An Analysis of Married Women's Empowerment in Sub-Saharan Africa

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Abstract

Promoting women's empowerment is good for economic development. The third Millennium Development Goal (MDG) is indeed about promoting gender equality and women's empowerment. This empowerment is not only an important dimension of well-being, but it is also a means to achieving other development goals. Most research has explored this issue from a conceptual point of view. The aim of this study was to analyse married women's empowerment in some Sub-Saharan Africa (SSA) countries. It used an approach based on the structural equation model with latent variables, a model that has been developed in psychometric literature. This approach enabled the study, within the same model, to measure the socio-demographic and cultural determinants of empowerment, as well as the effects of it on other dimensions of well-being in four SSA countries (Ghana, Madagascar, Malawi, and Nigeria). Data for this study were obtained from demographic and health surveys (DHSs). The findings highlighted the significant impact of the level of wealth, household size, level of education, and fertility rate on women's empowerment. Further, the distributive analysis used in the study revealed the existence of significant differences between countries.

Key words: *Women's empowerment, structural equation model, latent variables, wealth index, health index, stochastic dominance*

1. Introduction

According to the World Bank (World Bank, 2001), promoting gender equality in a given country, especially through greater women's empowerment, is good for a country's economic development because it fosters growth and contributes to poverty reduction. Promoting gender equality and women's empowerment is indeed the third Millennium Development Goal (MDG). At the regional level, there have been a number of initiatives aimed at promoting gender equity. First among them are the African Union's founding legal instrument and African Charter on Human and Peoples' Rights, both of which recognize the principle of gender equality and non-discrimination. There is also the African Union (AU) Heads of State and Government's Solemn Declaration on Gender Equality made in Addis Ababa in July 2004. Finally, there are other initiatives such as the African Union's NEPAD, which have made gender equality one of their fundamental principles that must guide the development of the African continent (ECA, AU and AfDB, 2008).

Women's empowerment is not only an important aspect of well-being as a concept of social justice, but also a means of achieving other development goals (Malhotra et al., 2002). According to these authors, it is appropriate to target women for three reasons: first, that makes it possible to reach all the sub-groups and minorities in society; second, the household is the locus of women's empowerment; third, promoting the involvement of women in a country's institutions fundamentally requires changes in those (like the household) that are influenced by patriarchal structures.

From a sample of 14 sub-Saharan African (SSA) countries, Batana (2013) found that empowerment was a dimension of well-being in which women were disadvantaged. Indeed, apart from Madagascar, where the rate of disadvantaging women in terms of empowerment was about 25%, this rate was between 40% and 50% in most of the countries studied, while in some of them it was almost 70%. This shows the extent to which women's empowerment is a well-being issue that needs to be addressed; it also points to the existence of very significant differences between African countries. Does such disadvantaging of women slow down economic development and poverty reduction? If it does, how could the problem be addressed?

To be able to strengthen women's empowerment and thus foster gender equality in African countries, we should first determine the factors that influence it. However, such a strengthening of women's empowerment should be justified by the role it should play in promoting development and well-being. That is why the analysis of women's empowerment in this study will be done from two angles: its determinants, on the one hand, and its effects on economic development and household well-being, on the other hand. The analysis will focus on married women's empowerment in four SSA countries (Ghana, Madagascar, Malawi and Nigeria). It will specifically look at

the potential links between empowerment and economic, sociological, cultural and demographic variables. The first objective will be to identify the determinants of women's empowerment, the second will be to try and understand the effects of the strengthening of this empowerment on household well-being, and the third will be to study the features of the distribution of women's empowerment in each country, and then make between-country comparisons.

The relevance of this study is two-fold: first, it is a relevant contribution to the literature on women's empowerment in Africa, the bulk of which has so far borne on conceptual rather than empirical aspects; second, from a methodological point of view, it has been able to measure the very concept of empowerment. Indeed, given the difficulty in defining this concept, it is not easy to produce a single and consensual measure. By putting forward a definition based on the decision-making power of the woman in the household and limiting the analysis to married women, this study has offered a measurement of empowerment that is quite intelligible and is based on the use of the structural equation models, with latent variables that have been developed in psychometric literature. While recent applications to the economy of well-being have been made (Wagle, 2005; Di Tommaso, 2007; Krishnakumar, 2007; Krishnakumar and Ballon, 2008), this is the first study to have integrated empowerment into its analysis. The study also briefly discusses the endogeneity issues that are often not covered in those types of models. Furthermore, the approach it has used to measure empowerment is one that enables distributive analyses as well as between-country comparisons.

The next section is a review of the literature, which revolves around three points: the definition of the conceptual framework and measurement of empowerment, the role of empowerment on development, and the principal determinants of empowerment. Section 3 describes the theoretical framework and the methodology of the study. Section 4 presents the main findings, especially the estimations of the structural equation models and the distribution analysis and Section 5 is the conclusion.

2. Review of the Literature

2.1 Conceptual Framework and the Measurement of Empowerment

2.1.1 Concept of empowerment

Empowerment is a complex concept that is often thought of as a process but sometimes considered to be a state. It comprises several components.

Empowerment is a process. For Kabeer (1999), the notion of empowerment is inevitably linked to the state of powerlessness and refers to the process through which people who do not possess the capacity to make choices manage to acquire it. Thus, for the author, empowerment does not concern people who are already empowered with a strong decision-making power, but is a process during which those who did not have this power acquire skills in the decision-making process. From this point of view, if we look at the gender issue from a socio-economic, political and cultural environment that is conducive to the hegemony of the male sex, empowerment refers to the process through which women strengthen their relative decision-making capacity relative to that of men.

Empowerment has several components. By relating the concept of empowerment to terms such as action power, autonomy, participation, self-management, self-determination, liberation, mobilization, and self-confidence, Ibrahim and Alkire (2007) brought out two essential components of empowerment, namely action power and the institutional environment that provides people with opportunities to use their power. For Kabeer (1999), this institutional environment refers to the existence of resources or preconditions that enable the use of power, while action power concerns the ability for people to make decisions; that is, their capacity to make their own life choices and to pursue their goals in the face of possible constraints. Alsop and Heinsohn (2005) have linked a person's high level of empowerment to his or her capacity to make judicious choices that will be translated into desirable actions and development results. This is a third component of empowerment, also recognized by Kabeer (2001) and according to which empowerment not only has effects on economic development, but is also in itself a dimension of well-being that is dependent upon factors related to the decision-making power and the opportunity structure.

Alsop and Heinsohn (2005) define the opportunity structure as a context within which each person exercises his or her empowerment, which corresponds to the institutional environment. According to Narayan (2002; 2005), it encompasses both the institutional climate and the social and political structures. Of the three components of empowerment, only action power can be considered a true component of it. For its part,

the opportunity structure creates the conditions for operationalizing that empowerment, while choice achievements are in reality the development results that are observable when people exercise their empowerment. For instance, education and employment are resources that foster women's empowerment. Indeed, having a job is not in itself an empowerment guarantee if the woman does not have the action power related to the use of the income generated by that job. That is, we would not want to suggest that a female slave has a higher degree of empowerment simply because she is in employment. On the other hand, good action power enables an educated and salaried woman, despite all the constraints related to the institutional environment she faces, to make the choices she deems appropriate for the allocation of resources in order to achieve her well-being and development goals.

Empowerment can also be analyzed as a state. The conceptual framework for analyzing empowerment fits well into the one defined by Sen (1985) in his *capability approach*. This approach refers to the capability that people have to choose the lifestyle they desire. Taking into account personal characteristics, the social environment and economic circumstances, people have the capability to make certain choices that they value (Sen, 1997). An important aspect to bear in mind is that the notion of capability rests on that of freedom. Thus, empowerment is a process within which people possess an action power that they are free to exercise in order to achieve the goals they have set for themselves. And even though it transpires that empowerment is often thought of as a dynamic process, it can be useful to assess its effectiveness by looking at it as static at a given moment. Indeed, in the same way we can measure the amount of capital that gets accumulated through a dynamic process, it is possible to measure the level of empowerment and even make comparisons through time and space. From this perspective, empowerment will be defined as a state, which does not exclude its dynamic nature of perpetual change from one state to another.

2.1.2 Measurement of empowerment

The complexity of the concept of empowerment does not arise solely from its diverse definitions, but also from the level of aggregation. Thus, according to Malhotra et al. (2002), empowerment can be exercised at three levels: the individual or household level; the community or intermediate level; and the national, regional or aggregate level. The literature has focused more on the individual or household level because, despite the complex nature of the definition of empowerment, most studies are in agreement that this notion refers to the woman's ability to participate in making decisions that affect their lives and those of their families (Malhotra et al., 2002). Indeed, the effective operationalization of action power takes place first and foremost within the household and involves the relationships between the woman and her spouse, and possibly the other members of the household. This study agrees with those authors on the fact that the household is the locus where women's empowerment is exercised. Therefore, it defines women's empowerment as the latitude that women have in participating in the process of making key decisions within the household. There has been little literature on the other levels of analysis, namely the community/intermediate and regional/national levels, essentially because of lack of availability of data.

Another source of difficulty in measuring empowerment has to do with the choice

of its dimensions. In this connection, Ibrahim and Alkire (2007) define empowerment as a multidimensional concept and propose select indicators to measure it that are internationally comparable. These indicators include, among others, control over personal decisions, decisions within the household, and the capacity to change aspects of one's life at the individual and community levels. Moghadam and Senftova (2005) also suggest that women's empowerment should be measured on several indicators related to their participation and their rights in the civil, political, social, economic and cultural domains. It is important to emphasize that these dimensions are not rigid; they can vary with the context to which the concept of women's empowerment refers. As has indeed been shown by several studies (Hashemi et al., 1996; Malhotra and Mather, 1997; Beegle et al., 2001), women's empowerment can be enhanced in one domain but not in another.

Measuring empowerment should take into account the fact that this is a multidimensional concept. Thus, the techniques that are usually used to analyze multidimensional poverty and well-being can be appropriate here. In this connection, Williams (2005) suggests that methods of confirmatory factor analysis should be used, while other studies have measured empowerment using an index based on an indicator weighted average (see, for example, Chaudhry and Nosheen, 2009).

Alsop and Heinsohn (2005) have done a detailed review of the main methods of the aggregation of empowerment. Among them are the method of aggregated scores and composite indices based on several indicators, psychological self-assessment measures using score scales, and a number of qualitative methods. However, global indices should be used with caution because an inappropriate combination of indicators could have differentiated effects on the estimation results (Malhotra et al., 2002).

There are two issues to be considered when measuring empowerment. The first is related to the context in which the woman exercises her empowerment. Depending on the context, a woman's ability to make a choice can be relevant as an element of empowerment in one context but not in another. For instance, a woman's ability to make decisions concerning the education of her children can only be observed if she is a mother, but cannot in the case of a woman without children. It is thus necessary to pay particular attention to choose the right indicators that will enable an appropriate analysis of the empowerment of each woman in the population under study.

The second issue that arises while measuring empowerment stems from the very definition of the concept, as this is often perceived in the literature as being a process, following Kabeer's (1999) definition. If it is indeed looked at as a process, it will be difficult to design a measure of it that would produce an exact idea of it. That is why most studies propose the use of proxies such as level of health, level of education, amount of information, employment, etc (Ackerly, 1995; Kishor, 2000). However, other studies do not deem such an approach appropriate. They instead suggest that the process of empowerment should be analyzed using direct indicators such as decision-making, control, and choice (Mason, 1995; Govindasam and Malhotra, 1996).

2.2 Empowerment and Development

A number of studies have underscored the impact of women's empowerment on well-being and poverty reduction. For instance, a study on Nepal showed

that a woman's ownership of land could significantly enhance her decision-making power and improve her children's nutritional status (Allendorf, 2007). Liu (2008) also found that enhancing women's empowerment in the Chinese rural areas was likely to improve children's nutritional status. Few studies have been carried out in relation to the African context. Haddad and Hoddinott (1994) showed that increasing the woman's share in the household's income was likely to improve the nutritional status (measured by the height-for-age index) for boys but not for girls. Moreover, such an increase was found to lead to an increase in the household's budget allocated to food, at the expense of the budget for clothing, alcohol, and cigarettes (Hoddinott and Haddad, 1995). Incidentally, in a study on Zimbabwe, Hindin (2000) found that women who had no decision-making power in the household were significantly more likely to have a lower body mass index (BMI) and a chronic energy deficit. Another study showed that greater women's participation in the economy had led them to take to using family planning and contraceptive methods in Togo (Gage, 1995). Wolff, Blanc and Gage (2000) and Blanc and Wolff (2001) reported a similar finding from a study on two districts of Uganda, but at the same time stressed that the level of education and the fact of living in an urban area significantly increased women's negotiating power.

2.3 Determinants of Women's Empowerment

While a number of studies have been carried out to analyze the determinants of women's empowerment, they mainly bore on Asian countries. A study conducted in Indonesia showed that participation in the labour force, a better level of education, and a higher level of wealth had a positive effect on married women's empowerment, particularly on their decision-making power in the household (Rammohan and Johar, 2009). Other studies focused on the case of India. Pezzini (2005) found that the level of education and that of income, as well as the area of residence, could be obstacles to having access to individual rights of abortion and could thus limit women's empowerment in India. For their part, Rahman and Rao (2004) revealed that Muslim women in India had a higher decision-making power than their Hindu counterparts. As for Garikipati (2008), he found that even though the loans granted to women often enabled them to increase their wealth and their households' incomes, they did not enhance their level of empowerment. However, an earlier study carried out in Bangladesh had found the opposite; it found that schemes designed to grant loans to poor women in rural areas had significantly enhanced their empowerment, as measured by eight different dimensions (Hashemi et al., 1996). According to several studies (Mayoux, 1997, 2000, 2002; Cheston and Kuhn, 2002), microcredit schemes promote women's empowerment on several levels: economic, socio-cultural, family and inter-professional, legal, political and psychological. Using a sample of 500 women aged from 15 to 49 in a region of Bangladesh, Rahman et al. (2009) highlighted the important role of education and access to the media for women's empowerment. A number of other factors, among them family structure, the woman's holding of a bank account, her access to the media, her age, her being a Muslim, her living in an urban area, her level of education, and the existence of job opportunities for women were found to be significant for women's empowerment in Pakistan (Chaudhry and Nosheen, 2009). The literature on this issue with regard to the African context is still very scanty. However, there is one study that

can be mentioned: Mayoux (2001). This was interested in the determinants of women's empowerment in Cameroon. It showed, for instance, that microfinance schemes that increased women's share capital were likely to significantly contribute to enhancing their empowerment.

3. Theoretical and Methodological Framework

3.1 Choice of dimensions, indicators and exogenous variables

3.1.1 Choice of dimensions and indicators

This study has chosen three dimensions to define well-being within the household. First, is the women's *empowerment index,* which has been designed as an important dimension of well-being (Ibrahim and Alkire, 2007; Batana, 2013). However, in this study, this conceptualization of women's empowerment concerns only the family dimension as defined by Malhotra et al. (2002). Thus, the indicators of this dimension have to do with the women's capabilities to participate in decision-making within their respective households. These indicators have already been identified by Ibrahim and Alkire (2007) as being internationally comparable.

The second dimension is *wealth index*. This index is very useful, especially when information on income is not available. It has been deemed by some studies to be the essential dimension of well-being (Sahn and Stifel, 2000; 2003), to the extent that it is a global index covering several aspects of well-being. However, other studies consider it to be just one dimension, among others (Duclos et al., 2006; Batana and Duclos, 2010; Batana, 2013). The indicators of this dimension essentially have to do with the possession of durable goods and access to basic services.

The third dimension is *health index*. Di Tommaso (2007) used a measure of physical health as a dimension of well-being in a study involving a sample of children from some states of central India. Krishnakumar (2007) also considered health to be a key dimension of well-being. In this study, the health dimension is based on the indicators of both mother health and child health. For instance, it has to do with access to prenatal and natal health care, and the preventive health care that children receive after being born.

3.1.2 Choice of exogenous variables

In addition to the interdependence that is likely to exist between the three dimensions of well-being, several exogenous variables can also be considered potential determinants of one or the other of those dimensions. Among the determinants of empowerment, one

can mention the woman's level of education and that of her husband, as well as socio-demographic and cultural characteristics such as fertility rate, household size, religion, area of residence, duration of married life, and socio-professional category.

The *level of education* is a determinant of access to information and knowledge conveyed through the modern means of communication, and the cultural provisions that are learnt through formal education. It enables the acquisition of scholarly knowledge, participation in exchanges done through the conventional languages of communication, integration into the world of work, and acquisition of a certain professional status. Moreover, the differences in the social mobility among women, in their mode of representation, their behaviour vis-à-vis prevention and health services, their symbolic capital and their position vis-à-vis the decision-making power within the conjugal unit can all be identified from the women's level of education.

A *woman's age* can have an effect on her empowerment in terms of enhancing or reducing her status in her relationship with her husband. Age is a factor of social differentiation, since to each age in life are corresponding social roles, social mobility trajectories, statuses, sociability and differentiated practices. Including age as a variable enables an analysis of the social mechanisms through which age creates, between women, unequal conditions of empowerment.

Household size can also play an important role. This is because the number of people in the household where she lives has an effect on the use of her time, productivity of her work, mobilization and utilization of her resources, the magnitude and intensity of her family responsibilities, and her relationship with her husband and other members of the household. By making the household size a variable, this study aimed to show how the conditions of women's empowerment vary according to the constraints and the relationship climate associated with a small-sized monogamous household, a high-fertility monogamous household, and a polygamous household.

The categories of women that were surveyed in this study belong to different religions. Thus, *belonging to a given religion*, that is, professing a given faith and adhering to certain norms, reference values and practices can, for a woman, be either a cultural handicap or a social setting conducive to the process of her empowerment. For a woman, religion will thus be a positive or negative determinant of social empowerment. As a variable, it will enable us to analyse the religious determinants of the woman's use of health services, her behaviour vis-à-vis prevention, her participation in the decision-making process in her married life, and her way of utilizing the wealth she has produced.

The *area of residence* is likely to influence women's empowerment as well, since women living in rural areas and those living in towns are not guided by the same normative and symbolic systems. Moreover, the two categories of women are differentiated by inequality in their access to basic services and by cultural traditions. After all, structures, activities, trade, cultural models, and the processes of change undergo a faster modernization in urban areas than in rural ones. This modernization is an asset for urban women, as it allows them to benefit from a multiplicity of interrelationships, the development of trading networks, the diversification of the purchasing power, the diverse means of collective dissemination of educational information and new knowledge, a greater availability of public and health services, the means of getting integrated into the world of work, and the dissemination of emancipation discourse and practices.

Another determinant of women's empowerment is the *duration of married life*. A woman who has been recently married participates in the achievement of her family's economic and social functions with experiences, family links, a self-image, strategies and modes of perception and representation that are different from those of a woman who has been married for a relatively long time. These social elements play a role in the differentiation of economic positions, self-determination and initiative abilities, the woman's position in her relationship with her husband, and in her participation in decision-making and adjusting her household to external changes.

The *fertility rate* is likely to be correlated with women's empowerment. Even though maternity can contribute to a woman's special position within the household when it comes to decision-making, the larger the number of children she may have to bear, the more reduced her position is likely to be in economic and social activities, which in turn may to cause an imbalance between the sources of income she generates and the amount of responsibility she has with regard to the number of children she has to take care of. Such high fertility rates keep the woman more in her traditional role, weakens her economic means, and reduces her sources of power and decision-making capacity. This is likely to cause her to continue depending on her husband or other family members. Therefore, when the woman extends the time during which she would like to have children, her reproductive role puts her at a disadvantage on the job market (Adjamagbo et al., 2006).

Access to employment is an aspect of economic empowerment. Even though the definition of empowerment used in this study has to do with decision making within a household and, thus, is not directly about economic empowerment, it is possible that the woman's attitude towards participating in decision making is at the same time linked to her likelihood of being in paid employment. However, access to employment is also considered to be a determinant of empowerment, to the extent that it is likely to reduce women's economic dependency, while economic autonomy is a key requirement for empowerment (Moghadam and Senftova, 2005).

The way the interrelationships between a woman and her husband are built and maintained is connected to their respective *socio-professional origin*, a notion whose definition is based on the activity and status within the profession. That is why there is variation, from one woman to another, in the socio-professional origin, the relationship with her husband, the margin of autonomy she has acquired, and the role behaviours she has effectively assumed.

Except for fertility rate and access to employment, all the variables described above are assumed to be exogenous to the extent that they are not determined beforehand by the other variables of the model.

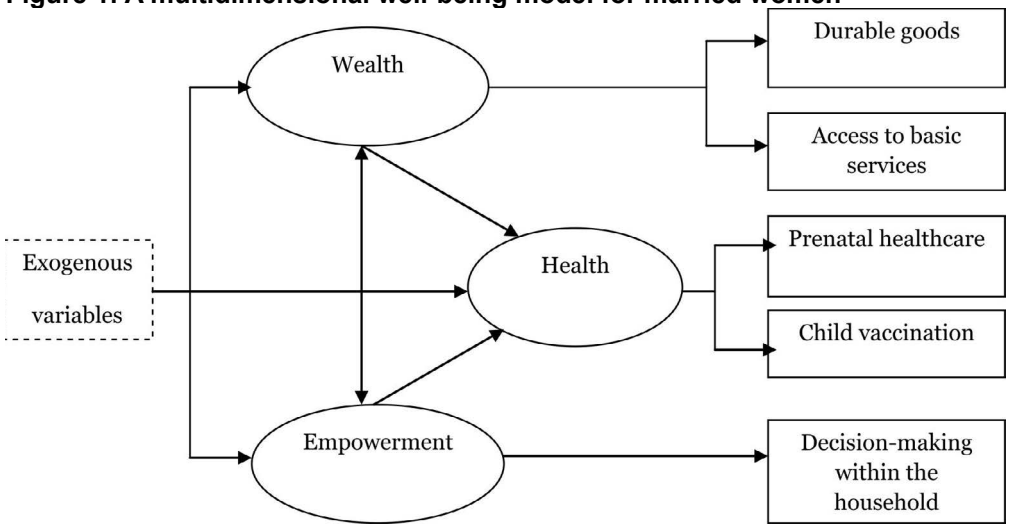
3.2 Specification of the Model

The three dimensions of well-being were measured using the structural equation models with latent variables. These three dimensions are the latent variables of the model. The indicators (endogenous variables) that were used to determine them are all qualitative, meaning that the study used the model developed by Muthén (1983; 1984). The same model was adopted by Wagle (2005) and Krishnakumar and Ballon (2008) to measure multidimensional poverty. Such a method is appropriate

when several dimensions (latent variables), which are possibly interdependent between them, are to be measured simultaneously. Moreover, the method makes it possible to take into account the possible exogenous variables that can directly influence the latent variables.

Figure 1 presents the interrelationships between the model's variables. It shows the dimensions (or latent variables) of wealth, health and empowerment, and the endogenous variables (or indicators); the latter are observations about each individual's ability to fulfill herself in each one of those dimensions. For instance, a woman whose degree of empowerment is high will have a strong probability to play an effective role in decision making within the household. Similarly, a wealthy individual has a greater chance of owning durable goods and having access to basic services. The third category of variables featured in the graph is that of exogenous variables. These are a set of variables related to people's socio-demographic and cultural characteristics, and which are likely to affect their abilities to fulfill themselves within each dimension. For instance, living in a rural area predisposes someone to not getting as much healthcare as someone living in a town.

Figure 1: A multidimensional well-being model for married women



In the above model, it is assumed that women's empowerment can influence the household's level of wealth and vice versa and, in addition, that these two dimensions most likely affect the level of health. The impact of empowerment on well-being has been highlighted in the literature (Haddad and Hoddinott, 1994; Hindin, 2000; Allendorf, 2007; Liu, 2008). The effect of wealth on the level of health has been trivially established in the literature on social health inequalities,[1] which reinforces the present study's assumptions, especially that SSA countries do not offer a universal health cover. The effect on women's empowerment is less trivial even though several studies have established the beneficial role of income (Pezzini, 2005; Rammohan and Johar, 2009). Given the nature of the health dimension taken into account in this study, and which basically revolves around prenatal and neonatal health, it is not expected that it will have an effect on health and empowerment. Such an effect could only be observed in

the long term in the children's adult life.

Following the model used by Wagle (2005) and that used by Krishnakumar and Ballon (2008), this study's model comprises two sets of equations. The first set represents the structural model and considers each latent variable to be a function of exogenous factors, and possibly of other latent variables. The second set, also called the measurement model, relates each category of endogenous variables to its respective latent variable. This is what the model looks like:

$$f = \Gamma f + \Pi x + \varepsilon$$
$$y = \Lambda f + u \quad (1)$$

The first line in Equation 1 represents the structural equation model, while the second is the measurement model. f is a vector of the latent variables of the dimensions (3×1) comprising f_1, f_2 and f_3, which stand for empowerment, wealth and health, respectively. x is a vector $(q \times 1)$ of the exogenous variables. If we suppose m_1, m_2 and m_3 to be the numbers of indicators for empowerment, wealth and health, respectively, with $m = m_1 + m_2 + m_3$, then y is the vector $(m \times 1)$ of indicators. Π is the matrix $(3 \times q)$ of the coefficients of the exogenous variables, Γ the matrix (3×3) of the coefficients of the latent variables that capture their interdependence, and Λ the matrix of the factor weights that underscore the extent to which the abilities in each dimension affect achievements. ε and u represent two vectors, (3×1) and $(m \times 1)$, respectively, of error terms. With the interrelationships defined between the latent variables, the matrix Γ should have the following form:

$$\Gamma = \begin{bmatrix} 0 & \tau_{12} & 0 \\ \tau_{21} & 0 & 0 \\ \tau_{31} & \tau_{32} & 0 \end{bmatrix}$$

In the face of ordered qualitative variables as in our case, the response variables y_j^*, which are continuous and non-observable, get included for each indicator y_j with $j = 1,...,m$. If it is assumed that the variable y_j takes the $K+1$ values, namely $0,...,K$, it then gets linked to each response variable y_j^* in the following way:

$$y_j = k \text{ if } \gamma_k^j \le y_j^* < \gamma_{k+1}^j, \quad (2)$$

where $k = 0,...,K$, $\gamma_0^j = -\infty$ and $\gamma_{K+1}^j = +\infty$. γ_k^j represents the threshold parameters for each indicator j.

When the indicator is a binary variable, as in our case, the reaction function becomes:

$$y_j = \begin{cases} 1 \text{ if } y_j^* \geq 0 \\ 0 \text{ if } y_j^* < 0 \end{cases} \tag{3}$$

Taking into account this reaction function, the measurement model in Equation 1 can be rewritten as follows:

$$y_j^* = \lambda_j f + u_j \text{ where } j = 1,...,m. \tag{4}$$

where λ_j represents the factor weight associated with the indicator j.
Further, the following assumptions are posited:

$$\begin{aligned} &E(\varepsilon) = 0, \\ &E(u) = 0, \\ &V(\varepsilon) = \Phi(3 \times 3), \\ &V(u) = \Psi(m \times m). \end{aligned} \tag{5}$$

It is equally assumed that ε is not correlated with x and u, and that u is not correlated with x and f. On the other hand, Φ and Ψ represent entire matrices which, thus, admit of the existence of correlations with the totality of the indicators and admit of heteroscedasticity. Furthermore, if we suppose that I is the matrix for the identity of dimensions (3×3), then $I - \Gamma$ is an unremarkable matrix.

Based on the above assumptions, we can determine the matrix of the covariances/correlations of the observed variables y and x with θ, with θ being a structure comprising the totality of the vectors and matrices of the model's unknown parameters, namely Γ, Π, γ, Φ and Ψ. We will be able to estimate the model after verifying its identification. In practice, the identification test is done by using the rule of *t*, which is a necessary but insufficient condition. This rule compares the number of non-redundant elements of the covariances/correlations of the latent variables, which in the present case corresponds to $\frac{1}{2}(m+q)(m+q+1)$, and the number *t* of the model's unknown parameters θ. The model is then identified when $\frac{1}{2}(m+q)(m+q+1) \geq t$.

Krishnakumar and Ballon (2008) have proposed a two-step approach, where the first step applies the rule of *t* to the measurement equations, while the second simply applies the rank conditions of identification to the structural equation models by considering

the latent variables to be the observed variables. When the identification condition has been verified at each step, then the entire model will have been identified.

On the assumption that the distribution of f, which is conditional upon x, follows a normal multivariate, it is enough to consider just the first- and second-order moments in order to estimate the model based on the assumptions made in Equation 5. The estimation method will follow Muthén's (1983; 1984) three-step procedure, as described by Krishnakumar and Ballon (2008). This approach uses the weighted least squares in order to minimize the following matching function:

$$F = \left[\hat{\sigma} - \sigma(\theta)\right]' \Omega^{-1} \left[\hat{\sigma} - \sigma(\theta)\right] \quad (6)$$

where $\hat{\sigma}$ is the vector of the estimated values of $\sigma(\theta)$ obtained from the auto-correlations between the elements of f, $\sigma(\theta)$ is the vector corresponding to the theoretical covariance matrix, and Ω is the optimal weight matrix. This matrix represents a convergent estimator of the matrix of the asymptotic covariance of $\hat{\sigma}$. The minimization of Equation 5 thus corresponds to an estimation using the generalized least squares (GLSs).

3.3 Stochastic Dominance

Using stochastic dominance enables robust comparisons between countries for a variable of interest, such as the women's empowerment index. To this end, let us consider two distributions, *A* and *B*, with *F* and *G* as the respective functions of cumulative densities (*fdc*). $F(z)$ and $G(z)$ give, for each level z, the proportions of the women whose level of empowerment is below z, for *A* and *B*, respectively. The dominance conditions have been derived by several authors within the framework of univariate distributions (Atkinson, 1987; Foster and Shorrocks, 1988a, 1988b). Duclos and Araar (2006) established equivalence between the dominance in well-being, the dominance in poverty, and the stochastic dominance that was simply based on its function of cumulative densities and its integrations.

Let us consider the following sequence of functions:

$$D_F^1(z) = F(z) = \int_0^z dF(x), \text{ and}$$
$$D_F^s(z) = \int_0^z D^{s-1}(x)dx \text{ for } s \geq 2, \quad (7)$$

where s is the order of dominance. According to Davidson and Duclos (2000), the above sequence is equivalent to the following expression:

$$D_F^s(z) = \frac{1}{(s-1)!}\int_0^z (z-x)^{s-1} dF(x) \text{ for } s \geq 1. \quad (8)$$

The same expression can be derived for the distribution B. It is then said that the distribution B dominates the distribution A to the order s if $D_F^s(z) > D_G^s(z)$ for every z.

These comparisons can be extended to two dimensions, for instance by taking wealth into account. Estimation methods to this effect have been developed by Sahn and Younger (2006) and Batana and Duclos (2010).

The data are comparable between countries because the same metrics was used to measure both the quantitative and qualitative variables. Before making the comparison, the indices will be standardized following the procedure used for the human development index (Krishnakumar and Ballon, 2008):

$$\tilde{f}_i = \frac{\hat{f}_i - \min}{\max - \min} \tag{9}$$

where $\hat{f}_i$ represents the estimation of the index of either empowerment or wealth for the individual i taken from a representative sample from a given country, and t $\tilde{f}_i$ is its standardized value. The minimum and maximum values equally refer to the extremes in the sample. This standardization is practical, since it not only allows us to have only positive values, but also because the computed indices do not constitute natural measures of the respective dimensions, as is the case, for example, of income in relation to the monetary dimension of well-being. The standardization will be specific to each country when the analysis is aimed at producing the results of the estimation of the structural equation model; an overall standardization (for all the countries) will occur when the analysis concerns the distribution and comparison of countries.

3.4 Source and Selection of Data

Demographic and health surveys (DHSs) contain data that enable an analysis of certain dimensions of well-being, among them women's empowerment. The DHSs have been conducted in most African countries since the mid-1980s. They cover the whole country and use three questionnaires: the household questionnaire, the female questionnaire, and the male questionnaire. Since the same methodology of data collection will have been used, comparisons can be made between countries based on DHS data.

Four countries were chosen for this study. First, Madagascar, which has one of the lowest rates (25%) at which women are disadvantaged in terms of empowerment; then Ghana and Malawi, which have rates varying between 40% and 50%, and, finally, Nigeria, where the rate is higher than 60% (Batana, 2013). The analysis was based on the most recent DHSs carried out in those countries: in 2008 for Ghana, Madagascar and Nigeria, and 2010 for Malawi, which enables spatial comparisons. Table 1 presents the select dimensions, the indicators that were used to estimate them, as well as the main socio-demographic and cultural characteristics that correspond to the exogenous variables in the model presented in Figure 1.

Table 1: Selection and definitions of dimensions, indicators and variables

Dimensions and variables	Indicators
Dimension 1: wealth index	*Access to electricity, ownership of a radio and/or a TV set, ownership of a refrigerator, ownership of means of transport, quality of the floor, ownership of a telephone, access to clean drinking water, access to health facilities*
Dimension 2: health index	*Anti-tetanus injections during pregnancy, prenatal care, vaccination of the child against tuberculosis, diphtheria, tetanus, whooping cough, polio, and measles*
Dimension 3: empowerment index	*Decisions concerning the use of one's own income, one's health, the household's main expenses, the household's daily expenses, visits to relatives, the utilization of the husband's income*
Exogenous variables: Socio-demographic and cultural characteristics	*The household size, level of education, area of residence, the woman's age, her religion, the duration of married life, the fertility rate, the occupational status, the socio-professional category, the sex of the head of household, etc*

The unit of analysis is the married woman. It would have been interesting to also study the empowerment of women without husbands (single women and widows) so as to compare it with that of married women. After all, single women and widows may also be living in households that allow them little or no freedom to achieve their economic and intellectual fulfillment. But the available data limit the analysis to only married women because the questions (on the questionnaire) about empowerment were addressed only to them. While this renders the analysis of women's empowerment less comprehensive, it has the advantage of focusing on a category of more homogeneous women facing the same constraints when it comes to making decisions within the household. For instance, if one assumes that the obstacles to a woman exercising her empowerment can come from all the family members, a married woman would be less inclined than a widow or a single woman to make decisions, as she could be subjected to extra authority from her husband or partner, who usually is the head of household. Besides, the questionnaire was administered only to women aged between 15 and 49. [2]

The estimation of the general model described in Figure 1 was done only on samples comprising women with children because the health dimension basically concerned prenatal and postnatal care. The samples were modified later into the analysis. The taking into account of the health dimension brought out the issue of a number of data that were unavailable, because only women who had children about whom prenatal and postnatal data were available were taken into consideration. In the distribution analysis, this dimension will be excluded, which will allow us to have bigger samples for the analysis of the distribution of empowerment and of the wealth index. Moreover, the two dimensions that were eventually studied offered the best description of the current level of women's well-being, unlike the health dimension. In addition, only one overall sample containing data for the four countries was taken into account in order to enable comparisons between countries. This decision was motivated by the assumption that the models of behaviour and enhancement of well-being were identical for those countries.

4. Results and Discussion

4.1 Estimations of Structural Models

The results of the estimation of the structural equation models represented in the first line of Equation 1 are presented in tables A1 (for Ghana), A2 (for Malawi), A3 (for Madagascar) and A4 (for Nigeria) in the Annex. These tables present the main determinants of the wealth index, the health index, and the empowerment index for married women within their households. It must be emphasized that there is likely to be some endogeneity for certain variables that are considered to be exogenous. This is notably the case for the fertility rate (number of children for each woman) and a woman's employment: the two are likely to be endogenous due to their possible simultaneity with the woman's empowerment. The method used by the Mplus software does not explicitly deal with issues of endogeneity. It is, however, possible to use appropriate tools to incorporate this issue into the estimations. The age of the conjugal partner was used as a tool for fertility rate, while the number of years of schooling and the woman's age, which was segmented based on the school age, was taken as the tools for employment status. Since employment status is a binary variable, a logit model was first estimated. After that, the probabilities that were derived from this estimation were used as proxies for the employment status in the structural equation model.

Table 2 is a summary of the main results obtained by differentiating the variables that were found to have a positive impact from those found to have a negative one. Not surprisingly, and unequivocally, the results show that the woman's level of education and that of her spouse had a positive effect on the wealth index in all the countries studied. The same was found for the woman's spouse's activity sector: the level of wealth of a woman's spouse working in the non-agricultural sector was found to be higher than that of the spouse working in the agricultural sector. It was also found that urban women, on average, had a higher level of wealth than those living in rural areas, which is a very common finding in studies on poverty.

Table 2: Summary of the results of the structural equation model for all the four countries

	Variables with a positive impact*	**Variables with a negative impact***
Wealth index	*- Living in an urban area* *- The woman's age* *- Level of education* *- Household size* *- Working in a non-agricultural sector*	*- Fertility rate* *- Being a Muslim or an animist* *- The head of household is a woman*

Table 2: Continued

Health index	*- Wealth index* *- Empowerment index* *- The woman's age* *- The woman has a job* *- Level of education*	*- Household size* *- Fertility rate* *- Being a Muslim or an animist*
Empowerment index	*- Wealth index* *- Living in an urban area* *- The head of household is a woman* *- Level of education* *- Working in a non-agricultural sector*	*- Household size* *- Fertility rate* - Being a Muslim or an animist

** The variables included in this table are only those whose effect was significant in at least two countries.*

Compared to Christian women, Muslim or animist women were found to have a relatively low level of wealth in the three countries (Ghana, Malawi, and Madagascar) where Islam is a relatively minority religion, while the opposite was found in Nigeria, where Islam is a majority religion. Moreover, when the head of household was a woman, this had a negative effect on the wealth index, simply because households headed by women are less well-off than those headed by men. While household size was not found to have a significant impact in Ghana, it was found to have a positive one in Malawi, Madagascar and Nigeria. Indeed, when a household has several adult members who are likely to contribute to its income and property, this increases the probability that the household will own assets and durable goods, which will in turn increase its level of wealth. But, on the other hand, if the household instead has more child members, that is, a high number of young dependants, this will negatively affect its level of wealth. This explains why the fertility rate was found to be negatively correlated with the level of wealth. The positive effect observed for the woman's age can be explained by the fact that accumulating wealth is a dynamic process over time. It is thus understandable that an older woman will have had more opportunities to accumulate wealth than a younger one who has just been married. The fact that a woman had a job was found to have a positive effect on the level of wealth in Malawi and Nigeria, but a negative one in the case of Madagascar, with the latter being a rather counterintuitive finding.

In relation to the child health index, the results show that when women had a high level of empowerment, this had a positive and significant effect on the index of prenatal and postnatal health. Her high level of empowerment increased the probability that she would go for prenatal medical consultations so as to improve her future child's health environment. This finding corroborates those obtained by other studies (Allendorf, 2007; Liu, 2008) and reinforces the idea that women's empowerment is not only an end in itself as a development goal but equally constitutes a means that fosters the achievement of several other development goals. It is indeed generally acknowledged that gender equality is the key to achieving the MDGs. In this connection, in 2007 the World Bank launched its action plan in favour of women's empowerment. According to the World Bank, that was a prerequisite for the promotion of shared growth and an accelerated achievement of the third MDG (World Bank, 2006). The level of the woman's wealth, as expected, turned out to be an important determinant of child health. Other variables such as the level of education, the employment status, and the woman's age were found to have a positive and significant effect, while household size, fertility rate, and being a Muslim or an animist were found to have a negative effect.

The present study's estimations enabled us to identify the main determinants of women's empowerment. Except for the case of Madagascar, the level of wealth was found to be positively correlated with the empowerment index. The direction of the correlation is not, however, clearly defined. Indeed, greater women's empowerment is likely to increase their economic role, notably their contribution to their households' incomes and levels of wealth. On the other hand, though, it is reasonable to think that a woman's empowerment varies according to the social class to which she belongs. In the same line of argumentation, the employment status is a socio-economic status of positioning or re-positioning oneself in the married life. According to Kakwani and Son (2006), a greater ability on the part of women to contribute to their households' monetary income is likely to increase their transaction power, to the extent that they will be more able to have a greater say on the distribution of their households' resources. Thus, not only does employment provide income, but it also serves as a vector of integration into the world of work and identity, which guarantees women a certain economic autonomy by providing them with *"opportunities to fulfil themselves, to play a publicly recognized role, and to be useful to society"*.[3] However, the positive role played by employment was observed only in the case of Nigeria; the probability of being employed did not seem to have a significant effect in the case of the other countries. This counterintuitive finding can be explained by the choice of the instruments used to measure that probability, and therefore does not call into question the close link between a woman's being in paid employment and her empowerment.

The household size was found to play a negative role, except in the case of Malawi. It appears that women living in large households have fewer opportunities to play an active role in decision-making within their households. This state of affairs can be explained by the fact that large households often have several adults who are involved in conjugal life. Such a situation may weaken the woman's decision-making power especially when she is not the spouse of the head of household. The same negative effect was observed in relation to fertility rate: the higher this rate was, the lesser the woman's empowerment was found to be. It thus appears that for a woman to have given birth to many children is not a guarantee that her decision-making power will be enhanced. Even though one may think that maternity is likely to enhance the woman's level of empowerment, it is equally possible that a low level of empowerment reduces her ability to control births, which can cause her to have many children against her will.

With the exception of the case of Ghana where the woman's level of education or that of her spouse did not seem to play a significant role on empowerment,[4] education turned out to be an important determinant in the other countries. Thus, a woman with a good level of education was in general found to be much better equipped to exercise her decision-making power within the household. Education, which is likely to increase the woman's productivity, also provides her with an opportunity to find a better-paying job and, hence, to contribute more to the household's income. The spouse's level of education was found to play a positive role on women's empowerment, except for the case of Madagascar where it was observed that if the spouse had primary school level of education, this had a negative effect on the woman's degree of empowerment.

The status of head of household gives to the woman a residential and economic autonomy. It allows her a relative or total autonomy vis-à-vis possessions, revenues

from production, or her spouse's salary. The study found that when a household was headed by a woman, this had a positive and significant effect on her decision-making power within the household. There was a direct effect when the woman concerned was herself the head of household. But even when it was another woman who headed it, her level of empowerment was still positively affected.

The effect of the area of residence was found to be mixed. The fact of living in an urban area for a woman was found not to have a significant effect in the case of Ghana, while it was found to have significantly enhanced women's empowerment in Malawi and Madagascar. In the case of Nigeria, it was found that other things being equal, the urban women's level of empowerment was on average lower.

The animist women in Ghana were found to enjoy a higher level of empowerment than their Muslim and Christian counterparts, while these latter had a higher level than their Muslim counterparts. However, in Malawi and Madagascar, it was the Christian women who were found to enjoy a higher level of empowerment than their Muslim and animist counterparts.

The spouse's activity area was also found to play a role: being employed in the non-agricultural sector enhanced women's empowerment in Malawi and Madagascar, while the reverse was observed in Nigeria. This correlation may be related to the respective economic situations because, economically speaking, there are differences between the non-agricultural and the agricultural sector, with most of the poor populations generally being found in the latter. The same correlation was not observed in the case of Ghana, as the effect was not found to be statistically significant.

While age is recognized as a potential determinant of empowerment, its impact was not found to be positive and significant in the case of Ghana. In theory, greater empowerment in relation to being older is linked to changes in the woman's social and family roles, which come about in her married life. Often, the young woman gets married very early [5] and there is a big difference between her age and that of her husband, which makes the latter appear not only as a spouse but also as an older brother or a father. In such a situation, married life becomes a kind of a dissymmetrical relationship between an older brother and a younger sister or a father and a daughter in which the newly-married young woman develops a certain dependency vis-à-vis her husband. However, as she grows older and her married life lasts longer, her status changes from that of a young woman to that of a mother, as a result of which she gets more often requested to play family roles. The taking into account of other variables in our model caused the role of age to be rather relative, which explains why it was not found to be significant in most cases.

That seems to be the case for the duration of married life, which was found to have a positive and significant life only in Madagascar. This duration refers to marital status and the existence of arrangements or strategies to ensure the stability of the union and protect it against breaking up, which is a common threat for married couples. Since it hinges on this stability, the duration of married life makes it possible for the roles of the spouses to become quite similar. This increases the woman's position, which initially was very low compared to that of her husband.

4.2 Distribution Analysis

To analyze the specific relationships between the empowerment index and a certain number of characteristic variables such as the woman's age, household size and the wealth index, the Kernel regression was used. This is a technique using a non-parametric regression that consists in finding the non-linear relationship between the empowerment index and the explanatory variable. The technique enables an estimation of the conditional expectation of empowerment in relation to the previously mentioned variables. The results are presented in Figures 2, 3 and 4 for the wealth index, woman's age, and household size, respectively.

Figure 2: Kernel regression for the empowerment index in relation to the wealth index

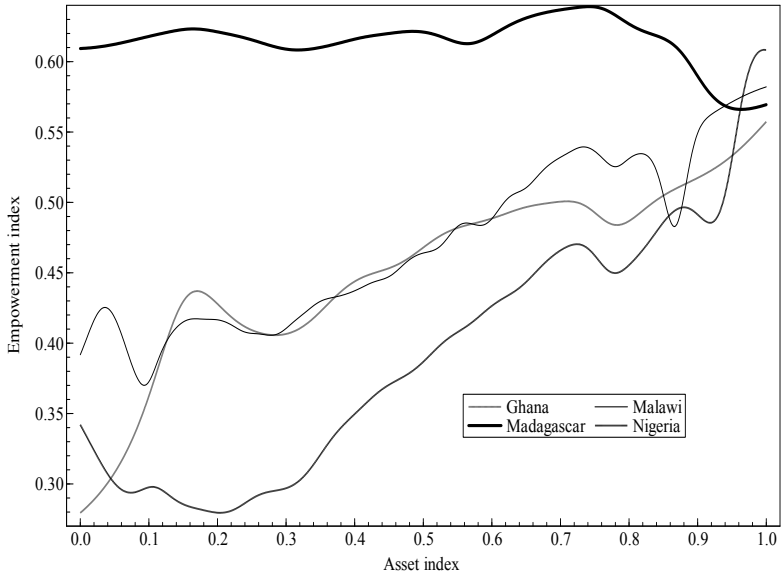
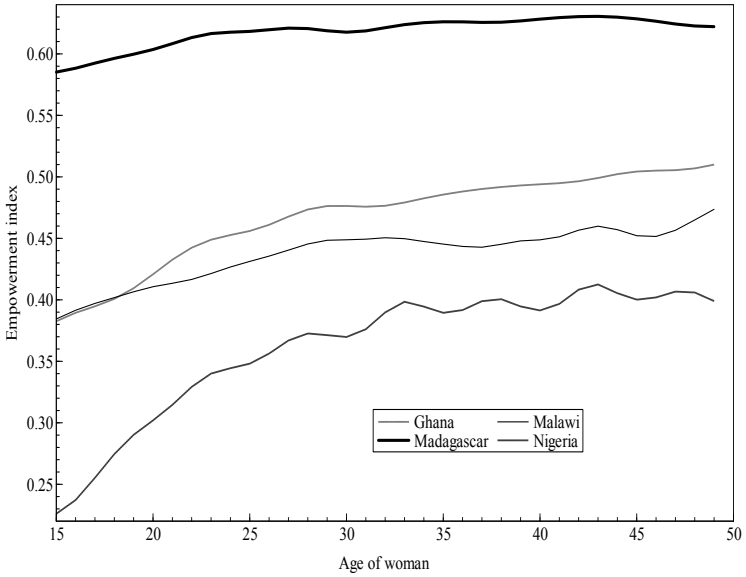


Figure 2 shows that the correlation between empowerment and wealth is virtually absent in the case of Madagascar, since the relationship is represented by a horizontal line. This finding confirms that obtained by estimating the structural equation model. On the other hand, a positive correlation could clearly be observed in the case of the other three countries. For Nigeria, the relationship could be clearly seen only beyond a wealth index of 0.3. For levels below 0.3, no correlation with empowerment could be observed. The same applies to the case of Malawi.

Figure 3 illustrates the relationship between empowerment and the woman's age. It shows a very clear relationship between age and the level of empowerment in Nigeria. The relationship in question is represented by an almost logarithmic curve with a positive slope and a decreasing marginal effect. The same relationship appears more linear in the case of Ghana, where a positive and significant correlation was equally observed. The slope of the curve is weaker in the case of Madagascar and Malawi, which suggests a lack of correlation.

Figure 3: Kernel regression for the empowerment index in relation to the woman's age



The results of the structural equation model showed that household size had a positive impact on women's empowerment. Figure 4 confirms this trend for most of the countries. For Nigeria, for instance, the empowerment index dropped from a level close to 0.40 for the small households, to about 0.30 for households that had more than 10 members. A similar drop was observed for Madagascar when the number of people in the household rose from 1 to 10, even though the relationship was less marked than that in the preceding case. The same trend was observed for Ghana, although in this case the relationship was ambiguous, as it became uneven beyond a household size of more than nine members. It is only in the case of Malawi that no negative relationship was found, as reflected in the fact that when household size varied from two to 11 members, the relationship was represented by an almost horizontal line.

In order to carry out the distribution analysis, the four samples were put together to form a single overall sample. This was done on the assumption that the variables and indicators get an increased value according to the same model in the countries concerned, which enables comparisons between these.

Figure 4: Kernel regression for empowerment index in relation to household size

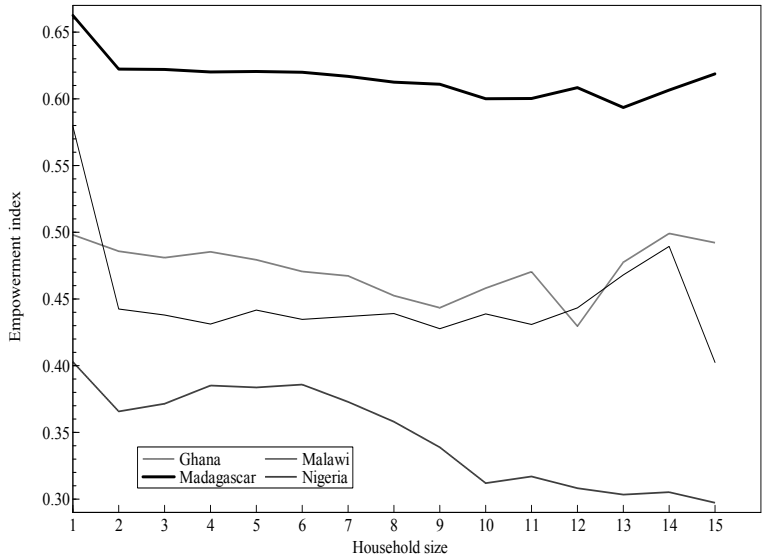


Figure 5: Kernel density curves for empowerment index for the four countries

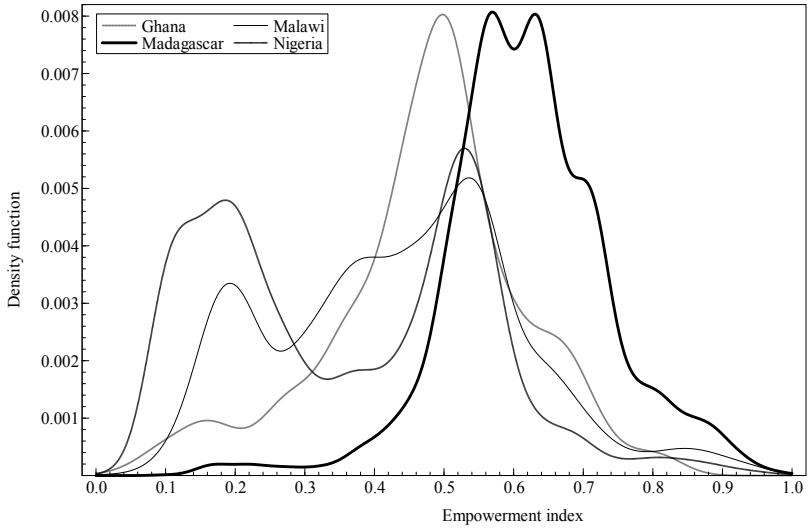
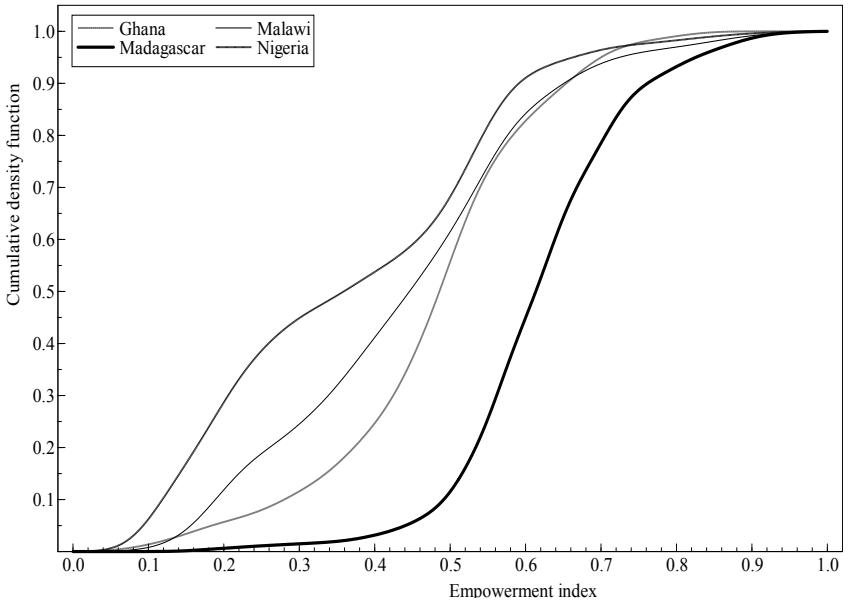


Figure 5 presents the Kernel estimations for the density curves for the empowerment index for the four countries. It can be noted that the distribution characteristics differ from one country to another: Ghana seems to present a density that is relatively similar to a normal law. The same can be said for Madagascar, but for this latter some bimodality can be observed around the average value of the index. This curve is to

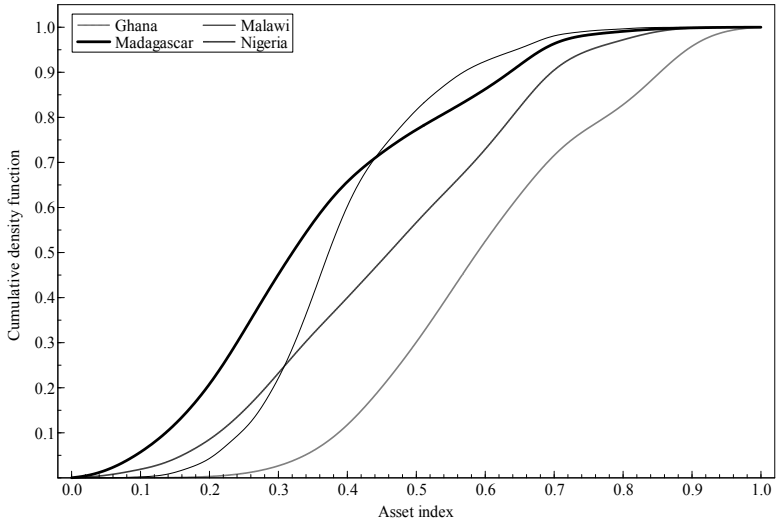
the right of that for Ghana, which means that the level of women's empowerment in Madagascar is higher than that in Ghana. This is confirmed by the cumulative density curves presented in Figure 6.

Figure 6: Cumulative density curves for the empowerment index for the four countries



The density curve for Nigeria is clearly bimodal, which is an indication of the existence of two groups of women according to their level of empowerment: the women whose index is lower than 0.4 seem to form a homogeneous group whose distribution follows a normal law, which is also the case for women whose index is higher than 0.4. The density curve for Malawi also looks atypical, as it has the form of a trimodal density. The fact that the curve is quite spread reflects the existence of a large variance between women in terms of empowerment. Figure 6, which compares the cumulative densities, presents a graphic analysis of the stochastic dominance when well-being is seen as dependent upon empowerment. The results show that the level of empowerment was found to be higher in Madagascar than in the other countries. This is because whatever the level of empowerment index taken as the threshold for determining the proportion of women who are below it, this proportion always turns out to be lowest in the case of Madagascar. This good performance on the part of Madagascar has already been pointed out by Batana (2013). Even though, on average, the level of empowerment in Ghana is higher than that in Malawi, there is no true relationship of dominance between the two because their curves cross each other. The same applies to the cases of Ghana and Nigeria. However, the curve for Malawi seems to dominate that for Nigeria.

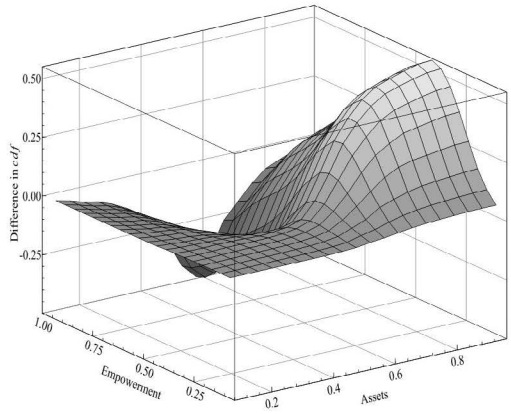
Figure 7: Cumulative density curves for the wealth index for the four countries



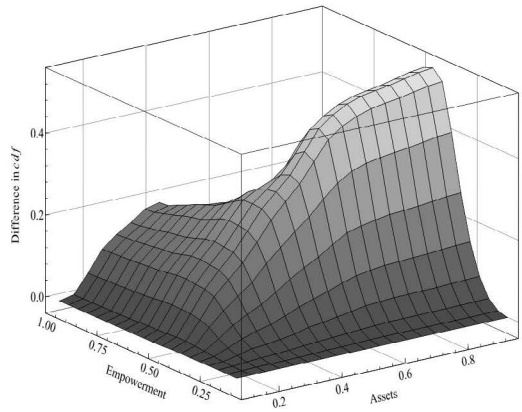
There are historical reasons behind the higher level of empowerment in Madagascar than in the other countries. History tells us that in pre-colonial Madagascar, there were five successive queens during the 19th century, a model which, according to Rabenoro (2012), was modified by a model inherited from colonization. That is how Madagascan society, which originally was matriarchal, saw men progressively becoming more powerful than women on several fronts, notably the political one. Nonetheless, this historical past has left observable marks especially on decision making within the household. As already noted by Ramamonjisoa (1993), women in Madagascar have remained all-powerful within the household; it is indeed they who plan household expenditure and manage the education of children.

Empowerment is just one dimension of well-being. Thus, the use of it cannot be enough to talk about real dominance in terms of well-being. The other dimension that is usually used to measure well-being is the wealth index, which is often used to make up for the non-availability of data in some household surveys on income and expenditure. Figure 7 presents an analysis of the unidimensional dominance based on the wealth index. From this dimension, Ghana was found to dominate the other three countries in terms of well-being. It was followed by Nigeria, which in turn dominated Madagascar. However, no dominance relationship was found between Madagascar and Malawi and between Malawi and Nigeria. This is reflected in the fact that their curves cross each other. These results suggest that the classification of countries varies according to which dimension is being considered. It is thus probable, considering the two dimensions (empowerment and wealth), that classifications change or become no longer valid. That is why Figure 8 analyzes the bivariate stochastic dominance between pairs of countries. It presents the differences between the cumulative density curves of several pairs of countries. When the surface area obtained covers only positive values or only negative values, then one of the countries dominates the other. Thus, except for the dominance of Malawi and Nigeria by Ghana (illustrated in parts B and C, respectively, of Figure 8), the other relationships remain characterized by a lack of dominance.

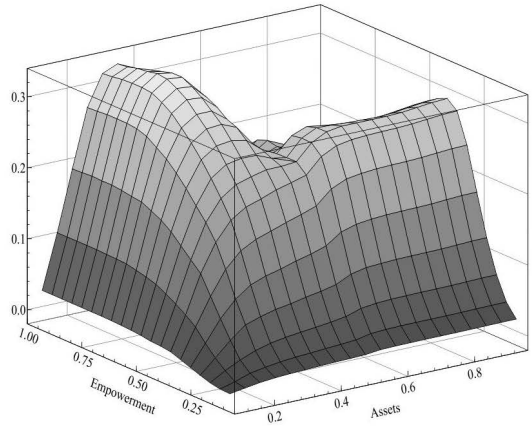
Figure 8: Differences between the bivariate cumulative distribution functions (cdf) for the four countries



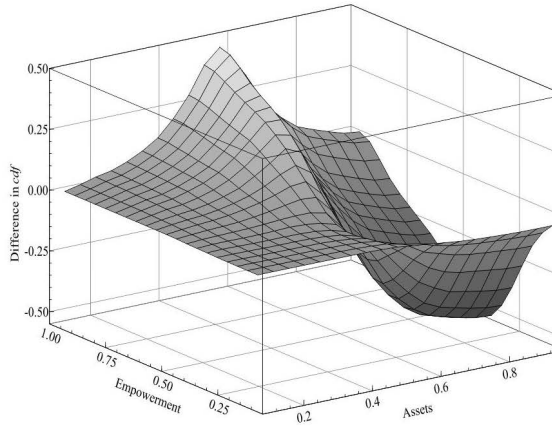
Madagascar's cdf minus Ghana's cdf



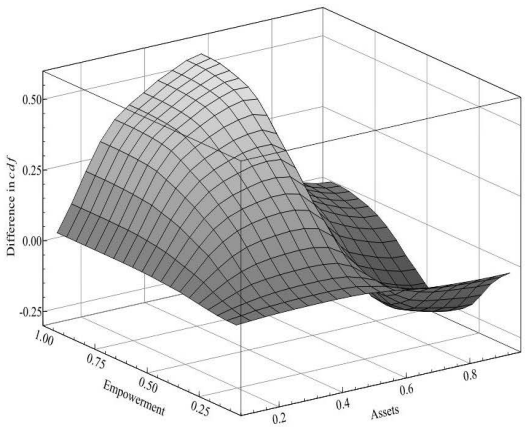
Malawi's cdf minus Ghana's cdf



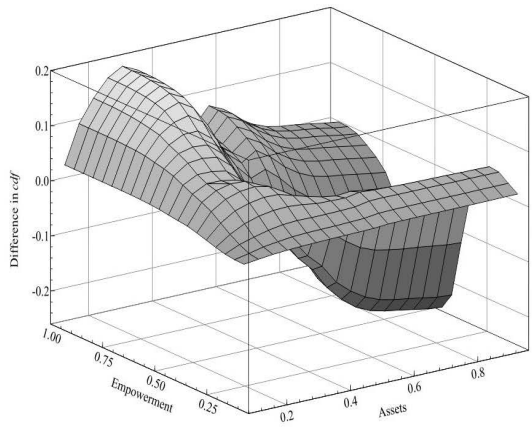
Nigeria's cdf minus Ghana's cdf



Malawi's cdf minus Madagascar's cdf



Nigeria's cdf minus Madagascar's cdf



Nigeria's cdf minus Malawi's cdf

5. Conclusion

Women's empowerment is not only a development goal, but also a means to achieving the other development goals, including the MDGs. That is why it is appropriate to seek to better understand its determinants as well as its implications for economic and social well-being in Sub-Saharan Africa. The challenge for this study was two-fold: first, to define and measure the concept of women's empowerment within a perspective of a distributive and comparative analysis between countries; and second, to find a methodological approach that could handle the endogeneity of certain exogenous variables, since the structural equation model with latent variables is not usually fit to deal with it. Using a definition based on the exercise of the decision-making power by married women within their households, the study estimated the measurement of women's empowerment in four SSA countries (Ghana, Madagascar, Malawi, and Nigeria) and explored the correlations between this empowerment with several other household socio-economic and socio-demographic variables.

As Duflo (2012) has emphasized, while women's empowerment can lead to improvement, notably in certain aspects of child welfare, it is equally likely to cause costs in certain others. This study found a correlation between empowerment and the quality of maternal and post-natal health, which justifies the interest accorded to the third MDG in relation to achieving the other development goals. On the other hand, the positive effect of the wealth index on empowerment indicates that development also has a positive effect on women's self-fulfilment. The existence of this double causality does not, however, guarantee that SSA countries are capable of forming a virtuous circle because, according to Duflo (2012), those interrelationships are not strong enough to be self-sustained. It is therefore necessary to take actions and develop policies to promote gender equality.

An important lesson to be learnt is that promoting women's empowerment must not be dissociated from anti-poverty policies. Actions must be taken jointly and after consultation so as to take advantage of the observed interrelationships. As the World Bank has observed (World Bank, 2011), women are more disadvantaged than men in low-income countries. It is imperative that implementation of activities designed to strengthen development foundations integrate issues of gender equality and women's empowerment from the conception phase.

Other actions can be envisaged on the social level. Given the negative impact of household size and fertility rate on women's empowerment and the health index, it would be desirable to intensify the implementation of birth-control policies and to enhance the woman's latitude in increasing her participation and economic power

within the household. This, in the medium and long term, will enable a considerable reduction in poverty levels, since population growth is usually a major obstacle to the fight against poverty. Moreover, promoting women's education at the secondary and post-secondary school levels can lead to a reduction in cases of early marriage and, thus, have a positive effect on women's empowerment. Further, it has been established that education plays a positive role on maternal, prenatal, and pos-tnatal health as well as on poverty reduction. The emphasis is laid on secondary and post-secondary education because that is where gender inequality is more pronounced than in primary education. Finally, education enables access to better-quality jobs and the creation of income-generating activities, both of which are likely to enhance empowerment.

Our analysis has also highlighted differences between countries: some variables were found to be more relevant in some countries but not in others. Furthermore, the distributive analysis showed that the level of women's empowerment in Madagascar was higher than that in the other countries studied, a finding which can be explained by factors that are extraneous to the model used. In particular, there are historical factors related to the fact that Madagascan society was originally matriarchal, which predisposes the woman to exercising a strong enough decision-making power within the household. However, it should be noted that, contrary to what one might think, this relatively strong empowerment does not necessarily give an advantage to the Madagascan women when it comes to self-fulfilment in the community and the country at large. This is partly due to the colonial model that transformed the political position for women in Madagascar. The analysis also showed that even if the role of wealth on empowerment is recognized, other factors not included in the model and often specific to each country could explain why a country such as Madagascar, whose level of wealth is lower than that of the other countries in the study, was found to have a higher level of women's empowerment.

Notes

1 Several studies have indeed proved the existence of health gradients even in developed countries that have a universal health cover system; see for example Marmot (2005), McLeod et al. (2003), Deaton (2003), Wildman (2003) and Jones and Wildman (2008).

2 It is important to emphasize that the term “married woman” is not limited to the women who were officially married at the registry office, but covers all those who were married according to customary law or who cohabit with a partner.

3 Deniel (1985: 15-16).

4 This lack of correlation does not necessarily mean that education does not matter; this finding can be attributed to multicollinearity with other variables.

5 In Ghana, for instance, according to Locoh (1995), the average age of the young woman’s first marriage was around 19.2 years in 1978 and 20.6 years by the end of the 1990s.

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Annexes

Table A1: Results of the structural equation model for Ghana

Explanatory variables	Model 1: (wealth index)	**Model 2:** (health index)	**Model 3:** (empowerment index)
Wealth index	-	0.270***	0.045**
Empowerment index	-	0.219**	-
The woman's age	0.009**	-0.005	0.005**
Duration of married life	-	0.010**	0.002
Household size	-0.002	-0.009	-0.006**
Fertility rate	-0.029**	-0.052***	-0.013**
Living in an urban (vs rural) area	0.537***	0.006	-0.009
Being a Muslim	-0.074*	-0.015	-0.036*
Being an animist or other	-0.227***	-0.044	0.062**
The head of household is female (vs male)	-0.159***	0.015	0.048**
The woman has a job	-0.157	0.118	0.022
The woman has a primary school level	0.128***	-0.048	0.006
The woman has a secondary level or +	0.296***	0.061	0.012
The spouse has primary school level	0.071	-0.064	-0.019
The spouse has a secondary level or+	0.196***	-0.017	-0.014
The spouse is in the non-farming sector	0.302***	0.053	0.025

Note: (*), (**) and (***) mean that the statistic is significant at the levels of 10%, 5%, and 1%, respectively

Table A2: Results of the structural equation model for Malawi

Explanatory variables	**Model 1:** (wealth index)	**Model 2:** (health index)	**Model 3:** (empowerment index)
Wealth index	-	0.086***	0.108***
Empowerment index	-	0.077***	-
The woman's age	0.007	0.002	0.003
Duration of married life	-	0.004*	0.004
Household size	0.022***	-0.024***	-0.007
Fertility rate	-0.028***	-0.059***	-0.005

Living in an urban (vs rural) area	0.311***	0.020	0.151***
Being a Muslim	0.038***	0.023	-0.029
Being an animist or other	-0.126**	-0.101**	-0.141*
The head of household is female (vs male)	-0.028***	-0.043**	0.301***
The woman has a job	0.379***	0.343**	0.097
The woman has a primary school level	0.097***	0.042**	0.060***
The woman has a secondary level or +	0.260***	0.065**	0.151***
The spouse has a primary school level	0.101***	-0.009	0.022
The spouse has a secondary level or+	0.236***	0.034	0.027***
The spouse is in the non-farming sector	0.099***	0.003	0.078***

Note: (*), (**) and (***) mean that the statistic is significant at the levels of 10%, 5%, and 1%, respectively

Table A3: Results of the structural equation model for Madagascar

Explanatory variables	**Model 1:** (wealth index)	**Model 2:** (health index)	**Model 3:** (empowerment index)
Wealth index	-	0.700***	-0.036
Empowerment index	-	0.201**	-
The woman's age	0.014***	0.009**	0.000
Duration of married life	-	-0.014***	0.003*
Household size	0.007***	-0.040***	-0.008***
Fertility rate	-0.056***	-0.076***	-0.010**
Living in an urban (vs rural) area	0.341***	-0.026	0.054***
Being a Muslim or an animist	-0.166***	-0.149***	0.007
The head of household is female (vs male	-0.084***	-0.003	0.106***
The woman has a job	-0.819***	-0.022	-0.127
The woman has a primary school level	0.147***	0.246***	0.022
The woman has a secondary level or +	0.323***	0.359***	0.054**
The spouse has a primary school level	0.101***	0.258***	-0.024*
The spouse has a secondary level or+	0.268***	0.173***	-0.023
The spouse is in the non-farming sector	0.373***	-0.087*	0.09849**

Note: (*), (**) and (***) mean that the statistic is significant at the levels of 10%, 5%, and 1%, respectively

Table A4: Results of the structural equation model for Nigeria

Explanatory variables	**Model 1:** (wealth index)	**Model 2:** (health index)	**Model 3:** (empowerment index)
Wealth index	-	0.859***	0.037***
Empowerment index	-	0.652***	-
The woman's age	0.010***	0.008***	0.000
Duration of married life	-	-0.021***	0.000
Household size	0.007***	-0.011***	-0.002***

Fertility rate	-0.016***	-0.051***	-0.001
Living in an urban (vs rural) area	0.398***	0.074***	-0.012***
Being a Muslim or an animist	0.086***	-0.233***	-0.069***
The head of household is female (vs. male)	-0.080***	0.034	0.052***
The woman has a job	0.308***	1.819***	0.324***
The woman has a primary school level	0.100***	0.174***	0.012**
The woman has a secondary level or +	0.300***	0.468***	0.022***
The spouse has a primary school level	0.130***	0.197***	0.007
The spouse has a secondary level or+	0.232***	0.222***	0.010*
The spouse is in the non-farming sector	0.288***	-0.020	-0.025***

Note: (*), (**) and (***) mean that the statistic is significant at the levels of 10%, 5%, and 1%, respectively

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