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Can money buy happiness? Subjective wellbeing and its relationship with income, relative income, monetary and non-monetary poverty in Bangladesh

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Abstract

This paper presents an empirical analysis of the importance of income, relative income, monetary and non-monetary poverty for individual wellbeing or happiness in rural Bangladesh. The study is the first estimate of a wellbeing function for Bangladesh using nationally representative micro-panel data. Employing a linear panel model with individual random effects and a large set of control variables like education, working status and disability, we found a strong and positive relationship between wellbeing and income. Being further below the poverty line – estimated using the depth-of-poverty measure – was found to have a significant negative effect on happiness. On the other hand, the income of the reference group was found to be just as important as one's own income for an individual's happiness. Comparisons were found to be asymmetric and upwards. Improvements in a multidimensional poverty index, constructed using indicators of household education, health and living standards, were found to have a positive and significant relationship with happiness in all specifications. Gender-disaggregated analysis reveals that, while the income effect was found to be stronger for male individuals, the effects of relative income, monetary and non-monetary poverty on subjective wellbeing are larger for female individuals. The results thus point towards a need to incorporate such notions into the assessment of individuals' wellbeing.

Keywords

Subjective wellbeing, income, relative income, reference group, poverty, multidimensional poverty index, panel data, Bangladesh

JEL Codes

O12, I31, I32

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1. Introduction

What drives people's happiness has been a topic of a growing body of literature in recent times. Does it depend on one's own income, or on the fact that the income is above a certain threshold so that one is not considered to be poor? Does it derive from the income of one's peers and knowing that one is better off or worse off than others? Or does it depend on other non-monetary aspects of wellbeing, like fulfilment of basic needs and enhancing one's capabilities? In this paper, we explore these questions by looking into the relationship between self-reported subjective wellbeing (SWB),[1] and other conventional measures of wellbeing using a nationally representative micro-panel dataset from rural Bangladesh.

Income or consumption expenditure is the most widely used and conventional metric of wellbeing. The premise lies in utility theory, which postulates that more income is better and, therefore, increases in income are desirable from an individual's perspective which, in turn, increases her utility and wellbeing. However, the evidence on this is mixed and may depend on the type of data being used. Country-specific time-series data has shown income not to hold much relevance for SWB and only weakly to correlate with happiness. For example, Easterlin (1974, 1995, 2001) found that, even though richer individuals are happier than poorer individuals, income increases do not translate into increases in wellbeing. On the other hand, using individual- and country-level cross-section micro-data, richer individuals are found to be happier, with additional income increasing satisfaction at a decreasing rate (Clark et al, 2016). Finally, studies using a micro-panel dataset that tracks individuals over time report a positive effect of income on happiness (for example van Praag et al, 2003; Ferrer-i-Carbonell & Frijters, 2004). Using German data and two poverty measures, namely the incidence and depth of poverty, Clark et al (2016) showed both measures to reduce life satisfaction.

One reason why absolute income does not raise happiness over time is because happiness may not only depend on absolute income but rather on the income of other individuals in society. A person's position in the income distribution of the relevant reference group may thus govern happiness (Kingdon & Knight, 2006). There is evidence of an effect in both directions in the literature. For example, Clark et al (2009), using Danish data, found that individuals, conditional on their own household income, report higher levels of satisfaction when their neighbours are richer. On the other hand, Ferrer-i-Carbonell (2005), using German data, found that increases in the average income of a reference group negatively affect the levels of satisfaction of individuals conditional on their own household income. This finding has important policy implications – if individuals care about their relative position on the income distribution spectrum, then policies that aim to raise their welfare should, at the same time, address issues of economic inequality (Asadullah & Chaudhury, 2012).

[1] In this paper, we use the terms 'subjective wellbeing', 'happiness' and 'life satisfaction' interchangeably.

Other than the monetary aspects of wellbeing, such as income or consumption, non-monetary aspects, such as fulfilment of basic needs and expanding people's capabilities to be and do things that are of intrinsic worth, are increasingly thought of as alternative determinants of life satisfaction (Kingdon & Knight, 2006). Such non-monetary aspects include education, health or living standards like access to electricity, decent housing, sanitation, etc. These are often incorporated in the analysis as a basic needs index in the life satisfaction specification and are found to be positively related to life satisfaction (see, for example, Guillen-Royo, 2011; Aida, 2018).

In Bangladesh, the rate of economic growth has been impressive and has accelerated in recent years. Between 2010 and 2018, real GDP grew at a rate of 6.6% per year on average and reached 8.2% in 2019, the highest in the country's history. The country also witnessed a notable reduction in the rate of poverty, which fell from 48.9% in 2000 to 24.3% in 2016. The rate of reduction was faster in the rural areas, with poverty declining from 52.3% to 26.4% over the same period (BBS, 2019). Although earlier studies on happiness in Bangladesh, like Camfield et al (2009) and Worcester (1998), had noted that individuals were reporting higher levels of happiness, sometimes even higher than in some developed countries with a higher per capita income and living standards, improvements in conventional wellbeing measures do not seem to have translated into happiness among the general population in recent times. This is evident from the World Happiness Index 2019: on a list of 156 countries, Bangladesh ranked 125 in 2019, having slipped 10 places from 115 in the index the previous year (Helliwell et al, 2019). This is consistent with the Easterlin (1974) paradox, which argues that income growth does not lead to ever increasing gains in happiness. The sustained spell of economic growth and poverty reduction in Bangladesh, along with an apparent decline in individual happiness, thus raises the question of how relevant current income is to the wellbeing function, or whether there are factors other than income that better explain happiness. The lack of an appropriate micro-panel dataset that provides repeated information on happiness and other measures of wellbeing is a constraint on answering this paradox (Asadullah & Chowdhury, 2012).

Considering the above preliminaries, we provide econometrically rigorous evidence of the determinants of happiness in Bangladesh, using a nationally representative micro-panel dataset from rural Bangladesh collected in 2011–12, 2015 and 2019. Previous studies on happiness in Bangladesh (Camfield & Guillen-Royo, 2010; Camfield et al, 2009; Devine et al, 2008) only provided qualitative or summary evidence on the relationship of wellbeing and income. On the other hand, even though Asadullah and Chowdhury (2012) provided a first set of estimates of a wellbeing function, they noted that a lack of micro-panel data hampered them in answering the economic growth–happiness paradox in Bangladesh.

This paper, thus, provides the first estimate of a wellbeing function for Bangladesh using a nationally representative panel dataset and attempts to unravel the puzzle of economic growth and declining happiness. In particular, we build on the existing

developed country studies and contribute to the small but growing developing country literature on subjective wellbeing by testing the following hypotheses:

1. What is the effect of absolute income on life satisfaction of individuals over time?
2. Is the effect of absolute income bigger in comparison to relative income? We use three different specifications to test the effect size of the reference group income on individual SWB.
3. Does the effect size of absolute income change as a result of inclusion of a basic needs index reflecting the non-monetary aspects of wellbeing?
4. How does SWB change with poverty status? Does being further away from the poverty line matter for happiness?

We also present results disaggregated by gender for each analysis of these hypotheses to see if there are any gender-differentiated effects.

The use of panel data also provides a considerable advantage over time-series or cross-section data. Panel data enable us to consider an individual's unobserved personal traits, such as optimism or ability, which largely determines SWB. For example, in a case where the objective situation is identical, a more optimistic individual would tend to have a higher SWB score compared to a pessimistic one. The empirical analysis in this paper corrects for this by incorporating individual random effects. As a result, the error term (unobservable traits), which has a systematic part related to the individual, can be identified by applying panel data techniques.

The rest of the paper is structured as follows. Section 2 discusses the data and the different measures of wellbeing, as well as the control variables used in the regressions. Section 3 discusses the empirical strategy. Section 4 presents the results. Section 5 offers some concluding remarks.

2 Data

The data used in this paper come from a recently collected three-round multipurpose nationally representative panel dataset, the Bangladesh Integrated Household Survey (BIHS), conducted by the International Food Policy Research Institute (IFPRI). The data are nationally representative of rural Bangladesh and representative of rural areas in each of the seven administrative divisions of the country. The first round of the survey was conducted from November 2011 to March 2012, the second from January to June 2015 and the third from January to June 2019. Using the sampling frame of the community series of the 2011 Population and Housing Census of Bangladesh, a two-stage stratified sampling design was employed to select primary sampling units (PSUs) and households from within each PSU. The total sample size in Round 1 was 6503 households from 318 PSUs. Taking attrition and split households into account, the total sample size was 6436 in Round 2 and 6618 in Round 3. Questions of subjective wellbeing were asked to a primary male and a primary female respondent in the household. After adjusting for non-response to the life satisfaction question, we were

left with 21,255 observations across the three rounds and 10,628 observations for male and female each.

2.1 Measure of income

The common assumption in studies of SWB is that family income is positively correlated with wellbeing (Ferrer-i-Carbonell, 2005), and we tested this hypothesis for our data. We used per capita monthly consumption expenditure as a proxy for income at the household level. Income is often considered as being endogenous in the estimation of SWB. The level of life satisfaction can very well be predicted by inherent personal characteristics and health status, which are also correlated with income. Therefore, any estimation of the effect of income on SWB will be biased by these unmeasured personality traits (Helliwell & Huang, 2009). In our dataset, we had information on the health status of the respondent and whether the previous four weeks had been better, worse or the same for the individual. We controlled for both these factors in the regression analysis. On the other hand, by applying appropriate panel data techniques, we were also able to account for individuals' unobserved personal traits. Furthermore, by instrumenting household income using information on household expenditure, we accounted for the potential endogeneity of income (see Asadullah & Chowdhury, 2012; Kingdon & Knight, 2007). This practice is also widely used in the poverty literature. In the discussion, we use the terms 'expenditure' and 'income' interchangeably.

Total consumption expenditure was measured as the sum of total food consumption and total non-food (non-durable and durable) expenses. Expenditures on individual consumption items were aggregated to construct total expenditures. Quantities of goods produced by the household for home consumption were valued at the average unit market prices of commodities. 'Lumpy' infrequent expenditures such as a dowry, wedding, pilgrimage (Hajj), health and medical expenditures, and the costs of legal or court cases were excluded from the calculations. The summary statistics presented in Table 1 show that average household income increased by more than 65% during the survey years, from 2630.17 taka in 2012 to 4382.68 taka in 2019.

Table 1: Summary statistics by survey years

	2012					2015					2019				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Life satisfaction	7,084	7.13	2.31	1	10	7,086	7.02	2.40	1	10	7,085	7.37	2.04	1	10
Per capita monthly hh expenditure (taka)	7,086	2630.17	1435.84	511.69	17447.81	7,086	3368.88	1873.16	640.64	18711.21	7,086	4382.68	2252.73	897.56	23371.67
Headcount poverty (d^0)	7,086	0.60	0.49	0	1	7,086	0.56	0.50	0	1	7,086	0.47	0.50	0	1
Depth of poverty (d^1)	7,086	0.17	0.19	0	0.80	7,086	0.16	0.18	0	0.792256	7,086	0.12	0.16	0	0.7601708
Headcount MPI	7,086	0.74	0.44	0	1	7,086	0.60	0.49	0	1	7,080	0.43	0.50	0	1
MPI score	7,086	0.57	0.19	0.00	1	7,086	0.65	0.16	0.06	1	7,080	0.72	0.16	0.06	1
Log average expenditure in district	7,086	2696.18	473.27	1706.51	4897.47	7,086	3471.10	712.39	2073.00	6999.80	7,086	4538.56	722.40	2571.12	8296.23
Log difference of own and district exp	7,086	-0.12	0.44	-1.64	1.53	7,086	-0.13	0.43	-1.67	1.45	7,086	-0.12	0.42	-1.41	1.72
Richer	7,086	0.12	0.23	0	1.53	7,086	0.12	0.23	0	1.45	7,086	0.11	0.22	0	1.72
Poorer	7,086	0.24	0.28	0	1.64	7,086	0.25	0.28	0	1.67	7,086	0.24	0.27	0	1.41
Respondent's characteristics															
Age	7,086	39.94	12.28	16	102	7,086	42.96	12.28	19	105	7,086	46.15	12.28	22	108
Age squared	7,086	1746.39	1080.75	256	10404	7,086	1996.07	1153.48	361	11025	7,086	2281.08	1230.89	484	11664
Has no schooling	7,086	0.47	0.50	0	1	7,086	0.45	0.50	0	1	7,086	0.46	0.50	0	1
Has less than primary education	7,086	0.13	0.34	0	1	7,086	0.16	0.36	0	1	7,086	0.15	0.36	0	1
Has primary education	7,086	0.33	0.47	0	1	7,086	0.32	0.47	0	1	7,086	0.32	0.47	0	1
Has secondary or more education	7,086	0.07	0.25	0	1	7,086	0.07	0.25	0	1	7,086	0.07	0.25	0	1
Never married	7,086	0.01	0.10	0	1	7,086	0.01	0.09	0	1	7,086	0.01	0.07	0	1
Married	7,086	0.98	0.13	0	1	7,086	0.98	0.13	0	1	7,086	0.98	0.13	0	1
Widowed/separated/deserted	7,086	0.01	0.09	0	1	7,086	0.01	0.10	0	1	7,086	0.01	0.10	0	1
Last four weeks worse than usual	7,086	0.13	0.33	0	1	7,086	0.12	0.32	0	1	7,086	0.11	0.31	0	1
Has a disability	7,086	0.12	0.33	0	1	7,086	0.22	0.41	0	1	7,086	0.33	0.47	0	1
Day labourer	7,086	0.11	0.31	0	1	7,086	0.10	0.30	0	1	7,086	0.08	0.27	0	1
Self-employed/business	7,086	0.13	0.33	0	1	7,086	0.15	0.35	0	1	7,086	0.14	0.35	0	1
Farmer	7,086	0.49	0.50	0	1	7,086	0.40	0.49	0	1	7,086	0.25	0.43	0	1
Non-earning occupation	7,086	0.22	0.41	0	1	7,086	0.30	0.46	0	1	7,086	0.47	0.50	0	1
Number of dependants in household	7,086	1.93	1.20	0	9	7,086	1.86	1.19	0	7	7,086	1.77	1.22	0	8
Non-Muslim household	7,086	0.13	0.34	0	1	7,086	0.13	0.34	0	1	7,086	0.13	0.34	0	1
Household is joint family	7,086	0.28	0.45	0	1	7,086	0.33	0.47	0	1	7,086	0.36	0.48	0	1

Source: Author's calculations from IFPRI Bangladesh Integrated Household Survey (BIHS) 2011–12, 2015 and 2019 surveys.

2.2 Measure of subjective wellbeing

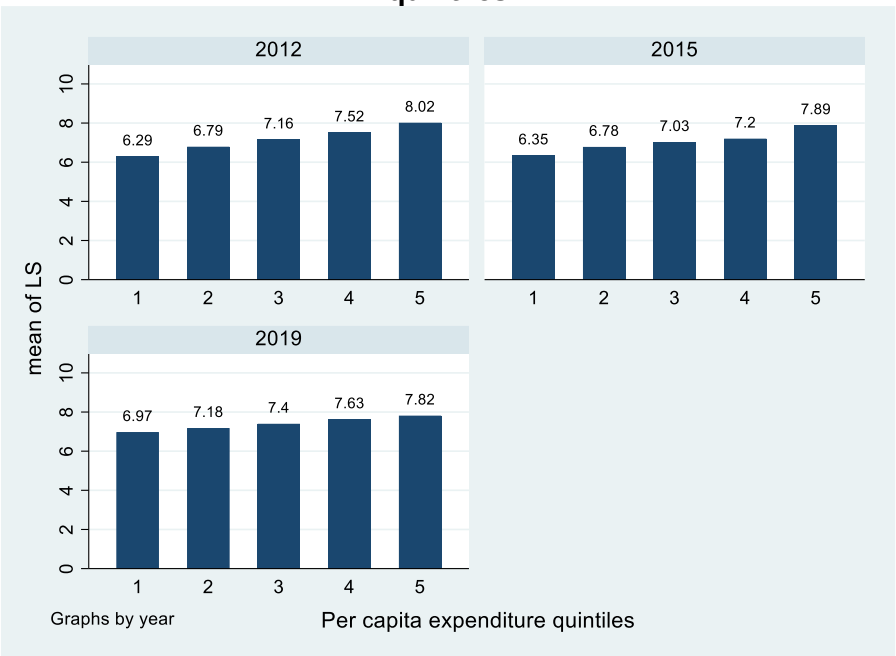
The empirical analysis in this paper relies on a subjective, self-reported measure of wellbeing derived from an individual's answers to a life satisfaction question. The question was asked to the primary male and female respondent in each household in the following manner:

> "I am going to ask you a series of questions and I want you to tell me how you would rate your satisfaction on a scale of 1 to 10, where 1 means you are not satisfied and 10 means you are very satisfied. If you are neither satisfied or dissatisfied this would be in the middle or 5 on the scale. How would you rate your satisfaction with: Your satisfaction with your life overall?"

The answer to this question takes discrete values of 1 to 10 and can be referred to as the subjective wellbeing, general satisfaction and self-reported life satisfaction.

The summary statistics show that on average SWB scores were around 7.13 in 2012, 7.02 in 2015, and 7.37 in 2019. In Figure 1, we present the mean SWB score by the quintiles of per capita monthly expenditure for each of the three rounds of the survey. Although there seems to be a positive relationship of SWB with income, with the mean SWB score increasing in higher expenditure quintiles, we found the effect levelled off over the years between 2012 and 2019. The gap in the SWB score between the poorest and richest quintile in 2019 was almost half that in 2012 – falling from around 1.73 in 2012 to around 0.85 in 2019. Therefore, although there was a positive correlation between income and life satisfaction, there seem to be other factors driving SWB than are explained by absolute household income.

Figure 1: Mean of life satisfaction score by per capita monthly expenditure quintiles



2.3 Measure of monetary poverty

In this paper, we calculate two poverty indicators from the Foster–Greer–Thorbecke (FGT) class of poverty measures (Foster et al, 1984) – the poverty headcount and poverty gap. Let $x = (x_1, x_2, \ldots x_n)$ be the income distribution among n individuals, where $x_i \geq 0$ is the income of the individual i. The poverty line is denoted by z. For any income distribution, x, individual i is said to be poor if $x_i < z$. The normalised deprivation of individual i who is poor with respect to z is given by his or her relative shortfall from the poverty line:

$$d_i^{\alpha} = \left(\frac{z - x_i}{z}\right)^{\alpha},$$

where $\alpha \geq 0$ is a parameter. When $\alpha = 0$, we get the incidence or headcount measure of poverty, since the normalised deprivation is equal to 1 for all of the poor. When $\alpha = 1$, normalised deprivation reflects the intensity or depth of poverty, with a higher value of d being assigned to poorer individuals, ie those who are further below the poverty line. The normalised deprivation score for the rich, ie those whose income weakly exceeds z, is always set equal to 0. We hypothesise that both indicators of poverty would be negatively correlated with SWB, consistent with the findings of Clark et al (2016) using data from Germany.

We used the US$3.20/per person per day international poverty line, which is the standard for lower-middle-income countries(World Bank, 2018),[2] converted to the local currency equivalent (LCE) at 2011 purchasing power parity (PPP) exchange rates and adjusted for cumulative inflation, from 2011 to the month and year the survey data were collected, using a consumer price index. The 2011 PPP exchange rate for Bangladesh was $1 = 24.8492.[3] For the price index, we used the rural general consumer price index (GCPI), with base year 2011, estimated by the Bangladesh Bureau of Statistics. The LCE is calculated as:

$$LCE = \left[\frac{1.90 \times PPP_{2011}}{100}\right] \times GCPI_{2011}$$

The summary statistics presented in Table 1 reveal that the incidence of poverty for our sample fell during the study period from 59.78% in 2012 to 56.05% in 2015 and 47.13% in 2019. The poor were also better off during this time, their income moving closer to the poverty line, as indicated by the depth-of-poverty measure falling from 17.30 in 2012 to 15.55 in 2015 and 11.64 in 2019.

2.4 Measure of non-monetary poverty

To capture the non-monetary aspects of poverty, we used the Alkire and Foster (AF) counting approach to construct a multidimensional poverty index (MPI) similar to the

[2] Bangladesh attained lower-middle-income status in 2015. See https://www.worldbank.org/en/country/bangladesh/overview).
[3] http://databank.worldbank.org/data/home.aspx.

global MPI published by the Oxford Poverty and Human Development Initiative (OPHI) and adopted by the United Nations Development Programme (UNDP) (Alkire et al, 2018). The MPI is calculated along three dimensions of wellbeing, namely, health, education and living standards. The indicators for health are the nutrition of household members and dietary diversity in the household,[4] for education, years of schooling of household members and school attendance for school-aged children, and for living standards, cooking fuel, sanitation, drinking water, electricity, housing and assets. First, deprivation in each indicator is calculated as defined in Table 2. Then nested weights are used to weigh the contribution of each indicator to the MPI. The index allocates equal weights to the health, education and living standard dimensions, ie equal importance is given to these dimensions in the calculation of non-monetary wellbeing.

[4] We could not calculate the indicator for child mortality, as used in the Global MPI, since it was not collected in the BIHS and we have, thus, replaced it with an indicator for dietary diversity in the household.

Table 2: Dimensions, indicators, deprivation cut-offs and weights of the MPI

Dimensions of poverty	MPI indicator	Deprived if…	Weight
Health	Nutrition	Any person below the age of 70 is undernourished[+]	1/6
	Dietary diversity	Dietary diversity score[++] is less than 42	1/6
Education	Years of schooling	No household member aged ten years or older has completed six years of schooling	1/6
	School attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8	1/6
Living standards	Cooking fuel	The household cooks with dung, wood or charcoal	1/18
	Sanitation	The household's sanitation facility is not improved (according to SDG guidelines) or it is improved but shared with other households*	1/18
	Drinking water	The household does not have access to improved drinking water (according to SDG guidelines)**	1/18
	Electricity	The household has no electricity	1/18
	Housing condition	The household has inadequate housing: the floor is of natural materials or the roof or wall are of rudimentary materials***	1/18
	Assets	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike or refrigerator, and does not own a car or truck	1/18

Source: Adapted from Alkire et al (2018).

Notes: [+] Adults 20 to 70 years are considered malnourished if their Body Mass Index (BMI) is below 18.5 m/kg2. Those aged five to 20 are identified as malnourished if their age-specific BMI cut-off is below minus two standard deviations. Children under five years are considered malnourished if their z-score of either height-for-age (stunting) or weight-for-age (underweight) is below minus two standard deviations from the median of the World Health Organization 2006 reference population.

[++] Measured using the food consumption score (FCS). The FCS is calculated as a weighted summation (out of 112) of the number of days a household has consumed a food group (staples, pulses, vegetables, fruits, meat/fish, milk, sugar, and oil) in the past seven days, where the weights reflect the differential nutritional benefit of each food group.

* A household is considered to have access to improved sanitation if it has some type of flush toilet or latrine, or ventilated improved pit or composting toilet, provided that this is are not shared.

** A household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole or pump, protected well, protected spring or rainwater purified before consumption.

*** Deprived if the floor is made of mud/clay/earth, sand or dung; or if the dwelling has no roof or walls or if either the roof or walls are constructed using natural materials such as cane, palm/trunks, sod/mud, dirt, grass/reeds, thatch, bamboo, sticks, or rudimentary materials such as carton, plastic/ polythene sheeting, bamboo with mud/stone with mud, loosely packed stones, uncovered adobe, raw/reused wood, plywood, cardboard, unburnt brick or canvas/tent.

Subsequently, the MPI score is calculated for each household as a weighted sum of the indicators:

$$MPI_i = \sum_{j=1}^{d} w_j g_{ij}^0$$

where g_{ij}^0takes a value of 1 if the household i is deprived in indicator $j = (1, \dots d)$ and 0 otherwise, and w_j is the weight of each indicator. Scores are then added up for all indicators to give us the MPI score. For ease of interpretation, we subtracted the score from 1 so that higher values indicated lower levels of deprivation. Following the Global MPI, an MPI score of less than the threshold of (1/3) was considered to be multidimensionally poor. We hypothesised the MPI score to be positively correlated with SWB.

Table 1 reveals that the incidence of multidimensional poverty fell from 74.12% in 2012 to 60.01% in 2015 and 43.31% in 2019 – a rate of decline much faster than the decline in monetary poverty. In terms of the percentage of households deprived per indicator, presented in Table 3, it is worrying that almost half the rural population in 2019 was suffering from inadequate nutrition and a lack of proper sanitation facilities, while almost three-quarters of the population were suffering improper housing conditions. A useful feature of using the AF method to calculate multidimensional poverty is that the aggregate index can be broken down to elicit the contribution of each dimension and indicator to overall MPI poverty (Alkire et al, 2018). Using this, we found that the biggest contributor to the MPI over the survey period was nutrition, followed by years of schooling, cooking fuel and housing, as presented in Table 3.

Table 3: Subgroup breakdown of the MPI

		Contribution of dimension to MPI			Percentage household deprived in …			Contribution of indicator to MPI		
Dimension	**Indicator**	**2012**	**2015**	**2019**	**2012**	**2015**	**2019**	**2012**	**2015**	**2019**
Health	Nutrition	0.35	0.34	0.31	64.65	58.41	47.14	0.25	0.29	0.28
	Dietary diversity				21.50	8.06	3.82	0.09	0.05	0.03
Education	Years of schooling	0.20	0.21	0.25	43.43	33.73	30.10	0.19	0.20	0.23
	School attendance				3.18	2.50	2.06	0.01	0.02	0.02
Living standards	Cooking fuel	0.46	0.45	0.44	96.66	95.40	90.81	0.11	0.12	0.13
	Sanitation				72.29	55.52	50.95	0.09	0.08	0.10
	Drinking water				17.92	7.13	6.53	0.02	0.01	0.01
	Electricity				56.36	43.91	16.34	0.07	0.07	0.04
	Housing				89.17	84.90	76.49	0.10	0.12	0.12
	Assets				53.31	33.22	22.79	0.07	0.06	0.05

Source: Author's calculation from the BIHS 2011–12, 2015 and 2019 surveys.

2.5 Measure of relative income

We followed Ferrer-i-Carbonell (2005) to construct three measures of relative income: (1) the income of a reference group; (2) the distance between one's own income and that of the reference group; and (3) the asymmetry of comparisons, ie the income effect differentiated for rich and poor individuals. The income of a reference group was calculated as its average income, ie $\frac{1}{N_i}\sum_i y$, where i are the individuals who belong to the same reference group. We include the log of the reference group income in our estimations of SWB. The reference group in our paper was comprised of all the other households in the district. We hypothesised the income of the reference group to be negatively correlated with individual SWB, ie the higher the income of the reference group, the less satisfaction one would have with one's own income.

For the second measure of relative income, we calculated the distance between the individual's income and the income of the reference group by subtracting the log of the average income of the reference group from the individual's own income, ie $\ln(y) - \ln(y_r)$, where y is own income and y_r is reference group income. We hypothesised that the larger the positive difference between an individual's income and that of the reference group, the happier the individual would be, whereas the larger the negative difference, the more unhappy the individual would be.

Our final relative income measure helped us explore the hypothesis that income comparisons are not symmetrical, ie individuals with an income above that of their reference group do not experience a positive impact on wellbeing, while the wellbeing of individuals with an income below that of the reference group is negatively affected. Duesenberry (1949) postulated this idea and argued that poorer individuals were negatively affected by the income of their richer peers, while the opposite did not hold: richer individuals were not any happier knowing that their income was above that of their co-citizens. To test this, we calculated two variables, *richer* and *poorer*, as follows: if an individual's income is higher than the reference group's income then $richer = \ln(y) - \ln(y_r)$, and $poorer = 0$; if an individual's income is less than the reference group's income then $richer = 0$, and $poorer = \ln(y_r) - \ln(y)$; and, if the income of the individual and the reference group are the same, then both variables $richer/poorer = 0$. We hypothesised the coefficient of the *richer* variable to be non-significant or at least of a smaller magnitude than the *poorer* variable.

2.6 Control variables

The control variables included in all the estimations were the age and age squared of the respondent (in years); dummy for education of the respondent segregated by the following categories – no schooling, less than primary, primary and secondary or more; dummy for whether the respondent is widowed, divorced, separated or deserted; dummy for respondent's occupation, namely, day labourer, self-employed or in business, farmer, or in a non-earning occupation (housewife, student, etc); dummy for whether the respondent has any chronic disabilities; and dummy for whether the four

weeks preceding the survey were worse than usual for the respondent. In addition, we also included some household information, such as the number of dependent household members; whether the household had a joint family structure; and whether the household was non-Muslim. We also included year fixed effects in all estimations.

The statistics presented in Table 1 reveal that, in the first round of the survey in 2012, the average age of respondents in our sample was 39.94 years, with 47% never attending formal schooling, and 49% working in farm-related occupations. Twelve per cent of respondents had some form of disability, with 13% revealing that the four weeks preceding the survey day were worse than usual. In comparison, by the time of the last round of survey in 2019, 25% remained in farm-related occupations, 33% reported some form of disability and 11% reported that the previous four weeks had been worse than usual.

3 Empirical strategy

The primary objective of this paper is to estimate the relationship between SWB and income. In such estimations, Ferrer-i-Carbonell and Frijters (2004) have shown that assuming cardinality or ordinality makes little difference; what is more important is to take into account personal traits, like optimism and ability, which are individual-specific and constant over time. In our estimations, we assumed cardinality of the SWB outcome variable and estimated a panel random-effects model using the following specification:

$$SWB_{nt} = \alpha + \beta y_{nt} + \sum_{k} \delta_k x_{k,nt} + \varepsilon_{nt} \quad (1)$$

where n is the individual, t indicates the time, x is a set of k control variables, y represents income, and ε_{nt} represents the unobservables. The estimation of the specification also includes time fixed effects, T, and individual random effects to capture the panel structure of the data set. Inclusion of time fixed effects captures the fixed yearly changes, which are the same for all individuals. This also obviates the need to transform monetary variables from nominal to real terms, since inflation is captured in the fixed effect. On the other hand, the individual random effects capture unobservable personal traits, such as optimism and ability, which are constant over time but different for each individual. This is important since, for a given level of income and other characteristics, a more optimistic individual may be expected to report a higher SWB than a more pessimistic individual. The error structure can thus be represented as $\varepsilon_{nt} = v_n + \eta_{nt}$, where v_n is the individual random effect and η_{nt} is the error term, which is assumed to be random and uncorrelated with observable explanatory variables. However, Ferrer-i-Carbonell (2005) noted that this is a strong assumption, since unobservable personal traits, like optimism and ability, would possibly be correlated with observable explanatory variables, such as income and education, and used the Mundlak (1978) transformation to assume the following

structure of the correlation: $v_n = \sum_j \lambda_j \bar{z}_{j,n} + \omega_n$. Here, the error term is broken down into a pure error term ω_n which is uncorrelated with the observable explanatory variables, and a part that is correlated with a subset of $z_{j,nt}$ of the observable explanatory variables $x_{k,nt}$, where $j \leq k$. The individual random effect and $z_{j,nt}$ is assumed to be correlated in the form $\lambda_j \bar{z}_{j,n}$, where $\bar{z}_j$ is the average of z_j across time. From the list of explanatory variables, variables that are possibly correlated with unobservable random effect are included in subset $z_{j,nt}$, namely, income, education, occupation and disability, while other variables, such as age and religion, are not included.

Thus, by incorporating the individual random and time fixed effects, we were able to estimate three different specifications to test the relationship of SWB with income, relative income and measures of poverty:

$$SWB_{nt} = \alpha + \tau T + \beta y_{nt} + \sum_k \delta_k x_{k,nt} + \sum_j \lambda_j \bar{z}_{j,n} + \omega_n + \eta_{nt} \quad (2)$$

$$SWB_{nt} = \alpha + \tau T + \beta y_{nt} + \gamma y_{r,nt} \sum_k \delta_k x_{k,nt} + \sum_j \lambda_j \bar{z}_{j,n} + \omega_n + \eta_{nt} \quad (3)$$

$$SWB_{nt} = \alpha + \tau T + \beta PI_{nt} + \sum_k \delta_k x_{k,nt} + \sum_j \lambda_j \bar{z}_{j,n} + \omega_n + \eta_{nt} \quad (4)$$

Here $y_{r,nt}$ and PI_{nt} are the measures of relative income and poverty, respectively. We added the measure of multidimensional poverty to each of the above base specifications to see how the strength of the relationship with income, relative income and monetary poverty changed with the inclusion of non-monetary aspects of wellbeing. We also disaggregated the estimation by gender to see how the relationship varied for men and women.

4 Results

We present results from specifications (2) to (4) in this section. In the discussion which follows, we focus only on the key variables in question (income, measures of monetary and non-monetary poverty, and relative income). The coefficients of the control variables all had the expected signs consistent with the literature. We found that age effects, estimated by a quadratic form, have a U-shaped pattern in almost all specifications, which is consistent with the literature (Asadullah & Chaudhury, 2012). Similarly, we found marital status to influence happiness – individuals who were widowed, separated, or had been deserted reported lower levels of SWB than married individuals, as evident from the negative coefficient on the widowed/separated/deserted variable. Likewise, respondents in joint families also

reported higher levels of SWB, which can be attributed to the importance of family life in Bangladeshi culture. As expected, the indicator variables of disability and whether the previous four weeks were worse than usual were found to have a negative effect on SWB. We also found that respondents in non-Muslim households were reporting lower levels of happiness. This is worrying with respect to minority rights and freedom in a country with a Muslim-majority population.

With respect to individuals' education level, grouped in the four categories of no schooling, less than primary, primary, and secondary or more, SWB was found to increase with the level of education in a non-linear manner, that is we found a higher magnitude of effect accruing to coefficients of higher levels of education. This is consistent with the existing literature. However, when disaggregated by gender, we see that, although the same holds for males, females had a negative correlation of SWB with higher levels of education. In particular, a female individual with an education level of primary or secondary or more had a negative relationship with SWB, with a higher magnitude of effect in the secondary or more category. This is not surprising in the context of rural Bangladesh – female members of households are not usually employed in meaningful and gainful employment in rural areas, something which may be morale- and wellbeing-suppressing – particularly for those with higher levels of education. This was also evident in the data, which showed the majority (61.9%) of primary or secondary or more educated females to be in non-earning occupations, compared with just 4.5% of males with the same levels of education.

The model's explanatory power for all specifications, captured using the between-R^2, range from about 0.13 to 0.23, which is consistent with similar work on SWB. Kahneman et al (1999) explained that only about 8% to 20% of individual wellbeing depends on objective factors and can thus be explained through the models.

4.1 SWB and income

The first model we estimated is from specification (2), where we explored the effect of income on individuals' SWB measure. The results are presented in Table 4. The simplest specification, which regresses SWB on the log of per capita monthly expenditure, is presented in column 1. We found the correlation of the income coefficient with SWB to be strong, positive and highly statistically significant. The effect size was also found to be larger for female compared to male individuals. However, the addition of control variables to the specification reversed the size of the effect – male individuals now derived more happiness from income compared to female individuals (see columns 5 and 6). The effect size of income on SWB was also reduced for the overall sample, as shown in column 4.

Table 4: Subjective wellbeing, income and non-monetary poverty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Base model			Base model + controls			Base model + controls and MPI score		
Variable	Full sample	Male	Female	Full sample	Male	Female	Full sample	Male	Female
Log per capita expenditure	0.839***	0.721***	1.032***	0.535***	0.643***	0.396***	0.486***	0.610***	0.325***
	(0.045)	(0.059)	(0.059)	(0.071)	(0.098)	(0.096)	(0.071)	(0.098)	(0.097)
MPI score							0.998***	0.636***	1.429***
							(0.135)	(0.173)	(0.183)
Age of respondent				-0.001	-0.004	-0.009	-0.008	-0.009	-0.024
				(0.008)	(0.011)	(0.015)	(0.008)	(0.011)	(0.015)
Age square of respondent				-0.000	0.000	0.000	-0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Respondent has less than primary education				0.192***	0.381*	0.054	0.189***	0.384*	0.034
				(0.066)	(0.217)	(0.174)	(0.066)	(0.217)	(0.174)
Respondent has primary education				0.209***	-0.002	-0.375	0.202***	-0.015	-0.415*
				(0.059)	(0.268)	(0.230)	(0.059)	(0.269)	(0.231)
Respondent has secondary education or more				-0.036	0.057	-1.284*	-0.045	0.048	-1.276*
				(0.114)	(0.481)	(0.680)	(0.113)	(0.480)	(0.717)
Respondent is widowed/separated/deserted				-0.688***	-0.121	-1.238***	-0.671***	-0.118	-1.228***
				(0.179)	(0.405)	(0.204)	(0.179)	(0.406)	(0.201)
Previous four weeks were worse than usual				-0.383***	-0.276***	-0.471***	-0.380***	-0.270***	-0.468***
				(0.052)	(0.075)	(0.073)	(0.052)	(0.075)	(0.072)
Respondent has a disability				-0.157***	-0.193**	-0.204**	-0.157***	-0.196**	-0.204**
				(0.051)	(0.087)	(0.079)	(0.051)	(0.087)	(0.080)
Day labourer				-0.028	-0.019	-0.157	-0.025	-0.014	-0.140
				(0.096)	(0.151)	(0.309)	(0.096)	(0.151)	(0.304)
Self-employed/business				-0.014	0.050	0.541*	-0.014	0.051	0.537*
				(0.090)	(0.148)	(0.299)	(0.090)	(0.148)	(0.299)
Farmer				0.147*	-0.031	0.376	0.143*	-0.028	0.363
				(0.086)	(0.155)	(0.237)	(0.086)	(0.155)	(0.237)
Non-earning occupation				0.336***	-0.409*	0.171	0.329***	-0.408*	0.157
				(0.087)	(0.223)	(0.237)	(0.087)	(0.223)	(0.238)
Number of dependants in household				-0.027	0.014	-0.076***	-0.015	0.020	-0.062***
				(0.019)	(0.024)	(0.023)	(0.019)	(0.024)	(0.023)
Non-Muslim household				-0.187*	-0.317**	-0.048	-0.194*	-0.320**	-0.074

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Base model			Base model + controls			Base model + controls and MPI score		
Variable	Full sample	Male	Female	Full sample	Male	Female	Full sample	Male	Female
				(0.102)	(0.125)	(0.122)	(0.102)	(0.127)	(0.121)
Household is joint family				0.213***	0.174***	0.251***	0.179***	0.153***	0.197***
				(0.041)	(0.051)	(0.054)	(0.040)	(0.051)	(0.054)
Constant	0.447	1.177**	-0.884*	-1.378**	-0.767	-1.906**	-0.556	-0.180	-0.301
	(0.372)	(0.488)	(0.483)	(0.567)	(0.762)	(0.770)	(0.571)	(0.771)	(0.784)
Year dummies	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	21,255	10,628	10,627	21,255	10,628	10,627	21,249	10,625	10,624
Number of a01	3,543	3,543	3,543	3,543	3,543	3,543	3,543	3,543	3,543
R-sq between	0.155	0.0956	0.109	0.215	0.135	0.158	0.230	0.140	0.176

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Next, we looked at whether inclusion of the multidimensional poverty index, which captures measures of wellbeing other than income, had a dampening effect on the strength of the relationship of SWB and income. As discussed earlier, an individual's happiness should not only be measured by the monetary aspect; rather, non-monetary aspects also play an important role in determining happiness. We did indeed find this to be true – inclusion of the MPI score was found to reduce the effect of income on SWB, as presented in column 7. And, as hypothesised, the MPI score was found to be positively related to happiness. Female individuals were seen to care more about the non-monetary aspects of wellbeing, with the strength of the relationship between the MPI score and SWB strongest for women, as depicted by the magnitude of the coefficient on the MPI variable.

4.2 SWB and monetary poverty

Table 5 presents the results of contemporaneous poverty on individuals' SWB. In the base specification presented in column 1, the coefficient of the poverty incidence variable, measured using the $3.20/person/day measure, indicates a negative correlation between poverty and SWB, ie being in poverty lowers an individual's happiness. However, the relationship is not statistically significant. On the other hand, the intensity or depth of poverty, measured by gap of income from the poverty line was found to be statistically significant and negatively related to SWB. In other words, the further an individual is below the poverty line, the lower is his/her SWB. When the analysis is disaggregated by gender, we find that contemporaneous poverty is statistically significant and a strong determinant of SWB for male respondents. The effect size is quite large – a male individual who lives in a household just below the poverty line, so that the incidence of poverty is 1 and depth of poverty is almost 0, had a SWB score that is 0.187 lower than the same person when he is not poor. This effect size is of similar magnitude to the drop in wellbeing from being chronically disabled. On the other hand, poverty incidence did not have a statistically significant effect for female individuals, but depth of poverty did, and the magnitude of the effect was larger than that of male individuals.

Table 5: Subjective wellbeing, monetary and non-monetary poverty

	(1)	(2)	(3)	(4)	(5)	(6)
	Base model + controls			Base model + controls and MPI score		
Variable	Full sample	Male	Female	Full sample	Male	Female
Headcount poverty (d^0)	-0.081	-0.187***	0.049	-0.088*	-0.193***	0.037
	(0.052)	(0.070)	(0.072)	(0.052)	(0.069)	(0.072)
Depth of poverty (d^1)	-0.762***	-0.554**	-0.946***	-0.627***	-0.460**	-0.745***
	(0.162)	(0.230)	(0.216)	(0.163)	(0.232)	(0.216)
MPI score				1.000***	0.657***	1.402***
				(0.135)	(0.173)	(0.182)
Age of respondent	-0.002	-0.004	-0.009	-0.008	-0.009	-0.024
	(0.008)	(0.011)	(0.015)	(0.008)	(0.011)	(0.015)
Age square of respondent	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Respondent has less than primary education	0.194***	0.395*	0.054	0.191***	0.398*	0.034
	(0.066)	(0.216)	(0.174)	(0.066)	(0.216)	(0.174)
Respondent has primary education	0.209***	0.005	-0.384*	0.202***	-0.008	-0.421*
	(0.059)	(0.269)	(0.230)	(0.059)	(0.270)	(0.231)
Respondent has secondary education or more	-0.040	0.014	-1.342**	-0.048	0.008	-1.323*
	(0.114)	(0.487)	(0.683)	(0.114)	(0.486)	(0.718)
Respondent is widowed/separated/deserted	-0.688***	-0.122	-1.236***	-0.671***	-0.118	-1.228***
	(0.178)	(0.399)	(0.203)	(0.178)	(0.401)	(0.201)
Previous four weeks worse than usual	-0.381***	-0.272***	-0.468***	-0.378***	-0.267***	-0.466***
	(0.052)	(0.075)	(0.073)	(0.052)	(0.075)	(0.072)
Respondent has a disability	-0.149***	-0.178**	-0.196**	-0.149***	-0.181**	-0.197**
	(0.051)	(0.087)	(0.079)	(0.051)	(0.087)	(0.079)
Day labourer	-0.028	-0.022	-0.152	-0.025	-0.017	-0.137
	(0.096)	(0.152)	(0.310)	(0.096)	(0.152)	(0.304)
Self-employed/business	-0.014	0.052	0.538*	-0.013	0.053	0.535*
	(0.090)	(0.147)	(0.298)	(0.090)	(0.147)	(0.299)
Farmer	0.149*	-0.023	0.378	0.145*	-0.021	0.365
	(0.087)	(0.156)	(0.237)	(0.087)	(0.156)	(0.238)
Non-earning occupation	0.335***	-0.436*	0.170	0.327***	-0.434*	0.156
	(0.087)	(0.224)	(0.238)	(0.087)	(0.224)	(0.238)
Number of dependants in household	-0.030	0.007	-0.074***	-0.019	0.013	-0.061***
	(0.019)	(0.024)	(0.023)	(0.019)	(0.024)	(0.023)

	(1)	(2)	(3)	(4)	(5)	(6)
	Base model + controls			Base model + controls and MPI score		
Variable	Full sample	Male	Female	Full sample	Male	Female
Non-Muslim household	-0.188*	-0.319**	-0.049	-0.195*	-0.322**	-0.074
	(0.103)	(0.126)	(0.123)	(0.103)	(0.127)	(0.122)
Household is joint family	0.199***	0.158***	0.239***	0.167***	0.137***	0.188***
	(0.040)	(0.051)	(0.054)	(0.040)	(0.051)	(0.053)
Constant	1.311**	2.155***	0.325	1.817***	2.543***	1.433
	(0.630)	(0.806)	(0.904)	(0.630)	(0.806)	(0.913)
Year dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	21,255	10,628	10,627	21,249	10,625	10,624
Number of a01	3,543	3,543	3,543	3,543	3,543	3,543
R-sq between	0.213	0.133	0.159	0.228	0.138	0.176

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

When the MPI score is included in the model as a control (for columns 4-6), we see a decrease in the strength of the effect of poverty incidence and depth on SWB, similar to that observed in the case of income. The magnitude of the effect of the MPI score on SWB is similar to that of the income specifications, with the effect stronger for women than men.

4.3 SWB and relative income

Table 6 presents the results of the third specification – the effect of the three measures of relative income described earlier on SWB. In columns 1 to 3, the (log) average income of the reference group is included alongside family income. The inclusion of the average income of the reference group does not change the magnitude or the direction of the relationship of income to SWB, as seen in the base specification in column 1 in the table. As hypothesised, the sign on the average income of the reference group was found to be negative, which is consistent with other studies using similar measures (for example, McBride, 2001; Ferrer-i-Carbonell, 2005). Both income coefficients are similar in magnitude for the total sample, ie if all individuals in the reference group enjoy an income increase of the same magnitude, their expected SWB will remain fairly constant. When the analysis is disaggregated by gender, the coefficient of the average income of the reference group is higher for female compared to male individuals. This means that a proportionate increase in the income of the reference group would see a larger fall in SWB among female than male individuals.

In columns 4 to 6, the average income of the reference group is replaced by the difference between the individual's own family income and the reference income. As expected, the effect of the difference is positive: the wider the gap between an individual's own income and the income of the reference group, the happier is the individual. The effect was found to be statistically significant for the whole sample, and for the subsample of female individuals, with the magnitude of the effect larger for female compared to male individuals. In addition, the income coefficient has now become non-significant for all samples.

Table 6: Subjective wellbeing, relative and non-monetary poverty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Average reference group income			Difference between own and reference group income			Richer/poorer		
Variable	Full sample	Male	Female	Full sample	Male	Female	Full sample	Male	Female
Log per capita expenditure	0.534***	0.641***	0.395***	0.051	0.336	-0.313	0.055	0.337	-0.304
	(0.071)	(0.099)	(0.096)	(0.202)	(0.278)	(0.237)	(0.202)	(0.277)	(0.238)
Log average expenditure in district	-0.483**	-0.305	-0.709***						
	(0.195)	(0.274)	(0.223)						
Log difference of own and district expenditure				0.483**	0.305	0.709***			
				(0.195)	(0.274)	(0.223)			
Richer							0.438**	0.297	0.611**
							(0.207)	(0.282)	(0.244)
Poorer							-0.511**	-0.309	-0.770***
							(0.204)	(0.290)	(0.233)
MPI score	0.987***	0.627***	1.404***	0.987***	0.627***	1.404***	0.983***	0.626***	1.394***
	(0.134)	(0.172)	(0.182)	(0.134)	(0.172)	(0.182)	(0.134)	(0.173)	(0.182)
Age of respondent	-0.007	-0.008	-0.021	-0.007	-0.008	-0.021	-0.007	-0.008	-0.021
	(0.008)	(0.011)	(0.015)	(0.008)	(0.011)	(0.015)	(0.008)	(0.011)	(0.015)
Age square of respondent	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Respondent has less than primary education	0.189***	0.383*	0.031	0.189***	0.383*	0.031	0.189***	0.383*	0.030
	(0.066)	(0.217)	(0.174)	(0.066)	(0.217)	(0.174)	(0.066)	(0.217)	(0.174)
Respondent has primary education	0.203***	-0.016	-0.411*	0.203***	-0.016	-0.411*	0.203***	-0.016	-0.413*
	(0.059)	(0.270)	(0.231)	(0.059)	(0.270)	(0.231)	(0.059)	(0.270)	(0.231)
Respondent has secondary education or more	-0.042	0.042	-1.228*	-0.042	0.042	-1.228*	-0.043	0.042	-1.247*
	(0.114)	(0.480)	(0.705)	(0.114)	(0.480)	(0.705)	(0.114)	(0.480)	(0.706)
Respondent is widowed/separated/deserted	-0.669***	-0.135	-1.205***	-0.669***	-0.135	-1.205***	-0.668***	-0.135	-1.201***
	(0.178)	(0.405)	(0.201)	(0.178)	(0.405)	(0.201)	(0.178)	(0.405)	(0.201)
Previous four weeks worse than usual	-0.378***	-0.270***	-0.459***	-0.378***	-0.270***	-0.459***	-0.378***	-0.270***	-0.459***
	(0.052)	(0.075)	(0.073)	(0.052)	(0.075)	(0.073)	(0.052)	(0.075)	(0.073)
Respondent has a disability	-0.154***	-0.192**	-0.197**	-0.154***	-0.192**	-0.197**	-0.154***	-0.192**	-0.198**
	(0.051)	(0.088)	(0.079)	(0.051)	(0.088)	(0.079)	(0.051)	(0.088)	(0.079)
Day labourer	-0.025	-0.013	-0.165	-0.025	-0.013	-0.165	-0.025	-0.013	-0.163
	(0.096)	(0.151)	(0.305)	(0.096)	(0.151)	(0.305)	(0.096)	(0.151)	(0.305)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Average reference group income			Difference between own and reference group income			Richer/poorer		
Variable	Full sample	Male	Female	Full sample	Male	Female	Full sample	Male	Female
Self-employed/business	-0.016	0.049	0.512*	-0.016	0.049	0.512*	-0.017	0.049	0.510*
	(0.090)	(0.148)	(0.299)	(0.090)	(0.148)	(0.299)	(0.090)	(0.148)	(0.300)
Farmer	0.143*	-0.028	0.352	0.143*	-0.028	0.352	0.143*	-0.028	0.351
	(0.086)	(0.155)	(0.238)	(0.086)	(0.155)	(0.238)	(0.086)	(0.155)	(0.238)
Non-earning occupation	0.327***	-0.410*	0.141	0.327***	-0.410*	0.141	0.327***	-0.411*	0.140
	(0.087)	(0.223)	(0.239)	(0.087)	(0.223)	(0.239)	(0.087)	(0.224)	(0.239)
Number of dependants in household	-0.004	0.028	-0.044*	-0.004	0.028	-0.044*	-0.003	0.028	-0.042*
	(0.019)	(0.024)	(0.023)	(0.019)	(0.024)	(0.023)	(0.019)	(0.024)	(0.023)
Non-Muslim household	-0.198*	-0.323**	-0.082	-0.198*	-0.323**	-0.082	-0.198*	-0.323**	-0.082
	(0.101)	(0.126)	(0.119)	(0.101)	(0.126)	(0.119)	(0.101)	(0.126)	(0.119)
Household is joint family	0.181***	0.154***	0.199***	0.181***	0.154***	0.199***	0.180***	0.154***	0.197***
	(0.040)	(0.051)	(0.053)	(0.040)	(0.051)	(0.053)	(0.040)	(0.051)	(0.053)
Constant	2.564*	1.768	4.268**	2.564*	1.768	4.268**	2.531*	1.762	4.196**
	(1.511)	(2.168)	(1.776)	(1.511)	(2.168)	(1.776)	(1.512)	(2.166)	(1.775)
Year dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	21,249	10,625	10,624	21,249	10,625	10,624	21,249	10,625	10,624
Number of a01	3,543	3,543	3,543	3,543	3,543	3,543	3,543	3,543	3,543
R-sq between	0.237	0.143	0.181	0.237	0.143	0.181	0.237	0.143	0.181

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Finally, columns 7 to 9 present results from the third measure of relative income, which includes the variables richer and poorer. As with the second measure of relative income, the family income coefficient was non-significant for all three samples. We found that, for the whole sample and for the subsamples of male and female individuals, the comparisons were asymmetric: the coefficient for richer is smaller than the coefficient for poorer. The coefficients for the male sample, however, were not significant. This result yields the conclusion that in our sample the comparisons are, as postulated by Duesenberry (1949), asymmetric and upwards, ie poorer individuals are negatively affected by the income of their richer peers, while the richer individuals are not any happier knowing that their income is above that of their co-citizens.

5 Concluding remarks

Using a nationally representative micro-panel dataset from rural Bangladesh spanning eight years and three rounds, this paper has explored the relationship between subjective wellbeing and other conventional metrics of wellbeing, namely, income, relative income, monetary and non-monetary poverty. This is the first estimate of a wellbeing function for Bangladesh using a nationally representative micro-panel dataset. The empirical analysis estimated individual subjective wellbeing functions by means of a linear model with individual random effects. A large set of control variables – education, working status and disability – was included in the estimations of the wellbeing functions.

The main conclusions about the micro-determinants of wellbeing are as follows. First, a strong and positive relationship between SWB and income was found, which is highly statistically significant. This relationship is robust to the inclusion of control variables, albeit dampening to some extent. Second, for poverty measures, the depth of poverty, i.e. how far an individual is below the poverty line, was found to matter more for happiness compared to the incidence of poverty. Third, relative income was found to be an important determinant of happiness – a higher average income in the reference group was found to reduce happiness, with SWB increasing as the gap between one's own income and that of the reference group increased. The comparisons are asymmetric and upwards, ie poorer individuals are negatively affected by the income of their richer peers, while richer individuals are not any happier knowing that their income is above that of their co-citizens, Four, with respect to gender effects, although the income effect was found to be stronger for male individuals, the effect of relative income, monetary and non-monetary poverty on SWB were larger for female than for male individuals.

Our findings have important policy implications with respect to assessing wellbeing. In estimating the subjective wellbeing functions for Bangladesh, we find that our preferred specification is multidimensional in nature. This encompasses some variables corresponding to the income notion, some to the basic needs (or enhancing people's capabilities) notion, and some to the relative (or social) notion of deprivation. Therefore, any effort to improve the wellbeing of the general population should be holistic in

nature, the aim of which should not only focus on improving income, but on simultaneously improving people's standard of living, expanding their set of capabilities, and addressing the economic inequalities that may exist in society.

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