

A Comparative Analysis of Contraceptive Use in Africa: Evidence from DHS

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Abstract

The aim of this article is to show a comparative analysis of contraceptive use in areas of traditionally high fertility that have gone through profound changes. Data have been taken from the latest Demographic and Health Surveys (DHS). Logistic regression models were adopted for four selected representative countries, namely Egypt, Mali, Namibia and Niger. There were two selection criteria: data should be recent, and selected countries should have high (Egypt 57.4%; Namibia 46.4%) or low (Mali 7.5%; Niger 10.0%) contraceptive use. The probability of using contraception when a woman has had one to four children is 2.4 times higher than when they have had no children. Contraception data are always gathered at a point of time, but cross-sectional data are not sufficient to understand all the mechanisms hidden behind contraceptive use. Different contraceptive behaviours need good estimation tools to develop specific family planning programmes.

Background

The objective of the global action plan of the Cairo conference was to favour economic and social development through the control of demographic growth. To achieve this aim, African countries will have to manage to reduce their general mortality, infant mortality and maternal mortality and to decrease their high fertility to finally favour a certain stabilization of the world population. To achieve such aims, family planning was one of the most preferred tools, through better contraceptive use. To understand the levels and trends of contraception use (Montgomery and Casterline, 1996), it is important to have a good idea of the social situation and the social issues on the continent.

Different policies put in place here and there consist of developing family planning activities (training of health personnel, educational activities, clinical services, etc.). Today, one can see that such policies were not implemented everywhere with the same vigour (Bongaarts and Sinding, 2009; Clement and Madise, 2004). The gap is revealed by comparing urban and rural areas. One can therefore justifiably wonder about the causes of these discrepancies. The more important means of contraception were developed in the urban areas where the fertility levels were the lowest (Bongaarts, Mauldin and Phillips, 1990). Together with the urbanization and dispersal of better education strategies, the level of instruction rose in the urban areas, leading to easier access to information, especially medical information related to contraception

(Caldwell and Caldwell, 1988; Cleland and Rutstein, 1986; Oyedokun, 2007; Tankoano, 1989). Rural areas are devoid of such structures (sanitary and education infrastructures) which could facilitate people's knowledge and practice of contraception. The inadequacies in educational structures increase difficulties in accessing contraceptive information (Sathiya Susuman, 2009). As a consequence, there is a great necessity for additional efforts and means of communication related to this matter.

In addition to this lack of educational structures, there is an inadequacy of healthcare structures in many African countries. They are not only limited, but the population has restricted access to them. The rural population is generally scattered in huge geographical areas with sometimes a single inadequate and poorly equipped health centre (Podhisita, 1998; Sahran, and Valente, 2002). The aim of a real diffusion of contraception practices pre-supposes easy access to family planning centres dedicated to the specific issues of each population and staffed by health workers, matrons and sanitary educators who are well trained. The advance in favourable behaviours towards family planning seems to be partly due to the effects of the crisis and one could think that it should reach the rural regions. Aspirations for a reduced family can be perceived in the premises of fertility decline in rural areas (Delaunay, 1998), though one cannot affirm that the decrease in fertility is only due to contraception.

Family planning is perceived by international authorities as the most effective means to ameliorate the general quality of life while developing the health status of the mother and the child. By the same token, it gives governments a chance to lighten the pressure on themselves regarding the social and economic needs that they will not have to carry (Population Reference Bureau, 2008). The implementation of such policies is not without problems. On the one hand, there are some factors which facilitate the changes of behaviours and, on the other hand, factors which require the intervention of governments through big institutional measures (economic incentives or family planning, for instance). The continuing development of African capitals makes urbanization become a precursor element of change and constitutes the base of diffusion of new ideas and new demographic behaviours (Ross and Winfrey, 2001).

Use of contraception is generally very limited in most of Africa except in a few east African and southern African countries like Kenya, Botswana, and Zimbabwe which benefitted early from the introduction of clinics (Muhwava, 2003). These countries were the first ones to admit their high levels of fertility. Everywhere else, the conscientiousness grew, but family planning programmes were very dissimilar. There were indeed some countries which were very late implementing any programmes (Locoh and Makdessi, 1996). Following the Knowledge Aptitude Practice surveys (KAP), the Demographic and Health Survey (DHS) were implemented and permitted to gauge the results of these policies. These statistics revealed strong disparities among countries. One has to recognize that huge efforts were made in a variety of ways, but efficacy, especially in rural areas, could not always be assured.

Why would African countries have an interest in controlling their populations' growth? What are the stakes in terms of employment, health and education? What is the role of family planning for their economic development? Most of the developing countries have finally considered the rapid growth of their populations and its consequences as a big challenge (Amegee, 2001; Charbit, 2002; Demographic and Health Survey, 2003). The principal problem of this growth is the aggravation of pauperization. The fear of its intensification exists in particular in African capitals with high urban growth. This observation is essential to understanding family planning programmes. The economic crisis has been a pre-condition for implementation of birth control policies, and understanding the economic issues is a pre-requisite to understanding the stakes of contraception and unsatisfied needs for contraception in Africa (Westoff, 1974; Wilder, 2007).

The United Nations ran their first survey in 1976, when 37% of African governments considered that their national fertility was too high. These surveys showed the evolution of the positions. The gap between partisans of reduction and the ones in favour of 'laissez faire' continued to mount (United Nations, 2009a). A wider consensus was indeed obtained at the African Population Conference in Arusha (Tanzania) in 1984, with the adoption of the 'Kilimanjaro action programme' (United Nations, 1998). Between the Bucharest conference and just before the second conference in Mexico, the proportion of countries in favour of an intervention for diminution went from 38% to 49%. This proportion rose to 61% two years after the Mexico conference. In the meantime, there was a deterioration of the principal rates of basic products (petrol, minerals, and metals) as well as agricultural production (fishing, cattle rearing, and forestry resources) together with a heavier external debt. In parallel, the demographic burden was rising higher and higher (3% of the annual population growth). Times after the Mexico conference are marked by an important change in the attitude of governments towards family planning. As a first concrete action which reflected this change of attitudes, public authorities gave official support for the utilization of modern contraceptives (United Nations, 2004).

In this situation, the study of relationships between individuals and the social environment is essential for one to understand the diffusion of new values in a rural society (Van de Walle, and Foster, 1990). In particular, regarding a comparative analysis of contraception and fertility, several studies carried out in Africa (Amegee, 2001; Caldwell, and Caldwell, 1988; Donadje, 1992; Mokima, 1992) show the impact of the family circle in the couple's decision making. A couple's choices of fertility and education of their children are, at the same time, individual and collective. The individual is influenced by an organized and structured social framework. The place of the couple in this environment is dictated by laws and customs which have their sources in the family's traditions. This way of life allows the close extended family a say in family matters and in particular on all questions related to fertility (Ezeh, and Mboup, 1997; Mesganaw, 2006). The patriarchal system is the base of this social ideal. The man has all the rights pertaining to the constitution of his descent. And because a large descent is venerated, he will try to maximize it (Freedman and Berelson, 1976; Westoff and Bankole, 2000). The community makes sure that this optimization is effective. The female only exists in

this society through conforming with strict rules. Yet, a large descent is a guarantee for social recognition of the husband but also of the wife. As a consequence, the biological reproductive conception of the community sphere translates necessarily into procreation decisions (Lapham and Mauldin, 1972). The levirate, sororate and polygamous traditions are examples which show the fertility perspective of these populations.

The factor of contraception appears to be more and more necessary to approach the fertility decline in Africa. One cannot speak today of the decrease of fertility in certain African countries without taking note of the upsurge of contraceptive practices. The beginning of the decline of fertility, even if largely attributable to first marrying at a later age, cannot be mentioned without reference to contraception which has slowly entered African customs. The retrospective surveys run within the frames of international programmes make it possible to follow the evolution of the knowledge and practice of contraception in Africa. We now turn to data and methodological issues involved in testing the change in contraceptive use and fertility we have just presented.

Data and Methods

The Demographic and Health Surveys are household surveys which are designed to be nationally representative. These surveys provide a large range of data in the areas of health, nutrition and general population issues. The aim of the DHS was to provide comprehensive information on fertility and mortality, maternal and child health, family planning, fertility preferences, and on knowledge and behaviour concerning HIV/AIDS. Such surveys are ideally implemented every five years to allow comparisons in time, yet several countries do not offer a survey every five years. The DHS are large surveys covering in general between 5000–30,000 households, and can be complemented by interim surveys with smaller samples. Analysing the DHS, we present an overview of the contraceptive situation in Africa (Gribble, 2003; Ministry of Health and Social Services, 2003) and we would like to highlight in more detail the potential factors that could influence contraceptive use. To do so, we have chosen certain countries as examples. Our choice was based on two criteria: data should be recent, and the selected countries should have high or low contraceptive use.

Variable Selection

The analysis is made country by country before grouping them into regional areas as northern, western, central, eastern and southern Africa, and by other critical variables such as main religion or main language spoken. Finally, it is a global African overview that we develop. For each country and each survey we consider variables on contraceptive use. The point is to create tables by age and contraceptive methods used. Using these comprehensive tables as a starting point, we create summary tables which highlight the type of users to put emphasis on the category of background characteristics. The analysis, thanks to the large sample, is a direct analysis based on cross tabulations (not shown). The cross-tabulations are mainly organized around contraceptive behaviour and age, as one point of this study is to look at the technical aspect of the estimation of contraceptive use and fertility. To consider the reasons and variables influencing contraception, we use logistic regression to go into a more

detailed analysis of socio-economic factors such as, for instance, education of respondent, education of partner, wealth status, place of residence, religion, and so on. The specific variables we used can be categorized as follows:

Sample weight (variable V005 in the data sets): the variable is used to obtain a representative sample of women aged 15–49 in each country.

Year of interview (variable V007 in the data sets).

Age (variable V013 in the data sets): the variable selected for the study was a five-year age group, sorted into seven specific age groups: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44 and 45–49.

Type of residence (variable V025 in the data sets): type of residence was sorted into rural or urban place of actual residence, as well as the region of residence.

Highest education level of the respondent (variable V106 in the data sets) and *her partner* (variable V704 in the data sets): the education level was the highest attended type of schooling. It was sorted into: never attended school, primary education, secondary education, tertiary or higher education.

Professional status of the respondent: the professional status was sorted into working or not working (without going into labour categories, as the great majority of the working females in Africa were employed in the agricultural sector).

Size of the household (variable V136 in the data sets): the size of the household was expressed in terms of number of household members.

Relationship between respondent and head of household (variable V150 in the data sets): this category was considered as the respondent being the head of household or not.

Gender of head of household (variable V151 in the data sets): this category was sorted into household head male or female.

Decision-making for contraceptive use: this category showed the degree of decision of the female in the household (low, middle, high).

Religion (variable V130 in the data sets): the religion considered is the religion which the respondent considered they belonged to. The categories were: Animist, Catholic, Christian (when the difference was not made among Christians groups), Muslim, Orthodox, Protestant, other and no religion.

Number of children ever born (variable V201 in the data sets): this variable was asked to the respondent to establish the number of children born alive that she had ever had.

Number of living children (variable V213 in the data sets): this variable was asked to the respondent to establish the number of children still alive that she had.

Age at first birth (variable V212 in the data sets): the respondent was asked her age in completed years at first birth, if she had ever given birth.

Pregnancy (variable V218 in the data sets): the respondent was asked if she was pregnant at the time of the interview (yes or no). This variable was particularly important for the category ‘reason not to use contraception’.

Use of contraception (variable V312 in the data sets): the respondent was asked which contraceptive methods she used at the time of the interview. The respondent had the choice between several methods: pill, condoms, the intrauterine device (IUD),

injections, implants, diaphragm, male sterilization, female sterilization, rhythm abstinence, withdrawal or other methods.

Also, a host of new variables were created, recoded from existing variables. For instance, current contraceptive use was a key variable and it has been re-coded into current contraceptive users and non-current contraceptive users. Users were subdivided into users of modern methods and traditional methods and non-users were themselves sorted into non-users with reason not to use, and non-users with no reason not to use (non-users not presented here). The logistic regression model by contraceptive users was for four selected representative countries: Egypt, Mali, Namibia and Niger.

Statistical Analysis

The analysis summary statistics were obtained to see which variables were significant for further analysis, and means, standard deviations, chi-square and degrees of freedom were calculated for the selected variables. Cross tabulations were run in examining the association between contraceptive use, the type of contraceptive use and the age of the females. These cross-tabulations were of the utmost importance as they show the evolution of rates of contraceptive use by age, and also permit us to understand the structure of the population under study (not presented here). Moreover, it enables the researcher to show the evolution in time when at least two surveys were available. Logistic regressions analysis was used for four countries: Egypt, Mali, Namibia and Niger. These countries were chosen because of their high (Egypt and Namibia) and low (Mali and Niger) contraceptive use. From these four countries, which we considered representative of the different situations one can find in the continent, we tried to understand the impact of demographic and socio-economic variables on the use of contraception in Africa.

Table 1. Africa: summary table of use and non-use of contraception by country and year of survey.

Country	Year	Population size	Users of modern methods	Users of traditional methods	Total users	Total non-users	Non-declared	Total
Benin	2006	17,789	6.7	10.6	17.3	82.6	0.1	100
Burkina-Faso	2003	12,463	10.2	3.7	13.9	86.1	0	100
Chad	2004	6032	1.4	1.1	2.5	91.2	6.3	100
Congo	2005	7036	13.4	30.5	43.9	55.5	0.6	100
DRC	2007	9995	6.6	13.5	20.1	79.9	0	100
Egypt	2008	14,678	54.9	2.5	57.4	40.8	1.7	100
Ethiopia	2005	14,070	9.5	0.8	10.3	89.6	0.1	100
Ghana	2003	5691	14.8	5.9	20.7	79.2	0.2	100
Guinea	2005	7954	5.5	5	10.5	89.5	0	100
Kenya	2003	8195	22.7	5.6	28.4	71.6	0.1	100
Lesotho	2004	6495	27.3	1.4	28.6	70.5	0.9	100
Liberia	2007	7091	11.7	1.6	13.3	86.7	0	100
Madagascar	2004	8383	12.8	8.6	21.4	78.6	0	100
Malawi	2004	11,692	22.4	3.2	25.7	74.3	0	100
Mali	2006	14,583	5.6	1.9	7.5	92.3	0.2	100
Morocco	2003	17,050	26.2	6.6	32.8	65.7	1.5	100
Mozambique	2003	12,587	15.1	4.2	19.3	71	9.7	100
Namibia	2007	9836	45.2	1.3	46.4	53.2	0.4	100
Niger	2006	9222	4.5	5.5	10	90	0	100
Nigeria	2003	7615	7.7	5.5	13.2	86.2	0.6	100
Rwanda	2005	11,317	4.8	4.8	9.6	90.2	0.2	100
Senegal	2005	14,602	7	1.7	8.7	91.3	0	100
Swaziland	2007	4987	35.4	2.4	37.9	62.1	0	100
Tanzania	2004	10,289	20.5	1.7	22.1	77.9	0	100
Uganda	2006	8528	15.3	4.2	19.5	80	0.5	100
Zambia	2007	7146	20.4	9.5	29.9	70.1	0	100
Zimbabwe	2006	8907	38.4	1.7	40.1	59.8	0.1	100

Sources: Demographic and Health Surveys

Findings

Descriptive Analysis

Table 1 shows the four countries we chose which we believe give a good picture of the continent: two countries with high contraceptive use (Egypt 57.4%; and Namibia 46.4%), and two countries with low contraceptive use (Mali 7.5%; and Niger 10.0%).

Because of wealth issues and the socio-economic development of these countries, females might have problems in accessing contraception for financial and logistic reasons. Yet females could use a natural method to prevent unwanted pregnancies, methods which do not require money, or particular medical advice (Gribble, 2003). But it is very interesting to note that, when females use contraception, they use more modern methods above traditional ones.

The same proportions are found in Mali with 2.6% of females using the pill, 2.2% injections, and only 0.7% periodic abstinence, or 0.5% the withdrawal method. In other words, in Mali 5.6% of the females use a modern method while 1.9% use a traditional

method. In Ethiopia, 9.5% of females choose modern methods, with only 0.8% choosing a natural one, and in Senegal 7% of users employ modern contraception, against 1.7% of users employing traditional methods. Egypt is indeed the country with the highest contraceptive use (57.4%). Namibia, with a high contraceptive use (46.4% in 2007) represents the southern African countries in terms of contraceptive behaviours.

These results show that contraceptive use is not only a matter of access to contraception, as potentially everyone can access natural methods, but rather a matter of socio-political choices of public authorities to focus on diffusion of modern contraception on the one hand, and a matter of influence of culture and society itself over the fertility preferences of the individuals, on the other hand. For the four countries, we controlled for the following variables: age of respondent, number of living children, religion, education level of the respondent and her partner, wealth category, work status, place and region of residence. For clarity, we kept in our tables, displayed in this section, the variables which were meaningful; in other words, only the variables which were statistically significant and had an impact on the contraceptive use. For each significant variable we looked at the odd ratios, which inform us about the probability to use (or not to use) according to different categories inside the same variable, when compared to a control group. For instance, if we look at the role of education, we will see whether the chance to use contraception increases with education level or not. This regression analysis will be first presented for countries with high contraceptive prevalence (Egypt and Namibia) and then for countries with low contraceptive prevalence (Mali and Niger).

Figure 1 shows the geographical distribution of the different level of contraceptive use and enables us to locate the different type of countries according to their attitude towards contraception. Countries of type I are essentially concentrated in West Africa.

The map in Figure 1 depicts the proportions of users of contraception regardless of modern or traditional methods in Africa. The results shown on this map correspond to the latest survey for each country where a Demographic and Health Survey was available. The four different groups of countries found on this map indicate four different levels of contraceptive use. As one can see, contraceptive use is very low in countries belonging to the category of group I. Contraceptive use is almost non-existent in Chad in 2004 with a mere 2.5% of users of all methods. The level of contraceptive use is also particularly low in Mali in 2006 with 7.5% of females using contraception. In Rwanda in 2005 the contraceptive use rate is also below 10% (9.6%). Niger just reached 10% in 2006. We decided to include Ethiopia with 10.3% as well as Guinea 10.5% in this category, as the level of contraception was very close to 10% and because the characteristics of these two countries were similar to the other countries belonging to this first group. Indeed, these countries are among the poorest in Africa.

Regression Model by Selected Background Characteristics on Contraceptive use in Selected Countries

Egypt 2008. Egypt is a country with a high proportion of users. It is interesting to first look at the factors that can influence this use. In this first model, we tried to understand

which variables had a potential impact on contraceptive use. For instance, we wanted to understand if working status plays a role and, if so, whether working or not working makes females use more contraception. By looking at each variable and its categories, we will be able to see what will be the best tools for family planning programmes. The probability of being a contraceptive user changes among the age groups. When females are 20–24 years old they are 7.2 times more likely to use contraception than when they are 15–19 years old (see table 2). When we compare the older ages to this youngest reference group, one can observe that the probabilities are always higher, but seem to decrease after 25 years old. Indeed, at 25–29, females are 5.5 times more likely to use contraception and the probability will decline to around 3.0 times for the older groups. This trend is normal and similar to the one that one can find in developed countries, with the highest probabilities to use contraception concentrated between the ages of 25 and 39 years old.

If we now consider the number of living children (potential current pregnancy excluded), the results correspond to a country where females use contraception to limit birth, with the probability of using contraception increasing with the number of children alive (until five children). Females who already have one to four children have a 1.3 times higher chance of using contraception than a female without children. But for those who have had at least five children, there is a probability of using contraception 1.5 times less than childless females. In other words, females who have up to five children are more inclined to use than females who do not have a child yet, but once females reach five children, they are less inclined to use because of the age effect or cultural reasons, for instance.

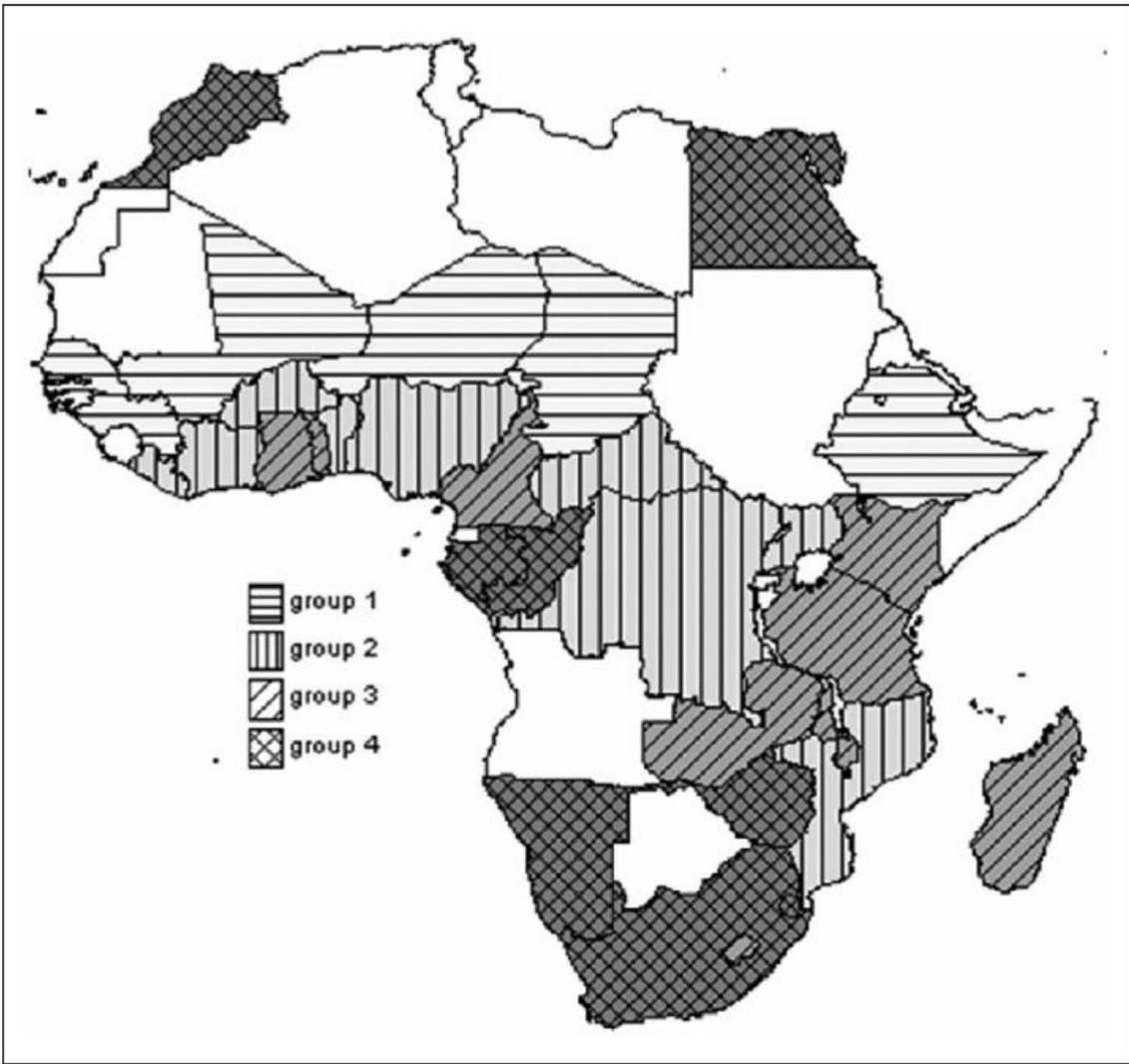


Figure 1. Africa: map of proportions of females 15–49 years old who use any contraceptive methods. *Sources:* Demographic and Health Surveys

Table 2. Regression model (95% CI) predicting the respondents' selected background characteristics on contraceptive use in selected countries.

Variables	Egypt 2008			Namibia 2007			Mali 2006			Niger 2006		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
		<	>		<	>		<	>		<	>
Age												
15–19*	1.0			1.0			1.0			1.0		
20–24	7.3	5.4	9.7	1.5	1.2	2.0	1.1	0.7	1.5	0.5	0.3	0.7
25–29	5.5	4.6	6.5	2.9	2.4	3.7	1.9	1.4	2.6	1.5	1.1	2.1
30–34	3.8	3.3	4.3	2.5	2.1	3.1	2.2	1.6	3	1.9	1.4	2.5
35–39	3.4	3.0	3.9	2.0	1.6	2.4	2	1.4	2.8	1.8	1.3	2.5
40–44	3.4	2.9	3.8	1.8	1.4	2.2	2.7	2.0	3.8	1.6	1.2	2.2
45–49	2.8	2.4	3.1	1.6	1.3	2.0	1.7	1.2	2.5	1.3	0.9	1.8
Number of living children												
0*	1.0			1.0			1.0			1.0		
1–4	1.3	1.1	1.4	2.4	1.9	3.2	1.1	0.9	1.3	0.9	0.8	1.2
5+	0.5	0.4	0.5	1.2	1.0	1.5	0.9	0.7	1.1	1.1	0.9	1.4
Education level												
No education*	1.0			1.0			1.0			1.0		
Primary	1.5	1.3	1.6	2.2	1.8	2.8	3.0	2.0	4.5	0.7	0.4	1.1
Secondary	0.6	0.6	0.9	0.7	0.6	0.8	0.6	0.4	0.9	0.9	0.5	1.8
Higher	0.8	0.6	0.9	0.7	0.5	0.8	0.4	0.2	0.7	0.6	0.4	1.0
Partner's education level												
No education*	1.0			1.0			1.0			1.0		
Primary	1.1	0.1	21.6	1.4	1.2	1.8	0.5	0.4	0.6	5.6	3.8	8.4
Secondary	1.1	0.1	22.2	1	0.9	1.2	3.4	2.5	4.7	7.9	5.4	11.6
Higher	1.1	0.1	22.2	1.1	1.0	1.3	4.3	3.2	5.7	12.3	7.6	19.9
Wealth category												
Poorest*	1.0			1.0			1.0			1.0		
Poorer	0.9	0.7	1.0	0.7	0.6	0.9	0.4	0.3	0.5	0.9	0.67	1.2
Middle	0.8	0.7	0.9	0.9	0.8	1.1	0.5	0.4	0.6	0.8	0.6	1.0
Richer	0.8	0.7	0.9	0.8	0.7	1.0	0.5	0.3	0.6	0.7	0.5	0.9
Richest	0.8	0.7	0.9	1.1	1.0	1.3	0.8	0.6	1.0	0.8	0.6	1.1
Work status												
Not working*	1.0			1.0			1.0			1.0		
Working	1.0	0.9	1.1	1.6	1.4	1.7	1.1	1.0	1.3	1.2	1.0	1.4
Residence												
Rural*	1.0			1.0			1.0			1.0		
Urban	1.0	0.7	1.4	1.1	1.0	1.3	2.0	1.6	2.4	2.0	1.5	2.6

Source: Demographic Health Survey. *reference category; OR = odds ratio; < lower level; > upper level.

Education also plays a role in contraceptive use, with the probability of use increasing with education level. A female who has primary education has 1.4 more chance of using than a female without education, but when we consider the education level of females' partners, there is also a positive correlation between using contraception and partners' education level.

Wealth status seems to positively influence contraceptive use. Indeed, the richer females are, the more they are likely to use contraception. When one compares the different wealth categories with the poorest category, one can see that there is a positive relationship

between wealth and contraceptive use. Poorer females are 1.1 times less likely to use contraception than poorest females. Females belonging to the middle wealth category are 1.2 less likely to use than the poorest females; those belonging to the richer category are 1.2 more likely, and finally the richest women are also 1.2 times more likely to use than the poorest women in the country. Therefore the more the economic status of females increases, the more they are prone to use contraceptive methods.

Work status (obviously correlated with wealth) has a strong impact on contraceptive use. When females are working, the probability of them using contraception is equal to the probability of females not working. Therefore working status has a strong impact on contraceptive use.

When one looks at the place of living, one can see that, interestingly, there is a difference in likelihood to use contraception for females living in rural and urban areas.

Namibia 2007. Namibia, with a high contraceptive use (46.4% in 2007) represents the southern African countries in terms of contraceptive behaviours. Indeed, countries from this sub-region generally have the highest contraceptive use on the African continent. Because of the recent data available for this country, Namibia was selected to give a picture of contraception for the southern part of Africa in particular, and to give us insights into the role of demographic and socio-economic variables of a high contraceptive-use country in general. The regression analysis was organized by four selected countries by contraceptive users. For each model, the same variables are discussed to see the impact of these variables on the respective contraceptive behaviours.

Table 2 displays probabilities to be a contraceptive user according to selected criteria. When one looks at the probabilities to use and the age of females, one can see a normal correlation between these two variables. Indeed, the chances of being a contraceptive user increases until 34 years old, and decreases after that age. This trend is explained by the fact that the contraceptive use increases once females have reached their ideal family size, and decreases when women start to be infertile. In the case of Namibia, when one considers the age group 15–19 as the group of reference, one can see that females of 20–24 have 1.5 times more chance of using contraception than this reference group. At 25–29 years old, there is 2.9 times more chance, at 30–34 years old, there is 2.5 times more chance, at 35–39 there is 1.9 times more chance, at 40–44 years old there is 1.7 times more chance and at 45–49 years old there is 1.6 times more chance. Therefore results for Namibia correspond to a typical country where a high proportion of females practice birth control. These trends are similar to trends that one finds in western countries, with increasing probabilities until 30 years old and decreasing probabilities after that age.

Regarding the number of living children, the probability of using contraception is higher when females already had at least one child. The probability of using contraception when a woman has had one to four children is 2.4 times higher than when they had no child. When a woman had five children or more, the chances of using contraception are only 1.2 times higher than when she has none. These results are once again in perfect accordance

with the contraception levels in the country. Females tend to limit their pregnancies when they have between one and four children, but once they reach five children or more, they usually do not use contraception even if they already have a large family, and often either by choice or fate.

Education reveals interesting results. In fact, one would expect that the more females are educated, the more they are prone to use. However, the regressions show that such a statement is not true. If females with primary school education have 2.2 times higher probabilities of using than their counterparts with no education, females with secondary education or higher education are less likely to use than females who never went to school (1.3 times less chance respectively). This result, if strange at first glance, can hide an age and generation effect. Indeed, females who are the most educated are the youngest, and therefore less prone to use contraception as they have not reached their ideal family size yet. The same pattern can be observed when one takes into consideration the education level of women's partners. When a partner has completed primary school, the chances of a female using contraception are 1.4 times higher than for a partner who never attended school, but when he has a secondary or higher education level, the odds to use contraception are equal to one, which shows that education in that case does not have a great influence on contraceptive use: only no education is significant.

Wealth status does not play a positive role in contraceptive use. Indeed, it seems that the poorest females use contraception more than any other categories. Compared to the poorest (the reference category), the poorer use 1.3 times less, the females from the middle category use 1.1 times less, the richer 1.2 times less, and the richest have the same probability to use. Therefore wealth status does not seem to be an efficient tool for influencing contraceptive use. Work status seems to play a bigger role, even if the probability of using when working is only 1.6 times higher than when not working. Contraceptive use is not very responsive to the place of residence. The odds for females who live in urban areas are only 1.1 times higher than the odds for a female who lives in rural areas. Therefore, the place of residence does not have any impact on contraceptive use. In other words, only a few variables seem to play a positive role on contraceptive use: age, number of living children and, to a smaller extent, education. Indeed, socio-economic variables do not have as great or positive impacts, as demographic variables do. This model gives us insights into probabilities to use contraception according to selected variables.

Mali 2006. Mali is a west-African country with one of the lowest contraceptive uses on the African continent in 2006 (7.5%). By looking at the users, the unmet-needs and the intention to use, one will have a clearer idea of the variables that can help increase contraceptive use and especially decrease the proportion of unmet-needs. The likelihood of being a user in Mali differs a little from one age group to the other but not to a great extent. At 20–24 years old the probability of using is the same as at 15–19 years old. At 25–29 years females have 1.8 times more chance of using contraception than their youngest counterparts; for the age group 30–34 years old the likelihood is 2.2 times higher; for the age group 35–39, it is 2.7 times higher and, finally, at 45–49 years old,

females have 1.7 times more chance of using than at 15–19 years old. Hence age only has a small effect.

Echoing age, the number of living children does not have a great impact on contraceptive use. Indeed, females with one to four children have the same probabilities to use than a female who did not have any, and when females have had at least five children, they are 1.1 times less likely to use than those who are childless.

Therefore, it is not a variable that can be effectively employed to improve contraceptive use in the country. Education has indeed a certain weight on the probability to use. When females have a primary education level, then they are 3.0 times more likely to use contraception than females who never attended school. But when education level increases, the positive impact disappears and even becomes negative. Females who have a secondary school level education are 1.4 times less prone to use contraception than females who have no schooling, and females who have a higher education level have 1.6 times less chance of using than those who have received no formal education. Therefore, increasing the general level of education of females above primary school level is not a direct answer to increasing contraceptive use. However, increasing the level of education of a female's partner might be a solution to push contraceptive use up. When the partner has a primary education, the chances of the female using are 1.6 times lower than when the partner has no education, but when he has a secondary education level the chances of the woman using increases by 3.4 times, and when he has a higher level of education, the likelihood of using contraception is 4.3 times higher. Such results show not only the role of education, but also the importance of potential communication between husband and wife (partners) regarding family planning issues.

Interestingly, the wealth category has no positive impact on contraceptive use. On the contrary, when a female belongs to the poorer category she has 1.6 times less chance of using than when she belongs to the poorest one. For females in the middle and richer categories the likelihood to use is 1.5 times lower than the poorest. And, finally, for the richest females the chance of using is 1.2 times lower than for the poorest ones. Thus, wealth status has no positive impact on the probability of using contraception.

Working status seems to have a slight effect on contraceptive use, with the chances to use being 1.1 times higher when females work than when they do not, but this is certainly not a big difference. On the other hand, place of residence has a certain impact. Women who live in urban areas have 1.9 times higher chance of using contraception than those living in rural areas.

Niger 2006. Niger, on the border of west-central Africa, was selected for this regression analysis because it is one of the countries with the lowest contraceptive use (10%). So we wanted to look in more detail at the variables that can influence the use or non-use of contraception in this country, to illustrate countries with low contraceptive use. In this first model, we try to understand which variables have a potential impact on contraceptive use in Niger. The results of logistic regressions are displayed in Table 3.

Except for the group 20–24 years old, which has a 1.5 times lower probability of using than the 15–19 years group, age has a positive impact on contraceptive use. At 25–29 years old, the chance of a female using contraception is 1.5 times higher than for the reference group; at 30–34 years old and 35–39 years old respectively, it is 1.9 times higher; at 40–44 years old it is 1.6 times higher; and for the oldest group, 45–49 years old, it is 1.3 times higher compared to 15–19 years old. Thus, after 25, age plays a positive role on contraceptive use.

Number of living children does not play a great role. The probability of using is the same for females who have one to four children and for those who have none. However, the chance of using is a bit higher (1.1 times) for females who have five children or more than for females who are childless.

Education level has no positive impact on contraceptive use. In fact, the opposite is the case. Females with a primary education have 1.3 times less chance of using contraception than females without education. Those with secondary education are 1.1 times less likely to use than those with no schooling, and women with higher education levels have 1.5 less chance of using than their counterparts who never attended school. However, the education of the females' partner does play a positive role. Women whose partners have primary school level have 5.6 times more chance to use than those whose partner never went to school. Females with a partner having a secondary education level are 7.9 times more likely to use, and those with a partner with higher education have 12.3 times more chances to use than those with a partner who did not attend school. Therefore, it seems that, even if the schooling of females does not have any impact, the schooling of their partners has an impact on their contraceptive use. Therefore, the involvement of the partner in family planning must be taken into account in this country.

Wealth as a category does not show any positive impact on contraceptive use. Poorer females are 1.1 times less likely to use than the poorest. Females belonging to the middle and richer category, respectively, are 1.3 times less likely to use compared to the poorest and the richest females have 1.2 times less chance of using than their poorest counterparts. When females work, they have greater chances (1.2 times greater) to use than when they do not work. Therefore, working status can play a positive role on contraceptive use. There is also noticeable difference of probability use regarding the place of residence. Urban women have 2.0 times more chance of using than rural females.

Interestingly, Christian females and those belonging to other religions are less likely to use than Muslims, but these results must be considered with caution because of the sample size of the non-Muslim population and the consequence of the high standard error (2.6) of this variable in Egypt.

However, when one looks at the region, one can see that females who live in upper Egypt rural region are less likely to use contraception (1.5 times less) than the ones living in lower Egypt rural region. The ones situated in the frontier governorates are also less likely

to use, with a probability 1.4 times lower. In conclusion, contraceptive use in Egypt depends on demographic variables (age of the females and likely age at first marriage), but the rest of the socio-economic variables, contrary to what one would think, do not play a great role.

Table 3. Regression model (95% CI) predicting the respondents' region and religion on contraceptive use in selected countries.

	Egypt 2008	OR	95% CI	Namibia 2007	OR	95% CI	Mali 2006	OR	95% CI	Niger 2006	OR	95% CI
Region												
L E Rural*	1.0			Oshana*	1.0		Sikasso*	1.0		Dosso*	1.0	
U Governorates	0.9	0.8	1.1	Caprivi	0.5	0.4	Kayes	1.0	0.8	Agadez	1.1	0.8
L E Urban	1.1	0.8	1.5	Erongo	1.0	0.8	Koulikoro	2.2	1.8	Diffa	0.4	0.3
U E Urban	0.7	0.6	0.8	Hardap	0.7	0.6	Segou	1.2	0.9	Maradi	2.1	1.6
U E Rural	0.5	0.3	0.7	Karas	0.8	0.6	Mopti	1.7	1.4	Tahoua	0.4	0.3
F Governorates	0.6	0.5	0.7	Kavango	0.6	0.5	Tombouctou	1.1	0.9	Tillaberi	0.9	0.7
				Khomas	0.9	0.7	Gao	0.8	0.8	Zinder	2.5	1.9
				Kunene	1.0	0.8	Kidal	0.5	0.3	Niamey	0.5	0.4
				Ohangwene	0.4	0.4	Bamako	1.7	1.3			
				Omaheke	0.9	0.7						
				Omusati	0.6	0.5						
				Oshikoto	0.7	0.5						
				Orjozondjupa	0.7	0.5						
Religion												
Muslim*	1.0			R Catholic*	1.0		Muslim *	1.0		Muslim*	1.0	
Christian	0.0	1.1	1.4	Protestant	0.8	0.3	Christian	1.2	1.0	Christian	1.3	0.4
Others	0.1	0.4	0.5	No religion	0.6	0.2	Animist	1.3	1.1	Animist	1.2	0.3
				Others	1.2	0.4	No religion	1.6	0.6	No religion	0.8	0.2
							Others	1.4	1.1	Others	-	-

Source: Demographic Health Surveys.

* reference category; L E Rural = lower Egypt rural; U Governorates = urban governments; L E urban = lower Egypt urban; U E urban = upper Egypt urban; U E rural = upper Egypt rural; and F Governorates = frontier governorates; R Catholic = Roman Catholic; OR = odds ratio; < lower level; > upper level.

Differences can be also observed between religions. Compared to Roman Catholic adepts, Protestant females have 1.2 times less chance of using contraception, and Atheist women (no religion) have 1.4 times less chance of being a contraceptive user. Only females declaring that they belong to another cult have slightly higher chances of using than Catholics (1.2 times more chance) in Namibia.

The population in Mali is essentially Muslim (90%), but one can see that religion can play a role in contraceptive use. Indeed Christian females are 1.2 times more likely to use than Muslims, but one has to note that they only represent 1% of the population. Animists (8% of the population) have a 1.3 times higher chance of using than their Muslim counterparts, Atheists also have 1.6 more chance of using, and females belonging to other religions have 1.4 times higher chances of using contraception than Muslims. Therefore, religion has an impact on contraception use, but to increase contraceptive use by changing the religions of the females is not feasible.

On the regional level, one can observe the same trend, with females from urban regions having a higher probability of using than females from rural regions (2.2 more chance in Koulikoro, and 1.6 more chance in Bamako than in Sikasso) in Mali.

Christian and Animist females use, respectively, 1.2 times more than Muslims females. Atheists use 1.2 times less than Muslims. Hence the effect of religion exists, but to a limited extent in Niger. This is also true at the regional level with a higher probability in the regions of Maradi (2.1 times) and Zinder (2.5 times) but, interestingly, with lower chances for females inhabiting the region on Niamey (1.5 times less chance).

Discussion

The highest prevalence of contraception is mainly situated in northern and southern Africa. Countries from West Africa are the ones where contraceptive use is the lowest, including one east-African country, Ethiopia. In central Africa, contraceptive use is still low but not as low as in West Africa. It is also interesting to note that the majority of the countries which have the lowest contraceptive use are French-speaking countries, while the countries considered as English-speaking are those with the highest contraceptive rate. Considering the level of non-users, the majority of non-users are concentrated in West Africa, followed by central and East Africa, and finally southern Africa and Egypt in northern Africa. The level of users does not guarantee a good coverage of the population against unwanted pregnancies. Indeed, when one looks at east Africa in particular, one can see that, even though contraceptive use is much higher than in the majority of West-African countries, the level of unmet needs is also much higher, and vice versa, despite the fact that the majority of West-African countries' contraception use is less than 10%. Indeed, their proportion of unmet-needs is lower than the level in east Africa. The contraceptive use rate is therefore not an accurate indicator in gauging the level of females who are protected against the risk of unwanted pregnancies in a designated area.

In Egypt and Namibia, overall, socio-economic variables do not play a great role. Indeed the probability of being a user of contraception does not increase noticeably with education level, wealth status, working status or religion. In fact, when the social level increases one could see that it could even have a negative impact on the population of unmet needs. Indeed, the probability of unmet needs for contraception tends to be higher for females who have a better social status than for those who belong to the lowest layers of these societies. Interestingly, the same conclusions were made when looking at Mali and Niger, the two countries with low contraceptive use.

The education level of the partner and socio-economic variables did not have a great impact of contraception behaviours. The only variables which play a role are age and the number of living children (but to a limited extent). Therefore it is a problem for family planning programmes which can hardly find a key variable to play with to improve family planning in Africa. Age cannot be one of these variables, as it is the one variable that no programme can change. In conclusion, these results show that socio-economic variables have a much lower impact than what one would expect.

Overall, this article wanted to show that, if family planning programmes want to succeed, they have to rethink their approach. First, they should take into account that policies and programmes need to be country specific. Second, they should focus on educating at the local level – both females and males – on the benefits of a reasonably sized family. Third, they should take into account the targeted population and the resources available, and try to develop the access to traditional methods rather than focusing on imposing modern methods of contraception. Finally, they should use the correct tools of information and certainly not rely on the contraceptive use rate only. We would like to stress that better understanding of contraceptive issues could come from better data collection tools. Indeed, contraception data are always gathered at a point of time but cross-sectional data are not sufficient to understand all the mechanisms hidden behind contraceptive behaviours. One would need longitudinal studies, with a history of contraception, which would provide the researcher with the dynamics of contraceptive use (age at first use, discontinuation and its reason, etc.). Therefore, longitudinal studies should be carried out, and a question on contraception should be included in census questionnaires.

In conclusion, Africa is a continent of contrast. There are different contraceptive behaviours, and good estimation tools are needed to develop specific family programmes to insure that, soon, all females on this continent will have the freedom and access to their fundamental right to choose their number of children.

References

- Amegee L (2001) Structures familiales, relations intergénérationnelles et rapports de genre.
- Bongaarts J, Mauldin WP and Phillips JF (1990) The demographic impact of family planning programs. *Studies in Family Planning* 21(6): 299–310.
- Bongaarts J and Sinding S (2009) A response to critics of family planning. *International Perspectives on Sexual and Reproductive Health* 35(1): 39–44.
- Caldwell JC and Caldwell P (1988) Is the Asian family planning program model suited to Africa? *Studies in Family Planning* 19(1): 1–18.
- Charbit Y (2002) *Le monde en développement : démographie et enjeux socio-économiques*. Collection Société. Paris: Les études de la documentation Française, janvier.
- Cleland J and Rutstein S (1986) Contraception and birthspacing. *International Family Planning Perspectives* 12(3): 83–90.
- Clement S and Madise N (2004) Who is being served least by family planning in Ethiopia. *Studies in Family Planning* 8(2): 124–36.
- Delaunay V (1998) *Fécondité. La situation démographique et épidémiologique dans la zone de Niakhar au Sénégal 1984–1996*. Dakar: ORSTOM.
- Demographic and Health Survey (2003) *South Africa Demographic and Health Survey*. Washington, DC: Macro International.
- Donadje F (1992) *Nuptialité et fécondité des hommes au Sud-Bénin. Pour une approche des stratégies de reproduction au Bénin*. Thèse de doctorat de démographie, Université Catholique de Louvain-la-Neuve. Louvain-la-Neuve: Académia.
- Ezeh AC and Mboup G (1997) Estimates and explanations of gender differentials in contraceptive prevalence rates. *Studies in Family Planning* 28(2): 104–121.
- Freedman R and Berelson B (1976) The record of family planning programs. *Studies in Family Planning* 7(1): 1–40.
- Gribble J (2003) The standard days method of family planning: A response to Cairo. *International Family Planning Perspective* 29(4): 188–191.
- Lapham RJ and Mauldin WP (1972) National family planning programs: Review and evaluation. *Studies in Family Planning* 3(3): 29–52.
- Locoh T and Makdessi Y (1996) *Politiques de population et baisse de la fécondité en Afrique sub-saharienne*. Paris: CEPED 44.
- Mesganaw F (2006) Comparative study of the characteristics of family planning service users and non-users in Northwest Ethiopia. *African Journal of Reproductive Health* 10(1): 62–70.
- Mokima JG (1992) Impact de l'environnement socio-culturel et politique sur la fécondité au Congo. Paper presented at Les modes de régulation de la reproduction humaine. Incidence sur la fécondité et la santé. Colloque International de Delphes, 6–10 October.

- Montgomery MR and Casterline JB (1996) Social learning, social influence, and models of fertility. *Population and Development Review Supplement* 22: 151–175.
- Muhwava W (2003) Patterns of contraceptive use at the edge of fertility transition in Zimbabwe. *African Journal of Population Studies* 18(1): 19–33.
- Ministry of Health and Social Services (2003) *Namibia Demographic and Health Survey 2000*. Windhoek: Ministry of Health and Social Services.
- Oyedokun A (2007) Determinants of contraceptive usage: Lessons from women in Osun State, Nigeria. *Journal of Humanities and Social Science* 1(2): 1–14.
- Podhisita C (1998) Gender decision-making in family formation and planning: Achievement and future direction. *Journal of Population and Social Studies* 6(1–2): 1–27.
- Population Reference Bureau (2008) *World Contraceptive Use Annual Report*. New-York: Population Reference Bureau.
- Ross J and Winfrey W (2001) Contraception use, intention to use and unmet need during the extended post- partum period. *Family Planning Perspectives* 27(4): 20–27.
- Sahran M and Valente T (2002) Spousal communication and family planning adoption: Effects of radio drama serial in Nepal. *International Family Planning Perspectives* 28(1): 16–25.
- Sathiya Susuman A (2009) Factors affecting contraceptive use in Ethiopia: Evidence from DHS 2005. *Interdisciplinary Journal of Contemporary Research in Business* 1(3): 90–115.
- Tankoano FA (1989) Politique de planification familiale au Burkina Faso. *Maîtrise de la croissance démographique et développement en Afrique*: 233–249.
- United Nations (1998) *State of the World Population*. New-York: United Nations Division of the Population, Department of Economic and Social Affairs.
- United Nations (2004) *World Fertility Report: 2003*. New York: United Nations Publication. United Nations (2009a) *State of World Population*. New York: United Nations Publication.
- Van de Walle E and Foster A (1990) *Fertility Decline in Africa: Assessment and Prospects*. Washington, DC: The World Bank.
- Westoff CF (1974) Coital frequency and contraception. *Family Planning Perspectives* 6(3): 136–141. Westoff CF (1976) Trends in contraceptive practice: 1965–1973. *Family Planning Perspectives* 8(2): 54–57. Westoff CF and Bankole A (2000) Tendances de la demande de limitation des naissances dans les pays en voie de développement. *Perspectives Internationales sur le Planning Familial* numéro special 29–35.
- Wilder J (2007) Women’s empowerment in Ethiopia: New solutions to ancient problems. *Pathfinder International Ethiopia*.

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