Maternal Education, Economic Empowerment, and Infant Mortality in Burkina Faso

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Bringing Rigour and Evidence to Economic Policy Making in Africa

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Abstract

Education levels in Burkina Faso, especially among women, remain low despite efforts made by government authorities and development partners to implement priority area 4 of the Sustainable Development Goals (SDG). This situation presents difficulties for women in terms of their being economically and socially empowered. At the same time, the infant mortality rate in Burkina Faso is higher than the average for sub-Saharan Africa. This study therefore used data derived from health and population surveys to provide evidence of the combined impact of the level of education and economic empowerment of women on infant mortality, using an instrumental variables approach on a linear probability model. The results highlight the positive impact of the education levels of women understood through the aspect of literacy and their economic empowerment, in terms of probability of gain, decision-making power in relation to those gains and in relation to the family's level of expenditure. Nevertheless, the impact of the level of economic empowerment of mothers remains mixed. In regard to economic policy, emphasis should be laid upon the strengthening of policies related to education of girls to ensure their empowerment in the future.

1. Introduction

In terms of programmes related to social and economic development, Burkina Faso prioritizes education and health in conformity with the Sustainable Development Goals (SDGs). Indeed, objective two of the recent National Economic and Social Development Plan 2016–2020 (PNDES)focuses on the development of human capital. The new development plan (PNDES II 2021–2025) also places human capital and the inequalities related to sex and gender within its scope of interests, by dedicating section 2 to such interests. In addition, the ministry in charge of public service, labour and social security has, since 2009, sought to put in place a universal health insurance system To this end, the National Health Insurance Fund was established in 2020, and officially launched in July 2021 for the Northern region. Another initiative is the free maternal and child health policy for children under the age of 5 years, ongoing since 2016. The programme integrates women empowerment; affirmative action in the award of scholarships and other grants for the benefit of young girls; and special funds dedicated to women.

Despite these efforts by the Government of Burkina Faso, with the support of development partners, the situation for most of the population paints a grim picture. For example, the 2019 General population and housing census of the National Institute of Statistics and Demography (INSD) reveals a low literacy rate (31.9%), with 36% and 27.9% respectively for men and women (INSD, 2022). Indeed, although the numbers for primary school level are at acceptable levels, those at secondary schools and tertiary institutions remain low. More specifically, over the past five years, the gross average enrolment rate was 91% in primary school, 35.96% in secondary school and 4.23% for tertiary education (World Bank, 2021). In addition, this situation also reveals the difficulties faced by women in terms of their being economically and socially empowered. Thus, the unemployment rate for women over the past five years was relatively high, at an average of 6% (World Bank, 2021). Furthermore, according to the African Development Bank (BAD, 2021), more than 65.4% of women work in the informal sector and mainly within low paying jobs.

Moreover, Burkina Faso has high child mortality rates: 56.68 out of 1,000 for infant mortality; 26.98 out of 1,000 for neonatal mortality; and 93.96 out of 1,000 for infant and child mortality from 2015 to 2019[1]. These rates are relatively higher than those of sub-Saharan African countries which are at 54.42 out of 1,000 for infant mortality, 28.5 out of 1,000 for neonatal mortality and 80.64 out of 1,000 for infant and child

mortality. All these results indicate that Burkina Faso is characterized by a low level of women's education, a low level of women's empowerment and a high infant mortality rate. These observations lead to various questions being raised, notably: Is the lack of economic empowerment of women related to their low levels of education? Are the elevated levels of infant mortality related to the lack of economic empowerment of mothers?

Research studies indicate that education has tremendous advantages for a country's economic and social empowerment (Schultz, 1960; Becker, 1964). Recent empirical studies have shown that education improves women's empowerment and has a negative impact on child mortality through the mother (Sundaram et al., 2014; Hossain, 2015; Bibi et al., 2020). According to The United Nations Entity for Gender Equality and the Empowerment of Women (UN Women, 2014)), the empowerment of women is the best way to eradicate gender inequality and poverty, and promote inclusive economic growth. No less importantly, Eswaran (2002) demonstrated that the empowerment of women improves their negotiation power within the household, which reduces fertility and the rates of infant mortality. In the same manner, women's empowerment also translates into an improvement in the participation of women in decision making within the household (Essifile et al., 2020). However, other studies, notably some that are empirical, highlight the limited role of the education of women on their level of economic empowerment (Samarakoon and Parinduri, 2015; Assaad et al., 2020) and also in the reduction of child mortality (Titaley et al., 2008; Hossain, 2015; Cornish et al., 2021).

In relation to Burkina Faso specifically, the studies reveal that the enrolment of girls improves their participation in decision making within the household (Thiombiano, 2014 ; Pambè et al., 2014). However, other studies have demonstrated that the economic empowerment of women does not have an impact on their decision making within the household (Karimli et al., 2021), but improves their involvement in decision making in regard to the well-being of their children (Nikiema and Kponou, 2020; Karimli et al., 2021). Although the various studies cited above may have addressed the problems in regard to the specific context of Burkina Faso, the approaches used were purely from a statistical perspective, and thus did not take into consideration the aspect of time in the studies. Furthermore, none of the studies focused on specific elements linking the school enrolment of girls to child mortality through the economic empowerment of women.

Our focus on Burkina Faso will thus be original through the methodological approach and the structure of survey data used to take the time dynamic into account. The significance of this study is that it seeks to enrich economic policies that are geared towards a significant reduction in child mortality. The study focused on examining the economic status of mothers and their levels of education. It also had as its overall objective, an examination of the impact of the level of education of mothers on child mortality in Burkina Faso through a focus on women's economic empowerment. More specifically, the study examined the impact of the level of education of the mother on economic empowerment, then examined the impact of the economic empowerment of mothers on child mortality.

The rest of the paper is organized as follows. The subsequent section focuses on the literature review. Section 3 presents the methodology and the data used; and the last section presents the results followed by their analysis.

2. Literature review

The relationship between the levels of education and women's empowerment according to research studies

Women's empowerment can be defined as the process by which women acquire a greater capacity to make strategic life choices that were not possible for them in the past (Kabeer, 1999; Huis et al., 2017. In the process, the conceptualization of economic empowerment focuses on the examination of two inter-related results, namely the results from women in the labour market and the participation by women in decision making on economic issues within the household (Fox and Romero, 2017). In attaining these results, education is considered to be one of the main factors for the economic empowerment of women (Ibrahim and Asad, 2020).

Conceptually, in regard to the results of women's participation in the labour market, the relationship between the level of education and women's empowerment could be linked to the Human Capital Theory (Schultz, 1960; Becker, 1964, 1985; Schultz, 1990; Becker et al., 1994); Welch, 1975). According to the Human Capital Theory, education could lead to changes in cognitive capacities and provide one with skills that are needed in the labour market (Becker, 1964; Schultz, 1990). As a result, according to the theory educated women are considered to be more attractive for employers given their higher levels of productivity, and such women often hold prestigious better paying jobs that require specific skills and know-how (Becker, 1994). Accordingly, Govinda (2008) indicated that a secondary school level of education or higher for women is one of the main determinants of economic empowerment, as long as they have an equal opportunity as men to being employed.

Moreover, in regard to the participation of women in household economic decisions, the relationship between the level of education and women's empowerment could be inscribed within the framework of the Intra-household Bargaining Theory (Becker, 1981; McElroy and Horney, 1981; Becker and Tomes, 1986; Lundberg and Pollak, 1993). Overall, this theory models household decisions as a (non) cooperative game in which a woman and her partner resolve their differences through a solution from negotiation (Kien and Nguyen, 2020). A common assumption in most models of this theory is that the negotiating power of the woman is positively correlated to her human capital (Becker, 1981; Becker and Tomes, 1986) and the quality of her economic opportunities (Getahun and Espen, 2017; Duflo, 2012; Kien and Nguyen, 2020). Thus, by increasing the knowledge and economic resources of women, education increases their negotiation power within households (Kien et Nguyen, 2020).

Some studies provide empirical validation to the relationship between the level of education and the economic empowerment of women in some regions. For example, Adelore and Olomukoro (2015) examined the influence of literacy programmes on the socio-economic empowerment of women in Nigeria using a sample of 1,022 women who had benefitted from literacy courses. Their results demonstrated that thanks to the literacy programmes, women had more access to loans and to financing for their economic activities, which allowed them to increase their income. Comparable results were arrived at by Oyitso and Olomukoro (2012) in Nigeria. A study undertaken in Tamil Nadu revealed that better-educated women obtained better results than their less-educated counterparts in a composite index measuring their access to resources and their control of those resources, thus their role in economic decision-making (Kabeer, 2005). Bussemakers et al. (2017), used data from a World Bank survey collected from women in 139 countries using logistic regression models at several levels. They found that education is an important driver for the economic empowerment of women in the world, while pointing out that the results could vary from one country to the other.

Proof of the significant role played by women's level of education in their socio-economic emancipation is also shown through a study focusing on rural India undertaken by Dhanaraj and Mahambare (2019). The researchers used a sample of survey data from a longitudinal survey gathered from more than 27,000 women and carried out in 2005 and 2012 and examined the data using a conditional logistic regression and the instrumental variables approach. They found that women with a higher level of education are not restrained by cultural norms and traditions since education increased their decision-making power within a household. The study also demonstrated that the level of education is likely to increase the earning capacity of women as well as their quality of employment. In the same manner, Kabeer (2005) demonstrated that in the rural areas of Bangladesh, educated women participate in making a larger array of decisions than uneducated women. Whereas uneducated women participated in an average of 1.1 decisions, the number increased to 1.6, 2.0 and 2.3 among women that have undertaken primary school, intermediary level and secondary school studies respectively.

However, the impact of education on the results of economic empowerment are likely to be subject to the socio-economic context of various countries (Kabeer, 2005). In societies that are characterized by extreme forms of gender inequality, not only is access to education constrained through various restrictions on their mobility and to their limited role in the economy in general but also their impact could be much more limited (Cameron et al., 2001; Kabeer, 2005) or non-existent (Samarakoon et Parinduri, 2015; Kien and Nguyen, 2020). For example, Samarakoon and Parinduri (2015) did not find any proof that education improves the decision-making power of women within households in Indonesia. Furthermore, other studies have demonstrated that more participation by women in income generating activities could increase the overall workload of women and provoke conjugal violence (Green et al., 2015; Ismayilova, 2015). More recently, Assaad et al. (2020) observed that there is a disconnect between the level of education and the economic participation of women in the Middle-

East and in North Africa. According to these researchers, an increase in the level of education has not contributed to the participation of women in the labour market. Comparable results were arrived at by Ahmed and Hyndman-Rizk (2018) in a study focusing on Bangladesh. The researchers observed that despite an increase in the completion rates for higher studies by women, the number of women in the job market among those who hold certificates has considerably decreased.

In the case of Burkina Faso, very few studies have examined the relationship between education and the empowerment of women in Burkina Faso (Thiombiano, 2014). Baya (1993) highlighted that among the active women in Bobo-Dioulasso, a town in Burkina Faso, the percentage share of salaried women increases with education levels. The results indicated that 23.5% of salaried women have a higher level of education, 19.2% have a secondary school level of education, 3.5% have a primary school level of education, and the percentage share is almost at 0% for those who are illiterate. More recently, by examining data from the Burkina Faso Demographic and Health Survey (DHS) 2010, Pambè et al. (2014) observed that educated women are more likely to be well informed in terms of negotiating for their participation in household decisions, and to a certain extent, also because they are better placed to have a salaried job. Overall, a strong recommendation from their study is that in Burkina Faso a woman having a salaried job is a positive and significant factor associated to its major influence on all aspects of household decision making. In the same manner, by examining the data from the DHS undertaken in Burkina Faso in 2010 using a binary logistic regression, Thiombiano (2014) demonstrated that as compared to illiterate women, educated women are more likely to take part in making decisions about their health care, important household purchases, and visiting their parents and relatives. For example, women with a secondary school level of education or higher, have twice as many more chances of making decisions concerning their health care than those that are illiterate.

However, by examining the impact of an intervention through the strengthening of the economic capacity of poor women in Burkina Faso using a random controlled test, Karimi et al. (2021) observed that the intervention had no impact on the decision-making power of the women in the household economy (significant household purchases, use of the wife's income and the use of the husband's income). Nevertheless, the intervention had significant and positive impacts on the participation of women in decision-making activities on their children's school enrolment, marriage of children and children's healthcare (Karimli et al., 2021). The ineffectiveness of the intervention on the decision-making capabilities of women in the overall household economy reveals the possibility of how access to economic resources could limit the decision-making power of women.

The relationship between the economic empowerment of women and child mortality in literature

The Demographic Transition Theory argues that, in general, economic development leads to a decrease in mortality (Heer and Smith, 1968). In applying the Gender Stratification Theory[2], recent studies have been particularly focused on the significance of the economic empowerment of women in the determination of the level of child mortality. Several studies have established that the economic status of women, conditioned by their level of education, strengthens their decision-making power in regard to children's healthcare. A study undertaken by Pratley (2016) focusing on developing countries, indicated that financially independent women tend to channel a large part of the family's financial resources towards primary healthcare and to a variety of other social protection programmes that tend to reduce child mortality.

An empirical validation of the theory has been undertaken in research studies. For example, Westeneng and D'Exelle (2015) demonstrated how economic empowerment reduces the vulnerability of mothers in regard to reproductive health issues in Tanzania. Indeed, they argue that women who contribute to household income have a higher level of resorting to the use of prenatal care services and are less likely to give birth at home; factors that lead to a reduction in child mortality. Furthermore, some authors have argued that the babies of economically empowered women are less exposed to death as they benefit from a nutritional status that is favourable to their well-being (Smith et al., 2004; Carlson et al., 2015; Essilfie et al., 2020). These studies suggest that an increase in the economic empowerment of women is an important way of reducing child mortality through an improvement in children's nutritional status.

Nevertheless, numerous studies raise doubts on the relationship between economic empowerment and child mortality. For example, Hossain (2015), noted in the case of Bangladesh that the chances of an infant dying increased if the mothers participate in income generating activities as compared to their counterparts. According to the study, the mother's employment could have an impact on the degree of care afforded to the baby coupled with less frequent breastfeeding, which would reduce the baby's survival chances. A similar result was arrived in Indonesia at by Titaley et al. (2008), using data from a demographic and health survey. Also, in the case of Sierra Leone, Cornish et al. (2022) argue that the economic empowerment of women reduces domestic conflicts and allows women to take up various responsibilities. However, difficulties remain in regard to decision making in regard to child care since men remain as authority figures within households.

Finally, in regard to Burkina Faso, Nikiema and Kponou (2020) examined the impact of women's empowerment on the nutritional status of women. Drawing from the Burkina Faso Continuous Multisectoral Survey 2014 database, the researchers defined various measures of women's empowerment, including the control of income from sales, access to land, independence in production decisions, access to finance and the level of education from which they constructed a composite indicator of

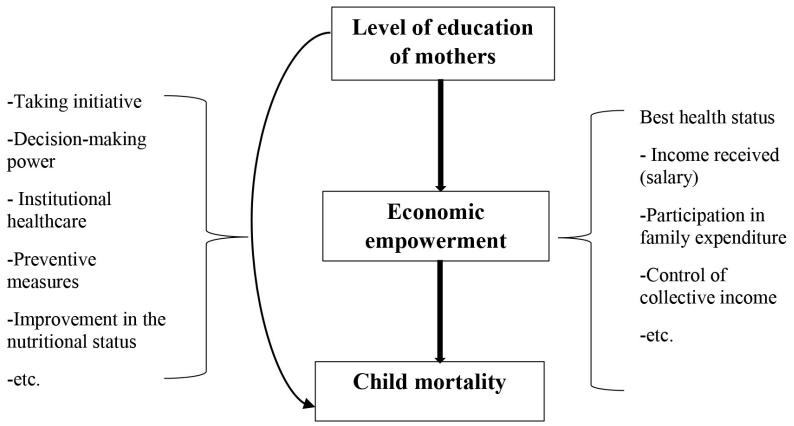
women's empowerment. As their estimation method, the researchers addressed the various possibilities in their identification of parameters and concluded that women's empowerment has benefits for children. Similarly, Karimli et al. (2021) used repeated measures data gathered from 360 adult women who are caregivers of children, within the framework of a cluster randomized controlled trial carried out within households living in a state of absolute poverty in Burkina Faso. The researchers noted that the advent of economic empowerment increased the involvement of women in decision making in regard to matters related to the well-being of their children but had no impact on the participation of women in decision making in regard to the household's overall economy.

3. Methodology and data

Econometric models and variables

The framework of conceptual analysis on the health of the child is based on a traditional paradigm of utility-maximizing parents (McElroy and Horney, 1981; Behrman et al., 1982; Aslam and Kingdon, 2012; Imai et al., 2014). The model assumes that a household with two parents (father and mother), concerned about the quality of health and nutritional status of the children, are considered as "public goods" and are not decision makers. Each of the parents chooses their own consumption in order to maximize the well-being of the children (their health status). With the mother being the most likely to prioritize the well-being of children, a higher negotiation power on her part improves the health status of the children. Furthermore, a higher level of education for the mother, improves her negotiation power within the household and, consequently, the nutritional status of the children. From existing studies and based on our research objectives, Figure 1 outlines our understanding of the transmission mechanisms of the impact of the education level of mothers on the health status of children through women's empowerment.

Figure 1: Transmission of the effects of the level of education of the mothers on the children's mortality



Source: Developed by the authors

Our objective was to determine whether there is a causal effect of education on the economic empowerment of women within a household. Given that we have access to observation data from a quasi-experience framework, it was necessary to consider the role of unobserved variables that could potentially play a biased role in our estimations. The ordinary least squares (OLS) observation method leads to biased estimations on the impact of education on the economic empowerment of women. This bias could derive from the omission of key variables that influence factors linked to education and to the results of household decisions, from a poor specification of the model, or also the key (and unobservable) differences between the groups, which could be key drivers for the difference in results instead of the impact of education. With such considerations in mind, we used a rich set of covariables within a framework of instrumental variables (IV) to discover any causal impact of education on the level of women's economic empowerment. The same strategy was used to examine the impact of the level of mother's economic empowerment on child mortality.

We first estimated the impact of the educational policy on school enrolment or the literacy level of women using a specification described in Equation (1):

$$\mathrm{Edu}_{irt} = \sigma \mathrm{PolCohort}_{i} + X\varphi + \epsilon_{irt} \quad (1)$$

Whereby PolCohort is a dummy variable taking the value of 1 for individuals exposed to an education policy or literacy. We used the Framework Act and its various provisions as our reference point. This act notably institutes, among other things, compulsory schooling for children aged between 8 and 16 years. To facilitate this policy, several programmes have been developed to increase academic infrastructure and its accessibility. Thus, those aged 6 in 1996 were 13 years old in 2003, the year in which the first survey was undertaken. Since the survey focused on individuals aged between 15 and 49 years, we retained those that were aged between 8 and 16 years in 1996, and therefore between 15 and 23 years in 2003, as the cohort or the treatment group. These people were given the value of 1. Another variable of the policy is defined by referring to literacy policies. These are, among others, the alpha commando strategies (1985–1987) during the revolution and bantaaré[3] (1987–1989), which was followed by the creation of permanent centres for literacy and training (CPAF) in 1990. Those strategies targeted members of the population aged between 16 and 50 years. The sample focusing on individuals aged between 15 and 49 years who were 16 years old in 1985 were aged 34 in 2003 and 41 years in 2010 and were thus still eligible. Those aged 49 years in 2003 were 31 years of age in 1985, and those aged 49 years in 2010 were 24 years old in 1985. Our cohort or treatment group for this second policy variable thus comprised women who were aged between 16 and 31 years in 1985 for the 2003 survey and 16 and 24 years for the 2010 survey; all these were therefore given the value of 1.

Equation 2 allows us to capture the impact of education on the economic empowerment of women.

$$\mathrm{Emp}_{irt} = \alpha_1 \widehat{Edu}_{irt} + \mathrm{X}_{irt}\beta + \mathrm{Y}_{hrt}\theta + \vartheta_r + \gamma_t + \varepsilon_{irt} \quad (2)$$

Where the variable of the result Emp (economic empowerment) of the individual *i* in region r over the period *t* is regressed using the variable $\widehat{Edu}$ that is an indicator of the level of education of women; the period *t* corresponds to the years covered by the survey; *X* is a vector of control variables related to the woman; and *Y* is a vector of control variables related to the household. The regressions also include fixed temporal effects (γ_t) and regional fixed effects (ϑ_r). Equation 2 was estimated using an *IV*.

Using Equation 3, we captured the impact of the empowerment of mothers on child mortality. We used the level of education as an instrument to control for the possibility of endogeneity related to the variable of economic empowerment.

$$\mathrm{Mort}_{irt} = \alpha_2 \widehat{\mathrm{Emp}}_{mrt} + \mathrm{Z}_{irt}\delta + \mathrm{X}_{mrt}\eta + \mathrm{Y}_{hrt}\Phi + \lambda_r + \kappa_t + \mu_{irt} \quad (3)$$

The models (formalized by equations 1, 2 and 3) are limited dependent variable models. A linear probability model (LPM) was adopted for this study. LPM simplifies the interpretation of coefficients and allows for the estimation of more flexible specification that include temporal trends and proper shocks for each individual, which could lead to minor gains for limited dependent variable techniques (Beck, 2011; Bazzi and Blattman, 2014).

Based on previous studies, we retained three indicators to capture the economic empowerment of women, namely the benefits to the woman (in cash or in kind); the control by the woman of those benefits; and the decision making by the woman on her expenditure and her family. In regard to the variable on child mortality, we considered three indicators: neo-natal mortality; infant mortality; and infant and child mortality. In regard to the variable on the level of education, we also retained three indicators, illiteracy; primary school level of education; and the higher level of education or a level equivalent to secondary school. Tables 1 and 2 provide a more detailed presentation of the main variables of the model.

Table 1: Key variables of equation 2

Dependent variables
Benefits for the woman in cash or in kind (1 if yes, 0 if not)
Control by the woman over the benefits (1 if yes, 0 if not)
Decisions over family expenditure (1 if the woman participates, 0 if not).
Explanatory variables
Level of education of the woman (1 = illiterate; 2 = primary school; 3 = at least secondary school) or number of years of education or literacy level
Wealth index of the household (1 = poor; 2 = average; 3 = rich)
Area of residence (1 =: urban; 2 = rural)
Marital status (1 = lives with a partner; 2 = lives on their own)
Age group of women (15–19; 20–24; 25–29; 30–34; 35–39; 40–44; 45–49)
Religion of the woman (1 = Muslim; 2 = Catholic; 3 = Traditional; 4 = Others
Level of education of partner (1 = illiterate; 2 = primary; 3 = at least secondary)
Occupation of partner (1 = unemployed; 2 = senior executive; 3 = office clerk; 4 = self-employed; 5 = skilled labourer; 6 = others

Source: Developed by the authors

Table 2: Key variables of equation 3

Dependent variables
Neo-natal mortality (1 if the child dies before the age of one month, 0 if not)
infant mortality (1 if the child dies before the age of one year, 0 if not)
Child and infant mortality (1 if the child die before the age of five years, 0 if not)
Explanatory variables
Benefits for the woman in cash or in kind (1 if yes, 0 if not)
Control by the woman over the benefits (1 if yes, 0 if not)
Decisions over family expenditure (1 if the woman participates, 0 if not).
Sex of the child (1 = boy: 2 = girl)
Sex of the head of household (1 = man; 2 = woman)
Wealth index of the household (1 = poor; 2 = average; 3 = rich)
Area of residence (1 = urban; 2 = rural)
Place of birth (1 = health centre; 2 = other)
Marital status (1 = lives with a partner; 2 = lives on their own)
Age group of the mother (15–19; 20–24; 25–29; 30–34; 35–39; 40–44; 45–49)
Religion of the mother (1 = Muslim; 2 = Catholic; 3 = Traditional; 4 = Others

Source: Developed by the authors

Data sources

The study used data that was accessible on demand. Indeed, major surveys have been undertaken in several countries in the world, often over various periods, in order to gather information on demography and health. The surveys contain plenty of information on a wide array of subjects, using a representative sample of the populations of countries participating in the DHS programme. For each country, the information collected is processed, tabulated, and presented in a report that describes the living conditions and the socio-demographic and health status of each country.

The DHS databases provide much information covering the living conditions of households, maternal and child health, HIV/AIDS prevalence, etc. The databases also provide the possibility of examining the microeconomic data in a manner that provides an international comparison.

Furthermore, the DHS survey comprises several questionnaires. The questionnaire on women gathers data on the general characteristics of the women surveyed (for example, age, level of education, wealth quintile, professional status), and more specific data related to the empowerment of women, such as the income received in cash, wife's income amount as compared to that of the husband, the control and use of their own income and that of the husband, etc. Information related to child mortality is extracted from the questionnaire on births and deaths of children. The questionnaire also provides information on fertility behaviour that exposes children to a high mortality risk (for example, having children before the age of 18 years, after the age of thirty-four or after a birth interval that is less than 24 months). A complete record of births is given, whereby one can enumerate all the children born to a woman, including date of birth, gender, survival status, age (if they are alive) and date of death (if they are dead).

Several DHS and Malaria Indicator Survey (MIS) have taken place in Burkina Faso, with a total of six survey phases (1993, 1998, 2003, 2010, 2014 and 2017) of which the last two were more focused on indicators of malaria (MIS). The availability of variables of interest for our study limits us to the use of two DHS surveys (2003 and 2010). The analysis involved compiling a large database using those surveys and allowing us to take the time factor into consideration. For the 2003 database, we took into account children born from 1998, whereas for the 2010 database we considered children born between 2003 and 2010. An observation of the trends of a range of factors over the duration of these two periods was related to distinct participants. Such a process allowed us access to data that provides information on children born between 1998 and 2010, and for mothers aged between 15 and 49 years.

4. Results and analysis of the results

Descriptive analysis of the data

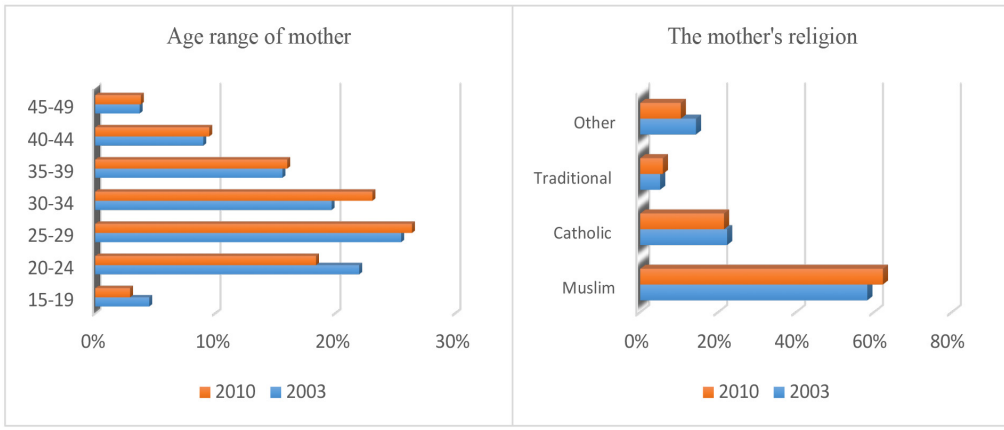
Trends in the key indicators for the two surveys from 2003 and 2010

Overall, the results from the DHS reveal that households are characterized by three main wealth indexes (rich, poor and average), among which the poor are the most significant (40% in 2003 and 42% in 2010). Within households, very few women have the status of head of the household. Thus, more than 90% of households are headed by a man.

In regard to the constitution of the members that comprise a household, the results from the survey highlight the variation between 2003 and 2010, of various characteristics related to mothers, children and spouses. According to the area of residence, it was evident that in 2003, most (84.4%) women lived in the rural area against 15.6% in the urban area. The rates were 79.1% and 20.29% respectively in 2010. The results indicate that more than 96% of the women live with a partner compared to less than 4% who live without a husband, i.e. are single. Most were young. For example, more than 80% of mothers were aged between 20 and 39 years.

In regard to the religion of the mother, the results reveal that more than a half of the women surveyed are Muslim (58.3% in 2003 and 62.3% in 2010). They are followed by Catholics (22.3% in 2003 against 21.5% in 2010) and traditionalists (5.1% in 2003 and 5.8% in 2010).

Figure 2: Age and religious characteristics of mothers

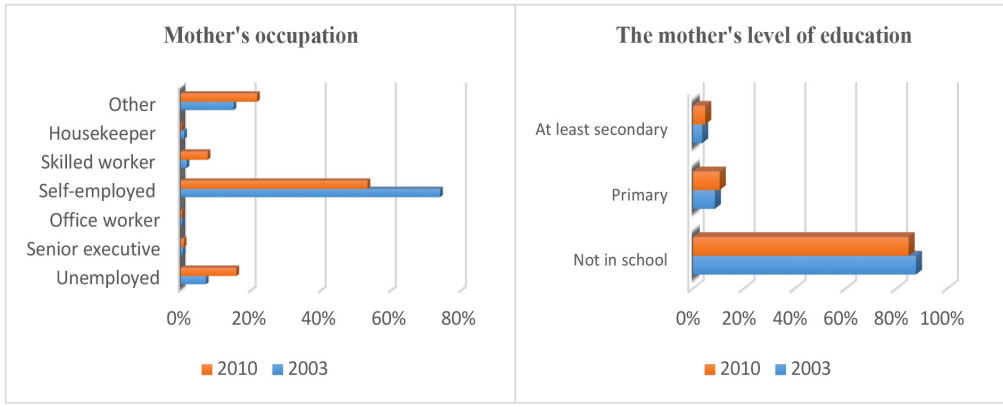


Source: DHS Burkina Faso (2003 and 2010), Authors' construction

For the characteristics of the mother according to their job status, we observed that more than 80% had a job, among whom, fewer than 50% received a salary in return in 2003 compared to close to 54% in 2010. Most of the working women were self-employed (74% in 2003 and 53% in 2010). In addition, we observed that other types of jobs were recorded, although in relatively small proportions. This was the case notably for office clerks, senior executives, skilled workers and housewives.

Furthermore, in focusing on the level of education, the results of the survey demonstrate that more than 80% of mothers were illiterate, less than 11% had a primary school level of education and less than 5% had at least a secondary school level of education. Nevertheless, the percentage share of women with a primary school level of education and those with at least a secondary school level of education increased from 2003 to 2010, increasing from 8.6% in 2003 to 10.5% in 2010 and from 3.6% in 2003 to 4.8% in 2010 respectivley. This trend could be due to the education policy (The Ten-year Basic Education Development Plan, for example), that was implemented by the government between 2001 and 2011.

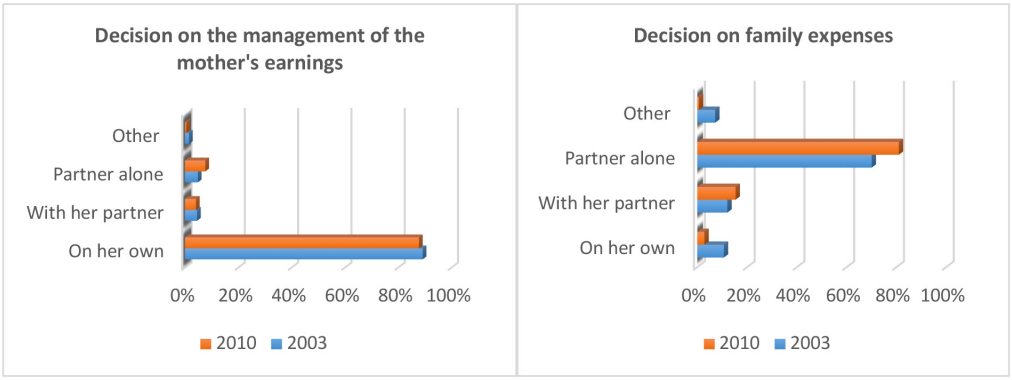
Figure 3: The characteristics of the mother according to her employment status and level of education



Source: DHS Burkina Faso (2003 and 2010), Authors' construction

In regard to whether the decision could be within the context of the management of a mother's income, most women indicated they are able to make independent choices. For example, the results of the survey suggest that more than 80% of the mothers make their own decisions on how to manage their income, whereas less than 10% affirm that their partners unilaterally make decisions on the management of their income. For the remainder, close to 4% state that they include their partners in the management of their income. However, very few mothers participated in decision making on family expenditure. Indeed, whereas the percentage share of men involved in decision making on family expenditure increased from 70% in 2003 to 81% in 2010, in 2003 and 2010 respectively only 12% and 10% of mothers made decisions on family expenditure either jointly with their partners or alone. Nevertheless, the percentage share of mothers making sole decisions on family expenditure was characterized by a significant reduction dropping from 10% in 2003 to 3% in 2010, which indicates a low involvement by mothers in terms of decision making on family expenditure.

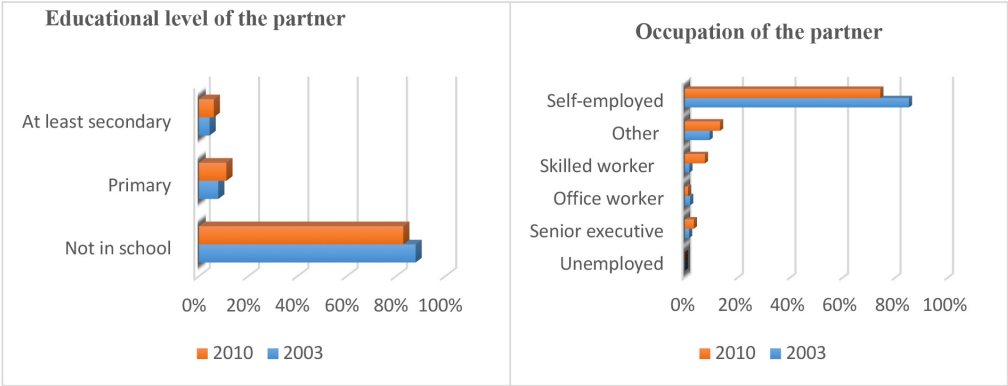
Figure 4: The characteristics of the mother according to their decision-making in the management of their earnings and family expenses



Source: DHS Burkina Faso (2003 and 2010), Authors' construction

In following the distribution through various characteristics such as the level of education and partner's job, the results of the survey demonstrate that just like in the case of women, the literacy levels of men are worrying. For example, the results showed that most spouses were illiterate (more than 80%), with only 20% having primary school level of education and at least secondary school level of education. However, in regard to jobs, none of the spouses was unemployed. Several positions such as office clerk, senior executive, labourer, etc. were occupied by these spouses. The most common form of employment was self-employment.

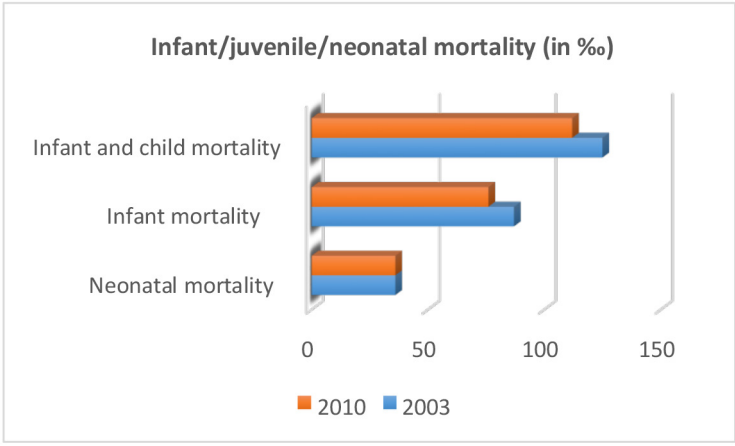
Figure 5: The characteristics of mothers' spouses according to their level of education and occupation status



Source: DHS Burkina Faso (2003 and 2010), Authors' construction

Of the children in the study sample, 51% are male against 49% who are female. Furthermore, the infant and child mortality rates reduced, although they remained high. Indeed, the infant and child mortality rates increased from 87% to 76% and from 125% to 112% in 2003 and 2010 respectively. Furthermore, neo-natal mortality remained relatively stable (36%).

Figure 6: Characteristics related to child mortality



Source: DHS Burkina Faso (2003 and 2010), Authors' construction

Mortality rate for children per socio-economic and demographic characteristics

Table 3 presents the neonatal infant mortality rates for children according to various socio-demographic characteristics of the household, infant, mother and the spouse over the period 2003–2010.

Data show that infant mortality is higher among boys than among girls, over the study period. The neonatal mortality of boys was close to 36.69 per 1,000 against 31.32 per 1,000 among the girls. Similarly, the infant and child mortality rates were at 83.48 per 1,000 and at 120.76 per 1,000 for boys and 76.26 per 1,000 and 112.38 for girls respectively.

Over the period 2003–2010, infant mortality was significantly lower when parents were educated than when they were illiterate. The results demonstrate that out of 1,000 births by illiterate mothers, 83.81 die before their first birthday, against 61.91 and 45.28 per 1,000 births for mothers with primary school and mothers having at least secondary school levels of education respectively. The trend is similar for the neonatal and infant and child mortality rates. The neonatal and infant and child mortality rates are at 36.82 out of 1,000 births and 122.9 per 1,000 for children of illiterate mothers; 28.68 out of 1,000 and 87.76 out of 1,000 for children of mothers who had a primary school level of education, and 27.42 out of 1,000 and 58.67 out of 1,000 for children whose mothers had attained at least a secondary school level of education.

An identical analysis could be applied to the level of education of the spouses (see Table 2). Although in the study period child mortality was relatively higher among children with illiterate mothers than for children of illiterate fathers, the three mortality rates were much lower among children of educated mothers than for those of children of educated fathers (comparison done according to an equal level of education). This observation strengthens the argument that child mortality depends more on the characteristics of the mother than those of the father. Another observation that is in agreement with this idea is that over the same period (2003–2010), the mortality rates of children from a household headed by a women (77.47 out of 1,000 births; 27.74 out of 1,000; and 106.17 out of 1,000 respectively for the rate of infant, neonatal and infant and child mortality respectively) were much lower for children from households headed by a man (80.1 out of 1,000 births; 36.08 out of 1,000; and 117.32 out of 1,000 respectively for the rate of infant, neonatal and infant and child mortality respectively).

Furthermore, we noted that infant mortality rate for mothers earning an income was slightly lower (78.59 out of 1,000 births) than that of the mothers who were not earning an income (79.87 out of 1,000 births). The neonatal mortality rate among children from mothers earning an income was at 35.07 out of 1,000 births against 35.22 out of 1,000 among children of mothers who were not earning an income. Paradoxically, the mortality rate for children of women who had a certain level of decision-making power on the use of their own income was distinctly higher than the mortality of other categories of children. For example, the infant and child mortality rate was 114.15 out of 1,000 births for children whose mother managed their own income independently, against 94.79 out of 1,000 for the other categories of children (a difference of 19.36 percentage points).

The mortality rates (neonatal, infant, infant and child) were much lower when the mothers had some decision-making power over family expenditure. The infant mortality rate for children whose mothers had some decision-making power over family expenditure was 75.14 per 1,000 births against 81.16 for the other categories of children.

Data also shows that the infant mortality rate is lower in urban areas (63.1 out of 1,000 births) than in the rural areas (83.93 out of 1,000 births). Neonatal mortality is also lower in urban areas (32.36 out of 1,000 births) than in rural areas (36.36). The social status of the family also seemed to have a certain influence on child mortality. The rate of infant and child mortality decreased from 135.47 out of 1,000 among children from a family belonging to the poor classes of society, to 115.28 out of 1,000 for children from a family belonging to the middle class and to 95.97 out of 1,000 among children from a family belonging to the rich classes of society.

Table 3: Mortality rate of children per socio-economic characteristics

	Indicators of mortality		
	Infant (out of 1,000 births)	Neonatal (out of 1,000 births)	Infant and Child (out of 1,000 births)
Level of education of the parents			
Level of education of the mother			
Illiterate	83.81	36.82	122.99
Primary	61.91	28.68	87.76
Secondary and higher	45.28	27.42	58.67
Level of education of the spouse			
Illiterate	82.37	36.2	122.26
Primary	71.57	31.94	95.24
Secondary and higher	56.43	30.59	72.78
Other socio-demographic characteristics of the mother			
Area of residence of the mother			
Urban	63.1	32.36	86.53
Rural	83.93	36.36	123.78
Religion of the mother			
Muslim	73.26	32.97	111.1
Catholic	69.07	31.96	93.39
Traditional	88.59	38.05	130.28
Others	105.62	46.75	143.65
Marital status of the mother			
Married	79.71	35.84	116.39
Other	87.03	28.45	124.68
Earning an income			
Yes	78.59	35.07	114.37
No	79.87	35.22	117.29
Decision-making power of the mother			
Use of income			
She decides	78.53	35.03	114.15
Someone else decides	67.05	34.68	94.79
She decides on family expenditure			
Yes	75.14	36.56	108.1
No	81.16	35.57	118.76
Socio-demographic characteristics of the household and the gender of the child			
Gender of the head of the household			
Man	80.1	36.08	117.32

Woman	77.47	27.74	106.17
Social class of the family			
Poor	92.2	39.39	135.47
Middle	78.94	35.01	115.28
Rich	66.53	31.62	95.97
Gender of the child			
Boy	83.48	39.69	120.76
Girl	76.26	31.32	112.38

Source: DHS Burkina Faso (2003 and 2010), Authors' calculations

Econometric results

This section presents the econometric results. First is the impact of the level of education on the economic empowerment of women, then the results of the impact of economic empowerment of mothers on child mortality.

Level of education and the economic empowerment of women

This section examines the impact of the level of education of women on their economic empowerment. Nevertheless, for testing robustness, we also focused on the impact of the number of years spent in school and access to literacy by women on their level of economic empowerment.

Table 4 presents the results of an analysis of the impact of the level of education of women on the probability of their economic empowerment.

Table 4: Level of education and the economic empowerment of women

	Ordinary least squares (OLS)			Two-stage least squares (2SLS)		
	Income	Use	Expenditure	Income	Use	Expenditure
Level of education (Ref. Illiterate)						
Primary	0.0311	0.0320**	-0.0011	-0.9659	-0.2958	-1.351
	(0.0237)	(0.0120)	(0.0113)	(0.5732)	(0.5041)	(0.8975)
At least secondary school	0.0938**	-0.0001	0.0681**	-0.9226**	-0.1290	-0.2646
	(0.0340)	(0.0092)	(0.0241)	(0.3804)	(0.2018)	(0.4365)
Social class of the household (Ref. poor)						
Middle	-0.0210	-0.0054	-0.0131	-0.0097	-0.0016	-0.0022
	(0.0263)	(0.0225)	(0.0137)	(0.0266)	(0.0268)	(0.0156)
Rich	0.0327	-0.0078	-0.0094	0.0859**	0.0108	0.0393
	(0.0363)	(0.0181)	(0.0229)	(0.0372)	(0.0356)	(0.0315)
Area of residence						
Rural	-0.1974***	-0.0479*	-0.0283	-0.3454***	-0.0835*	-0.1701
	(0.0586)	(0.0259)	(0.0303)	(0.0984)	(0.0432)	(0.1114)
Marital status (Ref. Single)						
Living with a partner	-0.0801**	-0.0298**	-0.2250***	-0.0476	-0.0227	-0.1941***

	(0.0268)	(0.0118)	(0.0359)	(0.0470)	(0.0205)	(0.0403)
Polygamous family	-0.0368**	0.0177	-0.0407**	-0.0881**	-0.0034	-0.0940**
	(0.0139)	(0.0101)	(0.0152)	(0.0308)	(0.0291)	(0.0394)
Religion (Ref. Muslim)						
Catholic	-0.0296	0.0171	0.0450**	0.0310	0.0307	0.0987*
	(0.0265)	(0.0140)	(0.0192)	(0.0391)	(0.0233)	(0.0469)
Traditional	0.0155	0.0229	0.0185	-0.0011	0.0169	0.0007
	(0.0201)	(0.0143)	(0.0177)	(0.0334)	(0.0184)	(0.0279)
Others	-0.0042	-0.0432	0.0263	-0.0376	-0.0587	-0.0190
	(0.0262)	(0.0374)	(0.0323)	(0.0381)	(0.0384)	(0.0505)
Level of education of the spouse (Ref. Illiterate)						
Primary	0.0497***	-0.0206*	0.0102	0.2166**	0.0348	0.2346
	(0.0145)	(0.0103)	(0.0122)	(0.0975)	(0.0866)	(0.1569)
At least secondary school	0.0625**	0.0232	0.0394*	0.5410***	0.0904	0.2857
	(0.0278)	(0.0140)	(0.0219)	(0.1769)	(0.1029)	(0.2418)
Fixed effects region	Yes	Yes	Yes	Yes	Yes	Yes
DHS year (region)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11.182	3.615	12.368	11.153	3.609	12.333
R^2	0.29594	0.06518	0.08011			
Within R^2	0.03623	0.01246	0.01455			
F (1st stage) 1, p				0.00050	0.09762	0.00154
F (1st stage) 1, p				0	0	0
Wald (1st stage), p				0.00036	0.00092	0.00075
Wald (1st stage), p				0.00109	0.00039	0.00030
F-test (2nd stage), p				0.01361	0.85735	0.00491
Wald (1st stage), p				0.05280	0.81010	0.24525

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

The results of the estimation of the Two-stage least squares (2SLS) demonstrated that the level of education (primary) variable has a negative but insignificant impact on the various indicators of economic empowerment, namely participation by women in income generation, and their decision-making power in terms of the use of their own income and family expenditure. One possible explanation for why the primary school level of education variable lacks significance in regard to the economic empowerment of women could be the low income yields from primary school level education (Cameron et al., 2001). Furthermore, when the level of education of the

woman increases to that of secondary school it reduces her economic independence, notably in regard to contributing to household income. For example, when the level of education of the woman increases from primary to secondary level, income decreases by 0.92%. It is evident that the secondary school level of education has a negative impact on women's participation in contributing to household income and that the impact becomes significant with its improvement. Such a result is contrary to the economic theory on human capital (Schultz, 1960; Becker, 1964), which highlights the significant role played by education on economic growth and development. It is also contrary to the results of several empirical studies (see, for example, Bussemakers et al., 2017; Dhanaraj and Mahambare, 2019). However, the result agrees with the results of various researchers (Ahmed and Hyndman-Rizk, 2018; Assaad et al., 2020). This result could be due to the low participation of graduates in the labour market due to structural problems in Burkina Faso's economy in this connection, the mismatch between the economic fabric of society and the knowledge acquired through traditional education. Indeed, in Burkina Faso the dominant education system offers general education which does not create enough possibilities for the private sector in regard to the employment of educated women. This leads to a decrease in employment opportunities in the public sector which is seen as the main provider of jobs, resulting in a diminishing of the participation of educated women in the labour market.

Further to the level of education, other factors influence the economic empowerment of women, such as the area of residence of the household and the level of education of the spouse. When the level of education of the spouse is above primary of secondary school, it leads to an improvement in the income of their partner which increases from 4.9% to 6.2%. Equally, the decision-making power of the partner increases in the same manner. One of the possible explanations for this result is that women with partners of a certain level of education have more freedom to enjoy their rights than those whose partners have a minimum level of education. This is because existing literature on women's rights could be unknown to partners who are illiterate.

Moreover, living in rural areas reduces women's chances of increasing their income and decision-making power over the management of the income by 19.78% and 4.8% respectively. These results could be explained through the fact that due to socio-cultural burdens, the role of the woman in Burkina Faso is still traditional in rural areas, as compared to the urban areas. The woman's role is to take care of the needs of family members (among other domestic duties) that do not include the financial needs of the household. Also, rural areas offer fewer employment opportunities than urban areas.

Marital status also has an impact on the empowerment of women. In our study, women with a partner experienced a reduction in their probability of pay out, management power over their income and participation in family responsibilities by 8%; 3% and 2.2% respectively. These results could be because the family obligations for women with partners are a hindrance to job seeking and income generating activities. Similarly, it could be justified through the fact that women with a partner could choose to share those responsibilities with that person, whereas single women

do not have a choice and have to do everything on their own. In regard to religion, the results highlighted the fact that women in Christian households have better opportunities for improving their participation in household responsibilities. This is probably because contrary to Christianity, Islam could limit access by women to various income generating activities that could be proscribed by Islamic law, for example. This limits access by such women to resources that could help them become economically empowered.

In order to verify the results of the level of education on the economic empowerment of women, we examined the various indicators of education, namely the number of years spent in school and the literacy level.

Table 5 presents the results of an analysis of the impact of the number of years spent in school on the economic empowerment of women in Burkina Faso.

Table 5: Number of years a woman spends in school and economic empowerment

	OLS			2SLS		
Dependent:	Income	Use	Expenditure	Income	Use	Expenditure
Years spent in school	0.0049*	0.0008	0.0061***	-0.0458*	0.0002	0.0359*
	(0.0027)	(0.0009)	(0.0016)	(0.0235)	(0.0104)	(0.0189)
Social class of the household (Ref. poor)						
Middle	-0.0207	-0.0051	-0.0131	-0.0192	-0.0049	-0.0154
	(0.0262)	(0.0226)	(0.0137)	(0.0267)	(0.0227)	(0.0132)
Rich	0.0339	-0.0070	-0.0096	0.0491	-0.0066	-0.0196
	(0.0361)	(0.0180)	(0.0229)	(0.0352)	(0.0195)	(0.0226)
Area of residence						
Rural	-0.2010***	-0.0499*	-0.0257	-0.2545***	-0.0505*	0.0084
	(0.0589)	(0.0259)	(0.0306)	(0.0723)	(0.0275)	-0.0376
Marital status (Ref. Single)						
Living with a partner	-0.0805**	-0.0286**	-0.2263***	-0.0722**	-0.0291**	-0.2275***
	(0.0273)	(0.0118)	(0.0363)	(0.0329)	(0.0114)	(0.0340)
Polygamous family	-0.0376**	0.0163	-0.0399**	-0.0522**	0.0163	-0.0312*
	(0.0139)	(0.0100)	(0.0152)	(0.0185)	(0.0108)	(0.0158)
Religion (Ref. Muslim)						
Catholic	-0.0286	0.0172	0.0435**	-0.0044	0.0177	0.0307
	(0.0261)	(0.0142)	(0.0186)	(0.0311)	(0.0186)	(0.0209)
Traditional	0.0155	0.0227	0.0190	0.0080	0.0229	0.0241
	(0.0203)	(0.0141)	(0.0176)	(0.0260)	(0.0148)	(0.0187)
Others	-0.0043	-0.0447	0.0273	-0.0125	-0.0445	0.0314
	(0.0264)	(0.0372)	(0.0319)	(0.0256)	(0.0369)	(0.0330)
Level of education of the spouse (Ref. Illiterate)						
Primary	0.0527***	-0.0161	0.0067	0.0876***	-0.0155	-0.0182

	(0.0145)	(0.0103)	(0.0123)	(0.0143)	(0.0108)	(0.0178)
At least secondary school	0.0802**	0.0200*	0.0381*	0.3176**	0.0230	-0.1070
	(0.0325)	(0.0105)	(0.0198)	(0.1115)	(0.0531)	(0.0884)
FE Region	Yes	Yes	Yes	Yes	Yes	Yes
DHS year (region)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11.183	3.615	12.369	11.154	3.609	12.334
R^2	0.29534	0.06325	0.08055			
Within R2	0.03546	0.01042	0.01497			
F-test (2nd stage), p				0	0	0
Wald (1st stage), p				0	0	0
F-test (2nd stage), p				0.04756	0.98335	0.08661
Wald (1st stage), p				0.05112	0.98301	0.05700

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

The results of the estimation using the 2SLS method, as illustrated in table 5, indicate that the number of years spent in school has a negative impact on the participation of the woman in contributing to income. However, it is evident that there is a positive impact of the number of years spent in school on decision making in regard to household expenditure. Nevertheless, the negative impact related to the participation of the women in contributing to family income is higher in absolute value than the positive impact resulting from her participation in decision making. Consequently, the more the years spent in school, the more the economic empowerment of the woman increases. This therefore confirms the fact that the level of education promotes the economic empowerment of women.

Table 6 presents the results of an analysis of the impact of literacy on the economic empowerment of women.

Table 6: Literacy and the economic empowerment of women

OLS				2SLS		
Dependent:	Income	Use	Expenditure	Income	Use	Expenditure
Literacy	0.0287**	0.0042	0.0138**	0.0436***	-0.0016	0.0244**
	(0.0113)	(0.0040)	(0.0066)	(0.0136)	(0.0055)	(0.0087)
Social class of the household (Ref. poor)						
Middle	-0.0204	-0.0051	-0.0136	-0.0212	-0.0049	-0.0144
	(0.0277)	(0.0225)	(0.0137)	(0.0260)	(0.0226)	(0.0137)
Rich	0.0330	-0.0062	-0.0091	0.0306	-0.0053	-0.0100
	(0.0313)	(0.0192)	(0.0223)	(0.0356)	(0.0179)	(0.0234)
Area of residence						
Rural	-0.2012***	-0.0481*	-0.0295	-0.1977***	-0.0494*	-0.0268
	(0.0620)	(0.0251)	(0.0267)	(0.0585)	(0.0244)	(0.0310)

Marital status (Ref. Single)						
Living with a partner	-0.0808**	-0.0288**	-0.2266***	-0.0816**	-0.0291**	-0.2267***
	(0.0299)	(0.0117)	(0.0380)	(0.0271)	(0.0115)	(0.0365)
Polygamous family	-0.0370***	0.0170	-0.0408**	-0.0358**	0.0166	-0.0396**
	(0.0128)	(0.0103)	(0.0167)	(0.0137)	(0.0097)	(0.0152)
Religion (Ref. Muslim)						
Catholic	-0.0281	0.0174	0.0451**	-0.0281	0.0183	0.0442**
	(0.0231)	(0.0135)	(0.0203)	(0.0264)	(0.0145)	(0.0189)
Traditional	0.0154	0.0230	0.0178	0.0170	0.0233	0.0175
	(0.0187)	(0.0149)	(0.0193)	(0.0200)	(0.0145)	(0.0172)
Others	-0.0034	-0.0457	0.0251	-0.0014	-0.0452	0.0240
	(0.0257)	(0.0373)	0.0314	(0.0262)	(0.0374)	(0.0323)
Level of education of the spouse (Ref. Illiterate)						
Primary	0.0504***	-0.0167	0.0092	0.0487***	-0.0154	0.0071
	(0.0148)	(0.0100)	(0.0165)	(0.0142)	(0.0103)	(0.0124)
At least secondary school	0.0755***	0.0196*	0.0542**	0.0615**	0.0256*	0.0433*
	(0.0269)	(0.0114)	(0.0249)	(0.0272)	(0.0120)	(0.0227)
Region	Yes	Yes	Yes	Yes	Yes	Yes
DHS (region) Yes		Yes	Yes	Yes	Yes	Yes
Observations	11.172	3.612	12.357	11.143	3.606	12.322
R^2	0.29557	0.06267	0.07912			
Within R^2	0.03572	0.01048	0.01388			
F-test (2nd stage), p				0	0	0
Wald (1st stage), p				0	0	0
F-test (2nd stage), p				0.00011	0.85349	0.01464
Wald (1st stage), p				0.00136	0.77376	0.00511

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

The results in Table 6 suggest that access to literacy programmes promotes the economic empowerment of women, notably through an improvement in the participation of women in terms of contributing to an improvement in household income and in decision making in regard to family expenditure. This result not only agrees with the economic theory of human capital (Welch, 1975; Schultz,1990; Becker et al., 1994) but also with results from previous empirical studies (Oyitso and Olomukoro, 2012; Adelore and Olomukoro, 2015). One of their underlying arguments is that the literacy programme allows women who benefit from it to access more income generating activities than those that do not benefit from it. Besides, this result differs from that of the impact of the number of years spent in school on the economic

empowerment of women highlighted previously. This could be explained through the fact that contrary to the traditional system of education in which general education is emphasized, the strategies that literacy programmes implement are accompanied by specific vocational training made possible by setting up literacy and training centres.

In summary, in Burkina Faso the level of education and the number of years spent in school do not improve the economic empowerment of women. However, literacy programmes for women have contributed to increasing their economic empowerment. Consequently, we can state that although the level of education of the women is necessary in order to improve their human capital, it is not enough to ensure their empowerment.

Economic empowerment of women and child mortality

In this section, we propose an examination of the impact of economic empowerment on three main indicators of child mortality. To that effect, various results are given in Tables 7, 8 and 9, through an examination of the mortality of children below one year of age (infant mortality), the mortality of children below one month of age (neonatal mortality and the mortality of children aged below five years (infant child mortality) respectively as outcome variables. From various estimations, we used the education variable as an instrument.

Table 7: Economic empowerment of the woman and infant mortality

Dependent variable	Child mortality					
2SLS	Instrument: Years spent in school			Instrument: Literacy		
Income	-0.1157			-0.0641		
	-0.0763			(0.0535)		
Decision making		-0.6813			-0.5839	
		(0.9388)			(0.8723)	
Family expenditure			-0.1996*			-0.2535
			(0.1026)			(0.2339)
Decision on family healthcare (Ref. Woman alone)						
Jointly with her partner	0.0176	0.0164	0.0567*	0.0128	0.0154	0.0704
	(0.0138)	(0.0213)	(0.0296)	(0.0110)	(0.0194)	(0.0608)
Jointly with someone else	-0.0012	0.0146	-0.0677*	-0.0150	0.0221	-0.0769
	(0.0441)	(0.2021)	(0.0362)	(0.0403)	(0.1860)	(0.0491)
Solely by the partner	0.0024	-0.0200	-0.0658	0.0061	-0.0143	-0.0860
	(0.0080)	(0.0472)	(0.0386)	(0.0066)	(0.0442)	(0.0872)
Someone else	0.0175	0.0203	-0.0610	0.0213	0.0258	-0.0842
	(0.0149)	(0.0612)	(0.0469)	(0.0130)	(0.0588)	(0.1026)

Social class of the family (Ref. Poor)						
Middle	-0.0159**	-0.0124	-0.0144**	-0.0131**	-0.0108	-0.0155**
	(0.0072)	(0.0180)	(0.0058)	(0.0057)	(0.0173)	(0.0067)
Rich	-0.0084	-0.0190	-0.0170***	-0.0097*	-0.0166	-0.0177**
	(0.0051)	(0.0213)	(0.0048)	(0.0045)	(0.0194)	(0.0059)
Gender of the child (Ref. Boy)						
Girl	-0.0019	-0.0049	-0.0050	-0.0022	-0.0045	-0.0051
	(0.0029)	(0.0075)	(0.0033)	(0.0028)	(0.0070)	(0.0035)
Gender of the head of household (Ref. Man)						
Woman	0.0060	-0.0037	0.0131	0.0060	-0.0041	0.0171
	(0.0073)	(0.0157)	-0.0078	(0.0072)	(0.0149)	0.0154
Area of residence						
Rural	-0.0200	-0.0073	0.0055	-0.0048	-0.0039	0.0046
	(0.0239)	(0.0282)	(0.0072)	(0.0178)	(0.0254)	(0.0085)
Religion (Ref. Muslim)						
Catholic	0.0034	0.0031	0.0033	0.0031	0.0028	0.0042
	(0.0047)	(0.0075)	(0.0061)	(0.0045)	(0.0076)	(0.0089)
Traditional	0.0141**	0.0046	0.0084*	0.0163***	0.0048	0.0070
	(0.0048)	(0.0085)	(0.0045)	(0.0048)	(0.0086)	(0.0080)
Others	0.0242***	0.0400**	0.0203***	0.0253***	0.0399**	0.0196**
	(0.0062)	(0.0164)	(0.0064)	(0.0065)	(0.0160)	(0.0067)
Place of birth (Ref. at home)						
In a health centre	-0.0091**	-0.0156	-0.0141***	-0.0098**	-0.0149	-0.0138**
	-0.0041	(0.0101)	(0.0042)	(0.0039)	(0.0095)	(0.0046)
Marital status (Ref. Single)						
Living with a partner	-0.0266	0.0111	-0.0119	-0.0199	0.0085	-0.0142
	(0.0219)	(0.0266)	(0.0152)	(0.0193)	(0.0261)	(0.0170)
Age of mother at first birth (Ref. younger than 20 years)						
20 to 30 years	-0.0087*	-0.0082	-0.0059	-0.0082*	-0.0075	-0.0049
	-0.0041	(0.0118)	(0.0039)	(0.0040)	(0.0108)	(0.0042)
Older than 30 years	0.0395	0.0875*	0.0456	0.0434	0.0853*	0.0464
	(0.0406)	(0.0426)	(0.0336)	(0.0405)	(0.0420)	(0.0328)
EF Year of birth	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21.582	7.574	24.758	21.564	7.568	24.738
F-test (1st stage), p, earnings	0			0		
F-test (1st stage), p, use		0.25905			0.31349	
F-test (1st stage), p, purchase			0			0.00028

Wald (1st stage)-p, earning	0			0		
Wald (1st stage)-p, use		0.33432			0.38268	
Wald (1st stage)-p, purchase			0			0.00079
F-test (2nd stage), p	0.14780	0.41432	0.09601	0.35832	0.53239	0.24403
Wald (1st stage), p-value	0.12930	0.46805	0.05161	0.23059	0.50324	0.27842

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

Table 8: Economic empowerment of the woman and neonatal mortality

Dependent variable	Neonatal mortality					
2SLS	Instrument: Years spent in school			Instrument: Literacy		
Income	-0.0152			-0.0077		
	(0.0578)			(0.0585)		
Decision making		-0.0792			0.0315	
		(0.5512)			(0.7149)	
Family expenditure			-0.0142			-0.0396
			(0.0766)			(0.1416)
Decision on family healthcare (Ref. Woman alone)						
Jointly with her partner	0.0081	0.0053	0.0098	0.0073	0.0032	0.0162
	(0.0090)	(0.0109)	(0.0215)	(0.0090)	(0.0145)	(0.0381)
Jointly with someone else	0.0244	0.1074	0.0172	0.0222	0.1158	0.0125
	(0.0402)	(0.1117)	(0.0350)	(0.0389)	(0.1037)	(0.0411)
Solely by the partner	0.0052	-0.0003	0.0015	0.0056	0.0049	-0.0083
	(0.0054)	(0.0286)	(0.0288)	(0.0053)	(0.0349)	(0.0532)
Someone else	0.0120	0.0139	0.0073	0.0124	0.0197	-0.0039
	(0.0094)	(0.0346)	(0.0353)	(0.0096)	(0.0437)	(0.0639)
Social class of the family (Ref. Poor)						
Middle	-0.0046	-0.0091	-0.0033	-0.0041	-0.0074	-0.0037
	(0.0033)	(0.0107)	(0.0034)	(0.0038)	(0.0131)	-0.0041
Rich	-0.0041	-0.0067	-0.0058*	-0.0043	-0.0048	-0.0061**
	(0.0035)	(0.0114)	(0.0027)	(0.0034)	(0.0133)	(0.0025)
Gender of the child (Ref. Boy)						
Girl	-0.0038*	-0.0019	-0.0066***	-0.0038*	-0.0014	-0.0066***
	(0.0020)	(0.0040)	(0.0021)	(0.0020)	(0.0046)	(0.0021)
Gender of the head of household (Ref. Man)						
Woman	0.0060	-0.0037	0.0131	0.0060	-0.0041	0.0171

	(0.0073)	(0.0157)	-0.0078	(0.0072)	(0.0149)	0.0154
Area of residence						
Rural	-0.0045	-0.0007	-0.0039	-0.0023	0.0024	-0.0043
	(0.0165)	(0.0166)	(0.0034)	(0.0164)	(0.0184)	(0.0033)
Religion (Ref. Muslim)						
Catholic	0.0013	0.0002	0.0012	0.0013	-0.0002	0.0017
	(0.0038)	(0.0079)	(0.0036)	(0.0039)	(0.0087)	(0.0051)
Traditional	0.0096*	0.0042	0.0076*	0.0099**	0.0035	0.0068
	(0.0044)	(0.0057)	(0.0040)	-0.0041	(0.0073)	(0.0042)
Others	0.0117*	0.0095	0.0092	0.0120*	0.0101	0.0092
	(0.0060)	(0.0130)	(0.0055)	(0.0059)	(0.0132)	(0.0054)
Place of birth (Ref. at home)						
In a health centre	-0.0071*	-0.0110*	-0.0093**	-0.0072*	-0.0108**	-0.0093**
	(0.0035)	(0.0054)	(0.0031)	(0.0036)	(0.0049)	(0.0032)
Marital status (Ref. Single)						
Living with a partner	0.0082	0.0138	0.0126	0.0093	0.0113	0.0117
	(0.0122)	(0.0180)	-0.0078	(0.0124)	(0.0196)	(0.0092)
Age of mother at first birth (Ref. younger than 20 years)						
20 to 30 years	-0.0052**	-0.0049	-0.0053*	-0.0051**	-0.0040	-0.0049
	(0.0021)	(0.0084)	(0.0026)	(0.0023)	(0.0106)	(0.0029)
Older than 30 years	0.0574*	0.0968*	0.0480*	0.0579*	0.0940*	0.0483*
	(0.0300)	(0.0476)	(0.0262)	(0.0300)	(0.0483)	(0.0266)
EF Year of birth	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21.582	7.574	24.758	21.564	7.568	24.738
R^2	0.00167	-0.00653	0.00211	0.00316	0.00439	-0.00382
Within R^2	0.00059	-0.00928	0.00139	0.00208	0.00167	-0.00455
F-test (1st stage), p, earnings	0			0		
F-test (1st stage), p, use		0.25905			0.31349	
F-test (1st stage), p, purchase			0			0.00028
Wald (1st stage)-p, earning	0			0		
Wald (1st stage)-p, use		0.33432			0.38268	
Wald (1st stage)-p, purchase			0			0.00079
F-test (2nd stage), p	0.77645	0.89017	0.86104	0.86918	0.96098	0.78808
Wald (1st stage), p-value	0.79205	0.88578	0.85301	0.89500	0.96490	0.77989

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

Table 9: Economic empowerment of the woman and infant mortality

Dependent variable	Infant and child mortality					
2SLS	Instrument: Years spent in school			Instrument: Literacy		
Income	-0.1388*			-0.1091*		
	(0.0738)			(0.0606)		
Decision making		-0.7527			-1.314	
		(0.9395)			(1.673)	
Family expenditure			-0.2621**			-0.4833
			(0.1055)			(0.3099)
Decision on family healthcare (Ref. Woman alone)						
Jointly with her partner	0.0243**	0.0183	0.0790**	0.0215**	0.0288	0.1351
	(0.0104)	(0.0189)	(0.0288)	(0.0086)	(0.0293)	(0.0783)
Jointly with someone else	0.0192	-0.0167	-0.0281	0.0113	-0.0602	-0.0672
	(0.0742)	(0.2046)	(0.0931)	(0.0741)	(0.2731)	(0.0999)
Solely by the partner	0.0060	-0.0202	-0.0828*	0.0083	-0.0468	-0.1668
	(0.0108)	(0.0514)	(0.0412)	(0.0100)	(0.0879)	(0.1178)
Someone else	0.0279	0.0084	-0.0749	0.0301	-0.0214	-0.1715
	(0.0241)	(0.0612)	(0.0521)	(0.0228)	(0.1024)	(0.1375)
Social class of the family (Ref. Poor)						
Middle	-0.0196**	-0.0180	-0.0188***	-0.0180**	-0.0266	-0.0231**
	-0.0078	(0.0175)	(0.0055)	(0.0071)	(0.0296)	(0.0080)
Rich	-0.0113*	-0.0273	-0.0223***	-0.0120**	-0.0365	-0.0251***
	(0.0057)	(0.0186)	(0.0044)	(0.0050)	(0.0292)	(0.0067)
Gender of the child (Ref. Boy)						
Girl	-0.0019	-0.0091	-0.0058	-0.0022	-0.0110	-0.0057
	(0.0051)	-0.0082	(0.0054)	(0.0051)	(0.0119)	(0.0063)
Gender of the head of household (Ref. Man)						
Woman	-0.0038	-0.0150	0.0075	-0.0039	-0.0114	0.0236
	-0.0078	(0.0189)	(0.0103)	(0.0076)	(0.0226)	(0.0216)
Area of residence						
Rural	-0.0197	-0.0035	0.0096	-0.0109	-0.0178	0.0057
	(0.0251)	(0.0261)	(0.0084)	(0.0191)	(0.0399)	(0.0087)
Religion (Ref. Muslim)						
Catholic	-0.0039	-0.0026	-0.0026	-0.0041	-0.0004	0.0013
	(0.0055)	(0.0066)	(0.0067)	(0.0056)	(0.0087)	(0.0105)
Traditional	0.0216**	0.0149	0.0151**	0.0229***	0.0193	0.0088
	(0.0073)	(0.0112)	(0.0068)	(0.0067)	(0.0184)	(0.0122)
Others	0.0216**	0.0418**	0.0179**	0.0223**	0.0383	0.0168**
	(0.0088)	(0.0180)	(0.0064)	(0.0089)	(0.0248)	(0.0073)

Place of birth (Ref. at home)						
In a health centre	-0.0193***	-0.0292**	-0.0250***	-0.0197***	-0.0294*	-0.0244***
	(0.0054)	(0.0126)	(0.0048)	(0.0054)	(0.0149)	(0.0053)
Marital status (Ref. Single)						
Living with a partner	-0.0205	0.0054	-0.0132	-0.0167	0.0193	-0.0221
	(0.0256)	(0.0287)	(0.0175)	(0.0234)	(0.0480)	(0.0210)
Age of mother at first birth (Ref. younger than 20 years)						
20 to 30 years	-0.0088	-0.0075	-0.0048	-0.0085	-0.0129	-0.0012
	(0.0057)	(0.0132)	(0.0048)	(0.0056)	(0.0186)	(0.0057)
Older than 30 years	0.0202	0.0751	0.0283	0.0225	0.0893	0.0311
	(0.0448)	(0.0430)	(0.0391)	(0.0453)	(0.0501)	(0.0405)
EF Year of birth	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21.582	7.574	24.758	21.564	7.568	24.738
F-test (1st stage), p, earnings	0			0		
F-test (1st stage), p, use		0.25905			0.31349	
F-test (1st stage), p, purchase			0			
Wald (1st stage), p, earnings	0			0		
Wald (1st stage)-p, usage		0.33432			0.38268	
Wald (1st stage), p, purchase			0			0.00079
F-test (2nd stage), p	0.13275	0.43354	0.05788	0.17612	0.22247	0.05393
Wald (2nd stage), p-value	0.05996	0.42303	0.01300	0.07167	0.43213	0.11894

Note: *p<0,1; **p<0,05; ***p<0,01. The robust standard errors in parentheses

Source: Developed by the authors

Overall, the results indicate that the economic empowerment of women seems to have a negative impact on the probability of the death of children. Indeed, when one considers the number of children as an instrument, then the participation of the mother in decision making in regard to family expenditure contributes to a decrease in child mortality in Burkina Faso. For example, the coefficient associated with the variable of participation by the woman in decision making on family expenditure was negative. More specifically, an increase in participation by the wife in decision making in regard to family expenditure was negative. These results are contrary to those arrived at in previous studies such as those in Indonesia (Titaley et al. 2008), Bangladesh (Hossain, 2015) and Sierra Leone (Cornish et al., 2021). However, economic empowerment measured by the participation of the mother in contributing to family income and her management of the family resources does not indicate any impact on the level of neonatal and infant mortality. Such results in the context of our study

could be attributed to the existence of a socio-cultural burden that is restrictive and presents an improvement in the decision-making power of women within households (through their income and their contribution to the household budget) which could translate into an improvement in the well-being of children in particular and the family in general.

Besides, the results demonstrate that economic empowerment continues to reduce infant and child mortality for mothers who have a certain level of education and participate in the generation of family income. For example, the probability of death among children aged 5 years and below (infant and child mortality) decreases by 13% when the mother participated in generating family income and by 26% when they participate in decisions concerning family expenditure. The underlying argument is thus that families in which the mothers are not only educated but also participated in decision making about household expenditure, are more inclined towards dedicating a significant percentage of their income on healthcare expenditure and on maintaining good nutritional status that is favourable to their well-being (Smith et al., 2004; Carlson et al., 2015; Elsiffie et al., 2020). Also, due to a better knowledge and sensitization on health care and the prevention of illnesses, educated mothers take care of their child and themselves during and after a pregnancy better than uneducated mothers do.

Thus, in conformity with the conceptual framework of this study, economic empowerment of mothers is presented by one of the channels of transmission of the impacts of the level of education of the woman on child mortality in Burkina Faso UNCLEAR. However, the results corroborate those of various studies such as those of Carlson et al. (2015) and Essilfie et al. (2020).

Furthermore, the results reveal that the various mortality rates seem better explained through other socio-economic and demographic aspects notably the social class of the family (middle class or rich), the region in which the household lives, the place of birth of the child and the age of the mother at her first child birth have an impact on the probability of the death of the children. Indeed, if the wife belongs to the middle class or the rich, neonatal, infant and child mortality rates reduced. Similarly, we noted that being born in a health centre reduces the probability of death. However, practising a traditional religion had a positive impact on neonatal, infant and child mortality. This could be explained by the fact that the gender norms are more pronounced within traditional communities. Besides, the healthcare decisions of a family have various impacts on child mortality. For example, if the decision is made by the mother and her partner, the probability of death among the children increases, whereas it decreases if the decision is made by the mother and someone else. The mother's age at the time of her first childbirth is also a determinant in explaining the risks of deaths among children. If the mother had her first child between 20 and 30 years of age, mortality reduces, however, if she is aged above 30 years, mortality increases.

In summary, we noted that in Burkina Faso the improvement in human capital of women is favourable to their economic empowerment. Indeed, access to education, in other words to training in school and in literacy classes for women, improves their

income probability. Nevertheless, it seems not to have an impact on their decision-making capacity in regard to household income. It is also evident that the decision-making capacity in terms of household income reduces child mortality in Burkina Faso, especially in rural areas.

5. Conclusion and policy implications

This study had two objectives: to highlight the role played by the level of education of women on their economic empowerment and, through a knock-on effect, the impact of the economic empowerment of mothers on child mortality. An instrumental variables approach was adopted for a linear probability model. We defined the variable on educational policy as an instrument by referring to the major reforms undertaken in the 1980s and 1990s.

Although the results revealed some clear responses, some of the responses were mixed and allow us to confirm all the hypotheses in our analysis. The first examination of the level of education measured through the level of primary school education or higher, does not allow for an improvement of the economic empowerment of the woman in Burkina Faso in all the aspects addressed. However, when the level of education is captured through participation in literary programmes, it becomes a determinant of economic empowerment of the woman in the country. This relationship can be explained by the fact that the literacy programmes implemented have been accompanied by vocational training, which often best meets the needs on the labour market. This result is consistent with the human capital theory propelled by Becker (1964), who emphasizes that educational attainment improves employability opportunities, which is a guarantee of autonomy for women. In the second part of our results, we found proof related to the role of economic empowerment of women in the reduction of child mortality. Indeed, our results show that the economic empowerment apprehended by its participation of mothers in decision-making concerning family spending induces both a decrease in infant and child mortality. Nevertheless, economic independence, captured by the variable's participation in the contribution and management of income, did not seem to be a determinant in the reduction of child mortality. In future, this study could be extended beyond its focus on economic empowerment. The participation of women in politics and a more active participation by women in decision making within the household are other possibilities for future studies. Furthermore, government authorities should pursue efforts in school enrolment for young girls by investing more in education and improving the education system through integrating vocational training within the school curriculum so as to guarantee a pairing of the knowledge acquired through education with the demands of the labour market. Moreover, in regard to the traditional customs that are often discriminatory towards women, it is important that

policies targeted towards supporting human capital through the well-being of children do not focus on only one action point, such as the enrolment of girls in educational institutions, but also on the larger institutional context of family and property rights.

Notes

1 These statistics have been calculated by the author using data from the World Bank (WDI, 2022).

2 The gender stratification theory tends to account for the differences in privileges and powers in the society that are linked to gender inequality (Boenheru and Williamson, 1996).

3 Bantaaré and alpha commando are non-formal literacy and education policies implemented in Burkina Faso from the 1980s onwards.

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