

CAPABILITY AND WOMEN'S WELL-BEING IN INDIA: AN EMPIRICAL STUDY BASED ON NATIONAL FAMILY HEALTH SURVEY- 2 & 3**

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Abstract:

Empirical literature on women's well-being within the framework of Capability Approach in Indian context is less extensive and less known. The present paper traces the development and expansion of Capability Approach towards multidimensional assessment of well-being and works out a wide range of indicators in seven evaluative spaces reflecting well-being of Indian women in different dimensions of life, such as food intake, reproductive life, health, housing, education, autonomy, and leisure with the use of the fuzzy sets theory. The study also ranks the major Indian States according to non-income and income dimensions of well-being to check whether rankings in both the dimensions differ sharply. It also does binary-multivariate logistic regression analyses to locate variations in the achieved levels of functionings with respect to a set of possible explicative factors, which include individual and household characteristics as well as social and environmental factors. The study produces results for two different points of time (1998-1999 and 2005-2006) and computes average annual growth rates of women's well-being in different dimensions of life utilising data from the Indian National Family Health Survey-2 & 3. By doing comprehensive and comparative analyses and introducing the concept of growth rate in women's well-being the present study contributes some new knowledge and empirical evidence to the existing literature.

Key words: capability, growth rate, functioning, Indian women, well-being

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1. INTRODUCTION

Amartya Sen's capability approach is a framework for the evaluation of individual welfare in terms of their functionings and capabilities, which are defined as an individual's actual and potential activities and states of being respectively (Kuklys, 2005). Thanks to Sen (1985, 1987, 1992, 1993, 1994) when we conceptualise welfare as standard of living or quality of life, our focus of attention shifts from merely income or consumption to a wide range of indicators, which reflect well-being in different dimensions of life. Such indicators may include knowledge and education, health and nutrition, housing, and others, subjective feelings of which are constitutive elements of human life and which should not be ignored while assessing people's standard of living (Chiappero-Martinetti, 2000).

Sen's empirical observations, which are considered as the basic principles and ideas behind the development of capability approach, have been affirmed by the leading commentators in this field (see Kuklys, 2005; Robeyns, 2005). Using data from 1980 to 1982, Sen (1985) found that while the (roughly equivalent) GNP per capita of Brazil and Mexico are more than seven times the GNP per capita of India, China and Sri Lanka, functionings performances in life expectancy at birth, infant mortality and child death rates were best in Sri Lanka, and better in China compared to India and in Mexico compared to Brazil. Another finding was that India performed badly regarding basic education but had considerably higher tertiary education rates than China and Sri Lanka. Sen concluded that the public policy of China and especially Sri Lanka towards distributing food, public health measures, medical services and school education have led to their remarkable achievements in the capabilities of survival and education. In another study, Sen (1985) examined sex bias in India. It showed that females have worse achievements than males for a number of functionings, like age-specific mortality rates, malnutrition and morbidity. The lessons from the above examples are that ranking of countries based on GNP per capita is quite different from a ranking based on the selected functionings, and growth in GNP per capita should not be equated with growth in living standards (Robeyns, 2005). Sen's studies, therefore, warrant a multidimensional assessment of individual welfare in the space of standard of living measures such as health, nutrition, education, or shelter. These basic ideas of capability approach opened up new avenues of research in the field of development studies leading to the computation of number indices of quality of life in different dimensions (see Fukuda-Parr, 2003; Kaul 2003). Since 1990, United Nations' Human Development Report (HDR) also started to chronicle the condition and progress of nations, especially by evaluating how well they provide their

citizens with the basic capabilities to participate in and to contribute to society. According to UNDP – the creator of Human Development Index – the factors to gauge in assessing such capabilities include the ability to live a long and healthy life, the ability to be knowledgeable, and the ability to have access to the resources needed for a decent standard of living (United Nations, 1996). Comparisons of rankings of these indices with GNP per capita show significant differences, which establish that income per capita is an imperfect indicator of human development (UNDP, 1990-2006; Robeyns, 2005). Although application of human development index has had the largest impact on policy making, using just a few functionings makes it somewhat crude (Robeyns, 2005), which again demands a reasonable exploration to make such measures rich incorporating functionings in other possible dimensions.

On the above background, we see that although Amartya Sen was influenced enough from the experiences of India (and other developing countries) while developing capability approach, empirical literature on women's well-being in this field in the context of India is less extensive and less known. In Robeyns' survey (2005), which provides a good interdisciplinary introduction to the approach, we find a very few studies based on micro-data and none of which are related to India. The main purpose of this paper is to focus on the use of rich Indian data towards empirical applications of capability approach, and minimise the major gaps associated with the existing quantitative applications, as reflected from the work of Ingrid Robeyns (2005). From this perspective, the present study would contribute some new knowledge and empirical evidence to the existing literature. The exercise will be carried out by doing a multidimensional assessment of well-being of Indian women within the framework of Capability Approach.

Though a good number of techniques are available in literature for indexing with robustness and accuracy, the present study finds the use of fuzzy set theory suitable for evaluation of relevant functionings, which has been pioneered in this field by Enrica Chiappero Martinetti (1994, 2000, 2005). The use of fuzzy set theory has added advantage of applying of non-linear functions such as a sigmoid or logistic function in data processing (Kuklys, 2005). It also does binary-multivariate logistic regression analyses to locate variations in the achieved levels of functionings with respect to a set of possible explicative factors, which may include individual and household characteristics as well as social and environmental factors. In standard literature such explicative factors are termed as conversion factors (Kuklys, 2005), and such an exercise will give an idea how functionings achievements are related to conversion factors, knowing of which is very crucial for policy prescriptions.

2. DATA

The study utilises data from Indian National Family Health Survey-2 & 3 (NFHS-2 & NFHS-3). NFHS-2 covers a representative sample of about 95000 women in the 15-49 age group from 26 States and Union Territories of India, which comprise more than 99 percent of India's population. The data file that has been used in the present exercise (women's file) contains huge information on 90303 women with 977 variables. However, after filtering data according to present need we find 79145 cases suitable for analyses. The data collection was carried out in two phases, starting in November 1998 and March 1999.

NFHS-3 covers a representative sample of about 124385 women in the 15-49 age group from all 29 States of India, which comprise more than 99 percent of India's population. However, after filtering data (from the women's file) according to present need we find 73436 cases suitable for analyses. The data collection was carried out in two phases, starting in November 2005 and August 2006. The surveys provide State-level estimates of demographic and health parameters as well as data on various socio-economic and programmatic dimensions. (IIPS and ORC Macro, 2000 and 2007).

3. SELECTION OF FUNCTIONINGS

In most empirical studies, based on large-scale surveys, the selection of functionings is made according to availability of data (Chiappero-Martinetti, 2000) or done in an *ad hoc* way, in accordance with researchers' values (Kuklys, 2005). If we look at literature, we find that some functionings such as, education, health, and nutrition are very common in most of the studies with many other uncommon ones as shown in table 1.

From table 1 we see that according to the objectives, some studies considered income dimension of well-being, some others did not. Balestrino (1996) and Ruggeri Laderchi (1997) evaluated non-income dimensions of well-being and tried to test whether these are good supplement to that of income dimension. Chiappero Martinetti (2000) has purely focused on non-income dimensions of well-being and incorporated respondents' subjective judgments or perception on satisfaction about personal and household economic resources, and on comparison of the last year economic condition. She has also considered respondents' perception on many other aspects under the functioning of 'psychological conditions'. However, the present data sets are not good enough to study respondents' psychological conditions. Following Balestrino (1996), Ruggeri Laderchi (1997), and Mozaffar Qizilbash (2002) it is possible to examine whether non-income dimensions of well-being contradicts with income dimension in India at provincial level or

to rank the major provinces of India according to functionings poverty and compare the ranking with that based on per capita Net State Domestic Product (NSDP) .

Kuklys (2005) have considered two functionings (health and housing) and computed the indicators following the procedure of factor analysis, and examined relationships of those with resources (income and education) and conversion factors (age, gender, marital status, job status, and whether the individual lives in London area) by estimating structural equation models. The present study is also designed to explore the relationship between achieved level of functionings in each evaluative space and conversion factors by doing logistic regression analysis. As we are mainly focusing on non-income dimensions of well-being, we are not considering income; also as we consider education as achieved level of functioning instead of one resource, we opt for a regression approach. Moreover, as most of our indicators are categorical (as shown in table 2), binary logit regression models seem to be more appropriate in our analyses.

As the present study is mainly focusing on well-being of women, it is needless to say that selection of reproductive health related functionings and those related to autonomy and freedom is obvious. It is to be noted that India is a signatory to the ICPD, Cairo (United Nations, 1994) which maintained that people have the ability to reproduce and regulate their fertility, mothers are able to go through pregnancy and child birth safely, the outcome of pregnancy is successful in terms of maternal and infant survival and well-being and couples are able to have sexual relations free of fear of pregnancy and contracting diseases. Considering the above-mentioned reproductive life related abilities, we look forward to incorporate some variables reflecting reproductive health: children ever born (keeping in mind that high fertility is social evil in Indian context), and children ever died.

The present study would like to examine the degree of autonomy that Indian women enjoy to make effective choices and translate those into desired actions and outcomes. Amartya Sen's specific ideas in this direction on well-being, agency and freedom have been taken towards empirical reality by Sabina Alkire (2005). Human agency, according to Sen, is people's ability to act on behalf of goals that matter to them. Sen's idea on agency-freedom is confined to something that a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important. And this aspect of freedom is a core element of positive social change. Well-being, on the other hand, refers to the person's own state and is attached to any one type of aim. Alkire (2005) feels that the agency aspect is important in assessing what a person can do in line with his or her conception of the good. On these points, she introduces large-scale cross-cultural psychological studies of self-direction, of autonomy, of self-efficacy, and of self-determination, and explains why the psychological measures of agency may be relevant to those. However, she

distinguished the agency measure based on the self-determination theory of Ryan and Deci (2000) as an accurate (as it is the closest to Sen's concept of agency) and robust indicator of autonomy in different domains.

The objective of this paper is to measure women's autonomy (in Indian context), which is one of the three basic psychological needs identified by Ryan and Deci (2000), the other two being competence and relatedness. In self-determination theory (Ryan and Deci, 2000), autonomy is seen as a tendency or propensity towards self-organisation and self-regulation. When autonomous, individuals' actions are self-organised with respect to their inner and outer circumstances, instead of being merely cued up or prompted by non-integrated processes or exogenous pressures. NFHS-2 & 3 collect information reflecting women's autonomy and we look forward to use relevant information in our study with the application of fuzzy set theory. It is to be noted that NFHS data on women's autonomy is not suitable for psychological techniques followed or proposed by Chirkov et al. (2003) and Alkire (2005), as the survey did not collect any information on why women might have done a particular activity.

We have also incorporated one functioning: exposure to mass media and leisure, which will simultaneously reflect respondent's connection with the world beyond self, as well as leisure activities. The present study incorporates 'reading newspaper' and 'watching TV' under one functioning: 'Exposure to mass media and leisure'.

Keeping in mind the above-mentioned trend in literature, objective of the study, availability of data, and also the standard criteria mentioned by the leading commentators in this field (Chiappero Martinetti, 2000; Alkire, 2005; Kuklys, 2005; Robeyns, 2005) it has been decided to confine the present study in seven evaluative spaces as appear below and as shown in table 2: food intake, reproductive life, health and morbidity, housing, education, autonomy, and exposure to mass media & leisure.

4. METHOD

4.1. Fuzzy sets theory

Fuzzy set theory substitutes the characteristic function of a crisp set that conventionally assigns a value of either 1 or 0 to each element in the universal set, with a generalised characteristic function (called membership function), which varies between 0 and 1. Larger values denote higher degrees of membership. In formal terms, if X denotes a universal set, then the membership function μ_A , by which a fuzzy set A is usually defined, has the form $\mu_A: X \rightarrow [0, 1]$ where $[0,1]$ is the interval of real numbers from 0 to 1. Hence, $\mu_A(x) = 0$ if the element $x \in X$ does not belong to A , $\mu_A(x) = 1$ if x completely belongs to A and $0 < \mu_A(x) <$

1 if x partially belongs to A . Let us assume that the subset A defines the position of each individual according to the degree of achievement of a given attainment or refers to one of the indicators considered for the functioning assessment. In this case, membership values equal to 1 identify a condition of full achievement with respect to a given functioning, whereas a value equal to 0 denotes the opposite situation of total failure. When we consider quantitative variables or qualitative variables measured on an ordinal scale or expressed with linguistic attributes (as in the case of health and physical condition or subjective opinions or perception on one's own conditions), intermediate values between 0 and 1 describe gradual positions within the arrangement (Chiappero Martinetti, 2000). It is, therefore, necessary: i) to define an appropriate arrangement of modalities (or values) on the basis of the different degrees of hardship / well-being; ii) to identify the two extreme conditions such that $\mu_A(x) = 1$ (full membership) and $\mu_A(x) = 0$ (non-membership); iii) to specify the membership functions for all the other intermediate positions (Chiappero Martinetti, 2000).

As mentioned in table 2, we have specified 3 types of membership functions for the functionings under study, which appear below.

4.1.1. Linear function

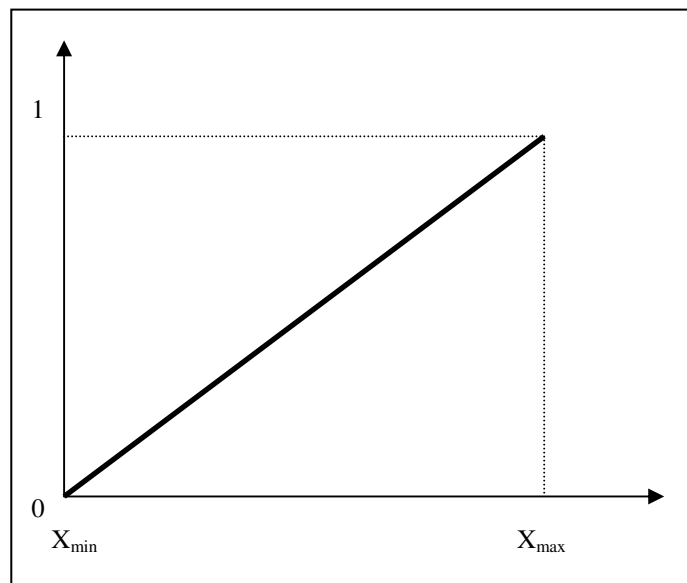


Figure 1. Linear membership function

$$\mu(x) = \frac{x - x_{\min}}{x_{\max} - x_{\min}}.$$

4.1.2. Trapezoidal function

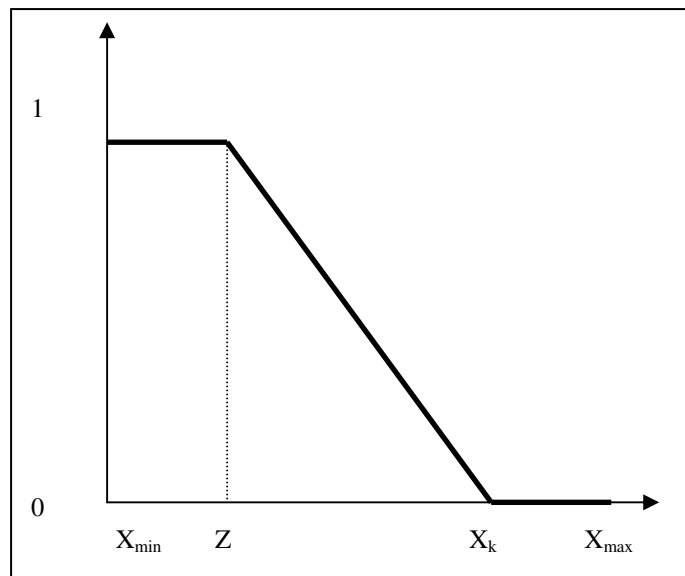


Figure 2. Trapezoidal function

$$\begin{aligned} \mu(x) &= 1, && \text{if } x_{\min} \leq x \leq Z \\ \mu(x) &= 0, && \text{if } x_k \leq x \leq x_{\max}. \\ \mu(x) &= \frac{x_k - x}{x_k - Z} && \text{if } x_w \leq x \leq x_k. \end{aligned}$$

4.1.3. Sigmoid function

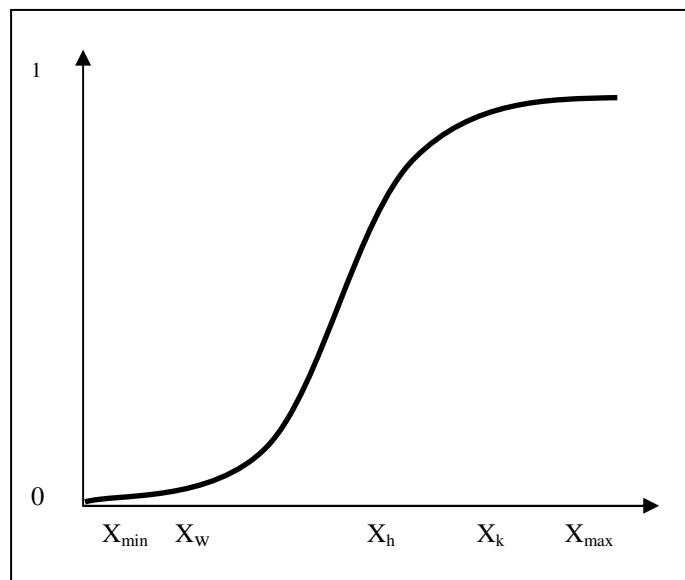


Figure 3. Sigmoid curve / function

$$\begin{aligned} x_w = \mu(x) = 0 & & x_h = \mu(x) = 0.5 & & x_k = \mu(x) = 1 \\ \mu(x) = 1, & & & & \text{if } x_k \leq x \leq x_{\max} \end{aligned}$$

$$\begin{aligned} \mu(x) &= 0, && \text{if } x_{\min} \leq x \leq x_w. \\ \mu(x) &= \frac{1}{2} \left[\frac{x - x_w}{x_h - x_w} \right]^2 && \text{if } x_w \leq x \leq x_h \\ \mu(x) &= 1 - \frac{1}{2} \left[\frac{x_k - x}{x_h - x_k} \right]^2 && \text{if } x_h \leq x \leq x_k. \end{aligned}$$

In our multidimensional approach, each dimension of human well-being is considered as equally relevant, and we will have a neutral choice to assign an equal weight to all constitutive elements (see Chiappero Martinetti, 2000). It is to be noted that in the present exercise $X_{\min} = X_w$.

4.2. Selected functionings and methods of evaluation

4.2.1. Food intake

NFHS provides information about how often respondents consume different varieties of food stuff, such as milk or curd, pulses and beans, fruits, vegetables, eggs, fish, chicken or meat. Though there are various items, we focus on two main sources of protein: milk /animal (such as, milk or card, eggs, fish, chicken or meat), and pulses / beans. In the first category there are multiple questions. We have clubbed all these together based on our previous experience. In an earlier study (see Majumder, 2007), we have seen that food-habits vary sharply across cultures and societies in India. While respondents in some north Indian States (such as Gujarat, Haryana, etc.) consume non-vegetarian items almost never, such items are consumed frequently in other parts of India. In order to minimise such complicacies, we have kept sources of milk protein and animal protein together. We would like to see whether respondents are able to take any of these to meet their dietary requirements. According to frequency of intake, for each type of foodstuff, data is available in four categories: daily, weekly, rarely, or never. We have processed information to assign the value 1 if one respondent consumed any of the items at least once in week, 0 otherwise. We have measured achievement in this functioning of nutrition in two different dimensions as shown in table 2.

4.2.2. Reproductive life

Quality of reproductive life is measured by two functionings: children ever born and children ever died. Details on this functioning are shown in table 2.

4.2.3. Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1961). As the definition is so broad and wide,

conventional demographic indicators such as, infant mortality rate, total fertility rate, life expectancy at birth, are usually used to measure health status of a population. However, as NFHS provides information on anaemia or level of haemoglobin in blood of the respondents, the present study finds it suitable to consider it as an achieved level of functioning in the dimension of health (see IIPS and ORC Macro, 2007). Using such information we have adopted a linear function to process data for this functioning.

4.2.4. Housing

NFHS collects information about source of drinking water in the housing area structure, type of toilet facility, and also whether the house has electricity connection, etc. We have considered information on these categories (three) to measure the quality of housing / shelter.

4.2.5. Education

Achievement in this category is measured by completed years of education. While evaluating the functioning of education, we have selected 16 modalities beginning from 0 year of education to 15 years and above. Though all the modalities are equidistributed, we will in no way put equal importance to increase in one year of education at all levels. We assumed that well-being or good associated with the increase in one year of education follow a sigmoid pattern rather than a linear trend. Also, as education up to eighth standard has been given much priority, a sigmoid curve of the present-type seems to be more appropriate.

4.2.6. Autonomy

We have measured autonomy in two possible dimensions: who decides on obtaining health care and reproductive freedom (difference between ideal number of children mentioned by the respondent and children ever born).

4.2.7. Exposure to mass media

We have also taken into account whether respondents read newspaper at least once a week and / or watch TV every week.

Evaluative spaces / functionings, and membership degrees to the elementary subsets are shown in table 2.

4.3. Explicative or conversion factors

4.3.1. Individual level factors

4.3.1.1. Age of the respondent: Though we are studying well-being of ever married women in the 15-49 age-group, we have made three categories of age: 15-24, 25-34, 35-49, to examine whether level of well-being varies with age.

4.3.1.2. Relationship with the head of the household: There are four categories of relationship as shown in table 3. We get some respondents as head of the households; in those cases respondents are mostly widowed or separated or not living together. As intra-household distribution of resources or bargaining power associated with such matters are believed to depend largely on respondents' status in the familial hierarchy, this particular variable will reflect true picture prevailing in Indian societies.

4.3.2. Household level factors

4.3.2.1. Size of family: There are two categories (≤ 5 and > 5) as shown in table 3.

4.3.2.2. Index of wealth: NFHS does not collect information on household income. However, it computes an index of wealth. It is an indicator of the level of wealth that is consistent with expenditure and income measures. The wealth index is based on 33 assets and housing characteristics: household electrification; type of windows; drinking water source; type of toilet facility; type of flooring; material of exterior walls; type of roofing; cooking fuel; house ownership; number of household members per sleeping room; ownership of a bank or post-office account; and ownership of a mattress, a pressure cooker, a chair, a cot/bed, a table, an electric fan, a radio/transistor, a black and white television, a colour television, a sewing machine, a mobile telephone, any other telephone, a computer, a refrigerator, a watch or clock, a bicycle, a motorcycle or scooter, an animal-drawn cart, a car, a water pump, a thresher, and a tractor (IIPS and ORC Macro, 2000 and 2007).

4.3.3. Social factors

4.3.3.1. Religion: There are three categories as shown in table 3: Hindu, Muslim and other (Christian, Sikh, Buddhist/Neo Buddhist, Jain, Jewish, Zoroastian/Parsi, no religion, other).

4.3.3.2. Caste / ethnicity: There are three categories as shown in table 3. Scheduled categories are mentioned in one of the schedules of the Indian Constitution, which are considered to be weaker sections of society whose interests need to be safeguarded and promoted. Socially, these groups are seen as occupying the lower stratum of the local hierarchy.

4.3.4. Environmental factors

4.3.4.1. Natural environment: Altitude of the area from sea level.

4.3.4.2. Social and economic environment: We have decided to take one proxy variable, type of locality (rural / urban) to capture differences in socio-economic front and impact of those towards level of well-being.

4.3.4.3. Geographical region: Though there are various agro-climatic regions in India, we have formed three broad regions: Northern India (Bihar, Gujarat, Haryana, Himachal Pradesh,

Jammu and Kashmir, Jharkhand, Madhya Pradesh, New Delhi, Punjab, Rajasthan, Uttaranchal, Uttar Pradesh, West Bengal), North-Eastern hilly region (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura), and Southern India (Andhra Pradesh, Chattisgarh, Goa, Karnataka, Kerala, Maharashtra, Orissa and Tamil Nadu). All the three regions have almost differentiable culture, demography, geography, etc. We are interested to examine whether women's well-being varies sharply in India across regions.

4.5. Multivariate analyses

As most of the variables are categorical, instead of a straight line, it seems preferable to fit some kind of sigmoid curve to the observed points. Though there are many ways to define a sigmoid curve mathematically, the logistic function tends to be preferred, partly because it leads to the logit regression model and partly because it is easy to interpret (Retherford and Choe, 1993). The standard form of an estimated logistic function is:

$$P = \frac{1}{1 + e^{-z}} \quad \dots \quad \dots \quad (i)$$

where z is the predictor variable, e is the base of the natural logarithm, and P is the estimated probability of occurrence of one point of the dependent variable. From equation (i) it follows that:

$$1 - P = 1 - \frac{1}{1 + e^{-z}} = \frac{e^{-z}}{1 + e^{-z}} \quad \dots \quad \dots \quad (ii)$$

Dividing (i) by (ii) we get

$$\frac{P}{1 - P} = e^z \quad \dots \quad \dots \quad (iii)$$

Or,

$$\Omega = \exp(Z) \quad \dots \quad \dots \quad (iv)$$

where Ω (uppercase omega) $\equiv \frac{P}{1 - P}$ (is called the odds).

Now, if we assume that Z, instead of being a single predictor variable, is linear function of a set of predictor variables:

$$Z \equiv \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k, \quad \dots \quad \dots \quad (v)$$

substituting (v) in (iv) we get:

$$\Omega = \exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k). \quad \dots \quad \dots \quad (vi)$$

For the present exercise, if P be the estimated probability of getting a high score (> the median value, except the dichotomous one – exposure to mass media & leisure), and if we assign the dependent variable 1 if the score is above the median value, 0 otherwise in each of the achieved levels of functionings, in odds form the model is:

$$\Omega = \exp(\beta_0 + \sum \beta_{1i} X_{1i} + \sum \beta_{2i} X_{2i} + \sum \beta_{3i} X_{3i} + \sum \beta_{4i} X_{4i}). \quad \dots \quad \dots \quad (vii)$$

The equation includes individual- (X_{1i}), household- (X_{2i}), social- (X_{3i}), and environment- (X_{4i}) level conversion factors. Eight models will be estimated for each round of survey for each of the seven evaluative spaces (after aggregation in each space) as well as for overall achievement after aggregation of all the functionings in seven dimensions.

In order to be more specific about the models (results are displayed in tables 8A & 8B) we are presenting median values of the membership degrees of the functionings as following: Model I-A / I-B: Food intake (median: 1.000 / 1.000); Model II-A / II-B: Reproductive life (median: 0.833 / 0.833); Model III-A / III-B: Health (median: 0.667 / 0.667); Model IV-A / IV-B: Housing (median: 0.667 / 0.556); Model V-A / V-B: Education: (median: 0.425 / 0.189); Model VI-A / VI-B: Autonomy (median: 0.625 / 0.625), Model VII-A / VII-B: Exposure to mass media and leisure (dichotomous: 0 / 1), and Model VIII-A / VIII-B: Overall Well-being (median: 0.679 / 0.608). It is to be noted that as most of the variables are categorical, we could not divide the population / sample into exactly two equal halves in all cases.

In order to look at goodness of fit, we have also displayed a statistic, *Nagelkerke R Square* (Nagelkerke, 1992) that attempts to provide a logistic analogy to R Square in OLS regression.

$$\text{Nagelkerke } R^2 = \frac{1 - \exp\left[-\frac{2}{n}(L_2 - L_1)\right]}{1 - \exp[2(n^{-1})L_1]}$$

where the L_1 = the likelihood of the first model; L_2 = the likelihood of the second model; it is assumed that the second model has all the predictor variables included in the first model, plus at least one more i.e., the first model is nested in the second model (Retherford and Choe, 1993). *Nagelkerke R Square* varies between 0 and 1.

5. Results and discussion

5.1. Multidimensional assessment of well-being

Tables 4A and 4B shows mean values of the membership degrees of the seven functionings and twelve elementary indicators corresponding to NFHS-3 and NFHS-2 respectively. The first functioning is: ‘food intake’ the first elementary subset of which is consumption of milk or curd / eggs / fish / chicken / meat (one or more of these items once in a week). With respect to consumption of these items (by women) in NFHS-3, we see the highest score in Kerala (0.972) followed by Goa (0.949), West Bengal (0.942), Andhra Pradesh (0.942) and others. The score is lowest in Madhya Pradesh (0.563) and remarkably low in Bihar (0.596) and Uttar Pradesh (0.652). The average score of India is 0.768, it divided the States almost equally into two halves. Of the 19 States (or group of States), there are nine, which score below the national average.

In 1998-1999 (NFHS-2 in table 4B), we see the highest score in Goa (0.976) and the lowest score in Madhya Pradesh (0.450). The average score of India was 0.743. There are four other States below this national average: Orissa (0.453), Bihar (0.571), Uttar Pradesh (0.613), and Rajasthan (0.728). However, among these poorly performed States, the scores of Madhya Pradesh and Orissa were remarkably low.

Table 5 shows average annual growth rates in the well-being dimensions. It shows that (among the previously mentioned poorly performed four States) well-being with respect to food intake (μ_{11}) increased by more than 7.35 per cent in Orissa, and more than 3.48 per cent in Madhya Pradesh annually in last seven years or so. Bihar and Uttar Pradesh also increased levels of well-being slightly. However, the situation of Rajasthan deteriorated over the past five years (average annual rate of growth: - 0.25 %). However, among the States Haryana experienced the highest rate of decline (growth: - 2.69 %) followed by Punjab (growth: - 2.47 %) and Himachal Pradesh (growth: - 1.78 %).

With respect to consumption of pulses and beans (NFHS-3 in table 4A), the condition is the best in Karnataka (0.988) and awful in Tamil Nadu (0.591). NFHS-2 in table 4B showed highest score in Punjab (0.993) and lowest score in Assam (North-Eastern hilly region). From table 5, we see that condition of Tamil Nadu declined sharply (annual growth rate: - 5.28 %). Punjab also experienced a moderate rate of decline (growth: - 2.03 %) over the past seven years.

The level of well-being with respect to nutrition (μ_1) is the highest in Karnataka (0.964) and lowest in Tamil Nadu (0.750) as shown in table 4A. The average Indian score is 0.826, which is quite satisfactory. The same national average score was 0.800 in 1998-1999 as shown in table 4B. However, there are seven States (including the National Capital Territory of Delhi), which experienced negative growth rates in between two rounds of survey (Tamil Nadu, Punjab, Haryana, Himachal Pradesh, Gujarat, Maharashtra, and Delhi).

On the reproductive front (μ_2) all the States performed positively except Bihar (where hardship with respect to children died increased). Kerala consistently scored the highest in both the points of time. Average score of India increased slightly from 0.800 to 0.826 over the past seven years indicating an average annual growth rate of 0.89 per cent.

We measured well-being related to health (μ_3) by level of haemoglobin in blood. Though it seems that the situation remains stable (from the average score of India: 0.767 and 0.766 in NFHS-3 and NFHS-3 respectively), the condition deteriorated in reality. In 1998-1999, there were eight States (or group of States) below the national average. However, in 2005-2006, there are 12 States (or group of States) below the level of national average. There are eight States, which experienced negative growth rates between the two points of time. The growth rate on the health front is the highest in Tamil Nadu (0.57 %). It is to be mentioned that Tamil Nadu experienced the highest rate of decline in food intake. The results are quite confusing if we consider consumption of food as input and level of haemoglobin in blood as output. The well-being with respect to food intake reflects satisfaction from access to food.

The fourth functioning (μ_4) is related to housing conditions. The first elementary sub-set of it (μ_{41}) measures well-being from access to drinking waters. In NFHS-3 (table 4A), the situation is the best in Tamil Nadu (0.885) and the lowest in Kerala (0.454). The score of Bihar is slightly better than Bihar (0.465). In NFHS-2 (table 4B), the situation was the best in Delhi and most awful in Bihar. If we look at table 5, we see that overall situation of India deteriorated over the years. Well-being from access to drinking water decreased in 12 States in between 1998-1999 and 2005-2006. The annual rates of decrease in well-being levels are more intense in Jammu & Kashmir (growth: - 3.41 %), Kerala (growth: - 3.14 %), Assam

(growth: - 2.46 %), and Karnataka (growth: - 2.14 %). The increase in well-being is remarkable in Andhra Pradesh (2.5 %).

The second elementary sub-set of housing condition is type of toilet facility (μ_{42}). A score value of 1.000 in this functioning reflects well-being associated with the use of own flush toilet and a score value of 0.000 implies no toilet facility or field. It is to be noted that the picture was dreadful in NFHS-2 with an average national score of 0.339. None of the scores was satisfactory, except the same of Delhi, which scored 0.818. Even Kerala was far behind of Delhi with a score of 0.630. The situation was the most awful in Bihar with a score of 0.141. However, we see that the situation has changed remarkably in most of the States as well as in the Country over the past seven years or so. The Country experienced a growth rate of 7.65 per cent per year. The growth rate is the highest in Andhra Pradesh (23.16 %) followed by Uttar Pradesh (18.35 %), Bihar (17.41 %) and others. Kerala also experienced a very high rate of growth (6.89 %) and comes at the top of the list with a score of 0.943. Orissa remains at the bottom of the list with a score of 0.212 though the State experienced a growth rate of 5.1 per cent per year. Jammu & Kashmir is the only State, which experienced a negative growth rate (growth: - 4.56 %) in this functioning. It is to be mentioned that NFHS-2 was conducted in Jammu only. However, NFHS-3 was conducted in Jammu as well as in Kashmir. Probably, the housing conditions are not good in Kashmir and this may result to a lower score for the whole State.

The third elementary sub-set (μ_{43}) of housing condition takes into account weather houses are electrified. The condition is the best in Delhi and worst in Bihar in both rounds of the survey. However, condition of Bihar improved remarkably with some other States. The State experienced a growth rate of 20.73 per cent per year. Average score of India also increased by more than 2 per cent annually. The condition of Jammu and Kashmir deteriorated slightly. The overall performance in housing conditions is the best in Delhi and most awful in Bihar.

The fifth functioning (μ_5) reflects well-being associated with completed years of education. Consistently women in Kerala performed the best in NFHS-2 and NFHS-3. However, still the score of Kerala is too low (0.569 in NFHS-3 and 0.518 in NFHS-2). The average scores of India are 0.345 and 0.268 in NFHS-3 and NFHS-2 respectively. The scores of Rajasthan, Bihar, Uttar Pradesh, and Madhya Pradesh in both rounds of survey are extremely low. So, the Country has a long way to go in this direction. Table 5 shows improvement in this direction over the past seven years in all the States except Delhi. Delhi experienced a negative growth rate (growth: - 0.12 %) in education. The improvement is the

highest in Bihar (9.36 %) followed by Andhra Pradesh (8.5 %), Madhya Pradesh (7.08 %), Jammu & Kashmir (6.83 %) and others.

The sixth functioning reflects well-being with respect to autonomy (μ_6). The first elementary sub-set (μ_{61}) of it measures how autonomous women are on the question of obtaining health care for themselves. Women in Punjab and Assam (North-Eastern Hilly region) are seen more autonomous with respect to this question. Punjab scored 0.740 in NFHS-3 and 0.721 in NFHS-2. Kerala too scored 0.721 in NFHS-2. However, over the years the State experienced a decline in well-being with respect to this question. The condition deteriorated in other three States also, namely Gujarat, Delhi, and Himachal Pradesh.

The second elementary sub-set of autonomy is reproductive freedom (μ_{62}). Reproductive freedom is measured by difference between respondents' opinion on ideal number of children and children ever born. Consistently women in Kerala exercised the highest degree of reproductive freedom in contrast to others in rest of the Country. However, the average scores of other States are not so satisfactory. There are 13 States (or group of States) the scores of which lie below the national average (0.609) in 2005-2006. The situation of the Country deteriorated (growth: - 0.53 %) with negative growth rates in 10 States. The overall autonomy (μ_6) is practiced highest in Kerala (0.781) followed by Assam/North-Eastern Hilly region (0.716), Goa (0.714) and others as shown in table 4B.

The seventh and final functioning measures well-being associated with exposure to mass media and leisure (μ_7). Women in Delhi are seen in the best condition as they are most exposed to mass media and leisure activities as compared to others. However, score of Delhi decreased to some extent over the years. Bihar remains at the bottom of the list with a score of 0.337 in NFHS-3 and 0.190 in NFHS-2. Though performance of Bihar is poorest among all, the State experienced a growth rate of more than 10 per cent annually over the past seven years. Other poorly performed States like Uttar Pradesh, Rajasthan, Orissa, and Madhya Pradesh also experience high or moderate rates of growth.

Finally, we move the overall well-being (μ), which is the simple average of all previously mentioned functionings. Our multidimensional assessment of well-being based on NFHS-3 revealed that condition of women is the best in Kerala (0.799) followed by Goa (0.784), Delhi (0.762), Himachal Pradesh (0.732) and others. The situation is most awful in Bihar (0.514) with slightly better conditions in Rajasthan (0.557), and Uttar Pradesh (0.585). The average score of India is 0.658 as shown in table 4A. The average Indian condition improved to some extent as reflected from the average annual growth rate of well-being of 1.72 per cent. The conditions improved in all the States except in Delhi, which experienced a negative

growth rate (growth: - 0.11 %) over the past seven years. The situation in Punjab remains unchanged.

5.2. Ranking of the States according to non-income and income dimensions of well-being

In tables 6A and 6B we have ranked the States (or group of States) according to income and non-income dimensions of well-being. From discreet observation, we see that there is no association between ranks in income dimension and non-income dimension. For example (in NFHS-3: table 6A), Kerala ranks first in non-income dimensions of well-being though its rank is eighth in income dimension. In the previous round of survey (NFHS-2: table 6B), Kerala ranked second in non-income dimensions of well-being though its rank was ninth in income dimension.

However, a thorough observation reveals that obviously there is an association between income and non-income dimensions of well-being. In table 6A, we see that Goa stands second in non-income dimension and first in the income dimension; Delhi stands third in non-income dimension and second in income dimension; Bihar stands 19th in non-income dimension and 18th in income dimension; Rajasthan stands 18th in non-income dimension and 17th in income dimension; Uttar Pradesh stands 17th in non-income dimension and 19th in income dimension. We see similar picture in NFHS-2 (in table 6B) also.

From table 7 we see that Spearman's rank correlation coefficients are significantly high in some cases. Well-being levels in housing conditions, education, autonomy, and exposure to mass media and leisure are quite strongly related to the same in income dimension.

5.3. Results of multivariate analyses

5.3.1. Individual level factors

Tables 8A and 8B show results of logistic regression analyses. It is to be noted that multivariate analyses produce excellent results as, in some cases, pseudo R square values crossed 0.500 (a value more than 0.400 is considered very well).

The first predictor variable is age of the respondent. In table 8A, we see that with respect to age well-being conditions tend to increase in some dimensions (food intake, health, and housing); at the same time well-being conditions tend to decrease in some dimensions (reproductive life, education, and autonomy). For example, when age-group changes from 15-24 to 25-43, odds ratio of achieving higher score (more than the median value) increases by 4.6 per cent (odds ratio is multiplied by 1.046). However, we see that negative impact of age is more intense than that of positive impact. We see that as age increases (likelihood of) well-being condition associated with reproductive life decreases sharply. When age-group

changes from 15-24 to 25-43, likelihood of well-being condition (associated with reproductive life) decreases by 74.3 per cent. When age-group changes from 15-24 to 35-49, the same decreases by 90.8 per cent. Similarly, we see sharp negative relationship between age and well-being conditions associated with education, autonomy, and overall wellbeing in all dimensions.

The second predictor variable (in true sense attribute) is 'relationship to head of household'. We have three categories: other usual residents, head, and wife. We have produced results with respect to 'head' and 'wife' in contrast to 'other' usual residents. We see that well-being conditions tend to decline sharply for head of the households and wives in contrast to those of other usual residents.

The two individual level variables, in NFHS-2 (table 8B) work in a similar fashion.

5.3.2. Household characteristics

We have two variables in this category: family size, and household wealth index. We see that all the functioning achievements are very strongly and negatively related to size of family, and very strongly and positively related with household wealth index. Higher level of household wealth is very likely to cause higher level of well-being in housing, education, and exposure to mass media and leisure.

5.3.3. Social factors

We have two variables in this category: religion, and caste. We have three broad categories of religion: Hindu, Muslim and Other (Christian, Sikh, Buddhist, etc.). We see that as compared to Hindu women, Muslim women are more likely to fulfil their dietary requirements, and enjoy better housing condition in NFHS-3 (table 8A); and better housing condition only in NFHS-2 (table 8B). They are like to achieve poor scores (as compared to Hindus) in all other dimensions. Women in other religious categories are like to perform in all the functionings (as compared to Hindus) except in food intake.

The second social variable is caste / ethnicity. We see that (in table 8A), women in the scheduled tribe communities (there are many communities in that category) enjoy more autonomy than women in the general category; similarly, scheduled caste women are more like to exposed to mass media and leisure. In table 8B (in NFHS-2), we see that scheduled caste and tribe women were performed poorly in all the functionings as compared to women in the general category.

5.3.4. Environmental factors

We have included three environmental factors: altitude of the locality from sea level, socio-economic environment (measured by type of locality: rural / urban), and geographical region

(north, north-east, and south). We see that women in hilly areas (higher altitude) are likely to perform better in reproductive life in 2005-2006 (table 8A). They perform poorly in all other well-being dimensions. However, in 1998-1999 (table 8B), we see that women in hilly areas performed better in most of the well-being dimensions (except in food intake).

Well-being conditions vary sharply with respect to type of locality (rural vs. urban). Urban dwellers are like to remain far ahead of their rural counterpart in most of the well-being dimensions. There is one exception: women in urban set ups are likely to have less poor health condition (insufficient level of haemoglobin in blood) in 2005-2006.

Geographical factors also play important role to locate variations in well-being dimensions in Indian context. In table 8A, we see that women in the North-Eastern hilly region enjoy better housing as compared to their South Indian counterparts. Women in the North are likely to be better educated and enjoy more autonomy than women in the South India in both rounds of survey. In NFHS-2, women from North-Eastern hilly region performed poorly in all functionings as compared to women from South India.

6. CONCLUSION

The study revealed that the condition of women, based on well-being in seven essential dimensions, is the best in Kerala followed by Goa, Delhi, Himachal Pradesh and others in 2005-2006. In 1998-1999, Delhi stood first followed by Kerala, Goa, Himachal Pradesh and others. Over the past seven years or so Kerala could increase overall well-being score and come at the top of the list. Well-being conditions increased in most of the States, except in Delhi.

Though the overall economy of the Country is growing at more than 9 per cent per annum for the past few years from macro-point of view, the present study reveals that growth in women's well-being is as low as 1.19 per cent per annum. Well-being conditions, which are associated with food intake, health, access to safe drinking water, and autonomy decreased remarkably in some evaluate spaces in some States over the past seven years.

From discreet observation, we see that there is no association between rank in income dimension and non-income dimension. However, a thorough observation reveals that obviously there is an association between income and non-income dimensions of well-being. Women with higher average income per capita enjoy better well-being conditions.

Multivariate analyses too revealed that household wealth is a very crucial factor towards non-income dimensions of well-being. The analyses also revealed that the familial hierarchy and larger size of a household significantly obstruct in the process of achieving higher level

of well-being. Well-being conditions vary sharply with ethnicity / caste, religion, type of locality, and geographical regions. By doing such comprehensive and comparative analyses and introducing the concept of growth rate in women's well-being the present study thus contributes some new knowledge and empirical evidence to the existing literature.

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Table 1. Functionings in some of the existing quantitative studies

<i>Author (Year)</i>	<i>Subject / Country</i>	<i>Functionings</i>
Schokkaert and Van Ootegem (1990)	Belgian unemployed	Income loss, gender, age and family composition
Balestrino (1996)	Poor people, Italy	Education, nutrition or health failure
Ruggeri Laderchi (1997)	Common people, Chile	Education, health and child nutrition
Brandolini and D'Alessio (1998)	Common people, Italy	Health, education, employment, housing, social relationships and economic resources
Chiappero-Martinetti (2000)	Common people, Italy	Health (chronic illnesses); education and knowledge (level of education, knowledge1: books, knowledge2: newspapers); Social interaction (friends, passive participation, active participation, political interest); and psychological conditions (economic resources, personal/social relations, health, working, leisure time)
Klasen (2000)	Common people, South Africa	Education, income, wealth, housing, water, sanitation, energy, employment, transport, financial services, nutrition, health care, safety, perceived well-being
Kuklys (2005)	Common people, U. K.	Health (visits to doctor, physical illness affects daily activity, self-assessed health status); and housing (problems with condensation, rot in windows or floor, heating, space)

Table 2. Evaluative spaces / functionings and membership degrees to the elementary subsets

<i>Functionings</i>	<i>Elementary Subsets</i>		<i>Membership degrees & Value levels</i>		<i>Membership function</i>	
Food intake (μ_1) (Consumption of food: at least once a week)	Milk / egg / fish / chicken / meat	μ_{11}	0	No	Dichotomous	
			1	Yes		
	Pulses or beans	μ_{12}	0	No	Dichotomous	
			1	Yes		
Reproductive life (μ_2)	Children ever born	μ_{21}	0	Five and above	Trapezoidal function	
			0.333	Four		
			0.667	Three		
			1	Up to two		
	Children ever died	μ_{22}	0	Yes	Dichotomous	
			1	No		
Health (μ_3)	Level of haemoglobin in the blood / Anaemia*	μ_3	0	≤ 7 g/dl	Trapezoidal function	
			0.333	7-9.9 g/dl		
			0.667	10-11.9g/dl		
			1	≥ 12 g/dl		
Housing (μ_4) (Basic amenities available in the housing area)	Source of drinking water	μ_{41}	0	Surface / other	Linear function	
			0.500	Hand pump / well		
			1	Piped & bottled		
	Type of toilet facility	μ_{42}	0	No facility / field	Linear function	
			0.333	Pit latrine		
			0.667	Shared flush toilet		
Has electricity	μ_{43}	0	No	Dichotomous		
		1	Yes			
Education (μ_5)	Completed years of education	μ_5	0	No education (Intermediate positions: 1 \rightarrow 14 years of education)	Sigmoid curve / function	
			1	Fifteen years +		
			0	Others		Linear function
			0.250	Husband		
	Who decides on obtaining health care	μ_{61}	0.500	Jointly with others		
			0.750	Jointly with husband		
			1	Respondent		
			0	No freedom	Dichotomous	
1	Yes					
Exposure to mass media & Leisure (μ_7)	Reads newspaper and / or watches TV at least once a week	μ_7	0	No	Dichotomous	
			1	Yes		

* Anaemia status by haemoglobin level> severe: ≤ 7 g/dl, mild: 7-9.9 g/dl, moderate: 10-11.9 g/dl, no- anaemia: ≥ 12 g/dl

** Difference between respondent's perception on ideal number of children and children ever born (a membership degree of 1 stands for zero and / or positive difference implying freedom, 0 otherwise)

Table 3. Explicative or conversion factors

<i>Level</i>	<i>Factors</i>		<i>Categories</i>
Individual level factors	Age of the respondent	β_{11}	1 Young, 15-24 years
			2 Middle, 25-34 years
			3 Old, 35-49 years
	Relationship to household head	β_{12}	1 Head
			2 Wife
			3 Daughter / mother / sister / grand-daughter / daughter-in-law / mother-in-law / co-spouse / other relative / adopted / foster child / not related
Household level factors	Family size	β_{21}	1 Small, ≤ 5
			2 Large, 6+
	Household wealth / standard of living index	β_{22}	1 Low
			2 Medium
Social factors	Religion	β_{31}	1 Hindu
			2 Muslim
			3 Other (Christian, Sikh, Buddhist/Neo Buddhist, Jain, Jewish, Zoroastian/Parsi, no religion, other)
	Caste / ethnicity	β_{32}	1 Scheduled caste
			2 Scheduled tribe
			3 General
Environment level factors	Natural environment (Altitude of the area from sea level)	β_{41}	1 Low, < 1000 metres
			2 High, > 1000 metres
	Social and economic environment (Type of locality)	β_{42}	1 Urban
			2 Rural
	Geographical region	β_{43}	1 Northern India
			2 North-eastern hilly region
3 Southern India			

Table 4A. Membership degrees to the elementary subsets: mean values for India and the major States (NFHS-3*)

<i>States</i>	<i>n</i>	μ_{11}	μ_{12}	$[\mu_1]$	μ_{21}	μ_{22}	$[\mu_2]$	μ_3	μ_{41}	μ_{42}	μ_{43}	$[\mu_4]$	μ_5	μ_{61}	μ_{62}	$[\mu_6]$	μ_7	$[\mu]$
Andhra Pradesh	4415	0.942	0.978	0.960	0.757	0.849	0.803	0.730	0.883	0.614	0.938	0.811	0.329	0.637	0.630	0.633	0.792	0.723
Assam ^a	11376	0.798	0.762	0.780	0.676	0.836	0.756	0.766	0.502	0.656	0.790	0.649	0.393	0.719	0.714	0.716	0.639	0.671
Bihar ^b	4391	0.596	0.914	0.755	0.569	0.715	0.642	0.711	0.465	0.318	0.434	0.405	0.211	0.557	0.517	0.537	0.337	0.514
Delhi	1674	0.736	0.961	0.848	0.710	0.846	0.778	0.824	0.877	0.863	0.992	0.911	0.458	0.694	0.583	0.639	0.879	0.762
Goa	1425	0.949	0.890	0.919	0.851	0.929	0.890	0.841	0.717	0.661	0.966	0.781	0.481	0.655	0.773	0.714	0.861	0.784
Gujarat	2429	0.794	0.958	0.876	0.704	0.804	0.754	0.743	0.816	0.548	0.912	0.759	0.341	0.642	0.572	0.607	0.648	0.676
Haryana	1734	0.756	0.937	0.846	0.699	0.846	0.773	0.739	0.787	0.496	0.938	0.740	0.324	0.700	0.585	0.643	0.624	0.670
Himachal Pradesh	2080	0.773	0.948	0.861	0.789	0.910	0.849	0.815	0.761	0.514	0.988	0.754	0.462	0.662	0.597	0.630	0.751	0.732
Jammu & Kashmir	987	0.785	0.910	0.848	0.649	0.830	0.739	0.741	0.543	0.298	0.919	0.586	0.300	0.562	0.549	0.556	0.594	0.623
Karnataka	3560	0.941	0.988	0.964	0.752	0.844	0.798	0.763	0.709	0.382	0.906	0.666	0.312	0.547	0.605	0.576	0.671	0.679
Kerala	2088	0.972	0.736	0.854	0.881	0.946	0.913	0.867	0.454	0.943	0.916	0.771	0.569	0.694	0.868	0.781	0.837	0.799
Madhya Pradesh ^c	7057	0.563	0.940	0.751	0.627	0.735	0.681	0.766	0.572	0.394	0.803	0.589	0.284	0.560	0.579	0.570	0.530	0.596
Maharashtra	5282	0.758	0.938	0.848	0.745	0.861	0.803	0.783	0.878	0.664	0.897	0.813	0.443	0.692	0.604	0.648	0.772	0.730
Orissa	2824	0.693	0.925	0.809	0.693	0.752	0.723	0.734	0.470	0.212	0.547	0.410	0.283	0.666	0.602	0.634	0.524	0.588
Punjab	2241	0.754	0.848	0.801	0.746	0.870	0.808	0.825	0.765	0.663	0.971	0.800	0.382	0.740	0.571	0.655	0.793	0.723
Rajasthan	2761	0.715	0.854	0.784	0.571	0.736	0.653	0.753	0.638	0.322	0.703	0.555	0.181	0.565	0.561	0.563	0.411	0.557
Tamil Nadu	3930	0.909	0.591	0.750	0.823	0.867	0.845	0.764	0.885	0.476	0.919	0.760	0.414	0.694	0.642	0.668	0.839	0.720
Uttar Pradesh ^d	9176	0.652	0.949	0.801	0.552	0.716	0.634	0.776	0.606	0.439	0.616	0.554	0.282	0.628	0.483	0.556	0.493	0.585
West Bengal	4006	0.942	0.909	0.926	0.773	0.846	0.809	0.741	0.687	0.653	0.648	0.662	0.350	0.633	0.631	0.632	0.627	0.678
India	73436	0.768	0.884	0.826	0.689	0.810	0.749	0.767	0.658	0.526	0.789	0.658	0.345	0.645	0.609	0.627	0.632	0.658

*Indian 'National Family Health Survey-3' was conducted in 2005-2006.

Food intake (μ_1)> μ_{11} : milk /animal protein; μ_{12} : pulses or beans;

Reproductive life (μ_2)>: μ_{21} : children ever born; μ_{22} : children ever died

Health (μ_3)> level of haemoglobin in blood / anaemia;

Housing (μ_4)> μ_{41} : source of drinking water; μ_{42} : type of toilet facility; μ_{43} : has electricity;

Education (μ_5)> completed years of education;

Autonomy (μ_6)> μ_{61} : decision on obtaining health care; μ_{62} : reproductive freedom;

Exposure to mass media & Leisure (μ_7)> Reads newspaper and / or watches TV at least once a week;

$[\mu_i]$: simple average of the functionings in each evaluative space

^a North-Eastern Hilly Region: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; ^b Includes newly formed State of Jharkhand; ^c Includes newly formed State of Chhattisgarh; ^d Includes newly formed State of Uttaranchal

Table 4B. Membership degrees to the elementary subsets: mean values for India and the major States (NFHS-2*)

<i>States</i>	<i>n</i>	μ_{11}	μ_{12}	$[\mu_1]$	μ_{21}	μ_{22}	$[\mu_2]$	μ_3	μ_{41}	μ_{42}	μ_{43}	$[\mu_4]$	μ_5	μ_{61}	μ_{62}	$[\mu_6]$	μ_7	$[\mu]$
Andhra Pradesh	3833	0.902	0.922	0.912	0.689	0.763	0.726	0.758	0.748	0.230	0.774	0.584	0.204	0.567	0.731	0.649	0.612	0.635
Assam ^a	9546	0.769	0.688	0.728	0.619	0.796	0.707	0.754	0.610	0.535	0.596	0.580	0.302	0.614	0.707	0.661	0.529	0.609
Bihar ^b	6215	0.571	0.888	0.729	0.566	0.745	0.656	0.702	0.524	0.141	0.174	0.280	0.126	0.486	0.679	0.582	0.190	0.466
Delhi	2105	0.787	0.912	0.849	0.688	0.845	0.766	0.810	0.930	0.818	0.983	0.910	0.462	0.707	0.629	0.668	0.913	0.768
Goa	1189	0.976	0.763	0.869	0.764	0.865	0.814	0.830	0.780	0.442	0.937	0.720	0.422	0.618	0.700	0.659	0.833	0.735
Gujarat	3479	0.848	0.972	0.910	0.662	0.760	0.711	0.772	0.831	0.386	0.867	0.695	0.308	0.662	0.607	0.635	0.613	0.663
Haryana	2717	0.938	0.993	0.965	0.629	0.788	0.709	0.774	0.720	0.337	0.903	0.654	0.256	0.633	0.596	0.614	0.619	0.656
Himachal Pradesh	2927	0.887	0.992	0.939	0.708	0.868	0.788	0.855	0.842	0.348	0.981	0.723	0.385	0.665	0.570	0.617	0.802	0.730
Jammu & Kashmir ^c	2548	0.789	0.688	0.738	0.560	0.775	0.668	0.773	0.720	0.444	0.920	0.695	0.201	0.543	0.516	0.530	0.588	0.599
Karnataka	4060	0.858	0.987	0.923	0.687	0.777	0.732	0.785	0.838	0.273	0.828	0.646	0.274	0.536	0.570	0.553	0.625	0.648
Kerala	2721	0.934	0.700	0.817	0.816	0.911	0.864	0.899	0.587	0.630	0.749	0.655	0.518	0.721	0.850	0.786	0.807	0.764
Madhya Pradesh ^d	6548	0.450	0.805	0.628	0.558	0.642	0.600	0.759	0.628	0.210	0.720	0.519	0.188	0.423	0.578	0.501	0.472	0.524
Maharashtra	4772	0.770	0.956	0.863	0.693	0.822	0.758	0.775	0.868	0.349	0.883	0.700	0.358	0.595	0.585	0.590	0.724	0.681
Orissa	4264	0.453	0.818	0.635	0.656	0.730	0.693	0.716	0.527	0.155	0.410	0.364	0.222	0.435	0.646	0.541	0.335	0.501
Punjab	2599	0.917	0.993	0.955	0.688	0.837	0.763	0.806	0.685	0.503	0.969	0.719	0.368	0.721	0.583	0.652	0.799	0.723
Rajasthan	6007	0.728	0.820	0.774	0.561	0.686	0.624	0.766	0.678	0.230	0.653	0.520	0.134	0.430	0.562	0.496	0.316	0.519
Tamil Nadu	4522	0.855	0.954	0.904	0.766	0.813	0.790	0.734	0.822	0.329	0.826	0.659	0.349	0.641	0.611	0.626	0.698	0.680
Uttar Pradesh ^e	5269	0.613	0.879	0.746	0.529	0.652	0.591	0.771	0.556	0.189	0.395	0.380	0.191	0.485	0.631	0.558	0.366	0.515
West Bengal	3824	0.808	0.797	0.803	0.718	0.805	0.761	0.718	0.647	0.419	0.475	0.514	0.299	0.499	0.664	0.582	0.531	0.601
India	79145	0.743	0.858	0.800	0.643	0.766	0.704	0.766	0.688	0.339	0.679	0.569	0.268	0.557	0.633	0.595	0.543	0.606

*Indian 'National Family Health Survey-2' was conducted in 1998-1999.

Food intake (μ_1)> μ_{11} : milk /animal protein; μ_{12} : pulses or beans;

Reproductive life (μ_2)>: μ_{21} : children ever born; μ_{22} : children ever died

Health (μ_3)> level of haemoglobin in blood / anaemia;

Housing (μ_4)> μ_{41} : source of drinking water; μ_{42} : type of toilet facility; μ_{43} : has electricity;

Education (μ_5)> completed years of education;

Autonomy (μ_6)> μ_{61} : decision on obtaining health care; μ_{62} : reproductive freedom;

Exposure to mass media & Leisure (μ_7)> Reads newspaper and / or watches TV at least once a week;

$[\mu_i]$: simple average of the functionings in each evaluative space

^a North-Eastern Hilly Region: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; ^b Includes newly formed State of Jharkhand; ^c Survey is done in Jammu only;

^d Includes newly formed State of Chhattisgarh; ^e Includes newly formed State of Uttaranchal

Table 5. Average annual growth rates in the functioning achievements in between NFHS-2 (1998-1999) and NFHS-3 (2005-2006)*

States	μ_{11}	μ_{12}	$[\mu_1]$	μ_{21}	μ_{22}	$[\mu_2]$	μ_3	μ_{41}	μ_{42}	μ_{43}	$[\mu_4]$	μ_5	μ_{61}	μ_{62}	$[\mu_6]$	μ_7	$[\mu]$
Andhra Pradesh	0.62	0.84	0.73	1.37	1.56	1.47	-0.51	2.50	23.16	2.94	5.39	8.50	1.71	-1.92	-0.34	4.08	1.92
Assam ^a	0.52	1.49	0.99	1.28	0.70	0.96	0.22	-2.46	3.14	4.52	1.65	4.18	2.37	0.14	1.15	2.88	1.41
Bihar ^b	0.61	0.41	0.49	0.07	-0.56	-0.30	0.18	-1.56	17.41	20.73	6.19	9.36	2.03	-3.31	-1.07	10.73	1.43
Delhi	-0.90	0.75	-0.02	0.44	0.02	0.22	0.24	-0.79	0.76	0.13	0.02	-0.12	-0.26	-1.01	-0.60	-0.52	-0.11
Goa	-0.38	2.31	0.80	1.58	1.03	1.30	0.18	-1.12	6.87	0.43	1.18	1.94	0.83	1.45	1.16	0.47	0.92
Gujarat	-0.88	-0.20	-0.52	0.88	0.80	0.84	-0.52	-0.25	5.82	0.72	1.28	1.49	-0.42	-0.80	-0.61	0.79	0.27
Haryana	-2.69	-0.78	-1.71	1.54	1.02	1.25	-0.63	1.29	6.55	0.54	1.82	3.68	1.47	-0.26	0.66	0.11	0.30
Himachal Pradesh	-1.78	-0.62	-1.15	1.59	0.67	1.07	-0.65	-1.33	6.62	0.10	0.59	2.77	-0.06	0.66	0.29	-0.88	0.04
Jammu & Kashmir	-0.07	4.48	2.07	2.20	0.98	1.47	-0.57	-3.41	-4.56	-0.02	-2.18	6.83	0.49	0.89	0.68	0.14	0.56
Karnataka	1.34	0.01	0.62	1.31	1.20	1.25	-0.39	-2.14	5.54	1.31	0.43	1.92	0.28	0.85	0.58	1.02	0.66
Kerala	0.56	0.71	0.63	1.11	0.53	0.79	-0.49	-3.14	6.89	3.09	2.46	1.37	-0.52	0.29	-0.09	0.52	0.64
Madhya Pradesh ^c	3.48	2.33	2.72	1.72	2.01	1.87	0.13	-1.24	12.16	1.60	1.87	7.08	4.49	0.02	1.91	1.70	1.91
Maharashtra	-0.22	-0.26	-0.24	1.04	0.66	0.82	0.14	0.16	12.52	0.22	2.24	3.29	2.26	0.45	1.36	0.92	1.00
Orissa	7.35	1.81	3.80	0.78	0.42	0.60	0.35	-1.50	5.10	4.64	1.75	3.81	7.37	-0.94	2.38	7.83	2.41
Punjab	-2.47	-2.03	-2.24	1.17	0.55	0.82	0.33	1.62	4.41	0.03	1.56	0.53	0.37	-0.29	0.06	-0.10	0.00
Rajasthan	-0.25	0.58	0.18	0.25	1.01	0.64	-0.24	-0.82	5.55	1.06	0.93	4.87	4.36	-0.02	1.87	4.17	1.02
Tamil Nadu	0.88	-5.28	-2.36	1.03	0.92	0.97	0.57	1.06	6.20	1.56	2.13	2.58	1.15	0.70	0.93	2.80	0.82
Uttar Pradesh ^d	0.88	1.10	1.02	0.60	1.36	1.01	0.09	1.25	18.35	7.76	6.35	6.61	4.09	-3.25	-0.05	4.81	1.89
West Bengal	2.30	1.95	2.12	1.06	0.71	0.88	0.44	0.86	7.75	5.05	3.99	2.37	3.73	-0.69	1.19	2.51	1.78
India	0.47	0.42	0.45	0.99	0.80	0.89	0.02	-0.60	7.65	2.25	2.17	3.99	2.19	-0.53	0.75	2.27	1.19

* The gap between the mid-points of two reference periods of the surveys is nearly 86.5 months (7.21 years).

NHFS-2: Indian 'National Family Health Survey- 2' & NFHS-3: Indian 'National Family Health Survey- 3'.

Food intake (μ_1)> μ_{11} : milk /animal protein; μ_{12} : pulses or beans;

Reproductive life (μ_2)>: μ_{21} : children ever born; μ_{22} : children ever died

Health (μ_3)> level of haemoglobin in blood / anaemia;

Housing (μ_4)> μ_{41} : source of drinking water; μ_{42} : type of toilet facility; μ_{43} : has electricity;

Education (μ_5)> completed years of education;

Autonomy (μ_6)> μ_{61} : decision on obtaining health care; μ_{62} : reproductive freedom;

Exposure to mass media & Leisure (μ_7)> Reads newspaper and / or watches TV at least once a week;

$[\mu_i]$: simple average of the functionings *in each* evaluative space

^a North-Eastern Hilly Region: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; ^b Includes newly formed State of Jharkhand; ^c Includes newly formed State of Chhattisgarh; ^d Includes newly formed State of Uttaranchal

Table 6A. Ranking of selected States: non-income vs. income dimensions of well-being (NFHS-3)

States	Rank according to								NSDP ^a
	$[\mu_1]$	$[\mu_2]$	μ_3	$[\mu_4]$	μ_5	$[\mu_6]$	μ_7	$[\mu]$	
Andhra Pradesh	2	7	18	3	11	10	6	6	11
Assam ^a	16	12	8	13	7	2	11	12	13
Bihar ^b	17	18	19	19	18	19	19	19	18
Delhi	8	10	4	1	4	8	1	3	2
Goa	4	2	2	5	2	3	2	2	1
Gujarat	5	13	13	8	10	13	10	11	6
Haryana	11	11	16	10	12	7	13	13	3
Himachal Pradesh	6	3	5	9	3	12	8	4	7
Jammu & Kashmir	9	14	14	15	14	17	14	14	14
Karnataka	1	9	11	11	13	14	9	9	10
Kerala	7	1	1	6	1	1	4	1	8
Madhya Pradesh ^c	18	16	9	14	15	15	15	15	15
Maharashtra	10	8	6	2	5	6	7	5	4
Orissa	12	15	17	18	16	9	16	16	17
Punjab	13	6	3	4	8	5	5	7	5
Rajasthan	15	17	12	16	19	16	18	18	16
Tamil Nadu	19	4	10	7	6	4	3	8	9
Uttar Pradesh ^d	14	19	7	17	17	18	17	17	19
West Bengal	3	5	15	12	9	11	12	10	12

μ_1 : Food intake; μ_2 : Reproductive life; μ_3 : Health; μ_4 : Housing; μ_5 : Education; μ_6 : Autonomy; μ_7 : Exposure to mass media & Leisure; $[\mu_i]$: simple average of the functionings *in each* evaluative space; $[\mu]$: simple average of all the functionings *in all* evaluative spaces; ^a Per capita Net State Domestic Product in 2005-2006 (the figure for Jammu & Kashmir corresponds to 2004-2005; figures of the group of States are simple averages) at current prices (Source: Economic Survey 2007-2008); ^a North-Eastern Hilly Region: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; ^b Includes newly formed State of Jharkhand; ^c Includes newly formed State of Chhattisgarh; ^d Includes newly formed State of Uttaranchal

Table 6B. Ranking of selected States: non-income vs. income dimensions of well-being (NFHS-2)

States	Rank according to								NSDP ^a
	$[\mu_1]$	$[\mu_2]$	μ_3	$[\mu_4]$	μ_5	$[\mu_6]$	μ_7	$[\mu]$	
Andhra Pradesh	5	10	14	12	14	6	11	11	12
Assam ^a	17	13	15	13	9	3	14	12	6
Bihar ^b	16	16	19	19	19	12	19	19	19
Delhi	10	5	4	1	2	2	1	1	1
Goa	8	2	3	3	3	4	2	3	2
Gujarat	6	11	10	6	8	7	10	8	7
Haryana	1	12	8	10	12	10	9	9	5
Himachal Pradesh	3	4	2	2	4	9	4	4	10
Jammu & Kashmir	15	15	9	7	15	17	12	14	15
Karnataka	4	9	6	11	11	15	8	10	11
Kerala	11	1	1	9	1	1	3	2	9
Madhya Pradesh ^c	19	18	13	15	17	18	15	15	14
Maharashtra	9	8	7	5	6	11	6	6	4
Orissa	18	14	18	18	13	16	17	18	18
Punjab	2	6	5	4	5	5	5	5	3
Rajasthan	13	17	12	14	18	19	18	16	16
Tamil Nadu	7	3	16	8	7	8	7	7	8
Uttar Pradesh ^d	14	19	11	17	16	14	16	17	17
West Bengal	12	7	17	16	10	13	13	13	13

μ_1 : Food intake; μ_2 : Reproductive life; μ_3 : Health; μ_4 : Housing; μ_5 : Education; μ_6 : Autonomy; μ_7 : Exposure to mass media & Leisure; $[\mu_i]$: simple average of the functionings *in each* evaluative space; $[\mu]$: simple average of all the functionings *in all* evaluative spaces; ^a Per capita Net State Domestic Product in 1999-2000 at current prices (figures of the group of States are simple averages) (Source: Economic Survey 2005-2006); ^a North-Eastern Hilly Region: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; ^b Includes newly formed State of Jharkhand; ^c Includes newly formed State of Chhattisgarh; ^d Includes newly formed State of Uttaranchal

Table 7. Spearman's rank correlation: income and non-income dimensions of well-being

		$[\mu_1]$	$[\mu_2]$	μ_3	$[\mu_4]$	μ_5	$[\mu_6]$	μ_7	$[\mu]$
NFHS-3	NSDP	0.430 ³	0.686 ¹	0.504 ²	0.860 ¹	0.777 ¹	0.630 ¹	0.807 ¹	0.796 ¹
NFHS-2	NSDP	0.574 ³	0.675 ¹	0.607 ¹	0.807 ¹	0.805 ¹	0.737 ¹	0.828 ¹	0.867 ¹

Sig. (2-tailed) ¹p<0.01, ²p<0.05, ³p<0.10

Table 8A. Results of regression analyses: odds ratios [exp (β)] of attaining high score^a in all dimensions of well-being [NFHS-3 (2005-2006)]

<i>Predictor variables</i>	$[\mu_1]$	$[\mu_2]$	$[\mu_3]$	$[\mu_4]$	μ_5	$[\mu_6]$	μ_7	$[\mu]$
Age of the respondent (rc: 15-24)								
25-34	1.046 ³	0.257 ¹	1.218 ¹	1.230 ¹	0.823 ¹	0.423 ¹	1.049 ³	0.725 ¹
35-49	1.053 ²	0.092 ¹	1.259 ¹	1.304 ¹	0.434 ¹	0.193 ¹	0.860 ¹	0.377 ¹
Relationship to head of household (rc: other)								
Head	0.718 ¹	0.154 ¹	0.824 ¹	0.713 ¹	0.405 ¹	0.396 ¹	0.596 ¹	0.370 ¹
Wife	0.814 ¹	0.218 ¹	0.879 ¹	0.859 ¹	0.371 ¹	0.489 ¹	0.748 ¹	0.409 ¹
Size of family (rc: small, ≤ 5)								
Large (> 5)	0.882 ¹	0.159 ¹	0.939 ¹	0.770 ¹	0.547 ¹	0.252 ¹	0.774 ¹	0.375 ¹
Wealth/Standard of living Index (rc: low)								
Medium	1.610 ¹	1.523 ¹	1.242 ¹	8.278 ¹	2.662 ¹	1.114 ¹	3.476 ¹	4.222 ¹
High	2.847 ¹	3.486 ¹	1.559 ¹	60.825 ¹	12.849 ¹	1.807 ¹	18.273 ¹	26.914 ¹
Religion (rc: Hindu)								
Muslim	1.110 ¹	0.483 ¹	ns	1.272 ¹	0.465 ¹	0.909 ¹	0.501 ¹	0.549 ¹
Other religion	0.659 ¹	ns	1.283 ¹	1.576 ¹	1.456 ¹	1.309 ¹	1.100 ³	1.383 ¹
Caste / ethnicity (rc: general)								
Scheduled Caste	0.797 ¹	0.688 ¹	0.908 ¹	0.843 ¹	0.560 ¹	0.815 ¹	1.071 ¹	0.717 ¹
Scheduled Tribe	0.597 ¹	0.621 ¹	0.690 ¹	0.655 ¹	0.616 ¹	1.281 ¹	0.621 ¹	0.510 ¹
Altitude from sea level (rc: < 1000 metre)								
> 1000 metre	ns	1.112 ¹	ns	0.795 ¹	0.873	ns	0.804 ¹	0.937 ³
Type of locality (rc: rural)								
Urban	ns	1.119 ¹	0.969 ³	6.118 ¹	1.590 ¹	1.126 ¹	2.325 ¹	2.181 ¹
Region (rc: South)								
North-East	0.645 ¹	0.559 ¹	0.951 ¹	1.088 ¹	0.573 ¹	0.670 ¹	0.386 ¹	0.406 ¹
North	0.841 ¹	0.738 ¹	0.657 ¹	ns	1.403 ¹	1.514 ¹	0.692 ¹	0.886 ¹
Constant	2.272 ¹	64.257 ¹	0.696 ¹	0.019 ¹	0.823 ¹	9.242 ¹	0.769 ¹	0.832 ¹
-2 Log likelihood	85124.080	68333.829	99477.951	54492.045	73764.773	85015.227	64748.846	64252.844
Pseudo (Nagelkerke) R Square	0.103	0.411	0.031	0.629	0.417	0.255	0.481	0.534

^a Above the median values (except the dichotomous one, μ_7); μ_1 : Food intake; μ_2 : Reproductive life; μ_3 : Health and morbidity; μ_4 : Housing; μ_5 : Education; μ_6 : Autonomy; μ_7 : Exposure to mass media & Leisure; $[\mu_i]$: simple average of the functionings in each evaluative space; $[\mu]$: simple average of all the functionings in all evaluative spaces; rc: reference category; ns: not significant; ¹p<0.01, ²p<0.05, ³p<0.10

Table 8B. Results of regression analyses: odds ratios [exp (β)] of attaining high score^a in all dimensions of well-being [NFHS-2 (1998-1999)]

<i>Predictor variables</i>	$[\mu_1]$	$[\mu_2]$	$[\mu_3]$	$[\mu_4]$	μ_5	$[\mu_6]$	μ_7	$[\mu]$
Age of the respondent (rc: 15-24)								
25-34	ns	0.214 ¹	1.240 ¹	1.124 ¹	0.782 ¹	0.750 ¹	ns	0.648 ¹
35-49	0.924 ¹	0.071 ¹	1.310 ¹	1.124 ¹	0.480 ¹	0.531 ¹	0.788 ¹	0.363 ¹
Relationship to head of household (rc: other)								
Head	0.813 ¹	0.261 ¹	ns	1.124 ²	0.664 ¹	1.221 ¹	ns	0.833 ¹
Wife	0.927 ¹	0.274 ¹	ns	1.075 ¹	0.632 ¹	0.521 ¹	0.840 ¹	0.594 ¹
Size of family (rc: small, ≤ 5)								
Large (> 5)	0.872 ¹	0.182 ¹	ns	0.714 ¹	0.617 ¹	0.474 ¹	0.679 ¹	0.432 ¹
Wealth/Standard of living Index (rc: low)								
Medium	2.156 ¹	1.550 ¹	1.430 ¹	6.266 ¹	3.368 ¹	1.120 ¹	4.507 ¹	5.619 ¹
High	4.874 ¹	3.591 ¹	1.849 ¹	37.961 ¹	15.165 ¹	1.554 ¹	36.432 ¹	40.782 ¹
Religion (rc: Hindu)								
Muslim	0.906 ¹	0.663 ¹	ns	1.501 ¹	0.599 ¹	ns	0.613 ¹	0.714 ¹
Other religion	0.879 ¹	1.226 ¹	1.448 ¹	1.568 ¹	1.899 ¹	1.612 ¹	1.603 ¹	1.922 ¹
Caste / ethnicity (rc: general)								
Scheduled Caste	0.897 ¹	0.729 ¹	0.896 ¹	0.950 ³	0.571 ¹	0.902 ¹	0.925 ¹	0.784 ¹
Scheduled Tribe	0.502 ¹	0.667 ¹	0.706 ¹	0.547 ¹	0.440 ¹	ns	0.464 ¹	0.382 ¹
Altitude from sea level (rc: < 1000 metre)								
> 1000 metre	0.872 ¹	1.231 ¹	1.681 ¹	3.371 ¹	ns	1.232 ¹	1.524 ¹	1.679 ¹
Type of locality (rc: rural)								
Urban	1.436 ¹	1.522 ¹	1.081 ¹	11.901 ¹	2.608 ¹	1.213 ¹	5.448 ¹	5.199 ¹
Region (rc: South)								
North-East	0.654 ¹	0.532 ¹	0.873 ¹	0.348 ¹	0.360 ¹	0.868 ¹	0.393 ¹	0.317 ¹
North	0.768 ¹	0.783 ¹	0.700 ¹	0.639 ¹	1.430 ¹	1.374 ¹	0.727 ¹	0.758 ¹
Constant	1.607 ¹	44.455 ¹	0.565 ¹	0.157 ¹	1.195 ¹	1.230 ¹	0.517 ¹	1.193 ¹
-2 Log likelihood	92409.975	77619.678	106742.344	66944.650	82711.919	95608.883	74498.432	71477.670
Pseudo (Nagelkerke) R Square	0.144	0.415	0.043	0.557	0.385	0.102	0.474	0.507

^a Above the median values (except the dichotomous one, μ_7); μ_1 : Food intake; μ_2 : Reproductive life; μ_3 : Health and morbidity; μ_4 : Housing; μ_5 : Education; μ_6 : Autonomy; μ_7 : Exposure to mass media & Leisure; $[\mu]$: simple average of the functionings *in each* evaluative space; $[\mu]$: simple average of all the functionings *in all* evaluative spaces
rc: reference category; ns: not significant; ¹p<0.01, ²p<0.05, ³p<0.10