



Quality of Life in Rural Bengal: A Case Study

Dr. Sibaram Chatterjee

Abstract

The paper traces the status of Quality of Life in Paschim Medinipur, one of the backward districts in the state of West Bengal by adopting a methodology combining different dimensions of Quality of Life, *viz.*, per capita household income, better health care, education expense, possession of valuable assets, per capita consumption of nutritious food, use of safe drinking water, better housing, use of sanitation, relative social freedom and social recognition during post pandemic period. It attempts to develop a Quality of Life Index (QLI) by using totally fuzzy analysis. Regression analysis is used too to show the impact of bank credit on the Quality of Life. The empirical results confirm that bank credit has a significant positive impact on Quality of Life.

Keywords: Quality of Life, Bank Credit, RRB.

I. Introduction:

Human Development Index (HDI) was introduced in 1990 by the United Nations Development Programme (UNDP) to measure the broader aspects of human development including the economic status of the people. The HDI is theoretically based on Sen's capability approach (1985) which proposes a framework to evaluate individual well-being, social relationship and changes in societies. The three main factors of Sen's approach are the "commodities" (or resources), the "functionings" and the "capabilities". Based on his capability approach, the UNDP (1997) attempts to define human development as the process of increasing people's choices by expanding their human capabilities and opportunities. According to this approach, mere deprivation of basic needs does not imply poverty only but influence it. Sen suggests that human well-being is not determined by the possession of resources only but by the transformation of these resources into "functionings" which depends not only upon personal factors but also on social and environmental factors. Sharply, the distinction among the "commodities", "functionings" and "capabilities" lets open the possibility of designing several composite indicators of human well-being. 'Standard of Living' and 'Quality of Life' are two such important composite indices.

Standard of living is exclusively based on income and material wealth, which emphasizes on economic (or quantitative) aspect of life. Whereas, Quality of Life (QOL) is concerned not only with the economic aspect but also with other aspects of life like social, ecological, political and environmental aspects. Thus, it deals with the quantitative and qualitative facets of life. Thus, QOL represents the status of general well-being of the individuals and the society. The term is used in a wide range of contexts, including the fields of international development, health care and politics. According to World Health Organization (1993), QOL is an individual's perception of his position in life in the context of the culture and value systems in which he lives and in relation to his goal, expectation, standard and concern. Evaluation of QOL depends upon the individual's value system and the cultural environment where he lives in and also upon some external factors. Good living conditions lead to high quality of life and vice versa. Thus, 'Standard of Living' index is constructed to include several indicators corresponding to "Commodities" that could be identified as inputs, while 'Quality of Life' index includes several indicators and corresponds to a combination of "functionings" and / or "capabilities" within the meaning of freedom. These indicators can be identified as output within transformation logic of "commodities" as Sen suggests.

QOL is influenced by many factors like employment, income, welfare, education, health, social support, working condition, ecological factors and so forth. In the present study,

Quality of Life in Rural Bengal: A Case Study

eleven indicators have been taken into consideration, namely, per capita household income, average intake of nutritious food per member of the household, use of safe drinking water, better housing / shelter, better health care, use of sanitation, average educational expense per household student, total enrolment in school, average amount of assets possessed by household, relative social liberty and social recognition. Thus, poverty can be defined as an accumulation of 'deprivations' or 'shortfalls' according to the different considered dimensions. Inversely, QOL can be interpreted as an accumulation of 'effective achievements' (Vale'rie Be'renger and Audrey Verdier-Chouchane, 2006). In this present study, QOL has been assessed from the perspective of 'effective achievement' by formulating a composite index by using Totally Fuzzy Analysis. The COVID-19 pandemic has a greater impact on livelihood of the poor and priority sector. Both the Governments have taken various measures to uplift the economic status of the priority sectors. One of the important measures is credit dose given to them to boost up their quality of life.

The QOL, a growing area of study, has gained its position in the empirical research of various fields like social policy, economics, psychology, health services and so forth. The main problem is that there is no universal determination of the QOL. A few studies related to QOL and its determinants have been done in India and abroad so far. Access to credit helps the poor to improve their productivity and management skill which in turn increases their income and other benefits, such as, health care and education. Realistic evidence can be originated from various papers, such as, Morduch (1995), Gulli (1998), Pitt and Khandker (1998, 2002), Zeller (2000), Parker and Nagarajan (2001), Khandker (2001, 2003), Khandker and Faruque (2001), etc.. Benhabib *et al.* (2007) observes that the fuzzy set approach is more pertinent than others in capturing different graded attributes of poverty. The study reveals that income is not the sole indicator of human well-being and should be supplemented by other attributes, *viz.*, housing, level of comfort and social capital. Pradhan (2008) examines the status of QOL in India with particular reference to north-eastern states and proposes a methodology to combine different dimensions of QOL like income, education, health, employment and infrastructure into quality of life index by applying Totally Fuzzy Analysis. Kabir *et al.* (2012) have examined the impact of micro credit on reduction of poverty through improvement of standard of living and increasing empowerment of poor and marginalized sections of the society. They conclude that there is a noticeable and positive impact of micro credit activities on the standard of living, empowerment and poverty reduction among the poor people of Bangladesh. Saleem (2011) attempts to find out the impact of credit dose on the well-being of the farmers in Pakistan. The study observes that more educated younger farmers with either family and farm size and farming experience are being provided credit as they are more adoptive. Extension services

have been easily accessible to them so that they may take full advantage of obtaining credit through application of this credit in adoption of new farm technology and to raise their income and hence their living standard. Quach *et al.* (2005) has developed an econometric frame to analysis the effect of credit on the economic welfare of households in rural Vietnam. The household borrowing has a greater positive impact on poorer households, compared to better-off households. Abiola and Oyeleye (2012) examine the impact of micro-finance banks on poverty alleviation in selected local government areas of Oyo State. They observe that the poverty index of the respondents has reduced after obtaining bank loan. They recommend that the size of loans given should be increased in order to enhance their QOL and consequently to alleviate poverty. Valerie and Verdier-Chouchane (2006) have used 9 indicators of standard of living and 9 indicators of QOL which are divided into various fields like, health, education and environment etc. to provide a finer measurement of poverty. The empirical results are based on two different multidimensional analysis of poverty, *i.e.*, the Totally Fuzzy Analysis and the factorial analysis of correspondence.

Most of the earlier studies as mentioned above put their effort on the measurement of standard of living or economic well-being of the households, which are more or less quantitative measures. Qualitative measure of standard of life has been left out in those studies. The earlier studies did not put any specific emphasis on the role of Bank credit on QOL through upliftment of income and wealth level. The earlier empirical findings show that credit induces economic aspect of QOL, whereas education and age push the social aspects. But, there is hardly any work conducted so far on the impact of bank credit on QOL in the context of backward region. The regional problems and prospects relating to QOL are not clearly discussed or demonstrated in the earlier studies. The study thus attempts to explore and find out to what extent the QOL of the sample households in the district of Paschim Medinipur, one of the backward districts of West Bengal, has been influenced after they could obtain bank loan. The following questions have been addressed in the study: Does the bank credit play any significant role on QOL of the households in post-pandemic period? Is education level and age of the head of the household related to QOL of the households? Is the human development index of a region having any significant impact on QOL of the households in that region?

The rest of the paper is divided into five sections. Section II is devoted to the justification and presentation of mathematical framework of 'Totally Fuzzy Analysis' for the analysis of QOL. Section III represents the sample frame and data sources. Various indicators for framing QOLI and the status of QOL are analyzed in Section IV. Section V presents the regression model for estimation of QOL and analyses the empirical results. Section VI concludes.

II. Totally Fuzzy Analysis to measure QOL – A theoretical description of the technique

The development of QOL indices for each household requires the choice of a suitable methodology for measurement. Fuzzy set as developed by Zadeh (1965) allows the treatment of multidimensional and vague concepts such as, human well-being, standard of living, quality of life and poverty. Fuzzy set is ideal to address the vertical vagueness and horizontal vagueness of QOL by allowing every household some degree of ‘effective achievement’ in each dimension of QOL (Naidoo, 2007).

According to the traditional approach, the set of poor households is a crisp set *i.e.*, a household either belonging to the set of poor households or not depending on one critical level (*e.g.*, the poverty line). There is no partially poor household. The fuzzy set approach has two critical levels instead of one minimum level, below which a household absolutely belongs to the set of poor, and a maximum level above which a household absolutely does not belong to the set of poor households. If a household falls between these two critical points then that household partially belongs to the set of poor households. Fuzzy set allows for multi-dimensions to be used in measuring the status of QOL of a household. For the construction of QOL index using fuzzy theory, membership function of a given set associated to each household and indicator need to be formulated. The value of membership function will provide a degree of ‘effective achievement’ (inversely, which is the degree of deprivation¹) of the sample household relative to a given indicator (Naidoo, 2007). There are several definitions for the membership function in the literature.

The present study has followed the “Totally Fuzzy Analysis” (TFA) as defined originally by Cerioli and Zani (1990) in contrast to the “Totally Fuzzy & Relative” (TFR) defined by Cheli and Lemmi (1995) for the formulation of membership function. Cerioli and Zani (1990) opined that there should be a minimum critical level below which a household should be considered as absolutely poor (*i.e.*, indicating poor quality of life) and a maximum level above which a household should be considered absolutely not poor (*i.e.*, indicating better quality of life). If a household’s deprivation falls between these two levels, the membership function would be a linear function between the minimum critical level and the maximum critical level.

Mathematical framework of TFA

Assume $i \in [1, n]$ respondent and $j \in [1, M]$ are the indicators of QOL. Consider $X_j^i = \{ X_{j/j=1,2,3,\dots,M}^i \}$ are vectors of respective indicators of QOL. The variable X_j^i is the value taken

by indicator j for the i th respondent. For the formulation of Membership Function in respect of degree of effective achievement for each indicator, let us assume that μ_j^i provides the degrees of effective achievement of the i th respondent relative to the indicator j . When ranking values of j by increasing order (*i.e.*, higher the value of a given indicator, higher is the degree of effective achievement), function μ_j^i is defined as follows:

$$\mu_j^{(i)} = \begin{cases} 1 & \text{If, } X_j^{\max} \leq X_j^i \\ \frac{X_j^i - X_j^{\min}}{X_j^{\max} - X_j^{\min}} & \text{If, } X_j^{\min} \leq X_j^i \leq X_j^{\max} \\ 0 & \text{If, } X_j^i \leq X_j^{\min} \end{cases}$$

where, X_j^{\min} and X_j^{\max} are the lower and upper bound of the system.

It is to be noted that the functions are increasingly linear between zero and one according to the degree of effective achievement. If it is closer to one, it is an indication of high degree of achievement and if it is closer to zero, it is an indication of low degree of achievement. The higher degree of achievement means higher QOL. In order to obtain the composite index of QOL for each respondent, different degrees of effective achievement obtained for each respondent and indicator need to be summarized. Following Cerioli and Zani (1990), composite index is defined by taking the weighted arithmetic mean of the membership functions, obtained from the respective indicators. Mathematically, it is represented as:

$$\mu_{QL}^{(i)} = \sum_{j=1}^M w_j \mu_j^{(i)} \dots\dots\dots (2)$$

where, w_j is the weight attributed to the respective indicators (j),

and where weight must be positive and its sum must be equal to one.

That is:

$$w_j \geq 0 \text{ and } \sum_{j=1}^M w_j = 1 \dots\dots\dots (3)$$

The weights of each indicator are calculated by the following way:

Quality of Life in Rural Bengal: A Case Study

$$W_j = \log(1/\bar{\mu}_j) / \sum_{j=1}^M \log(1/\bar{\mu}_j) \dots\dots\dots(4)$$

$$\text{where, } \bar{\mu}_j = 1/N \sum_{i=1}^N \mu_j(i) \dots\dots\dots (5)$$

The weight, W_j is inverse function of the mean effective achievement level relative to the indicator j. Since quality of life (inverse of which is poverty) does not vary in a linear way, the logarithmic curve function has been used into the weighting system. In this way a more important weight has been given to the indicators those are more widespread among the respondents. The value of quality of life index lies between 0 and 1, thus 1 indicating high QOL and 0 indicating low QOL.

III. Sample and Data source

On the basis of a number of socio economic indicators, districts of West Bengal are segregated into two groups: relatively developed districts and relatively backward districts (Das, 2011). In the study, Paschim Medinipur district of West Bengal has been selected from the group of backward districts. The state of West Bengal, in which the selected district belongs to, has around 91 million population, with a population density 1029, comprising of 68% rural population and 77 % literacy rate as per Census 2011. The percentage of BPL families stood at 34.12% in 2005 (Govt. of West Bengal, 2007). The percentage share of SCs and STs in total population was 23.02% and 5.50% respectively in 2001. Paschim Medinipur district has around 5.94 population, accounting for 6.51% of the total population of the state, with a rural population of 87.97% in 2011. The literacy rate of the district reached at 79.04% in 2011 as per the Census. The percentage of BPL families stood at 43.79% in 2005 (Govt. of West Bengal, 2008).

The blocks of Paschim Medinipur district have different socio-economic characteristics. On the basis of a number of socio-economic variables, namely, food grain productivity (FGP), percentage of non-marginal workers (NMW), percentage of above poverty line families (APL), literacy rate, road density per square km. and percentage of mouza electrification, the blocks are segregated in two strata, *i.e.*, relatively developed (having positive group index) and relatively less developed (having negative group index) (Table A1 in Annexure).

Primary data have been collected from the households which have been selected on the basis of multi-stage stratified random sampling. In the first stage, 3 blocks (having

positive group index) have been randomly chosen from the relatively developed strata and another 3 blocks (having negative group index) have been randomly chosen from the relatively backward strata. In second stage, 10 households, which have taken loan from regional rural banks (RRBs), have been selected from each block. Relevant information for both pre-bank credit period and post-bank credit period from each sample RRB's beneficiary household has been collected in order to assess the impact of bank credit on QOL. The information from 60 sample households was collected on the socio-economic characteristics affecting well-being of the households, *viz.*, provision of health care, education expenses per student of the household, average amount of nutritious food consumption per member of the household, average amount of assets possessed by the household, per capita monthly household income, provision of housing or shelter, provision of safe drinking water, provision of sanitation, their experience regarding relative social liberty, their participation in social decisions and their involvement in social works and development, etc.. These data have been collected with the help of a structured questionnaire for both pre-loan and post-loan period in the year 2021-2023.

IV. Findings relating to QOL of the Households after application of Totally Fuzzy Analysis

The Indicators of QOL

The HDI in any economy comprises of three basic dimensions, namely, a long and healthy life (*i.e.*, health dimension), knowledge (*i.e.*, education dimension), and a decent standard of living (*i.e.*, wealth dimension). In addition to these three components, QOL is also influenced by societal component. Ten indicators have been taken into consideration in this study and they have been categorized under four above-mentioned components.

Health component includes better health care, safe drinking water and use of sanitation. Education component includes educational expenses per student of household. Wealth or standard of living component includes nutritious food budget, average amount of assets possessed by household, per capita household income and better housing or shelter. Societal component includes relative social freedom and social recognition.

Let us now elaborate the notations used to represent different indicators as mentioned above and scoring of response received from different sample respondents whereas applicable.

Y_1 denotes better health care of the household. 2 point has been given to the respondents who go to the private clinic for their health treatment. 1 point has been assigned to those who obtain their health treatment from the public health centre or any other charitable health institutions. 0 point has been given to them who have not any ability either to go to

Quality of Life in Rural Bengal: A Case Study

private health clinic or public health centre for their better health treatment; they only follow traditional method of health treatment.

Y₂ denotes educational expenses per student of the household.

Y₃ denotes average amount of nutritious food consumption per member of the household.

Y₄ denotes average amount of assets including business assets and household assets.

Y₅ denotes amount of monthly household income per member of the household.

Y₆ denotes better housing/ shelter.

- a. If the house is owned by the respondent, point 1 is to be given, otherwise 0.
- b. If the house is modern type, point 1 is to be given, otherwise 0.
- c. If the house is pucca type, point 1 is to be given, for chucha type point 0.
- d. If the house has electric connection, point 1 is to be given otherwise 0.
- e. If the house has gas connection, point 1 is to be given otherwise 0.

Y₇ denotes use of safe drinking water. If the respondent has own sources of drinking water system, 1 point has been given. In case of supplied by local authority like Gram Panchayat, point 0 is to be given. Another extra 1 point is to be given to those households who drink water after proper purification.

Y₈ denotes use of sanitation. If the respondent has erected the sanitation system out of his own sources of income, point 2 is to be given. If the respondent has erected the sanitation system with the financial support of local panchayat, point 1 is to be given. Otherwise point 0 is given.

Y₉ denotes relative social freedom.

- i. Point 1 is to be given, if there is no political or other disturbance in his or her village, otherwise 0 is given.
- ii. If the respondent can participate in any public protest freely, point 1 is to be given to him.
- iii. Point 1 is to be given, if the respondent can express his or opinion freely in his or her society, otherwise 0 is given.

Y₁₀ denotes social recognition.

- i. Has he or she any participation in social decision?
Point 1 is to be given for yes, otherwise 0 is given.
- ii. Has he or she any involvement in social works and development?
Point 2 is to be given for active participation; point 1 is to be assigned for sleeping participation and point 0 is to be given for non participation.

The study considers two separate points of time, s and t. The households obtained the credit at the point of time at s. The impact borrowing during the period (from s to t) is expected to

occur at the end of the period and to affect household economic welfare and QOL. Let us assume that i th household obtains credit at time s . During the period from s to t , the households extend its QOL through the generation of its economic welfare which is observed at time t . Thus, the QOL of the i -th household at period s and t are denoted as y_{is} and y_{it} respectively.

By using totally fuzzy analysis (TFA) we construct the Quality of Life Index (QOLI) of each respondent for both pre-bank credit and post- bank credit periods (y_{is} and y_{it} respectively). According to the above formulations, closer the value of QOLI is to one, higher is the degree of ‘effective achievement’ which indicates high degree of QOL. Inversely closer the value of QOLI is to zero, higher is the degree of ‘deprivation’ which indicates lower QOL. Table 1 represents the descriptive statistics of the above variables and QOLI of the households after obtaining bank credit as well as before obtaining bank credit.

Table 1 Descriptive Statistics of QOLI and its Indicators

Variables/ QOLI	After obtaining Bank Credit (At Period t)				Before obtaining Bank Credit (At Period s)			
	Max	Min	Mean	S.D.	Max	Min	Mean	S.D.
Y ₁	3	0	2.317	.983	3	0	1.48	1.05
Y ₂ (Rs.)	2000	0	492.76	531.22	1000	0	107.73	154.26
Y ₃ (Rs.)	1200	0	276.88	244.51	550	0	96.567	122.41
Y ₄ (Rs.)	1800000	3500	411058	494188	1375000	0	158416	237232
Y ₅ (Rs.)	4389.00	48.00	1289.63	1154.47	2500	30	399.417	391.44
Y ₆	5	0	2.767	1.43	4	0	1.733	1.247
Y ₇	2	0	0.65	0.777	2	0	0.583	0.720
Y ₈	2	0	1.167	.806	2	0	0.983	0.833
Y ₉	3	0	1.417	1.013	3	0	1.267	0.861
Y ₁₀	3	0	1.40	1.123	3	0	1.55	0.91
y_{it} / y_{is}	.758	.038	.342	.208	0.961	0.018	0.246	0.182

Table 2 represents indicator-wise average degree of effective achievement *i.e.* $[1/N \sum_{i=1}^n \mu_j^i]$ of QOL of the sample respondents in respect of before obtaining bank credit and after obtaining bank credit situations.

Table 2 Average Degrees of Effective Achievement of QOL by Indicators

	Period	Y ₁	Y ₂	Y ₃	Y ₄	Y ₅	Y ₆	Y ₇	Y ₈	Y ₉	Y ₁₀
Degrees of	Pre-Credit	0.494	0.108	0.176	0.115	0.150	0.433	0.292	0.492	0.422	0.517

Quality of Life in Rural Bengal: A Case Study

Effective Achievement $1/N \sum_{i=1}^n \mu_j^i$	(s)										
	Post- Credit (t)	0.772	0.246	0.231	0.227	0.286	0.553	0.325	0.583	0.472	0.467
	Increase/Decrease (Times)	1.56	2.28	1.31	1.97	1.91	1.28	1.11	1.18	1.12	0.90

Note: t indicates time period after obtaining bank credit, s indicates time period before obtaining bank credit and N is the total number of sample households.

Table 2 exhibits average degrees of effective achievement of QOL by indicators after availing bank credit. It has been found that the average degrees of effective achievement in quality of life of all the indicators have been more or less improved, except social recognition (Y_{10}). It is interesting to note that most of the economic indicators of quality of life, which are directly related to the income and wealth of the households, such as, better health care (Y_1), educational expenses per student of the household (Y_2), average amount of nutritious food consumption per member of the household (Y_3), average amount of assets possess by the household (Y_4), per capita monthly household income (Y_5) have been considerably improved in post-credit period (t) as compared to pre-credit period (s).

The study represents a comparative picture of the status of QOL of the individual household in four preferable zones, namely, very low quality of life zone ($0.25 > y_{it} \geq 0$), low quality of life zone ($0.50 > y_{it} \geq 0.25$), high quality of life zone ($0.75 > y_{it} \geq 0.50$) and very high quality of life zone ($1 \geq y_{it} \geq 0.75$). This is actually done between two different points of time *viz.*, before taking credit and after taking credit. Table 3 represents the status of QOL of the individual household in four preferable zones.

Table 3 Status of QOL: A comparison between Pre-credit period and Post-credit period

Class	After Obtaining Bank Credit		Before Obtaining Bank Credit	
	Households	% Share	Households	% Share
$0.25 > y_{it} \geq 0$	22	36.67	34	56.67
$0.50 > y_{it} \geq 0.25$	24	40	21	35
$0.75 > y_{it} \geq 0.50$	13	21.67	04	6.67
$1 \geq y_{it} \geq 0.75$	01	1.66	01	1.66
Total nos. of Households (N)	60	100	60	100

Table 3 exhibits that in pre-credit period (s), 91.67 percent of the sample respondents, achieving below 50 percent score, were lying either in the group of very low QOL zone or low QOL zone.

Though, in post-credit period (t), this scenario has been slightly improved. But, in spite of availing bank credit, 76.67 of the respondents still belongs to these groups. In post-credit period, 21.67 percent of the sample respondents belongs to the group of high QOL zone as opposed to 6.67 percent in pre-credit period. However, a generally poor QOL of this district is perceived to be a combined effect of the lower rate of agricultural productivity, lower rate of industrial growth, lower per capita household income, lack of infrastructural facilities, market having no demand, lower rate of literacy and above all political instability. Along with this, the sample blocks included in “Jungle Mahal”² area suffer from serious socio-economic problems like geographical hindrance, rugged and hilly region, unfertile red laterite soil, waste and barren land and unemployment.

The calculated overall QOLI of the households, before and after availing bank credit are 0.246 and 0.342 respectively. This is calculated by getting the average from 60 sample households. In order to test whether the QOLI of the respondents after obtaining bank credit is significantly greater than that of before obtaining bank credit, Z test has been conducted. For 60 sample observations, the observed value is 2.70. Hence, the null hypothesis is rejected at 1% level resulting in a conclusion that QOLI of the households after obtaining bank credit is significantly greater than that of before obtaining bank credit. After availing bank credit (at period t), there is a considerable improvement in the QOLI of the sample households as compared to their position just before obtaining the bank credit (at period s).

Table 4 represents a vivid picture relating to change in QOLI with the change in time duration of bank credit. Time duration indicates the period of time out of total credit term, which has already been expired after taking bank credit and during which credit has already been utilized by the household. Table 4 shows that longer the time span of utilization of bank credit, better is the QOL of the respondent and vice-versa.

Table 4 Distribution of Values of QOLI across time spans of Credit of the Household

QOL Indices Time Span (T) (in' Months)	No. of Households				
	$.25 > y_{it} \geq 0$	$.50 > y_{it} \geq .25$	$.75 > y_{it} \geq .50$	$1 \geq y_{it} \geq .75$	Total (N)
$T \leq 15$	16	01	0	0	17
$15 < T \leq 36$	04	03	0	0	07
$36 < T \leq 60$	01	09	0	0	10
$T > 60$	01	11	13	01	26
Total (N)	22	24	13	01	60

V. Estimation of QOL: Multiple regression results

The Regression Model for Estimation of QOL

In this section, we investigate the impact of bank credit on QOL of the households by using

Quality of Life in Rural Bengal: A Case Study

multiple linear regression analysis. We use eleven models (10 indicators for QOL and over all QOL). The dependent variables are QOL indices as measured in the previous section. Two sets of independent variables are included in the regression analysis: those relating with credit and control variables measuring household characteristics of bank credit as well as macro indicators relating to the development of the region (block). The reason why we include control variables is that personal characteristics may influence the QOL of the household. Similarly, the regional development indicator may also influence the QOL of the households, thus the QOL being high in relatively developed region and vice-versa. The specification of independent variables and their descriptive statistics is summarized in Table 5.

Table 5 Specification of Independent Variables and their Descriptive Statistics

Variables	Specification	MAX	MIN	MEAN	SD
C ₁	Amount of Bank Credit (Rs.)	1200000	4000	217266.7	312539.7
C ₂	Duration of credit used by the household (in Months)	150	3	54	39.86
C ₃	Utilization of Loan (1 if loan used in the productive sector, 0 otherwise)	1	0	0.78	0.42
X ₁	Per Capita Savings (Rs.)	2500	0	482.67	569.59
X ₂	Age of the head of the Household (Years)	67	22	42.88	12.46
X ₃	Education Level of the Head of the Household	3	0	1.58	1.01
X ₄	Human Development Index	0.649	0.454	0.557	0.069

The QOL of the households during post bank credit period is estimated on the basis of the following regression model:

$$Y = \alpha + C\beta + X\lambda + \varepsilon$$

where, C is (3xN) matrix of credit indicators,

X is the (4xN) matrix of control variables,

α and ε are (N x 1) vectors of constant and disturbance term as usual,

β and λ are the (N x 1) coefficient vectors of credit and control variables respectively,

N is the number of observations (households), which is 60, and

Y is the Quality of Life of the Household.

The above regression model is applied to estimate QOL of post-loan period. Separate regression equations have been run taking separate indicators of QOL as the dependent variable. Accordingly, eleven regression models, *i.e.*, ten models for ten indicators and additional one for overall QOL score (y_{it}) have been run. Thus, eleven models have been

specified for the estimation of $Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Y_7, Y_8, Y_9, Y_{10}$ and y_{it} . The results of the eleven regression equations are presented in Table 6.

Table 6 Regression Estimations

Dependent Variable	α	Independent Variables							R ²	Adj R ²	F Value
		C ₁	C ₂	C ₃	X ₁	X ₂	X ₃	X ₄			
Y ₁	-1.65*	.01435	-.001	.95***	.0003	-.008	-	6.30***	.621	.570	12.17**
Y ₂	1150.09**	20.89	2.85	260.69	.449***	-4.084	-	23.08	.573	.515	9.96***
Y ₃	86.98	5.58	1.707	1.97	.220***	1.676	22.83	-233.43	.649	.602	13.73**
Y ₄	.673	0.98***	.0208*	-.139	.003***	-.009	.225	-1.466	.934	.926	105.85**
Y ₅	1059.6**	114.79**	4.138	124.14	1.33***	.088	19.37	-	.938	.930	112.78**
Y ₆	-.43	0.009	.018**	.470	.0003	-.007	.196	3.06*	.830	.807	36.14**
Y ₇	-2.49***	.01024	.007	.01167	.0002	.0004	-.179	4.81***	.546	.484	8.92***
Y ₈	-2.1***	.02204	.009**	.119	.00005	.005	-.05	4.35***	.721	.683	19.17**
Y ₉	-2.11**	-.0301	-.0064	.176	.00008	.0431**	.47**	2.078	.550	.490	9.08***
Y ₁₀	-2.42**	-.0602	-.009	.388	.0001	.05***	.55**	2.388	.556	.497	9.32***
y_{it}	-.21**	.0132**	.0013*	.0548*	.0002**	.002***	.021	.377**	.899	.885	66.12**

** → Significant at 1% Level, * → Significant at 5% Level and . → Significant at 10% Level.

The results indicate that the QOL of the households is positively influenced by the bank credit,

Quality of Life in Rural Bengal: A Case Study

duration of credit, effective utilization of loan, per capita savings of the household, education of the head of the household, age of the household head and also by the HDI of the region in which the household belongs to. Bank credit is a significant potential powerful explanatory indicator of the QOL. Access to bank credit (C_1) and its effective utilization into productive purpose (C_3) enhance per capita income of the household of the respondent, which makes them economically safer and secured, which ensures them to have a better QOL. Usage of loan in productive purpose has also a significant positive impact on the QOL. More and more usage of loan in productive sector ensures better income of the household, which enables them to have a better QOL. Time span of utilization of credit (C_2) positively and significantly stimulates the QOL. Longer the time span, it ensures relatively better financial stability and hence better QOL of the household.

Per capita savings of the household is also a significant powerful indicator influencing the QOL. Mere increase in per capita income of the household does not bring financial stability in a household, unless this incremental income goes into capital formation through savings. More and more savings lead to more capital formation, a part of which may be further reinvested into the business for generating profit and some portion may be used for creation of household assets. Education level of the household head has a positive impact on QOL but not statistically significant. Age of the household head is also a significant powerful potential explanatory indicator effecting QOL. HDI has also a positive significant impact on QOL. HDI is closely related to the overall development of a region in respect of health, education and economic livelihood of the inhabitants, physical infrastructure etc. So, any improvement in HDI of a region obviously results in better QOL of the households of that region.

The empirical findings show that credit is an important causal factor behind all the components (or, the independent variables in the regression model) of QOL except relative social freedom (Y_9) and social recognition (Y_{10}) in post pandemic period. In fact, relative social freedom and social recognition significantly depend much more upon 'age' and 'education' level of the household head. This finding is in conformity with the earlier research findings of M.H. Quach *et al.* in 2005 in the context of rural Vietnam. Education level of the household head in fact influences all the indicators of QOL in general positively except better health care (Y_1), average educational expenses per student of the household (Y_2), safe drinking water (Y_7) and personal sanitation system (Y_8). Per capita savings of the household has a positive and statistically significant impact on average educational expense per student of the household, average amount of nutritious food consumption per member of the household (Y_3), average amount of assets possessed by the household (Y_4) and per capita monthly income of the household (Y_5), which are closely related to the economic livelihood of the respondents.

HDI positively and significantly influences the infrastructural development indicators (*viz.*, better health care, better housing/ shelter, safe drinking water and personal sanitation system) of the QOL. Surprisingly, HDI is also having a positive impact on relative social freedom and social recognition but not statistically significant. Thus it can be concluded that in post-pandemic period, credit induces economic aspect of QOL, whereas education and age enhance the social aspects of QOL. Here comes to the role of infrastructural development of the region, measured by HDI too. Surprisingly, HDI has achieved to induce the households in respect of their upliftment of QOL in the field of better health care, better housing / shelter, safe drinking water and personal sanitation system.

VI. Conclusion

The paper traces the status of ‘Quality of Life’ in post-pandemic period in the district of Paschim Medinipur and also throws light on its determinants thereof. The empirical investigation follows the construction of QOLI of the households, by applying totally fuzzy analysis, while regression analysis has been used to study the dimensional impact on QOL. The study concludes that after availing bank credit, there is a considerable improvement in the QOLI of the sample respondents as compared to their position just before obtaining the bank credit. The study exhibits that after availing bank credit, the average degrees of effective achievement in quality of life of all the indicators have been improved, except social recognition (Y_{10}) and that most of the economic indicators of QOL have been considerably improved in post-credit stage as compared to pre-credit stage.

The empirical findings show that credit is an important causal factor behind all the components of QOL except relative social freedom and social recognition. In fact, relative social freedom and social recognition significantly depend much more upon ‘age’ and ‘education’ level of the household head. The study signifies that relative social freedom and social recognition are still confined irrespective of availing bank credit. Bank credit saves a man from a financially handicapped situation but it has failed to give the right to voice to one’s own free opinion. The study further confirms that HDI positively and significantly influences the infrastructural development indicators of QOL, *viz.*, better health care, better housing/ shelter, safe drinking water and personal sanitation system. Thus, the study concludes that credit induces economic aspect of QOL, whereas education and age encourage the social aspects of QOL. Here comes to the role of infrastructural development of the region, measured by HDI too. HDI influences both social and infrastructural indicators of QOL. The study accordingly concludes that to improve the overall status of QOL, there is a need to improve all the dimensions of QOL simultaneously. This is because they are very much interdependent of each other. The lack of one leads to lack of others, resulting in an overall degradation in the

Quality of Life in Rural Bengal: A Case Study

QOL. The study also recommends that there is an urgent need of well- integrated programme for the relatively backward blocks of this district.

Notes:

1. The concept “Quality of Life” is the inverse of ‘Poverty’. The measurement of the degree of ‘Deprivation’, effectively measures the poverty and the degree of ‘Effective Achievement’ effectively measures the quality of life. “Quality of Life” index constitutes the accumulation of degree of effective achievement in each dimension, whereas “Poverty” index comprises of degree of deprivation in each dimension.
2. Paschim Medinipur is one of the districts included in “Paschimanchal Unnayan Parshad Area” constituted in 2006 by the Govt. of West Bengal. The west and north-west part of this district covering 12 blocks is very backward and poverty-stricken. This area is however surrounded by forest (the word, ‘jungle’ is a synonym in Bengali language of the English word, ‘forest’). Recently, this area has been affected with political disturbance in form of the Maoist movement. The area has been popularly called by the novelists and journalists as “Jungle Mahal”.

References

- Benhabib, A., Ziani, T., Bettahar, S., Maliki, S. 2006. “Poverty evaluation in Algeria: A Logit-Probit model applied to a multidimensional field survey in the region of Tlemcen" in Petmesidou .M and Papatheodorou (eds.) "Poverty end social deprivation in the Mediterranean”, Zed Book.
- Baliamoune, M., 2003. “On the Measurement of Human Well-Being: Fuzzy Set Theory and Sen’s Capability Approach” presented at the WIDER Conference on “Inequality Poverty and Human Well-Being”, Helsinki (May).
- Cerioni, A. and S, Zani. 1990. "A fuzzy approach to the measurement of poverty", in Dagum, C. and M, Zenga. 1990 (eds.), “Income and Wealth Distribution, Inequality and Poverty, Studies in Contemporary Economics”, Springer Verlag, Berlin, pp.272-284.
- Das, Pinaki. 2011. *Pattern of Growth of Rural Non-Farm Employment in India*. Firma KLM (Pvt.) Ltd., Kolkata.
- Government of India. 1975. *Report of the Committee (Working Group) on Rural Banks*. New Delhi.
- Government of West Bengal. 2007. *Economic Review*. Bureau of Applied Economics & Statistics. Kolkata. West Bengal.
- Govt. of India. 2008. *Economic Survey. 2007-08*. Ministry of Finance. New Delhi.
- Govt. of West Bengal. 2008. *Districts Statistical Hand Book 2007*. Paschim Medinipur. Bureau of Applied Economics and Statistics. Kolkata. West Bengal.

- Gulli, H. 1998. "Microfinance and Poverty: Questioning the Conventional Wisdom", Washington DC, Inter-American Development Bank. www.iadb.org/en/publications/publication-detail,7101.html?id=67614.
- Idowu, Abiola. Oyeleye, O.A. 2012. "Impact of Microfinance Banks on Poverty Alleviation in Selected Local Government Areas of Oyo State, Nigeria", *European Journal of Business and Management*, 4(21). www.iiste.org/journal/index.php/EJBM/article/view/3624.
- Khandker, S.R. and Faruque, R.R. 2001, "The impact of Farm Credit in Pakistan", Rural Development, Development Research Group, World Bank Paper. www.elibrary.worldbank.org/content/workingpaper/10.1596/1813-9450-2653.
- Khandker, Shahidur. R. 1998. "Fighting Poverty with Micro-Credit: Experience in Bangladesh. New York: Oxford University Press. www.amazon.com/Fighting-Poverty-Microcredit-Experience-Publication/dp/0195211219.
- Morduch, J. 1994. "Poverty and Vulnerability". *American Economic Review*, 84(2). Pp. 221-225.
- Mohammad Anawarul Kabir, Suman Dey and Mohammad Shamsal Islam. 2012. "The Role of Micro Credit and Micro Finance Institutions (MFIs) – Extent and Intensity of Poverty, Poverty alleviation and outreach," *International Affairs and Global Strategy*, 4, www.iiste.org/journals/index.php/IAGS/article/view/1457
- Naidoo, A.G.V. 2007. "A Multi-Dimensional Measure of Poverty in South Africa", University of Pretoria, <http://upetd.up.ac.za/thesis/available/etd-06092008-165345/>
- Parker, J., and G. Nagarajan. 2001. "Can Microfinance Meet the Poor's Needs in Times of Natural Disaster?" *Microenterprise Best Practices, Development Alternatives*, www.microfinancegateway.org/p/site/m/template.rc/1.9.27806/
- Pradhan, R.P. 2005. "Socio- Economic Disparity on North Eastern Regions of India: Prospective challenges and Opportunities". *Indian Journal of Social Development*, 5(1), pp. 93-113.
- Pitt, M., and S., Khandker. 1998. "The impact of group-based credit programmes on poor households in Bangladesh: Does the gender of participants matter?" *Journal of Political Economy*, 106(5), pp. 958-995.
- Quach, M.H. 2005. "Access to Finance and Poverty Reduction- An Application to Rural Vietnam", Ph.D. Thesis, the University of Birmingham, www.theses.bham.ac.uk/111/1/QUACH05PHD.pdf.
- Sau, S. N. 2009. Database for Planning and Development of West Bengal, Vol.I, Firma KLM Private Limited, Kolkata, West Bengal.

Quality of Life in Rural Bengal: A Case Study

- Sen. A.K. 1981a. "Poverty: an ordinal approach to measurement", *Econometrica*, 44(2), pp. 219 -31.
- Sen. A.K. 1985. "Commodities and Capabilities", North Holland, Amsterdam. Reprinted in Oxford University Press, Oxford India Paperbacks 1999.
- Sen. A.K. 1987. "The Standard of Living" Cambridge University Press, Cambridge, U.K.
- United Nations Development Programme (UNDP). 1997. Human Development Report. New York: Oxford University Press.
- Valerie Berenger and Audrey Verdier-Chouchane. 2007. "Multidimensional Measures of Well-Being: Standard of Living and Quality of Life across Countries", *World Development*, 35(7), pp 1259-1276, doi: 10.1016/j.worlddev.2006.10.011.
- Valerie Berenger and Audrey Verdier-Chouchane. 2006. Economic Research Working Paper No. 83, "Are African Countries Richer than They are Developed? A Multidimensional Analysis of Well-Being", www.afdb.org. visited in March, 2012.
- Zadeh, L.A. 1965. "Fuzzy Sets". *Information and Control*, 08, pp. 338-343.

Appendix

Table A1 Block wise Calculation of Group Index (data 2021-2022)

BLOCKS	FGP	NMW	APL	ELC	RDEN	LITERACY RATE	GROUP INDEX
NAYAGRAM	2.22	58.61	30.74	39.73	0.69	55.7	-9.732
BINPUR-II	2.92	48.18	31.41	58.1	0.78	61.6	-7.493
JAMBONI	2.53	53.3	32.89	71.53	0.86	67	-5.442
GOIBALAVPUR-I	2.14	70.36	57.55	43.88	1.08	56.9	-4.481
SANKRAIL	2.78	58.49	48.67	46.77	0.96	65.8	-4.444
GARHBETA-II	2.35	66.65	49.24	72.08	0.71	66.6	-3.744
BINPUR-I	2.72	61.69	52.54	73.14	1.02	62.3	-2.841
KGP-I	3.33	75.24	41.44	55.31	0.87	66.8	-2.78
KGP-II	3.21	62.21	46.43	63.89	1.04	67.4	-2.35
MIDNAPUR	2.36	70.24	51.1	100	0.9	60.1	-2.075
KESHIARY	2.16	65.44	53.11	72.36	1.13	67.2	-1.879
JRR	3.15	54.82	50.98	73.12	1.26	64.6	-1.723
GBP-II	2.59	73.37	52.28	71.26	1.09	63.7	-1.588
SALBONI	2.62	64.55	63.89	86.55	0.78	65	-1.574
NARAYANGARH	2.06	62.86	58.4	68.35	1.18	70.6	-1.205
GARHBETA-III	2.43	64.37	68.05	95.83	0.74	65.2	-1.087
DANTON-I	2.97	74.94	51.19	73.18	1.02	66.5	-0.856
GARHBETA-I	2.54	68.97	63.13	100	1.04	64.3	0.316

KESHPUR	2.75	74.07	60.1	76.72	1.25	67	0.809
CHANDRAKONA-I	3.27	89.9	55.79	98.43	0.86	70.8	2.524
CHNDRAKONA-II	3.14	94.7	58.16	99.18	1.17	66.5	3.611
DANTON-II	3.69	68.84	53.03	99.14	1.4	73.7	3.685
SABANG	3.81	64.72	62.63	85.78	1.27	78.6	3.854
PINGLA	4.62	65.48	49.49	99.42	1.31	78.8	4.6
MOHANPUR	4.75	75.32	49.84	89.11	1.35	75.1	4.638
GHATAL	4.22	77.4	61.14	100	1.22	73.5	4.976
DEBRA	4.4	65.76	66.24	98.91	1.5	73.1	5.65
DASPUR-I	5.17	90.9	77.14	100	1.48	74.7	9.835
DASPUR-II	4.79	94.9	79.71	100	1.48	79.7	10.794

Note: For finding out the value of the index, the variables had to be converted into their standard normal variate form to make them unit free. Then all the variables had to be added up to get the value of the index. On the basis of this ranking, the blocks are classified into two strata, namely relatively developed and relatively backward.

Bio-note

Dr. Sibaram Chatterjee, Associate Professor, Department of Commerce, Pingla Thana Mahavidyalaya, Maligram, Paschim Medinipur, India.

Email id: sibaramchatterjee@gmail.com