Child malnutrition in Cameroon: Does out-of-wedlock childbearing matter?

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Abstract

The objective of this study is to compare the nutritional status of legitimate children and that of children born out-of-wedlock in Cameroon. The study is founded on two hypotheses: the cultural stigma hypothesis and the characteristics hypothesis. Analysis is based on 1498 children under three years of age and living with their mother from the 1998 Cameroon Demographic and Health Survey. Children born out of wedlock represent 7.4 % of all children studied. The paper shows that, in Cameroon, children born out-of-wedlock experienced low risk of malnutrition (28%) about 10 percentage points lower than legitimate children (38%). In fact the likelihood of out-of-wedlock childbearing is higher among educated and/or urban women whose children are less exposed to malnutrition. Mother's socioeconomic characteristics particularly mother's education remain the fundamental factors affecting child malnutrition in Cameroon. However, though findings don't support the cultural stigmatization hypothesis, they could not reject it either.

Introduction

Interest in studying factors associated with inequalities in health and schooling among children has increased since the 1990 International Convention for Children (Unicef, 1990). Generally, scholars compared children living in developed countries to those living in developing countries; and children living in rich households to those living in poor households. At the individual level, comparisons are often based on sex, age or legitimacy of birth. Most recent studies show that children born out of wedlock experience low birth weight and high risk of infant and/or child mortality owing to their marginalization in some societies (Akoto, 1993; Johnson-Hanks, 2005) or to poverty of single mothers and their households (Meekers, 1994a). However, the current literature is not clear on how marginalization of children born out of wedlock has a direct impact on their mortality. Other studies show that in several African countries, particularly in Cameroon, out of wedlock childbearing is more frequent among the most educated women (Meekers, 1994b; Calves, 2000; Emina, 2005) whose children are expected to have lower risk of heath problems due to lower risk of malnutrition as well as better access to health care services.

The objectives of this study are to compare the nutritional status of legitimate and out-of-wedlock children, and to identify the main determinants of observed differences. The first section of this paper outlines the theoretical considerations explaining the relationship between legitimacy of birth and health status of children. The second section presents out-of-wedlock childbearing phenomenon in Cameroon. Methodology (data and methods of analysis) is described in the third section. The last section reports the principal findings of this research.

1. Theoretical considerations

Past studies in social demography have developed two main hypotheses about the relationship between legitimacy of birth and children's health outcomes, namely cultural stigmatization or social exclusion hypothesis, and characteristics hypothesis.

1.1 Cultural Stigmatization and social exclusion hypothesis

In Africa, being born to unmarried[1] parents can affect health outcomes through social exclusion resulting from the stigma of non-marital sex, conception, and childbearing (Akoto, 1993; Johnson-Hanks, 2005). Insofar as non-marital sex, conception, and childbearing are stigmatized, unmarried mothers may be expelled from their kin and social networks, will be less able to make claims on the time, resources, and support of their families, and may hesitate to seek prenatal care out of fear or shame. For instance, higher infant mortality among out-of-wedlock children in Cameroon, Senegal and Kenya, is explained by stigmatization of children born out-of-wedlock in some societies including Bamileke and Biu-Mandara (Akoto, 1993; Johnson-Hanks, 2005). That is, stigma itself may have significant negative effects on health and health care of children.

However, this hypothesis seems to ignore the role of modernization which may inhibit the positive or negative effect of cultural inheritance. In fact, it is claimed that prevalence of out-of-wedlock childbearing is positively associated with modernization, and mostly occurs among educated women and those living in urban areas. Moreover, children born to these women have lower risk of health problems.

1.2 Characteristics or selective hypothesis

According to the *characteristics hypothesis*, out of wedlock is associated with particular social and economic characteristics (place of residence, level of education, household living standard). In this case, legitimacy of birth itself has little or no influence on the dependent variable such as prevalence of malnutrition or risk of infant or child mortality. For example, others have suggested that the high mortality risk observed to out-of-wedlock children can be explained by young maternal age of single mothers because younger maternity is positively associated with an underweight and premature baby (Gueye and van de Walle, 1988; Lester, 1992). Similarly, being born out-of-wedlock can increase heath problems (for example, malnutrition and mortality) through resource deprivation as a result of poor living conditions (Buvinic et al., 1992; Meekers, 1994a; Olabisi and Adetanwa, 1997). In fact, in some contexts, unmarried parents are largely poor and more likely to face economic hardship. For instance, analysing the implications of premarital childbearing on infant mortality in Côte d'Ivoire, Meekers (1994a) concluded that the main contributor to the high mortality of premarital children is probably not discrimination but simply the fact that unmarried mothers themselves are generally in disadvantaged social positions. However, nowadays, most scholars assert that the likelihood of having an out-of-wedlock birth is higher among the most educated women or those living in urban areas (Calves, 2000; Emina, 2005). This could inhibit the influence of cultural inheritance. For example, in Cameroon, children born out-of-wedlock experienced lower exogenous mortality risk because they seem to have "better" use of medical service including vaccination (Emina, 2005). Nevertheless, the positive effect of modernity could be inhibited in case of unwanted pregnancy, particularly if the future mother is still in school or does not have economic autonomy.

2. Does out-of-wedlock childbearing matter in Cameroon?

Out-of-wedlock pregnancies or fertility constitute a social issue in Cameroon even though they are tolerated in some societies (Cameroon, 1988). This is because of traditional values

[1] In this paper marriage includes informal union and/or living together with reference to the DHS definition of marriage. Thus union is synonym of marriage in this paper.

and/or the consequences of out-of-wedlock childbearing on mothers as well as on children's socioeconomic outcomes, including maternal and infant mortality or adolescent school dropout.

Considering traditional values, out-of-wedlock pregnancy and childbearing were the most upsetting things that could happen to a young single girl and her family in major traditional societies except in the Tropical Forest People including Bulu, Beti-Fang, Bassa, Bafia, Douala living in the Centre, South, East and Littoral provinces (Ombolo, 1990; Emina, 2005). Tropical Forest People tolerated out-of-wedlock motherhood, presumably because of interest in women who had proven their fertility given high infertility and sterility in Central African countries. Fulfude and Kirdi people living in the Northern region, as well as Bamileke-Bamoun and Grassfielders ethnic groups' tradition forbade out-of-wedlock childbearing which was seen as causing dishonor for families and was sanctioned heavily by communities. In these societies, women are expected to be virgins at marriage, premarital childbearing is unacceptable and the consequences for defiance are severe. For instance, a single mother had an eventual risk of having no husband. In addition, her parents could be "excluded from her community" by the village (Bangha, 2003). Among Fulfude and Biu-mandara, a single woman who becomes pregnant must leave the highlands and find refuge in the plains, as far away as possible, and never return, not even for ordinary visits (Johnson-Hanks, 2003). Normative early marriage, rigorous supervision of young women, polygyny and strong negative sanctions in the case of infraction were social strategies to avoid premarital sex and its consequences.

However, with reference to table 1, it appears that out-of-wedlock childbearing seems to be common in all Cameroonian societies, particularly in urban areas and among the most educated women except in the Northern region mainly occupied by Fulfude and Biu-mandara. The proportion of women who start their motherhood out-of-wedlock rose from 22% in 1991 to 25% in 2004 and 26% in 1998. The difference between the years 1998 and 2004 could be attributable to a decrease in length of premarital sexual period (difference between age at first sexual relation and age at first marriage).

Table 1 – Proportion (%) of women aged 15-49 who had experienced first birth out-of-wedlock in Cameroon

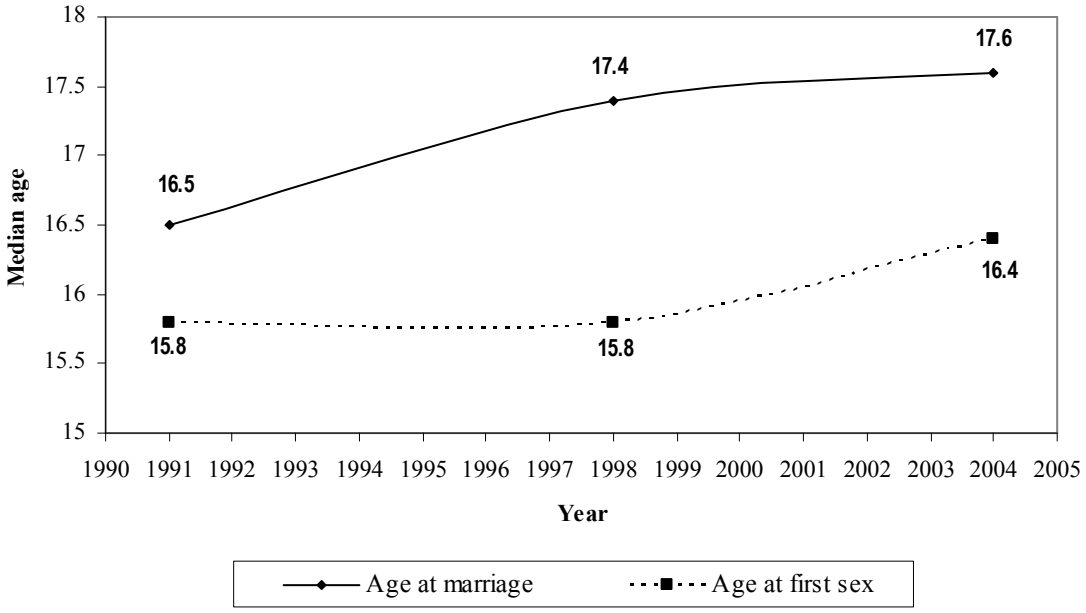
	1991	1998	2004
Region of residence			
Yaoundé, Douala	31.6	(-)	33.1
Adamawa, North, Extreme-North	**8.1**	4.2	**5.8**
North-West, South-West	17.9	31.7	35.1
Littoral, West	21.6	31.3	20.4
Central, South, East	33.4	40.3	38.3
Place of residence			
Urban	25.6	30.0	27.3
Rural	17.2	17.6	22.6
Level of education			
No education	9.6	5.7	6.2
Primary level	22.3	26.7	24.4
Secondary and high level	38.6	42.8	39.1
All (Cameroon)	**21.7**	**25.7**	**24.7**

Note: (-)Data for Douala are included in Littoral and West region while those for Yaoundé are included in Central/South/East region; Source: Cameroon Demographic and Health Survey (CDHS-1991, 1998 and 2004)

Figure 1 shows the evolution of both median age at first sexual relation and age at first union from 1991 to 2004. Family life education efforts among adolescents, awareness of the

HIV/AIDS epidemic and promotion of contraception methods could explain the increase of age at first sexual relation and that of age at first union from 1998 to 2004 and the regression of out-of-wedlock motherhood, particularly in urban areas and among educated girls.

Figure 1 - Age at first marriage and age at first sexual intercourse in Cameroon from 1991 to 2004



Influence of modernity may explain the prevalence of out-of-wedlock childbearing in Western regions (Northwest, Southwest, and West) via schooling, urbanization and economic hardship delaying marriage and increasing risk of premarital sex. This coupled with low contraceptive use and abortion interdiction, led to out-of-wedlock childbearing. In contrast, the Northern regions remain less developed: a high proportion of the population is not educated[2] and is poor. Furthermore, Northern societies are mostly ruled by Islam or traditional norms which encourage early marriage (median age at marriage is 15 years old in the Northern region compared to 18 in other regions) and polygyny.

Table 2 – Median length (years) of period between first sex and marriage by region of residence in Cameroon (1991, 1998 and 2004)

	1991	1998	2004
Region of residence			
Yaoundé/Douala	2.0	3.1	2.9
Adamawa/North/Extreme North	-0.1	0.0	0.1
Central/South/East	1.9	3.0	2.5
West/Littoral	0.5	1.8	1.0
North-West/South-West	0.2	2.1	2.3
All (Cameroon)	**0.5**	**1.4**	**1.2**

Source: Cameroon Demographic and Health Survey (CDHS-1991, 1998 and 2004)
http://www.statcompiler.com/statcompiler/table_builder.cfm?userid=205371&usertabid=223917

[2] For example, only 6% of reproductive aged women have a secondary or higher education level in the Northern region compared to 30% or higher in the rest of the country (Emina, 2005).

Out-of-wedlock childbearing is also a social issue because of its consequences on women's schooling and maternal and child mortality (Lesthaeghe et al., 1989). Data from the 1998 Cameroon Demographic and Health Survey show that pregnancy causes about 15.0% of women aged 15-49 to drop out school. Likewise, using data from the 1988 Botswana Family Health Survey, in conjunction with focus group interviews, Meekers and Ghyasuddin (1999) highlighted that pregnancy caused 8% of women aged 15-49 to drop out of primary school and 20% to drop out of secondary school.

Furthermore, previous research points out that mortality rate of children born out-of-wedlock are higher than those of legitimate children in Cameroon (Akoto, 1993; Emina, 2005; Johnson-Hanks, 2005). The association between adolescent fertility and child health problems may account for one of the observed relationships between out-of-wedlock childbearing and higher child mortality rate (Lesthaeghe et al., 1989; Emina, 2005).

3. Data and Methods

The data for this research come from the 1998 Cameroon Demographic and Health Survey. In this sample, there are 1498 children aged less than three years (born from 1995 to 1997) and living with their mother. Children born out of union represent 7.4 % of all children studied. The analysis focuses on three kinds of variables: independent variable (*Legitimacy of birth*), dependent variable (*nutritional status of children*). The control variables include mother's ethnic groups, region of residence and place of residence (urban or rural), mother's level of education, children's living arrangement and household living standard. These variables are chosen on the basis of their associations with the likelihood of out-of-wedlock childbearing and child nutrition status as observed in previous studies on Sub-Saharan Africa. The legitimacy of birth is defined as the status of a child according to the marital status of his/her mother at the time that he/she is born, regardless of the current marital status. When the mother was in union (formal or informal) the children are considered legitimate, whereas those born to single mothers are defined as out of wedlock children. In fact, the definition of marriage used by the 1998 Cameroon Demographic and Health Survey depends on respondent self definition of union (traditional union, legal and/or religious as well as de facto living together).

The prevalence of malnutrition is defined as the proportion of children with weight two standard deviations or more below the median weight-for-age (underweight) and/or height-for-age (stunted) and/or weight-for-height (wasted) of the NCHS/CDC/WHO international reference population. This indicator, called "*Classification of Children with Anthropometric failure" (CIAF)*, is a composite index of anthropometric failure; and provides a single, aggregated figure of the number of undernourished children in a population (Nandy et al., 2005). This variable distinguishes two categories of children: (1) children who don't suffer from any anthropometric failure; and (2) those who suffer from anthropometric failure in at least one measure (stunted, wasted, underweight). This variable is coded "yes" or "no" for malnutrition.

When examining the association between children's nutritional status and the legitimacy of their birth in Cameroon, one must take into account the large regional[3] differences within the country, mother's ethnic group, educational level, household living standard, place of

[3] The Republic of Cameroon is divided into 4 natural regions including the 10 provinces: Northern provinces, Northwest and Southwest, Littoral and West, South, East and Centre.

residence and child's living arrangement, because generally both malnutrition and proportion of out-of-wedlock children are associated with these characteristics.

Household living standard has been shown to be associated with child nutritional status (see for instance Fotso and Kuate, 2005; Pongou et al., 2005; Pongou et al., 2006). In our study, household living standard is measured with an asset index and wealth quintile constructed using the statistical model developed by Filmer and Pritchett (2001) (see also Gwatkin et al., 2000). The index measures economic status based on household assets and possession of household consumer durables such as electricity, television, and bicycle. The basic premise of the index is that wealthier households are more likely to own any given set of assets; and that some assets are likely to be owned at relatively low levels of economic status (radio or bicycle), while others will be owned only at higher levels (television or car). Furthermore, certain assets like building materials and television are most common in urban areas regardless of the level of living standard. To take account of these realities on the one hand, scores are attributed to each asset according to its weight in the first factor from the principal components analysis. On the other hand, scores are different between urban and rural areas. Using rank methods, households are classified by quintile of wealth. To avoid small numbers, the two bottom quintiles of wealth are grouped, and so are the two top quintiles. Thus, the Household Living Standard has three categories: poor, medium and rich.

The ethnic groups variable encompasses four categories after regrouping the 250 Cameroonian ethnic groups with reference to their cultural and linguistic similarities[4]: The *Fulani/Fulfude and Kirdi People* located in the Northern provinces (Adamawa, North and Extreme North); the *Bamileke-Bamoun* in West province, the *Grassfielders* encompassing Tiv, Ngemba, Banyang are located in Northwest and Southwest province; and the *Tropical Forest People* including Bassa, Douala, Bafia, Bulu, Beti-Fang who live in Littoral, Centre, South and East provinces.

It appears that legitimate children differ from out-of-wedlock children according to all selected variables except for the household living standard. More than half of out-of-wedlock children belong to Tropical Forest People. Further, children born out-of-wedlock are concentrated in urban areas, among educated women and in multifamily[5] households. The proportion of out-of-wedlock children varies by region and ethnic affiliation, which corroborates the observation in the anthropological literature that premarital sex and out-of-wedlock childbearing are tolerated in the tradition of the Tropical Forest People. In addition, these regions are located in the most developed regions of Cameroon with the two largest cities (Yaoundé and Douala) where women are more educated and prevalence of health problems is low. As expected, the percentage of legitimate children is higher in the northern region, where the population is predominantly poor, Muslim, has little education, and marries early. Further, about 72% of legitimate children live in two parent households.

Although the traditions of Bamileke-Bamoun and Grassfielders do not tolerate premarital sex and out-of wedlock childbearing, the proportion of out-of-wedlock children is growing in these societies probably because of modernization (women's education and urbanization) which increases age at first marriage and the likelihood of premarital sex (Emina, 2005). This distribution of children by socio-demographic characteristics according to the legitimacy of their birth supports previous findings in Cameroon (Calvès, 2000; Johnson-Hanks, 2003; Emina, 2005 and 2007).

[4] http://www.ethnologue.com/show_country.asp?name=Cameroon.
[5] In most cases, children live with mother and grandparents or other relatives.

Table 3 – Distribution of legitimate and out-of-wedlock children by selected variables

	Legitimate	Out- of- union	All
Mother's age			
< 20	**9.2**	**34.2****	11.0
20-24	25.8	**43.3****	27.2
25 and +	**65.0**	22.5**	61.8
Region of residence			
North, Adamawa, Extreme North	**37.2**	**3.6****	34.7
North-West and South-West	15.5	25.2	16.2
Littoral and West	18.8	20.7	18.9
Central, South and East	28.5	**50.5****	30.2
Ethnic groups			
Fulani and Kirdi people of North	**38.6**	**3.6****	36.0
Bamileke and Bamoun	19.0	16.2	18.8
Grassfielders (Banyang, Efik-Korop, Ejagham, Tiv, Ring…	12.6	23.4	13.4
Tropical Forest People (Beti, Bulu, Fang, Bassa, Bafia…)	28.4	**54.9****	30.4
Non-Cameroonians*	1.4	1.8	1.5
Place of residence			
Urban	38.4	**48.6**	39.2
Rural	**61.6**	51.4	60.8
Mother's Education			
Less than Secondary	**72.1**	36.9**	69.5
Secondary and higher	27.9	**63.1****	30.5
Child lives with			
only mother	6.7	9.0	6.9
two parents	**71.7**	3.6**	66.6
mother and grandparents/ relatives parents	21.6	**87.4****	26.5
Household Living Standard			
Poor	36.1	33.3	36.0
Medium	22.1	29.7	22.6
Rich	41.7	37.0	41.4
TOTAL (NUMBER)	**1387**	**111**	**1498**

Note: * Non-Cameroonians are excluded in stratification and multivariate analyses; ** significant difference at 5%; Source: 1998 Cameroon DHS

Analyses are based on frequency distribution, chi-square test (bivariate and stratification analyses) and logistic regression. The choice of these methods is justified by the nature of the dependent, independent and control variables which are all qualitative, and their efficiency in the case of small samples such as the 111 out-of-wedlock children. However, logistic regression procedure assumes independence between all children while in some cases, more than one child belongs to the same mother and/or household. The *mixed model* methodology which provides a framework for analyzing data with dependent observations as well as the *Multilevel analysis* are used in these cases to take into account clustering of observations. In this study, the *mixed logistic regression model* is used to handle repeated measures designs with one repeated response variable (SAS Institute Inc, SAS/STAT, 1999:1511).

4. Findings

4.1. Nutritional advantage of children born out-of-wedlock in Cameroon

Table 4 shows the prevalence of malnutrition among children aged less than three years in Cameroon. Thirty-seven percent of children under three are malnourished (stunted and/or wasted and/or underweight). According to the 1998-99 National Family Health for India, 60% of under three years old in India were malnourished using the CIAF indicator.

Table 4 – Prevalence of malnutrition in Cameroon by legitimacy of birth

Status of birth	% of malnourished	Number of children	Chi-square
Out-of-wedlock	27.9	111	4.52**
Legitimate	38.0	1387	
All children	37.3	1498	

Note: * p< 0.10; ** p<0.05; *** p<0.001 ; Source: 1998 - CDHS

While children born out-of-union are generally assumed to have poorer developmental outcomes because of their stigmatization in some societies and/or poverty of their mothers, being born out-of-wedlock is not a predictor of malnutrition in children under the age of 3 years in Cameroon. In fact, compared to children born in union, children born out of wedlock experienced a low risk of malnutrition: 28% of children born out of wedlock were malnourished (underweight and/or stunted and/or wasted), about 36 percent lower than legitimate children (38%) (tables 4 and 5; model 1 table 6).

How does legitimacy of birth affect child nutritional status in Cameroon? What could explain the nutritional advantage of out-of-wedlock children, which seems to yield no support for the cultural stigmatization hypothesis? To assess the characteristics hypothesis, we control for region of residence, place of residence, mother's education and household living standard. If a difference disappears after control for one variable, we say that this variable is the factor that accounts for the difference. In this case, legitimacy of birth is a covariate which itself does not influence child malnutrition. In contrast, if any variable does not inhibit the difference, we say that legitimacy of birth is itself a factor of malnutrition in Cameroon. In addition, we use multivariate logistic regression to assess the validity of findings from stratification or analysis by strata. Likewise, higher prevalence of malnutrition among out-of-wedlock children in some ethnic groups, namely those which traditions don't tolerate out-of-wedlock childbearing, enables us to accept the cultural stigmatization hypothesis. Tables 5 and 6 present findings from controlling effect of legitimacy of birth on child nutritional status by strata and at multivariate level. The logistic regression analysis (table 6) includes three models: bivariate model or model 1 presents the crude effect of legitimacy of birth on child nutritional status; model 2 controls for crude effect of legitimacy of birth by mother's ethnic group to assess cultural stigmatization hypothesis; while the characteristic hypothesis is tested through model 3 which includes mother's education and context of living (place of residence, region of living, household living standard) in the model. We avoid keeping ethnic group, region of residence and religion in the same model due to strong association between the three variables (see Emina, 2005).

Table 5 - Proportion of malnourished children by legitimacy of birth according to selected socio-demographics characteristics in Cameroon (1998-CDHS)

	All children N=1498	Out-of-wedlock N=111	Legitimate N=1387	Chi-square
Mother's age				
< 20	39.4	31.6	41.7	1.2629
20and +	37.0	26.0	37.7	4.0295**
Region of residence				
Adamawa, North, Extreme-North	50.6	50.0	50.6	0.0005
North-West, South-West	35.8	(35.7)	35.8	0.0001
Littoral, West	23.0	(21.7)	23.1	0.0214
Central, South, East	31.8	25.0	32.8	1.3850
Ethnic groups				
Fulani and Kirdi people of North	**50.1**	(50.0)	**50.1**	0.0000
Bamileke and Bamoun	24.2	(16.7)	24.2	0.5949
Grassfielders	33.8	(38.5)	33.8	0.2861
Tropical Forest People	31.4	26.2	31.4	0.8835
Place of residence				
Urban	27.2	21.2	27.8	1.0428
Rural	43.6	35.1	**44.2**	1.8151
Mother's religion				
Christian	**32.8**	25.8	33.5	2.3878
Non Christian	47.3	(50.0)	47.2	0.8506
Mother's education				
No education or Primary	**43.3**	35.0	43.6	1.1645
Secondary or Higher	23.2	24.6	23.0	0.0927
Household's Living Standard				
Poor	**47.6**	36.1	**48.4**	**2.0334**
Middle	35.3	30.3	35.9	0.4017
Rich	29.0	20.0	**29.7**	1.6927
Children's Living Arrangement				
Living with single mother	27.4	(20.0)	28.3	0.3091
Living with only mother with her parents	39.3	(25.0)	39.4	0.3446
Living with two parents	**34.4**	29.5	36.0	1.3690
Total	**37.3**	27.9	38.0	**4.52****

Note: * p< 0.10; ** p<0.05; *** p<0.001; ( ) Number less than 30. Source: 1998 – CDHS

Table 6- Risks (odds ratio) of being malnourished for out-of-wedlock children compared to children born within union: results from logistic regression models

	Odds ratio		
	Model 1	Model 2	Model 3
Out-of-Wedlock	0.6438**	0.8359	0.9175
Legitimate	Reference	Reference	Reference
% of Variation[a]	-	*29.84*	*42.50*
Log likelihood	-972.1376	-940.6808	-909.6109

Note:
[a] : ((risks in model i/ risks in model1)-1) X 100. For i varying from 2 to 4.
* p<0.10 ; ** p<0.05; *** p<0.01
Model 1: Not taking into account mother and household characteristics.
Model 3: Controlling for mother's ethnic group.
Model 3: Controlling for place of residence, region of residence, mother's education and Household living arrangement. With reference to the strong association between ethnic group and region of residence, we avoid controlling for these two variables within one model (see Emina, 2005 for details). Source: 1998 – CDHS.

4.2. Advantage of modernity as partial mediating factor

Table 5 presents the proportion of malnourished children aged less than three years in Cameroon by mother's characteristics according to the legitimacy of birth. In general, better nutritional status is observed among children whose mothers had a secondary or higher education, children living in urban areas, in rich households, in the Littoral/West region and/or children living with a single mother. Indeed, malnourishment is associated with household worsening conditions including insecurity, food shortage, untreated infectious diseases, and incapacity to purchase health care. However, mother's education, residence in urban areas and living in rich households lead mothers to follow hygiene, feeding and caring instructions for children, and to use preventative and curative health. Further, these characteristics are associated with availability of food and access to medical services. Similar results have been observed in most African countries (Madise et al., 1999) as well as in Cameroon (Gwatkin et al., 2000; Pongou et al., 2005; Pongou et al, 2006). Likewise, results show higher prevalence of malnutrition in the northern region, whose populations are poor and less educated, and socioeconomic infrastructure such as under-five clinics and hospitals are rare (Emina, 2005; Pongou et al., 2005).

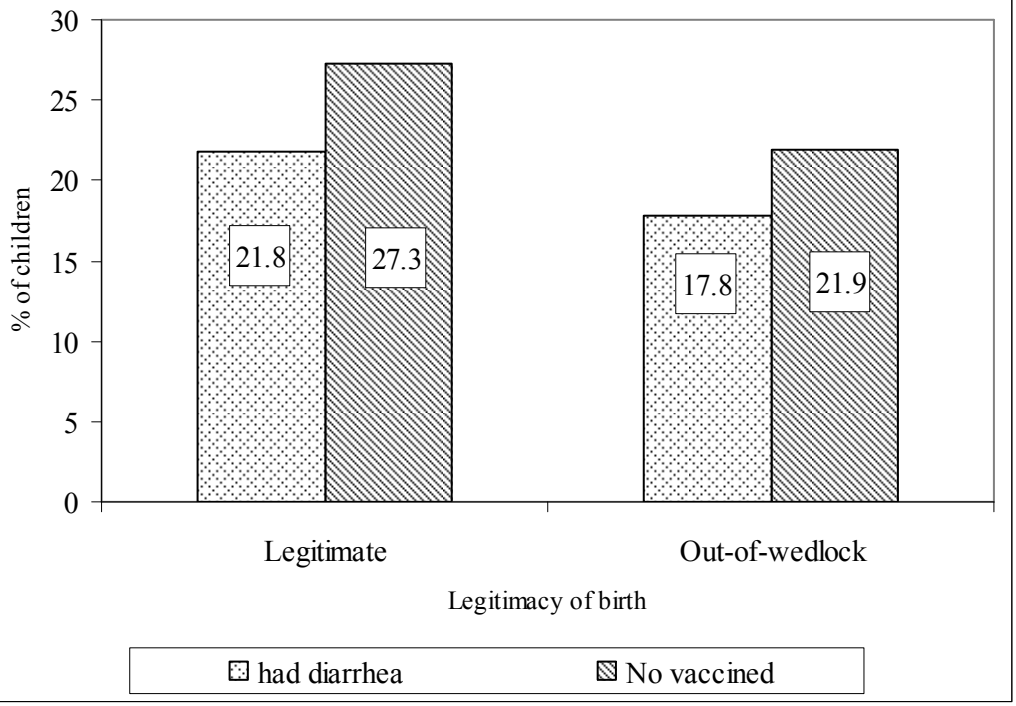
Comparison of malnutritional prevalence by legitimacy of birth according to selected socio-demographic variables shows results varying by variable as well as according to their characteristics. First, the difference between the two types of children (out-of-wedlock and legitimate) disappears completely in all regions except in the Centre/South/East region whose tradition tolerates out-of-wedlock childbearing. Similarly, there is no difference in the prevalence of malnutrition between out-of-wedlock and legitimate children whose mothers have secondary or higher education, and/or live with the two parents. Second, the prevalence of malnutrition remains favorable for out-of-wedlock children before controlling for sociodemographic characteristics (table 4), but differences are not statistically significant. These cases are observed after controlling for place of residence. Third, the nutritional advantage of children born out-of-wedlock remains significant in the Central/South/East region and in poor households.

The remaining nutritional advantage of out-of-wedlock children whose mothers are less educated (no education or primary education) or who live in rural areas could be explained by the very small number of out-of-wedlock children in these cases. However, the advantage of out-of-wedlock children in the Central/South/East region is probably due to grandparents support in caring for children. Indeed, in this region, out-of-wedlock childbearing is tolerated.

The Characteristic hypothesis based on the social advantage of modernity could therefore be a partial explanation of the better nutritional status of children born out-of-wedlock in Cameroon. In fact, mother's education and residence in urban areas are positively associated with the likelihood of out-of-wedlock childbearing. However, these characteristics are negatively associated with the prevalence of malnutrition. In addition, out-of-wedlock childbearing is more frequent in all regions except North, Adamawa and Extreme North with higher human capital development: schooling, low risk of child health problems and low mortality. Nevertheless, no variable fully explains the nutritional advantage of children born out-of-wedlock, and the statistical association disappears after controls are included in most cases.

Introducing simultaneous controls for mother's and household characteristics (models 3) in logistic regression confirms the characteristics hypothesis as well as the results from analysis by strata. Compared to legitimate children, the prevalence of malnutrition among out-of-wedlock children increases by 42.5% from 0.64 (model 1) to 0.92 (model 3). Thus, legitimacy of birth appears not to be a principal factor of child malnutrition in Cameroon (table 6[6]). These results corroborate those found by Meekers (1994a) using Cote d'Ivoire 1980 Fertility Survey data which pointed out the non-influence of legitimacy of birth on infant mortality probably because of child value in most African societies. Also, the relationship between legitimacy of birth and child health problems varies according to the socio-demographic characteristics of out-of-wedlock mothers. If out-of-wedlock childbearing is associated with mother's poverty, like in Nigeria (Olabisi and Adetanwa, 1997) or in Cote d'Ivoire (Meekers, 1994a), children born out-of-wedlock are disadvantaged, fed badly, and face higher health and mortality risk, because meals and health care for both unmarried mothers and their babies are not regular. However, if out-of-wedlock childbearing is associated with modernity, namely, if the phenomenon is more frequent among the most educated mothers, children born out-of-wedlock can experience better outcomes than legitimate children. For instance, using data from the 1998 Cameroon Demographic and health Survey, Emina (2005) highlighted lower prevalence of diarrhea and better medical service use including vaccination among out-of-wedlock children compared to legitimate children (see figure 3). Obviously, these findings contrast with most previous research which asserted higher infant mortality among this group in Cameroon (Akoto, 1993; Johnson-Hanks, 2005).

Figure 3 - Prevalence of diarrhea and percentage of no vaccined children by legitimacy of their birth in Cameroon (1998-CDHS)



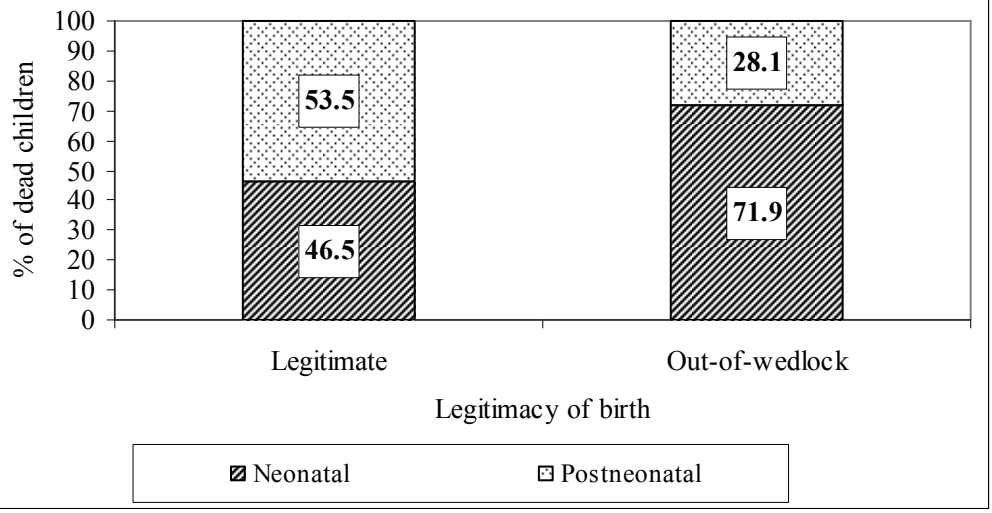
[6] Details for each variable are available in tables A1 in annexes.

4.3. Paradox of out-of-wedlock higher infant mortality versus "better" nutritional status in Cameroon

The findings of this study don't support stigmatization or marginalization of out-of-wedlock children in Cameroon regardless of ethnic groups, even if children born out-of-wedlock seem to be more malnourished among the Grassfielders ethnic groups (table 5). In fact, these differences are not significant, probably because of the small size of the out-of-wedlock sample in some cases. Nevertheless, controlling for mother's ethnic group using logistic regression (model 2) shows increase of malnutrition prevalence among out-of-wedlock children by 305; because 50% of out-of-wedlock children belong to Bulu-Beti-Fang ethnic group whose tradition tolerates out-of-wedlock childbearing.

However the "better" nutritional status of children born out-of-wedlock in Cameroon, or the absence of difference after controlling for selected socio-demographic variables, seem to contrast with higher infant mortality[7] of children born out-of-wedlock in the same country. Indeed, while children born out-of-wedlock experienced low risk of malnutrition, about 36% lower than legitimate children; the infant mortality rate for out-of-wedlock children was 95 infant deaths per 1,000 live births in 1998, higher than the rate among legitimate infants of 70 per 1,000. To understand this paradox, figure 4 presents the distribution of dead children by age at death according to legitimacy of birth, while table 7 displays prevalence of health service use according to the legitimacy of birth in Cameroon.

Figure 4 - Percentage of children dead before 1 year by period of death according to legitimacy of birth in Cameroon (1998 - CDHS)



[7] Malnutrition causes about 55% of under-five mortality in Africa (Unicef, 1998).

Table 7 – Legitimacy of birth and mother's medical service use in Cameroon

	Legitimate	Out-of-wedlock
% of no prenatal visits	19.6	4.7
% Delivery at home	41.9	23.9
% of Delivery by caesarian	2.4	4.7
Median timing of first antenatal visit	4.1	3.9

Source: 1998 -CDHS

It appears that the higher out-of-wedlock mortality risk is concentrated during the first four weeks of life (neonatal mortality), and is essentially due to endogenous factors: stress, youth childbearing of unmarried mothers, etc. (Emina, 2005). These results corroborate lower prevalence of diarrhea and higher proportion of immunized children among out-of-wedlock children. In fact, lower exogenous mortality risk is associated with better medical service use and better nutritional status (Emina, 2005). Likewise, prevalence of malnutrition by legitimacy of birth seems to have the same variation as mother's use of medical service during the antenatal period including place of delivery. However, the "better" single mother's health behavior contrasts with higher neonatal mortality among out-of-wedlock children although they are more frequently delivered by caesarian. In fact, progress in medicine helps to avoid neonatal mortality, particularly in the context of early prenatal visit and delivery within a medical service.

Furthermore, contrast between "better" health behavior and nutrition status of children born out-of-wedlock and their higher neonatal mortality leads to the survival bias hypothesis. Comparison of the proportion of out-of-wedlock children born from 1995 to 1997 and those of living out-of-wedlock children in 1998 by selected socio-demographic characteristics, namely mother's ethnic group and mother's education is used to assess this hypothesis. It assumes that a lower proportion of living out-of-wedlock children than of out-of-wedlock childbearing indicates a survival bias; while opposite results (equal or higher proportion of out-of-wedlock children at survey (1998)) leads to the rejection of this hypothesis. Table 8 presents the proportion of out-of-wedlock childbearing from 1995 to 1997, corresponding proportion of out-of-wedlock children in 1998, and the difference and percentage of variation.

Table 8 – Proportion of out-of-wedlock childbearing (1995-1997) and proportion of out-of-wedlock children in 1998 in Cameroon

	1	2	3	4
	% of out-of-wedlock			
	childbearing (1995-1997)	children at 1998 survey	Difference (1-2)	% of variation
Year of birth				
1995	9.2	6.3	2.9	**-31.5**
1996	8.6	6.9	1.7	-19.8
1997	9.2	8.4	0.8	-8.7
Ethnic groups				
Fulani and Kirdi people of North	1.0	0.7	0.3	**-30.0**
Bamileke and Bamoun	9.4	6.4	3	**-31.9**
Grassfielders	14.0	12.9	1.1	-7.9
Tropical Forest People	15.7	13.4	2.3	-14.6
Mother's education				
No education or Primary	4.4	3.9	0.5	-11.4
Secondary or Higher	19.2	15.3	3.9	-20.3
Total	**9.0**	**7.4**	**1.6**	**-17.9**

Source: 1998 – CDHS ; 4=((2/1)-1)*100

Overall, out-of-wedlock children face higher mortality regardless of socio-demographic and/or cultural characteristics even if mothers belong to societies whose traditions tolerate out-of-wedlock childbearing. This confirms the survival bias hypothesis due to the higher prevalence of out-of-wedlock childbearing among adolescent women (49%) and/or to probable involuntary or voluntary infanticide. In fact, if medical progress could avoid infant mortality regardless of mother's age, in the context of low medical development as in Cameroon, a young mother and her child would face a greater risk of mortality. In addition, experience of shame due to stigma about out-of-wedlock pregnancy among adolescents and feeling of despair about the future (risk of school dropout, economic weight of raising child, etc.) as highlighted in some previous studies (Singh, 1998; Johnson-Hanks, 2005) could lead to infanticide (voluntary or involuntary).

> "*In some countries, an unmarried adolescent mother is likely to experience social ostracism and financial difficulties; early childbearing can also mean unhappiness because the birth was unplanned, marital conflict resulting from marrying in order to have a child born within a socially recognized union, disappointment because of failure to complete secondary school or to go beyond it, and loss of earning opportunities*" (Singh, 1998:117).

Thus, the out-of-wedlock children nutritional advantage observed at the bivariate level and the absence of difference after controlling for some selected demographic variables could not assert the absence of out-of-wedlock child stigmatization in Cameroon.

Conclusion

Despite the limitations posed by the small sample size of out-of-wedlock children and some lack of information (about the person who takes care of the child, and material and financial support from the biological father), our findings show that legitimacy of birth does not have a significant influence on child nutritional status in Cameroon. In fact, the nutritional advantage of out-of-wedlock children observed in bivariate analysis is attributable to the fact that these children are mainly born to educated mothers, reside in urban areas or reside out of the northern region. In fact, the prevalence of malnutrition is lower among children whose mother has a secondary or higher education and who live in urban area and/or out of Northen region.

Although these findings do not support marginalization or stigmatization of out-of-wedlock children with reference to child nutritional status, this hypothesis could not be rejected. Indeed, out-of-wedlock children experienced higher neonatal mortality despite their advantage in prenatal and postnatal medical care use. Thus, the analysis of the socioeconomic effect of legitimacy on child health outcomes should be made with caution using global approaches and longitudinal and qualitative data.

To conclude, out-of-wedlock childbearing is a social concern in Cameroon with respect to higher neonatal mortality risk of children born out-of-wedlock. It is important to emphasize that intensive and sustained social policies should be implemented in order to : (i) raise schooling and life conditions as factors of human development- attention should be focused particularly on rural areas and Adamawa, North and Extreme North regions where about half of children aged less than 3 years are malnourished- and (ii) enhance health counseling services to improve adolescents' reproductive health and prepare them against unwanted pregnancies and child mortality.

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Table A1 - Risks of being malnourished for under 3 years child by selected characteristics in Cameroon: results from logistic regression models

	Odds ratio		
	Model 1	**Model 2**	**Model 3**
Legitimacy of birth			
Out-of-wedlock children	0.6438**	0.8359	0.9175
Legitimate children	Reference	Reference	Reference
Ethnic groups			
Fulani and Kirdi people of North		2.1678***	
Bamileke and Bamoun		0.6803**	
Grassfielders		1.1339	
Tropical Forest People		Reference	
Region of residence			
Adamawa/ North/ Far North			1.6359***
North-West/ South-West			1.0657
West/Littoral			0.7438**
Centre/South/East			Reference
Place of residence			
Rural			1.7383***
Urban			Reference
Mother's education			
No education or Primary			1.4734***
Secondary or Higher			Reference
Household's Living Standard			
Poor			1.8094***
Middle			1.2106
Rich			Reference
Deviance	*1944.275*	*1881.361*	*1819.222*
Degree of Freedom	1474	1471	1467
Deviance/ Degree of Freedom	1.319	1.279	1.240
Log likelihood	*-972.1376*	*-940.6808*	*-909.6109*

Note: * p<0.10 ; ** p<0.05; *** p<0.01

Model 1: Not taking account into mother's and household characteristics.

Model 3: Controlling for mother's ethnic group.

Model 3: Controlling for place of residence, region of residence, mother education and Household living arrangement.

Source: 1998 – CDHS