Measuring Gender and Women's Empowerment

Using Confirmatory Factor Analysis*

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Abstract

This paper develops a new method for constructing measures of gender and women's empowerment with cross-sectional survey data. I argue that gender and women's empowerment are best measured as a system of interrelated dimensions derived from context specific gender norms. A theoretical model of women's empowerment in rural Bangladesh is tested using confirmatory factor analysis of data from the 1996 Matlab Health and Socioeconomic Survey (MHSS). This analysis advances the research on women's empowerment by testing many of the theoretical assumptions found in previous research, and makes sophisticated measures of gender and women's empowerment accessible to demographers.

Despite the strong emphasis on the importance of women's empowerment and gender equity found in international population, development, and HIV/AIDS prevention policy over the last ten years, research on gender and women's empowerment remains marginal in demographic research. Shortly after the 1994 International Conference on Population and Development where women's empowerment and gender equity were identified as central to sustainable development, researchers noted that the concept of empowerment was ill-defined and its relationship to demographic processes was unclear (Presser and Sen 2000). However, in the years since there has emerged a general consensus about a clear theoretical conceptualization of women's empowerment for international development research (Malhotra, Schuler, Boender 2002). The fact that this consensus did not result in a significant increase in research on women's empowerment or in our empirical understanding of its relationship to demographic processes is troubling.

The lack of demographic research on women's empowerment likely results from its particular conceptualization in the development literature where empowerment is treated as a process of change over time and best measured using qualitative research techniques. This development-theory driven conceptualization of empowerment makes it extremely difficult to operationalize and measure in demographic research primarily dependent on the quantitative analysis of survey data. To redress the shortage of demographic research on women's empowerment, it is therefore necessary to re-conceptualize women's empowerment for the purpose of measurement. This article brings together research on gender, women's empowerment, and research on women in rural Bangladesh to show how measures of gender and women's empowerment can be constructed for use in demographic research.

Below I first present a new conceptual model of women's empowerment that focuses on measuring its gender component. I then develop and test a measurement model for gender and women's empowerment in rural Bangladesh using confirmatory factor analysis and cross-sectional survey data. Finally, I construct and compare different indicators of women's empowerment. The following research uses the 1996 Matlab Health and Socioeconomic Status Survey (MHSS) (Rahman et al. 1996) to develop measures of gender and women's empowerment in rural Bangladesh. The MHSS is a multistage, multisample household survey that collected information from 11,150 individuals aged 15 and over in 4,538 households. In a special section of the survey, 6,068 women were asked specifically about behaviors related to their empowerment. Data from this section are used to test a theoretical model of gender and women's empowerment using confirmatory factor analysis and to construct measures of women's empowerment.

CONCEPTUALIZING WOMEN'S EMPOWERMENT

In their extensive review of research on women's empowerment, Malhotra et al. (2002) argue that international development research is approaching a consensus about the conceptualization of empowerment. As a starting point for their discussion, Malhotra et al. (2002) use a definition of empowerment suggested by Kabeer (1994). Kabeer's simple and illustrative definition of empowerment is "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them" (Malhotra et. al 2002:6). From this definition Malhotra et al. (2002) suggest that empowerment contains two important elements that distinguish it from the general

concept of "power," the idea of process or change from a condition of disempowerment and the concept of human agency, which implies choices made from the vantage point of real alternatives without severe consequences. Women's empowerment, then, is conceptualized as an increase in agency over time.

However, Malhotra et al. (2002) also concede that one of the main challenges created by this particular conceptualization of empowerment is measurement. Although demographers often measure processes or transitions (health transitions, fertility transitions, etc.), measuring a power transition is much more difficult. One factor that makes measuring empowerment as a process difficult is the "enormous problem with regard to the availability of adequate data across time" (Malhotra et al. 2002:20). Even if longitudinal data on women's levels of power were available, there is the complicating factor that "the behavioral and normative frontiers that define appropriate indicators for measuring empowerment are constantly evolving" (Malhotra et al. 2002:20). As behavioral norms change over time, so too do the behaviors that are indicative of power. As a result, it is not always possible to measure empowerment at two different points in time in the same way. Measuring women's empowerment with different variables makes quantifying gains in power and comparative analysis over time problematic. It is, therefore, almost impossible to measure women's empowerment quantitatively as a process and not necessarily desirable for demographers.

The second element of empowerment identified by Malhotra et al. (2002), agency, is seemingly less problematic to measure. However, the specific conception of agency in this conceptualization of empowerment is that women must be agents rather than only recipients of change (Malhotra et al. 2002). This understanding of agency grew from the

empowerment approach to development, which emphasizes the importance of women's participation in policy and program development. This particular type of gain in agency cannot be accurately captured in survey research. For example, Malhotra et al. (2002) explain that there could be improvement in indicators of gender equality, "but unless the intervening processes involved women as agents of that change rather than merely as its recipients, we would not consider it empowerment" (7). The difficulty of measuring the process of change and women's involvement in that process of change makes empowerment very complicated to measure from a demographic perspective.

An additional problem with the measurement of women's empowerment has been the over emphasis on the health component of empowerment. The 1994 Cairo Consensus established three areas of emphasis related to women's empowerment: improved health, access to economic resources, and reductions in gender inequality. Measures of women's empowerment have generally focused on the first component of empowerment, health. Women's gains in power related to reproductive health have been the major emphasis of many post-Cairo programs. Malhotra and Mehra (1999) note that post-Cairo program assessment has focused primarily on reproductive health issues which has "meant that a large proportion of the indicators devised and adopted by multilateral agencies, national governments and NGOs emphasize the health rather than the social, economic, and gender components of the Cairo agenda"(3). Whereas the emphasis on empowering women to improve their reproductive health is important, sustainable gains in women's empowerment must also include gains in economic power and decreases in gender inequality.

Indicators for the gender components of women's empowerment are especially important to develop in order to distinguish between opportunities or choices for women and the ability (or agency) to exercise those choices (Malhotra and Mehra 1999). For example, gains in access to reproductive health care do not necessarily translate into gains in women's ability to control their sexual and reproductive health (Malhotra and Mehra 1999). Therefore, the gender component of women's empowerment that reflects women's agency within the process of accessing health care is important to develop. The gender component of women's empowerment must be measured to determine if women's access to reproductive health care is accompanied by sustainable gains in women's control over their reproductive health.

Due to the measurement issues related to the previous conceptualization of empowerment in the development literature and the need to develop measures of the economic and gender component of women's empowerment, it is clear that re-conceptualizing women's empowerment is necessary in order for it to be broadly used as a variable in demographic research. Clarifying the distinction between the health, economic, and gender components of empowerment can be established by conceptualizing the gender component of women's empowerment in relationship to the other components of empowerment. A model that separates the gender and economic components of empowerment is attained by combining conceptual models of empowerment proposed by Kabeer (1999) and England (2000).

Kabeer (1999) identifies three main elements of empowerment. The "preconditions" of empowerment include economic as well as various human and social resources (Kabeer 1999). The exercise of power, or agency, in the presence of resources

is the "process" of empowerment. And, resources and agency together create the potential for certain outcomes called "achievements." This model is useful for differentiating between the components of empowerment mentioned before. The economic and gender components of empowerment are pre-conditions, the exercise of power is agency, and the health component of empowerment is an achievement. Kabeer (1999) does not specify causal relations between resources, agency, and achievements because she views them as interrelated dimensions of the ability to exercise choice. However, modeling empowerment requires at least a theoretical causal sequence between these components. The causal sequence of England's (2000) model (not shown) is useful because it does identify directional relationships. The preconditions in England's model include economic resources and norms held by others. These preconditions interactively affect the use of power and also directly affect the achievements (England 2000). Differentiating between the economic and gender components and adopting this interactive causal sequence generates the model shown in Figure 1.

[Figure 1 about here]

Figure 1 is a graphic representation of a new conceptualization of women's empowerment. Here, systemic gender norms are influenced by and influence the economic resources available to women and both components of empowerment have an interactive effect on the exercise of power or agency. The exercise of power affects demographic outcomes such as health, fertility, and mortality, and economic resources also have an independent influence on these "achievements." For the purpose of this research, the model is unidirectional. The causal directions in the model follow the more prevalent interest in the influence of gender and women's empowerment on demographic

resources. Future research should focus on the reverse causal sequence from demographic processes to the exercise of power, gender, and economic resources.

In Figure 1 gender norms and economic resources are what Kabeer (1999) refers to as "pre-conditions" for empowerment. In this model they are conceptually divided so that measures for the gender components of women's empowerment can be theoretically isolated and empirically measured. This separation also allows the relationship between economic pre-conditions of empowerment and women's relative level of power in the gender system to be analyzed. Agency, or women's exercise of power, is the one consistent element of the various definitions of women's empowerment. In the conceptual model agency refers to women's actions that reflect an exercise of power.

Within this new conceptual model the gender component of women's empowerment can be conceptualized as women's relative position or exercise of power within the gender system. Mason (1995) defines "gender system" as the "socially constructed expectations for male and female behavior that are found (in variable from) in every known society" (1). The gender system, then, becomes possible to measure as a women's relative level of adherence to contextually specific gender norms. Here women's exercise of power is not compared to an earlier point in time but is relative to other women's concurrent exercise of power. To be "empowered" in this definition means to exercise more power than other women in the same context. In this conceptual model, women's empowerment is also relative to the current and context-specific set of gendered norms. Measuring women's empowerment according to this definition means finding a way to measure women's relative exercise of power within the gender system.

This conceptualization allows empowerment to be measured and a theory of gender to be developed more explicitly in demographic research. The gender system can be identified by the social norms that prescribe appropriate behaviors of women. Women's exercise of power within the gender system, or women's level of empowerment, can then be measured by their relative level of adherence to gender norms. Women who defy the gender system (for whatever reason) are then considered empowered. The challenge of measuring women's empowerment as their relative position within the gender system then becomes the challenge of measuring gender as a system.

It is important to note, however, that the system of gender norms cannot be observed directly. The system of gender norms is visible only through individual behavior in relation to them. Therefore, behaviors, or the actual exercise of power/agency will be used as indicators of the underlying (or latent) system of gender norms. Figure 2 shows the conceptualization of empowerment for measurement and uses an oval to indicate the latent nature of the gender system. Gender norms become obvious and measurable when women break them. Figure 2 also shows that empowerment is demonstrated by a relative lack of adherence to gender norms. Gender, then, is the system of expectations that underlie women's observable behaviors. Women's empowerment can then be measured as women's relative level of adherence to gender norms.

[Figure 2 about here]

This conceptual model of gender and empowerment makes it possible to measure women's empowerment with cross-sectional data. Furthermore, the gender system, or

the gender component of women's empowerment, can be measured using statistical techniques for latent variables such as confirmatory factor analysis. The next sections describe how to specify a theoretical model of the gender system, how to use confirmatory factor analysis to test the model using survey data, and then how to construct measures of gender and women's empowerment from the confirmatory factor analysis output.

DEVELOPING AN ANALYTICAL MODEL OF GENDER AND WOMEN'S EMPOWERMENT IN RURAL BANGLADESH

An important part of the process of generating an analytical model of the gender system is identifying culturally appropriate indicators for it. A theoretical framework based on in-depth knowledge of the culture and norms that define behavioral expectations for women must be developed before confirmatory factor analysis can be used to test its appropriateness. The process of choosing measures of gender and empowerment is described in detail here because it demonstrates the important and complex process of combining qualitative knowledge of a setting and concern for measurement to generate culturally appropriate measures of the gender system and associated behavioral indicators of empowerment. To accomplish this task, the MHSS data are used in combination with a multi-dimensional theoretical model developed through earlier qualitative research by Hashemi and Schuler (1993).

Ideally, women in the culture of interest should be a part of identifying important dimensions of their empowerment and thus in defining the theoretical framework. In rural Bangladesh the interest in studying the influence of family planning programs and

micro credit programs has produced a fair amount of research on women's empowerment. Qualitative research done by Hashemi and Schuler (1993) identified dimensions of empowerment through in-depth interviews and participant observation. Therefore, Hashemi and Schuler's (1993) work provides an important starting place for the development of a theoretical model of women's empowerment in rural Bangladesh.

Hashemi and Schuler (1993) identified six dimensions of empowerment based on activities women identified as important for their day-to-day functioning: 1. Sense of Self and Vision of the Future; 2. Mobility and Visibility; 3. Economic Security; 4. Decision Making Power in the Household; 5. Participation in Non-Family Groups; 6. Interact Effectively in the Public Sphere. Hashemi and Schuler (1993) discuss these dimensions as interrelated, noting that a change in one dimension would likely affect other dimensions. The dimensions Hashemi and Schuler (1993) identified are depicted graphically in Figure 3 to represent women's the conceptualization of empowerment as an interrelated system.

[Figure 3 about here]

Hashemi and Schuler (1993) also argue that some dimensions of empowerment are conducive to quantitative measurement while others are not. Therefore, the dimensions of empowerment must be modified for quantitative analysis based on the availability of appropriate measures. While some dimensions of empowerment were identified as theoretically important, their measurement proved to be problematic using the MHSS.

Furthermore, Hashemi and Schuler's (1993) analysis of women's empowerment did not attempt to distinguish between the economic and gender components of

empowerment. Separating the economic and gender components of women's empowerment is important for examining the relationship between the two and for being able to clarify what measures of empowerment actually measure (Kabeer 1999). Demographic models that incorporate measures of the gender component of empowerment and control for economic variables can isolate the influence of each. This strategy recognizes that women's empowerment and their adherence to gender norms fluctuates by class (Balk 1996). Theoretically separating economic resources from gendered behaviors is the best way to examine the influence of economic privilege and desperation on the gender component of empowerment.

Hashemi and Schuler's (1993) dimensions of empowerment are used as a starting point for building a theoretical model of women's empowerment in rural Bangladesh. The first dimension Hashemi and Schuler (1993) specified as "sense of self and vision of a future." This dimension included assertiveness, actions indicating a sense of security, and not experiencing visibility as shameful. Hashemi and Schuler (1993) explain:

> increased assertiveness – a sign of transformation in a woman's self-perception – is often expressed in such seemingly simple actions as not leaving the road when a man appears, *not hiding behind her saree or burka*, talking directly with men and outsiders, being outspoken, and looking men and outsiders in the eyes, rather than looking down (my emphasis) (4-5).

Hashemi and Schuler (1993) conceptualize this dimension of empowerment as an interpersonal or subjective state and concluded that this dimension of empowerment was best measured by participant observation in communities.

A specific part of this first dimension is possible to measure through questions found in the MHSS. Questions in the MHSS about modesty practices were available to measure conformance to modesty norms. The questions asked were:

When you go outside the bari do you cover your head in the presence of men?

Do you cover your head inside the bari in the presence of men?
Do you wear a burqa when you go outside the bari for your work?
Do you wear a burqa when you go to any festival/visit any relative?
Do you cover your head inside your bari in the presence of outsider men?

These questions identify women's practice of modesty, not her feelings about these practices. This observable aspect of a woman's sense of self is more appropriately named *Not Modest* to reflect women's non-adherence to norms of modesty in rural Bangladesh.

The five questions relating to modesty covered different types of modesty. Covering one's head with a scarf or chaddar is very different than wearing a full burqa, a long veil concealing a woman from head to toe (Alam 2000). The burqa epitomizes the social exclusion and subordination of rural women (Alam 2000). Factor analysis was used to test the relationship among the five questions about modesty practices. The factor analysis grouped the questions into two factors; the first included the questions about wearing a burqa while the second factor included the questions about covering one's head into another factor. This provided support for the idea that wearing a burqa was different than covering one's head. Because women reported that they were much more likely to cover their heads than wear a burqa, covering one's head was chosen to represent the normative expectation of women. Finally, to avoid over-emphasizing practices inside the bari, two questions were chosen to represent non-adherence to modesty norms (*Not Modest*), whether or not women covered their head inside the bari and outside the bari.

Not Modest represents women's general lack of adherence to norms of modesty inside the bari and outside the bari and is chosen to represent a woman's sense of self. *Not Modest* presumes that women who break modesty norms have a stronger sense of self and, therefore, are more empowered than women who adhere to norms of modesty. There are many debates about whether or not practicing modesty is a component of

empowerment or simply a representation of personal preference. Another argument is that, as with other norms of modesty, the ability to maintain modesty is a matter of privilege, being able to afford to remain modest. However, since it is an important part of the system of *purdah* as it is practiced in rural Bangladesh, *Not Modest* is an important dimension to include in a system of gender norms. If the dimensions of empowerment are interrelated, then changes in practices of modesty could have a correlation to changes in other dimensions of agency.

The second dimension of empowerment identified by Hashemi and Schuler (1993) was "mobility and visibility." Because the previous dimension *Not Modest* already measured visibility, this dimension here is limited to measures of women's mobility. In this dimension they included actions that involve women leaving the home. Hashemi and Schuler (1993) explain:

> …the system of *purdah* in rural Bangladesh imposes strict sanctions against women's physical mobility by demarcating space outside the homestead…as public and therefore inaccessible to women. Increased transgressions of the boundaries determining private space reflects a change in women's status (6).

Hashemi and Schuler (1993) also argue that information relating to women's mobility can be elicited through a structured survey by asking questions about where they go, how often, and with whom.

The MHSS includes a battery of mobility questions that asked women if they had gone alone or with someone in the last year to various places such as the hospital or cinema. If they had gone to the place in the last year, they were asked if they needed permission from their husband or other family members to go. Within this battery of questions it was desirable to measure general mobility and not place-specific mobility, so two questions about general mobility were used. These were:

During the last year did you visit any place riding on public transportation?
During the last year did you visit any place riding on a rickshaw?

Since questions were used that focused on women's ability to use public transportation this dimension is named *Uses Public Transportation*.

Uses Public Transportation depends on two similar questions. This was necessary to allow for all women to have access to public transportation. While some women might have access to buses or boats, other women might only have access to rickshaws. The information about whether or not women required permission was included in the indicators for *Uses Public Transportation*. The coding of these two indicators presumes that women who use a form of transportation, alone, and without permission are the most empowered.

The third dimension that Hashemi and Schuler (1993) identified was "economic security." This dimension included ownership of property or other economic assets. As previously discussed, one of the important tasks for research on women's empowerment is to triangulate gendered dimensions of empowerment with economic power (Kabeer 1999); therefore, this dimension of empowerment was not used in the theoretical model of the gender components of empowerment. Instead, other dimensions of empowerment that measure women's agency in the market (described below) were included.

The fourth dimension of empowerment Hashemi and Schuler (1993) identify is "status and decision-making power within the household." This dimension included decisions on the allocation of resources within the household, control over money and purchases, and enhanced status in the family. Hamid (1996) suggests that measures of women's empowerment should include participation in decision-making "in all spheres of life not just areas of society which are accepted as women's place" (135). Therefore,

this theoretical dimension was both concentrated, focusing specifically on decision-making, and expanded to include influence on decisions made by community members. The two questions used to indicate decision making in the household and influence on decisions in the community were:

Are you consulted or asked to participate in making decisions for the household such as selling rice?

Do other individuals in the community seek your opinion about important matters?

This dimension is simply labeled *Makes Decisions* and it is presumed that answering "yes" to each question signifies women with more power.

The fifth dimension of empowerment Hashemi and Schuler (1993) identify is "ability to interact effectively in public sphere." This dimension includes political awareness and ability to access services and programs. Hashemi and Schuler (1993) do not include accessing markets in this dimension; however they describe this dimension as an indicator of empowerment because women are handling cash and interacting with men, two things women do if they make purchases at a market or bazaar. Therefore, one way to measure the ability to interact effectively in the public sphere in the MHSS is to use variables that assess women's ability to make various purchases or to go to the market.

According to Alam (2000), even small purchases for the household are usually made by men in rural Bangladesh. However, Hashemi and Schuler (1993) propose that the ability to make small purchases is common for women and therefore not a meaningful measure of empowerment. An average of 33% of women in the MHSS reported that they can make purchases of small items such as kerosene oil. Furthermore, only an average of 19% of the women in the MHSS reported being able to make slightly larger purchases

such as sarees. Therefore, there appears to be both a distinction between the ability to make small and large purchases and reason to believe that women do not make small purchases as often as Hashemi and Schuler suggest. To account for the possibility that making small and large purchases reflect different aspects of women's power, two dimensions were considered - the ability to make small purchases and the ability to make large purchases. These two dimensions are designated *Makes Small Purchases* and *Makes Large Purchases*.

The indicators of *Makes Small Purchases* were generated from a sequence of questions about whether women needed permission to make small purchases from the shop; whether they could buy the small items from the shop by themselves; and whether they actually did buy small items from shops themselves. The indicators of *Makes Large Purchases* were generated from a similar sequence of questions. The coding of these variables assume that women who are part of the decision about what to buy, who can make purchases on their own, and who do make purchases on their own are the most empowered.

The final dimension of empowerment identified by Hashemi and Schuler was "participation in non-family groups." This dimension included participation in NGO programs, taking group actions, and participating in a forum for creating a sense of solidarity with other women. Hashemi and Schuler (1993) explain

> In rural Bangladesh women typically lack an identity outside of their family. Along with their emergence from the home comes the possibility of an identity outside of the home – that of income earner or member of a women's group. This allows women to reduce their emotional dependence on their families and, by building alternative support networks, to increase their potential to assert themselves within the family as well as the community (12).

The MHSS did ask questions about women's group membership and involvement in group actions, but variations in these questions were too small to be useful. Very few women in the survey were members of an official group or had participated in group actions.

Since Hashemi and Schuler (1993) argue that this dimension is significant because it indicates women's level of interaction with non-family members, another related variable was chosen. The MHSS asked women if they visit women in other baris alone to talk, and if so, if they needed permission. Because baris are generally family compounds, going out of the bari often means visiting non-family members. Therefore, this is an appropriate measure of interaction with non-family members. In the model, this dimension is specified as *Visits Women* and women who do visit other women, alone, and without permission are considered the most empowered.

The original theoretical model of women's empowerment proposed by Hashemi and Schuler (1993) is thus transformed into the theoretical model shown in Figure 4. The differences in the models stem from data constraints and the need to differentiate between the gender and economic components of empowerment. The final questions used in the analysis of the gender components of women's empowerment are provided in the Appendix where each variable is oriented to reflect empowerment, with higher scores reflecting greater empowerment.

[Figure 4 about here]

USING CONFIRMATORY FACTOR ANALYSIS TO TEST AN ANALYTICAL MODEL OF WOMEN'S EMPOWERMENT IN RURAL BANGLADESH

The MHSS provides empirical indicators for the theoretical dimensions of empowerment. Answers to the behavioral questions in the MHSS discussed above are presumed to indicate, or be generated by, the underlying system of gender norms that prescribe expectations about women's behaviors relating to six interrelated dimensions: *Makes Decisions*, *Not Modest*, *Makes Small Purchases*, *Visits Women*, *Makes Large Purchases* and *Uses Public Transportation*. Typically, the multi-dimensional theoretical model of women's empowerment remains only theoretical and research is carried out presuming its appropriateness. However, confirmatory factor analysis (CFA) is a statistical technique that uses the indicators to test the appropriateness of the full theoretical model.

CFA is becoming increasingly popular in the social sciences because it takes a hypothesis-testing rather than an exploratory approach to the analysis of data (Byrne 2001). A hypothesized model can be tested statistically in a "simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data" (Byrne 2001:3). As Byrne (2001) explains:

> Based on knowledge of theory, empirical research, or both, [the researcher] postulates relations between observed measures and underlying factors a priori and then tests this hypothesized structure statistically…to determine the adequacy of its goodness of fit to the sample data (6).

The theoretical model of gender and women's empowerment discussed above can, therefore, be treated as a system of interrelated dimensions. Confirmatory factor analysis will test this hypothesis that women's empowerment is a multidimensional construct, and whether the indicators chosen conform to the theoretical model.

CFA depends on the specification of a model, a statistical statement of the relationships among variables, prior to analysis of data (Hoyle 1995; Kline 1998). Figure 5 shows the full specification of the model. Women's reported behaviors are determined by the latent dimensions of the gender system on the left and latent error terms or unique factors on the right. Confirmatory factor analysis uses the theoretical constraints presented in the model to determine its fit with the data. Fit indices give feedback about the appropriateness of the model based on the covariance structure of the observed data. Modification indices indicate how the model might be adjusted to improve its fit. For this model, modification indices indicated that the model fit would be improved if *e8* and *e9,* and *e9* and *e10* were allowed to be correlated. This adjustment was made but not shown graphically and is referred to as the adjusted six-dimension model.

[Figure 5 about here]

In addition to the modifications indices, CFA provides model fit indices related to the overall fit of the model to the data. It also provides feedback about each component of the model, some of which is discussed below. Table 1 gives model fit indices for a one-dimension model (not shown graphically), the six-dimension model, and the adjusted six-dimension model (not shown graphically). Three different indices are shown in Table 1 because there is a great deal of debate in the CFA literature about which type of index is most appropriate. Furthermore, there is a great deal of debate about the cut-off point for accepting a model as appropriate; but, it is agreed that the closer the fit index is to one, the better the fit to the data. Table 1 confirms that gender and empowerment are multidimensional. Whichever fit index is considered, the six-dimension model fits

significantly better than the one-dimension model. The fit indices also increased when certain error terms (*e8* and *e9*, *e9* and *e10*) where allowed to be correlated.

[Table 1 about here]

Confirmatory factor analysis also provides feedback about the relationship between latent dimensions. Covariances and correlations between the latent dimensions are estimated for the model. A critical ratio is calculated for each covariance between the latent dimensions by dividing its estimate by its standard error. The critical ratio operates as a z-statistic in a test of statistical significance (Byrne 2001), testing whether the estimate is statistically different from zero. Three covariances estimated for *Not Modest* are not statistically different from zero - *Not Modest* and *Visits Women*, *Not Modest* and *Makes Large Purchases*, and *Not Modest* and Uses Public Transportation. This result indicates these three covariances (represented by double headed arrows between the latent dimensions) could be dropped from the model in future research if *Not Modest* is represented by the same indicators.

The estimated correlations between dimensions of empowerment with statistically significant covariances are shown in Table 2. The estimated correlation between *Not Modest* and *Makes Decisions* is negative, suggesting that an increase in *Not Modest* is associated with a decrease in *Makes Decisions*. This result indicates that the systematic relationship between *Not Modest* and *Makes Decisions* is opposite to expectations. Women who conform to norms of modesty have more decision making power than women who do not conform to modesty norms. Therefore, increases in dimensions of empowerment in this model are not necessarily associated with increases in all other dimensions. Further investigation found that *Not Modest* and *Makes Decisions* are

significantly determined by age and that both have a non-linear relationship with age acting in opposite directions. *Not Modest* initially decreases with age while *Makes Decisions* initially increases with age. This likely explains the negative correlations of the two dimensions.

[Table 2 about here]

The high correlation between *Makes Small Purchases* and *Makes Large Purchases* is not surprising but probably contributes error to the model and decreases its fit to the data. However, it remains theoretically important to separate the two dimensions since some researchers suggest that making small purchases is not indicative of power for women in rural Bangladesh whereas other researchers suggest the opposite. The low correlation between *Not Modest* and *Makes Small Purchases* also suggests that *Not Modest* may be a dimension of empowerment that is not systematically related to anything except *Makes Decisions*. Otherwise, the estimated correlations show that the dimensions of gender and women's empowerment are interdependent.

Using confirmatory factor analysis to test an analytic model of gender and women's empowerment has several important advantages. First, it provides an opportunity to test a measurement model composed of interrelated dimensions. Therefore, gender and women's empowerment can be modeled as a system, rather than as discrete dimensions of empowerment. CFA also guides data reduction so there are fewer subjective and arbitrary steps involved in choosing indicators and constructing measures of the different dimensions of women's empowerment.

Another strength of confirmatory factor analysis from the perspective of research on women's empowerment is that it allows for empirical testing of many of the

previously untested assumptions made in demographic research on women's empowerment. CFA models include latent variables, unobserved variables that are theoretical constructs used to represent an underlying common influence on the observed variables (Hoyle 1995; Kline 1998). The use of latent variables in research on women's empowerment is useful for several reasons. First, it provides an opportunity to test the assumption that there are separate dimensions of empowerment. Furthermore, using latent variables allows for the fact that gender norms, or the gender components of empowerment, cannot be directly observed.

Another advantage of confirmatory factor analysis that follows from the use of latent variables is that it provides an alternative way to use multiple indicators for measurement. Using multiple indicators is beneficial because it reduces the effect of measurement error of any individual observed variable on the accuracy of the overall results. Multiple indicators have generally been used in additive scale form. However, CFA provides a way to construct continuous multiple indicator measures of the underlying dimensions of women's empowerment from observed variables.

GENERATING MEASURES OF GENDER AND WOMEN'S EMPOWERMENT

Quite often, research using CFA uses the process to justify the number of factors and the choice of indicators (see for example Glass et al. 1997). Once the analytical model is confirmed as appropriate, the observed variables are used to generate additive scale measures for each dimension of empowerment. For example, a measure of *Makes Decisions* could be constructed by adding together the answers on the two indicators for that dimension, *Asked advice* and *Participates in household decisions*. Using this method

results in an independent scale measure for *Makes Decisions* that is empirically distinct from the other dimensions and indicators even though they are theoretically connected. Independent scales such as these have advanced the research on women's empowerment; however, these measures do not pick up the interrelated nature of the latent dimensions and do not generate measures that treat gender and women's empowerment as a system.

Confirmatory factor analysis provides another alternative method for data reduction. Regression weights estimated by CFA can be used to generate weighted scales that maintain the interrelatedness of the dimensions of gender and women's empowerment. The regression weights for the adjusted six-factor model are shown in Table 3. CFA estimates a weight for each indicator in relation to each dimension of gender and the weights provide a way to generate a single measure for each latent dimension that utilizes all of the observed variables.

[Table 3 about here]

A sample equation for the creation of a continuous scale for *Uses Public Transportation* is given at the bottom of Table 3. Standardized scores for each variable are multiplied by the appropriate weights and added together. This technique creates measures of gender that integrate the influence of other aspects of empowerment. The resulting weighted scores represent a woman's score on the latent dimensions of gender and truly measure gender as a system.

Table 4 provides information about the resulting weighted measures of each latent dimension as well as an overall measure of empowerment constructed by adding the weighted scores for each dimension together. The weighted measures of gender are similar to the independent measures that of empowerment. For comparison, Table 5

shows the high correlations between the weighted measures and additive measures. These high correlations between the scores demonstrate the similarities between the scores. However, the weighted measures have the empirical advantage of reducing the amount of measurement error by increasing the number of indicators used for the dimension. Furthermore, the weighted measures have a theoretical advantage in that they represent the ideal conceptualization of gender as system of interrelated dimensions.

[Table 4 and 5 about here]

Another way to demonstrate the difference between the weighted and the independent constructs is to examine the correlations among scores resulting from the different methods of construction. Table 6 first gives the correlation matrix of the independent scales and then gives the correlation matrix for the weighted measures. Invariably, the weighted measures are more highly correlated with each other than the independent measures, revealing their greater interconnection.

[Table 6 about here]

It is obvious that there is a theoretical advantage to using the weighted measures to construct measures of gender. Doing so preserves the ideal conceptualization of gender as a system of interrelated dimensions. Preliminary comparisons in models of child health suggest that there is also an empirical advantage of using the weighted constructs (Williams 2004); but further research is needed to examine the possible empirical implications of using weighted constructs.

DISCUSSION

It remains difficult, if next to impossible, to measure women's empowerment as a process over time. Re-conceptualizing women's empowerment as women's relative exercise of power in relation to a contextually specific gender system allows gender and empowerment to be measured quantitatively using cross-sectional data. Gender is conceptualized as a set of underlying systematic expectations for women's behaviors and women's empowerment represents their relative exercise of power within that system. Given this conceptualization of gender and women's empowerment, a contextually appropriate theoretical model of gender and empowerment can be developed and tested using confirmatory factor analysis. Within this process, qualitative research on gender is an invaluable tool in the process of model specification.

The ability to measure gender and women's empowerment quantitatively gives demographers a better way to study their impact on demographic processes. Although the process of specifying and testing theoretical models of gender and women's empowerment using confirmatory factor analysis is at first difficult, it ultimately provides variables that will improve the specification of many different types of demographic models. Furthermore, repetition of this process in a particular context will refine models and decrease the time investment necessary for generating meaningful measures of gender and women's empowerment.

Re-conceptualizing gender and women's empowerment also helps differentiate between the gender and economic dimensions of women's empowerment. Future research can examine the relationship between the two components of empowerment and

inform policy makers about the possible social impacts of increasing women's economic opportunities or the possible economic impact of encouraging changes in gender norms.

Appendix – Dimensions and Indicators of Empowerment

Dimension	Variable	MHSS Questions and Code
Makes Decisions	Sought for advice	Do other individuals in your community seek your opinion about important matters? 0-no 1-yes
	Participates in household decisions	Are you consulted or asked to participate in making decisions for the household such as selling rice? 0-no 1-yes
Not Traditionally Modest	Does not cover head outside bari	When you go outside the bari do you cover your head in the presence of men? 0-always 1-sometimes 2-never
	Does not cover head inside bari	Do you cover your head inside your bari in the presence of men? 0-always 1-sometimes 2-never
Uses Public Transportation	Rides public transportation	Visit any place riding on public transport? 0-never 1-yes, but never alone 2-yes, alone, with permission 3-yes, alone, do not need permission
	Rides rickshaw	Visit anyplace riding on rickshaw? (same coding as *Uses Public Transportation*)
Makes Large Purchases	Makes large purchases at the daily bazaar	Ability to make larger purchases at the daily bazaar. 0- part of the decision, can't purchase by self, don't 0- not part of the decision, can't purchase by self, don't 0- not part of the decision, can purchase by self, don't 1- not part of the decision, can purchase by self, do 2- part of the decision, can purchase by self, don't 3- part of the decision, can purchase by self, do
	Makes large purchases such as sarees	Ability to make larger purchases such as sarees for yourself. (same as coding as above)
	Makes other large purchases	Ability to make larger purchases such as betel leaf/nut. (same as coding as above)
Makes Small Purchases	Makes small purchases such as coconut oil	Ability to make purchases of small items such as coconut-oil, soap, and glass bangles. (same as coding for *Makes Large Purchases*)
	Makes small purchases such as kerosene	Ability to make small purchases such as kerosene oil, cooking oil, and spices. (same as coding for *Makes Large Purchases*)
Visits Women	Visits women in other baris	Visit women in other baris to talk. (same coding as *Uses Public Transportation*)

REFERENCES

Alam, N. 2000. "Women, Households, and Communities and Care of Sick Children in Rural Bangladesh." Thesis, Faculty of Medicine, University of London.

Balk, D. 1996. "Defying Gender Norms in Rural Bangladesh: A Social Demographic Analysis." Population Series Working Paper No. 78. East-West Center, Honolulu.

Byrne, B.M. 2001. *Structural Equation Modeling With AMOS: Basic Concepts, Applications, and Programming*, Edited by L. Harlow. New Jersey: Lawrence Erlbaum Associates, Publishers.

England, P. 2000. "Conceptualizing Women's Empowerment in Countries of the North." Pp. 37-65 in *Women's Empowerment and Demographic Processes: Moving Beyond Cairo*, edited by H. B. Presser and G. Sen. Oxford: Oxford University Press.

Glass, T.A., C.F. Mendes De Leon, T.E. Seeman, and L. F. Berkman.1997. "Beyond Single Indicators of Social Networks: A Lisrel Analysis of Social Ties Among the Elderly." *Social Science and Medicine* 44:1503-1517.

Hamid, S. 1996. *Why Women Count: Essays on Women in Development in Bangladesh*. Dhaka: University Press Limited.

Hashemi, S.M. and S.R. Schuler. 1993. "Defining and Studying Empowerment of Women: A Research Note From Bangladesh." JSI Working Paper No.3. Arlington, Virginia.

Hoyle, R.H. 1995. "The Structural Equation Modeling Approach: Basic Concepts and Fundamental Issues." Pp. 1-15 in *Structural Equation Modeling: Concepts, Issues, and Applications*, edited by R. H. Hoyle. London: Sage Publications.

Kabeer, N. 1994. *Reversed Realities: Gender Hierarchies in Development Thought*. London: Verso.

—. 1999. "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment." *Development and Change* 30:435-464.

Kline, R.B. 1998. *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press.

Malhotra, A. and R. Mehra. 1999. "Fulfilling the Cairo Commitment: Enhancing Women's Economic and Social Options for Better Reproductive Health." Report. International Center for Research on Women, Washington, D.C.

Malhotra, A., S. R. Schuler, and C. Boender. 2002. "Measuring Women's Empowerment as a Variable in International Development." Report. International Center for Research on Women and the Gender and Development Group of the World Bank.

Mason, K.O. 1995. "Gender and Demographic Change: What Do We Know?" Report. International Union for the Scientific Study of Population, Belgium.

Presser, H.B. and G. Sen. 2000. "Women's Empowerment and Demographic Processes: Laying the Groundwork." Pp. 4-11 in *Women's Empowerment and Demographic Processes: Moving Beyond Cairo*, *International Studies in Demography*, edited by H. B. Presser and G. Sen. Oxford: Oxford University Press.

Rahman, O., J. Menken, A. Foster, and P.Gertler. 1996. *Matlab[Bangladesh] Health and Socioeconomic Survey (MHSS).* [Computer file]. 5th ICPSR version. Santa Monica, CA: RAND [producer], 2001. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2001.

Williams, J.R. 2004. *When Paradigms Collide: Feminism, Demography, and Women's Empowrment in Rural Bangladesh.* Dissertation. University of Colorado, Boulder.

Table 1 - Model Fit Indicators for Three Empowerment Models (N=5758)

Indicators	Model 1 One-dimension	Model 2 Six-dimension	Model 3 Six-dimension adjusted
Goodness of fit index (GFI)	.6968	.9678	.9812
Tucker-Lewis index (TLI)	.4113	.9483	.9692
Comparative fit index (CFI)	.5183	.9686	.9822

Source: AMOS output

Table 2 – Estimated Correlations between Dimensions of Empowerment

Dimensions	Estimated Correlation*
Makes Decisions ↔ Makes Small Purchases	.114
Makes Decisions ↔ Not Modest	-.470
Makes Decisions ↔ Visits Women	.201
Makes Decisions ↔ Makes Large Purchases	.146
Makes Decisions ↔ Uses Public Transportation	.074
Makes Small Purchases ↔ Not Modest	.059
Makes Small Purchases ↔ Visits Women	.106
Makes Small Purchases ↔ Makes Large Purchases	.659
Makes Small Purchases ↔ Uses Public Transportation	.228
Visits Women ↔ Makes Large Purchases	.106
Visits Women ↔ Uses Public Transportation	.261
Makes Large Purchases ↔ Uses Public Transportation	.246

*Truncated

Table 3 - Regression Weights and Sample Equation for Final Adjusted Model

	Latent Variables				
Observed Variables	*Uses Public Transportation*	*Makes Large Purchases*	*Makes Small Purchases*	*Not Modest*	*Makes Decisions*
Rickshaw	**.4551**	.0109	.0055	.0013	.0002
Public	**.2033**	.0049	.0024	.0006	.0001
Sarees	.0029	**.1061**	.0082	-.0005	.0015
At bazaar	.0023	**.0839**	.0065	-.0004	.0012
Other	.0111	**.4082**	.0317	-.0019	.0057
Coconut oil	.0035	.0201	**.3401**	.0024	.0022
Kerosene	.0062	.0351	**.5956**	.0041	.0039
Inside	.0008	-.0012	.0024	**.2744**	-.0213
Outside	.0018	-.0027	.0051	**.5914**	-.0458
Household	.0004	.0086	.0054	-.0505	**.3043**
Asked advice	.0001	.0017	.0011	-.0101	**.0611**
In other baris	.0183	.0010	.0012	.0028	.0140

Sample equation:

Uses Public Transportation = .4511 x *Rickshaw* + .2033 x *Public* + .00298 x *Sarees* + .0023 x *At bazaar* + .0111 x *Other* + .0035 x *Coconut oil* + .0062 x *Kerosene* + .0008 x *Inside* +.0018 x *Outside* + .0004 x *Rice* + .0001 x *Advice* + .0183 x *In other baris*

Table 4 – Summary of Weighted Measures of Women's Empowerment

Variable	N	Min	Max	Mean (Standard Deviation)
Visits Women [a]	5956	0.000	3.000	2.0630 (1.0808)
Makes Decisions	5759	-0.8332	0.3362	0.0025 (0.3560)
Small Purchases	5759	-0.5497	2.5284	-0.0030 (0.9453)
Not Modest	5759	-0.4660	2.7100	-0.0072 (0.8439)
Large Purchases	5759	-0.3138	2.2648	-0.0015 (0.5828)
Public Transportation	5759	-1.2458	2.5475	-0.0002 (0.6057)
Overall Empowerment	5759	-3.0154	12.9933	2.0545 (2.3719)

[a] Unmodified

Table 5 – Correlations between Weighted Scales and Independent Scales

Dimension	Correlation with Independent Measures
Makes Decisions	.8672
Not Modest	.9881
Makes Small Purchases	.9977
Makes Large Purchases	.9620
Uses Public Transportation	.9835
Visits Women	1.0000*

**Visits Women* is constructed only using one indicator. In future models additional indicators for Participates in Non-Family Groups should be used.

Table 6 – Correlation Matrices for Different Constructs of Empowerment

Independent Scales[a]	*MD*	*NM*	*MSP*	*VW*	*MLP*	*UPT*
Makes Decisions	1.00					
Not Modest	-.30	1.00				
Small Purchases	.06	.07	1.00			
Visits Women	.18	.00	.10	1.00		
Large Purchases	.10	.02	.59	.10	1.00	
Public Transportation	.07	.02	.20	.23	.23	1.00
Weighted Scales[a]						
Makes Decisions	1.00					
Not Modest	-.56	1.00				
Small Purchases	.11	.06	1.00			
Visits Women	.19	-.01	.11	1.00		
Large Purchases	.16	-.02	.70	.11	1.00	
Public Transportation	.07	.02	.24	.26	.27	1.00

[a] Correlations rounded to the nearest hundredth

Figure 1. Conceptual Model of Gender and Women's Empowerment

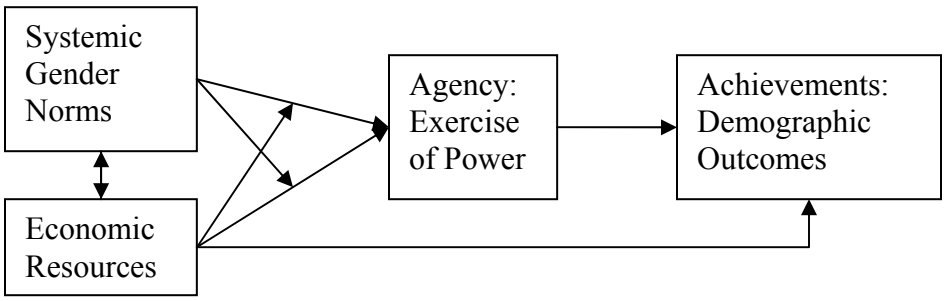

Figure 2. Conceptual Model for Measuring Gender and Women's Empowerment

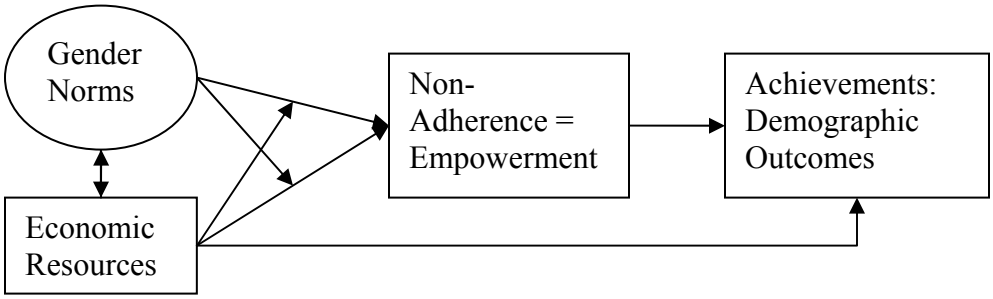

Figure 3. Hashemi and Schuler's (1993) Dimensions of Empowerment

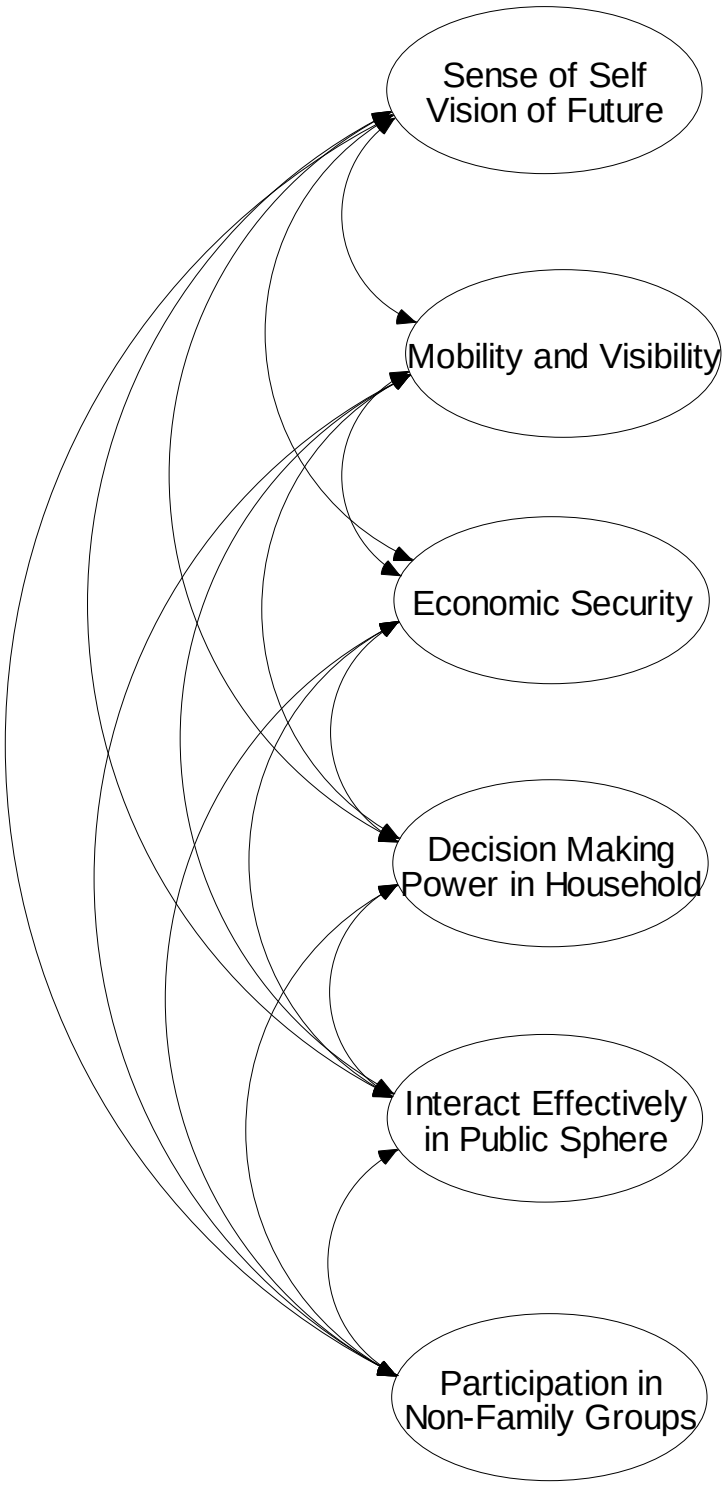

Figure 4. Theoretical Dimensions of Empowerment from the MHSS

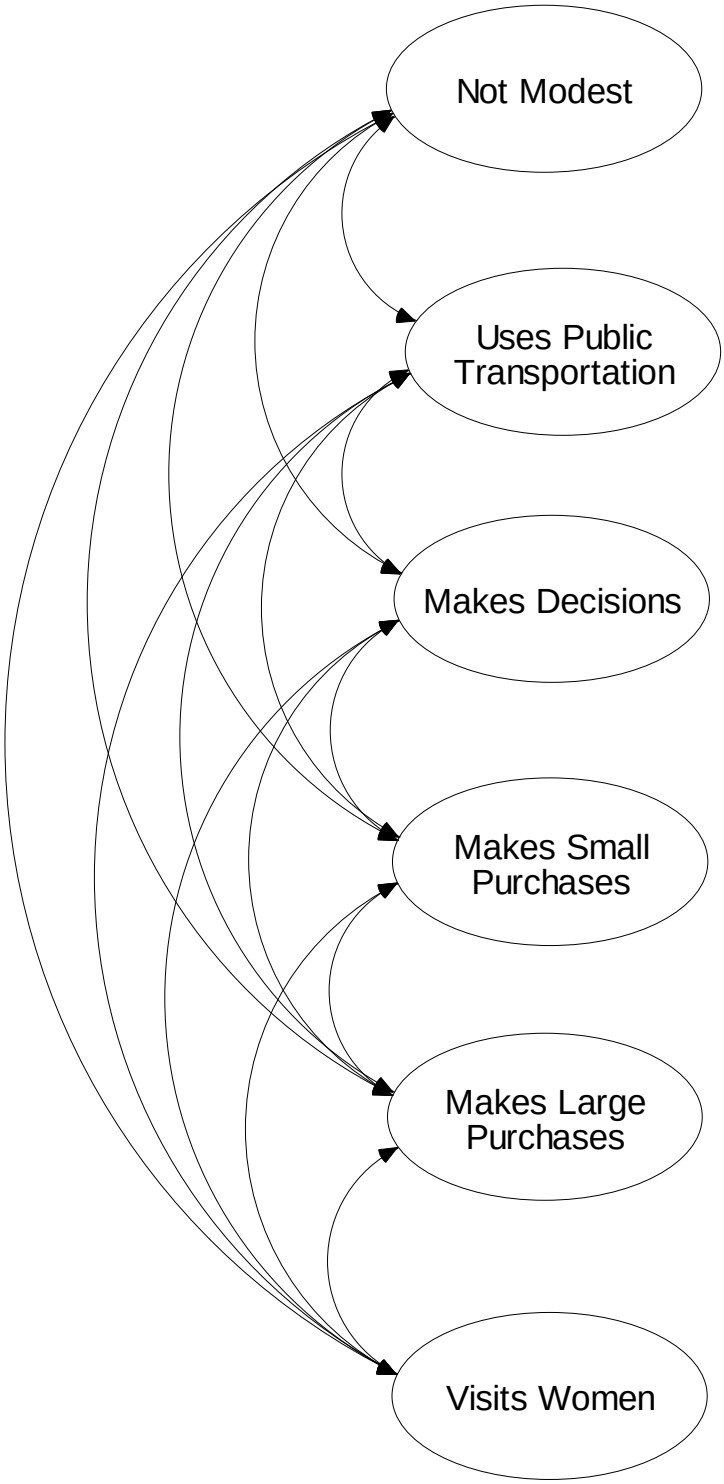

Figure 5. Full Analytic Model of Gender and Women's Empowerment