

Migration and Fertility in Burkina Faso:¹

Evidence from the 2000 Survey on Migration/Urbanization and Environment

Salahudin Muhidin²
Université de Montréal, Canada

Jacques Ledent
INRS- Urbanisation, Culture et Société, Canada

Short Abstract (149 words). This study represents one of the study attempts on life course analysis of migration and fertility using biographic data from a developing country. The analyses are based on the exceptional reliable survey data, EMIUB which was conducted in Burkina Faso in 2000. The study utilizes samples of 4,568 women who were aged 15-64 at the time of survey. The respondents had provided completed biographic histories on fertility (births), residential movements, marital status, and social-economies activities.

Four hypotheses were tested in the study, namely: socialization, selection, disruption, and adaptation. Results of the analysis revealed that the effect of migration and urbanization is strong, both before and after controlling for the effects of certain covariates (i.e. age, cohort, marital and working statuses, education, and duration of residency). Continuously urban residents exhibit fertility rates that are about lower than rural women at every parity, even after controller by urban residence during childhood. Rural-urban movers, by contrast, exhibit a very specific pattern, with slower progression to second birth.

¹ Paper is prepared for the XXVth IUSSP International Population Conference, Tours, France 18-23 July 2005, Session 306: "Migration and fertility changes in developing countries". The authors greatly acknowledge the stimulating and valuable discussions/comments from Prof. Thomas K. LeGrand, Sabine Henry and Bruno Schoumaker.

² Address for correspondence: S. Muhidin, Département de démographie, Université de Montréal. CP- 6128, Succursale Centre-ville, Montréal, (QC) H3C-3J7, Canada. E-mail: s.muhammad@umontreal.ca

1. Introduction

In most African countries, and Burkina Faso is no exception, fertility is now significantly lower in urban areas than in rural areas (Shapiro and Tambashe, 2001). The fertility is being low in principal/capital cities as compared to other urban and rural areas. According to the latest Demographic and Health Survey (2003), the total fertility rate in Burkina Faso was still at 6.2 children per women, but it was around 3.1 children in Ouagadougou (Burkina Faso's capital city). Over the last two decades, fertility has remained fairly stable in rural areas while urban areas have experienced a significant fertility decline. A combination of three proximate determinants —i.e. an increased use of modern contraceptive methods, a delay in age at marriage and more frequent induced abortions—account for this urban fertility decline. Moreover, socio-economic determinants for these fertility changes in urban areas notably include better female education, increased access to contraception, and changes in values regarding fertility among urban residents.

At the same time, rural-urban migrations in Burkina Faso have accounted for a large part of the population increase of Ouagadougou and Bobo Dioulasso over the last two decades. As a result, a large proportion of urban residents are in fact rural-urban migrants and, overall, half of the women living in Ouagadougou and Bobo Dioulasso in 2000 were in fact born in rural areas (Schoumaker *et al.*, 2002). As a consequence, by their sheer number, rural-urban migrants may have a significant impact on the level of fertility in the cities, and the relationship between migration and fertility is thus an important question to address in the context of Burkina Faso. In addition, there have been very few empirical studies on migration-fertility interrelationship in Africa.

Established researches on migration and fertility analysis make it clear that the ideal design for testing the relationship between these two requires life histories of migration and fertility, with appropriate information on background characteristics at different points in the life cycle. Nevertheless, the availability of such ideal data sets is still few, especially among developing countries. This present study, therefore, represents one of the study attempts on life course analysis on migration and fertility using biographic data from a developing country.

The main purpose of this paper is to conduct an analysis of the relationship between personal traits, urban residence and fertility in Burkina Faso by incorporating an event history analysis. First we describe the country setting, with emphasizes more on the patterns and levels of migration and fertility in Burkina Faso in section 2, and then we elaborate further the theoretical framework in Section 3. We examine the data in Section 4, which also describes the applied regression model. Results from the statistical analyses are elaborated in Section 5. The paper is concluded in Section 6 with a discussion of the relationship between migration, urbanization and fertility in the context of Burkina Faso and of future direction of research.

2. Country Setting and Demographic Development

Burkina Faso is a landlocked Sahel country, located in the hearth of West Africa between Niger, Mali, Ivory Coast, Ghana and Bénin (Figure 1). It is one of the poorest countries in the world: it ranked 159th of 162 countries in the UNDP's human development index (UNDP 2001), and its gross domestic product (GDP) per capita was approximately \$230 US at the end of the 1990s (IMF 2000).

The population of Burkina Faso, estimated at 4.3 million in 1960, is now about 10.3 million (based on the 1996 census) and growing at an average annual rate of around 2.5%. The population age structure is relatively young with 47.9% of people aged less than 15 years old and 4.1% of people aged 65 years and over, and women account for 52% of the population. The country is characterized by large disparities in population density with the central over-crowded plateau around the capital city (Ouagadougou) and the less densely populated provinces in the Sahelian, eastern and southwestern parts of the country. The densities range from 335 per square kilometer in Kadiogo Province to 5.8 per square kilometer in Komandjoari Province.

Only slightly more than 20% of the total population lived in urban areas (Beauchemin *et al.*, 2002), in which Ouagadougou and Bobo Dioulasso together represent approximately half the urban population (11 % of the total population). In other words, Burkina Faso remains of low urbanized country even by African standards. It is no wonder

therefore the country's economy depends heavily on farming by growing crops or rearing livestock. Vast majority of the population (90%) is engaged in these activities. These sectors account for one-third of the country's GDP and 80% of total exports in 1998 (INSD, 2000). However, these sectors are still characterized by low productivity. Agriculture is largely dominated by small family farms which are engaged primarily in subsistence agriculture. Grain crops are occupying 88% of the land area cultivated each year. Moreover, both agriculture and livestock productions are greatly affected by the unfavorable climate and soil conditions, such as irregular rainfall and soils with low organic content.

Figure 1: Map of Burkina Faso showing Ouagadougou and Bobo Dioulasso.



Burkina Faso remains the country with the lowest rates of completion and enrollment of primary school education (41% of the gross enrollment rate in 1998-99 and about 32% was girls). As a result, literacy is still relatively low but increasing. Overall, one person out of five was literate in 1996 and only one female out of ten. Differences were

also marked between urban and rural environments (13.6% in rural areas compared to 56.6% in urban areas).

Regarding to demographic indicators, Burkina Faso is still in the early stage of the demographic transition. It is characterized by the fall of death rates but birth rates continue at the high rates. Infant mortality rates declined significantly from 212 deaths per thousands in 1960 to 105 deaths per thousands in 1996. Accordingly, the life expectancy at birth increased from 32 years in 1960 to 54 years in 1996, with higher life expectancy in urban environments. Nevertheless, this relatively short life expectancy could be further reduced in the coming years due to the dramatic effect of the spread of HIV infection (7% infection rate among its adult population) (IRIN, 2003).

Despite the fact that mortality has declined, fertility in Burkina Faso is still high compared to the other West African countries. The total fertility rates was 6.1 children per woman in 1960, increased to 6.7 in 1976 and 7.2 in 1985, and then declined to 6.9 in 1993, 6.8 in 1998/99 and 6.2 in 2003. The period of fertility decline since 1985 has been marked as “a stabilization period” (Sinare, 1994). Furthermore, the fertility rates are notably difference according to the residential area. A tendency of fertility decline has already started in urban areas (especially in Ouagadougou), while it has not been observed in rural areas. TFR in urban areas declined from 6.5 in 1985 to 5.0 in 1993, to 4.1 in 1998/99, and to 3.7 in 2003. On the other hand, the figure continued to grow and highly stable in rural areas with TFR was 7.3 children in the period 1973-1999 and slightly declined to 6.9 in 2003. Significant difference is also noticed by educational level. Based on the 2003 DHS, women with higher education have lower fertility (i.e. TFR=2.8) than their counterparts have (i.e. lower education, TFR=5.8 and no education, TFR=6.7).

In terms of migration, Burkina Faso has traditionally been characterized by intense mobility, both within and across the country (Cordell *et al.* 1996; Hampshire and Randall 1999; Adepaju, 2003). Internal migration from rural to urban areas is significant, but the migrations from one rural to another rural area are still dominant. Migrations from rural areas towards urban centers have contributed significantly to the process of urbanization since the postwar years (Cordell *et al.*, 1996). Ouagadougou and Bobo-Dioulasso, Burkina Faso's two largest urban centers have attracted the largest share of rural-urban migrants

over the last decades, although smaller towns have also received important numbers of migrants.

Migrations within rural areas involve both short-distance and long-distance moves. The former disproportionately concerns women migrating for family reasons, such as marriage and separation, while long-distance moves mainly consist of agricultural migrations. One specific type of long-distance move in rural Burkina Faso developed from the late 1960s and involves migrations from densely populated areas in the Mossi Plateau to the less populated areas of Burkina Faso's southwest (Cordell *et al.* 1996; Goldberg and Frongillo 2001). Migrations between rural areas were also encouraged by resettlement programs, such as the AVV (*Aménagement des Vallées des Voltas*) program launched in the early 1970s to develop regions freed from onchocercosis (Sidibe, 1986; Guiella, 1996).

As in other developing countries, return migration and circulation is also a prominent feature of Burkinabé migration (Blion 1995; Cordell *et al.* 1996). People continue to maintain strong links with their place of origin, and a large fraction of migrants tend to return to their village at some point. In Burkina Faso, the probability of returning to the village is especially high among men: 60% of those leaving their village after age 15 return within 10 years, while the corresponding figure for women is around 15%³.

International migration from Burkina Faso to its neighboring countries greatly represents a large proportion of rural migrants, especially as labor migrants. It is estimated that nearly three million of Burkinabe now live outside the country. Côte d'Ivoire, one of the adjacent countries, has long been the principal destination. Labor migration to Côte d'Ivoire can be traced back to historical factors such as forced labor policies and colonial taxation under the French colonial rule (Cordell *et al.* 1996). Recently, Côte d'Ivoire has continued to attract a large number of Burkinabé migrants (Cordell *et al.*, 1996; Roncoli *et al.* 2001). In the 1990s, about 80% of international migrants were attracted to that neighbor country (Henry *et al.*, 2004). Yet, the situation is likely to change with recent events in Côte d'Ivoire.

³ These results were computed from the survey used in this study. Cordell *et al.* (1996) reached similar conclusions using the 1974-1975 National Migration Survey.

3. Theoretical Framework

Most empirical research relating migration and fertility in sub-Saharan Africa has assumed, implicitly or explicitly, a causal effect of migration on fertility (e.g. Brockerhoff and Yang, 1994; Brockerhoff, 1995; McKinney, 1993; Omondi & Ayiamba, 1999; and White *et al.* 2004). Some studies, however, have assumed a causal effect of fertility on migration. Evidences regarding the effect of migration on fertility are mixed. The migration can have negative and positive impacts on fertility. Nevertheless, these linkages have critical implications for government programs for fertility reduction. These relationships have usually been investigated by acknowledging the type of migration (i.e. international, internal and urban-rural residential) and its interaction with each other as well as with other population parameters, such as the age/sex structure, education, marital status, and socio-economic circumstances.

Four hypotheses have usually been identified to link rural-urban migration and fertility as proposed in Goldstein and Goldstein (1983). These are selectivity, adaptation, disruption and socialisation hypotheses. According to the *selectivity hypothesis*, women who migrate are “a select group with different socio-economic and demographic characteristics from that of the rural population, and their preferred family size may also be different” (Lee, 1984). In that case, it is not migration as such that influences fertility, but the association between migration and fertility reflects the fact that women who migrate are also more likely to want fewer children and to be better able to control their fertility. In that sense, the selectivity hypothesis does not refer to a direct causal link between migration and fertility, and “migrants” would still have had a lower fertility if they had stayed in rural areas (Brockerhoff, 1998).

The *adaptation hypothesis* on the other hand emphasizes the role of the urban environment on fertility behaviour. Migrants arrive in a new environment that may influence their demand for children and the costs of fertility regulation. For instance, greater availability of contraception, better access to health care, increased contacts with “modern values”, greater employment opportunities-- may all contribute to a lower fertility among migrants than among rural stayers. In other words, the characteristics of the urban

environment conduce women to reduce their fertility compared to what it would have been had they not migrated to urban areas (Lee, 1993). Rural-urban migrants' fertility would then tend to the level of fertility of urban natives (Brockhoff, 1998) as the fertility preferences of migrants gradually may adapt to the new environment (economic, social, and cultural) at the destination place.

The *disruption hypothesis* is somewhat more limited in scope, in the sense that its effects are presumably restricted to a short time window before and/or after migration. According to the disruption hypothesis, migrants' fertility decreases temporarily just before and/or after migration because of disruptive factors associated with the migration process (Lee, 1993:36). One of these disruptive factors is the separation of spouses that can occur in the early stage of migration (Lee, 1993; Brockhoff, 1998). Smith (1983) also suggests that, among unmarried migrant women, marriage may be delayed because "institutional arrangements for meeting and evaluating potential spouses are weak or inefficient". Physiological effects due to the stress associated with the migration have also been cited as possible mechanisms for the disruptive effects. The long-term effect on fertility depends on whether women subsequently compensate for the disruptive effect by a higher fertility. This disruption effect is likely for migrations involving major changes, such as long distance moves and moves to greatly different environments or severe climate.

The *socialization hypothesis* premises the belief that fertility behavior of migrant reflects the fertility preference prevalent in their childhood environment. Rural-urban migrants are then expected to exhibit levels of fertility similar to rural residents and convergence toward the lower fertility levels of urban residents is expected to occur only after at least a generation has elapsed. Rural fertility levels remain to exceed urban fertility.

Those four mechanisms can obviously operate together to influence fertility. It is for example quite likely that migrants are a selected group of women regarding their fertility preferences, but it does not preclude an adaptation to the urban environment. It is also quite likely that, because they are a select group, migrants are more likely to adapt their fertility in urban areas. The theoretical framework discussed here is applied in this study, which will be further elaborated in the next section on data source and method.

4. Data Source and Method

4.1. Data Sources

The data for this study come from a unique nationally-representative retrospective survey entitled “Migration Dynamic, Urban Integration and Environment Survey of Burkina Faso” (EMIUB) carried out between March and July 2000 by the University of Montreal (Canada), the University of Ouagadougou (Burkina Faso) and the CERPOD (Mali). The survey contains extensive histories of respondents’ biographic (life course) including residence and birth histories, which thus offers a possibility to perform a statistical analysis on the possible relationship between those two variables. It completely interviewed 8,644 individuals (i.e. 4,076 males and 4,568 females) aged between 15 and 64 years old, from 3,570 households (Schoumaker *et al.* 2002). Considering the fact that problem on memory recall may exists among older respondents, this present analysis on migration and fertility is then limited to look at women below age 50 (i.e. aged 15-50 years old) and lived in Burkina Faso at the time of survey.

Besides fertility and migration variables, the analysis also considers other socioeconomic characteristics (i.e. generation/cohort, ethnicity, education, economic activity, and marital status) which may associate with the fertility of women. All together, the information has been reformed into a life history calendar, which consists of person-life spell of women. The life history calendar has then allowed us to construct more complex measures for analyzing the relationship between migration and fertility.

4.2. Method

To examine the effect of migration on fertility, we will focus on the timing of birth’s conception which is assumed about 9 months before an event of birth. Given the nature of the data source, in which the time of event occurrence was recorded at exact date, it allows us to measure time variable in a continuous scale. In other words, events may occur at any

point in time. After considerable initial consideration, we chose to apply the Cox model⁴ as discussed in Allison (1984).

The birth's conception interval spell is our basic unit of analysis. At first, we considered age at first union to be the starting point of the risk reproductive period. To simplify, all spell begin from age 14 as the initiation of reproductive age.⁵ The event of birth's conception therefore defines the end of one spell and the beginning of another. The exposure period end at age 49 (the end of childbearing age) or is right-censored at current age by the survey. Each spell contains several characteristics some of which are fixed for all time, while others may change from time to time (time-varying). In short, the model for this analysis is:

$$h(t | x) = h_0(t) \exp(x_i \beta_i + x_j \beta_j) \quad (1)$$

where \mathbf{X}_i is a matrix of fixed covariates, and \mathbf{X}_j is a matrix of time-varying covariates, and β_i and β_j are the respective vectors of coefficients. The analysis starts with a simple *multivariate* model, focused solely on the effect of migration on fertility, and then moves to a more complete analysis that includes other characteristics of the woman. We will run the event history models for all parities. In addition, birth parity (0, 1, 2, and 3 or more) is also included as an independent variable because it may strongly affect the time to the next birth.

4.3. Covariates and Definitions

In order to draw out the four hypotheses addressed earlier (socialization, adaptation, selection and disruption) into the analysis, we introduce control variables that are known to determine those assumptions.

Our primary explanatory variable – migration or change residence – is defined as a move from an administrative area (in this case district/department) to another area for duration of at least 6 months. The feature of residential change data, which consists of

⁴ The results were robust to model specifications. Models of continuous exponential and discrete time gave substantively similar results.

⁵ There were about 21 (0.46%) out of 4568 women reported to have union (cohabit or marriage) before 11 years old.

information on staying duration and geographical boundary units, allows us to construct this definition of migration. Thus, the residence changes that took place within a village and inter-village and/or in the duration of less than 6 months will not be taken into account. A woman might move to her parent residence or other family just before giving a birth and then return to her usual residence within a short period. Regarding to the short distance moving (such as within or inter-village), a family might try to move to a larger lodging within a closer distance simply to have room for more desired children. It would then rather to accelerate the fertility than otherwise. In addition, the short distance migration may have less effect on the *disruption effect* as it may generally not involve a greater change in social and economic environment.

In the analysis, migration is also defined based on urban and rural categorized. Yet, the information on residential place was self reported by respondents. In order to explore the accuracy of this information, we use a definition of urban places as settlements with at least 10,000 inhabitants, anytime, as utilized in the previous study of Beauchemin *et al.* (2002). This definition, however, is only applied to the residence in Burkina Faso as detailed information on region settlements was only provided for residence in Burkina Faso. We combine other related information to defining the place of residence for those who were staying abroad or outside Burkina Faso. Respondents provided a complete history of their activities by time period, which can be used as a proxy measure of residence. Answers to this question can reliably measure place of residence, because the response categories for this question (city, town and village) are well understood.

The socialization effects, we introduce a variable for indicating of upbringing residence as place-of-origin and examine if this variable reveals a difference on their fertility levels. The variable is based on the childhood residence. There are three types of place-of-origin: (1) really urban, (2) really rural, and (3) in-between. The socialization hypothesis will likely come out of the real urban versus the real rural categories. These types are defined as follows:

- *Really rural*: woman spent at most 2 years residing in the urban area (or outside the country) prior to age 15.
- *Really urban*: woman spent at most 2 years residing in a rural area prior to age 15.

- *In between*: the residual (other).

The adaptation effect in this case has a significant relationship with the disruption effect. Variable of duration at current residence and birth parity are introduced. In order to examine the urbanization effect, we also include a variable of duration at urban residence.

For selectivity factor, we include some basic characteristics relevant to fertility and migration behaviors, such as age, cohort, birth parity, education, type of residence, and activity See Table 1. Marital status was excluded from the covariates lists due to colinearity. In addition, the process of marriage itself is complex.

Table 1. Operational definition of variables considered for the relationship between migration and fertility in Burkina Faso

<i>Variable</i>	<i>Definition</i>
Parity	Parity of children ever born 0 = first birth, 1=second birth, 2=third birth, 3=fourth birth+
Age group	5 years groups of reproductive women age: 15-19 (reference), 20-24, 25-29, 30-34, 35-39, 40-44, 45-49
Age square	Age*Age
Education	School attainment by women No education (<i>as reference</i>), Primary school, Secondary school +
Occupation	Working status of women Not working (<i>as reference</i>), Paid and Un-paid worker
Urban residence	
Age 15 years	Urban at beginning reproductive period, coded as 1 and 0 of not
Previous year	Urban at conception time (t-1), coded as 1 and 0 of not
Interaction	Interaction urban age 15 and previous year (t-1)
Duration residency	Duration at urban residence 0-5 months (<i>as reference</i>), 6-12 months, 1-2 years, 2-3 years, 4 years+
Region of residence	Ouaga, Center (<i>as reference</i>), Bobo-Banfora, Rest Burkina, and Abroad
<i>Indep. Notime- variant</i>	
Cohort	Cohort/generation of women <1955 (<i>as reference</i>), 1955-1969, 1970-1984
Religion	Traditional (<i>as reference</i>), Muslim, and Christian
Ethnicity	Ethnicity from women's father Mossi (<i>as reference</i>), Bobo, Fulani, Gourmantche, Other in Burkina, and Other outside Burkina

Note: The models have been applied to two groups of women (resided in urban and in rural at age 6 years).

5. Summary of Primary Results

Results from the primary analyses show that migration does not have an impact to the hazard of first birth. It may be due to the fact that first births are influenced more by biological and socioeconomic background factors, rather than migration.

Socialization effect is expressed in the evidence that women from real urban place-of-origin have significantly lower risk of having birth at any parity compared to those from real rural place-of-origin. Selection effect was revealed on the pace of childbearing among the rural-urban migrants, especially after parity 3 and higher. It indicates some tendency to adapt the urban norm. In terms of duration at current residence, we still find mixed effect for an adaptation effect. As expected, selection effect was found in this study. Age has a very strong influence on the timing of the births. Education has a negative influence on the hazard of births. Married women surely have higher risk of giving births. Disruption effect was expressed in terms of delayed fertility.

References

- Adepoju, A. 2003. Migration in West Africa. *Development*, 46(3): 37-41.
- Allison, P.D. 1984. *Event History Analysis*. Newbury Park : Sage.
- Beauchemin, C., Beauchemin, E. and Le Jeune, G. 2002. *Tabvilles Burkina Faso: Rapport de présentation*. Enquête EMIUB. Document technique d'analyse 2002-01. Montréal: Département de démographie, Université de Montréal.
- Blion R., 1995. Les Burkinabés de Côte d'Ivoire: Entre 'intégration' et circulation migratoire. *Mondes en Développement*, 23(91): 81-93.
- Brockerkhoff, M., 1995. Fertility and Family Planning in African Cities: The Impact of Female Migration, *Journal of Biosocial Science*, 27(3): 347-358.
- Brockerkhoff, M., 1998. Migration and the fertility transition in African cities, in: R. E. Bilson (Ed.) *Migration, Urbanization, and Development: New Directions and Issues*, pp. 357-390. New York: United Nations Population Fund (UNFPA) and Kluwer Academic Publishers.
- Brockerkhoff, M. and Yang, X.S., 1994. Impact of Migration on Fertility in Sub-Saharan Africa. *Social Biology*, 41(1-2): 19-43.
- Cordell, D.D., Gregory J.W., Piché V., 1996. *Hoe and Wage: A Social History of a Circular Migration System in West Africa*. Westview Press, USA, 384p.
- Goldberg A., Frongillo E., 2001. Cultural Perspectives for Understanding Food Security Among the Mossi: A Background Paper on Food Security in Burkina Faso, Washington D.C., Food and Nutrition Technical Assistance Project.
- Goldstein, S. and Goldstein, A., 1983. *Migration and fertility in Peninsular Malaysia: An analysis using life history data*. Santa Monica, CA: RAND Corporation.
- Guiella G., 1996. Enquêtes à passages répétés (EPR) dans trois zones rurales du Burkina Faso : objectifs, méthodologie, évaluation de la qualité des données et premiers résultats, UERD, p.61.

- Hampshire K., Randall S., 1999. Seasonal Labour Migration Strategies in the Sahel: Coping with Poverty or Optimising Security? *International Journal of Population Geography*, 5(5): 367-385.
- Henry S., Schoumaker B., Beauchemin C., 2004. The impact of environmental conditions on migration in Burkina Faso: an event-history analysis. *Population and Environment*, 25(5): 423-460.
- International Monetary Fund [IMF]. 2000. *Burkina Faso: Recent Economic Developments*. Washington D.C., IMF, Staff Country Reports from IMF 00/103.
- Institut National de la Statistique et de la Démographie [INSD]. 2000. Recensement général de la population, Burkina Faso, 1996: analyse des résultats définitifs, vol.2, Direction de la Démographie, 348p.
- INSD et ORC Macro. 2004. *Enquête Démographique et de Santé du Burkina Faso 2003*. Calverton, Maryland, USA: INSD et ORC Macro.
- IRIN, 2003. <http://www.irinnews.org/>, 27 may 2003.
- Lee, B. S. 1992. The influence of rural-urban migration on migrant's fertility behavior in Cameroon. *International Migration Review* 26(4): 1416-1447.
- Lee, R. 1993. p.4.
- Lee, R. 1996.
- Lee, B.S., and Farber, S.C. 1984. Fertility Adaptation by Rural-Urban Migrants in Developing Countries: The Case of Korea. *Population Studies*, 38(1): 141-155.
- Lee, B. S., and Pol, L. G. 1993. The influence of rural-urban migration on migrants fertility in Korea, Mexico and Cameroon. *Population Research and Policy Review*, 12(1): 3-26.
- Mathieu P., 1998. Population, pauvreté et dégradation de l'environnement en Afrique: fatale attraction ou liaisons hasardeuses? *Nature, Sciences, Sociétés*, 6(3): 27-34.
- McKinney, B.J., 1993. Impact of rural-urban migration on migrant fertility in Senegal. *DHS Working Paper No. 6*, Columbia MD: Macro International Inc.
- Omondi, C.O. and Ayiemba, E.H.O., 1999. Migration and fertility relationship: A case study of Kenya. *African Population Studies*, 18(1): 97-113.
- Quesnel A. (ed.), 1999. *Population Dynamics in Rural Areas Freed From Onchocercosis in West Africa: Synthesis of National Monographs*, Paris, CICRED.
- Roncoli C., Ingram K., Kirshen P., 2001. The costs and risks of coping with drought: livelihood impacts and farmers' responses in Burkina Faso. *Climate Research*, 19: 119-132.
- Schoumaker, B., Dabire, B., Piché, V., and Kouaouci, A. 2002. *Enquête sur les Migrations, l'Insertion Urbaine et l'Environnement au Burkina Faso*. Atelier de Ouagadougou. Ouagadougou: Unité d'Enseignement et de Recherche en Démographie (unpublished document).
- Shapiro, D. and Tamashe, O. 2003. Villes et transition de la fécondité en Afrique au sud du Sahara. In: Eggerickx, Th. et al. (Eds.), *Populations et défis urbains*, Academia/L'Harmattan, Louvain-la-Neuve/Paris, pp. 605-626.
- Sidibe D.F., 1986. Régime foncier et migrations. L'expérience de l'Aménagement des Vallées des Volta. In Crousse, B., Le Bris E., Le Roy E. (eds.). *Espaces disputés en Afrique noire, Karthala, hommes et sociétés*, pp. 187-198.
- Sinare, T. 1994. Fécondité. In Konate, D.H., Sinare, T. and Serroussi, M. (eds.), *Enquête Démographique et de Santé 1993 du Burkina Faso*. INSD/Macro International Inc. pp.25-41.
- Smith, P.C. 1983. The Impact of Age at Marriage and Proportions Marrying on Fertility. In: Bulatao, R.A., and Lee, R.D. (Eds.). *Determinants of Fertility in Developing Countries: Fertility Regulation and Institutional Influences*. New York: Academic Press, p.500.
- UNDP. 2001. *Human Development Report 2001*, UNDP, New York, Oxford University Press, p.274.
- White, M., Muhidin, S., Stiff, C., and Knight, R. 2004. *Migration and Fertility in Ghana*. Presented paper at the PAA meeting, Boston, 1 April 2004.