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Intergenerational transmission and poverty

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INTERGENERATIONAL TRANSMISSION OF FERTILITY AND POVERTY IN DRC

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I. INTRODUCTION

The interest of economists in fertility is not recent. Since Malthus (1798) with "an essay on population principle", the fertility rate is an important factor. As underlined by Brown & Norville (2001) , a country fertility rate produces some short and long run effects on the political, social and economic spheres. Several theories were elaborated in order to analyse fertility and the evolution of population either at macro level or at micro level. Formally, fertility behaviour is subjected to rational decision making.

Economists have looked at the role of the increase in income. On one hand, Becker (1960) developed the *price of time model* which reports that a modification of income is followed by a change in the demand for children considering parents as rational economic agent[1]. This model was augmented by the trade-off between quality and quantity of children, which occurs during the fertility transition. "Parents are considered to be rational, calculating cost and benefit at every birth and as a result the model has something to say about spacing of children" (Fulop, 1977, p.5). On the other hand, the relative income hypothesis of Easterlin (1980) suggested that when incomes are higher than material aspirations (formed in childhood) birth rates would rise. In his opinion, Leibenstein (1974, 1975) considers children to be commitment goods, thus why the expenditures on children traduces a commitment undertaken by parents instead of a temporary feeling toward child.

However, fertility choices are not only driven by the change in income. Culture, family and society are expected to play a role. In that context, economists have investigated the role of norms of fertility and in particular the existence of an intergenerational transmission of fertility norms. According to Bisin & Verdier (2005), preferences and norms are shaped partly by transmission through generations. Several studies have been interested in the intergenerational transmission of fertility by considering the relationship between the fertility of parents and children (Murphy, 1999; Murphy & Knudsen, 2002; Booth & Kee, 2009; Rodgers & Kohler, 2012). According to some recent studies, modern societies present positive associations between parents and children fertility behaviour (Booth & Kee, 2009; Murphy & Knudsen, 2002; Vogl, 2015).

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[1] "The price of time model assumes that since childcare has traditionally been predominately a woman's responsibility, men's earnings should have almost exclusively an "income effect" on fertility -- that is, a positive effect -- while women's earnings should have a "price", or negative effect" (Macunovich, 2008).

The question of the transmission of fertility norms has deep consequences for the evolution of income distribution at the society level (Chuan, Seong, & Chau, 2014). Starting with two families with the same wealth level and different norms level (high and low), the fertility transmission may create wealth inequality such that poor families remain poor. Though fertility can be related to poverty concerns (Aassve et al., 2005; Schoumaker et al., 2004). For additional children, the resource inherited from parents per individual will decrease.

Certainly, in the empirical ground, the availability of specific data in developed countries allowed a spread out of studies in fertility transmission. However, with few exceptions of studies such as Murphy (2012), developing countries remain less analysed while such investigation can lead to a deep comprehension of poverty and fertility transmission providing some tools to the policy makers.

The aim of this paper is to build on previous studies and to analyse the relationship between fertility across generation in a developing country- Democratic Republic of Congo- with a specific emphasis on poverty. The incidence of poverty in this country is given by 63% in 2012 (INS, 2014) whereas the fertility rate is 6.04 children per women.

The key question of the present study is how do preferences in the origin family affect preferences for children in the destination family. The preferences in the origin family are measured by the number of siblings and the ones of the destination family are captured by the completed fertility which is the women's number of children ever born. According to data available we will consider women-daughter fertility transmission. Because the literature on intergenerational transmission pointed out that some specific children may play a particular role in this transmission (first-borns), we also explore the marginal effect for the respondents who are fist-borns. In addition to that, we control for the respondent poverty status.

The methodology is largely inspired by Booth & Kee (2009) using the framework of Bisin & Verdier (2001) which is defined in an endogenous fertility model. In this context, individual dynamic preferences are determined not only by genetic mechanism, but also by cultural transmission where parents may play a crucial socialisation role. To do this, the dependent variable is given by the *completed fertility in the destination family for* women aged from 45 to 49. In a Poisson regression framework, controls variables consist on respondent number of siblings, socio-economic variables, poverty status and birth-order. Our data comes from the Demographic and Households Surveys carried out in DRC during 2007 and 2013-2014 by USAID and other partners.

The paper is structured as follows. The first section will present the literature review focusing on the interest of economists in intergenerational fertility transmission. The second section unwrap the methodology by describing data and variables, the third section presents the results and the discussion.

II. LITERATURE REVIEW

1. Evidence of fertility transmission in developed countries

Parents transmit values to children and these values include attitudes and outcomes such as risk and time preferences, female labour force participation, beliefs, fertility (Albanese, De Blasio, & Sestito, 2015; Bisin & Verdier, 2005). In the field of cultural transmission, we focus on fertility transmission across generations . Empirical studies aim to investigate associations between parents charasteristics and children outcomes.

One strand of the litterature focuses on transmission of family size from parents to children. The variable of interest is the family size in the destination family which is explained by a set of variables such as family background. Axinn, Clarkberg, & Thornton, (1994) used appropriate coding of Coombs measures[2] of fertility preference of individual to analyse the relationship between parents family size preferences and their children preferences. The correlation between mothers' preferences for their own family size and those of their children is 0.41. The magnitude of the effect of mothers' preferences for their children's behaviour is greater than the effect of mothers' preferences for their own behaviour using comparison of standardized regression coefficients. Scores on the Coombs preference scale increased by just one-half point for each additionally sibling. With a similar approach, Booth & Kee (2009) used a Poisson regression model to estimate the causal effect of parents family size on children outcomes. According to these authors, when moving from low to upper part distribution of destination family size, the impact of family size on fertility increases, and the estimated marginal effects reported the fact that a unit increase in the origin family size from the sample mean leads to an increase of 0.089 units in the destination family in the conditional mean of fertiltity estimated by Poisson regression. This finding goes in the same way with Murphy & Knudsen (2002) who showed that fertility rises monotonocally with the number of siblings, from an mean value of 0.26 children for those with no sibs to 0.59 for those with 4 or more sibs suggesting that people from large families have large families temselves.

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[2] The Coombs measures of family size preferences, sometimes called I-scales, predict subsequent fertility behavior more accurately than simple single-question preference measures (Coombs 1978, 1979). They are constructed from subset of question on fertility preferences which allows to differentiate among respondents who want "n" children as the maximum number and those for whom "n" children is the minimum (for more details see Axinn, Clarkberg, & Thornton, 1994)).

An additionnal assessment of Booth & Kee (2009) and Murphy & Knudsen (2002) comparatively to Axinn et al. (1994) is the investigation of the effect of bith-order. The degree of socialisation is different from the first born and the later ones within a family. First born are more likely to conform to parental norms(Booth & Kee, 2009; Hendershot, 1969) and relationship between family sizes in successive generations was twice as large for women who were first-born as for those later born (Johnson & Stokes, 1976). However, the paper of Murphy & Knudsen (2002) failed to find any birth order effect.

Furthermore, some studies extend the analysis from two to three generations by assuming that fertility behaviours of individual are correlated to those of their grandparents. "Parental and grandparental preferences could be passed along both during a person's childhood and later through contact in adulthood" (Kolk, 2014). These grandparent-child association most of the time find an intergenerational fertility continuity. Grandchildren inherited characters from their parents which in turn have inherited them from their grandparents. Research on this specific issue found that socio-economic association (grandparents and children) are modest (Erola & Moisio, 2007; Warren & Warren, 1997). Kolk (2014) established that parental family size increased the likelihood of giving birth by 10% for each child, and this impact decreases when adding the grand-parents fertility measures.

Another strand of studies focus on transmission of time of childbearing or of the age at first birth. Kim (2014) used a logistic regression to estimate the effects of variable such as living arrangements, number of siblings, birth order and religion of upbringing on the transmission of age at first birth. The author found that mothers and children first birth are correlated and that this correlation is stronger between mothers and daughters than between mothers and sons. For the cohorts born in 1980s, a one year increase in mother age at first birth decreases the odds of transition to parenthood by 4.5% for sons and 5.5 % for daugthers, and these odd ratios are lower for those born in the 1950s (2% for sons and 1% for daughers). In similar way, the relevant variables that influence time at first birth as reported by Barber (2001) are mothers family background (such as education of her parents, kind of occupation of her father), mothers childbearing behaviour (as contraceptive method), and financial and educationnal characteristics (family income, family financial assets at the time of the child's birth and mothers education at the time of child birth). With a discrete-time hazard method, the author found that "one more year of postponement in the first generation leads to a 15% lower monthly premarital childbearing rate in the second generation". This rate increases from 15% to 80% if the mother of first generation shift his childbearing for 10 years. Overall,

age at first birth of parent is significantly positively associated with timing of the entry of their children in parenthood (Barber, 2001; Kim, 2014)

Overall the nature of fertility correlations is not unanimous. Earlier investigations found either negative correlation or no correlation between parents and children fertility behaviour. Easterlin (1980) argued that there exists a negative relationship between the fertility of successive generations. The idea behind is that children born into small birth cohorts would be better off economically than those from large cohorts and would have higher fertility as a consequence (Murphy & Knudsen, 2002 : 236). Thus, Fisher theory postulates no relationship between achieved fertility of successive generations (Fisher, 1930; Rodgers, Kohler, Kyvik, & Christensen, 2001).

2. Difference between developed and developing countries

Many studies have been conducted in developed countries and the availability of accurate data allowed a wide range of analysis in specific themes such as childbearing (Barber, 2001; Kim, 2014b), transmission of family size preferences (Booth & Kee, 2009), effects of own sibling on fertility behaviour (cf. Murphy (2014) for a review). "The overall conclusion is that the relationship between the fertility of successive generations in developed countries tended to become stronger during the demographic transition until the latest period analysed in the 1970s when the younger generation was bearing children" (Murphy, 2013:104).

Moreover, actual developed countries are characterised by an autonomous that enable women to be independent and there are more likely to reach fertility outcomes closer to their parents ones (Murphy, 2013). Within an autonomous society, children are more freely, but they reproduce fertility behaviours of their parents, although this observation can seem paradoxal. The paper of Bravel & Kok (2009) suggests that intergenerational transmission tends to become stronger in societal conditions that leave more room for 'free' individual decision-making[3] . In the same way, Murphy & Knudsen (2002) underlined the fact that post-transitional societies allow an accurate analysis of fertility transmission because they are characterised by a large flexibility of lifestyle and motivation for having children are complex

[3] "the argument is that in societies and social circles that are strongly regulated by social norms and prescriptions , people tend to behave as required by their social position. Under these circumstances, intergenerational similarities are largely limited the intergenerational transmission of social status. Yet, when social rules and regulation relax and more room is left for persona decision and, hence, the internalization od ideas about what is wrong and right. Therefore, so called personal opinions may actually be borrowed from parents" (Bravel and Kok, 2009)

and not necessarily driven by imposition of reproduction behaviour. Thus, fertility transmission can be well analysed.

Developing countries present a more contrasted view. Required data are sometimes unavailable and studies remain few. One important paper is the Murphy's one related to the fertility correlations patterns in 46 contemporary developing countries (Murphy, 2012). The magnitude of fertility continuities is estimated either for completed fertility (total number of children born) or for effective fertility (number of children surviving to age of reproduction). The intergenerational correlations are similar to those of pre transitional western population but less than the values founded in contemporary developed societies. Among the countries of interest, the completed fertility correlations are positive for 78% and significant for 41% countries. Exploring the intergenerational dynamics and fertility transition in 40 developing countries, Vogl (2015) found that the intergenerational transmission raises fertility rates and delays the fertility decline.

3. Mechanisms of fertility transmission

According to Kolk (2014), the existence of intergenerational fertility is well established but the causes of fertility continuities are poorly understood.

The first possible explanation of this pattern is the role of socio-economic continuities such as education, religion, occupational class and income. The persistence of these socio-economic characteristics between generations can explain why fertility of offspring is similar to the parents' one. Intergenerational transmission of fertility and welfare outcomes result from cognitive abilities, education and earnings (Lochner, 2008). In general, more educated women tend to have fewer children (Shreffler & Nii-Amoo Dodoo, 2009) and non-educated women fertility behaviours is closely similar the those of their mothers (Murphy, 2012). Considering education, are to be taking into account not only the level of human capital or the highest grade completed at school by parents but also the educational resources available for the household (Kim, 2014). Barber pointed out the fact that mothers with high disposable resources are more likely to exert social control and to transmit their age at first birth to their daughter (Barber, 2001). Moreover, education provides information about contraception practices which can go from parents to children by creating similarities in the fertility behaviour.

Beside socio-economic characteristics, religion may influence fertility choices by canalizing the sexual behaviour and discouraging practises such as use of contraception and abortion. Adsera (2006) studied the role of religion in shaping fertility preferences for 13 developed

countries. He concluded that religion is a good predictor of fertility in a secular society. For those affiliated to pronatalist religion such as Catholicism and conservative Protestantism, the ideal number of children is higher than for mainline Protestants and individual with no religion. In the same way, the study of Chabé-Ferret (2013) pointed out the fact that the effect of fertility norms decreases when controlling for religion and being Muslim is associated with higher fertility although it has no effect on the two first births. The role of religion can also be captured through its influence on the marriage market. Bisin, Topa, & Verdier (2004) found that marriage market is influenced by segregation which follows from the distribution of population by religious groups. In such situation, strong preferences are accorded to people with the same religious belief.

Moreover, as previously stated, income and occupational classes may play a role. The young men from low income and low assets families enter less quickly in marital parenthood than their peers with better backgrounds (Barber, 2001). The income of households determines the resources available per children and influences parents and later children fertility behaviour. The association between income and fertility is a historical inquiry of economists. According to Becker (1960) , richer parents tends to have more children as they have sufficient resources to care about them, although this relation flipped during the demographic transition. In addition, actual and future incomes should be taken into consideration. Hondroyiannis (2010) argued that responsible parents may postpone time of childbearing if they forecast to face the risk of low income and unemployment.

The second reason of intergenerational fertility transmission is the socialization of preferences. The role of preference and value during the childhood socialization is the most common explanation for intergenerational fertility behaviour (Kolk, 2014). Parents transmit their norms and values such as ideal family size, marriage, age at the first birth. "Socialization theory assumes that the conformity of children's behaviour with that of their parents is at least partly the result of the process of learning from the primary network consisting mainly of parents, usually the mother in particular, during the early formative years of life" (Bravel &Kolk, 2009 : 2). In this context, learned ideas become to be perceived as personal by internalisation (Barber, 2000). The common result of several studies is that fertility of successive generations is stronger from mothers to daughters than for mothers to sons, and this strengthens the role of socialization as daughters could be more exposed to family influence than boys (Murphy & Knudsen, 2002). Moreover, social control may play a role in

intergenerational transmission of fertility. "Parents not only serve as behavioural role models for their children but also set rules and monitor their children's dating and sexual behaviour in order to control the timing of children's entry into parenthood" (Kim, 2014a). Notwithstanding, with economic changes, social norms may evolve and society flips from a fertility equilibrium to another one (Munshi & Myaux, 2006).

The interaction between purposeful socialization creates *cultural transmission.* Bisin & Verdier (2005) pointed out that social norms can be transmitted from one generation to another through either direct or indirect socialization. Inside the family, parents may exert a direct socialization (vertical socialization), whereas the indirect one result from social imitation and learning (oblique socialization). The reason why individuals are engaged in direct socialization is that parents would like their children to inherit their own cultural traits (Bar-Gill & Fershtman, 2016) and this is referred to as *paternalistic altruism* by Bisin & Verdier (2001) as. However, the cultural *substitution hypothesis* argues that the persistence of cultural traits among generations is attributed to rational decisions regarding to parents valuation of costs and benefits of transmission in a specific socio-economic environment. Thus why "direct vertical transmission acts as a cultural substitute to oblique transmission whenever parents have less incentives to socialize their children the more widely dominant are their values in the population" (Bisin & Verdier, 2001:303). The non vertical socialization can be either oblique coming from other people of elder generation or horizontal when coming from people of offspring generation (Cavalli-Sforza & Feldman, 1981).

The framework of Bisin & Verdier (2001) consideres population dynamics with endogenous transmission mechanism of preferences , in opposite of an evolutionary selection mechanism were children preferences are either inherited or imitated. In the model of endogenous transmission, economic pay offs are not necessarily monotonic because transmission mechanism depends on parent's socialization actions (cf. Bisin & Verdier, 2001).

The third explanation is the genetic heritability of fertility. For Rodgers et al. (2001), the preferences from parents acquired by children can be genetic, cultural or combination of both. Some studies were developed in this area, such as the paper of Austermits and Heyer (1998) about transmission of rare genetic diseases. Contemporary societies may lead to a strengthening of the role of genetics in fertility outcomes (Rodgers & Kohler, 2012) and "even if variables related to socialization factors, including stability of lifestyle and childhood satisfaction, are related to subsequent fertility, this would not mean that genetic factors are ruled out, since these pathways may be genetically influenced" (Murphy, 2013:105). However, genetic analysis goes beyond the scope of this paper.

4. Consequences of fertility transmission

This section focus on the consequences of fertility transmission by giving some highlights to the question "why should economist care about fertility transmission?".

The interaction between parents and children outcomes has implications on aggregate social and economic phenomena (Vogl, 2015) and the magnitude through which fertility rates are transmitted from one generation to another have some long term economic effects (Blau, Kahn, Liu, & Papps, 2008; Fernández, Fogli, & Olivetti, 2004). The following parts develop three consequences of the fertility transmission process: public policy effects, poverty and welfare implications, and labour force participation aspects.

Firstly, some flows of studies were interest in the difference of intergenerational fertility transmission between immigrants and country's native born population (see for example Blau et al.(2008) for United states of America and Chabé-Ferret (2013) for France). The immigrant women are intrinsically different from United States native borns in terms of low quality of labour supply, low human capital and high fertility rates. The high fertility rates of immigrant women can lead to a future large share of immigrant descendants in the whole population. Thus, the implementation or the change in a public policy can be constrained by the different cultural fertility behaviour. For Alesina, Glaeser, & Sacerdote (2001), to meet an agreement for supplying public goods, such as social insurance programs, is more difficult in an increasing cultural diversity due to the fact that the interests of different groups can diverge in an important way. Moreover "a standard result in demographic analysis is that given two initial population with different rates of growth, no matter how small the advantage , the one with the higher value will come to dominate numerically the lower one and the population eventually becomes effectively homogenous and consist only of the higher growth population" (Rodgers & Kohler, 2012: 210) as more described by Fisher fundamental theorem of natural selection (Fisher, 1930).

Secondly, the intergenerational transmission of fertility has poverty and welfare implications. On one side, the fertility behaviour can be related to poverty concerns. "The general empirical observation that poorer countries tend to have higher population growth rates and that larger households tend to be poorer, underlies the presumption of a positive causal relation between poverty and fertility at the national and household levels respectively"(Aassve et al., 2005:5). The high mortality levels can increase the fertility rates if we assume that social security is dysfunctionning (Guinnane, 2011; Schoumaker & others, 2004). Poor households are more

likely to have more children which create a vicious circle by maintaining the household in a poverty trap.

On the other side, concerns about intergenerational transmission of fertility become more important due to his welfare implications (Lochner, 2008). In a society characterised by high level of fertility, if people tends to mimic fertility rates of their parents, the welfare of both can be affected in diverse ways.

First, transfers of wealth from parents to children may suffer from the low availability of reproductive resources (Gibson & Gurmu, 2011) and this can lead to competition and conflict between siblings (Gibson & Gurmu, 2011; Trivers, 1974). Such competition arises due to the inheritance norms around productive assets. Considering a resource like as land in an agrarian economy, asset owned by an adult is determined substantially by inheritance (Shreffler & Nii-Amoo Dodoo, 2009). High fertility rates and fertility transmission have strong repercussions on future generation welfare because is more likely to reduce the resource inherited per person (Gibson & Gurmu, 2011; Shreffler & Nii-Amoo Dodoo, 2009). Additionally, in the situation where this transfer process of asset discriminate some children, poverty can either occurs or be perpetuated. Bird (2007) highlights the fact that the "access to and control of productive assets is a clear determinant of individual or household income and consumption levels. Asset holdings are also vital contributors to the initial conditions of a household and can cause 'poverty traps', influencing risk aversion, vulnerability and ability to cope with shocks and contingencies".

Second, the household size and composition do matter because resource available should be shared between sibs. "Household composition can influence fertility rates, dependency ratios, access to productive assets, investment capital and public fora. These factors can in turn influence income; investment, savings and consumption, nutrition, health and education, and through these factors the likelihood that an individual will be chronically poor" (Bird, 2007, :10). These implications may differ according to the type of society. As an illustration, in some primitive societies, the men who have numerous brothers are more likely to achieve higher social status and to marry earlier, whereas in agricultural and pastoral communities it is not obvious as high household size reduces wealth inheritance, and the lack of productive assets such as land and livestock which are important for individual welfare. This case can exacerbate poverty status (Gibson & Gurmu, 2011).

Third, fertility continuities affect economic investment through human or physical capital. The investment of parents for children may be done through education or bequest of asset. However, a trade-off between the two can also occur. Several studies address this question (Bird, 2007; Shreffler & Nii-Amoo Dodoo, 2009). According to Shreffler & Nii-Amoo Dodoo (2009), a situation of land scarcity induces a high investment of parents in education of children. Considering the inheritance norms, parents will substitute the lacks of land assets by more education of their children. Fertility decision for young married are shaped by their property inherited which will lead the couple to limit or not the number of children. Though, the investment in human capital depends on fertility evolution.

Salamon (1992) analysed the effect of culture and fertility norms on land investment in Southern Illinois region. The structure of land ownership, choice of crops, farming practices, and female fertility is different according to the culture. Descendants of German-Catholic are attached to their land, have more children, and as a consequence, they grow labor-intensive crops whereas descendant of Yankees consider farming as a business and trade their land more often. A paradoxal result is the persistence of the non-profitable Germanic Catholic land tenure which highlights the transmission of culture and its impact on economic decision.

Overall, the findings remain that resources available do matters and as they should be transferred from one generation to another, the household size and his composition are key elements knowing that this belong to fertility behaviour of successive generations.

Thirdly, there is a relationship between labour market and fertility behaviour (Shreffler & Nii-Amoo Dodoo, 2009). When analysing the intergenerational fertility transmission, gender role and essentially women labour participation should be taken into account. The shape of fertility behaviour influences obviously the employment by determining the number of women available to participate in labour market. Also, the fertility decline observed in most of developed countries was claimed to belong to the increase in women's labour participation. The higher is the women wage the lower is the fertility rates because if a women earns a higher wage, the time spent to give birth and to rise children is more costly (Easterin and cummins, 1985). If some cultural characteristics are transmitted from one generation to another (Fernández et al., 2004; Kolk, 2014; Rodgers & Kohler, 2012), the gender roles are also transmitted (Fernández et al., 2004) and more likely will be the fertility behaviour. Fernández, Fogli, & Olivetti (2004) found that "the probability that a man's wife works is positively and significantly correlated with whether his mother worked, even after controlling for many other background characteristics of husband and wife". In that way, the transmission

mechanism work through fertility and through labour force participation. The economist planner should be interested in the future trends of labour supply according to the actual one and fertility transmission can play a key role for forecasting.

Fertility transmission and fertility transition

The historical fertility transition is the process by which much of Europe and North America went from high to low fertility in the nineteenth and early twentieth centuries (Guinnane, 2011). Economic explanations of such decline are the exogenous decline in infant mortality, the innovations in the technology of contraception, the increase in the direct cost of childbearing, the changes in the opportunity costs of child-bearing, the net increase in returns to child quality, the implementation of State and private insurance system (see Guinnane, 2011).

The demand for children model, which was initially developed by Becker, provide a good framework for analysing fertility transition theory as it predicted an negative association between income and demand for children.

Distinction should be made between Malthusian and modern societies. In malthusian economy, the population dynamics replicates high level of fertility from parents to children, the demographic transition flips this shape from positive to negative. "In the Malthusian regime, better-off parents bear more children, and their children obtain more education, which in turns promotes higher fertility. In the modern regime, better-off parents bear fewer children, and their children obtain more education, which in turns promotes lower fertility" (Vogl, 2015). So transmission mechanism changes according to the type of society.

III. DATA AND VARIABLES

1. Data

- **Data source**

I used data from the Demographic and Household Surveys (DHS) conducted by USAID and other partners in Democratic Republic of Congo. The DHS survey aims of providing data to political deciders concerning a wide range of indicators related to population, health, and nutrition. Those surveys were conducted in DRC during 2007 and 2013-2014.

The DHS uses three types of questionnaires; the first one is addressed to households, the second to men and the last to women. We are essentially interested in the women questionnaire and we focus on some specific modules related to the respondent background, reproduction behaviour, use of contraceptive, fertility preferences, husband background and women's work.

- **Data processing**

Data obtained from the DHS website required some adjustments to be suitable to our study. For some analysis we have to combine the household and the women files in order to match household variables to each woman's respondent. The DHS data provides the weigh for transforming data in a national representative way. However we did not use it because absolute frequencies were not significantly different from weighed ones and the aim of our paper is not to compare two countries, but just to assess in deeper the fertility behaviour of congolese women. The data base presents some missing variables due to either to a non-response of the respondent or the non-applicability of the question to a specific respondent, those missing values were either dropped or replace by the average of concerned variable. We used Stata 12 for data processing and Excel.

- **Analytical framework**

Our analytical framework is largely inspired from Axinn, Clarkberg, & Thornton ,1994; Bisin & Verdier, 2005; Booth & Kee, 2009. The principal aim is to assess the effect of fertility norms on women completed fertility. We address the variable which enter into account when analysing the fertility rates of two successive generations considering fertility variable as endogenous. Fertility determinants, as underlines by the literature, are found in socio-economic characteristics, genetic traits and fertility norms, and the principal norms will be captured in this paper by the size of the family which the respondent belongs to (his number of siblings) . This characteristics of his origin family is presumed to shape his own behaviour as predicted by socialization theory and cultural transmission (Bisin & Verdier, 2005).

Though we assess the effect of origin family size on completed fertility by controlling for socio-economic and poverty variables. Additionally, after measuring this effect of variable of interest, we check the effect of being the first-born on the completed fertility (ie family size of the destination family). In that sense, two families are compared; the origin (which includes information on women history and number of siblings) and the destination family (women's total children ever born).

2. The variables

❖ Dependent variable for model 1: women's completed fertility in the destination family

Our dependent variable is the women's completed fertility in the destination family which represents the number of children to whom the women gave birth. Such approach was done by Booth & Kee (2009). Two issues should be taken into consideration. First, we have to ensure that the surveyed woman has already completed her fertility period by being aged above 45. As the DRC- DHS survey covered all women aged from 15 to 49 this variable will take into consideration only the subsample aged from 45 to 49. Second, the number of children alive can be significantly different for completed fertility as underlined by the study of Murphy (2012). These differences can be exacerbated in Sub-Saharan countries as infant mortality rate is significant. For the purpose of producing accurate measures, we considered all children ever born in the destination family.

❖ Dependent variable for the model 2: fertility size preferences in the destination family

If the respondent has living children, this variable is extract from the question '*If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how-many would that be*?". If the respondent did not yet give birth the question was " *If you could choose exactly the number of children to have in your whole life, how many would that be?* . A similar approach was done by Axinn et al., (1994) by assessing influence of parents fertility preferences on their children behaviour. For our study, this variable is reported for the whole women sample (of 28882 women) and no need to be restrained to the eldest age group of 45-49. It varies from 0 to 16 with 6, as the average 6,36.

❖ Explanatory variables

- *Number of siblings*

This variable captures the number of children in the origin family and varies from 1 to 16. It reports the completed fertility of the respondent mother minus 1. It is used as a proxy of the fertility norms in the origin family. Literature predicts a positive effect assuming that children born in large family reproduce large families.

- *The birth order index*

We generate a birth order index in order to minimize the variability of this variable and to ensure that it has the lowest correlation with the origin family size. For this purpose, birth order index goes from 0 (for the first born) to 1 (for the last born). If we assume that the absolute birth order of the respondent is given by $\emptyset$ and the origin family is N, the birth order index is given by $\beta = \frac{\emptyset - 1}{(N-1)}$. Literature predicts that first born are more likely to conform to parents fertility norms.

- *Women background characteristics*

First, the *age at first marriage* can be relevant because one can assume that the earlier the women enters in the reproductive circle, the higher will be her completed fertility. In our sample, the average age at first marriage is given by 19. Second, *the level of education attended:* women education was considered by Axinn et al., 1994 and Booth & Kee (2009) to be an important variable in fertility behaviour. Third, we will consider another variable, *married status*.

- *Husband background* such as education can be determinant of wife completed fertility.

- *Poverty status*

Poverty is traditionally assessed either by monetary or by non-monetary approaches. We adopt a non-monetary approach as the DHS survey does not provide data on consumption expenses for the household. The poverty status is captures by dummies derived from the DHS wealth index (which range goes from 1 to 5 according to the existence of some facilities in the respondent household).

- *Marital status:* this variable was integrated in the model by creating dummies for different categories (married, with partner, widowed and divorced).

3. Econometric specifications: count data estimates

For estimating fertility decision as the result of a set of controls variables, studies used an ordinary least regression(Axinn, Clarkberg, & Thornton, 1994). Though this estimations are not adequate. A response function such as the number of children ever born are that has some

specificities. It consists on a discrete value with non negative integer or count, data are concentrated in a few discrete values and skewed to the left; and intrinsically heteroskedastic with variance increasing with the mean (Cameron & Trivedi, 2001).

For theses features to be taken into consideration, data are estimated with a Poisson regression. This stochastic specification has the merit of taking into account the skewed distribution. The Poisson model fits in an appropriate way the discrete and nonnegative nature of the data such that inference can be drawn on the probability of event occurrence(Winkelmann & Zimmermann, 1994). However, in the case of under and over dispersion, Poisson model is inadequate due to the fact that the equality of the mean and the variance is no longer respected. This raised the development of more flexible statistical models such as the negative binomial (Winkelmann & Zimmermann, 1994) , the generalized Poisson regression (Wang & Famoye, 1997; Winkelmann & Zimmermann, 1994), and the quantile ratio regression (Booth & Kee, 2009; Silva & Covas, 2000) .

The main aim of our research is to estimate the effect of origin family on the women's completed fertility in the destination family. For this analysis, we used a Poisson regression to estimate the first model; the test of goodness-of-fit supports that the dependent variable is a Poisson distribution. The probability that the dependant variable Y will be equal to a specific value y in a Poisson process is $P(Y = y) = \frac{e^{-\mu}\mu^{y}}{y!}$, with μ the intensity parameter given by $\mu = \exp(x_i\beta)$. The matrice of explanatory variables is x_i and the vector of coefficients is .

Our second model deals with the determinants of fertility preferences, and as the Poisson did not fits data correctly, we used a negative binomial regression which has a less restrictive property stating that the variance is not necessarily equal to the mean, $var(y|x) = \mu + \alpha\mu^2$. The hypothesis tests on the parameter α support the accuracy of negative binomial specification.

IV. RESULTS

We display first the descriptive statistics for the socio-economics and fertility characteristics. We combine both samples (2007 and 2013-2014). Poisson and negative binomial estimates are presented after.

1. Socio-economic statistics

As previously stated, our sample is constituted by the 2007 and 2013-2014[4] Congolese DHS survey. We will present same descriptive statistics for those years separately or mixed as required. The table below reports non weighed frequencies for the distribution of the sample per age group.

Table 1. Distribution per 5 years age group

Age in 5-year		Year		
Groups		**2007**	**2013**	**Total**
15-19	Freq.	2,084	3,981	6,065
	%	20.85	21.15	**21.04**
20-24	Freq.	2,228	3,68	5,908
	%	22.29	19.55	**20.50**
25-29	Freq.	1,66	3,485	5,145
	%	16.61	18.51	**17.85**
30-34	Freq.	1,389	2,572	3,961
	%	13.90	13.66	**13.74**
35-39	Freq.	1,048	2,191	3,239
	%	10.49	11.64	**11.24**
40-44	Freq.	901	1,595	2,496
	%	9.01	8.47	**8.66**
45-49	Freq.	685	1,323	2,008
	%	6.85	7.03	**6.97**
Total	Freq.	9,995	18,827	28,822
	%	100.00	100.00	100.00

For each survey the table 1 reports the absolute frequencies as well as the proportion in percentage. The sample size is given by 9995 for 2007 and by 18827 for 2013. Considering the sample globally, the proportion of women decreases from younger to older age-groups. The highest proportion comes from the younger female aged from 15 to 19. The shape of demographics distribution by age in developing countries weight more the base of the age pyramids as displayed by this table. For some analysis, we will specifically focus on the last group of older women aged from 45 to 49 which represents almost 7% of the whole sample.

[4] The 2013-2014 DHS survey will be referred to as 2013 survey

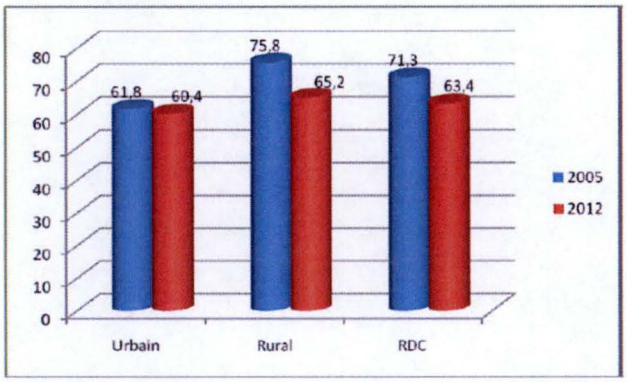
Table 2. Socio-demographic characteristics

		Year **2007**	**2013**	**Total**
Wealth index				
Poorest	Freq.	1,902	4,366	6,268
	%	19.03	23.19	**21.75**
Poorer	Freq.	1,763	3,74	5,503
	%	17.64	19.87	**19.09**
Middle	Freq.	1,837	3,655	5,492
	%	18.38	19.41	**19.05**
Richer	Freq.	2,016	3,39	5,406
	%	20.17	18.01	**18.76**
Richest	Freq.	2,477	3,676	6,153
	%	24.78	19.53	**21.35**
Highest educational level				
no education	Freq.	2,107	3,357	5,464
	%	21.08	17.83	**18.96**
Primary	Freq.	3,778	7,32	11,098
	%	37.80	38.88	**38.51**
Secondary	Freq.	3,819	7,589	11,408
	%	38.21	40.31	**39.58**
Higher	Freq.	291	561	852
	%	2.91	2.98	**2.96**
Current marital status				
never in union	Freq.	2,475	4,545	7,02
	%	24.76	24.14	**24.36**
Married	Freq.	5,6	9,254	14,854
	%	56.03	49.15	**51.54**
living with partner	Freq.	986	3,194	4,180
	%	9.86	16.96	**14.50**
Widowed	Freq.	211	440	651
	%	2.11	2.34	**2.26**
Divorced	Freq.	172	388	560
	%	1.72	2.06	**1.94**
no longer living together	Freq.	551	1,006	1,557
	%	5.51	5.34	**5.40**
Type of place of residence				
Urban	Freq.	4,789	6,827	11,616
	%	47.91	36.26	40.30
Rural	Freq.	5,206	12	17,206
	%	52.09	63.74	59.70
Total	Freq.	**9,995**	**18,827**	**28,822**
	%	100.00	100.00	100.00

Wealth index is computed based on different assets owned by the household from which the individual belongs . "Each household is assigned a standardized score for each asset, where

the score differs depending on whether or not the household owned that asset (or, in the case of sleeping arrangements, the number of people per room). These scores are summed by household, and individuals are ranked according to the total score of the household in which they reside. The sample is then divided into population quintiles -- five groups with the same number of individuals in each[5]". It should be noticed that the monetary poverty concern 63% of individuals in DRC (INS, 2014).

Grap1: Monetary poverty in DRC



Source Institut National de la Statistique RDC, 2014

According to the DRC *Institut National de la Statistique RDC*, the national poverty line is given by 869,210.30 Congolese francs per adult equivalent for Urban areas and FC 579,248.50 for rural areas. The incidence (P0) of monetary poverty decreases in the country by almost 8 points going from 71,34 in 2005 to à 63,40 % during the 2012. The poverty gap dropped from 32.3 % to 26.5 %, while the severity also decreased by 4 percentage points, from 18.5% to 14.5 %. In 2012, considering education level, 59.7% of poor is found among households whose the head has a primary level whereas the head with the university level count 26.9% of poor, this situation is similar to 2005 (INS, 2014).

Back to our results, in table 2 highest education level is distributed in a remarkable way: the women's proportion is considerable for non-educated (19%) but remain very low for the higher educated (3%). Women education stills challenging in DRC. For the 2007 survey, country's report find that the proportion of non-educated men is given by 5%, such discrepancy between men and women underlines the importance of women access to education which needs to be improved.

The proportion of 50% lives with their partners, the proportion of divorced women is very low (1%) due to cultural norms according to which marriage matters not only for the partners

[5] http://www.dhsprogram.com/data/Data-Quality-and-Use.cfm#CP_JUMP_5191 , 18 march 2016

but also for their respective families. The proportion of 25% witch have never been in union consist essentially of 63% of younger women aged from 15-19 and 25% aged from 20-24.

The distribution of the sample according to the type of residence results from the sampling design. 60% lives in rural area whereas 40% are in the urban one. The country has been subject to a period of rural flight which has decreased the size of rural population.

2. Fertility characteristics

Fertility preferences are influenced by social, cultural and economic environments. The proportion of women willing another child is decreasing with women age. It given by is 85% for the age-interval of 15-19, 90% for 20-24, 83% for 25-29, 71%for 30-34, 54% for 35-39, 35% for 40-44 and 13% for 45-49.

Table 3. Preference for another child

Want or not another child		**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**Total**
have another	Freq	5,143	5,263	4,268	2,822	1,749	869	271	20,385
	%	84.99	89.22	83.16	71.35	54.23	35.01	13.53	**70.91**
Undecided	Freq	417	167	205	206	198	135	63	1,391
	%	6.89	2.83	3.99	5.21	6.14	5.44	3.15	**4.84**
no more	Freq	165	328	568	822	1,117	1,164	995	5,159
	%	2.73	5.56	11.07	20.78	34.64	46.90	49.68	**17.95**
sterilized (respondent or partner)	Freq	1	5	13	23	36	46	48	172
	%	0.02	0.08	0.25	0.58	1.12	1.85	2.40	**0.60**
declared infecund	Freq	325	136	78	82	125	268	626	1,640
	%	5.37	2.31	1.52	2.07	3.88	10.80	31.25	**5.70**
Total		6,051	5,899	5,132	3,955	3,225	2,482	2,003	28,747
		100.00	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**

For the total, a share of 71% of women wants to have another child, and this underlines the pronatalist tendencies. The route of theses preferences are traditional childbearing customs which attribute a considerable value on having children in poverty situation. The lack of a well-functioning insurance program in developing countries induces parents to rely on their kin to take care of them during the old age (Guinnane, 2011; Schoumaker & others, 2004). So the population value in a considerable way an additional birth. According to the World Bank,

the mortality rate in DRC is high and given by 98 children per 1000[6] for 2015. The large proportion for those who wants another child is found among the young women aged from 20-24, as the average age of marriage is 18 years, those women have just get married.

Table 4. Preferred fertility size

ideal number of Children		year **2007**	**2013**	**Total**
0	Freq.	163	218	381
	%	1.63	1.16	**1.32**
1	Freq.	40	72	112
	%	0.40	0.38	**0.39**
2	Freq.	258	514	772
	%	2.58	2.73	**2.68**
3	Freq.	585	1,249	1,834
	%	5.85	6.63	**6.36**
4	Freq.	1,312	2,513	3,825
	%	13.13	13.35	**13.27**
5	Freq.	1,866	3,479	5,345
	%	18.67	18.48	**18.54**
6 and more	Freq.	5,086	9,497	14,583
	%	50.89	50.44	**50.60**
non-numeric response	Freq.	685	1,285	1,97
	%	6.85	6.83	6.84
Total		9,995	18,827	28,822

The question "*If you could choose exactly the number of children to have in your whole life, how many would that be?*" captures the preferences for family size. Women answers are reported in table 4. As already evoked, Congolese women can be considered as pro-natalist because the large share (51%) prefers to have more than six children, the proportion is going from high to low level as the number of children decreases. The 0,39 % wants to have only 1 children whereas 13% want 4.

Table 5. Current contraceptive method

		2007	**2013**	**Total**
not using	Freq.	7,933	15,653	23,586
	%	**79.37**	**83.14**	**81.83**
pill	Freq.	80	115	195
	%	0.80	0.61	0.68
iud	Freq.	11	18	29
	%	0.11	0.10	0.10
injections	Freq.	47	137	184
	%	0.47	0.73	0.64
condom	Freq.	504	751	1,255
	%	5.04	3.99	4.35

[6] http://data.worldbank.org/indicator/SH.DYN.MORT/countries/1W-CD?display=default, 8 may 2016

female sterilization	Freq.	66	105	171
	%	0.66	0.56	0.59
male sterilization	Freq.	0	1	1
	%	0.00	0.01	0.00
periodic abstinence	Freq.	1,031	1,149	2,18
	%	10.32	6.10	7.56
Withdrawal	Freq.	241	551	792
	%	2.41	2.93	2.75
Other	Freq.	74	173	247
	%	0.74	0.92	0.86
implants/norplant	Freq.	1	70	71
	%	0.01	0.37	0.25
female condom	Freq.	3	9	12
	%	0.03	0.05	0.04
foam or jelly	Freq.	4	2	6
	%	0.04	0.01	0.02
other modern method	Freq.	0	57	57
	%	0.00	0.30	0.20
collier du cycle	Freq.	0	36	36
	%	0.00	0.19	0.12
Total		9,995	18,827	28,822
		100.00	100.00	100.00

The contraceptive use is conditioned by population's traditional culture and religion concerns. The large share of respondents 81,83 don't use any kind of modern or traditional contraceptive method. This is closely related to religion practise.

Table 6. Completed fertility

All women				**Women aged from 45 to 49**			
completed fertility	**Freq.**	**Percent**	**Cum.**	**completed fertility**	**Freq.**	**Percent**	**Cum.**
0	7,492	**25.99**	25.99	0	58	2.89	2.89
1	3,874	13.44	39.44	1	67	3.34	6.23
2	3,417	11.86	**51.29**	2	91	4.53	10.76
3	2,955	10.25	61.54	3	111	5.53	16.28
4	2,663	9.24	70.78	4	154	7.67	23.95
5	2,255	7.82	78.61	5	211	10.51	34.46
6	1,872	6.50	85.10	6	212	10.56	45.02
7	1,508	5.23	**90.33**	7	234	11.65	**56.67**
8	1,123	3.90	94.23	8	278	**13.84**	70.52
9	748	2.60	96.83	9	222	11.06	81.57
10	481	1.67	98.49	10	165	8.22	89.79
11	261	0.91	99.40	11	116	5.78	95.57
12	133	0.46	99.86	12	68	3.39	98.95
13	26	0.09	99.95	13	12	0.60	99.55
14	8	0.03	99.98	14	4	0.20	99.75
15	3	0.01	99.99	15	3	0.15	99.90
16	3	0.01	100.00	16	2	0.10	100.00
Total	28,822	100.00		Total	2,008	100.00	

The table 5 displays completed fertility (actual number of children ever born) for the whole sample in the four first columns and for women aged from 45 to 49 only for the last four columns.

The number of children ever born fluctuates from a minimum of 0 (for 26 % of respondent) to a maximum of 16 (for 0,01%) . The half of our sample has 2 children or less, the highest frequency is observed for 0 children as the large proportion is constitute by younger women aged from 15 to 19, a proportion of 90% has 7 children or less.

The second part of the table is more comprehensive as it considers only women aged from 45 to 49 years old. The highest absolute frequency is found for 8 children born. 90% of these women have 10 children or less.

Table 7. Average children per sexe

Variable	Obs	Mean	Std. Dev.	Min	Max
completed fertility	28822	3.081813	2.941451	0	16
Sons at home	28822	**1.073728**	1.301798	0	9
Daughters at home	28822	**1.042017**	1.257242	0	8
Sons else where	28822	.2426272	.6557248	0	7
Daughters else where	28822	.2656651	.6972315	0	7
Sons who have already died	28822	.2435292	.6228162	0	8
Daughters who have already died	28822	.2142461	.5640057	0	6

The table below presents the average characteristics of the destination family size. The average women has 3 children with a maximum of 16, children lives with the parents as the average of boys elsewhere is given by 1.07 and 1.04 for daughters everywhere. Comparing boys and girls, there is a little difference and we can argue that if the parents have to choose which children to stay with at home, it will more likely be the son. The average number of girls who grow outside the family is higher than the average number of boys. This may result from many reasons; on one side the cultural value of boys is high considering the inheritance either of materials resources or for the father name. One the other side, girls get married earlier than boys.

3. Husband educational level

For the whole sample, the partner education is greater level than the women one. Non educated women get married to primary level partners, and those from primary level to the secondary level partners.

Table 8. Partner educationnal level

women educational level	husband/partner's education level					
	no educat	**primary**	**secondary**	**Higher**	**don't know**	**Total**
no education	1,244	1,854	1,617	35	151	4,901
Primary	569	2,876	5,232	180	303	9,16
Secondary	116	487	5,298	1,271	143	7,315
Higher	0	1	65	288	2	356
Total	1,929	5,218	12,212	1,774	599	21,732

Women from secondary level are more likely to conjugate with partners of similar level. Men are more educated than women except for secondary and high level of education. Considering the aggregate, the large proportion of women and men has the secondary level of education. The partner education is higher or equal to the wife education traducing the fact that men prefer women with lower or equal level of education and this can result in a kind of cultural restrictions by creating an obstacle for higher educated women to find a partner on marriage market.

4. Regression results

The average number of children ever born is 3.08 with 0 as minimum and 16 as maximum; this number includes the whole sample. If we consider women aged above 45, the completed fertility is 6.68. Though at the end of the childbearing, on average the woman who has 5.98 siblings give birth to 6.08 children suggesting a possible replication of fertility behaviour of origin family which will be assessed further with the regression analysis.

Table 9. Descriptive statistics for main variables

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Completed fertility (whole sample)	Number of children ever born	28822	3.08	2.94	0	16
Completed fertility (45-49)	Number of children ever born for women aged from 45 to 49 years	2008	6.68	3.06	0	16
Number of siblings	Number of siblings	28320	5.99	2.86	0	19
Year of birth	Date of birth cmc	28822	995.96	118.52	687	1189
Age at first birth	Age at first birth	21330	19.2	3.80	10	42
Age at first mariage	Age at first cohabitation	21802	18.06	3.99	8	45
Birthindex	Index of birth orther	28822	.47	.35	0	1
Poor	Dummy valued 1 if poor	28822	.19	.39	0	1
Middle	Dummy valued 1 if middle	28822	.19	.39	0	1
Richer	Dummy valued if richer	28822	.19	.39	0	1
Richest	Dummy valued 1 if richest	28822	.21	.41	0	1
primary education	Women's primary education	28822	.38	.49	0	1
secondary education	Women's secondary education	28822	.39	.49	0	1
high education	Women's high education	28822	.029	.17	0	1
partner primary education	Husband primary education	21133	.25	.43	0	1
partner secondary education	Husband secondary education	21133	.58	.49	0	1
partner high education	Husband high education	21133	.083	.28	0	1
Survey	Dummy valued 1 for 201 »-2014 survey	28822	.65	.48	0	1
Fertilty preferences	Quantitative variable of ideal number of children	26852	6.36	2.955399	0	30

For the ideal number of children, women prefer to have 6,36 children on average and the age at first birth is higher than the age at marriage, though birth takes place most of the time after the marriage. The variable year o birth is a transformation of date of birth[7], we consider this variable instead of the age of women because the 2 subsamples result from different surveys not conducted in the same times (2007 and 2013-2014).

As already evoked, the distribution of sample from poorest to richest is due to the quintile definition. For our variables, the omitted category is 'poorest'. We create also dummies for education of the women and education of the husband. The omitted categories are the non-educated. The estimation marginal effect for the completed fertility for women aged above 45 and those who are first-borns is given by the table below. For dummy variables, the marginal effect results from a discrete change of the dummy from 0 to 1.

[7] For more details about the transformation, see *DHS guidelines statistics*

Table10. Determinant of completed fertility (45-49), Poisson marginal effects

	All women aged from 45 to 49	**Women aged 45-49 who are first-borns**
number of siblings	0.089***	0.109*
	(4.35)	(2.36)
year ofbirth	-0.005	-0.007
	(-1.66)	(-0.97)
age at first birth	-0.206***	-0.279***
	(-10.35)	(-7.61)
age at first marriage	-0.038	0.045
	(-1.83)	(1.19)
birth order index	-0.038	
	(-0.20)	
poor	-0.282	-0.010
	(-1.56)	(-0.03)
middle	-0.222	0.331
	(-1.25)	(0.81)
richer	-0.161	0.029
	(-0.83)	(0.08)
richest	-0.956***	-0.895
	(-4.16)	(-1.64)
primary education	0.029	0.258
	(0.19)	(0.77)
secondary education	-0.244	-0.112
	(-1.28)	(-0.28)
high education	-0.446	0.028
	(-0.64)	(0.02)
partner primary education	0.084	0.861
	(0.38)	(1.80)
partner secondary education	0.087	0.691
	(0.42)	(1.61)
partner high education	0.041	0.547
	(0.13)	(0.70)
married	0.962***	0.657
	(3.38)	(1.12)
with partner	0.195	-0.036
	(0.55)	(-0.05)
Widowed	0.217	-0.283
	(0.64)	(-0.41)
divorced	-0.905*	-1.299
	(-2.24)	(-1.23)
Survey	0.433	0.661
	(1.47)	(1.11)
N	1813	378

t statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

The completed fertility depends positively and significantly from the number of siblings in the origin-family with a significant coefficient at 1%. The marginal effect for first-borns is higher

(11%) than for the all women aged above 45 (9%). This result goes in the same way with Booth & Kee (2009) who found that an unit increase in the origin family size increase the completed fertility in destination family by 0,89. In table 10, the marginal effect of 0.9 traduces the fact that having one more sib increases the respondent's probability of having one more child by 9%. Women tend to replicate the family size of their origin family. This result belongs to the fact that, on one hand, congolese population remain characterised by high fertility rates and high infant mortality. Children are considered as an investment and insurance during their parents' old ages. On the other hand cultural transmission remains strong and socialization within the family (direct) or outside from the community (oblique) still significant, to these reasons, we can also add the religion practises and the low uses of contraceptives method (or the whole sample 81% do not use currently contraception).

The second variable is the age of respondent and it is closely equal to zero, whereas the third variable, which captures the age of the respondent at first birth, has a negative effect on completed fertility. The later you enter in the reproductive period, the lower is the completed fertility at the end of this period. This result is similar to Booth & Kee, (2009). It suggests that age at first marriage is determined in consideration of number of children that a wife wants to have in the future. As the sample is constituted by women with pro-natalist preferences, they plane to enter early in reproductive age and this is likely to be harmful for time devoted to their education.

In comparison to the lower class (poorest); being poor, middle or rich do not have any significant effect on the number of children ever born. While, when the women's household move up to a richest class, there occurs a negative effect on completed fertility. Poverty status has a positive effect on number of children suggesting that poor household tend to have a high number of children which is consistent with the related literature (Guinnane, 2011; Schoumaker et al., 2004).

Secondary and high education levels have negative effects. Previous studies have predicted a negative effect of high educational level on the completed fertility, "educated women are of generally higher socioeconomic status, more intergenerationally socially mobile and more differentiated from their mothers than women without education" (Murphy, 2012). Even though, our study failed to find a significant effect of woman's education dummies. Obviously, being married increases the completed fertility whereas being divorced has a negative effect.

Table 11. Fertility preferences as dependant variable, Negative binomial regression, marginal effects

	All women	**Women who are first-borns**
number of siblings	0.074***	0.077***
	(9.04)	(4.50)
year ofbirth	-0.005***	-0.005***
	(-20.31)	(-9.99)
age at first birth	-0.055***	-0.059***
	(-6.85)	(-4.04)
age at first marriage	-0.032***	-0.045**
	(-4.05)	(-2.83)
birth order index	0.175**	
	(3.10)	
poor	-0.232**	-0.152
	(-3.07)	(-1.22)
middle	-0.392***	-0.310*
	(-4.60)	(-2.36)
richer (d)	-0.658***	-0.455**
	(-7.15)	(-3.11)
richest (d)	-1.294***	-1.126***
	(-12.72)	(-6.68)
primary education	-0.266***	-0.282*
	(-3.80)	(-2.35)
secondary education	-0.875***	-1.151***
	(-10.53)	(-7.69)
high education	-1.360***	-1.347***
	(-9.55)	(-4.49)
partner primary education	0.152	0.063
	(1.62)	(0.38)
partner secondary education	0.055	0.067
	(0.59)	(0.42)
partner high education	-0.454***	-0.421*
	(-4.02)	(-2.07)
married	1.135***	1.332***
	(11.60)	(7.45)
with partner	0.112	0.553*
	(0.96)	(2.53)
Widowed	0.529**	0.947**
	(3.13)	(2.66)
divorced	0.119	0.579
	(0.65)	(1.48)
survey	0.353***	0.269*
	(3.61)	(2.17)
N	17861	3551

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The table 11 describes the marginal effects of the negative binomial regression. The Poisson estimates were inappropriate for this model because the test of goodness-of-fit rejected the hypothesis of equality of variance and mean. As data were over dispersed, a negative binomial model was fitted[8].

The number of sibling stills significant and positively correlated to the fertility preference. The marginal effect of an additional sibling is higher for the effective completed fertility 9% than for fertility preference 7% (ideal number of children), this implies that fertility transmission is strong and goes beyond individual own preferences. Intergenerational transmission may be perpetuated in the future. Axinn et al. (1994) found also a positive (but not significant) effect of mother family size on the children family size preferences at 23 years old given by the effect of 4%.

The age of the women (year of birth) is significant and has a negative effect on the fertility preferences, the younger you are the larger is your ideal number of children, and this is obvious as the ability of women to give birth decreases with her age. Although this variable was not significant for the completed fertility.

The birth order index is significant with a positive sign as found by Booth & Kee (2009), these authors argued that higher birth order children owe their existence to the fact that their parents chose to have more children. In DRC, the first-borns are responsible for all elder sibs. Though, in terms of own preferences, the individual can consider that he already has to care about youngest and no need of having more children.

For poverty levels, all the dummies are significant suggesting that going from poorest class to poor, middle or richer class, decreases the ideal number of children. Women education dummies are all significant and being educated whatever the level decreases the ideal number of children. This may be due to the fact that time devoted to education can decrease time for childbearing by raising the opportunity cost. A high husband educational level is also significant and influence negatively the ideal number of children. Preferences are shaped by marriage partners. All the types of marital status are decreasing the fertility preferences.

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[8] The result of the the test of goodness-of-fit after the poisson estimation are given by:
- Deviance goodness-of-fit = 19049.51, Prob > chi2(17841) = 0.0000
- Pearson goodness-of-fit = 19200.14, Prob > chi2(17841) = 0.0000

The null hypothesis was rejected suggesting that the conditional mean and the conditional variance are not equal.

V. CONCLUSION

Fertility behaviour may results from economic decisions but also from preferences inherited from the parents. The objective of this study was to analyse how do fertility preferences in the origin-family (number of siblings) affect preferences for children in the destination family (the completed fertility). We focused in a particular way on the behaviour of first-borns as the literature argued that they are more likely to conform to parental norms. In a Bisin and Verdier (2001) framework, we developed a Poisson and a negative binomial regression applied to the demographic and health survey data from Democratic Republic of Congo. The sample was constituted by 28822 women surveyed during the 2003 and 20013-2014 DHS waves.

The average completed fertility is 6,68 children per women, whereas the ideal number of children is slightly lower (6,36 children) .Women's access to education should be improved in DRC as the proportion of non-educated women is given by 20%. The preferences for an additional child are considerable underlining the pro-natalist tendencies driven essentially by the luck of insurance system, the high mortality level, the low use of contraceptive method, and traditional customs which values large families.

Results related to the completed fertility regression support an existence of a positive intergenerational transmission of family norms through family size, the magnitude is slightly high for first born (11%) than for all women at the end of the reproductive period (9%). Education is significant only for high educated level were a discrete change from 0 to 1 decreases the completed fertility by 95%. Although this existence of a transmission of family size from mothers to daughters, birth order index and some dummies of poverty status (poor, middle, richer levels) are not significant, due probably to the homogeneity of the group of old aged women.

For the fertility preferences, one more sibling increases the ideal number of children by 7%. Other controls variables are significant such as the women's age, the age at first birth, the poverty status and the educational level.

The present study remains limited for some aspects. First, some keys features related to mothers to daughters fertility have been left out of our analysis. We missed data on the characteristics of mother fertility behaviour in the origin family such that wealth index, use of contraceptives, age at first birth, etc. Also, the variable related to the number of sibs could be

separated in different types in order to assess which effect dominates between full and half sibs as studied by Murphy & Knudsen (2002). Second, it could be interesting to extend the investigation on fertility trends to more than two generations. Third, an analysis in terms of fertility trap and poverty trap can be done in the purpose of highlighting the mechanisms behind the delayed of fertility transition in the Democratic Republic of Congo.

ABBREVIATIONS AND ACRONYMS

DHS: Demographic and Health Survey

DRC: Democratic Republic of Congo

GPRSP : Growth and poverty reduction strategy paper

INS: Institut National de Statistique

Freq. : Absolute frequencies

Tables

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