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# Fertility Preferences and Outcomes in Morocco: Does Women's Empowerment Matter in Actual-ideal Gap?

**Authors:** Chaimae Drioui and Fatima Bakass
**Authors affiliations:** National Institute of Statistics and Applied Economics, GEAS3D Laboratory, Morocco (Drioui); National Institute of Statistics and Applied Economics, GEAS3D Laboratory, Morocco (Bakass)
**Corresponding author/address:** Chaimae Drioui, National Institute of Statistics and Applied Economics, GEAS3D Laboratory, Morocco; email: cdrioui@insea.ac.ma

## Abstract

In Morocco, the fertility transition process, like changes in fertility preferences, has been accompanied by a notable improvement in women's status. The aim of this paper is to study the impact of Moroccan women's empowerment on the actual-ideal gap, an indicator that measures the gap between two components, the number of surviving children and the ideal number of children, and hence on their ability to limit their fertility to this ideal. To build a good indicator of the empowerment, we used the SWPER composite index proposed in the literature, which is based on several dimensions, including participation in decision-making, attitude towards male violence, and other conventional measures of women's status such as education and participation in economic activity. The empirical examination was conducted using the Skellam method, which models difference between two Poisson variables. Data were derived from two national population and family health surveys conducted in 2004 and 2011. The results indicate that there is a plausible negative association between women's empowerment and the ideal number of children. However, the relationship with the number of surviving children is not always verified. The lack of a link between women's empowerment and the actual-ideal gap can hide a non-symmetric and equally strong effect on its two components. Moreover, in an advanced transition context, women's empowerment may not operate significantly on surviving fertility because of actual constraints like contraceptive efficiency and sex preferences.

## Keywords

Actual-ideal gap, Demographic and Health Survey, fertility, Morocco, reproductive preferences, surviving fertility, SWPER index, women's empowerment

## Introduction

Having a child is a 'couple issue' that is subject to the bargaining power between the two partners involved. Gender inequality in this relationship proves to be a major element in the demarcation of this power (Doepke and Kindermann 2019; Rahman 2013). This paper aims to introduce the level of women's empowerment that results from acquisition of more decision-making ability into the analysis of the discrepancies between fertility preferences and reproductive behavior.

According to the latest revisions of the World Population Prospects by the United Nations (United Nations 2019), fertility has declined markedly throughout the World, although with quite different starts and rhythms from one country to another (Noin 1991; Tabutin and Schoumaker 2015). The decline in ideal family size, an essential component of so-called fertility preferences, is considered as a precondition and the main driver of this observed transition (Bongaarts 2001; Bongaarts and Casterline 2018). Classical theories have focused on explaining how, in modern and postmodern societies, the ideal number of children results from social and economic progress and the changing system of norms and values (Lesthaeghe and Meekers 1987; Van De Kaa, 2001). However, these theories often assume, implicitly or explicitly, that couples are able to achieve their fertility ideals, when in fact reached levels often deviate considerably from expressed preferences (Bongaarts 2001; Feyisetan and Casterline 2000).

Fertility will tend to be higher or lower than the level suggested by individual preferences, even when the couple has the same fertility project (Voas 2003). The discrepancy between the actual fertility and the ideal number of children has become an important issue, mainly since fertility in developed countries has fallen below the replacement level of 2.1 children while couples preferred to have two (Bongaarts 2001). Actual-ideal gap, which is the difference between actual and ideal fertility, is an indicator that has been proposed to measure these discrepancies (Feyisetan and Casterline 2000).

In the early 2000s, Bongaarts (2001) noted that the gap between reproductive attitudes and behaviors is an emerging issue that remains to be examined. Since then, there has been an increase in studies on this topic (Adsera 2006; Al-Ridhwany and Aljawadi 2018; Atake and Gnakou Ali 2019; Hou et al. 2020; Mishra and Parasnis 2021; Philipov 2009; Upadhyay and Karesek 2012). Some have shown that economic reasons – including high unemployment rates among women – were the main causes of limited fertility below the ideal reported level. Others have highlighted the role of preferences for boys and discrepancies in reproductive preferences between the woman and her partner that lead women to have more than the ideal number of children. When analyzing the actual-ideal gap through the lens of women's empowerment, a significant positive association is not always true and depends on the context studied and the measure of empowerment adopted (Upadhyay et al. 2014). Where the association is significant, improving women's status and enhancing their empowerment at different levels enables them to have more equal relationships in terms of bargaining and decision-making and makes them more able to achieve their desired fertility (Jejeebhoy 1995; Newson et al. 2005).

However, the number of such studies remains limited and restricted mainly to countries with high fertility. Moreover, most of the studies that have taken into account the level of women's empowerment used a one-dimensional indicator, like the women's level of education, economic participation or decision-making within the household. Moreover, the contexts studied have high fertility levels and often the status of women is valued through a high number of children.

Based mainly on studies in high fertility context, empowerment is a crucial contributor to positive reproductive attitudes and behaviors. The present paper is a contribution with new insights on the relationship between women's empowerment and actual-ideal gap. Indeed, we focus here on the case of Morocco, a North African, Arab-Muslim country marked by a low fertility and by a social valorization of the nuclear family. In addition, we aim to study the effect of women's empowerment using a multidimensional indicator and a dynamic/comparative approach through the use of two surveys. Other studies have used the number of children ever born to measure actual fertility. However, several studies have shown that high fertility can be a replacement or hoarding strategy for the real or anticipated impact of child mortality (Ben-Porath 1976; Doepke 2002). Thus, it is much more relevant to use surviving fertility. Finally, to our knowledge, no study on the actual-ideal gap has been conducted in Morocco.

Hin et al. (2011:133) consider that fertility preferences " *reflect individual motivations, attitudes and beliefs […] fertility ideals (or preferences or desires) are part of the reproductive decision-making process.*" Thus, this notion refers to the desires of individuals, their ideals, intentions, expectations, etc. On this point, several indicators have been developed in terms of the number of children desired, the sex composition of offspring, the preferred time of birth spacing, or the desire to limit births and the choice of contraceptive methods (Thomson 2015). However, even with their many uses, these preferences are subject to the phenomenon of rationalization, whereby women who have had unwanted births adjust their ideal number of children more toward (or equal to) the achieved number of children (Bongaarts 1990) and to their changes over time, as the individual and family trajectory changes over the life cycle (Voas 2003).

One of the particularities of reproductive preferences is that they are the choices of two spouses or partners, sometimes consistent but often distinct, at least at the beginning of the union (Doepke and Tertilt 2018; Fernandez and Gauvreau 1979; Voas 2003). Also, in some cases, women may exceed their desired number of children to meet their partner's high expectations, especially if their level of reproductive empowerment is low (Borgerhoff Mulder 2009; Dodoo et al. 1997; Jejeebhoy 1995; McAllister et al. 2012) or if they misperceive their partner's fertility project due to a lack of communication (Miller et al. 2004). From this perspective, spousal interaction is a crucial concept that must be incorporated into fertility studies as a couple issue that is established in a gendered relationship (Brugeilles and Lestage 2018; Fernandez and Gauvreau 1979).

There is an abundant literature on the levels and determinants of both fertility and reproductive preferences over many decades, including in developing countries. The conduction of hundreds of demographic and health surveys has shed light on these different issues and in particular on the role of women's social status and gender relations within the couple (Atake and Gnakou Ali 2019; Dobbelaere 1967; Drioui and Bakass 2021; Testa and Grilli 2006; Upadhyay and Karesek 2012).

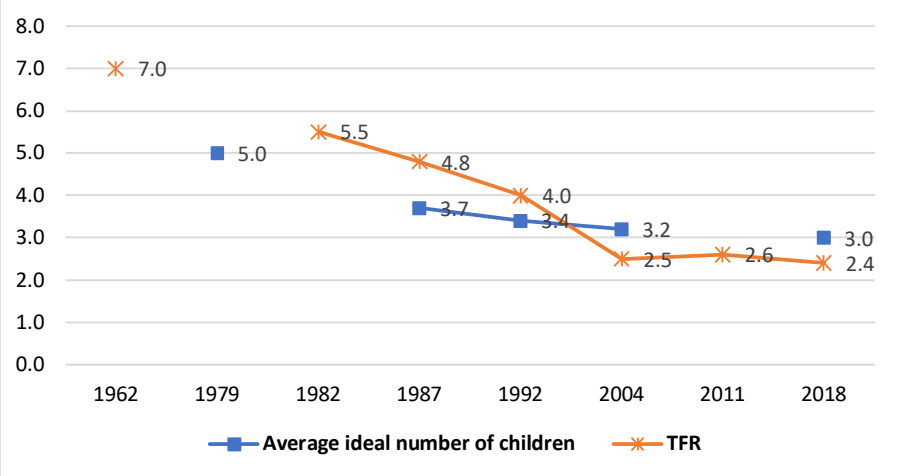
Kabeer (1999:437) refers to empowerment as *"…the expansion of people's ability to make strategic life choices in a context where this ability was previously denied to them."* This can be explored through three dimensions, "…*agency, resources and achievements.*" This concept applies to various social groups, particularly women, and is related to access to and control of resources according to their degree of strategic value for the groups/women in a given context. In this regard, Duflo (2012:1053) defines women's empowerment as "…*improving the ability of women to access the constituents of development—in particular health, education, earning opportunities, rights, and political participation.*" This underlines the multidisciplinary nature of this concept.

The measurement of women's empowerment has often been approached in the literature in a one-dimensional form involving variables such as education, economic activity, participation in decision-making, attitude towards male violence or mobility freedom (Ibrahim and Alkire 2007; Malhotra and Schuler 2005; Upadhyay et al. 2014). The construction of a composite index is an approach that can deal with the multidimensional nature of women's empowerment, although this type of construction requires particular caution in terms of the choice of variables and weighting, as stated by Alsop et al. (2006). Such examples include the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al. 2013), Survey-based Women's emPowerment index (SWPER) (Ewerling et al. 2017) and the Female Empowerment Index (FEMI) (Rettig et al. 2020).

The role of women's empowerment on actual-ideal gap differs according to the contexts studied and the indicator used. Atake and Gnakou Ali (2019), in a comparative study, showed that in Burkina Faso and Chad, the family dimension, measured by participation in decision-making on large household purchases, age at first marriage, age at first sexual intercourse, and access to family planning programs through the media, appears to be strongly associated with women's ability to achieve the ideal number of children. In Mali, in addition to the family dimension, economic empowerment has a significant impact. Another comparative study conducted by Upadhyay and Karasek (2012) found that in Mali, women's rejection of domestic violence positively influences their ability to achieve their desired number of children. In contrast, in Namibia, women who reported having a say in different decisions were more likely to exceed their desired number of children. Similarly, in Zambia, believing that a woman could refuse sex with her husband for any reason was associated with a high probability of having more than the ideal number of children. In these contexts, woman's social status is valued by high fertility.

In Morocco, the role of enhancing the status of women in various areas, particularly fertility-related issues, is relevant insofar as we have witnessed for more than 50 years a significant, continuous and irreversible fertility decline, which has been accompanied by a change in reproductive preferences, especially in the ideal number of children (Figure 1). The Total Fertility Rate (TFR) has thus fallen from

**Figure 1. Evolution of the average ideal number of children and the Total Fertility Rate (TFR), Morocco, 1962-2018**




***Source***. Developed by the authors, HCP data (2014) and Ministry of Health (2018)

7 children per woman in 1962 to 2.2 in 2014, according to the latest population census conducted by the High Commission for Planning (HCP 2014). At the same time, the average number of desired children has dropped from 5 children per woman in 1979 to 3 children in 2018 (Ministry of Health 2018). Since the end of the 1990s and the beginning of the 2000s, there has been an inversion of the two curves of evolution, with the TFR falling below what is desired. The gap is around 0.6 children on average over the last 15 years.

The fertility transition has been explained particularly by the increase in the age at first marriage, which increased between 1960 and 2014 from 17.5 years to 25.8 years for women and from 24 years to 31.4 years for men (HCP 2014). The family planning program adopted since the late 1960s has also played an undeniable role in reducing fertility through affordable, available and accessible contraception provided by the home visit program and health centers (Bakass 2003). As a result, the prevalence rate has continued to rise: 72% of women of reproductive age were using contraception in 2018, compared with only 36% in 1987 and 19.5% in 1980. It should also be noted that despite the significant drop in fertility, women continue to use the pill as their preferred method of contraception, with a prevalence of 60%.

This decline in fertility was concomitant with improvements in the women's status, particularly in education and economic activity (Fargues 1990; Sajoux and Chahoua 2013; Yaakoubd 1997; Yaakoubd and Vimard 2010). At the legislative level, human rights of women have been strengthened over the decades and their social status has been improved significantly. Since the beginning of the 2000s, several laws have been reformed towards more equality between men and women, such as the family law, the commercial law and the criminal procedures (Zerari 2006). In 2004, for example, Morocco raised the age of marriage for women from 15 years to 18 years and placed the family unit under the shared responsibility of both spouses (Murgue 2011; Rhiwi 2004). Also, Moroccan women no longer need the husband's consent to participate in economic activities (Mazouz 2014).

The major changes in reproductive patterns in Morocco require some attention, mainly under the lens of women's autonomy and empowerment. Few studies have analyzed fertility preferences (D'Addato 2006; Drioui and Bakass 2021; Obermeyer 1996), and none, to our knowledge, have analyzed the actual-ideal gap to examine women's ability to achieve their fertility ideals and identify the drivers. This paper aims to contribute to addressing this gap by analyzing the impact of women's empowerment on their ability to achieve their ideal number of children.

## Data and methodology

### *Data sources*

The data used in this study come from two surveys conducted by Ministry of Health in Morocco that are representative at the national, regional, and residence levels: the Population and Family Health Survey conducted in 2003-2004 (PFHS 2004) and the National Population and Family Health Survey conducted in 2011 (NPFHS 20110. Both surveys are cross-sectional micro data and restricted to ever-married women of reproductive age (15-49 years). They report a wide range information mainly on

achieved fertility, fertility preferences (including ideal number of children[1]), and demographic and socioeconomic characteristics of women and spouses.

The sample is composed by 11,513 households and 16798 women aged 15-49 in the first survey with response rates of 99% and 96% respectively and 15,343 households and 11,069 women aged 15-49 in the second survey with response rates of 98.5% and 94.6% respectively.

As the ability of women to have their desired number of children can only be well interpreted for married women who are at the end of their reproductive life, the analysis is limited to those aged 40 years and over. They are 2,843 in 2004 and 3,224 in 2011, representing respectively 17% and 29% of the total number of women interviewed.

***Variable of interest***

Our dependent variable is actual-ideal gap[2], calculated by subtracting the ideal number of children from the number of surviving children. Surviving fertility represents the difference between the number of children ever born and the number of children who died (boys and girls).

Note that the number of children born alive is based on the question: *In total and during your lifetime, how many children have you had born alive?* Number of children who died is based on the question: *Have you ever given birth to a boy/girl who died afterwards? If so, what is the number of deceased children (girls and boys)?* The ideal number of children reported by women is based on the question: *If you had to choose how many children to have in your life, how many would you have?* (Ministry of Health 2004, 2012). Because this variable has non-numerical values[3] of 8% and 3.8% in 2004 and 2011 respectively, these observations were removed.

***Independent variables***

The key explanatory variable is women's empowerment. For both surveys, the measurement of this index is based on the approach proposed by Ewerling et al. (2017) for African countries. This method allows to construct a multidimensional indicator that aims at summarizing the information contained in several other unidimensional variables considered relevant to the concept of empowerment.

For the year 2004, the variables selected are those retained by Ewerling et al. (2017) divided into three dimensions: women's attitudes toward various situations of domestic violence, participation in making different decisions, and social independence measured by age at first marriage, age at first birth, age difference between spouses, women's education, education difference between spouses, women's economic activity, as well as frequency of reading a newspaper or magazine. Appendix 1 illustrates the selected dimensions and their modalities.

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[1] Although some authors introduce conceptual differences between indicators of fertility preferences (Knodel and Prachuabmoh, 1973; Thomson, 2015), the concept of ideal number of children will be used in this paper interchangeably with desired number of children and ideal family size.

[2] We have retained the same concept used in the literature even if its measurement is different.

[3] Some women answer: "as God decides" or "I don't know".

In 2011, due to the lack of a component on "domestic violence" and the availability of a single question on participation in household decision-making, the measurement of the empowerment indicator that year included other variables, namely: decision-making on family planning, marital communication around the fertility project (the number of children desired and family planning) and freedom of movement. This last variable is measured on the basis of the question regarding the barriers faced by women in access to health care, within which the husband's refusal is one of the response modalities. These variables are summarized in appendix 2.

Because the age at first birth has a missing value level of 3.9% in 2004, we used a simple regression-based 'hot deck' to impute non-responses. This method randomly selects the value to be imputed for a missing case from a group of individuals who are similar to it in terms of variable or group of variables. In this case, women were clustered into age groups at first marriage. This variable was selected because it had the highest correlation with age at first birth (85%) and adding other variables would not increase the predictive power of the regression model. In 2011, age at first birth was not measured. We decide to estimate it by adding to the age at first marriage of the woman, the interval between the mean age at first marriage and the mean age at first birth estimated from the PFHS 2004, assuming that this gap did not change between the two dates.

For the two periods analyzed, in addition to the women's empowerment index, we adjusted for potential confounding variables, namely the place of residence (urban/rural), the wealth index, which is available in the databases in the form of five wealth quintiles (poorest, poorer, middle, richer, richest), and the ideal number of children for the husband compared to that of the wife as declared by the latter (the husband wants the same number of children, the husband wants more children, the husband wants fewer children, and wife does not know). Observations with missing values for some variables were removed. As a result, the analysis includes 2,351 women for the PFHS 2004 and 2,972 for the NPFH 2011.

The socio-economic and demographic characteristics of the women are presented in Table 1. It appears that more than half of the women in the analysis were married before the age of 20 in the PFHS 2004 (57.2%), whereas they represent 45.3% in the NPFSH 2011. The majority of women had their first birth before the age of 25 (71.8% and 64% for 2004 and 2011 respectively). Women with two or fewer children represent only 19.1% in 2004 and 21.5% in 2011, while those with more than five children constitute 32.6% and 21.8% of the sample in the two surveys respectively. Furthermore, most of women are urban (56% in 2004 and 63.1% in 2011), illiterate (73.2% and 63.4% respectively) and inactive (78.3% and 70.8% respectively). In 2004, about 20.5% of women were poorest, 24.1% were richest and 18.1% were from the middle class while in 2011, 13.6% were living in extreme poverty, 24.1% were from the wealthier class while 22.6% were from the middle one.

**Table 1. Socio-demographic and economic characteristics of women, 2004 and 2011**

| Characteristics | | PFHS 2004 (N=2 351) | | NPFHS 2011 (N=2 972) | |
|---|---|---|---|---|---|
| | | N | % | N | % |
| **Age at first marriage** | < 15 | 298 | 12.68 | 147 | 4.95 |
| | 15-19 | 1046 | 44.49 | 1198 | 40.31 |
| | 20-24 | 586 | 24.93 | 839 | 28.23 |
| | 25-39 | 239 | 10.17 | 450 | 15.14 |
| | 30-34 | 112 | 4.76 | 209 | 7.03 |
| | 35-39 | 56 | 2.38 | 102 | 3.43 |
| | 40-44 | 13 | 0.55 | 25 | 0.84 |
| | 45-49 | 1 | 0.04 | 2 | 0.07 |
| **Age at first birth** | < 15 | 76 | 3.23 | 21 | 0.71 |
| | 15-19 | 815 | 34.67 | 783 | 26.35 |
| | 20-24 | 798 | 33.94 | 1099 | 36.98 |
| | 25-39 | 354 | 15.06 | 578 | 19.45 |
| | 30-34 | 201 | 8.55 | 298 | 10.03 |
| | 35-39 | 89 | 3.79 | 126 | 4.24 |
| | 40-44 | 18 | 0.77 | 61 | 2.05 |
| | 45-49 | --- | --- | 6 | 0.20 |
| **Parity** | 0-2 | 450 | 19.14 | 638 | 21.47 |
| | 3-5 | 1134 | 48.23 | 1687 | 56.76 |
| | ⩾6 | 767 | 32.62 | 647 | 21.77 |
| **Place of residence** | Rural | 1034 | 43.98 | 1096 | 36.88 |
| | Urban | 1317 | 56.02 | 1876 | 63.12 |
| **Educational status** | No education | 1722 | 73.25 | 1885 | 63.43 |
| | Literacy/Primary | 300 | 12.76 | 747 | 25.13 |
| | Secondary/Higher | 329 | 13.99 | 340 | 11.44 |
| **Work status** | Working | 509 | 21.65 | 868 | 29.21 |
| | Not working | 1842 | 78.35 | 2104 | 70.79 |
| **Wealth status** | Poorest | 481 | 20.46 | 404 | 13.59 |
| | Poorer | 458 | 19.48 | 517 | 17.40 |
| | Middle | 426 | 18.12 | 672 | 22.61 |
| | Richer | 420 | 17.86 | 663 | 22.31 |
| | Richest | 566 | 24.07 | 716 | 24.09 |

Table 2 shows that, on average, a Moroccan woman aged 40 years and over has an average surviving fertility of 4.53 children in 2004 and 3.80 in 2011. Given that the fertility level is about 4.35 and 4.08 respectively, child mortality is not-negligible but tends to decrease from 0.55 and 0.28 child on average. Fertility ideal decreases from 3.75 children to 3.58 between the two dates, reducing the gap between attitudes and behaviors from 0.79 to 0.23 child.

**Table 2. Average number of surviving children and average ideal number of children, 2004 and 2011**

| | PFHS 2004<br>N= 2 351 | NPFHS 2011<br>N=2 972 |
|---|---|---|
| Average number of children ever born | 4.53 | 4.08 |
| Average number of surviving children | 3.98 | 3.80 |
| Average ideal number of children | 3.74 | 3.57 |

The results of the descriptive analysis of women's empowerment indicators are in Appendix 3 and 4 for 2004 and 2011 respectively.

In 2004, more than half of the women reported that domestic violence is justified if she goes out without permission, neglects her children, argues with her husband, and refuses to have a sexual relationship with him, while only 27.6% of the women stated that they agree with violence if she burns the food. Regarding the participation in decision-making, most of women reported that the decision is taken jointly with their spouse (46.2% on their own health care, 47.7% on major household purchases, 55.9% on visiting family or relatives). Furthermore, the majority of women do not read a newspaper or magazine (81.4%) and are inactive (78.3%). It also appears that women have spent 2.1 years of schooling on average, with an education gap of 1.5 years in favor of the spouse. In addition, these women were married on average at the age of 19.9 years and had their first birth at the age of 22.3 years, with an average age gap between spouses of 6.1 years in favor of the husband.

For 2011, the decision to use family planning was made by common agreement in 50.2% of cases, by the woman alone in 32.7% of cases, while 17.1% of women stated that the decision was ultimately made by their spouse or another person. In addition, most of the women had never discussed family planning in the year preceding the survey (60.3%). However, in 62.5% of the cases the women reported having discussed the number of children they wanted with their partner. Mobility freedom to have access to health care is not a major problem for 83.4% of the women. Furthermore, it seems that the majority of women are inactive (70.8%), illiterate (63.4%) and whose level of education is equal to that of their spouse in 60.7% of cases, while it is higher for only 9.7% of women. On average, women were married at the age of 21.7 years and had their first child at 23.5 years. The age difference between spouses has increased to 6.7 years.

***Statistical methods***

The construction of the composite index of women's empowerment is based on Factor Analysis of Mixed Data method (FAMD), which takes into account both quantitative and qualitative variables (Pagès 2014). To choose the number of factorial axes to be retained, we used the Guttman (1954) and Kaiser (1960) criterion which is based on the principle that a factorial axis is interesting if its eigenvalue is greater than 1. Thus, five factorial axes were retained, representing 70% for 2004 and 60% in 2011.

The dispersion test using the z-statistic shows that the number of surviving children and ideal number of children follow a Poisson distribution for both the 2004 and 2011 surveys. Furthermore, the test of equality of means (t-statistic) indicates that the means are significantly different at the 1% level for the two survey dates. In this case, the Skellam regression model, also known as the Poisson difference model, is the most appropriate method to analyze actual-ideal gap (Jiang et al. 2014; Karlis and Ntzoufras 2008; Skellam 1946). The box below shows the specification of Skellam model.

**Box 1. Skellam distribution**

If we consider two discrete random variables X and Y that have a Poisson distribution with parameters λ1 and λ2 respectively, the difference Z = X - Y is a discrete distribution defined on the set of integers Z = {. . . . , -2, -1, 0, 1, 2, . . . } and then follows a Skellam distribution of parameters (λ1, λ2) denoted Z ~ Skellam (λ1, λ2).
The density of Z is then written:

$$P(Z=z|\ \lambda_1, \lambda_2)= e^{\lambda 1+\lambda 2} \cdot \left(\frac{\lambda 1}{\lambda 2}\right)^{z/2} \cdot I_z\left(2\sqrt{\lambda 1\ \lambda 2}\right)$$

where $I_z(x)$ is the modified Bessel function.

## Results

***Surviving achieved fertility and ideal fertility by degree of women's empowerment***

Table 3 shows that the degree of women's empowerment introduces significant differentials in fertility attitudes and behavior in Morocco. Indeed, the average ideal number of children decreases as the degree of women's empowerment increases, with a gap of 1.8 in 2004 and 1.3 in 2011 between the first and last quintiles. Hence, the least empowered women (WEQ1) idealized a higher offspring of 1.8 and 1.3 children compared to the more empowered women (WEQ5) in 2004 and in 2011 respectively. The same trend is observed for the average number of surviving children, which declines as women's empowerment increases. A gap of 2.8 children in 2004 and 2.5 in 2011 is observed between the lowest autonomous women (WEQ1) and the highest empowered women (WEQ5).

Furthermore, it seems that there is also a significant gap of about one child between the number of surviving children and that declared as ideal in 2004 for the first four quintiles (between 1.05 for the first quintile and 0.88 for the fourth). In the top quintile (WEQ5), women achieve exactly what they want on average. In contrast, in 2011, the gaps are reduced to 0.63 in the first quintile, 0.72 in the second and 0.38 for the third. Women in the fourth quintile achieve as many children as idealized in contrast to women in the top quintile whose ideal number of children exceeds the average number of surviving children by 0.53.

These results indicate that the more empowered women are the pioneers and the force driver in the transition process of reproductive preferences and behaviors in Morocco.

**Table 3. Average number of surviving children and average ideal number by women's empowerment quintile**

| Women's Empowerment Quintile (WEQ) | Average number of surviving children | Average ideal number of children | Gap | Average number of surviving children | Average ideal number of children | Gap |
|---|---|---|---|---|---|---|
| | PFHS 2004 | | | NPFHS 2011 | | |
| **WEQ1** | 5.71 | 4.66 | 1.05 | 4.75 | 4.12 | 0.63 |
| **WEQ2** | 4.95 | 4.00 | 0.95 | 4.55 | 3.83 | 0.72 |
| **WEQ3** | 4.88 | 3.79 | 1.09 | 4.14 | 3.76 | 0.38 |
| **WEQ4** | 4.35 | 3.47 | 0.88 | 3.35 | 3.36 | -0.01 |
| **WEQ5** | 2.95 | 2.86 | 0.09 | 2.29 | 2.82 | -0.53 |
| **Total** | **4.53** | **3.74** | **0.79** | **3.80** | **3.57** | **0.23** |

WEQi= i$^{th}$ **W**omen's **E**mpowerment **Q**uintile

***Fertility project according to the level of women's empowerment***

The two surveys do not target husbands, so the husband's preferences are not available and cannot be compared with those of the spouses, but the wife's perception on the husband's fertility project was collected. Table 4 shows that the majority of women declare that the couple has the same ideal number of children (61.3% in 2004 and 59.2% in 2011) and nearly one woman per five reports that the husband wants more children than her (20.9% and 18.1% respectively). Women who have no idea about their husband's fertility project represent 8.3% and 11.9% respectively.

**Table 4. Wife's perception of husband's ideal number of children compared to her own ideal fertility**

| Wife's perception of the number of children desired by the husband | PFHS 2004 | NPFHS 2011 |
|---|---|---|
| **Same number** | 61.34 | 59.19 |
| **Higher number** | 20.88 | 18.10 |
| **Lower number** | 9.49 | 10.80 |
| **Don't know** | 8.29 | 11.91 |
| **Total** | **100.00** | **100.00** |

In addition, whether in 2004 or 2011, women who are in the top empowerment quintile are more likely to report a concordance between their husband's ideal family size and their own compared to those in the lower quintiles (Table 5). Women in the first quintile are also more likely to be unaware of their husbands' reproductive preferences: their percentage is, for example, 4 times that of women in the fifth quintile in 2011 (25.2% versus 6.4%, respectively).

**Table 5. Distribution (%) of women by empowerment quintiles and perception of husband's ideal number of children compared to their own ideal family size**

| Wife's perception of the number of children desired by the husband | Women's Empowerment Quintile (WEQ) | | | | |
|---|---|---|---|---|---|
| | **WEQ1** | **WEQ2** | **WEQ3** | **WEQ4** | **WEQ5** |
| **PFHS 2004** | | | | | |
| **Same number** | 56.14 | 60.30 | 60.13 | 63.38 | 66.15 |
| **Higher number** | 27.41 | 20.17 | 22.22 | 17.76 | 17.32 |
| **Lower number** | 7.02 | 10.73 | 7.63 | 11.40 | 10.51 |
| **Don't know** | 9.43 | 8.80 | 10.02 | 7.46 | 6.03 |
| **Total** | **100.00** | **100.0** | **100.0** | **100.0** | **100.0** |
| **NPFHS 2011** | | | | | |
| **Same number** | 44.58 | 58.28 | 63.48 | 64.78 | 64.04 |
| **Higher number** | 18.18 | 18.75 | 17.59 | 16.61 | 19.38 |
| **Lower number** | 12.06 | 9.80 | 10.05 | 11.96 | 10.18 |
| **Don't know** | 25.17 | 13.18 | 8.88 | 6.64 | 6.40 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

WEQi= i$^{th}$ **W**omen's **E**mpowerment **Q**uintile

***Actual-ideal gap by socio-demographic characteristics of women***

Table 6 presents the probability that surviving fertility exceeds the fertility ideal according to women's socio-demographic and economic characteristics. We can observe that this risk is higher for women whose marriage and fertility were early. Rural women, as well as less educated or inactive women and the poorest ones, are also most at risk.

According to the reproductive attitudes and behaviors, certain groups seem to be most at risk of having more surviving children than they desire: women with more than six children (80.8% and 69.4% in 2004 and 2011 respectively), the women whose husbands idealize a larger number of children (59.9% in 2004), and the women whose husbands want fewer children in 2011 (45.2%). By contrast, women with less than two children show the lowest risk level (2.44% in 2004 and 0.63 in 2011) as well as those whose husband want fewer children in 2004 (39.5%) and women who have the same ideal fertility as their partners in 2011 (33.9%).

**Table 6. Percentage of women who have achieved more children than desired by certain socio-demographic characteristics, Morocco, 2004 and 2011**

| Characteristics | | Actual-Ideal Gap > 0 | |
|---|---|---|---|
| | | PFHS 2004 N=2 351 (%) | NPFHS 2011 N=2 972 (%) |
| **Age at first marriage** | <15 | 58.05 | 48.98 |
| | 15-19 | 58.03 | 49.42 |
| | 20-24 | 48.98 | 37.07 |
| | 25-29 | 28.03 | 25.11 |
| | 30-34 | 11.61 | 12.92 |
| | 35-39 | 7.14 | 4.90 |
| **Age at first birth** | <15 | 59.21 | 38.10 |
| | 15-19 | 63.19 | 51.09 |
| | 20-24 | 54.26 | 43.77 |
| | 25-29 | 33.90 | 30.10 |
| | 30-34 | 15.92 | 16.11 |
| | 35-39 | 6.74 | 6.35 |
| | 40-44 | --- | 1.64 |
| **Parity** | 0-2 | 2.44 | 0.63 |
| | 3-5 | 45.86 | 39.54 |
| | ⩾6 | 80.83 | 69.40 |
| **The husband's ideal number of children compared to that of the woman.** | Same number | 47.16 | 33.88 |
| | Higher number | 59.88 | 43.68 |
| | Lower number | 39.46 | 45.17 |
| | Don't know | 45.64 | 40.68 |
| **Place of residence** | Rural | 55.13 | 43.43 |
| | Urban | 44.12 | 34.33 |
| **Educational status** | No education | 53.83 | 41.70 |
| | Literacy/Primary | 43.67 | 32.93 |
| | Secondary/Higher | 28.27 | 25.88 |
| **Work status** | Working | 39.88 | 32.83 |
| | Not working | 51.47 | 39.69 |
| **Wealth status** | Poorest | 56.13 | 41.58 |
| | Poorer | 53.28 | 41.39 |
| | Middle | 47.42 | 41.82 |
| | Richer | 48.10 | 34.84 |
| | Richest | 41.17 | 31.56 |
| **Total** | | **48.96** | **37.69** |

### *Actual-ideal gap by women's empowerment quintiles*

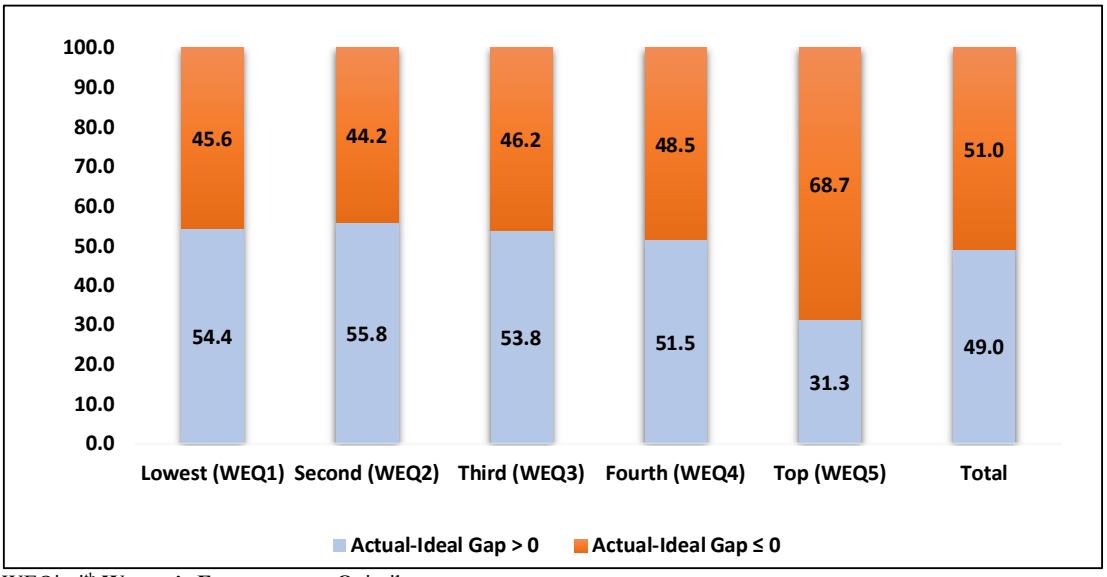
Figures 2 and 3 illustrate the actual-ideal gap according to the five quintiles of women's empowerment. For both surveys, the results show that generally the higher the level of empowerment, the smaller the gap between the number of surviving children and the ideal number.

In 2004, the risk that the number of surviving children exceeds the ideal number of children is higher for a significant majority of women in the first four women's empowerment quintiles (54.4%, 55.8%, 53.8%, and 51.5%, respectively), while it reaches barely one-third of women in the top quintile (31.3%). In 2011, there was an increase in women's ability to control their surviving fertility to not exceed their ideal regardless of the empowerment quintile. Indeed, and comparatively to 2004, only women in the first three quintiles are most at risk to exceed their ideal number of children but with a reduced level

(46.2%, 48.5%, and 41.2%, respectively) while their peers in the fourth and at the top of the quintiles have the lowest risk (33.5% and 19.9%, respectively).

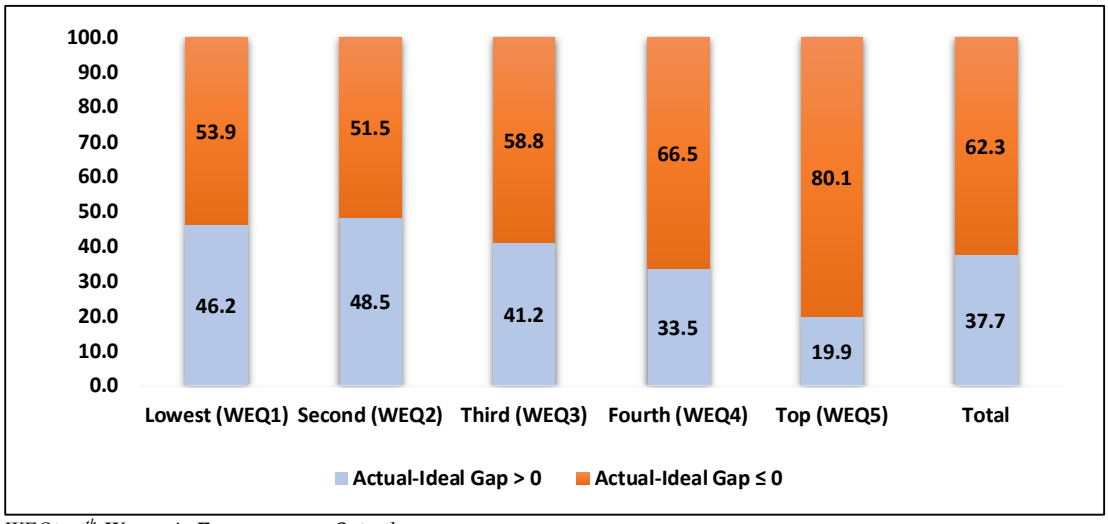
However, to confirm the robustness of the interrelationships identified between women's empowerment and the risk of having more than the ideal number of children, it is necessary to move on to a statistical modeling that takes into account confounding variables and also the relationship between women's empowerment and the two components of this risk.

**Figure 2. Actual-Ideal Gap by Women's Empowerment Quintiles, Morocco, 2004**




WEQi= i[th] **W**omen's **E**mpowerment **Q**uintile

**Figure 3. Actual-Ideal Gap by Women's Empowerment Quintiles, Morocco, 2011**




*WEQi= i[th] Women's Empowerment Quintile*

### *Impact of women's empowerment on actual-ideal gap and its two components*

Tables in the appendices 5 and 6 present the coefficients of Skellam regression model for the two components of the actual-ideal gap in 2004 and 2011, respectively. It is interesting to note that regardless of the independent variable, the coefficients for both parameters are non-symmetric. Thus, a negative relationship between an explanatory variable and the average number of surviving children corresponds to a negative relationship between the same variable and the average ideal number of children and conversely.

In 2004, the number of surviving children and the ideal number of children decrease as the women's empowerment index increases with respective coefficients of -0.253 and -0.309, and the results are significant at the 5% level. Thus, when women's empowerment increases by one point, the number of surviving children decreases by 0.776 ($=e^{-0.253}$), and the ideal number of children by 0.734 ($=e^{-0.309}$). Consequently, since this factor acts in the same direction on both components of the actual-ideal gap with almost the same strength, the gap is negligible (0.04 children on average) regardless of the level of women's empowerment.

In terms of the impact of the household's wealth, there is a decrease of the surviving fertility and the ideal fertility as wealth increases, but the results are not significant except for the top wealthy category. Actually, we see that compared to the moderately wealthy women (reference modality), there are no significant differentials between the number of surviving children and the ideal number of children on the one hand and the household's wealth on the other for the first four wealth quintiles. Compared to the middle rich category, the richest quintile is negatively associated with both components at 1% and 5% respectively, but with a roughly similar impact on the ideal number of children (a decrease of $0.652=e^{-0.427}$) and on the number of surviving children (a decrease of $0.573=e^{-0.556}$).

It also shows that when woman perceive a discrepancy in fertility ideals with her husband, or when she is unaware of husband's reproductive preferences, she is significantly more likely to have higher surviving fertility and higher ideal fertility than woman who think her ideal coincides with ideal's husband. The surviving fertility rate among women who think their husband wants more children than they do is effectively 1.541 ($=e^{0.433}$) times that of women who think that the ideals are aligned. This ratio is 1.582 ($=e^{0.459}$) for the ideal number of children. It is notable that for women who say that their husband wants fewer children than they do, the ratios are 2.194 ($=e^{0.786}$) and 1.515 ($=e^{0.416}$) respectively. This result indicates that the actual-ideal gap is significantly positive for this category with a gap of 0.68 children on average to the benefit of surviving fertility. For those who are unaware of their husband's preferences, the ratios are 1.805 ($=e^{0.591}$) and 1.528 ($=e^{0.424}$) respectively, indicating a more reduced gap (0.28 children) on average in favor of surviving fertility.

In 2011, women's empowerment has a significant influence on the ideal number of children, while there is no significant relationship with surviving achieved fertility. Thus, when the degree of empowerment increases by one unit, the ideal number of children decreases by 0.612 ($=e^{-0.491}$). The actual-ideal gap will then be significantly high for the more empowered women.

Furthermore, the number of surviving children and the ideal number of children are not associated with the wealth index, except for the poorest modality, which shows a significant association with the number of surviving children. Thus, the surviving offspring of poorest women is 1.64 ($=e^{0.495}$) times that of middle-class women (reference modality), and thus their actual-ideal gap will be significantly positive.

Moreover, when a woman reports a divergence in couple's reproductive preferences or when she ignores her spouse's ideal number of children, she is significantly more likely to have a higher surviving fertility and higher ideal number of children. For the category of women whose husbands want more children than they do, the surviving fertility rate is 1.546 ($=e^{0.436}$) times that of women who think their spouse wants as many children as they do. For desired fertility, this rate is 1.596 ($=e^{0.468}$) and the differences are thus negligible. For women who declare that husband wants fewer children than they do, these rates are 1.459 ($=e^{0.378}$) and 1.525 ($=e^{0.422}$) respectively, which keeps the actual-ideal gap at a very low level as well. The same situation is observed for women who are unaware of their spouse's reproductive preferences, since the rates are 1.724 ($=e^{0.545}$) and 1.497 ($=e^{0.404}$) respectively, recording a number of surviving children that is higher by 0.227 children on average than the ideal fertility.

In addition, the results indicate that, all other things being equal, there is no significant variation in surviving fertility and ideal fertility by the place of residence either in 2004 or 2011.

## Discussion and conclusion

Morocco is considered one of the pioneer countries in the demographic transition in both Africa and the MENA[4] Region (Tabutin and Schoumaker 2015). For the past two decades, its fertility has fallen below the desired level of fertility, which is about three children per woman on average, indicating that the country has started the end of its demographic transition, as has happened in many regions of the world when observed fertility falls below the desired level. This situation is generally observed in the most advanced stages of the process. This decline could be due to temporary factors, such as the decline in age at marriage, which – once a certain level of stability is reached – lead to a recovery in fertility and a trend towards the ideal level of fertility (Bongaarts 2001). The transition observed in Morocco has been accompanied by an improvement in the status of women, particularly in terms of higher levels of education, participation in economic activity and greater access to rights.

In such a context, it was interesting to study the effect of women's empowerment on achieved and ideal fertility and, hence, on the gap between these two components that measures their ability to achieve reproductive preferences. In this regard, we used micro-data from two population surveys conducted in 2004 and 2011. To measure women's empowerment, we constructed a composite index based on a multidimensional approach that integrates a series of variables or dimensions using the AFDM method. To account for the effect of child mortality on fertility and reproductive preferences, actual fertility – which represents the first component of actual-ideal gap in the literature – is replaced by surviving fertility. Furthermore, the actual-ideal gap has very often been measured by a binary variable to indicate whether or not women are able to achieve their fertility ideal. To overcome this limitation and to take into account the full range that can exist between fertility and the fertility ideal, we used the gap in its quantitative form.

The results show that, in the Moroccan context, whatever the dimensions retained for the measurement of women's empowerment, there is a significant association with the ideal number of children: all other things being equal, the most empowered women are more likely to opt for a lower fertility ideal. This association does not always hold for the number of surviving children and, consequently, for the actual-ideal gap. Sometimes the gap is independent of women's empowerment when the latter acts in the same

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direction, with the same strength, and simultaneously on the number of surviving children and on the ideal number of children. In other situations, the negative association between ideal fertility and empowerment, combined with similarity in reproductive behavior despite empowerment differentials, makes for a positive association between women's empowerment and the gap. Thus, it is the most empowered women who achieve higher-than-desired surviving fertility. This situation may be due to lower robustness of the women's empowerment indicator measurement in 2011 compared to 2004. Otherwise, it may hide a higher actual fertility among the less autonomous women, but which is affected by infant mortality among this group until it meets the surviving fertility level of the most autonomous women[5]. It is also possible that it reflects (but to a lesser extent) a potential high risk of contraceptive failure among the most empowered women, since they are potentially less likely to fear having an additional child since they don't exceed the fertility social norm, generally about three children. Another factor that can explain this result is the fact that the empowered women, whose fertility is expected to be low, find themselves obliged to increase their level of fertility to address a probable dissatisfaction with regard to gender composition of their offspring.

The association between women's empowerment and ideal number of children is consistent with other studies that have addressed the same issue, whether the empowerment indicator was measured using a multidimensional approach (Atake and Gnakou Ali 2019) or one-dimensional method through education, economic activity, or participation in decision-making and freedom of movement (Cao 2011; Feyisetan and Casterline 2000; Steele et al. 1998; Upadhyay and Karasek 2012; Uzobo and Odubo 2016; Woldemicael 2009). In contrast, the relationship of women's empowerment with the number of surviving children, and thus the gap, is not always verified as is the case in other contexts (Atake and Gnakou Ali 2019; Upadhyay and Karasek 2012).

Empowerment, which is often operationalized through decision-making, is an important dimension of people's agency and can take many forms, such as motivation, bargaining, reflection, or the ability to define and act on goals and choices for one's own life (Kabeer 1999). In this sense, women's acquisition of more decision-making power within the marital sphere constitutes a major element for more egalitarian gender relations between spouses (Rahman 2013). It is the improvement of the level of education and the access to the labor market that represent the two most important dimensions of women's empowerment because they are cultural and economic assets with which they will be able to make their voices heard (Glaude and De Singly 1986), in accordance with the resource theory (Barney 1991).

In the fertility and health field, empowerment thus acts as an amplifying factor for positive behaviors regarding reproductive health, reflects autonomy in accessing health care facilities, and reinforces bargaining and communication around the couple's fertility project. Particularly given the negative impact of high fertility on women's reproductive health (Dixon-Mueller and Germain 2007), when women have mobility freedom to access to health services, they can interact with health staff and be aware of the benefits of low fertility and strategies to avoid unplanned pregnancy through optimizing contraceptive practice (Bongaarts 2012; Dehlendorf et al. 2014). Women's empowerment also enhances social independence that allows women to break away from social norms based on strong natalist values and early marriage.

[5] Data shows that in 2011, the infant mortality reduces fertility by 0.5 children on average for the first empowerment quintile and 0.06 for the top quintile.

Our results suggest that, in the advanced transition context where fertility tends to drop significantly, women's empowerment operates more to reduce fertility ideals than surviving fertility. In other words, autonomy allows women to adhere to a lower fertility ideal norm in the interest of their reproductive health. But in practice and in terms of implications, women have to deal with other factors that affect fertility in one way or another, such as child mortality, the effectiveness of contraception or gender preferences. The difference between preferences and practices can be then seen as desires constrained by reality.

Discrepancies about the desired number of children and the birth control process may exist between spouses, and the lack of communication may distort the woman's mental representations of the couple's functioning while the reality may be otherwise (Diro and Awefak 2013; Turk and Bell 1972). As the woman acquires decision-making power, she becomes more willing to discuss the fertility project with her husband, which allows both spouses to establish each other's norms and values (Memmi and Desgrées du Loû 2015; Noumbissi and Sanderson 1999) and subsequently reach some consensus around the family they want to build. When reproductive strategies are mutually agreed upon, women have children in a more peaceful spousal climate and are able to achieve their fertility ideal. Our analysis confirms this trend, since in the case of differences in fertility projects, both the ideal and the surviving fertility are higher than for women whose projects are in agreement, with differences that can sometimes be significant.

In general, poor couples favor a large family size in the medium- and long-term perspective of income earned by the family through child labor or for old-age pension (Atake and Gnakou Ali 2019; Caldwell 1982). Couples who have more economic capital and thus do not need child labor tend to prioritize the quality of children rather than their quantity (Becker and Lewis 1973). Our results show that wealthier women have reproductive preferences and practices that fall below those of other clusters with a negligible gap, but the dynamics also suggest that as fertility and fertility ideals tend to be stabilized at the national level, the effect of wealth declines. Only individuals from the poorest class emerge with a fertility level that significantly exceeds their ideal.

In terms of methodology, our study opens up some research opportunities. First, measuring empowerment using a multidimensional method allows us to construct an index that summarizes the degree of women's autonomy by taking into account several dimensions such as education and economic participation. Second, it is important to model actual-ideal gap by the Skellam model because the lack of an association with a given explanatory variable does not mean that there is no impact of that variable; rather, it may mean that it acts simultaneously in the same direction and with the same strength on both components of the gap. Moreover, this model allows actual-ideal gap to be modeled in its quantitative form, thereby allowing us to go beyond the studies that have used this indicator in its binary form. Finally, since achieved fertility can be reduced by child mortality, it is much more relevant that the gap is measured by the difference between the number of surviving children and the ideal number of children.

Given that improving women's ability to achieve their fertility goals is a key step in promoting their reproductive rights (Withers 2009), we confirm that women's empowerment contributes significantly to a simultaneous reduction in fertility and the fertility ideal and indirectly to strengthening the ability to not exceed the ideal number of children. The improvement of women's status through their access to both educational and economic resources will allow for their participation in decision-making and their social independence by breaking away from traditional social norms that have a negative impact on their health and the achievement of more egalitarian bargaining relationships between spouses and regular

communication, particularly in terms of fertility projects, which are prerequisites for strengthening their ability to achieve their reproductive goals. Reproductive health interventions that aim to reinforce women's empowerment should, however, take into consideration constraints like contraception efficiency and gender preferences that can reduce the impact of women's autonomy, namely in the advanced transition phase.

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## Appendix 1. Selected Indicators for Measuring Women's Empowerment, 2004

| Indicator | Modalities |
|---|---|
| **Woman's attitude toward domestic violence** | |
| Beating justified if the wife goes out without telling husband | Justified= 0; Not justified=1 |
| Beating justified if the wife neglects the children | Justified= 0; Not justified=1 |
| Beating justified if the wife argues with husband | Justified= 0; Not justified=1 |
| Beating justified if the wife refuses to have sex with husband | Justified= 0; Not justified=1 |
| Beating justified if the wife burns the food | Justified= 0; Not justified=1 |
| **Woman's participation to decision-making** | |
| Who usually decides on respondent's health care? | Husband/other alone=-1; Joint=0; Respondent alone=1 |
| Who usually decides on large household purchases? | Husband/other alone=-1; Joint=0; Respondent alone=1 |
| Who usually decides on visits to family or relatives? | Husband/other alone=-1; Joint=0; Respondent alone=1 |
| **Other characteristics** | |
| Age of woman at first marriage | Continuous variable |
| Age of woman at first birth | Continuous variable |
| Age difference: woman's age minus husband's age | Continuous variable |
| Woman's education in completed years of schooling | Continuous variable |
| Education difference: woman's minus husband's completed years of schooling | Continuous variable |
| Respondent worked in past 12 months | No=0; Yes=1 |
| Frequency of reading newspaper or magazine | Not at all=0; Infrequent =1; Frequent =2 |

## Appendix 2. Selected Indicators for Measuring Women's Empowerment, 2011

| Indicator | Modalities |
|---|---|
| **Woman's participation to decision-making** | |
| Family planning decision-making | Husband/other alone =-1; Joint=0; Respondent alone =1 |
| **Discussion within couples about fertility project** | |
| Discussion with the spouse on the ideal number of children | No =0; Yes=1 |
| Frequency of discussion with the spouse on family planning in the past year | Never=0; Once or twice=1; More than twice=2 |
| **Mobility freedom** | |
| Difficulties in receiving care: getting permission to go | A major problem=0; Is not a major problem=1 |
| **Others characteristics** | |
| Age of woman at first marriage | Continuous variable |
| Age of woman at first birth | Continuous variable |
| Age difference: woman's age minus husband's age | Continuous variable |
| Women's education | No education=0; Literacy/Primary=1; Secondary/Higher=2 |
| The difference in education: woman's minus husband's level of education | Lower=0; Equal=1; Higher=2 |
| The woman worked in the past or is currently working | No=0; Yes=1 |

**Appendix 3. Descriptive statistics of the indicators selected for the measurement of the women's empowerment index, PFHS 2004**

| Indicators | Modalities | PFHS 2004 N= 2 351 |
|---|---|---|
| **Woman's attitude toward violence** | | |
| **Beating justified if the wife goes out without telling husband** | Justified | 54.74 |
| | Not justified | 45.26 |
| **Beating justified if the wife neglects the children** | Justified | 54.02 |
| | Not justified | 45.98 |
| **Beating justified if the wife argues with husband** | Justified | 56.15 |
| | Not justified | 43.85 |
| **Beating justified if the wife refuses to have sex with husband** | Justified | 52.66 |
| | Not justified | 47.34 |
| **Beating justified if the wife burns the food** | Justified | 27.48 |
| | Not justified | 72.52 |
| **Woman's participation to decision-making** | | |
| **Who usually decides on respondent's health care?** | Husband/other alone | 37.22 |
| | Joint | 46.24 |
| | Respondent alone | 16.55 |
| **Who usually decides on large household purchases?** | Husband/other alone | 39.77 |
| | Joint | 47.68 |
| | Respondent alone | 12.55 |
| **Who usually decides on visits to family or relatives?** | Husband/other alone | 32.54 |
| | Joint | 55.93 |
| | Respondent alone | 11.53 |
| **Other characteristics** | | |
| **Age of woman at first marriage** | Mean | 19.95 |
| **Age of woman at first birth** | Mean | 22.27 |
| **Age difference: woman's age minus husband's age** | Mean | -6.07 |
| **Woman's education in completed years of schooling** | Mean | 2.08 |
| **Education difference: woman's minus husband's completed years of schooling** | Mean | -1.53 |
| **Respondent worked in past 12 months** | No | 78.35 |
| | Yes | 21.65 |
| **Frequency of reading newspaper or magazine** | Not at all | 81.41 |
| | Infrequent | 8.25 |
| | Frequent | 10.34 |

**Appendix 4. Descriptive statistics of the indicators selected for the measurement of the women's empowerment index, NPFHS 2011**

| Indicators | Modalities | NPFHS 2011 N= 2 972 |
|---|---|---|
| **Woman's participation to decision-making** | | |
| Family planning decision-making | Husband/other alone | 17.06 |
| | Joint | 50.24 |
| | Respondent alone | 32.71 |
| **Discussion within couples about fertility project** | | |
| Discussion with the spouse on the ideal number of children | No | 37.45 |
| | Yes | 62.55 |
| Frequency of discussion with the spouse on family planning in the past year | Never | 60.30 |
| | Once or twice | 14.23 |
| | More than twice | 25.47 |
| **Mobility freedom** | | |
| Difficulties in receiving care: getting permission to go | A major problem | 16.55 |
| | Is not a major problem | 83.45 |
| **Other characteristics** | | |
| Age of woman at first marriage | Mean | 21.67 |
| Age of woman at first birth | Mean | 23.47 |
| Age difference: woman's age minus husband's age | Mean | -6.70 |
| Women's education | No education | 63.43 |
| | Literacy/Primary | 25.13 |
| | Secondary/Higher | 11.44 |
| The difference in education: woman's minus husband's level of education | Lower | 29.54 |
| | Equal | 60.73 |
| | Higher | 9.72 |
| The woman worked in the past or is currently working | No | 70.79 |
| | Yes | 29.21 |

## Appendix 5. Skellam regression coefficients, PFHS 2004

| | Number of surviving children | Ideal number of children |
|---|---|---|
| **Women's Empowerment** | | |
| Women's Empowerment Index | -0.253**<br>(0.06) | -0.309**<br>(0.09) |
| **Control variables** | | |
| **Place of residence** | | |
| Rural (reference modality) | | |
| Urban | 0.129<br>(0.13) | 0.024<br>(0.09) |
| **Wealth index** | | |
| Middle (reference modality) | | |
| Poorest | 0.254<br>(0.14) | 0.185<br>(0.10) |
| Poorer | 0.046<br>(0.13) | 0.089<br>(0.10) |
| Richer | -0.272<br>(0.13) | -0.143<br>(0.10) |
| Richest | -0.556***<br>(0.13) | -0.427**<br>(0.10) |
| **Husband's ideal number of children compared to that of the woman** | | |
| Same number (reference modality) | | |
| Higher number | 0.433***<br>(0.10) | 0.458**<br>(0.07) |
| Lower number | 0.786**<br>(0.12) | 0.416**<br>(0.11) |
| Don't know | 0.591**<br>(0.13) | 0.424**<br>(0.10) |
| _cons | 0.433*<br>(0.12) | 0.834***<br>(0.09) |
| **Number of women** | 2 351 | 2 351 |

standard errors in the parentheses
* p<0.10, ** p<0.05, *** p<0.01

## Appendix 6. Skellam regression coefficients, NPFHS 2011

| | Number of surviving children | Ideal number of children |
|---|---|---|
| **Women's Empowerment** | | |
| Women's Empowerment Index | 0.075<br>(0.05) | -0.491***<br>(0.05) |
| **Control variables** | | |
| **Place of residence** | | |
| Rural (reference modality) | | |
| Urban | -0.110<br>(0.09) | -0.177<br>(0,07) |
| **Wealth index** | | |
| Middle (reference modality) | | |
| Poorest | 0.495**<br>(0.12) | 0.333<br>(0.10) |
| Poorer | 0.345<br>(0.10) | 0.255<br>(0.08) |
| Richer | 0.096<br>(0.09) | 0.062<br>(0.08) |
| Richest | -0.096<br>(0.09) | -0.108<br>(0.09) |
| **Husband's ideal number of children compared to that of the woman** | | |
| Same number (reference modality) | | |
| Higher number | 0.436***<br>(0.08) | 0.468**<br>(0.07) |
| Lower number | 0.378**<br>(0.10) | 0.422***<br>(0.08) |
| Don't know | 0.545***<br>(0.09) | 0.404***<br>(0.08) |
| _cons | 0.028<br>(0.09) | 0.227<br>(0.08) |
| **Number of women** | 2 972 | 2 972 |

standard errors in the parentheses
* p<0.10, ** p<0.05, *** p<0.01