ORIGINAL RESEARCH ARTICLE

Women's autonomy and fertility in Chad

DOI: 10.29063/ajrh2023/v27i11.8

Georges Tagang and Jean-Robert M. Rwenge

Institute for Training and Research in Demography (IFORD), University of Yaoundé 2, Cameroon

***For Correspondence:** Email: t*agangeorges21@gmail.com*

Abstract

Chad's total fertility rate (TFR) is 6.4 children per woman, compared with no more than 5.5 in neighbouring countries: Cameroon and the Central African Republic. Scientific research on the determinants of fertility in Chad should therefore be carried out in order to show decision-makers how they can strengthen their actions in this area. This is the aim of this study, which focuses on the influence of women's autonomy on fertility in Chad. Analyses of data from the Multiple Indicator and Demographic and Health Survey (DHS/MICS) conducted in Chad in 2014/2015 and a qualitative survey conducted in the same country in 2020 show, among other things, that 1) in socio-cultural groups characterised by strong gender inequalities, women's autonomy is positively associated with their desired fertility; 2) in these and other groups characterised by less gender inequality, women's autonomy is negatively associated with their actual fertility, all things being equal; 3) the hypotheses explaining this relationship differ across sociocultural groups: In highly gender- inegalitarian groups, the frequent death of children leads couples in which women have either little or no autonomy to compensate with high fertility, whereas in less gender- inegalitarian groups, the negative association between women's autonomy and fertility is due to late union formation, union dissolution, the fertility-reducing effects of breastfeeding and modern contraception, and other intermediate fertility variables not considered here. These findings highlight both the importance of designing development programmes in Chad that focus on women's empowerment and the need for such programmes to take sufficient account of the socio-cultural contexts in which the populations concerned live. *(Afr J Reprod Health 2023; 27 [11]: 63-82).*

Keywords: Women's empowerment, fertility decrease, demographic dividend, Chad, sub-Saharan Africa

Résumé

Au Tchad, l'Indice Synthétique de Fécondité (ISF) est de 6,4 enfants par femme, alors que chez ses voisins, comme le Cameroun et la RCA, il ne dépasse pas 5,5. Il est alors très important de réaliser des recherches scientifiques sur les déterminants de la fécondité dans le premier pays, afin de montrer à ses décideurs comment ils devraient renforcer leurs actions dans ce domaine. La recherche réalisée ici en est un exemple et porte spécifiquement sur l'influence de l'autonomie de la femme sur sa fécondité dans ce pays. Les analyses des données de l'Enquête Démographique et de Santé et à Indicateurs Multiples (EDS/MICS) qui y a été menée en 2014/2015, et de celles de l'enquête qualitative, menée dans le même pays en 2020, ont, entre autres, révélé, ce qui suit : 1) dans les groupes socioculturels très inégalitaires en matière de genre, l'autonomie de la femme est positivement associée à sa fécondité désirée ; 2) dans ces groupes et dans ceux moins inégalitaires, toutes choses égales par ailleurs, l'autonomie de la femme est associée négativement à sa fécondité effective ; 3) les hypothèses d'explication de cette relation varie selon les groupes socioculturels : dans les premiers, les décès fréquents d'enfants entraînent les couples où les femmes ont une autonomie nulle ou faible à les compenser par une fécondité élevée ; dans les derniers, ce sont les entrées tardives en union, les ruptures d'unions, les effets réducteurs d'allaitement et de la contraception moderne et d'autres variables intermédiaires de la fécondité, non prises en compte, qui justifient pourquoi l'autonomie de la femme y est négativement associée à sa fécondité. Les résultats de cette étude témoignent non seulement de la pertinence des programmes de développement focalisés dans ce pays sur l'autonomisation de la femme, mais aussi du fait que pour être efficaces ces programmes devraient prendre suffisamment en compte les contextes dans lesquels vivent les populations concernées. *(Afr J Reprod Health 2023; 27 [11]: 63-82).*

Mots-clés: Autonomisation de la femme, baisse de la fécondité, dividende démographique, Tchad, Afrique subsaharienne

Introduction

The question of the size of the population is the key to the development and the future of sub-Saharan Africa as a whole. Poverty cannot be tackled effectively, nor can sustainable economic growth be achieved, without taking demographic phenomena into account. Reducing fertility is the main concern here. According to Locoh[1], fertility in sub-Saharan Africa has begun to fall: "Désormais, chaque nouvelle enquête vient confirmer que l'Afrique subsaharienne s'engage dans une nouvelle phase de la transition démographique" (Every new survey confirms that

sub-Saharan Africa is entering a new phase of demographic transition [free translation]). However, a significant number of countries in the region, particularly francophone countries, have not yet shown any signs of moving in this direction. The case of Chad is particularly acute. Unlike its neighbors, Cameroon and the Central African Republic, where the total fertility rate (TFR) does not exceed 5.5 children per woman[2,3], and Nigeria, where it stands at 5.5 children per woman[4], in Chad, it is higher and even rising[5]: according to 2004 Demographic and Health Survey (DHS) and the 2014 Multiple Indicator and Demographic and Health Survey (DHS/MICS), Chad's TFR has risen from 6.3 to 6.4 children per woman.

Given the many benefits of low fertility, the Government of Chad should strengthen its policies in this area and significantly reverse the current trend by 2030. These benefits occur at many levels: economic, social, and environmental[6-8]. The Government of Chad, therefore, needs relevant information, which can only be produced through rigorous scientific studies of the determinants of low fertility in Chad. To date, very few studies have been carried out in this country, despite the fact that, as mentioned above, all the demographic and health surveys carried out in Chad clearly show that fertility is rising rather than falling and that the TFR is at least 6.5 children per woman in 50% of the regions of the country, with the result that demographic growth is accelerating. At the current fertility rate, Chad's population, estimated at 16 million in 2020, will reach around 23 million in 2030[9], representing a growth rate of 3.2%.

Like its Central African neighbors, Chad is already aware of the harmful consequences of high fertility and has implemented a population policy that includes family planning programs. However, the situational and contextual analyses referred to by the policymakers themselves have clearly shown that there are significant socio-cultural barriers to improving Chadian women's fertility behavior. Gender inequalities structure and summarize a large part of these social barriers. But how do these barriers, gender inequalities and women's lack of autonomy influence fertility in Chad? In this study, we will try to answer this question by examining the links between gender inequalities, women's autonomy, and fertility in the context of Chad.

The notion of women's autonomy or "empowerment" is central to a number of theories of fertility and health[10]. Empowerment has been defined in a number of ways. According to Kabeer[11], it involves process and agency; she defines empowerment as "the expansion of people's ability to make strategic life choices in a context where this ability was previously denied to them". Process refers to the dynamic aspect of women's autonomy, but in the absence of longitudinal data, most previous studies have focused on agency, defined as women's ability to make choices[12]. Caldwell and Caldwell[13] define women's autonomy as their ability to take control of resources and decisions that affect them and to act independently of male and societal control. It, therefore, goes beyond access to resources to encompass their control in general and the freedom to use them in the interests of the woman or those close to her.

Previous studies have examined the influence of women's autonomy on family planning[14], fertility[15]and health[16-18]. They suggest that women's autonomy affects their ideal number of children, contraceptive use, child nutrition, child immunization, and mothers' use of maternal health services. However, the relationship between women's autonomy and their fertility- and health-related behaviors is much more complex. Indeed, previous studies on the influence of women's autonomy on fertility are limited: they have not taken into account the value system that characterizes the population studied or the key elements of the socio-cultural environment in which women's status is defined, the psychosocial characteristics and a good number of proximate determinants of fertility (union dissolution, postpartum behaviors, infant and child mortality, abortion practices…).

To compensate for the limitations of these studies, we have undertaken a contextual analysis of the relationship between women's autonomy and fertility, using an interdisciplinary approach. Fertility in sub-Saharan Africa is a complex social phenomenon that can only be understood by applying disciplines such as anthropology and sociology, in addition to demography, to take into

account the social and cultural realities of the societies concerned.

Methods

Data

This study uses both quantitative and qualitative data.

Quantitative data

These are from the Chad Multiple Indicator and Demographic and Health Survey (DHS/MICS), a household survey conducted in 2014/2015 by Chad's National Institute of Statistical, Economic, and Demographic Studies (INSEED), with technical support from ICF International. The survey was co-funded by the Government of Chad, UNFPA, UNICEF, USAID, the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), the World Bank, Agence Française de Développement (AFD) and the Swiss Agency for Development and Cooperation.

One of the main objectives of the survey was to obtain recent and reliable data on the reproductive and fertility preferences of Chadians, as well as the socio-cultural, socio-economic, and demographic characteristics associated with them. This household survey was representative at the national level, but also at the urban and rural levels, at the level of the capital N'Djamena, and at the regional level. For this purpose, the territory of Chad was divided into 21 study areas corresponding to the 22 regions of the country and the city of N'Djamena. Each study area (except the capital) was then divided into two strata: urban and rural. Sampling was carried out at the stratum level using the two-stage cluster method. (For more information on the sampling procedure, see the final report of the Chad DHS/MICS 2014-2015, published by INSEED, the Ministry of Public Health, and ICF International).

During the survey, 17,719 women aged 15-49 were interviewed individually. 5,248 men aged 15 to 59 were also interviewed in a sub-sample of one out of every two households. All data used here refer to 12,547 married women and 892 women in consensual unions.

Respondents were asked about the number of children they had, the number of children they wanted to have, and the person who made decisions in their household; socio-cultural, socio-economic, and demographic characteristics of the woman and her partner were also collected. Women and men without children were asked the following question about the number of children they would like to have: "If you could choose exactly how many children you would like to have in your lifetime, how many would you like to have?", while women and men with at least one child were asked, "If you could go back to the time when you didn't have children and choose exactly how many children you would like to have in your lifetime, how many would you like to have?". Although these questions seem relatively straightforward, they may have led respondents to underestimate the number because it is difficult for women and men with at least one living child to report the number of children they would like to have independently of the number of children they have already had. Questions on household decision-making covered the use of the woman's income from work, the woman's use of contraception, her health care, major household purchases, and visits from parents or other members of the woman's family.

The survey also collected data on perceptions of gender inequality through questions on domestic violence. For example, women were asked: "A husband may get angry or upset in response to some things his wife does. Do you think it is normal for a husband to beat his wife in the following situations: i) If she goes out without telling him? ii) If she neglects the children? iii) If she disagrees with him? iv) If she refuses to have sex with him? v) If she burns the food?

As the question on who uses the woman's income, which was also asked to gather information on decision-making in the couple, only concerned women who had been in paid employment in the 12 months prior to the survey, a sub-sample of 5,248 women (39.6%) were excluded from the study.

Qualitative data

The quantitative data was complemented by qualitative in-depth interviews and group discussions that we conducted in Chad in November-December 2020. The aim was to gather men's and women's views on gender inequalities. The interviews and group discussions were conducted in N'Djamena and in the villages of Koundoul (not far from the capital) and Beti (in the

Logone Oriental region) in order to highlight differences between and within urban and rural contexts on this issue. In addition, the sample was drawn in such a way as to enable the collection of opinions from people belonging to different social strata of the population. Thirty-six (36) women and twenty-six (26) men were interviewed individually: fifteen (15) women aged 20-29 and twenty-one (21) aged 30-49; seven (7) men aged 20-34 and nineteen (19) aged 35 or over. Men and women with little or no education were included, as well as men and women with a high level of education. A total of 21 group discussions were held, 7 in each of the three areas of residence. The data from this study are the only ones currently available to analyse women's decision-making power in Chad.

Variables

The dependent variable

Each of the following indicators of fertility was used as a dependent variable: the average number of children ever born, the number of live births in the five years preceding the survey (i.e. during the period 2010-2014), the desired number of children, the total number of children at the end of reproductive age and the gap between these last two indicators. The first three indicators concern all women aged 15-49 and the last two concern women aged 35-49.

As average parity measures cumulative fertility, it provides information on past rather than current fertility levels[19]. As most of the indicators of women's autonomy and the other independent variables (see below) were measured at the time of the survey, it was important to use a cross-sectional indicator (in addition to average parity), namely the number of live births in the 5 years prior to the survey. This was then used to calculate fertility rates by five-year age group: the sum of these fertility rates multiplied by 5 gives the total fertility rate (TFR). The TFR is a standardized fertility index: it indicates the average number of children a woman would have had by the end of her childbearing years if her fertility rates throughout her life had been the same as those observed in a given period. The TFR is therefore independent of the age structure. In this case, it allows the comparison of fertility levels between different sub-groups.

The last indicator (the gap between the average number of children at the end of reproductive age and the desired number of children) has not been used in any of the previous studies, but it is very useful: it makes it possible to characterize women who have not achieved their goal of having a small family because of persistent social pressure on fertility.

Independent variables

Women's autonomy

Women's autonomy is the main independent variable in this study. It was constructed using data on women's decisions about their own health care, major household purchases, and visits to parents or other family members. For each of these variables, there were three response options regarding who makes the decision: 0) "My husband", 1) "My husband and I", 2) "I alone". Thus, in this study, women's autonomy is a composite variable, i.e. the sum of the values of the three variables mentioned above. Its values range from 0 to 6, with 0 indicating a lack of autonomy and 6 indicating a high degree of autonomy. After recoding, women's autonomy becomes a qualitative variable with the following categories: 0) no autonomy, 1) low autonomy, 2) high autonomy. Since women's decision-making autonomy can only be studied within couples, the reference population here is composed of women in legal or free unions, regardless of the status of the union.

Other independent variables

The following variables were also included as independent variables because the literature review showed that they are also associated with fertility: place of residence, the woman's age, her level of education, her economic activity and the type of union (monogamous or polygamous). The place of residence was divided into three categories: N'Djamena, other cities and rural areas.

In the case of education, individuals with no education were distinguished from those with primary education and those with secondary or higher education. Women were grouped into three categories of economic activity: inactive, farmer and other. In addition to these variables, and given the context studied, where the man is the authority in the household, his level of education and economic activity were also taken into account, together with the age difference between the

spouses. The educational level of the husband also had three categories: no education, primary education and secondary education or higher. His economic activity was recoded as follows: activities in the modern sector, tradesmen, farmers and other. These two variables also provide information about the man's openness to modern values and his mode of wealth production. The age difference between the spouses was recoded as follows: 0-4 years, 5-9 years, 10 or more years, woman older than her partner, man and woman of the same age.

We have also taken into account the household wealth index. It was measured using data on household ownership of assets, materials used for housing construction, and type of access to water and sanitation. It placed households on a continuous scale of relative health and was transformed into a qualitative ordinal variable with five roughly equal groups: highest, fourth, middle, second, and lowest.

Given that, in the context studied, messages denouncing gender inequalities and promoting family planning are increasingly transmitted through the media, the degree of women's exposure to different media sources was included in the set of independent variables. This is another composite variable constructed on the basis of how often they watch television, listen to the radio, and read newspapers or magazines. It had three categories: rarely, average, and often.

Other variables

Ethnic group, religion, perception of gender inequality

Other variables were used to contextualize the analysis of the relationship between women's autonomy and their fertility, i.e. to analyze this relationship according to the woman's socio-cultural group.

There are many ethnic groups in Chad. With the exception of the Moundang, Massa and assimilated groups, Toupouri, Sara, Soumraye, Karo, Mayo-Kebbi and Tandilé, at least 60% of the people in the other ethnic groups are Muslims. However, among the former, the Toupouri are distinguished by a higher proportion of individuals reporting no religion. As ethnicity and religion are closely related in the population studied, these two variables were combined and grouped into two categories according to gender norms: 1) highly gender-inegalitarian socio-cultural groups and 2) less gender-inegalitarian socio-cultural groups. Gender norms were captured here by aggregating women's perceptions of the domestic violence they might experience. One of the important socio-cultural characteristics of these groups is that Muslim women are more strongly represented in the former than in the latter.

Intermediate fertility variables

These variables were used to explain the relationship between women's autonomy and fertility. Following Davis and Blake[20], Bongaarts[21] and Bongaarts and Potter[22], we included age at the first union, number of unions, duration of postpartum breastfeeding, duration of postpartum sexual abstinence, use of modern contraceptives, infant and child mortality, use of antenatal care, and use of delivery care.

Analytic methods

Quantitative data

The quantitative data were analyzed using descriptive statistical and multivariate explanatory methods. Since the dependent variable was captured by several indicators of different types: desired number of children, average parity, the total number of children born alive at the end of reproductive age, number of live births in the five years preceding the survey, and the gap between the total number of children born alive at the end of reproductive age and the desired number of children, several statistical methods were used at the two levels of analysis. At the descriptive level, for quantitative indicators whose distributions could be approximated by normal distributions - this is the case for the first three indicators- a one-factor analysis of variance was used to calculate the mean of each of the above indicators and to test the hypothesis that it varies significantly at the chosen threshold according to the categories of women's autonomy.

Also at the descriptive level, we used a Poisson regression model for the number of live births in the five years preceding the survey - the only quantitative indicator whose distribution resembles that of a rare phenomenon. Finally, for the gap between the total number of children born

alive at the end of reproductive age and the desired number of children, the only qualitative indicator, we used cross-tabulations together with chi-squared tests. As one-factor ANOVA and chi-square tests are familiar to social scientists and are clearly described in Rwenge *et al*[23] Rwenge[24], they are not presented below.

At the explanatory level, we used multivariate multiple regression for normally distributed quantitative indicators, multivariate Poisson regression for other quantitative indicators, and multinomial logistic regression for the qualitative indicator.

Linear regression models

These were used to assess the influence of women's autonomy on each normally distributed quantitative indicator, after controlling for the effects of other explanatory variables. The explanatory linear regression model is written as follows:

$$Y = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k + \varepsilon$$

Where $X_1, X_2, X_3, \ldots X_k$ are explanatory variables;

$\beta_1, \beta_2, \beta_3, \ldots \beta_k$ are regression coefficients;

and ε is the error term or residual.

The results of this model are interpreted by examining R^2, the chi-squared statistic, and β_i regression coefficients and their significance. R^2 is the proportion (%) of the variance of the dependent variable that is explained by the model. R^2 close to 100% means that the model is correctly specified (i.e. the independent variables correctly predict the variation of Y). The probability associated with the Chi-square statistic confirms the significance of R^2 and therefore the goodness of fit of the model. This probability is compared with the fixed significance threshold (α=5%). The further it is below this threshold, the more significant the R^2 value is.

For each independent variable, X_i, introduced in the regression model, there is a regression coefficient β_i which indicates how the variable X_i influences the dependent variable Y. This coefficient is associated with a probability that indicates its significance. If the probability is below the threshold, X_i has a significant effect on Y; if it is not, X_i has no effect on Y. The positive or negative sign attached to β_i indicates the positive or negative influence of X_i. If the regression coefficients in a multiple regression model are not standardized, they cannot be compared. Therefore, in this model, we do not interpret b_i but $\beta_i = \frac{s_i}{s_y} b_i$.

Poisson regression models

When the values of a dependent variable take the form of count data, it should not be considered and treated as a quantitative continuous dependent variable, as this may lead to a violation of the hypotheses underlying the use of linear regression models. The number of live births in the three or five years preceding the survey, the number of days a person is sick, the number of times a machine breaks down, etc., are examples of count data.

In all these cases, the variable to be explained is discrete in quantity and has a high number of low values. This is far from a normal distribution and the use of linear regression models leads to unsatisfactory results. To explain the variation in the number of live births in the five years preceding the survey, the Poisson model was used because its values are rare and positive. This is a special case of the generalized linear model (GLM) in which the conditional distribution of the dependent variable follows a Poisson distribution and the link function is logarithmic.

In our study, the dependent variable is the number of live births (y_i) given by a woman (i) in the five years prior to the survey, and the probability that the random variable Y_i is equal to the value y_i (the observed number of live births) is assumed to follow the Poisson distribution with mean μ_i:

$$P(Y_i = y_i \setminus \mu_i) = \frac{e^{\mu_i}\, {\mu_i}^{y^i}}{y_i!} \qquad [1]$$

Here μ_i, the mean number of live births per period, can be broken down as the product of a given fertility rate (λ_i) and a length of exposure (t_i):

$$\mu_i = t_i \lambda_i \qquad [2]$$

The logarithm of the mean (μ_i) is therefore equal to the sum of the logarithms of the length of exposure (t_i) and the fertility rate (λ_i) :

$$ln\mu_i = lnt_i + ln\lambda_i \qquad [3]$$

The offset is the logarithm of the length of exposure, and the logarithm of fertility rates is modeled as a linear function of k explanatory variables, thus:

$$\ln \lambda_i = \sum_{k=1}^{K} \beta_k x_{ki} \quad [4]$$

So:

$$\ln \mu_i = \ln t_i + \sum_{k=1}^{K} \beta_k x_{ki} \quad [5]$$

We can clearly see that, unlike the linear regression model, the Poisson model allows us to take into account the duration of exposure to the risk of events that occurred during the observation period, when this duration varies from one individual to another.

Taking the exponential of the equation [4], we see that the explanatory variables have multiplicative effects on rates, as

$$\lambda_i = \exp \sum_{k=1}^{K} \beta_k x_{ki} = \prod_{k=1}^{K} \exp(\beta_k x_{ki}) \quad [6]$$

Therefore, the exponential of the regression coefficient (β_k) of an explanatory variable (x_k) expresses the ratio between the fertility rate of women for whom the explanatory variable has a given value and the fertility rate of women for whom that variable has the same value minus one unit, all things being equal.

The offset is the logarithm of the duration of exposure to risk, which has a coefficient equal to one, and the logarithm of the fertility rate can be modelled in its simple form as a linear function of k explanatory variables. For a dichotomous variable, the exponential of the coefficient of that variable is equal to the ratio of the fertility rate of women in a given category to that of women in the reference category. The sign of the coefficient indicates whether the explanatory variable introduced into the model increases or decreases the number of births, depending on whether it is positive or negative.

Recent fertility among women in legal or free unions was modelled using Poisson regression in each sociocultural group and at the national level. An advantage of Poisson regression is that explanatory variables can be included in the calculation of these rates. It is also easy to calculate the corresponding total fertility rate, which is used as an indicator of fertility in this study, because their effects are expressed as rate ratios whose significance can be tested. For more details on how the Poisson model can be used when the dependent variable is the number of births in a given period, see, for example, Schoumaker[25,26].

Multinomial logistic regression models

This type of model is used when the dependent variable is qualitative and has more than two categories. This is the case of the gap between the desired number of children and the total number of children born alive at the end of reproductive age, which has three categories: 0 = the first is higher than the second; 1 = the two are equal; 2 = the first is lower than the second.

The basic principle of these models, unlike binomial models, is to allow the simultaneous comparison of measures of the association between a risk factor and different categories of a dependent variable with K > 2 categories, one of which is taken as the reference. To facilitate interpretation of the results of multinomial logistic regression, the model can be transformed into odds ratios; it is then easy to examine how a given variable changes the ratio between the probability under investigation and the probability corresponding to the reference category in the dependent variable. The interpretation of the regression results is as follows:

- If RRR > 1, when '0' is the reference category and '2' is the other considered category of the dependent variable, and when the explanatory variable is level of education with no level as reference, we can say, for example, that women with primary education are more likely than those with no education to have had more children than they wanted than to have had fewer children than they wanted.

- If RRR < 1, we can say that women with primary education are less likely than those with no education to have had more children than they wanted than to have had fewer children than they wanted.

As with binomial logistic regression, the goodness of fit of the model is tested by checking the probability associated with the chi-squared statistic. The model fits well if this probability is lower than the chosen significance threshold.

All explanatory multivariate analyses were performed in Stata 16. The SVYSET procedure was used to adjust the data for non-response and sampling.

Qualitative data

Data from individual interviews and group discussions were first transcribed word for word in Microsoft Word. The resulting textual data was then sorted by participant category and analyzed using the content analysis method. The results were presented and interpreted simultaneously with the results of the quantitative analysis.

Results

Background characteristics of respondents

At national level, 37.7% of Chadian women have no decision-making autonomy, 44.9% have low autonomy and 15.6% have high autonomy. The degree of decision-making autonomy of women varies significantly between socio-cultural groups, with a higher proportion of individuals in the first category in highly gender inegalitarian groups (48.1% versus 29.7% in less gender inegalitarian groups) (Table 1). The opposite is true for the other two categories (in the second category: 39.9% versus 50.9%; in the third one: 12 % versus 19.4%). The level of education of Chadian women is very low: 68.4% have no education, 21.7% have primary education and 9.9% have secondary or higher education. However, there are significant differences between socio-cultural groups. More women have no education in the most gender inegalitarian groups (88.9% compared to 49.6%). The educational level of their spouses is also low (56%, 17.5% and 20.1% respectively), but the difference between the two sexes shows that the latter are relatively better educated than the former in the less gender inegalitarian socio-cultural groups (Table 1). Among spouses, as among women, the better educated are more likely to be found in the latter socio-cultural groups than in the others (Table 1).

At national level, only 16.3% of women are employed in activities 'other' than agriculture. The proportion of unemployed women is twice higher in the highly gender-inegalitarian groups than in the others (65.5% compared with 31.5%). The opposite is true for women in non-agricultural occupations (16.3% compared with 54%). With regard to the economic activity of the spouse, 63.4% of Chadian women have a spouse who is a farmer, 14.3% have a spouse who is a trader, 6.6% have a spouse who is a manager/employee and 15.3% have a spouse who is engaged in other activities. The analysis of the difference in the frequency distribution of this variable by socio-cultural groups shows that the proportion of women whose spouses are farmers is higher in the less gender inequitable groups than in the others, and the opposite is true for those whose spouses are traders. The proportion of women whose spouses are managers/employees is also higher in the less gender inegalitarian groups. The problem of the age difference between spouses occurs in all socio-cultural groups, but more so in the highly gender inegalitarian groups, where 44.9% of women have spouses at least 10 years older than themselves, compared with 30 % in the less gender inegalitarian groups (Table 1). In the latter sociocultural groups, the proportions of women whose spouses are the same age or younger are 2.5 to 4.1 times higher than in the former groups (Table 1).

Bivariate association between women's autonomy and fertility

Women's autonomy and Desired Number of Children (DNC)

At the national level, the average ideal number of children per woman is 8.59 and is negatively associated with the degree of women's decision-making autonomy. The average ideal number of children per woman is significantly lower among women with high decision-making autonomy (7.95) than among those with none (8.70), while no difference is observed between the latter and women with low decision-making autonomy (8.72) (results not shown). The relationship between the two variables varies according to socio-cultural groups (Table 1). In highly gender-inegalitarian groups, this relationship is non-linear, taking the form of an inverted U. In these groups, the average ideal number of children is almost identical for women with high decisional autonomy (8.92) and women with no decisional autonomy (9.03), and it is higher for women with low autonomy (9.53). On the other hand, in groups with less gender inequality, the relationship between the two variables is linear: the average ideal number of children decreases as women's degree of autonomy increases. Here, women with no autonomy have the highest ideal number of children (8.28), those with high autonomy the lowest (7.42), and those with little autonomy the middle (8.16).

Table 1: Percentage distribution of women in legal or consensual unions, by selected background characteristics (Chad 2014/2015 DHS/MICS)

Background characteristics	National (N=13263)		Highly gender inegalitarian groups (N=6137)		Less gender inegalitarian groups (N=6889)	
	n	**%**	**n**	**%**	**n**	**%**
Woman's autonomy						
None	4997	37,7	2900	48,1	2014	29,7
Little	5955	44,9	2401	39,9	3445	50,9
High	2075	15,6	723	12,0	1314	19,4
Woman's education level						
No education	9069	68,4	5453	88,9	3420	49,6
Primary	2881	21,7	463	7,5	2395	34,8
Secondary and higher	1313	9,9	221	3,6	1074	15,6
Partner's education level						
No education	7425	56,0	5212	86,8	2043	33,1
Primary	2318	17,5	367	6,1	1919	31,1
Secondary and higher	2663	20,1	427	7,1	2210	35,8
Woman's activity						
Inactive	6269	47,3	4007	65,5	2155	31,5
Farmers	2118	16,5	1112	18,2	994	14,5
Others	4735	35,7	996	16,3	3691	54,0
Partner's activity						
Executive/Employee	854	6,4	290	4,8	552	8,1
Commerce	1874	14,1	1368	22,8	466	6,9
Farmers	8249	62,2	3343	55,7	4763	70,2
Others	2044	15,4	1003	16,7	1005	14,8
Age gap betwwen partners						
1-4	2323	17,9	657	10,9	1644	24,5
5-9	5443	42,0	2592	42,9	2759	41,2
10 and more	4828	37,2	2710	44,9	2008	30,0
Negative	212	1,6	38	0,6	169	2,5
Nul	162	1,2	40	0,7	122	1,8
Place of residence						
N'Djamena	944	7,1	545	8,9	387	5,6
Smal towns	1678	12,7	903	14,7	735	10,7
Rural	10640	80,2	4690	76,4	5767	83,7

Women's autonomy and number of Children Ever Born (CEB)

At the national level, the average number of CEB is 4.69. At the same level, in the two socio-cultural groups mentioned above, and controlling for age, the relationship between a woman's decision-making autonomy and the average number of CEB is in the form of an inverted U: the average number of CEB is lower in the highest degree of decision-making autonomy (4.48) than in the zero degrees of autonomy (4.74), but we see that the level of fertility among women with little autonomy is higher than in the two previous categories (4.83) (Table 1).

Women's autonomy and CEBF

In the milieu studied women at the end of their reproductive age have an average of 7.44 children. This fertility indicator is significantly related to the degree of decision-making autonomy. In each of the socio-cultural groups, it is lower among women with a high degree of decision-making autonomy (7.1 children in both the highly inegalitarian and the less inegalitarian groups) than among those with no autonomy (7.5 and 7.4 respectively). However, it is slightly higher among women with low decision-making autonomy (7.6 in both sociocultural groups) than among those with no autonomy.

Women's autonomy and TFR

Fertility levels were also calculated using data on births in the five years prior to the survey. These data clearly show that women's decision-making autonomy and TFR are negatively related: the value of this fertility indicator decreases with the degree of women's autonomy (7.2 children for highly autonomous women and 7.9 for women with little or no autonomy).

Gap between DNC and CEBF

Finally, in the milieu studied, 14.6% of women aged 35 and over reported having more children than their ideal number, 8.3% having exactly reached their ideal number, and 77.1% having fewer children than their ideal number. In less gender-inegalitarian sociocultural groups, women's degree of decision-making autonomy and the gap between DNC and CEBF are significantly related, contrary to what is observed in highly inegalitarian groups (Table 1).

However, in the latter groups, the proportion of women who have exactly reached their ideal number of children is higher among women with high decision-making autonomy (9.4%) than among women with no autonomy (4.2%) or low autonomy (5.6%) ($p \leq 0.01$). In the less inegalitarian groups, the difference is in the same direction: a greater proportion of highly autonomous women say they have exactly reached their ideal number of children (12.3% compared with 8.8% among women with little autonomy) ($p \leq 0.01$); but here the proportion observed in the first category is not different from that observed among women with no autonomy (14.1%) ($p=0.22$).

Thus, in the milieu studied, among women who are legally married or in free unions, the fertility achieved is high, but it remains below the desired number of children. According to the qualitative data, having many children is a divine blessing and contributes to prolonging the parents' lives. Consequently, high fertility confers social esteem and respect on the women and families concerned. Despite this high social value attached to procreation, there are people who are aware of the negative consequences of high fertility, but most respondents mentioned the difficulty of meeting the burden of raising a large number of children; only one respondent mentioned health problems:

"*Moi, j'ai quatre enfants qui sont sortis de mes entrailles … Je ne peux pas en avoir plus parce que je ne peux pas leur fournir ce qu'il faut pour qu'ils soient des hommes demain.* " (Homme marié, niveau supérieur, 46 ans, 4 enfants) ("I have four children who came out of my womb ... I can't have more because I can't give them what they need to be men tomorrow." (married man, higher education, age 46, 4 children) [free translation]).

"*À cause du fait d'avoir beaucoup d'enfants, certains hommes sont obligés de dilapider les caisses de l'État... Ils sont incapables de nourrir un grand nombre d'enfants* unhappy" (Homme marié, niveau secondaire, 35 ans, 3 enfants) ("Because some men have a lot of children, they're forced to waste the state's money... They can't feed a large number of children." (married man, secondary education, age 35, 3 children) [free translation]).

"*Il faut faire des enfants selon sa capacité, sinon ils souffriront et deviendront malheureux*" (Femme mariée, niveau secondaire, 38 ans, 9 enfants) ("You have to have children in accordance with your capacities or else they'll suffer and be unhappy" (married woman, secondary education, age 38, 9 children) [free translation]).

"*C'est un problème puisque quand tu as beaucoup d'enfants, tu ne peux pas bien les nourrir, les habiller, les loger…Moi, je ne vois que les inconvénients*" (Femme mariée, niveau primaire, 39 ans, 6 enfants) ("It's a problem because if you have a lot of children you can't feed, clothe or house them well. ... I can only see the disadvantages" (married woman, primary education, age 39, 6 children) [free translation]).

"*Oui, c'est un problème puisque quand tu accouches beaucoup tu vas vite te fatiguer et vieillir*"
(Femme mariée, niveau universitaire, 39 ans, 3 enfants) ("Yes, it's a problem because if you give birth a lot, you get tired and old very quickly" (married woman, university education, age 39, 3 children) [free translation]).

The burden of caring for children appears to be an individual one, but according to some respondents,

Table 2: Average Desired Number of Children (DNC), the average number of Children Ever Born (CEB), the total number of CEB at the end of the Reproductive Age (CEBF), and the gap between DNC and CEBF, according to the woman's degree of autonomy and sociocultural groups

Type of sociocultural groups	Women's Degree of Autonomy			Altogether
	None	**Low**	**High**	
Strongly gender-inegalitarian				
The average desired number of children (DNC)*	9.02 (2661)	9.53 (2238)	8.92 (749)	9.21 (5648)
The average number of CEB, age-adjusted*	4.74 (2900)	4.83 (2401)	4.48 (723)	4.76 (6137)
Total number of CEB at the end of the reproductive age (CEBF)*	7.49 (869)	7.55 (781)	7.11 (293)	7.45 (1943)
The gap between DNC and CEBF (%)*				
Fewer than the desired number	82.0	81.5	79.6	81.4
Equal to the desired number	4.2	5.6	9.4	5.6
More than the desired number	13.7	12.9	11.0	13.0
Total	100.0	100.0	100.0	100.0
N	1114	1010	386	2510
Total Fertility Rate (TFR)	7.28	7.21	6.89	7.19
Less gender-inegalitarian				
The average desired number of children (DNC)*	8.28 (1341)	8.16 (2050)	7.42 (820)	8.05 (4211)
The average number of CEB, age-adjusted*	4.64 (2014)	4.81 (3445)	4.43 (1314)	4.62 (6889)
Total number of CEB at the end of the reproductive age (CEBF)*	7.41 (574)	7.61 (1018)	7.08 (479)	7.42 (2071)
The gap between DNC and CEBF (%)*				
Fewer than the desired number	73.4	74.0	69.6	72.8
Equal to the desired number	14.1	8.8	12.3	11.1
More than the desired number	12.5	17.3	18.1	16.1
Total	100.0	100.0	100.0	100.0
N	479	759	382	1620
TFR	7.89	7.86	7.16**	7.71***

Significance threshold: *** p≤ 0.01; ** p≤ 0.05; * p ≤ 0.10.
Source: Author's calculations based on data from the Chad 2014/2015 EDS-MICS survey.

it may be less for parents who receive help from extended family members:

"*Si tu as des enfants et que tu es incapable de les scolariser ou de les nourrir, ta famille peut t'aider*" (Homme marié, niveau secondaire, 35 ans, 5 enfants) ("If you have children and can't afford to send them to school or feed them, your family can help you" (married man, secondary education, age 35, 5 children) [free translation]).

"*J'ai eu six enfants, trois garçons et deux filles sont en vie et une fille est décédée, un de mes garçons est partie vivre chez ma sœur qui est à N'Djamena*" (Homme marié, niveau primaire, 40 ans, 6 enfants) "I've had six children; three boys and two girls are alive and one girl has died. One of my boys went to live with my sister in N'Djamena" (married man, primary education, age 40, 6 children) [free translation]).

The support of a family member is therefore conditional on the ability of that relative to provide for the children of his or her poorer brothers or sisters. But the death of a parent is another circumstance that triggers family solidarity:

"*Mon mari est un fonctionnaire et nous élevons 9 enfants parmi lesquels quatre sont ceux de son frère décédé…avec autant d'enfants c'est très difficile*" (Femme mariée, niveau primaire, 30 ans, 5 enfants) ("My husband is a civil servant and we're raising nine children, including four of his dead brother. ... It's very difficult with so many children" (married woman, primary education, 30 years old, 5 children of her own) [free translation]).

It should be noted that the awareness of parental responsibility is expressed mainly in N'Djamena and by highly educated people.

Multivariate associations between women's autonomy and fertility

It should be recalled that these associations were clearly present in models in which all the

independent variables mentioned in section 1.2.2 were controlled (i.e. taken into account).

Influence of women's autonomy on desired number of children (DNC)

In highly gender inegalitarian sociocultural groups, women's degree of decision-making autonomy is a determinant of DNC - and is positively associated with it (Table 2). Other things being equal, both low and high autonomy women report a high ideal number of children (β = 0.59 and 0.31 respectively) compared to women with no autonomy. At the level of multivariate analysis, women's decision-making autonomy is negatively associated with ideal number of children in less inegalitarian sociocultural groups (Table 2). Contrary to what was observed above, women with high autonomy in these groups report a lower desired number of children (β = -0.60) compared to women with none. There is no significant difference between women with high and low autonomy. Furthermore, the analyses show that living in N'Djamena and being highly educated are two 'negative' determinants of women's ideal number of children.

Note: In the multivariate models, the effect of the degree of decision-making autonomy of the woman on each of the fertility indicators was controlled by the effects of the other independent variables mentioned in section 1.2.2, together with the effect of ethnicity. The problem of multicollinearity due to the strong association between the educational level of the wife and that of the husband was solved by replacing them with the educational level of the couple.

Source: Authors' work based on data from the Chad 2014/2015 DHS/MICS.

According to some of the women interviewed, the number of children they will have is not up to them but up to their husbands:

"*C'est à mon mari de décider du nombre d'enfants qu'on va avoir … S'il me dit que les deux enfants que nous avons suffisent, nous arrêtons*" (Femme mariée, niveau primaire, 31 ans, 2 enfants) ("It's up to my husband to decide how many children we will have. ... If he tells me that the two we already have are enough, we'll stop" (married woman, primary education, age 31, 2 children) [free translation]).

"*Moi, je ne peux pas décider de cela dans le foyer, sinon j'aurai tors*" (Femme mariée, niveau primaire, 39 ans, 5 enfants) ("I can't be the one to decide in our house, otherwise I'll be wrong" (married woman, primary education, 39 years old, 5 children) [free translation]).

For others, fate will decide how many children they have:

"*Moi le jour où Dieu lui-même ne me donnera plus d'enfants, j'arrêterai … même si c'est vingt enfants ou c'est combien même j'accoucherai* » (Femme mariée, niveau primaire, 21 ans, 2 enfants) ("The day God Himself doesn't give me any more children, I'll stop... Even if it's twenty children or however many, I'll give birth" (married woman, primary education, 21 years old, 2 children) [free translation]).

"*Chez nous on ne dit pas ça mon frère ; c'est Dieu qui nourrit les enfants ; on ne doit pas limiter*" (Femme marie, niveau secondaire, 30 ans, 4 enfants) ("My brother, we don't say that in our house. God is the one who feeds the children, we must not limit ourselves" (married woman, secondary education, 30 years old, 4 children) [free translation]).

These latter responses explain why the relationship between women's decision-making autonomy and desired fertility in highly gender-inegalitarian socio-cultural groups is not as expected.

Female respondents living in N'Djamena say they want a relatively low number of children because of the increasingly difficult living conditions in the capital:

"*Je ne souhaite avoir que trois enfants…J'en ai même discuté avec mon mari et il est d'accord parce que le coût de vie maintenant est trop élevé et faire beaucoup d'enfants n'a pas de sens*" (Femme mariée, niveau universitaire, 30 ans, 2 enfants) ("I don't want to have more than three children ... I even discussed it with my husband and he agrees because the cost of living is too high now and it makes no sense to have a lot of children" (married woman, university educated, 30 years old, 2 children) [free translation]).

"*Moi je ne voudrais pas avoir beaucoup d'enfants … J'ai quatre enfants … C'est déjà suffisant*

puisque le coût de vie maintenant est très élevé et ce n'est pas facile d'entretenir beaucoup d'enfants" (Femme mariée, niveau primaire, 25 ans, 4 enfants) ("I don't want to have a lot of children. ... I have four children, that's enough because the cost of living is very high now and it's not easy to provide for many children" (married woman, primary education, aged 25, 4 children) [free translation]).

"*C'est le manque de moyens qui m'entraînera à limiter le nombre de mes enfants puisque sans les moyens je soignerai les enfants avec quoi quand ils tomberont malades*" (Homme marié, niveau supérieur, 34 ans, 1 enfant) ("Lack of resources is what will make me limit the number of children, because without resources, how will I take care of my children when they get sick?" (married man, higher education, 34 years old, 1 child) [free translation]).

In N'Djamena, then, people are aware of the weight of the obligations associated with providing for children. This awareness of the material responsibilities associated with procreation seems to be particularly acute among people with a relatively high level of education who work in a sector other than agriculture. In the rural context, on the other hand, people consider it necessary to have many children because the risk of infant mortality is high and because children are a help to their parents and a source of support for them in old age:

"*Oui, lorsque tu fais beaucoup d'enfants, c'est une bonne chose ... Tu es heureuse parce qu'il y a ceux que Dieu va prendre et tu es sûre que certains vont vivre, grandir et devenir des gens qui t'aideront demain ... Même 10 enfants, je souhaite en avoir*" (Femme mariée, niveau primaire, 21 ans, 2 enfants) ("Yes, it's good to have lots of children. ... You're happy because there are those [children] that God will take and you're sure that some will live, grow up and become people who will help you tomorrow. ... I'd be happy even if I had 10 children" (married woman, primary education, 21 years old, 2 children) [free translation]).

Finally, some young women interviewed do not want to have more than four children, not because they do not support traditional values of family and fertility, but because they do not want to suffer as their own parents did:

"*Si j'accouche beaucoup d'enfants, je vais beaucoup souffrir…Je suis née dans une famille de 10 personnes et je voyais comment mes parents avaient trop de difficultés pour payer les frais de scolarité de leurs enfants et faire d'autres choses*" (Femme mariée, niveau primaire, 21 ans, 3 enfants) ("If I give birth to many children, I'll suffer a lot. ... I was born in a family of ten and I saw how my parents had too many difficulties paying for their children's education and other things" (married woman, primary education, 21 years old, 3 children) [free translation]).

"*Je souhaite avoir peu d'enfants, moins que le nombre d'enfants de mes parents puisqu'aujourd'hui tout coûte cher* » (Femme mariée, niveau secondaire, 24 ans, 3 enfants) ("I want to have few children, less than the number of children my parents had, because today everything is expensive" (married woman, secondary education, 24 years old, 3 children) [free translation]).

Influence of women's autonomy on CEB

In both highly inegalitarian and less inegalitarian sociocultural groups, a woman's degree of decision-making autonomy is a determinant of the number of children ever born. Among the former, a negative relationship between a woman's degree of decision-making autonomy and CEB is observed, all things being equal (Table 2). Among the latter, highly autonomous women have fewer children than those with little decision-making autonomy. Unexpectedly, women in less inegalitarian groups with no autonomy have fewer children than women with little autonomy.

Influence of women's autonomy on CEBF

In highly gender inegalitarian groups, a woman's degree of autonomy is a determinant of CEBF, in contrast to what is observed in less inegalitarian groups. In the former, all things being equal, CEBF is lower among highly autonomous women than among those with no autonomy.

Influence of women's autonomy on the gap between DNC and CEBF

In highly gender-inegalitarian sociocultural groups, where 'fewer than the desired number of

Table 3: Relationship between the degree of decision-making autonomy of the woman and each of the indicators of fertility: results from multivariate regression models

Sociocultural groups	Degree of decision-making autonomy of the woman		
	None	**Low**	**High**
Strongly gender-inegalitarian			
DNC	*(ref)*	0.59*	0.31*
CEB	*(ref)*	0.06	-0.25*
CEBF	*(ref)*	0.06	-0.37*
Gap between DNC and CEBF			
Equal to desired number vs fewer than desired number	1.00	1.72*	1.97*
More than desired number vs fewer than desired number	1.00	0.96	0.66
TFR	8.36	8.28	7.69*
Less gender-inegalitarian groups			
DNC	-0.12	*(ref)*	-0.60*
CEB	-0.15*	*(ref)*	-0.31*
CEBF	-0.04	*(ref)*	-0.32
Gap between DNC and CEBF			
Equal to desired number vs fewer than desired number	1.73*	1.00	2.42*
More than desired number vs fewer than desired number	0.91	1.00	1.17
TFR	6.84	6.63	6.09*

Significance threshold: *** p≤ 0.01; ** p≤ 0.05; * p ≤ 0.10; *(ref)*: reference category

children' is the reference category of the dependent variable, a woman's degree of decision-making autonomy is a determinant of having had as many children as desired. Compared to women with no autonomy, women with low autonomy are more likely to have had as many children as they wanted rather than fewer than they wanted (odds ratio 1.72). The same is observed when comparing women with high autonomy with women with no autonomy (OR of 1.97). Looking at the same reference category for the dependent variable in the same sociocultural groups, a woman's degree of decision-making autonomy is not a determinant of having more children than desired. The determinants here are polygamy and the number of unions, the former having a positive effect and the latter having a negative effect.

In socio-cultural groups that are less gender inegalitarian, the same is observed to some extent. Women with high autonomy are again more likely to have had the same number of children as their ideal number rather than fewer (OR 2.42). However, in these groups, in contrast to the highly inegalitarian groups, women with no autonomy differ in the same way from those with little autonomy (OR of 1.73).

Influence of women's autonomy on TFR

In both the highly inegalitarian and the less inegalitarian groups, this factor is negatively related to current fertility among women with the highest degree of autonomy. In the first type of group, all other things being equal, the TFR for highly autonomous women is 7.7 children per woman, compared with 8.4 for women with no autonomy. The same is true for the second type of group: 6.1 versus 6.8 children per woman.

Multivariate associations between women's autonomy and intermediate variables

The multivariate explanatory analyses show, among other things, that in both highly gender-inegalitarian and less gender-inegalitarian sociocultural groups, the highest level of autonomy is negatively associated with fertility as measured by either average parity or total fertility rate. They also show that in the first type of socio-cultural group, women's autonomy is associated in the same way with CEBF, while in the second type of group it is not significantly associated with the same dependent variable. In order to explain the

Table 4: Reproductive attitudes and behaviours of Chadian women in a union by the degree of decision-making autonomy of the woman (adjusted for the woman's and the partner's level of education, the woman's and the partner's economic activities, the woman's level of exposure to the media, the wealth index and the place of residence) (2014/2015 DHS/MICS, Chad)

Attitudes toward and behaviors related to reproduction	Degree of woman's decision-making autonomy		
	None	Low	High
Highly gender-inegalitarian sociocultural groups			
Percentage of women who entered their first union before the age of 20 (%)*.	90	89	85
Percentage of women who have been in more than one union (%) ns	7	8	8
Percentage of women who breastfed their penultimate child for at least 6 months (%)*.	71	68	76
Percentage of women who had not had sexual intercourse for at least 6 months after the birth of their penultimate child (%)*.	3	4	6
Percentage of women who know modern contraceptive methods (%)*	39	53	48
Percentage of women using modern contraception at the time of the survey (%) ns	2	2	2
Chances of survival for children aged 0 to 5 years*.	1.00	1.18	1.66
Percentage of women who have had antenatal care at a health facility (%) ns	69	72	67
Percentage of deliveries in a health facility in the last five years*	17	14	19
Less gender-inegalitarian sociocultural groups			
Percentage of women who entered their first union before the age of 20 (%)*.	85	86	82
Percentage of women who have been in more than one union (%) ns	12	12	16
Percentage of women who breastfed their penultimate child for at least 6 months (%)*.	69	74	75
Percentage of women who had not had sexual intercourse for at least 6 months after the birth of their penultimate child (%)*.	18	23	12
Percentage of women who know modern contraceptive methods (%)*	73	82	84
Percentage of women using modern contraception at the time of the survey (%) ns	6	8	9
Chances of survival for children aged 0 to 5 years*.	1,00	0,82	0,99
Percentage of women who have had antenatal care at a health facility (%) ns	72	81	80
Percentage of deliveries in a health facility in the last five years*	26	26	30

Significance threshold: *** p≤ 0.01; ** p≤ 0.05; ns: non-significant.

relationship between women's autonomy and their fertility, we have shown here how the intermediate fertility variables vary according to the categories of the first variable.

Union and union breakup

Late union entry and frequent union dissolution may explain the low fertility of women with a high degree of decision-making autonomy. In both types of socio-cultural group, other things being equal, the proportion of women who entered their first union before the age of 20 is significantly higher among women with no autonomy (90% and 85% respectively in the two types of group) or with little autonomy (89% and 86% respectively) than among women with a high degree of autonomy (85% and 82% respectively). In groups with low gender inequalities, the proportion of women who have joined more than one union is higher among the latter category of women (16%) than among the former (12%). In groups with high gender inequalities, this link is not significant (8% compared with 7%).

In highly gender inegalitarian socio-cultural groups, girls' early entry into marriage is socially valued because it allows them to avoid the shame that a possible pregnancy out of wedlock would bring to the family:

"U*ne fille, en vérité, si elle a 14 ans ou 15 ans elle est déjà prête pour le mariage parce que si elle reste, elle va tomber enceinte et ceci va amener la honte dans la famille* " (Femme mariée, niveau

primaire, 38 ans, 2 enfants) ("In truth, a girl is ready for marriage at 14 or 15, because if she stays, she'll get pregnant and bring shame to the family" (married woman, primary education, age 38, 2 children) [free translation]).

"M*a fille, si elle fait le désordre, je vais faire qu'elle se marie même si elle a 14 ans*" (Homme marié, niveau secondaire, 43 ans, 3 enfants) ("If my daughter behaves badly, I'll motivate her to get married, even if she's only 14" (married man, secondary education, 43 years old, 3 children).
" *Une fille ne doit pas atteindre 25 ans sans mari puisque ceci a des conséquences néfastes comme le risque d'avoir des enfants sans pères et celui*

d'accoucher difficilement à cause d'âge avancé " (Homme marié, niveau supérieur, 37 ans, 1 enfant) ("A girl should not reach the age of 25 without a husband, because this has harmful consequences, such as the risk of having children without fathers and of giving birth with difficulty" (married man, higher education, age 37, 1 child)).

Postpartum and contraceptive practices

Among couples, in both high and low inegalitarian socio-cultural groups, the proportion of women who breastfeed for a relatively long time (at least 6 months) increases with their decision-making autonomy. The prevalence of modern contraception is higher in low than in high inegalitarian groups, and only in the former does the prevalence of contraception increase with women's autonomy. Thus, among couples, the fertility-reducing effect of breastfeeding and contraception appears to be greater in low inegalitarian groups than in high inegalitarian ones, especially among highly autonomous women.

Most of the women surveyed reported using contraception, but mainly natural methods. Condoms were the only modern method mentioned:

"M*oi, c'est seulement la méthode naturelle que j'utilise*" (Femme mariée, niveau supérieur, 30 ans, 2 enfants) ("I only use the natural method" (married woman, higher education, 30 years old, 2 children) [free translation]).

("*Je compte seulement mes jours…mais avant, sous l'influence de mes amies, je prenais les pilules*" (Femme mariée, niveau secondaire, 21 ans, 2 enfants) ('I just count my days ... But before I used to take pills under the influence of my girlfriends" (married woman, secondary education, 21 years old, 2 children)).

"*Prendre les préservatifs c'est bien…et je connais comment calculer mes jours*" (Femme mariée, niveau universitaire, 22 ans, 1 enfant) ("Using condoms is good... And I know how to count my days" (married woman, university education, 22 years old, 1 child) [free translation]).

Most female respondents reported that they did not use modern contraceptive methods such as the pill, IUD or others for health reasons:
"L*a pilule, je n'en prends pas parce qu'elle a beaucoup d'effets secondaires, par exemple, elle cause certaines maladies*" (Femme mariée, 32 ans, niveau secondaire, 3 enfants) ("I don't take the pill because it has many side effects. For example, it causes some diseases" (married woman, secondary education, 32 years old, 3 children) [free translation]).

"*Je conseille même mes amies de ne pas utiliser ces méthodes ; les pilules, par exemple, rendent les femmes stériles*" (Femme mariée, niveau terminal, 35 ans, 3 enfants) ("I even advise my friends not to use these methods. For example, the pill makes women sterile" (married woman, last year of secondary school, 35 years old, 3 children) [free translation]).

"P*arce que même les femmes qui prennent ça tombent enceinte, moi j'ai vu ça avec mes propres yeux ...Il y'a une femme qui a pris les pilules mais elle s'est rendue compte qu'elle était enceinte de quatre mois* " (Femme mariée, sans instruction, 30 ans, 5 enfants) ("Because even women who take it [the pill] get pregnant - I have seen it with my own eyes. ... There's a woman who took the pill and found out she was four months pregnant" (married woman, no education, 30 years old, 5 children) [free translation]).

Finally, some respondents stressed that they would not use modern contraception until they had reached the number of children they wanted - at least 5:

"*C'est lorsque j'aurais mes cinq enfants que je vais prendre la pilule pour arrêter*" (Femme mariée, niveau primaire, 25 ans, 4 enfants) ("When I have my five children, I'll take the pill to stop" (married woman, primary education, 25 years old, 4 children).
"C*omme j'ai déjà quatre enfants c'est quand j'aurais deux en plus que je commencerai à utiliser les pilules pour arrêter de concevoir*" (Femme mariée, niveau universitaire, 37 ans, 4 enfants) ('Since I already have four children, if I have two more, I'll take the pill and stop getting pregnant' (married, university educated, 37, 4 children).

Obstetrical care behaviours and infant and child mortality

In both types of socio-cultural group, women with high decision-making autonomy are more likely than others to receive antenatal care and to give birth in a health facility. However, only in highly inegalitarian groups, the likelihood of survival of children aged 0-5 increase with women's decision-making autonomy, other things being equal. In such groups, the decreasing risk of mortality among children aged 0-5 as women's autonomy increases is the main explanation for the negative relationship observed between this factor and fertility. In less gender-equal groups, on the other hand, this relationship may be explained by certain marital and reproductive behaviours, of which some have been examined above.

Discussion

According to the results obtained here, women's level of decision-making autonomy, as assessed using data from the Chad 2014/2015 DHS/MICS survey, is associated with their ideal number of children. However, the direction of the relationship observed between the two variables varies according to the context. In highly gender-inegalitarian socio-cultural groups, we find a positive relation, while in less gender-inegalitarian groups this relation is negative. The same findings have been reported in Woldemicael[27] and Ushma and Karasek[28].

We have assumed that women with decision-making power have the self-determination and resources to achieve their fertility intentions. Perhaps highly autonomous women in highly inegalitarian socio-cultural groups fulfil societal expectations of high fertility better than other women, even if their personal wish was for a smaller family. Or perhaps these observations reflect a flaw in the autonomy measures. Hindin[29] and Mullany *et al*.[30] noted that when women make their own decisions or are the ones with the authority to do so, this is a sign of an absent partner. In highly inegalitarian socio-cultural groups, where Koumakoi and Rwenge[31] suggested that polygamy levels are high, the absence of a partner should result from non-cohabiting polygamy. A woman's decision-making power is therefore not a sign of autonomy in these groups, since it is she who takes on the full burden of household responsibilities.

The difference in the relationship between women's autonomy and desired fertility between the two groups may also be due to the fact that in sub-Saharan Africa a woman's fertility determines her status. In Muslim societies, women who have a high number of children - and who may see this number as ideal - may enjoy greater rights and authority within the household. These societies ascribe a high social status to women with many children; in this context those without children suffer negative social consequences.

Strong autonomy is negatively associated to achieved fertility in both types of sociocultural group - a finding that suggests that in highly gender inegalitarian groups, women with high levels of decision-making autonomy are better able than others to fulfil social expectations of high fertility, but in practice, in these and/or less inegalitarian groups, these women are more likely to adopt marital, reproductive and health behaviours that favour low fertility. This finding supports that from Hindin's[32] in Zimbabwe and Gudbrandsen's[33] in Nepal, while contradicting Adak and Bharati's[34] in India and Yabiku et al.'s[35] in Mozambique, as the latter two studies found that none of the chosen indicators of women's autonomy were significantly associated with achieved fertility.

The hypotheses for explaining the observed negative association between the degree of women's decision-making autonomy and fertility vary between socio-cultural groups. In highly inegalitarian groups, frequent infant mortality leads couples in which women have little or no autonomy to compensate with high fertility. In less inegalitarian groups, this hypothesis is not relevant, as no significant association was found

between women's decision-making autonomy and the chances of infant survival. Here, late unions, union dissolution, the fertility-reducing effects of breastfeeding and modern contraception, and other intermediate variables not considered here explain why women's decision-making autonomy is negatively associated with fertility.

The Chad 2014/2015 DHS/MICS data also showed that 14.6% of all women aged 35 and over reported having more children than their ideal number, and 8.3% reported having reached their ideal number. The gap between these two categories was greater in highly inegalitarian socio-cultural groups (13% versus 5.6%, the relative difference is 57%) than in less inegalitarian groups (16.1% versus 11.1%, the relative difference is 31%). This result supports the idea that, in Chad, fertility-related social values are particularly strong in the first type of sociocultural group: as emphasized above, women who have many children, or for whom a high number of children is ideal, are socially valued, which in turn gives them more rights and authority. For Donadjé[36], the fact that in African societies, most of which are patriarchal, it is the man and not the woman who is directly called upon by his family to achieve the goal of having high fertility explains why, in the collective imaginary, high fertility is what determines a woman's level of social esteem. If the woman does not enable the man to achieve this goal, her social value will fall and she will have to accept polygamy.

Moreover, the results of our study suggest that fertility in the first type of sociocultural group could be substantially reduced if women could avoid unwanted fertility and limit the number of children they have to the number they consider ideal. This means that the demand for family planning in these groups is high and that the supply of modern contraception should be increased.

We have seen that the gap between a woman's achieved fertility and her ideal number of children varies according to her degree of decision-making autonomy. Our findings for highly inegalitarian groups are entirely consistent with expectations: compared with women with no autonomy, both low and high autonomy women are more likely to have reached the number of children they wanted. In less inegalitarian sociocultural groups, however, this relationship is only observed for highly autonomous women. To understand this last result, we need to look again at the intermediate fertility variables. In less inegalitarian sociocultural groups, we see that although women with no autonomy and women with little autonomy entered a union at the same age, their behaviour in that union is different: the prevalence of modern contraception is lower among women with no autonomy than among women with some autonomy (5.6% and 10.3% respectively). However, this does not offset the positive fertility effects of the relatively short duration of breastfeeding found among women with some autonomy (18% of women with no autonomy versus 8% of women with some autonomy breastfeed their children for at least 25 months [results not shown]).

Conclusion and recommendations

In Chad, a woman's autonomy has a negative impact on her fertility, but the hypotheses explaining this relationship vary according to the type of socio-cultural group. This overall finding confirms not only the relevance of development programmes aimed at empowering women, but also the need for these programmes to take sufficient account of the socio-cultural and *economic* contexts in which the groups in question live.

References

1. Locoh TH. « Structure familiale et évolution de la fécondité dans les pays à fécondité intermédiaire d'Afrique de l'Ouest », 2022; pp.169-186.
2. [https://www.un.org/en/development/desa/population/publications/pdf/fertility/completing-fertility/Revised2LOCOHpaper.PDF]
3. Libité PR and Souaibou M. « Fécondité », in Institut National de la Statistique (INS) et ICF International 2012. Enquête Démographique et de Santé et à Indicateurs Multiples (EDS-MICS) du Cameroun 2011, Calverton, Maryland, U.S.A, 2012 ; 71-88.
4. United Nations Population Division (2019), World population prospects 2019 : Highlights [http://population.un.org/wpp2019/] (Consulté le 6 janvier 2021).
5. National Population Commission (NPC) et ICF International (2014), Nigeria Demographic and Health Survey 2013. Abuja, Nigeria and Rockville, Maryland, U.S.A, p.65.
6. Mbatina B. « Fécondité », *in* Institut National de la Statistique, des Études Économiques et Démographiques (INSEED), Ministère de la Santé Publique (MSP) et ICF International 2014-2015. *Enquête Démographique et de Santé et à Indicateurs*

Multiples (EDS-MICS) du Tchad 2014-2015, Rockville, Maryland, U.S.A, 2015 ; pp.67-82.
7. Vimard P and Fassassi R. Démographie et développement en Afrique : éléments rétrospectifs. In *Cahier Québécois de Démographie*, vol.40, n°2, Automne 2011, pp.365-370.
8. Domenach H. « Les grandes tendances démographiques et l'environnement : l'enjeu d'une planète viable », in Mondes en développement 2008, vol.2, n°142, pp.97-111.
9. World Bank. Determinants and Consequences of High Fertility. A synopsis of evidence. 2010. https://doi.org/10.1596/27497
10. Institut National de la Statistique, des Études Économiques et Démographiques (2014a), *Deuxième Recensement General de la Population et de l'Habitat (RGPH) du Tchad 2009*, *rapport d'analyse, thème 2, État et structures de la population*, N'Djamena, 189p.
11. Conner M and Norman P. « Predicting Health Behaviour: A Social Cognition Approach », dans M. Conner and P. Norman (dir.), Predicting Health Behaviour, Berkshire (Royaume-Uni), Open University Press. 2005.
12. Kabeer N. « Reflections on the measurement of women's empowerment », in A. Sisask (ed.), *Discussing Women's Empowerment: Theory and Pratice*, Stockholm, SIDA Swedish International Development Cooperation Agency. 2001.
13. Adjiwanou V and Legrand TK. « Effets des normes de genre, de l'éducation et de l'emploi sur l'autonomie décisionnelle des femmes en Afrique subsaharienne », cahier québécois de démographie, 2015 ; vol.44, n°1, pp.89-128.
14. Caldwell JC and Caldwell P. « Women's Position and Child Mortality and Morbidity in Less developed Countries », dans N. Federici, K. O. Mason et S. Sogner (dir.), Women's Position and Demographic Change, Oxford, Clarendon Press:1993; 122-139.
15. Rahman M., Mostofa . and Hoque M. « Women's household decision-making autonomy and contraceptive behavior among Bangladeshi women. Sexual and reproductive healthcare », March 2014, vol.5, n°1, pp.9-15.
16. Ushma DU and Karasek D. « Autonomisation des femmes et nombre idéal d'enfants : Examen des mesures EDS d'autonomisation en Afrique subsaharienne », *Perspective Internationales sur la Santé Sexuelle et Génésique*, numéro spécial de 2013, pp.10-21.
17. Kamiya Y. « Women's autonomy and reproductive health care utilisation : Empirical evidence from Tajikistan », Health Policy, 2011; 102, 2-3 : 304-313.
18. Singh K, Bloom S, Haney E, Olorunsaiye C and Brodish P. « Gender equality and childbirth in a health facility: Nigeria and MDG5 », *African Journal of Reproductive Health*, September 2012, vol.16, n°3, pp.123-129.
19. Bold Van Den M, Quisumbing AR and Gillespie S. *Women's empowerment and nutition: an evidence review*. IFPRI Discussion Paper 01294, September 2013, 80p.
20. Schoumaker B. « Indicateurs de niveau de vie et mesure de la relation entre pauvreté et fécondité : l'exemple de l'Afrique du Sud », *Population*, 1999 ; vol.54, n°6, pp.963-992.
21. Davis K and Blake J. « Social structure and fertility: an analytical Framework », *Economic Development and Cultural Change*, vol.4, n°3, 1956; pp.211-235.
22. Bongaarts J. « A Framework for analyzing the proximate determinants of fertility », *Population and Development Review*, vol.4, n°1, 1978; pp.105-132.
23. Bongaarts J. and Potter R. « Fertility, biology and behavior. An analysis of the proximate determinants », *New York, Academic Press,* 1983*;* 230p.
24. Rwenge M, Kamdem H, Nganawara D and Nouetagni S. Statistique descriptive appliquée à la démographie. Document pédagogique de l'IFORD, Imprimerie Saint-Paul de Yaoundé, avril 2013, 175p.
25. Rwenge M. Statistique mathématique : Exposés des méthodes et problèmes résolus. Presses Universitaire de Yaoundé, Yaoundé, juillet 2019, 250p.
26. Schoumaker B. *Analyse multiniveaux des determinants de la fécondité, théories, méthodes et applications au Maroc rural*, Thèse de doctorat en Démographie de l'Université Catholique Louvain-La-Neuve, 2001 ; 322p.
27. Schoumaker B. « Une approche personnes-périodes pour l'analyse des histoires génésiques », *Population*, vol.59, n°5, 2004 ; pp.783-793.
28. Woldemicael G. « Women's autonomy and reproductive preferences in Eritrea », *Journal of Biosocial Science*, vol.41, n°2, 2009; pp.161-181.
29. Ushma DU and Karasek D. « Autonomisation des femmes et nombre idéal d'enfants: Examen des mesures EDS d'autonomisation en Afrique subsaharienne », *Perspective Internationales sur la Santé Sexuelle et Génésique*, numéro spécial de 2013, pp.10-21.
30. Hindin MJ. « Women's input into household decisions and their nutritional status in three resource-constraind setting », *Public Health Nutrition*, vol.9, n°4, 2006; pp.485-493.
31. Mullany B, Hindin MJ and Becker S. « Can women's autonomy impede male involvement in pregnancy health in Katmandu, Nepal? », *Social Science and Medecine*, vol.61, n°9, pp.1993-2006.
32. Koumakoi H and Rwenge M. « Dynamique de la polygamie au Tchad », Annales de l'Université de Moundou, Série A-FLASH Vol.9(2), Décembre 2022, pp. 793-813.
33. Hindin MJ. « Women's autonomy, women's status and fertility related behavior in Zimbabwe », *Population Research and Policy Review*, vol.19, n°3, 2000; pp.255-282.
34. Gudbrandsen HN. « Female autonomy and fertility in Nepal », *South Asia Economic Journal*, vol.14, n°1, 2013; pp.157-173.
35. Adak DK and Bharati P. *Position of women in the Ladiya society: demographic perspectives*, Coll Antropol, vol.35, n°2, 2011; pp.319-324.
36. Yabiku ST, Agadjanian V and Sevoyan A. « Husbands' labour migration and wives' autonomy, Mozambique 2000-2006 », *Population Studies*, vol.64, n°3, 2010, pp.293-306.

37. Donadjé F. Nuptialité et fécondité des hommes au sud-Bénin. Pour une approche des stratégies de reproduction au Bénin. Louvain-La-Neuve, Belgique, Academia. Université Catholique de Louvain, Institut de Démographie, 1992, 222p.