# THE EFFECTS OF SOCIAL AUTONOMY ON BMI SCORES: A STUDY OF WOMEN IN NEPAL

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Gender differences in health and health care services have become the focus of an unprecedented mobilization of social resources and research in South Central Asia. Women in Nepal, India, and elsewhere in the region experience poorer health than men, and social factors, particularly inequities in status, account for these differences (Dreze and Sen 2002; DeRose, Das, and Millman 2000; Gittelsohn 1991). Accordingly, women's autonomy and self-empowerment have been central concepts in researching the relationship between women's social status and health.

Although research in both western and non-western societies has demonstrated the positive effects of women's autonomy on quality of life in general and health in particular (Jun, Subramanian, Gortmaker, and Kawachi 2004; Kalipeni 2000), these studies have not defined autonomy consistently. Women's autonomy is often described operationally without consideration of autonomy as a broad, multi-dimensional concept. Studies typically have relied upon a varied number of indicators of autonomy without clarifying which facet of women's agency may be most salient in predicting women's quality of life. With this in mind, the purpose of this paper is twofold: first, we want to investigate the relationship between autonomy, using a broad operationalization of the term, and a specific and objective measure of health status (Body Mass Index (BMI)); and, second, we will compare the effects of different indicators of autonomy on BMI.

## Autonomy and Women's Health

At the core of the international women's movement has been efforts to invigorate and enhance women's autonomy and reduce women's dependence on and vulnerability to men (c.f. Nelson, *et al.*, 1996). Empowerment is both mantra and strategy to individuals, groups, and societies that strive to reduce gender-based social, economic, and political divisions, and has considerable influence over health and health behavior. For example, increasing women's social agency in westernizing cultures has positive results on self-reported health (Berhane, Gossagye, Emmelin, and Hogberg 2001), antenatal care (Bloom, Wypij and Das Gupta 2001), and contraceptive use (Al Riyami, Afifi, and Mabry 2004), and a negative impact on fertility in India (Murthi, Guio, and Dreze 1995) and Nepal (Axinn and Fricke 1996; Morgan and Niraula 1995).

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Although enhancing women's agency in both western and westernizing societies has a positive effect on health and health behavior, the causal mechanisms linking autonomy to improved health intersect in a complex web of factors that bridges all levels of social life, albeit with cultural variations. In essence, raising women's social capital reduces dependency and heightens both status and bargaining power. In taking control of their economic and political lives, women are more likely to invest in themselves and their daughters and lessen their dependence on sons for security in old age (MacCormack 1988). As an example of cultural specificity in this process, increasing women's labor force participation in India lowers dowry levels, which has reduced the cost of raising girls (Murthi, Guio, and Dreze 1995). Given the weight of the findings of the studies cited above, among others, it is clear that empowerment improves women's health and well-being. Based on these ideas, the research hypothesis driving the first part of the present study predicts that among women in Nepal, greater autonomy will be associated with better health as measured by BMI levels.

A problem in this literature, however, is that studies lack consistency in defining what is meant by autonomy. Autonomy is a complex, multifaceted concept, yet studies rarely include more than a couple of autonomy's attributes in their operationalizations. Consequently, when a study concludes that autonomy influences health, it is not clear which facets of autonomy are contributing to the effects, and a certain degree of meaning is lost.

Agency and autonomy refer to individuals' ability to act independently of the constraints of social structure. For Giddens (1984), agency is equivalent to power and is behaviour that leads to changes in social outcomes from what may ordinarily be expected given knowledge of structural conditions and history. Specific to women, autonomy is typically framed in terms of structural norms, particularly power dynamics, governing women's associations with men. Therefore, a definition of women's autonomy should include the many forms in which gender-based power relations can take.

Jejeebhoy's (1995) definition is among the most thorough in the literature and serves as the basis for the present paper. Jejeebhoy suggests that autonomy is a reflection of women's degree of freedom, relative to men, along five structured dimensions: access to economic resources (economic autonomy); freedom of movement (physical autonomy); opportunity to participate in decisions (decision-making autonomy); freedom within intimate relationships (emotional autonomy); and freedom to learn and possess knowledge (knowledge autonomy). In order to maximize content validity in an operationalization of women's autonomy, all five of these dimensions should be considered.

What is not apparent in the literature on the effect of women's autonomy on health, however, is the relative influence of the various attributes representing the autonomy concept. Operationalized indicators of



autonomy have not necessarily been derived from a central and agreed-upon definition. For example, Table 1 shows a number of operationalizations of autonomy in the literature on health among women in South Asia and indicates considerable variation in conceptualization.

**Table 1: Previously Used Operationalizations of Women's Autonomy with Author, and Asian Countries Sampled**

| Authors &County Studied | operationalization |
|---|---|
| Axinn & Fricke (1996) (Nepal) | ties to natal kin |
| Balk (1997) (Bangladesh) | freedom of movement; household decision-making |
| Bloom, Wypij, & Gupta (2001) (India) | control of finances; decision-making power; freedom of movement |
| Dyson & Moore (1983) | freedom of movement; postmarital residence; behavior (India) norms limiting natal contact; freedom to inherit, control, and sell property; control over own sexuality; choice of mate |
| Ghuman (2003) (India, Malaysia, Philippines, Thailand) | freedom of movement; discretion over income; economic decision-making; freedom from violence and intimidation; decision-making power concerning ill children |
| Morgan & Niraula (1995) (Nepal) | freedom of movement; household decision-making |
| Morgan, Stash, Smith, & Mason (2002) (Thailand, Philippines) | freedom of movement; economic decision-making; interpersonal controls e.g. free from domestic violence and (India, Malaysia, Philippines, Thialand) free to disagree with husband |
| Murthi, Guio, & Dreze (1995) (India) | education; literacy; labor force participation |
| Rani and Bonu (2003) (India) | health care decision-making |
| Rayman & Rao (2004) (India) | household decisions-making; freedom of mobility |
| Pothukuchi (2001) (India) | freedom from family networks |

Previous uses of the autonomy concept in quantitative analyses of health have demonstrated poor content validity because studies have used a number of combinations of the various dimensions of the term. Autonomy has been

identified as predicting health and certain health behaviors, yet not all dimensions of the conceptual definition of the term have been included in studies' measurements. Although it would seem intuitive that various indicators of autonomy would predict health similarly, this question has yet to be tested. Therefore, the second objective of the present study was to determine if the various qualities of autonomy have common variability on an objective health measure.

**Body Mass Index (BMI)**

Body Mass Index, a computed number based on height and weight, BMI is a widely used anthropometric indicator of health, especially regarding nutritional status and nutrition-related disease. Designed primarily for public health studies, the BMI allows researchers to determine nutritional correlates in health outcomes and is used as both independent and dependent variables. BMI is not an absolute measure but is best understood if employed as a general guideline for assessing nutritional status, especially at the extremes. Because differences between any two particular BMI numbers is of limited value, BMI's use is most appropriate in public health and sociology of health studies for identifying individuals and population groups within the established ranges defining malnutrition and adiposity (obesity) in adults. Conventional health standards specify BMIs at 18.5 or below as malnourished, with 15 indicating near starvation; 30 and over are considered obese. Body Mass Index, the dependent variable in this study, is calculated by dividing weight by height squared, multiplied by 703.

Because of its strong reliability and validity as a measure of nutritional status, BMI can be found throughout the medical and public health literature. The measure has been used successfully in health studies with Asian samples. Examples of its recent use in studies of south Asian samples include Reddy, Reddy, and Rao's (2004) finding that lower BMI correlated with lower self-reported health among Indian elderly; Hutter's (1996) study that found that BMI is a key measure for identifying chronic energy deficiency among pregnant women in rural south India; an assessment of Nepalese refugees (Anonymous 2000); and Misra, Sharma, Pandey, and Khanna's (2001) work that BMI predicted atherosclerosis among economically deprived Indian urban residents.

Some health researchers have questioned the application of universal standards of BMI to Asian populations, citing cross-ethnic variability in BMI's reliability in classifying risk of metabolic disease. The BMI threshold for predicting these disorders is not consistent when comparing ethnic groups in Europe and Asia (Shiwaku, Anuurad, Enkhmaa, Kitajima, and Yamane 2004). This reliability matter, however, seems to be limited to the identification of metabolic disease and is not a concern in the present study.



**Methods**

**Study Population:** The data used in this study come from the 2001 Nepal Demographic and Health Survey (DHS), a nationally representative survey of 8,726 women aged 15-49 years (Ministry of Health [Nepal] 2002). The DHS is an extensive data set focusing on women and children's health, family planning, fertility, and nutrition. The data set includes variables that allow us to compare several dimensions of autonomy, although these terms do not correspond exactly to Jejeebhoy's scheme. Interviews were conducted in Nepali and several local languages, and informed consent was obtained from each respondent. The data were used with permission.

Because BMI was not adjusted for pregnancy, pregnant women were eliminated from the final study sample leaving 7,989 cases.

**Variables:** The DHS allows us to compare four of the five dimensions specified by Jejeebhoy. Economic autonomy is represented by two variables. First, having income paid as cash rather than "in-kind" (1=cash) proffers recipients greater discretion, hence power, over their personal and household resources. The second variable, the percentage of household income contributed by each respondent, was used to indicate relative household economic power.

Physical autonomy, the freedom of movement, was indicated by several variables. Because of the predominance of traditional sex roles in Nepalese households, we centered this concept on family composition variables. Assuming that in households women generally carry a greater work burden and hold lower status, we sought to identify markers in the DHS of these concepts. Three variables were selected: sex of the head of household (1=female), household size, and fertility. To tap into women's immediate child-bearing burden, fertility was indicated by the number of births in the last five years. It must be noted, however, that child-rearing is not the only factor in the relationship between fertility and BMI. Because of the impact that rapid serial pregnancies can have on women's bodies, this variable may act independently of the other variables in this group.

Decision-making autonomy was represented by two variables. First, health care autonomy was measured by summing two items that asked for respondents' freedom to seek medical treatment. The DHS asked women in the sample how big of a problem they have getting permission to seek treatment and knowing where to receive treatment. The two items loaded together in a factor analysis (data not shown) and were positively correlated ($r = .231$; $p \leq .01$).

Second, household decision-making autonomy was measured by indexing the following five items: Who has the final say on: (1) your own health care, (2) large household purchases; (3) making purchases of everyday household items, (4) making visits to family or relatives, and (5) what food is to be cooked? The response options reflected an ordinal ranking of distance

from autonomy each respondent had in making these decisions. A high score reflected greater social distance from making decisions (low autonomy). The items demonstrated strong reliability (alpha = .867).

Next, knowledge autonomy was represented by two variables. First, literacy level, which was operationalized by respondents' demonstrated ability to read four standardized statements, was used to indicate ability. Second, formal education was measured as years achieved. Education, however, was excluded from the final analyses because of high colinearity effects with literacy (r = .716), and the relationships between them and BMI were very similar. Of the two, literacy was preferred in light of prior research that has suggested that literacy competency rather than school attainment is the pathway through which education affects women's health behavior in Nepal (LeVine, LeVine, Rowe, and Schnell-Anzola 2004).

Jejeebhoy's measure of emotional autonomy could not be represented by DHS data with satisfactory validity and was excluded from consideration. Lastly, age and marital status were originally included as control variables, but were parsimoniously eliminated from the final analysis because they contributed little of consequence to the models.

The dependent variable for this study was BMI. To enhance reliability in measurement, the DHS interviewer's manual provides detailed instructions for obtaining height and weight data from respondents. Both measures required the interviewer and a health technician to use a measuring board to determine height and a solar powered scale to determine weight. In addition, the manual provides instructions for calibrating the scale.

For the present purposes, BMI was operationalized in two ways. First, we used BMI as the interval variable in which it is usually reported. Using BMI in this manner allowed us to study the associations of independent variables on the full range of BMI values. Second, for reasons to be described below, we dichotomized BMI into two groups: malnourished ($\leq$ 18.5) and non-malnourished (U.S. Centers for Disease Control, 2005).

**Results**

As can be seen in Table 2, the bivariate analysis indicated that all of the measures of women's agency were associated with BMI in the predicted direction. Household decision-making autonomy, freedom to seek medical care, literacy, and percentage of income were significantly related to higher BMI. Respondents living in households headed by women and having a cash income had higher BMIs as well. Household size and the number of births in the last five years had statistically significant negative correlations with BMIs. From the bivariate coefficients presented here, the argument that women's autonomy has an impact on an objective health measure was sustained.



**Table 2. Bivariate Analyses of Associations between BMI and Indicators of Autonomy.**

| | BMI | HHSize | Sex of HH Head | 5-Year Births | Income Share | Cash | Dec-Mak Auto. | Med. Auto. | Literacy |
|---|---|---|---|---|---|---|---|---|---|
| BMI | 1.000 | | | | | | | | |
| Household Size | -.032** | 1.000 | | | | | | | |
| Sex of Head of Household | -.029** | -.227** | 1.000 | | | | | | |
| Number of births within 5 years | -.090** | .130** | 130** | 1.000 | | | | | |
| Income Share | .160** | -.135** | -.062** | -.091** | 1.000 | | | | |
| Cash Income | .179** | -.131** | .045** | -.086** | .132** | 1.000 | | | |
| Dec-Making Autonomy | .095** | .394** | -.319** | .103** | -.176** | -.182** | 1.000 | | |
| Medical Autonomy | .060** | -.040** | .070** | -.063** | .104** | .094** | -.154** | 1.000 | |
| Literacy | .235** | -.023* | .043** | -.059** | .111** | .158** | .013 | .187** | 1.000 |

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Although BMI has been widely used as a health indicator, the findings presented thus far should be interpreted with caution because fluctuations in BMIs do not necessarily reflect meaningful differences in health status. A number of factors contribute to height and weight ratios that render many distinctions between BMI levels irrelevant at the interval-ratio level of measurement. For example, the difference between a BMI of 21 and 22 is of no particular interest in that the "22" does not necessarily reflect better health status, which is implicated by rule in an interval or ratio measure. In addition, the distribution of BMI values in relationship to quality of health is not linear; values of 30 and over are considered indicators of obesity (Centers for Disease Control, 2005).

On the other hand, categorizing BMI is both a suitable and reliable indicator of extreme conditions of nourishment status (Nube and Van Den Boom, 2003). With this scheme, an ordinal or even nominal BMI becomes a meaningful biosocial marker of health status in populations, which separate women in the sample into groups according to real and valid health conditions.

With a dichotomized BMI, however, the pattern of the bivariate relationships changes. As Table 3 shows, both autonomy in decision-making and the freedom to seek health care were unrelated to BMI categories. Household factors and fertility, which correlated with the interval measure of BMI, were not associated with the dichotomous version of BMI. The strongest predictors of malnourished status (low BMI) were literacy, percentage of income, and having cash income.

The hierarchical regression models reported in Table 4 show the results of regressing BMI on the various dimensions of autonomy; Model 1 included the economic variables; Model 2 added the physical autonomy factors; Model 3 decision-making; and Model 4 knowledge. As the table shows, the tangible assets (income share and having a cash income) remain significant predictors of BMI when all other autonomy variables are added to the model. Similarly, decision-making autonomy and the number of births in the last five years were strong predictors. The medical autonomy variable, however, was marginally significant when other factors are controlled. Each of the four dimensions of autonomy produced statistically significant gains in the amount of explained variance in BMI values.



**Table 3: Bivariate Analyses of Associations between Categorical BMIs and Indicators of Autonomy (Spearman's rho).**

| | Malnour (BMI < 18.5) | HH Size | Sex of HH Head | 5-Year Births | Income Share | Cash | Dec-Mak Auto. | Med. Auto. | Literacy |
|---|---|---|---|---|---|---|---|---|---|
| Malnourished | 1.000 | | | | | | | | |
| Household Size | .021 | 1.000 | | | | | | | |
| Sex of Head of Household | -.020 | -.289** | 1.000 | | | | | | |
| Number of births within 5 years | -.003 | .165** | -.062** | 1.000 | | | | | |
| Income Share | -.158* | -.135** | .078* | -.119** | 1.000 | | | | |
| Cash Income | -.068** | -.131** | .045** | -.085** | .174** | 1.000 | | | |
| Dec-Making Autonomy | .017 | .411** | -.313** | .131** | -.157** | -.184** | 1.000 | | |
| Medical Autonomy | -.004 | -.067** | .071** | -.065** | .092** | .101** | -.167** | 1.000 | |
| Literacy | -.156** | -.047** | .038** | -.034** | .187 | .153** | .006 | .187** | 1.000 |

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

**Table 4: Multiple Linear Regression of BMI on Factors of Autonomy**

| Model | | B | SE | Beta |
|---|---|---|---|---|
| 1 | Income Share | .327*** | .084 | .117 |
| | Cash Income | 2.541*** | .235 | .325 |
| | (constant) | 18.719*** | .293 | |
| | $R^2$ .132 | | | |
| 2 | Income Share | .288*** | .084 | .103 |
| | Cash Income | 2.453*** | .235 | .314 |
| | Household Size | .002 | .038 | .001 |
| | Sex of Head of Household (1=male) | -.007 | .293 | -.001 |
| | Births Last 5 Years | -.653*** | .142 | -.138 |
| | (constant) | 19.284*** | .544 | |
| | $R^2$ .150*** | | | |
| 3 | Income Share | .247** | .084 | .088 |
| | Cash Income | 2.312*** | .236 | .296 |
| | Household Size | .046 | .039 | .038 |
| | Sex of Head of Household (1=male) | -.354 | .303 | -.037 |
| | Births Last 5 Years | -.579*** | .142 | -.123 |
| | Decision-Making Autonomy | -.086*** | .023 | -.126 |
| | Medical Autonomy | .171* | .087 | .058 |
| | (constant) | 19.790*** | .761 | |
| | $R^2$ .167*** | | | |
| 4 | Income Share | .183* | .082 | .065 |
| | Cash Income | 1.766*** | .243 | .226 |
| | Household Size | .038 | .038 | .031 |
| | Sex of Head of Household (1=male) | -.399 | .296 | -.041 |
| | Births Last 5 Years | -.593*** | .139 | -.125 |
| | Decision-Making Autonomy | -.090*** | .023 | -.132 |
| | Medical Autonomy | .069 | .087 | .023 |
| | Literacy | .843*** | .120 | .219 |
| | (constant) | 20.279*** | .746 | |
| | $R^2$ .207*** | | | |

*** $p \leq .001$
** $p \leq .01$
* $p \leq .05$



Finally, the same analysis was conducted with dichotomized BMI as the dependent variable. To compare the impact of the four dimensions of autonomy on $R^2$ changes, linear regression models were run. As Table 5 shows, the same variables accounted for most of the explained variance as in Table 4; however, the physical and decision-making equations did not contribute to a significant change in $R^2$. Once literacy entered the equation, only the economic and knowledge dimensions of autonomy were significant. Births in the last five years was also significant, but as stated earlier, it is not clear if this effect is due to the physical limitations of child-rearing or the pregnancies. Logistic regression models were run on the dichotomized BMI variable and produced similar findings (data not shown).

**Table 5: Dichotomized BMI Regressed on Indicators of Autonomy**

| Model | | B | SE | Beta |
|---|---|---|---|---|
| 1 | Income Share | -.034*** | .010 | -.110 |
| | Cash Income | -.221*** | .027 | -.254 |
| | (constant) | .463*** | .033 | |
| | $R^2$ .085 | | | |
| 2 | Income Share | -.031*** | .010 | -.101 |
| | Cash Income | -.213*** | .027 | -.245 |
| | Household Size | .001 | .004 | .009 |
| | Sex of Head of Household (1=male) | -.024 | .034 | -.022 |
| | Births Last 5 Years | .038* | .016 | .073 |
| | (constant) | .448*** | .062 | |
| | $R^2$ .092 | | | |
| 3 | Income Share | -.030** | .010 | -.095 |
| | Cash Income | -.209*** | .027 | -.240 |
| | Household Size | -.001 | .005 | -.009 |
| | Sex of Head of Household (1=male) | -.006 | .035 | -.005 |
| | Births Last 5 Years | .035* | .016 | .066 |
| | Decision-Making Autonomy | .005*** | .003 | .062 |
| | Medical Autonomy | -.002 | .010 | -.006 |
| | (constant) | .387*** | .088 | |
| | $R^2$ .095 | | | |

| | | | | |
|---|---|---|---|---|
| 4 | Income Share | -.024* | .010 | -.077 |
| | Cash Income | -.158*** | .028 | -.181 |
| | Household Size | -.001 | .004 | -.005 |
| | Sex of Head of Household (1=male) | -.001 | .035 | -.002 |
| | Births Last 5 Years | -.036* | .016 | .068 |
| | Decision-Making Autonomy | .005 | .003 | .067 |
| | Medical Autonomy | .008 | .010 | .024 |
| | Literacy | -.078*** | .014 | -.183 |
| | (constant) | .342*** | .087 | |
| | $R^2$ .122*** | | | |

*** $p \leq .001$
** $p \leq .01$
* $p \leq .05$

**Discussion**

This study sought to investigate the relationship between four dimensions of women's autonomy (economic, physical, decision-making, and knowledge) and Body Mass Index, an objective health outcome measure, on a national sample of non-pregnant Nepalese women. As expected, greater autonomy correlated with higher BMI. All variables representing the four aspects of autonomy produced the predicted correlations in the bivariate analysis. When BMI was dichotomized to separate the sample into two groups, malnourished and all others, however, only the market-related qualities of autonomy were significant predictors of BMI: literacy and the two income variables.

The findings presented here suggest that while decision-making autonomy and physical autonomy at home contributed to higher BMIs, they had small and not significant utility in predicting women who fell into the malnourished category. Other autonomy factors, literacy, income conditions, and fewer recent births, however, do contribute to women staying out of the lowest range of BMIs. What may explain these differences?

Perhaps the single most important factor influencing women's well-being in Nepal is the control of property and market assets. Increasing women's control of market tangibles promotes women's ability to bargain, both within and outside the household. These assets work independently of household and decision-making autonomy, especially in terms of women avoiding malnourishment. With the exception of the fertility variable, the



qualities of autonomy that predict non-malnourishment were those that link women directly to social systems outside the family.

The research question driving this study was rooted in the concern that women's autonomy has not been considered in its broadest depth. Previous research has used an array of operations but has not attempted to explore the various dimensions of autonomy. The present investigation found that while autonomy was a critical variable in understanding women's health in South Asia, the concept was multi-faceted and particular indicators should be justified in the context of their usage. The data presented here are sufficiently robust to indicate the lack of equivalence between the terms if used individually without first having been subject to a factor analysis.

This being said, the study had limitations. First, the measure of physical limitations is not hardy and does not exactly correspond to Jejeebhoy's concept. Second, we could not include emotional autonomy in the models. Third, pregnant women, who are often vulnerable to nutritional inequities in Nepal, were excluded from the study.

To conclude, this research finds that while autonomy is a critical variable in understanding women's health in South Asia, care should be taken to specify what aspects of autonomy are at work under specific circumstances. Given that the content validity of the term has yet to be established, these data suggest that researchers should, in future, generate a standardized and indexed operationalization of autonomy that includes all five of Jejeebhoy's dimensions.

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