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Do the Poor Really Feel Poor? Comparing Objective Poverty with Subjective Poverty in Pakistan

Tahir Mahmood[1] · Xiaohua Yu[2] · Stephan Klasen[3]

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Abstract The current literature on poverty focuses intensively on objective poverty, which is based on household income, household consumption, basic needs, calorie intake or a multidimensional poverty approach. In contrast, this paper researches subjective poverty, which is compared with objective poverty measured by income in Pakistan. Using Pakistan Panel Household Survey 2010 data, where household heads classify themselves on a ten-point-scale from the poorest to the richest, we find that the determinants of subjective poverty (feeling poor) are not limited to household consumption, but include household size, household demographic structure, agriculture land ownership, sanitation facility, physical and food insecurity. In comparison with the overall non-poor, the objective poor and the subjective poor households are determined by different factors. Particularly, for households lying below the subjective poverty line, factors such as education, household size, own residence and physical security have a significant positive impact on the eradication of poverty relative to overall non-poor. In addition, the Spearman Rank test upholds that subjective poverty measure complements the conventional method. Thus, priority should be given to specific targeted determinants, which are more important in the alleviation of poverty, while making and implementing public policy given the limited available resources.

✉ Xiaohua Yu
xyu@uni-goettingen.de

Tahir Mahmood
tmahmoo@gwdg.de

Stephan Klasen
sklasen@uni-goettingen.de

[1] Courant Research Centre "Poverty, Equity and Growth", University of Göttingen, Platz der Goettinger Sieben 5, 37073 Göttingen, Germany

[2] Courant Research Centre "Poverty, Equity and Growth" and Department of Agricultural Economics and Rural Development, University of Göttingen, Platz der Goettinger Sieben 5, 37073 Göttingen, Germany

[3] Courant Research Centre "Poverty, Equity and Growth" and Department of Economics, University of Göttingen, Platz der Göttinger Sieben 3, 37073 Göttingen, Germany

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1 Introduction

The World Bank Development Report in 2013 indicates that 10.7% of the world's population lives on less than US $1.90 per day, which is the current poverty line, set by the World Bank.[1] Using the Pakistan Living Standard and Measurement (PSLM) 2014/15, the multidimensional poverty index based on the Alkire–Foster method, stands at 0.197, while the multidimensional poverty head count ratio was estimated at 38.8% of the population. Strong disparities in the poverty ratio between urban and rural areas also exist i.e. 9.4% in urban areas and 54.6% in rural areas. Consistently, the 2013 World Bank Development Report reveals that 29% of the people live below the poverty line in Pakistan. There is a hot debate over the measurement of poverty, as there are many different measures from different dimensions. Though the prevalent measurement applied in many countries exercises to set an objective poverty line, the comparison between different regions and groups is difficult (Deaton 2010). The objective poverty measures are prone to the changing pattern of purchasing power parity (PPP).

Uncertainty about PPP is not the only source of sensitivity in poverty measures. The national poverty lines are treated as precise cut-off. Likewise, poverty lines are set using standard technical rules, such as income, expenditure, or consumption, and not well informed in democratic discussion. For instance, there is an intensive discussion on the poverty line in India, which is set by the fixed calorie needs approach (Deaton and Drèze 2009). The reason is that as if the economic condition of household improves, individuals will do less energy consumption work, which however would increase poverty based on the fixed calorie needs, even though this might not be the case. At the same time, small changes in the threshold can have large effects on the count when there is a large fraction of the population near the line. Thus, it is hard to justify treating people so differently, whether or not they happen to fall on one or the other side of a largely arbitrary line (Deaton and Heston 2010).

Conventional poverty counts can also be very sensitive to survey design. For example, data availability issue on consumption instead of income, non-availability of regular annual survey data and changes of surveys over time are some issues confronted with the conventional measure of poverty. Again, loopholes exist about the ability of the household surveys to capture income and consumption accurately (Jodha 1988). Another example comes from Indian national sample survey carried out in 1998: seven-day recall for food and some other items in place of the 30-day period that had been their long standard. This change resulted in a sharp increase in the reported monthly expenditure, removing almost 175 million Indian from the national poverty count. The effect would have been larger if the standard nutritional approach was used (Deaton 2001). Hence, the global poverty estimates are a rough estimate, expecting classification errors. Keeping in view the above measurement,

[1] Objective poverty is defined as when the household income or consumption, after adjusting for household composition, is below a designated threshold line. While subjective poverty is defined as 'an individual or households perception of their economics position in life (both broader and narrow concept of subjective poverty)'.

two methods gained prominence recently: one is the capability approach (Sen 1988, 1993) and the other one is the multidimensional approach.

Poverty is also a subjective feeling. Some who are not objectively poor may feel poor, while some who are objectively poor do not feel poor. In order to overcome the aforementioned problems, different from the mainstream literature, Van Praag (1968), and Vos and Garner (1991) suggest a concept of subjective poverty measure: turning self-reports of income adequacy into poverty lines.

Specifically, in contrast to conventional measures of objective poverty, different concepts of subjective poverty measures have been proposed by researchers ranging from Income Evaluation Question (IEQ), Minimum Income Question (MIQ), and consumption adequacy questions, to broader definition of subjective welfare such as asking questions about life satisfaction and happiness to a somewhat narrow yet comprehensive definition by ranking individuals on a ladder from the poorest to the richest. Among all, Van Praag (1968, 1971), first used an Income Evaluation Question (IEQ) for a household survey: what income is considered very bad, bad, not good, not bad, good, and very good. Likewise, Goedhart et al. (1977) asked households a Minimum Income Question (MIQ), what minimum income is needed 'to make ends meet?' The concept of income as a measure of poverty is likely to be misunderstood by respondents particularly in poor parts of the world. The critique about the income criterion comes from Garner and Vos (1995). Further, subjective poverty line is derived using qualitative questions about perceived food consumption adequacy (Pradhan and Ravallion 2000). Van Praag et al. (2003) find out the limitations of aforementioned procedure that income is only one predictor among other important demographic and socio-economic variables effecting subjective well-being.[2]

Instead of asking question about income metrics, Cantril (1965) resort to ask open-ended question from individuals usually called the Cantril ladder: where people place themselves on a ladder according to their happiness and life satisfaction. Stevenson and Wolfers (2013) tested the subjective well-being and income relationship using the five waves of the Gallup World Poll and World Values Survey, and ask questions about people's life satisfaction and happiness. Furthermore, Kingdon and Knight (2006), and Zhou and Yu (2017) use the life satisfaction question ranging from very dissatisfied (coded as 1) to very satisfied (coded as 5). Similarly, Deeming (2013) used four global measures of subjective well-being: life satisfaction, worthwhile, happy, and anxious ranging from the lowest to the highest ladder. Shams (2014) tested determinants of subjective well-being using a happiness index in Pakistan but limited to the rural domain. However, the broad definition is sometimes criticized on the ground that just because someone is poor does not mean he or she is unhappy or unsatisfied.

A narrow yet accurate and comprehensible approach to well-being is to define the Cantril (1965) ladder from the poorest to the richest. There have been a number of studies. For instance, Mangahas (1995) for Philippines, ask people whether they are poor, borderline, or non-poor. Likewise, Riffault (1991), ask a similar question consisting seven-step ladders from the poorest to the richest, and the Euro barometer identifies the poor who fall on the lowest two ladders. Ravallion and Lokshin (2002) conducted a similar study asking

[2] Subjective well-being is defined as "a person's cognitive and affective evaluations of his or her life" (Diener et al. 2002). We have broader concept of subjective poverty (life satisfaction, happiness) and narrow definition of subjective poverty (perception about economic situation). In this study, we use the narrow definition of subjective poverty.

people's perception of their economic welfare in Russia. The question goes as "please imagine a 9-step ladder where on the bottom, the first step, stand the poorest people, and on the highest step, the ninth, stand the rich. On which step are you today?"

Keeping the aforementioned literatures in view, we study the subjective poverty in Pakistan by asking the following question from the household head: "In our society some people have higher economic position (the rich), and other have lower economic position (the poor). Below is a scale from one to ten. The numbers 1 through 10 represent different levels of economic position, from the lowest to the highest. On the scale, please indicate the position you occupy". Following Riffault (1991), we also constructed a binary variable of extreme poor consisting of the lowest two ladders and non-poor consisting of 3–10 ladders. Our intension is to value the individual freedom by asking individuals directly about his/her economic situation, instead of asking about life satisfaction, happiness, or income metrics. Because sometimes, satisfaction and happiness have different interpretations/connotations for individuals surveyed, despite their economic status.[3]

The benefit of this narrowed definition is that it makes the comparison to a monetary poverty line more meaningful. Another advantage of this perception type variable, unlike orthodox and/or physical variables, is that it does not require extensive cleaning of the data and is therefore less expensive. Generally, the perception type survey items are easy to answers. Unlike the official poverty line, the subjective poverty threshold is not manipulated. The subjective poverty nevertheless also confronts some issues such as response errors, random discrepancies in the interpretation of the survey question, idiosyncratic differences in the respondents' moods and differences in preferences (taste and personality). However, for specific purposes such as welfare impacts of policies and overall well-being, one would not attach much significance to such differences.

Self-rated questions about well-being are established as an alternative to a poverty measure. Nonetheless, to the best of our knowledge, research on subjective poverty is carried out in a limited way in Pakistan, although Pakistan is a large country with a population close to 200 million. In recently years, Pakistan has experienced a relatively rapid economic growth. Hence, the motivation is to fill the gap in the research area of subjective poverty in Pakistan. The prime objective of the study is to compare the subjective and objective poverty line for Pakistan. The study also attempts to yield anti-poverty policy implications by incorporating the subjective poverty measure into the conventional approaches.

The rest of the paper is organized as follows. Section 2 explains the data design, variables and shows descriptive statistics of the study; Sect. 3 presents the empirical method, followed by empirical results and discussions in Sect. 4. Finally, Sect. 5 concludes and gives some policy recommendations.

2 Data

2.1 Research Design

Our analysis is based on the third round Pakistan Panel Household Survey (PPHS) in 2010, a joint project of the Pakistan Institute of Development Economics (PIDE) and

[3] Individual freedom means the right to express their opinions and communicate freely with others their economic position without any constraints.

the World Bank. The sample size is 4142 households covering four provinces of which 2800 are rural and 1342 urban households.[4] After cleaning the data with missing variables, we obtained 3015 households consisting of 2143 rural and 872 urban samples. The PPHS covers a wide range of issues, including fertility education, employment, poverty, health, nutrition, food insecurity, housing, and well-being. The current study utilizes cross sectional data. The cross sectional survey data is easier and cheaper than the longitudinal data, no follow up is required, and possesses greater control over precision of estimates in subgroups particularly due to stratified sampling. The disadvantage of using survey data are no control over purpose and method of data collection in case of secondary data. In addition, cannot say much about causality but only correlation.

2.2 Variables

The basic subjective poverty question is asked from the head of the household, i.e. rank the household from the lowest ladder 1 (poor) to the highest ladder 10 (rich) in terms of economic position. We have also constructed a binary variable of subjective poverty which consists of the samples of the lowest 2 ladder as the poor and the rest as non-poor (Riffault 1991). For the purpose of comparison, we have categorized objective poverty based on per capita consumption of $1.25 and $1 per day.

The important determinants of subjective poverty included in the analysis are: (1) Per capita consumption which is the main measure of objective poverty; (2) Household composition, which is considered differently in subjective and objective poverty; (3) Gender based classification of children less than 18 years and also less than 6 years; (4) Age, education, marital status and employment status of the household head; moreover, (5) Main household characteristics which are expected to affect subjective poverty, i.e. household asset proxies by television, agriculture land holding, water and sanitation facilities, borrowing and livestock.

In addition, food insecurity and physical insecurity are of high value to poor people, but they are often missing due to difficult measurement (Sen 1988). Alkire (2007) stressed that insufficient empirical data which has a direct impact on the human development and well-being, particularly on the poor, such as physical security, agency, and empowerment, could improve standard surveys in a promising way. To analyze whether their inclusion adds sufficient influence to poverty and policy relevance, we take into account physical security measured by community insecurity and food insecurity in the analysis. The community insecurity question asked from the household head "in the last twelve months, have you heard incidents or injury or property damage experienced by others living in your community?" The community security question can have a strong impact on well-being and policy relevance, because when the data was collected in 2010, terrorism was at its peak in Pakistan. Similarly, the other important determinant included in the study is, "During the last 12 months was your household worried any time that your food would run out before you had money to buy more?" Clearly, the food insecurity question also has strong impact on the well-being, due to a bad harvest in 2010, which almost destroyed 50% of the harvest. Moreover, to control for regional

[4] Districts include in the sample from four provinces are; Dir, Mardan and Lakki Marwat from KP; Attock, Hafizabad, Faisalabad, Vehari, Bahawalpur and Muzaffargarh from Punjab; Larkana, Nawabshah, Mirpur Khas, and Badin from Sindh; and Loralai, Khuzdar, and Gwadar from Baluchistan.

heterogeneities (such as religion, social differences), regional and provincial dummies are incorporated in the analysis.

Two interaction terms are included, which are considered necessary for the analysis: the interaction between household being farmers and having agriculture land. We expect a positive effect of the interaction because agriculture land owning and farmer has strong consequences on poverty. Likewise, the interaction between household asset and per capita consumption has also an impact on subjective poverty. Because having television in the house does not alone manifest well-being, the interaction with the income or consumption makes strong assumption of being well off. Hence, we expect a significant effect of the interactions on the subjective well-being. Table 1 presents the definition and description of variables included in the analysis.

2.3 Descriptive Statistics

Table 2 shows descriptive statistics of demographic and socio-economic characteristics of the households under study. Almost 50% of the household heads are illiterate. Average age of the household head is 48. Equivalent household size is calculated according to the modified OECD equivalence scale. The average household size is 5.38 which is slightly less than the average household size 6.41 (Household Integrated Economic Survey 2011–2012) and national average household size 6.38 members observed for the period 2010–2011. Similarly, 31% of the households have agriculture land holding, only 11% livestock holding, and approximately 10% run their own businesses. In addition, 78% of the households have their own residence, 50% possess assets, three-fourths percent have no access to borrowing, and approximately half of the households have no sanitation facility. Alarmingly, 59% of the households are food insecure and 21% faced physical insecurity. Almost 70% of the households reside in rural area. Moreover, the distributions of households are 30, 31, 11, and 18% for Punjab, Sindh, KP and Baluchistan, respectively.

Table 3 shows descriptive statistic of subjective poverty in Pakistan. The first part is the original question asked the household head about his subjective poverty which consists of 10 ladders. The result shows that almost 60% of household subjective poverty falls on the first three ladders. This indicates that significant majority of the household are subjectively poor. The second part of the Table shows the poor and non-poor category. The poor category consists of the lowest two ladders and non-poor as the rest rank from 3 to 10. This classification shows that 28% of the household are poor subjectively at the national level. The regional and Punjab subjective poverty statistics are in line with national subjective poverty trend. While, the distribution of subjective poverty based on this ranking shows stark divergence for other provinces. That is, based on the first two ladders, 2.59% of households of Baluchistan, 12.69% of KP and 44.71% of Sindh province are poor.

Table 3 also shows the national average subjective poverty as well as regional and provincial subjective poverty. This is calculated as 10 minus the average rank to the 10 step subjective well-being question. The overall national subjective poverty is 7.65, which indicates that most of the people still regard themselves quite poor. The regional distribution of subjective poverty for urban and rural areas is 7.76 and 7.61 respectively. Interestingly, urban people subjectively feel poorer than rural, though the difference is not large and significant. Moreover, the distribution of average subjective poverty across four provinces of Pakistan is 7.84, 8.00, 6.80, and 7.24 for Punjab, Sindh, Khyber Pakhtunkhwa (KP) and Baluchistan, respectively. This depicts that Sindh ranks highest in subjective poverty,

Table 1 Definition of variables

Variables	Definition of variables
Outcome variables	
Subjective poverty, (1–10)	In our society some people have high economic position (the rich), and other have low economic position (the poor). Below is a scale from one to ten. The numbers 1 through 10 represent different levels in terms of economic position, from the lowest to the highest. On the scale, please indicate the position you occupy
Subjective poverty	We define the scale of 1–2 as poor, and the rest as non-poor Poor = 0, Non-poor = 1
$1 per day poverty line	Below $1 per day is poor, above non-poor (per capita consumption)
$1.25 per day poverty line	Below $1.25 per day per person is poor and above non-poor (per capita consumption)
$1.90 per day poverty line	Below $1.9 per day is poor, above non-poor (per capita consumption)
Comparison (four categories)	Category 1 = overall non-poor (both subjective and objective non-poor), category 2 = objective poor and subjective non-poor category 3 = subjective poor and objective non-poor category 4 = overall poor (both subjective and objective poor)
Explanatory variables	
Log of per capita consumption	Household natural log of per capita consumption used as proxy for household per capita income per month
Household size	Total members of the household as a continuous variable
Gender based classification of children less than 18 years and 6 years age	We have constructed continuous variables of children male and female separately as an explanatory variable. To examine how the gender of child affects well-being poverty
Household head age	Included both age and age-squared
Household head education	We have used education as years of schooling as continuous variable
Household head marital status	We divide marital status of household head into three groups. Group-1 married. Group-2 is equal to divorced. Group-3 is equal to single
Household head employment level	We categorize employment status of the household head into whether household head is employed, farmer or run his own business Yes = 1, No = 0
Agriculture land	Did the father of the head of household own agriculture land? Yes = 1, No = 0
Livestock	Does your household currently own animals? Yes = 1, No = 0
Household's borrowing	Have you ever tried to borrow in the past 12 months and has been successful? Yes = 1, No = 0

Table 1 (continued)

Variables	Definition of variables
Food insecurity	During the last 12 months was your household worried any time that your food would run out before you had money to buy more? Yes = 1, No = 0
Community insecurity level	In the last 12 months, have you heard any incidents or injury or property damage experienced by others living in your community? Yes = 1, No = 0
Agriculture land farmer interaction	We use interaction term for farmers having own agriculture land
Water facility	World health organization definition of improved drinking water definition Improved = 1, No = 0
Sanitation facility	WHO definition of improved sanitation facility Improved = 1, No = 0
Residence own	Whether household has its own house? Yes = 1, No = 0
Household asset (television)	Household having television in their houses as an asset Yes = 1, No = 0
Interaction term per capita consumption plus asset	We use interaction between asset and consumption
Region	We have two region, Urban = 1, Rural = 0
Provinces	Province-1 = Punjab, province-2 = Sindh, province-3 = KP, province-4 = Baluchistan

whereas KP is the least poor in the national ranking of subjective poverty. This might have resulted from regional heterogeneities, such as, religion, regional income inequality, and physical security. Similarly, the districts sampled, from Punjab are poorer in comparison with other districts in the same province. In addition, districts chosen from Baluchistan are better off compared to other districts in the same province. This indicates that districts chosen from Sindh to Punjab are poorer in relative terms.

Table 4 depicts the results of the objective poverty count together with the poverty gap index. The overall poverty headcount index is 32 and 48% using $1 per day and $1.25 per day, respectively. Though the new poverty line set by the World Bank is $1.90 per day. It is too high for Pakistan, where almost 76% are poor based on $1.90 per day; hence, it is not reasonable and relevant to this study. We therefore use $1 and $1.25 per day as the poverty lines for this study. Our results are almost in line with the national poverty line (Rs. 1745), which was about 36% during the analysis period 2010.[5] However, the rural poverty is higher compared to the urban poverty. Consequently, we find contrast findings of subjective and objective poverty for urban and rural domains. The two most poverty ridden provinces Baluchistan and Khyber Pakhtunkhwa (KP) have outperformed the

[5] The national poverty line is Rs. 1745 per capita per month (2010/11). The official poverty line was estimated using the Food Energy Intake (FEI) method, which regresses household consumption expenditure on calories consumed. The poverty line is evaluated at the minimum threshold caloric intake requirement (Economic Survey 2013–2014).

Table 2 Demographic and socio-economic characteristics of households

Characteristics	Mean	SE	Min	Max
Outcome variables				
Subjective poverty (1–10)	3.34	1.45	1	10
Subjective poverty (poor–nonpoor)	0.72	0.45	0 = Poor	1 = Non-poor
Objective poor ($1 per day)	0.68	0.47	0 = Poor	1 = Non-poor
Objective poor ($1.25 per day)	0.52	0.50	0 = Poor	1 = Non-poor
Objective poor ($1.9 per day)	0.24	0.42	0 = Poor	1 = Non-poor
Household head characteristics				
Age	47.87	14.84	16	90
Schooling	3.81	4.69	0	16
Employed	0.83	0.37	0 = No	1 = Yes
Own business	0.10	0.30	0 = No	1 = Yes
Farmer	0.31	0.46	0 = No	1 = Yes
Household characteristics				
Log per capita consumption	7.76	0.64	4.98	11.56
Household size	5.38	2.80	2	26
Girls < 18 years	1.64	1.55	0	14
Boys < 18 years	1.76	1.64	0	16
Boys < 6 years	0.56	0.87	0	5
Girls < 6 years	0.55	0.85	0	5
Agriculture land holding	0.39	0.48	0 = No	1 = Yes
Household livestock	0.11	0.31	0 = No	1 = Yes
Household borrowing	0.26	0.44	0 = No	1 = Yes
Household asset (TV)	0.50	0.50	0 = No	1 = Yes
Own residence	0.78	0.41	0 = No	1 = Yes
Food insecurity	0.59	0.49	0 = No	1 = Yes
Physical injury	0.21	0.41	0 = No	1 = Yes
Water facility	0.91	0.27	0 = No	1 = Yes
Sanitation facility	0.54	0.49	0 = No	1 = Yes
Province	2.09	1.02	1	4
Region	0.28	0.45	0 = Rural	1 = Urban

Definition of variables are given in Table 1. Author's calculation

Punjab province. Despite being the poorest and most deprived province based on national poverty account is Baluchistan. Nevertheless, it is rank lower in our study regarding poverty status. The poverty gap index, which is defined as the average ratio of the poverty gap to the poverty line and squared poverty gap index have the same conclusion as the headcount index.

Furthermore, Appendix Table 9 delineates the sampling weight for the overall sample as well as urban–rural domains. The population for each district is taken from the census 1998. The estimation is done with the sampling weight after cleaning the data. The last three columns from left to right represent the normalized sampling weight of overall, urban, and rural sample respectively.

Table 3 Descriptive statistics of subjective poverty in Pakistan. *Source*: PPHS 2010

Part-1: Original question rank from poorest to the richest (%)

Category	Poorest	2	3	4	5	6	7	8	9	Richest
National	9.25	19.47	30.68	19.37	14.26	4.21	1.96	0.66	0.07	0.07
Urban	9.86	19.27	33.37	18.92	14.11	2.64	1.61	0.11	0.00	0.11
Rural	9.01	19.55	29.58	19.55	14.33	4.85	2.10	0.89	0.09	0.05
Punjab	8.65	21.09	38.58	15.35	11.86	3.11	1.17	0.19	0.00	0.00
Sindh	15.97	28.74	24.18	14.14	9.67	3.56	2.37	1.28	0.09	0.00
KP	2.37	10.32	17.85	21.72	33.33	10.97	3.23	0.22	0.00	0.00
Baluchistan	0.94	1.66	42.35	40.00	11.06	1.18	1.42	0.71	0.24	0.47

Part-2: Poor verses non-poor (%)

Category	Poor	Non-poor
National	28.72	71.28
Urban	29.13	70.87
Rural	28.56	71.44
Punjab	29.74	70.26
Sindh	44.71	55.29
KP	12.69	87.31
Baluchistan	2.59	97.41

Part-3: Average subjective poverty in different regions and provinces of Pakistan

Sample	National	Urban	Rural	Punjab	Sindh	KP	Baluch.
Poverty	7.65	7.76	7.61	7.84	8.00	6.80	7.24

N = 3015

To calculate the average subjective poverty we rank original question in descending order. Baluch. stands for Baluchistan

Table 4 Aggregate poverty measures \$1, \$1.25 and \$1.9 per person per day (objective poverty)

Category	Headcount index			Poverty gap index			Squared Poverty gap index		
	\$1	\$1.25	\$1.9	\$1	\$1.25	\$1.9	\$1	\$1.25	\$1.9
Overall	0.32	0.48	0.76	0.08	0.14	0.32	0.03	0.06	0.16
Region									
Urban	0.21	0.37	0.70	0.05	0.09	0.25	0.01	0.03	0.12
Rural	0.36	0.52	0.79	0.09	0.16	0.34	0.04	0.07	0.18
Province									
Punjab	0.31	0.46	0.73	0.08	0.14	0.31	0.03	0.06	0.16
Sindh	0.40	0.56	0.83	0.11	0.18	0.27	0.04	0.08	0.20
KP	0.29	0.45	0.74	0.06	0.13	0.30	0.02	0.05	0.14
Baluchistan	0.18	0.33	0.68	0.03	0.07	0.23	0.008	0.02	0.10

Author's calculation PPHS-2010

3 Empirical Model

To analyze the determinants of subjective poverty which individuals ranked from the poorest to the richest and objective poverty captured by per capita consumption, we use an ordered probit model, while a probit model is used as robustness check (Greene 2011).[6] In order to compare subjective poverty with objective poverty, we utilize a multinomial probit model and Spearman's rank correlation test.

The latent outcome variable denoted by sp_i^* ranging from $-\infty$ *to* $+\infty$ is assumed to be a linear function of independent explanatory variables as:

$$sp_i^* = \beta^i x_i + \epsilon_i$$

where i is the individual observation, ϵ_i is the corresponding error with standard normal distribution. We use ten-scale (ladder) latent response variable ranging from the lowest 'poor' to the highest 'rich'. The observed categorical variable sp_i is related to unobserved sp_i^* by the threshold model define as;

$$sp_i = \begin{cases} 1 \; if \; -\infty < sp_i^* \leq \tau_1 \\ 2 \; if \; \tau_1 < sp_i^* \leq \tau_2 \\ \qquad . \\ \qquad . \\ 10 \; if \; \tau_9 < sp_i^* \leq +\infty \end{cases}$$

where, τ_1 to τ_9 are the threshold (cut-off) points. Given the independent variables, the probability of being observed response variable corresponds to the probability that the latent response variable lies between the corresponding thresholds.

$$\begin{aligned} \Pr(sp = 1|\mathrm{X}) &= \Pr(sp_i^* \leq \tau_1) = \Pi_1 \\ \Pr(sp = 2|\mathrm{X}) &= \Pr(\tau_1 < sp_i^* \leq \tau_2) = \Pi_2 - \Pi_1 \\ &\cdots\cdots \\ \Pr(sp = 9|\mathrm{X}) &= \Pr(\tau_8 < sp_i^* \leq \tau_9) = \Pi_9 - \Pi_8 \\ \Pr(sp = 10|\mathrm{X}) &= \Pr(\tau_9 < sp_i^*) = 1 - \Pi_9 \end{aligned}$$

where Π_s is the probability distribution function. Where, *sp* stands for subjective poverty. Similarly, the probit models for both subjective poverty and objective poverty: "poor", "non-poor" are given by:

$$\begin{aligned} \Pr(sp) = 0|\mathrm{X}) &= \Pr(sp_i^* \leq \tau) = \Pi \\ \Pr(sp) = 1|\mathrm{X}) &= \Pr(sp_i^* > \tau) = 1 - \Pi \end{aligned}$$

where τ is the threshold value, below the threshold value lie the poor and above the threshold value lie the non-poor.

[6] we utilize ordered probit model and probit model in our analysis given the nature of the data set. Using the ordered probit model sometime, the parallel regression assumption is violated. In this case, the generalized ordered probit is used as an alternative model. However, this model is very sensitive to low frequency counts. As a result, we have chosen to present the results of ordered probit model. In addition, we use the multinomial model, which is usually used when the parallel regression assumption is violated.

Table 1 elaborates the explanatory variables included in our model, and provides information about household demographic characteristics, household socio-economic characteristics, household food insecurity situation, community insecurity situation, and regional and province dummies to control for regional heterogeneities. The econometric model is specified as:

$$\begin{aligned} sp = {} & b_0 + b_1 consumption_i + b_2 hh\ size_i + b_3\ male18_i + b_4 female18_i + b_5 age_i \\ & + b_6 (age)_i^2 + b_7 educ_i + b_8 marital\ stautus_i + b_9 business_i \\ & + b_{10} agriculture\ land_i + b_{11} farmer_i + b_{12} agri.farmer_i \\ & + b_{13} borrowing_i + b_{14} livestock_i + b_{15} assetTV_i \\ & + b_{16} tv.consumption_i + b_{17} housecondition_i + b_{18} water_i \\ & + b_{19} sanitation_i + b_{20} food\ insecurity_i + b_{21} physical\ insecurity_i \\ & + b_{22} region_i + b_{23} province_i + e_i \end{aligned}$$

The above-mentioned explanatory variables are considered necessary determinants of subjective and objective poverty in the literature.

3.1 Comparison Between Subjective Poverty and Objective Poverty

The multinomial probit model is a generalized form of the probit model used when outcome variable takes on several categories. The model attempts to explain the relative effect of different explanatory variables on the outcome variable categories. The choices/categories are called alternatives and are coded as j = 1, 2 3, 4. Our data consists of alternative-invariant or case specific regressor—the regressors vary over the individual but do not vary over the alternative j. The probability that individual i select alternative j is given by:

$$p_{ij} = p\left(y_i = j\right) = \theta\left(x_{ij}'\beta\right)$$

We utilize four alternatives of the outcome variable; subjective non-poor and objective non-poor as category 1 (overall non-poor). Category 2 constitutes of subjective non-poor and objective poor. Category 3 consists of subjective poor but objective non-poor. Finally, category 4 deals with subjective and objective poor households (overall poor). For this purpose, we utilized the binary subjective poverty (lowest two ranks as being subjectively poor and above rank two as non-poor) and objective poverty measured less than $1.25 per day as poor (see Appendix Table 10 for $1 results).

In addition, as a robust check of comparison between the subjective and objective poverty, we resort to simple Spearman's rank correlation coefficient. There are two methods to calculate Spearman correlation: data without tied rank, and data with tied rank. Clearly, our data set includes tied rank; hence, we use the second method of Spearman's rank correlation coefficient method.

$$\rho = 1 - \frac{6\sum d_i^2}{n\left(n^2 - 1\right)} \rho = \frac{\sum_i \left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\sqrt{\sum_i \left(x_i - \bar{x}\right)^2 \sum_i \left(y_i - \bar{y}\right)^2}}$$

The Spearman's rank order correlation is a non-parametric test that measures the strength and direction between two monotonic variables, taking values from +1 to −1. The closer the value to zero, the weaker is the association between the ranks.

Now the question is that how to utilize the Spearman's correlation to compare the subjective with objective poverty. For this purpose, first we run the equation of subjective well-being ranging from the poorest to the richest rank (1–10). Then we determine the predicted value for the outcome (1). The outcome (1) is the predicted probability of being the poorest household. Afterward, we subtract the predicted probability of outcome (1) from 1 to get the probability of being non-poor. The Spearman's correlation test is utilized to test correlations between the new predicted probability and the per capita household consumption and between the original subjective question and per capita consumption. The null hypothesis states that the two variables are independent. If the null hypothesis were not rejected, it would mean that the subjective poverty is independent from the objective poverty level, implying both concepts should be taken into account while making and implementing poverty reduction strategies depending on the situation.

4 Empirical Results and Discussions

4.1 Determinants of Subjective Poverty

Table 5 presents the findings of the determinants of subjective poverty. The household income as well as consumption is an important determinant of subjective poverty. Actual per capita consumption and income turn out to be highly significant determinants of subjective well-being (Diener et al. 1993; Pradhan and Ravallion 2000; Ravallion and Lokshin 2002; Lever 2004; Kingdon and Knight 2006; Stevenson and Wolfers 2013; Deeming 2013). The current study confirms that household per capita consumption is an important determinant of subjective poverty (Diener and Biswas-Diener 2002; Zhou and Yu, 2017). The coefficient of per capita consumption is 0.25 indicating that as per capita consumption increases, the subjective poverty decreases significantly. Similarly, one unit increase in log of household per capita consumption leads to 11.7% point lower probability of experiencing subjective poverty. However, there is a so-called Easterlin Paradox: Income is positively correlated with subjective well-being at the individual level, but not important at the aggregate/average level. Layard (2005) tested this paradox for United States and Western Europe, and finds that since 1945 the personal income doubled, but subjective well-being hardly increased or even negative sometimes.[7] However, a recent study by Oishi and Kesebir (2015), states that Easterlin paradox can be explained partly by inequality. They examined the Easterlin Paradox for 34 countries, and confirmed that economic growth was not associated with increase in happiness when it was accompanied by growing income inequality. It suggests that equal distribution of national wealth is the prerequisite to eradicate subjective poverty.

Similarly, demographic variables play a pivotal role in determining subjective poverty. Specifically, household size is an important variable in determining the economic situation

[7] We also check the linear relationship between the district average value of the ladder (subjective well-being) and the log of per capita consumption to check the Easterlin Hypothesis (1974), and found a linear relationship among the districts average value of the ladder (average subjective well-being) and log per capita consumption. Appendix Fig. 1.

Table 5 Subjective poverty determinants results

Variables	Model 1[a]	Model 2[b]	Model 3[c]		Model 4[d]	
	Coefficient	Coefficient	Coefficient	Ave. ME[f]	Coefficient	Ave. ME
Household size as a continuous variable						
Household size	0.049***	0.049***	0.060***	0.018***	0.064***	0.019***
	(0.011)	(0.010)	(0.017)	(0.005)	(0.016)	(0.004)
Gender classification						
Girls < 18 years	0.021		0.030	0.009		
	(0.016)		(0.024)	(0.007)		
Boys < 18 years	0.017		0.038	0.011		
	(0.015)		(0.025)	(0.007)		
Girls < 6 years		0.052*			0.025	0.007
		(0.027)			(0.042)	(0.012)
Boys < 6 years		0.054**			0.098**	0.029**
		(0.027)			(0.043)	(0.012)
Age of household head						
Age	0.0006	0.005	−0.011	−0.003	−0.005	−0.001
	(0.010)	(0.010)	(0.013)	(0.003)	(0.012)	(0.003)
Age aquared	4.61e−06	−3.34e−05	0.0001	0.000	5.31e−05	0.000
	(0.0001)	(0.0001)	(0.0001)	(0.000)	(0.0001)	(0.000)
Household head education (*years of schooling as a continuous variable*)						
Schooling	0.026***	0.026***	0.024***	0.007***	0.024***	0.007***
	(0.005)	(0.005)	(0.007)	(0.002)	(0.008)	(0.002)
Marital status (*reference category married*)						
Divorced	−0.062	−0.067	−0.066	−0.019	−0.073	−0.022
	(0.099)	(0.099)	(0.140)	(0.042)	(0.140)	(0.042)
Single	0.048	0.086	−0.026	−0.008	0.0004	0.000
	(0.172)	(0.171)	(0.242)	(0.07)	(0.241)	(0.071)

Table 5 (continued)

Variables	Model 1[a]	Model 2[b]	Model 3[c]		Model 4[d]	
	Coefficient	Coefficient	Coefficient	Ave. ME[f]	Coefficient	Ave. ME
Employment status (*reference category unemployed*)						
Employed	0.064	0.082	0.122	0.036	0.147	0.043
	(0.076)	(0.076)	(0.105)	0.031	(0.105)	(0.031)
Own business (*reference category no*)						
Yes	0.051	0.048	0.152	0.045	0.155	0.045
	(0.072)	(0.072)	(0.116)	0.034	(0.116)	(0.034)
Agriculture land (*reference category no*)						
Yes	0.014	0.014	0.0335	0.027	0.033	0.026
	(0.062)	(0.062)	(0.093)	0.023	(0.090)	(0.023)
Farmers (*reference category no*)						
Yes	0.009	0.004	−0.066	0.002	−0.070	0.0006
	(0.090)	(0.089)	(0.110)	0.025	(0.110)	(0.025)
Interaction term (*agriculture land and farmers*)						
Interaction term	0.225**	0.219**	0.204		0.195	
	(0.110)	(0.110)	(0.148)		(0.148)	
Own house (*reference category no*)						
Yes	0.261***	0.267***	0.410***	0.122	0.417***	0.123***
	(0.060)	(0.060)	(0.078)	(0.022)	(0.078)	(0.022)
Household livestock (*reference category no*)						
Yes	0.061	0.056	0.036	0.011	0.025	0.007
	(0.074)	(0.074)	(0.108)	(0.032)	(0.108)	(0.232)
Household borrowing (*reference category no*)						
Yes	−0.141***	−0.147***	−0.042	−0.012	−0.043	−0.012
	(0.053)	(0.053)	(0.071)	(0.021)	(0.071)	(0.021)

Table 5 (continued)

Variables	Model 1[a]	Model 2[b]	Model 3[c]		Model 4[d]	
	Coefficient	Coefficient	Coefficient	Ave. ME[f]	Coefficient	Ave. ME
Household asset (television) (*reference category no*)						
Yes	−1.185**	−1.149**	−2.887***	0.003	−2.865***	0.004
	(0.559)	(0.557)	(0.887)	(0.023)	(0.877)	(0.023)
Household log of per capita consumption						
Consumption	0.252***	0.254***	0.214**	0.117***	0.201**	0.113***
	(0.058)	(0.057)	(0.088)	(0.018)	(0.085)	(0.018)
Interaction term (*consumption and asset*)						
Interaction term	0.154**	0.150**	0.376***		0.373***	
	(0.072)	(0.071)	(0.116)		(0.114)	
Food insecurity (*reference category no*)						
Yes	−0.256***	−0.253***	−0.248***	−0.073***	−0.245***	−0.072***
	(0.051)	(0.051)	(0.075)	(0.022)	(0.075)	(0.022)
Physical injury (*reference category no*)						
Yes	−0.148***	−0.146***	−0.147*	−0.043*	−0.145*	−0.043*
	(0.052)	(0.052)	(0.078)	(0.023)	(0.078)	(0.023)
Water facility (*reference category unimproved*)						
Improved	0.076	0.079	0.100	0.029	0.106	0.031
	(0.084)	(0.084)	(0.118)	(0.034)	(0.118)	(0.034)
Sanitation facility (*reference category unimproved*)						
Improved	0.038	0.037	0.098	0.029	0.098	0.029
	(0.051)	(0.050)	(0.073)	(0.021)	(0.073)	(0.021)
Provinces (*reference category Punjab*)						
Sindh	−0.029	−0.031	−0.211***	−0.070***	−0.207***	−0.069***
	(0.056)	(0.056)	(0.074)	(0.024)	(0.074)	(0.024)
KP	0.738***	0.751***	0.664***	0.181***	0.682***	0.184***
	(0.068)	(0.068)	(0.105)	(0.025)	(0.104)	(0.025)

Table 5 (continued)

Variables	Model 1[a]	Model 2[b]	Model 3[c]		Model 4[d]	
	Coefficient	Coefficient	Coefficient	Ave. ME[f]	Coefficient	Ave. ME
Balochistan	0.385*** (0.063)	0.398*** (0.063)	1.364*** (0.163)	0.284*** (0.022)	1.385*** (0.163)	0.287*** (0.022)
Region (*reference category rural*)						
Urban	−0.235*** (0.060)	−0.233*** (0.061)	−0.208** (0.087)	−0.06** (0.025)	−0.200** (0.087)	−0.059** (0.025)
Constant			−1.871** (0.742)		−1.942*** (0.736)	
Cut1	1.284**	1.397***				
Cut2	2.195***	2.308***				
Cut3	3.060***	3.173***				
Cut4	3.654***	3.768***				
Cut5	4.495***	4.610***				
Cut6	4.997***	5.112***				
Cut7	5.522***	5.638***				
Cut8	6.274***	6.400***				
Cut9	6.552***	6.682***				
Diagnostic test						
Wald chi^2 (27)	562.46	568.82	388.19		396.83	
Prob > chi^2	0.000	0.000	0.000		0.000	
Pseudo R^2	0.08	0.08	0.16		0.16	
Log pseudo likelihood	−315.390	−315.212	−101.436		−101.366	
Number of obs.	3015	3015	3015	3015	3015	3015

Table 5 (continued)

Robust standard errors in parentheses

[a]Model 1: ordered probit model scale-1 to scale-10 (subjective poverty gender classification less the 18 years)

[b]Model 2: Ordered probit model scale-1 to scale-10 (subjective poverty gender classification less the 6 years)

[c]Model 3: Probit model based on scale 1–2 as poor and 3–10 as non-poor (subjective poverty gender classification less than 18 years)

[d]Model 4: Probit model based on scale 1–2 as poor and 3–10 as non-poor (subjective poverty gender classification less than 6 years)

[f]Average marginal effect

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

of the household particularity in developing countries due to high dependency ratios. As the household size increases, the chance of being in the poor bracket falls significantly. The coefficient of household size is 0.05, and statistically significant. It means as the household size increases the well-being of the household improves significantly. This can be manifested from the average marginal effect, which indicates that an increase in household size is associated with 1.8% point higher probability of being subjectively better off. Our findings are almost similar to the existing studies. The subjective poverty has a reasonable relationship to family size. Winkelmann (2005) reveals that subjective well-being improves if income and household size increases proportionally. This indicates that for additional members of households, income equivalent scale should give a weight lower than one.

We have also constructed gender-based groups: one is children age less than 18 years and other one is children age group less than 6 years based on gender classification. The motivation of this classification is to check the impact of the classification of children based on gender on the overall household well-being. The study confirms that with the same age group, male children are preferred over female children subjectively. For instance, an increase in the number of male children compared with female children under 6 years of age lead to 2.9% point lower chance of experiencing poverty subjectively. However, the relative importance of being male child is higher for both age groups objectively. Winkelmann (2005) examined that well-being of individuals within the same family is highly correlated. The correlation is higher among siblings compared to correlation among spouses.

Similarly, feelings of belonging and identity, stable and secure marital relationship have favorable effect on subjective poverty, and vice versa. Camfield et al. (2009), Dolan et al. (2008), Kingdon and Knight (2006) indicate that probability of being unhappy increases with single household members compared to couples. Similarly, Ravallion and Lokshin (2002) analyzed that divorced or widowed individual put himself or herself on a lower ladder of subjective well-being. In this analysis, majority of the households head are married, so the result shows no significant differences for the households head being divorced or single. However, objectively the single person is worse off compared to married and divorced. As the household head becomes older, the subjective and objective poverty increases, however, insignificantly.

Importantly, United Nations Development Program (UNDP) considers education as torch bearer for employment, revenue generation, creativity, self-respect and confidence. Education through many channels reduces subjective poverty: creating employment opportunities, accessing economic resources, sense of control over life, stable social relationship, especially marriage that increases social support (Ross and Van Willigen 1997). On the contrary, if job offer does not match with education level, it often results in frustration, hence negative impact on subjective well-being (ILO 2005). The correlation between education and subjective well-being is not linear, and often depends on how one defines, and uses the ideas of education, influences, and happiness (Michalos 2008). The current study finds a significant impact of education on subjective poverty. The coefficients of education are 0.02 and 0.05 for subjective poverty and objective poverty respectively and both are statistically significant. The findings indicate with each additional year of schooling the probability of well-being both subjectively and objectively increases. Similarly, the average marginal effect confirms that an additional year of schooling enhances 0.07 and 1.8% point lower probability of experiencing subjective poverty and objective poverty respectively. This study is also consistent with Ravallion and Lokshin (2002) in that, education results in reducing subjective poverty.

Subjective well-being depends on how individuals have control over personnel, better application of one's capabilities, work objectives, security both physical and job, and social

status of the work (Warr 1999). Happiness studies show complicated correlation between work and well-being. The current study also confirms that employment reduces subjective poverty, but it is statistically not significant. This study is consistent with previous studies such as that unemployment has a large negative impact on well-being (Winkelmann 2005). Moreover, the results indicate a significant positive impact on well-being of farmers having agriculture land. However, farmers without their own land have significant negative impact on well-being. It also shows that, in Pakistan being an agriculture country, in relative terms farmers are worse off compared to other occupations, perhaps because of the relationship of farmers and agriculture landowners such as crop sharing or land leasing which could make farmers pay one-third of their output as rents.

Small farm size households perceive livestock holdings as a contributing factor in improving the quality of life.[8] The findings confirms a negative but not significant impact of livestock on subjective poverty. This is due to the fact that majority of the cattle breeder live on subsistence livelihood. Interestingly, the household borrowing has a significant positive impact on subjective poverty. Majority of the households have no access to the formal means of borrowing. Therefore, in desperate situation they borrow with high cost from the informal sources, ultimately often unable to pay it back. Likewise, improved sanitation facility has also a significant effect on the eradication of subjective poverty, while the improved drinking water has no significant effect; perhaps because more than 90% of the households have access to clean drinking water. The finding also confirms the better the physical house type, the lesser the chances of household to fall in the subjective poverty.

Two important variables such as physical insecurity and food insecurity are utilized in the analysis, which have strong influence on human development and well-being (Alkire 2007). The coefficients of food insecurity and physical insecurity for subjective poverty are -0.28 and -0.16 respectively. The findings delineate that food vulnerable and physically insecure household are likely to fall in the subjective poverty, even when the household expenditure is controlled for. The reason could be due to a severe flood in 2010, which almost destroyed 50% of the crops- backbone of the agriculture sector. Moreover, the terrorist activities were also active in the survey time. The interaction between household asset proxies by having television and household income has statistically significant negative impact on subjective poverty as well. In addition, television now almost become the necessary good, and has strong connection with income. Similarly, the present analysis confirmed that ownership of consumer durables raises subjective well-being (Ravallion and Lokshin 2002).

Finally, to control for regional heterogeneities, regional and provincial dummies are incorporated in the analysis. Importantly, contrary to the national poverty line, the household living in the rural areas, feels much better in terms of subjective poverty. Moreover, Mangahas (1995) find out that the subjective poverty is negatively related to urban areas. Hence, the current study is consistent with the previous studies. In addition, the KP province is the better off province compared to the remaining provinces, while Sindh province is the worst-off, which justify the results as the districts taken from the Sindh province is the least developed districts in the survey. The regional effect on subjective poverty can be due to perception of relative well-being, in that, living in affluent areas people feel

[8] WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. It is broader concept affected in a complex way by person's physical health, beliefs, psychology, social status, and relation to their environment.

Table 6 Objective poverty determinants results

Variables	$1.25 per day				$1 per day			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME
Household size as a continuous variables								
Household size	−0.147***	−0.050***	−0.131***	−0.045***	−0.160***	−0.044***	−0.147***	−0.044***
	(0.016)	(0.005)	(0.014)	(0.004)	(0.015)	(0.004)	(0.014)	(0.004)
Gender classification								
Girls < 18 years	0.046**	0.015**			0.023	0.007		
	(0.021)	(0.007)			(0.022)	(0.007)		
Boys < 18 years	0.052**	0.018**			0.064***	0.019**		
	(0.021)	(0.007)			(0.022)	(0.006)		
Girls < 6 years			0.045	0.015			0.037	0.011
			(0.038)	(0.013)			(0.039)	(0.012)
Boys < 6 years			0.067*	0.023*			0.072*	0.022**
			(0.037)	(0.012)			(0.038)	(0.011)
Age of household head								
Age	−0.002	−0.0007	0.003	0.001	−0.000	−0.000	0.005	0.001
	(0.012)	(0.000)	(0.012)	(0.004)	(0.012)	(0.003)	(0.012)	(0.003)
Age squared	5.14e−05	0.000	−7.65e−06	0.000	8.28e−05	0.000	2.47e−05	0.000
	(0.0001)	(0.000)	(0.0001)	(0.000)	(0.0002)	(0.000)	(0.0002)	(0.000)
Household head education *(years of schooling as a continuous variable)*								
Schooling	0.055***	0.018***	0.053***	0.018***	0.053***	0.016***	0.052***	0.015***
	(0.006)	(0.002)	(0.006)	(0.002)	(0.007)	(0.002)	(0.007)	(0.002)
Marital status *(Reference category married)*								
Divorced	−0.054	−0.018	−0.058	−0.019	−0.016	−0.005	−0.020	−0.006
	(0.132)	(0.045)	(0.133)	(0.045)	(0.135)	(0.041)	(0.136)	(0.041)
Single	−0.154	0.052	−0.167	−0.057	−0.186	0.058	−0.197	−0.062
	(0.216)	(0.073)	(0.217)	(0.074)	(0.217)	(0.070)	(0.217)	(0.070)

Table 6 (continued)

Variables	$1.25 per day				$1 per day			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME
Employment status *(Reference category unemployed)*								
Employed	0.0334	0.011	0.070	0.024	0.103	0.031	0.135	0.041
	(0.103)	(0.035)	(0.102)	(0.035)	(0.101)	(0.030)	(0.101)	(0.030)
Own business *(Reference category No)*								
Yes	0.148	0.051	0.141	0.048	0.247**	0.075**	0.236**	0.072**
	(0.103)	(0.035)	(0.103)	(0.035)	(0.109)	(0.033)	(0.109)	(0.033)
Agriculture land *(Reference category No)*								
Yes	0.110	0.045*	0.113	0.045*	−0.0318	0.007	−0.028	0.007
	(0.085)	(0.024)	(0.085)	(0.024)	(0.084)	(0.021)	(0.084)	(0.021)
Farmer *(Reference category No)*								
Yes	−0.062	−0.011	−0.073	−0.016	−0.175	−0.032	−0.186*	−0.036
	(0.109)	(0.027)	(0.108)	(0.027)	(0.107)	(0.025)	(0.106)	(0.025)
Interaction term (farmer and agriculture land)								
Interaction term	0.075		0.065		0.180		0.171	
	(0.137)		(0.136)		(0.137)		(0.136)	
Own house *(Reference category No)*								
Yes	0.256***	0.087***	0.259***	0.089***	0.300***	0.091***	0.302***	0.092***
	(0.077)	(0.026)	(0.076)	(0.026)	(0.076)	(0.022)	(0.075)	(0.022)
Livestock *(Reference category No)*								
Yes	−0.095	−0.032	−0.097	−0.033	0.140	0.042	0.134	0.041
	(0.093)	(0.032)	(0.094)	(0.032)	(0.094)	(0.028)	(0.094)	(0.028)
Borrowing *(Reference category No)*								
Yes	0.028	0.009	0.025	0.008	−0.019	−0.005	−0.023	−0.007
	(0.069)	(0.023)	(0.069)	(0.023)	(0.069)	(0.021)	(0.069)	(0.021)

Table 6 (continued)

Variables	$1.25 per day				$1 per day			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME
Household asset (television) *(Reference category No)*								
Yes	0.492***	0.174***	0.490***	0.173***	0.443***	0.138***	0.443***	0.139***
	(0.067)	(0.024)	(0.067)		(0.068)	(0.021)	(0.068)	(0.021)
Food insecurity *(Reference category secure)*								
Food insecure	−0.156**	−0.053**	−0.148**	−0.051**	−0.143**	−0.043**	−0.136*	−0.041**
	(0.068)	(0.023)	(0.068)	(0.023)	(0.069)	(0.021)	(0.069)	(0.021)
Physical injury *(Reference category No injury)*								
Injury	−0.099	−0.034	−0.092	−0.032	−0.071	−0.021	−0.065	−0.019
	(0.073)	(0.025)	(0.073)	(0.025)	(0.072)	(0.022)	(0.072)	(0.030)
Water facility *(Reference category unimproved)*								
Improved	0.003	0.002	0.012	0.004	0.104	0.031	0.114	0.034
	(0.108)	(0.024)	(0.107)	(0.036)	(0.098)	(0.029)	(0.098)	(0.030)
Sanitation facility *(Reference category unimproved)*								
Improved	0.179***	0.016***	0.172***	0.059***	0.281***	0.085***	0.276***	0.084***
	(0.065)	(0.022)	(0.065)	(0.022)	(0.065)	(0.019)	(0.065)	(0.019)
Provinces *(Reference category Punjab)*								
Sindh	−0.046	−0.016	−0.030	−0.010	0.032	0.009	0.043	0.013
	(0.071)	(0.025)	(0.071)	(0.024)	(0.072)	(0.022)	(0.072)	(0.022)
KP	0.173**	0.059**	0.183**	0.062**	0.202**	0.060**	0.211**	0.063**
	(0.087)	(0.029)	(0.087)	(0.029)	(0.091)	(0.026)	(0.091)	(0.026)
Baluchistan	0.226**	0.077**	0.254***	0.086***	0.368***	0.105***	0.394***	0.113***
	(0.098)	(0.033)	(0.098)	(0.033)	(0.108)	(0.029)	(0.109)	(0.029)

Table 6 (continued)

Variables	$1.25 per day				$1 per day			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME	Coefficient	Ave. ME
Region *(Reference category rural)*								
Urban	0.002	0.0008	0.010	0.003	0.002	0.0008	0.008	0.002
	(0.080)	(0.027)	(0.081)	(0.027)	(0.081)	(0.024)	(0.082)	(0.025)
Constant	− 0.136		− 0.287		0.033		− 0.116	
	(0.324)		(0.330)		(0.323)		(0.330)	
Diagnostic test								
Wald chi^2 (25)	369.59		364.51		407.79		400.06	
Prob > chi^2	0.000		0.000		0.000		0.000	
Pseudo R^2	0.13		0.13		0.14		0.14	
Log pseudo likelihood	− 116.823		− 117.151		− 104.592		− 104.876	
Observations	3015		3015		3015		3015	

Robust standard errors in parentheses

[a]Model 1: Probit model based on $1.25 per day (objective poverty gender classification less than 18 years)

[b]Model 2: Probit model based on $1.25 per day (objective poverty gender classification less than 6 years)

[c]Model 3: Probit model based on $1 per day (objective poverty gender classification less than 18 years)

[d]Model 4: Probit model based on $1 per day (objective poverty gender classification less than 6 years)

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

relatively worse off (Ravallion and Lokshin 2002). This could better explain the large discrepancies in the subjective and objective poverty in the better off region.

4.2 Determinants of Objective Poverty

Table 6 shows the results of objective poverty based on $1.25 and $1 per day. Being non-poor is coded 1 so that a positive coefficient means the covariate is associated with less poverty. Many findings of the objective poverty approaches are in line with the subjective poverty measure, but still some results are contradictory to the subjective poverty approach and need further explanation. Specifically, with the increase of household size, the conventional poverty escalates while the households become better off subjectively. In subjective term, an additional member of household is considered as an asset, and adds value to the household. While in monetary sense, the household become worse off with the increase of household size. Importantly, we have classified children based on gender. The findings confirm that boys are preferred over girls in both age groups objectively, implying that boys are given an economic values in monetary term relatively. However, subjectively, during young age, boys are also preferred, but with increasing age the difference between genders diminishes subjectively. In addition, household borrowing is considered as a burden subjectively and has a statistically negative impact on subjective well-being, nevertheless, it has an insignificant positive impact on household objective poverty.

Another important contradiction between findings of the two approaches comes up from the regional and provincial differences. The subjective poverty of households living in rural areas is lower, while it is higher for urban areas. Nevertheless, more chances of employment and income generation opportunities exist in urban localities. Hence, we expect that poverty will decline in monetary approach. However, this is opposite to the subjective approach. Other pivotal results of the two approaches is that food insecurity has a significant negative impact on households' subjective as well as objective well-being. For instance, 1% increase in food insecurity leads to 7.3% point and 5.3% points' higher probability of experiencing subjective and objective poverty, respectively. Regarding physical insecurity, we have contrasting results for both poverty approaches. For example, physical insecurity imparts significant negative impact on well-being in the subjective approach. However, the impact of physical insecurity is not statistically significant in the monetary approach. The reason behind this could be that physical insecurity imparts mental and psychological stress on households, while objectively it has a lesser impact due to ease of compensation or migration from the affected region.

4.3 Comparison of Subjective Poverty with Objective Poverty

Table 7 shows the results of the multinomial probit model. As discussed in the methodological part, we have generated four categories of outcome variables: subjective non-poor-objective non-poor combination (overall non-poor), subjective non-poor-objective poor combination (objective poor), subjective poor-objective non-poor combination (subjective poor), and subjective poor-objective poor combination (overall poor). The overall non-poor category is taken as a base outcome. Hence, we have three categories' findings relative to the base outcome discussed in detail as under.

In comparison to the overall non-poor, household size is associated with a higher likelihood of being poor objectively as well as overall poor and lower likelihood of being subjectively poor, consistent with the preceding results. Meanwhile, households with boys are

Table 7 Comparison of subjective poverty and objective poverty ($1.25)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Household size as a continuous variable						
Household size	0.186***	−0.108***	0.105***	0.159***	−0.109***	0.093***
	(0.022)	(0.039)	(0.025)	(0.020)	(0.036)	(0.024)
Gender classification						
Girls < 18 years	−0.069**	−0.010	−0.047			
	(0.032)	(0.044)	(0.038)			
Boys < 18 years	−0.058*	0.002	−0.067*			
	(0.031)	(0.047)	(0.037)			
Girls < 6 years				−0.038	0.031	−0.044
				(0.055)	(0.075)	(0.065)
Boys < 6 years				−0.049	−0.033	−0.154**
				(0.055)	(0.076)	(0.067)
Age of household head						
Age	0.0006	0.021	0.014	−0.004	0.022	0.004
	(0.018)	(0.024)	(0.019)	(0.018)	(0.025)	(0.019)
Age squared	−5.36e−05	−0.0002	−0.0001	2.17e−06	−0.0002	−8.64e−05
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Household head education *(years of schooling as a continuous variable)*						
Schooling	−0.077***	−0.054***	−0.091***	−0.075***	−0.054***	−0.089***
	(0.010)	(0.013)	(0.012)	(0.010)	(0.012)	(0.012)
Marital status *(reference category married)*						
Divorced	0.109	0.161	0.131	0.108	0.156	0.139
	(0.205)	(0.260)	(0.213)	(0.206)	(0.259)	(0.213)
Single	−0.151	−0.622	0.205	−0.100	−0.611	0.178
	(0.359)	(0.462)	(0.365)	(0.362)	(0.463)	(0.364)

Table 7 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Employment status *(reference category unemployed)*						
Employed	0.098	0.081	−0.214	0.052	0.074	−0.261*
	(0.160)	(0.184)	(0.159)	(0.160)	(0.183)	(0.157)
Own business *(reference category no)*						
Yes	−0.189	−0.255	−0.376**	−0.179	−0.255	−0.375**
	(0.151)	(0.192)	(0.188)	(0.151)	(0.191)	(0.188)
Agriculture land *(reference category no)*						
Yes	−0.226*	−0.199	−0.135	−0.230*	−0.205	−0.141
	(0.127)	(0.161)	(0.149)	(0.127)	(0.161)	(0.148)
Farmer *(reference category no)*						
Yes	−0.031	−0.069	0.182	−0.015	−0.069	0.186
	(0.164)	(0.208)	(0.182)	(0.163)	(0.208)	(0.181)
Interaction term (farmer and agriculture land)						
Interaction term	−0.081	−0.356	−0.329	−0.070	−0.346	−0.306
	(0.203)	(0.270)	(0.234)	(0.203)	(0.270)	(0.232)
Own house *(reference category no)*						
Yes	−0.214*	−0.442***	−0.753***	−0.214*	−0.443***	−0.761***
	(0.115)	(0.143)	(0.132)	(0.115)	(0.142)	(0.132)
Livestock *(reference category no)*						
Yes	0.217	0.140	0.011	0.216	0.140	0.025
	(0.138)	(0.187)	(0.165)	(0.139)	(0.187)	(0.166)
Household borrowing *(reference category no)*						
Yes	−0.058	0.037	0.009	−0.057	0.035	0.014
	(0.106)	(0.125)	(0.116)	(0.106)	(0.124)	(0.117)

Table 7 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Household asset (television) *(reference category no)*						
Yes	−0.696***	−0.228*	−0.600***	−0.689***	−0.230*	−0.600***
	(0.099)	(0.129)	(0.120)	(0.099)	(0.130)	(0.120)
Food insecurity *(reference category secure)*						
Food insecure	0.121	0.259**	0.505***	0.114	0.262**	0.498***
	(0.099)	(0.131)	(0.119)	(0.099)	(0.131)	(0.119)
Physical injury *(reference category no injury)*						
Injury	0.114	0.191	0.270**	0.102	0.191	0.267**
	(0.111)	(0.137)	(0.124)	(0.111)	(0.136)	(0.124)
Water facility *(reference category unimproved)*						
Improved	0.0327	−0.0775	−0.0983	0.0195	−0.0809	−0.106
	(0.162)	(0.203)	(0.181)	(0.161)	(0.203)	(0.180)
Sanitation facility *(reference category unimproved)*						
Improved	−0.183*	−0.0744	−0.382***	−0.171*	−0.0730	−0.378***
	(0.0962)	(0.123)	(0.117)	(0.0959)	(0.123)	(0.117)
Provinces *(reference category Punjab)*						
Sindh	0.124	0.389***	0.272**	0.0937	0.378***	0.262**
	(0.105)	(0.135)	(0.117)	(0.105)	(0.135)	(0.117)
KP	−0.0568	−0.659***	−0.977***	−0.0624	−0.663***	−1.009***
	(0.126)	(0.175)	(0.164)	(0.126)	(0.175)	(0.164)
Baluchistan	−0.165	−1.476***	−1.967***	−0.196	−1.479***	−2.002***
	(0.141)	(0.252)	(0.287)	(0.141)	(0.253)	(0.287)

Table 7 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Region *(reference category rural)*						
Urban	−0.128	0.0858	0.249*	−0.136	0.0843	0.232*
	(0.121)	(0.146)	(0.140)	(0.122)	(0.146)	(0.140)
Constant	−0.00351	−0.0147	0.352	0.110	−0.0465	0.615
	(0.500)	(0.632)	(0.537)	(0.509)	(0.648)	(0.546)
Diagnostic test						
Wald chi^2 (75)	713.81			708.66		
Prob > chi^2	0.000			0.000		
Log pseudo likelihood	−217.636			−217.853		
Observations	3015			3015		

Robust standard errors in parentheses

[a]Model 1: Multinomial model based on gender classification less than 18 years

[B]Model 2: Multinomial model based on gender classification less than 6 years

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 8 Spearman's correlation matrix

	Subjective poverty (1–10) Predicted outcome (1)	Objective poverty (per capita consumption)	Subjective poverty (1–10)
Subjective poverty (1–10) Predicted outcome (1)	1.00		
Objective poverty (per capita consumption)	0.48[a]	1.00	
Subjective poverty (1–10)	0.49[a]	0.26[a]	1.00

Test of Ho: variables are independent

[a],***$p < 0.01$

more likely to be out of poverty objectively compared to the overall non-poor outcome group, whereas no significant differences is seen based on the gender classification subjectively. In addition, the chances of being out of overall poverty increases for the households consisting boys relatively to the base outcome, also consistent with the previous results. Likewise, the chances of subjective poor increases for divorced household head and declines for single marital status household head, compared to the overall non-poor, however, the results are insignificant. More education lowers, as expected, the likelihood of being objectively or subjectively poor.

In relative term, when the households lying below the poverty line have their own residence, the chances of being impoverished declines. Hence, owning a house contributes to the eradication of poverty in the society. Similarly, improved sanitation facilities increase significantly the well-being of households that are both objectively poor and over all poor. However, the coefficients of subject poor households are insignificant. Thus improving the sanitation system for the poor has much value relatively. Moreover, farmers' households having their own land, the payoffs are high for the poor households, however statistically insignificant. The statistical insignificance could be due to Pakistan being an agriculture country, where household living above the poverty line usually have control over agriculture land. The payoffs of overall poor employed household head regarding poverty reduction are statistically significant relatively, but the results for the other categories are not significant. Similarly, the overall poor households having their own business are less likely to be poor. Interestingly, the impact of livestock on the well-being of four categories is surprising. The households, which own livestock are more likely to be poor compared to the base non-poor category. This indicates that the livestock are the means of livelihood of poor, but not enough to improve the well-being of the poor. In the same way, the impact of household borrowing in reducing poverty is the same on all four categories.

Physical insecurity affects individuals mentally and psychologically more than it does economically. The findings delineate that household living below the poverty line, incidents of physical insecurity increases poverty. This indicates that above the poverty line, household have more capacity to cope with the immediate effect of terrorist activities. They have better coping options both in the short and long run. Household asset is also an important contributor in alleviating poverty of individuals. Likewise, both subjective poor and overall poor are more likely to be food vulnerable compared to the non-poor households.

Finally, the Spearman's rank correlation result rejects the null hypothesis that the variables are independent. This confirms that subjective poverty and objective poverty measures are closely related, though some determinants are different in terms of statistical

significance. The findings add to the existing literature that the subjective poverty approach is also important measure of poverty in addition to the objective poverty measure. Thus, subjective poverty should be considered, as it has more broad contents particularly in developing countries where the variables such as education, household size, physical security, and residential status have far greater impact on the lower segment of society relatively. Table 8 presents the Spearman's rank correlation results.

5 Conclusion

We analyzed the determinants of subjective poverty in detail, and compared it with objective poverty. The subjective poverty approach consists of two cases. One is the ranking by individuals from the poorest to the richest. The other one is to generate poor and non-poor categories based on the ranking. Then we compared the determinants of subjective poverty with objective poverty line of $1.25 and $1 per day. The findings of subjective poverty approach complement the objective poverty, but the subjective poverty has more broad contents. We have contradictory findings for some of their determinants; such as household size, gender classification, physical and food insecurity and regional domains. In addition, the results of robustness check based on probit model are in line with the aforementioned measures. In comparing the two measures, we utilize the multinomial probit model after generating four nominal categories. The results also confirm these findings.

Keeping in view the above analyses, we highlight the possible implication of the study and suggest policy recommendation. First, subjective poverty approach is an important measure of poverty. Second, categorization of subjective poor captures well the impact of specific determinants. The payoff of higher education, own residence, physical security are large for the poor. In addition, the poor cannot cope with adverse situations. A small contribution of these predictors results in multiple effect for the poor due to much greater social and economic benefits. Therefore, promoting public programs such as rural education, housing policy, food policy, and security level should be in line with these findings. The local government should be involved to pinpoint the targeted groups based on subjective measure to solve their problems in a better manner. Similarly, there is a need to create opportunities for women such as education, right of inheritance, employment to come at par with their male counterpart. The security level of the poor should be given keen attention because the poor have limited coping strategies.

Appendix

See Tables 9, 10 and Fig. 1.

Table 9 Weighting scheme of sample households

Districts	Total population[a]	Sample population[b]	p weights $[(TP)_j/(SP)_j]$	pw-normalized $[(PW)_j/\sum(PW)_j]$	pw-normalized-urban $[(PWu)_j/\sum(PWu)_j]$	pw-normalized-rural $[(PWr)_j/\sum(PWr)_j]$
	$(TP)_j$	$(SP)_j$	$(PW)_J$	$(PWN)_J$	$(PWNu)_J$	$(PWNr)_J$
Faisalabad	5,429,547	3031	1791.33	0.207	0.166	0.172
Attock	1,274,935	1344	948.61	0.093	0.083	0.081
Hafizabad	1,136,044	3648	311.41	0.049	0.041	0.023
Vehari	717,649	2563	280.00	0.045	0.034	0.021
Muzafargarh	832,980	1785	466.65	0.038	0.055	0.035
Bahawalpur	2,090,416	1895	1103.12	0.090	0.074	0.097
Badin	2,635,903	1972	1336.66	0.055	0.082	0.117
Nawabshah	2,433,091	2406	1011.26	0.079	0.113	0.078
Mirpur Khas	1,071,533	2237	479.00	0.049	0.054	0.036
Larkana	905,935	1603	565.14	0.029	0.060	0.045
Dir	1,927,066	2545	757.19	0.093	0.069	0.065
Mardan	1,460,100	1872	779.96	0.063	0.049	0.075
Lakki Marwat	490,025	543	902.44	0.047	0.032	0.090
loralai	297,554	1409	211.18	0.019	0.010	0.019
Kuzdar	417,466	937	445.53	0.026	0.045	0.035
Gwadar	185,498	1220	152.04	0.010	0.026	0.008
Total	23,305,743	31,010	11,541.59	1	1	1

[a]Census 1998, [b]Pakistan panel household survey (PPHS) 2010. Author calculation

Table 10 Comparison of subjective poverty and objective poverty ($1)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Household size as a continuous variable						
Household size	0.195***	− 0.094***	0.127***	0.167***	− 0.102***	0.125***
	(0.021)	(0.032)	(0.024)	(0.019)	(0.030)	(0.023)
Gender classification						
Girls < 18 years	− 0.037	− 0.007	− 0.021			
	(0.032)	(0.038)	(0.040)			
Boys < 18 years	− 0.092***	− 0.029	− 0.068*			
	(0.032)	(0.041)	(0.039)			
Girls < 6 years				− 0.032	0.0205	− 0.044
				(0.054)	(0.066)	(0.070)
Boys < 6 years				− 0.056	− 0.040	− 0.172**
				(0.056)	(0.069)	(0.070)
Age of household head						
Age	0.006	0.029	0.003	0.001	0.028	− 0.005
	(0.018)	(0.021)	(0.019)	(0.014)	(0.021)	(0.019)
Age squared	− 0.0001	− 0.0002	− 0.0001	− 0.0001	− 0.0003	− 5.09e− 05
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Household head education *(years of schooling as a continuous variable)*						
Schooling	− 0.074***	− 0.050***	− 0.093***	− 0.072***	− 0.0495***	− 0.092***
	(0.011)	(0.012)	(0.012)	(0.010)	(0.0119)	(0.012)
Marital status *(reference category married)*						
Divorced	0.172	0.245	0.007	0.176	0.242	0.011
	(0.205)	(0.226)	(0.214)	(0.208)	(0.225)	(0.214)
Single	− 0.238	− 0.548	0.330	− 0.176	− 0.521	0.275
	(0.348)	(0.390)	(0.376)	(0.349)	(0.389)	(0.374)

Table 10 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Employment status *(reference category unemployed)*						
Employed	0.0257	0.041	− 0.355**	− 0.021	0.0247	− 0.395**
	(0.158)	(0.166)	(0.163)	(0.158)	(0.165)	(0.162)
Own business *(reference category no)*						
Yes	− 0.376**	− 0.306*	− 0.427**	− 0.359**	− 0.305*	− 0.423**
	(0.162)	(0.175)	(0.203)	(0.162)	(0.174)	(0.204)
Agriculture land *(reference category no)*						
Yes	− 0.016	− 0.101	0.016	− 0.017	− 0.106	0.014
	(0.125)	(0.146)	(0.153)	(0.125)	(0.146)	(0.153)
Farmer *(reference category no)*						
Yes	0.064	− 0.079	0.315*	0.083	− 0.073	0.319*
	(0.163)	(0.182)	(0.180)	(0.162)	(0.182)	(0.180)
Interaction term (farmer and agriculture land)						
Interaction term	− 0.108	− 0.183	− 0.462*	− 0.101	− 0.179	− 0.447*
	(0.205)	(0.241)	(0.236)	(0.204)	(0.241)	(0.235)
Own house *(reference category no)*						
Yes	− 0.334***	− 0.527***	− 0.810***	− 0.334***	− 0.530***	− 0.822***
	(0.113)	(0.125)	(0.135)	(0.112)	(0.125)	(0.135)
Livestock *(reference category no)*						
Yes	− 0.048	0.154	− 0.322**	− 0.042	0.156	− 0.304*
	(0.138)	(0.172)	(0.161)	(0.139)	(0.172)	(0.161)
Borrowing *(reference category no)*						
Yes	− 0.039	− 0.018	0.090	− 0.036	− 0.020	0.097
	(0.108)	(0.113)	(0.118)	(0.108)	(0.113)	(0.118)

Table 10 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Household asset (television) *(reference category no)*						
Yes	− 0.666***	− 0.227*	− 0.520***	− 0.660***	− 0.226*	− 0.525***
	(0.101)	(0.118)	(0.123)	(0.101)	(0.118)	(0.123)
Food insecurity *(reference category secure)*						
Food insecure	0.087	0.273**	0.569***	0.077	0.270**	0.566***
	(0.101)	(0.119)	(0.125)	(0.101)	(0.119)	(0.125)
Physical injury *(reference category no injury)*						
Injury	0.079	0.212*	0.242**	0.068	0.211*	0.241*
	(0.112)	(0.126)	(0.123)	(0.112)	(0.125)	(0.124)
Water facility *(reference category unimproved)*						
Improved	− 0.044	− 0.022	− 0.229	− 0.0582	− 0.0280	− 0.237
	(0.150)	(0.190)	(0.177)	(0.149)	(0.190)	(0.177)
Sanitation facility *(reference category unimproved)*						
Improved	− 0.357***	− 0.168	− 0.475***	− 0.346***	− 0.165	− 0.476***
	(0.097)	(0.119)	(0.113)	(0.097)	(0.119)	(0.112)
Provinces *(reference category Punjab)*						
Sindh	− 0.018	0.298**	0.190	− 0.045	0.287**	0.191
	(0.108)	(0.119)	(0.124)	(0.108)	(0.118)	(0.124)
KP	− 0.173	− 0.802***	− 1.002***	− 0.175	− 0.806***	− 1.044***
	(0.129)	(0.161)	(0.181)	(0.129)	(0.160)	(0.181)
Baluchistan	− 0.502***	− 1.725***	− 1.925***	− 0.537***	− 1.739***	− 1.956***
	(0.154)	(0.248)	(0.333)	(0.155)	(0.248)	(0.332)

Table 10 (continued)

Variables	Model 1[a]			Model 1[b]		
	Category 2	Category 3	Category 4	Category 2	Category 3	Category 4
	Objective poor	Subjective poor	Overall poor	Objective poor	Subjective poor	Overall poor
Region *(reference category rural)*						
Urban	0.0217	0.277**	0.204	0.0179	0.273**	0.189
	(0.123)	(0.132)	(0.148)	(0.123)	(0.132)	(0.148)
Constant	− 0.321	− 0.184	0.296	− 0.193	− 0.165	0.573
	(0.507)	(0.555)	(0.545)	(0.518)	(0.567)	(0.553)
Diagnostic test						
Wald $chi^2(75)$	722.18			716.73		
Prob > chi^2	0.000			0.000		
Log pseudo likelihood	− 206.578			− 206.733		
Number of obs.	3015			3015		

Robust standard errors in parentheses

[a]Model 1: Multinomial model based on gender classification less than 18 years

[b]Model 2: Multinomial model based on gender classification less than 6 years

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

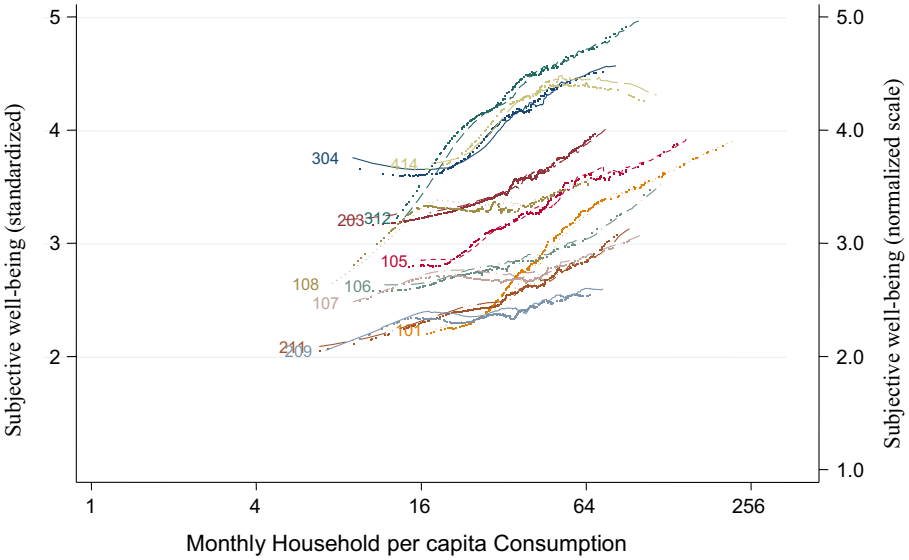

Fig. 1 Relationship between per capita consumption expenditure and subjective well-being

References

Alkire, S. (2007). The missing dimensions of poverty data: Introduction to the special issue. *Oxford Development Studies, 35*(4), 347–359.

Camfield, L., Choudhury, K., & Devine, J. (2009). Well-being, happiness and why relationships matter: Evidence from Bangladesh. *Journal of Happiness Studies, 10*(1), 71–91.

Cantril, H. (1965). *Pattern of human concerns*. New Brunswick: Rutgers.

Deaton, A. (2001). *Computing prices and poverty rates in India, 1999–2000*. Princeton: Research Programme in Development Studies.

Deaton, A. (2010). Price indexes, inequality, and the measurement of world poverty. *The American Economic Review, 100*(1), 3–34.

Deaton, A., & Drèze, J. (2009). Food and nutrition in India: Facts and interpretations. *Economic and Political Weekly, 44*(7), 42–65.

Deaton, A., & Heston, A. (2010). Understanding PPPs and PPP-based national accounts. *American Economic Journal: Macroeconomics, 2*(4), 1–35.

Deeming, C. (2013). Addressing the social determinants of subjective wellbeing: The Latest challenge for social policy. *Journal of Social Policy, 42*(3), 541–565.

Diener, E., & Biswas-Diener, R. (2002). Will money increase subjective well-being? *Social Indicators Research, 57*(2), 119–169.

Diener, E., Oishi, S., & Lucas, R. E. (2002). Subjective well-being: The science of happiness and life satisfaction. In C. R. Snyder (Eds.), *Handbook of positive psychology*. Oxford and New York: Oxford University Press.

Diener, E., Sandvik, E., Seidlitz, L., & Diener, M. (1993). The relationship between income and subjective well-being: Relative or absolute? *Social Indicators Research, 28*(3), 195–223.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology, 29*(1), 94–122.

Garner, T. I., & Vos, K. D. (1995). Income sufficiency v. poverty results from the United States and The Netherlands. *Journal of Population Economics, 8*(2), 117–134.

Goedhart, T., Halberstadt, V., Kapteyn, A., & Van Praag, B. (1977). The poverty line: Concept and measurement. *The Journal of Human Resources, 12*(4), 503–520. https://doi.org/10.2307/145372.

Government of Pakistan. (2014). *Economic survey 2013–2014*. Islamabad: Ministry of Finance.
Greene, W. H. (2011). *Econometric analysis* (7th ed.). ISBN-13, 978-0131395381.
International Labour Oragnisation (ILO). (2005). *Socioeconomic security for a better world*. Geneva: ILO.
Jodha, N. S. (1988). Poverty debate in India: A minority view. *Economic and Political Weekly, 23*(45/47), 2421–2428.
Kingdon, G. G., & Knight, J. (2006). Subjective well-being poverty vs. Income poverty and capabilities poverty? *The Journal of Development Studies, 42*(7), 1199–1224.
Layard, R. (2005). *Happiness: Lessons from a new science*. London: Penguin. ISBN 9780141016900.
Lever, J. P. (2004). Poverty and subjective well-being in Mexico. *Social Indicators Research, 68*(1), 1–33.
Mangahas, M. (1995). Self-rated poverty in the Phillippines, 1981–1992. *International Journal of Public Opinion Research, 7*(1), 40–52.
Michalos, A. C. (2008). Education, happiness and wellbeing. *Social Indicators Research, 87*(3), 347–366.
Oishi, S., & Kesebir, S. (2015). Income inequality explains why economic growth does not always translate to an increase in happiness. *Psychological Science, 26*(10), 1630–1638.
Pradhan, M., & Ravallion, M. (2000). Measuring poverty using qualitative perceptions of consumption adequacy. *The Review of Economics and Statistics, 82*(3), 462–471.
Ravallion, M., & Lokshin, M. (2002). Self-rated economic welfare in Russia. *European Economic Review, 46*(8), 1453–1473.
Riffault, H. (1991). How poverty is perceived. In K. Reif & R. Inglehart (Eds.), *Eurobarometer* (pp. 349–354). London: Palgrave Macmillan.
Ross, C. E., & Van Willigen, M. (1997). Education and the subjective quality of life. *Journal of health and social behavior*, *38*(3), 275–297.
Sen, A. (1988). *The standard of living*. Cambridge: Cambridge University Press.
Sen, A. (1993). Capability and well-being 73. In *The quality of life* (p. 30). Oxford: Clarendon Press.
Shams, K. (2014). Determinants of subjective well-being and poverty in rural Pakistan: A micro-level study. *Social Indicators Research, 119*(3), 1755–1773.
Stevenson, B., & Wolfers, J. (2013). Subjective well-being and income: Is there any evidence of satiation? *The American Economic Review, 103*(3), 598–604.
Van Praag, B. M. (1968). *Individual welfare functions and consumer behavior: A theory of rational irrationality* (Vol. 57). Amsterdam: North-Holland Pub. Co. Hardcover.
Van Praag, B. M. S. (1971). The welfare function of income in Belgium: An empirical investigation. *European Economic Review, 2*(3), 337–369. https://doi.org/10.1016/0014-2921(71)90045-6.
Van Praag, B. M. S., Frijters, P., & Ferrer-i-Carbonell, A. (2003). The anatomy of subjective well-being. *Journal of Economic Behavior & Organization, 51*(1), 29–49.
Vos, K. D., & Garner, T. I. (1991). An evaluation of subjective poverty definitions: Comparing results from the U.S. and the Netherlands. *Review of Income and Wealth, 37*(3), 267–285.
Warr, P. (1999). Well-being and the workplace. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 392–412). New York: Russell Sage Foundation.
Winkelmann, R. (2005). Subjective well-being and the family: Results from an ordered probit model with multiple random effects. *Empirical Economics, 30*(3), 749–761.
Zhou, S., & Yu, X. (2017). Regional heterogeneity of life satisfaction in urban China: Evidence from hierarchical ordered logit analysis. *Social Indicators Research, 132*(1), 25–45.