, as far as the determinants of the acuteness of poverty among the poor informal workers are concerned, it is found that years of education, technical education, social groups, and sectors may be treated as the important policy prescriptions to reduce the acuteness of poverty among the poor. Moreover, it is also found that these policy prescriptions significantly vary across marginal, medium and chronic poor informal workers. Poorest workers will be benefitted most through enhancing the educational qualifications and technical qualifications. Thus, government of India must spread various schemes like "Sarba Siksha Abhijan", "Kanyasree" so that the literacy rate and educational qualifications can be increased which will in turn help in reducing chronic poverty to a great extent. Consequently, marginal poverty and middle poverty can also be reduced by enhancing educational qualifications. However, mere implementation of such educational schemes would not be enough. Government of India should take proper steps so that literacy and educational qualifications can be spread at that grass root level in order to reduce the acuteness of poverty.

Notes

- (1) Informal employment is not only generated only in informal sector. Informal employees work in both the formal as well as informal sectors in unhealthy working conditions with long working hours and devoid of any social security benefits (GOI, 2007; ILO, Standing, 1999).
- (2) The term "working poor" has been highlighted by Papola (2008) and Heintz et al. (2007). They are mostly referred to as the informal workers living below the poverty line.
- (3) The casual workers, contractual workers, workers of the unorganised sectors are undoubtedly informal workers (by ILO definition of informal workers and GOI (2007) who mostly are deprived of any social security benefits.
- (4) Domestic enterprises by definition are unorganised or informal in nature.
- (5) All definitions based on GOI (2007).

- (6) We have measured poverty based on poverty line estimates as provided by Tendulkar Committee report for respective states, union territories as well as sector. Although Tendulkar Committee provides poverty line estimates as a whole for India and state specific poverty line, but we have taken the measure for respective states, union territories and sector. The reason is that if we would have taken the estimate of poverty as a whole for all India level, then the estimate of poverty would have been over-estimated in some of the states and under-estimated in some other states.
- (7) This is because poverty is a relative concept.
- (8) Here poor and non-poor is identified on the basis of Tendulkar Committee Report for respective states, union territories as well as sector.
- (9) All the three models are original equations which are required to estimate and analyze incidence of poverty among the informal workers.
- (10) Whenever a worker is ready and available for alternative job that means he is unsatisfied with his present work.
- (11) The Quantile Regression model estimates the differential effects of the covariates on full distribution.

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