Fertility, Ethnicity, Education, and the Demographic Dividend in the Democratic Republic of the Congo*

David Shapiro
Department of Economics
Pennsylvania State University
dshapiro@psu.edu

and

Basile O. Tambashe
Department of Population Sciences and Development
University of Kinshasa
btambashe@outlook.com

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Abstract

In the mid-1950s, a massive survey in what is now the Democratic Republic of the Congo (DRC) provided high-quality demographic data that revealed very sharp fertility differentials among the country's different ethnic groups. At that time, the vast majority of women of reproductive age had never been to school, so women's education was not a factor pertinent to fertility. Over the succeeding decades, especially following independence in 1960, women increasingly went to school and advanced in school, especially in Kinshasa, the capital. In the city, women's increased educational attainment was associated with lower fertility, particularly for women who at least reached the secondary schooling level. At the same time, fertility differences by ethnic group have diminished over time in the city. This paper examines fertility differences by education and by ethnicity in the country as a whole, distinguishing Kinshasa from other urban places and with separate analyses for those in rural areas as well. We seek to determine if the increased importance for fertility of education and reduced importance for fertility of ethnicity witnessed in Kinshasa is also apparent for the country as a whole. In addition, we explore the prospects for a demographic dividend in the DRC, reflecting both existing and emerging levels of fertility, both at the national and provincial levels.

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1. Introduction

This paper explores fertility and fertility differences in the Democratic Republic of the Congo (DRC) over the past nearly 60 years. In the mid-1950s, a massive survey in what is now the DRC provided high-quality demographic data that revealed very sharp ethnic fertility differentials in the country. The northern provinces, which were part of a broader central African infertility belt, had especially low fertility and high proportions of childless women; this was largely attributable to differential exposure to sexually transmitted infections (STIs) (Romaniuk, 1961, 1967), presumably reflecting the diversity of cultural mores and practices. In addition, and in contrast to what one normally anticipates, back in the mid-1950s fertility was higher in urban places (and especially in the capital, Leopoldville, now Kinshasa, and in Elisabethville, now Lubumbashi) as compared to rural places.

At that time, the vast majority of women of reproductive age had never been to school, so women's education was not a factor pertinent to fertility. Over the succeeding decades, particularly following independence in 1960, women increasingly went to school and advanced in school, especially in Kinshasa, and to a lesser degree, in smaller urban places. Women's increased educational attainment was associated with lower fertility in Kinshasa, particularly for women who had at least reached the secondary school level (Shapiro, 1996; Shapiro and Tambashe, 2003; Shapiro, 2015a). This is evident as well in data from the recent Demographic and Health Surveys. At the same time, fertility differences by ethnic group have diminished in the city (Sala-Diakanda, 1980; Tambashe, 1984; and Shapiro, 2010).

In this paper, we examine fertility differences by education and by ethnicity in the country as a whole. We seek to determine if the increased importance of education for fertility and reduced importance of ethnicity for fertility that has been observed in Kinshasa is also

apparent for the entire country. We carry out analyses distinguishing Kinshasa from other urban places and for those in rural areas as well. We also examine a few factors that contribute to fertility differences by ethnic group. In addition, we explore the prospects for a demographic dividend in the DRC, reflecting both existing and emerging levels of fertility at the national and provincial levels.

In the next section of this paper, we discuss the seven major broad ethnic groups in the DRC that are identified in the data, and their location within the country. This is followed by a review of the central findings on fertility and ethnicity from the mid-1950s, and then a section which discusses more recent evidence from Kinshasa indicating that educational attainment has supplanted ethnicity as an important factor influencing fertility. In section 5 we first examine the aggregate fertility levels by ethnic group and by educational attainment, and subsequently analyze national-level microdata on fertility in relation to education and ethnicity, with separate estimates for Kinshasa, other urban places, as well as rural areas. These analyses are based on the most recent Demographic and Health Survey (2013-14) carried out in the DRC. Section 6 examines several factors that may contribute to the observed differences in fertility by ethnic group. The last substantive section discusses the prospects for a demographic dividend in the DRC, with some disaggregation by current and prospective fertility levels. This is followed by a Summary and Conclusions section.

2. **Ethnic Groups in the DRC**

The DRC is an ethnic mosaic, with more than 300 distinct tribes. Some of these tribes are part of well-defined broad ethnic groups like the Bakongo. But in other cases, this is not so, and researchers seeking to study different ethnic groups are confronted with the challenge of

categorizing the very many tribes into a manageable number of broader ethnic groups. The classic work that proposed aggregating the numerous tribes into a smaller number of "cultural regions" or (for the most part) broad ethnic groups was Jan Vansina's *Introduction à l'ethnographie du Congo* (1966). Vansina identified 15 distinct cultural regions in the country, and his classification scheme has been used by many researchers subsequently.

For the DHS, these tribes have been aggregated into nine different categories that correspond to Vansina's 15-group classification. For this paper, we analyze data on the seven groups for which there are substantial numbers of respondents in the DHS data. These groups are the Bakongo, those from Bas-Kasai and Kwilu-Kwango (henceforth, Kwilu-Kwango^{+}), those residing in the Cuvette Centrale, Ubangi and Itimbiri (Ubangi^{+}), Uele and Lac Albert (Uele^{+}), Balese-Komo, Maniema, & Kivu (Balese-Komo^{+}), and those from Kasai, Katanga, and Tanganyika (Kasai^{+}). These seven groups account for more than 98 percent of the sample of female DHS respondents, with the Kasai^{+} and the Balese-Komo^{+} groups accounting for 25 and 20 percent of the total, respectively.

Table 1, based on analysis of DHS sample respondents, shows that in 10 of the 11 provinces[1], one or at most two broad ethnic groups predominate in any given province. The Bakongo group accounts for 95 percent of the sample from Kongo Central province (formerly Bas-Congo), the Balese-Komo^{+} group accounts for 94-98 percent of the sample from Maniema and North and South Kivu, the Kasai^{+} group represents 84 to 90 percent of the sample from Kasai-Oriental, Kasai-Occidental, and Katanga, the Bas-Kasai and Kwilu-Kwango group comprises 80 percent of the sample from Bandundu province, the Uele^{+} group accounts for 70

[1] On June 30, 2015, pursuant to the DRC's Constitution, a political, administrative, and territorial restructuring of the country took place, and in place of the previous 11 provinces there are now 26 provinces. In the analyses of recent DHS data in this paper, we refer to the 11 provinces that were in existence when the surveys were taken.

percent of the sample from Orientale province, and the Ubangi^{+} group composes almost 65 percent of the sample from Equateur province, with the remainder of the sample from the province consisting almost entirely of those from the Cuvette Centrale. Kinshasa is the exception: more than 30 percent of the sample from the city is made up of both Bakongo and Bas-Kasai/Kwilu-Kwango people, and nearly another 20 percent are from the Kasai^{+} group. Other groups are also lightly represented in the sample from the city.[2]

Table 1. Ethnic Group Composition of the Sample, Overall and by Province, 2013-14 DHS

Province	Bak-ongo	Kwilu-Kwango^{+}	Cuvette Centrale	Ubangi^{+}	Uele^{+}	Balese-Komo^{+}	Kasai^{+}	Other	Total
Kinshasa	33	30	6	7	1	3	18	2	100
Bandundu	1	80	18	0	0	0	0	0	100
Kongo Central	95	2	0	0	0	0	0	2	100
Equateur	1	0	34	64	0	0	0	1	100
Kasai-Oc.	0	13	1	0	0	0	85	1	100
Kasai-Or.	0	5	10	0	0	0	84	1	100
Katanga	0	1	0	0	0	1	90	8	100
Maniema	0	0	0	0	0	98	0	1	100
Nord Kivu	1	1	0	0	2	94	1	1	100
Orientale	0	0	1	16	70	10	1	1	100
Sud Kivu	0	1	0	0	1	97	0	1	100
Total	9	18	9	11	7	20	25	2	100

Source: Analysis of the 2013-14 DRC Demographic and Health Survey data.

3. **Fertility and Ethnicity in the 1950s**

From 1955-1957, the government of the then Belgian Congo undertook a massive survey, under the direction of demographer Anatole Romaniuk. That survey showed substantial differences in

[2] Appendix Table 1 shows where the members of the different ethnic groups live. In some cases, they are highly concentrated in a single province (this is especially the case for the Uele^{+} group, and largely the case for the Kwilu-Kwango^{+} and Ubangi^{+} women), while in others they are divided between two provinces (Bakongo, in Kongo Central, and – with 45 percent of all Bakongo women – in Kinshasa; and Cuvette Centrale in Equateur and northern Bandundu); or three provinces (the Kasai^{+} group, in the two Kasais and Katanga; Balese-Komo^{+}, in Maniema and North and South Kivu).

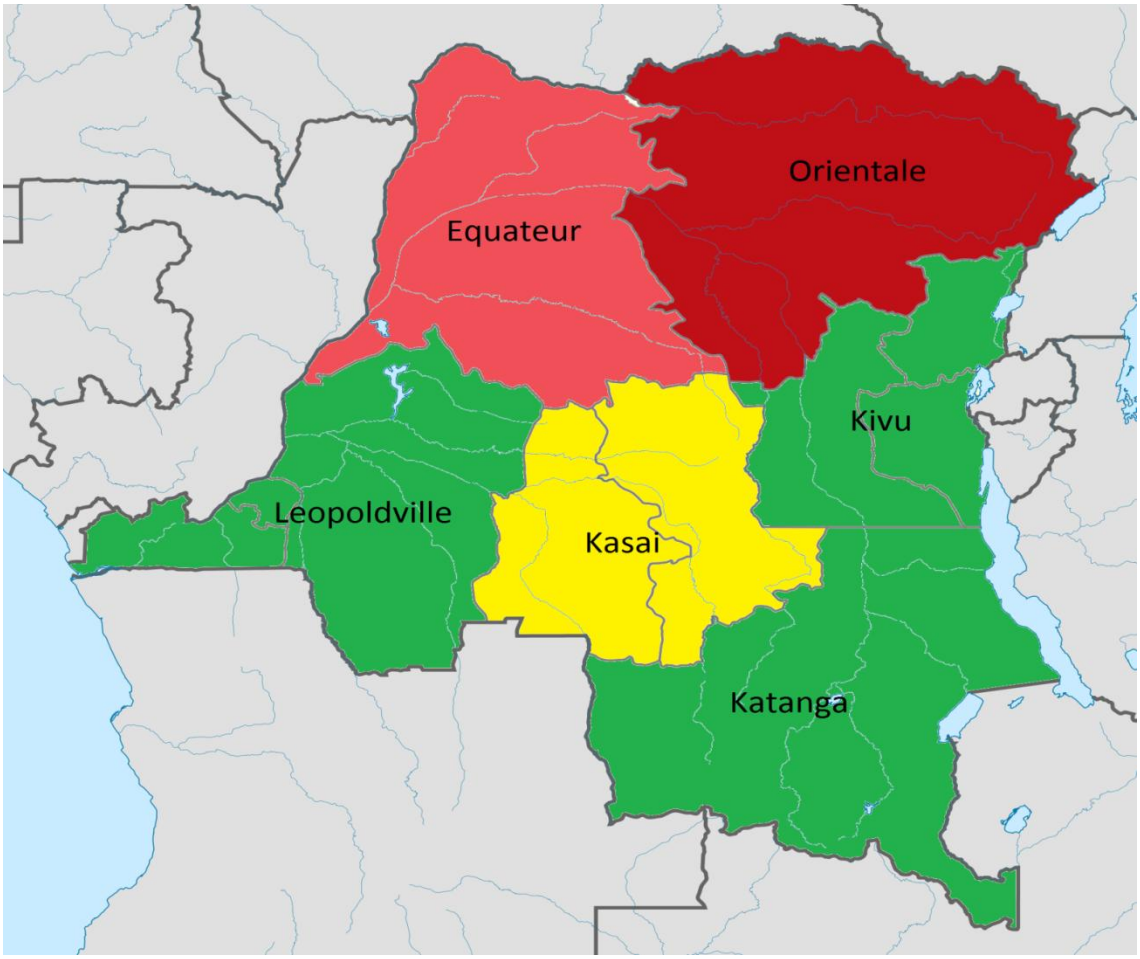
fertility across the six provinces, with birth rates in the 26 districts as high as 60 per thousand and as low as 21 per thousand (Romaniuk, 1968, Table 6.49). Similarly, total fertility rates in these districts ranged from lows of 2.9 and 3.2 to highs of 8.3 to 8.5 children per woman (Romaniuk, 1968, Table 6.48). Ordinarily, one would expect fertility in natural-fertility populations like these to be high, with only modest variation. Fertility overall was estimated at 5.9, and urban places had higher fertility than rural places – with the cities of Leopoldville and Elisabethville having estimated TFRs of 7.5 and 8.3, respectively.

Maps 1 and 2 show the TFRs for the six provinces and for the 24 districts, respectively, for which data were available. These maps clearly show that in the northern provinces and in many of the northern districts, in particular, fertility was unusually low. This low fertility was driven by high rates of sterility, which Romaniuk (1961, 1967) linked to the high incidence of STIs. Differing cultural mores and practices among the different ethnic groups – most notably the practice of sexual hospitality among some ethnic groups – resulted in diffusion of STIs and hence some groups and areas having quite low fertility while others had very high fertility. Indeed, the low-fertility northern provinces were part of a broader central African infertility belt across much of west and central Africa in which fertility was especially low (Retel-Laurentin, 1974).

In most of the country, region of residence is closely linked to ethnic group, as shown in Table 1. Low-fertility provinces included women from the Ubangi^{+}, Uele^{+}, and Cuvette Centrale ethnic groups. The cities, and especially the capital, Leopoldville, were where different ethnic groups lived together, but even here fertility differentials among ethnic groups could be traced back to their regions of origin. For example, Figure 1 shows that among women in Kinshasa (Leopoldville) in 1955, those from the Ubangi^{+} and Cuvette Centrale (Mongo) ethnic groups

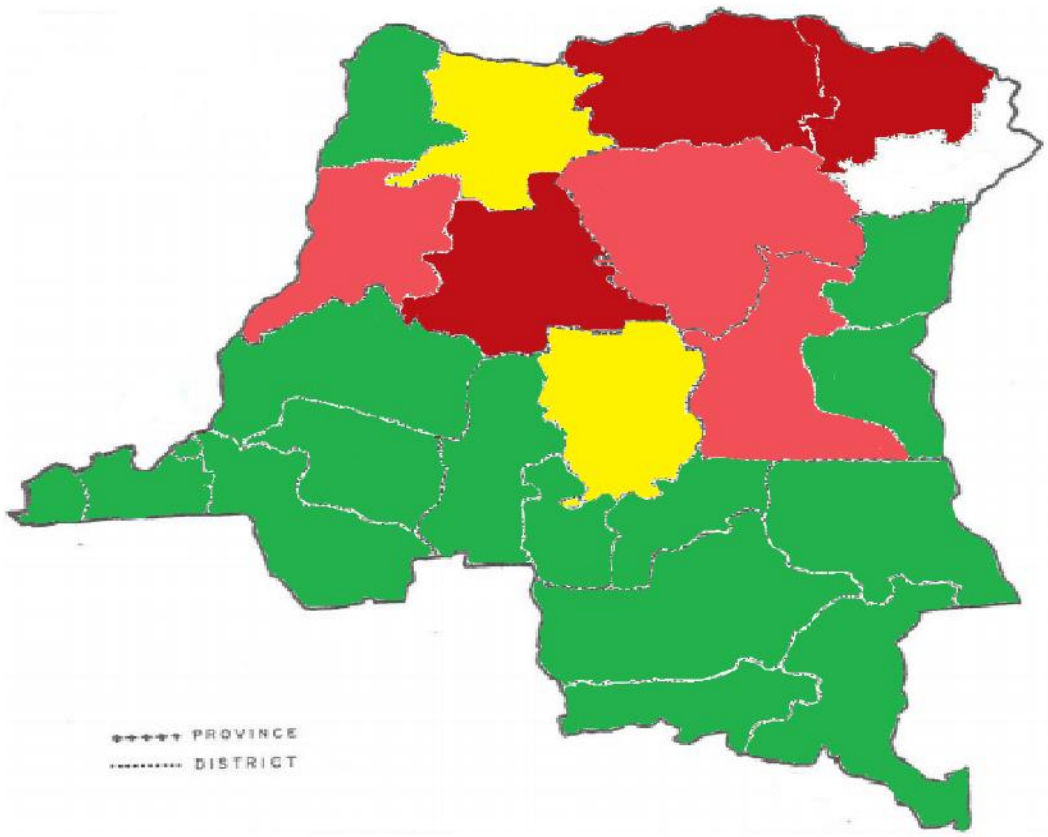
from the north had especially low fertility, while the two Bakongo groups, from what is now Kongo Central province in the southwest of the country, had particularly high fertility. The Kasai^{+} group (designated "Luba, related" in the figure) had fertility that was slightly below average for the city.

Map 1. Total Fertility Rates by Province, 1955-57

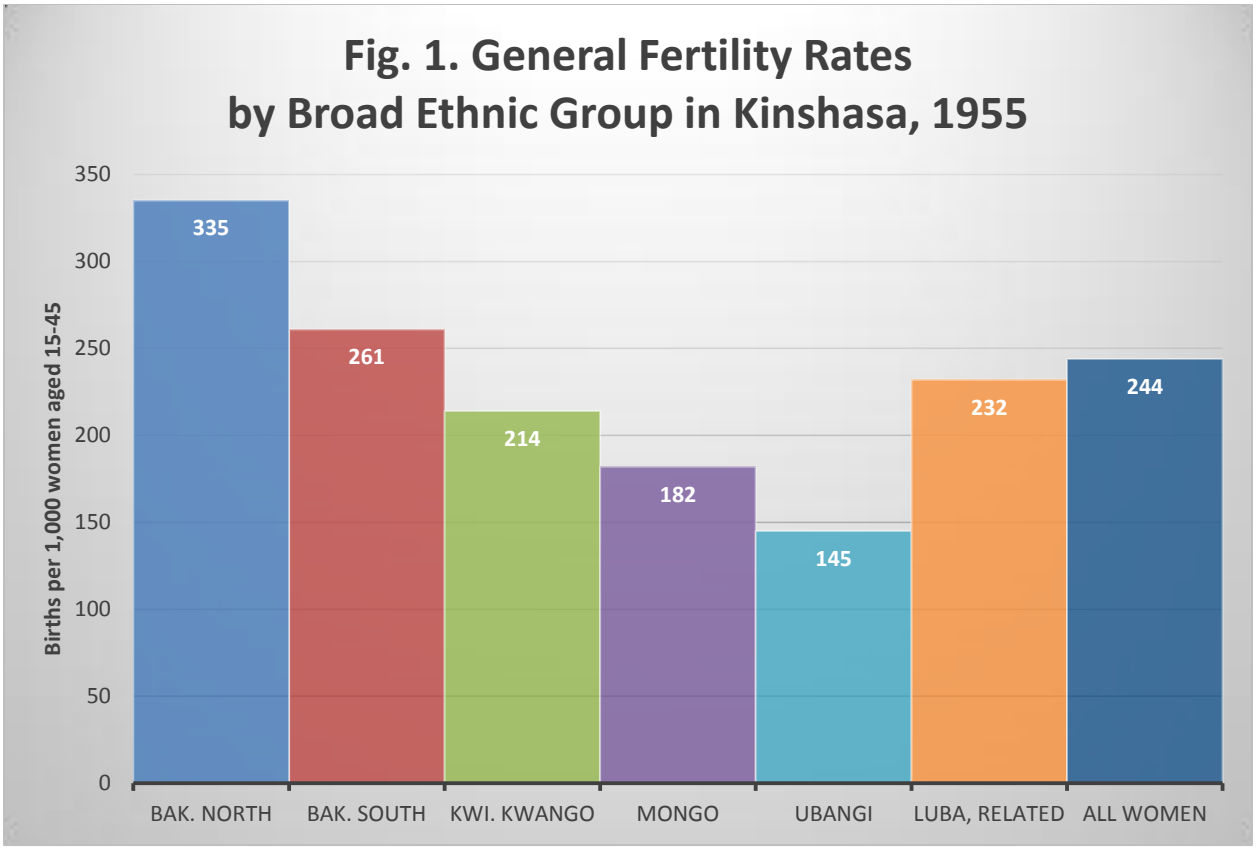


Legend for TFR	
≤4	Dark Red
5	Red
5-6	Yellow
>6	Green

Map 2. Total Fertility Rates by District, 1955-1957



Legend for TFR	
≤4	Dark Red
5	Red
5-6	Yellow
>6	Green



4. Fertility, Ethnicity, and Education in the 1970s and Beyond

Following the survey from the 1950s, the next national-level data collection operation was not until the 1984 Census. However, in the latter part of the 1970s a broad-based survey covering the western half of the country was undertaken, and showed evidence of narrowing of fertility differentials by ethnic group and a slight increase in overall fertility (Sala-Diakanda, 1980; Tabutin, 1982). This narrowing as well as the increased fertility were both attributed to successful public health campaigns against STIs in affected regions. Most notably, fertility in the Equateur and Tshuapa districts of Equateur province (home to the Mongo and related people of the Cuvette Centrale) had increased substantially since the mid-1950s, while infertility in these two districts had declined sharply (République du Zaire et al., 1978).

By the mid-1970s, women's education had begun to expand substantially, but educational attainment did not appear to have had much impact on fertility. For example, despite the fact that median educational attainment of women of reproductive age in Kinshasa had increased to about 5 years of schooling from none (Shapiro and Tambashe, 2003), overall fertility was estimated to be unchanged in the city (Sala-Diakanda, 1980). Subsequent work (Shapiro, 1996; Shapiro and Tambashe, 2003; Shapiro, 2015a) showed that the impact of education on fertility does not really emerge until the secondary schooling level, and in the mid-1970s, even in Kinshasa, most women of reproductive age (about 75 percent) (Shapiro and Tambashe, 2003) had less than secondary-level schooling.

Data from the 1984 Census showed that fertility had increased in the two historically low-fertility provinces of the 1950s, Equateur and Orientale, by 20-22 percent since the 1950s, with TFRs of 6.1 and 4.8, respectively. Kasai Orientale province, whose northern district Sankuru had somewhat low fertility in the 1950s, saw a 30 percent increase in its TFR, to 7.4 (Shapiro et al., 2016). Nationally the TFR was estimated at 6.7, but we believe that estimate is somewhat too high because fertility in Kinshasa was overestimated.[3]

A small-scale survey of fertility in Kinshasa that we carried out in 1990 found a TFR for the city of about 5.7, almost 25 percent lower that the estimates from the mid-1950s and mid-1970s. The survey also documented the growing role of women's educational attainment as a factor contributing to fertility decline. In particular, as noted earlier, schooling at the secondary level and above was associated with distinctly lower fertility (Shapiro, 1996). At the same time, examination of fertility differences in Kinshasa showed that the differentials by educational attainment were distinctly larger than those by ethnic group (Shapiro and Tambashe, 2003),

[3] We have argued elsewhere that the census estimate of 7.7 for the TFR for Kinshasa is too high (Shapiro and Tambashe, 2003, pp. 50-52). Our best guess is that in 1984 the city's TFR was approximately 6.4, reflecting the onset of fertility decline after 1975.

suggesting that education had supplanted ethnicity in the city as an important driver of fertility behavior.

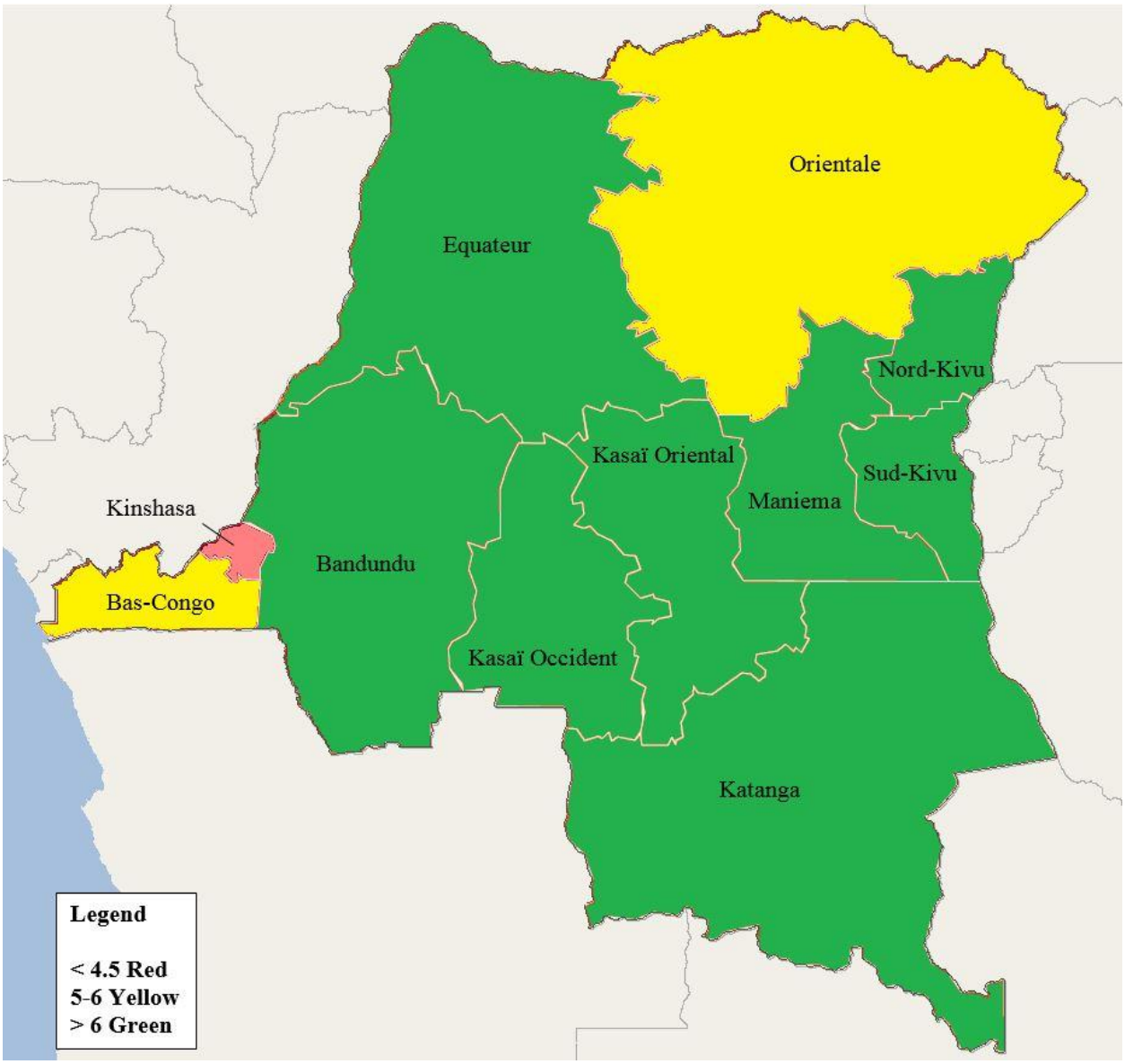
The 2007 DHS data documented that fertility in Kinshasa had continued to decline considerably, to a level of only about half of its level of 7.5 that prevailed from the mid-1950s to the mid-1970s (Shapiro, 2015a). By contrast, however, fertility had remained high elsewhere in the country. In effect, fertility transition was evident in Kinshasa, but the rest of the country was largely pretransitional (Romaniuk, 2011; Shapiro et al., 2016).

The second DHS in the DRC, carried out in 2013-14, indicated that at the national level the total fertility rate had increased from 6.3 to 6.6. The same trend emerged in Kinshasa, with the TFR increasing to 4.2 from its previous level of 3.7 in 2007, suggesting a stall in the city's fertility decline during the 6-7 years following the first DHS.

5. Education, Ethnicity, and Fertility in the DRC as of 2014

For our analyses of the relationships between education, ethnicity, and fertility, based on national-level data, we use data from the 2013-14 DHS. Map 3 shows total fertility rates by province for the 11 provinces that existed as of when that survey was carried out. Kinshasa is the only province with a TFR below 5, and Bas-Congo and Orientale are the only other provinces with TFRs that do not exceed 6.0.

Map 3. Total Fertility Rates by Province, 2013-14



Map 4 shows TFRs for the 26 new provinces that came into being in mid-2015. Kinshasa remains the only low-fertility province. Only four other provinces have fertility that does not exceed 6.0: Kongo Central (the former Bas-Congo province), Mai-Ndombe, Haut-Uele, and Tshopo. Over all, four of the new provinces have TFRs of 8.0 or higher, and another eight provinces have TFRs between 7 and 8.

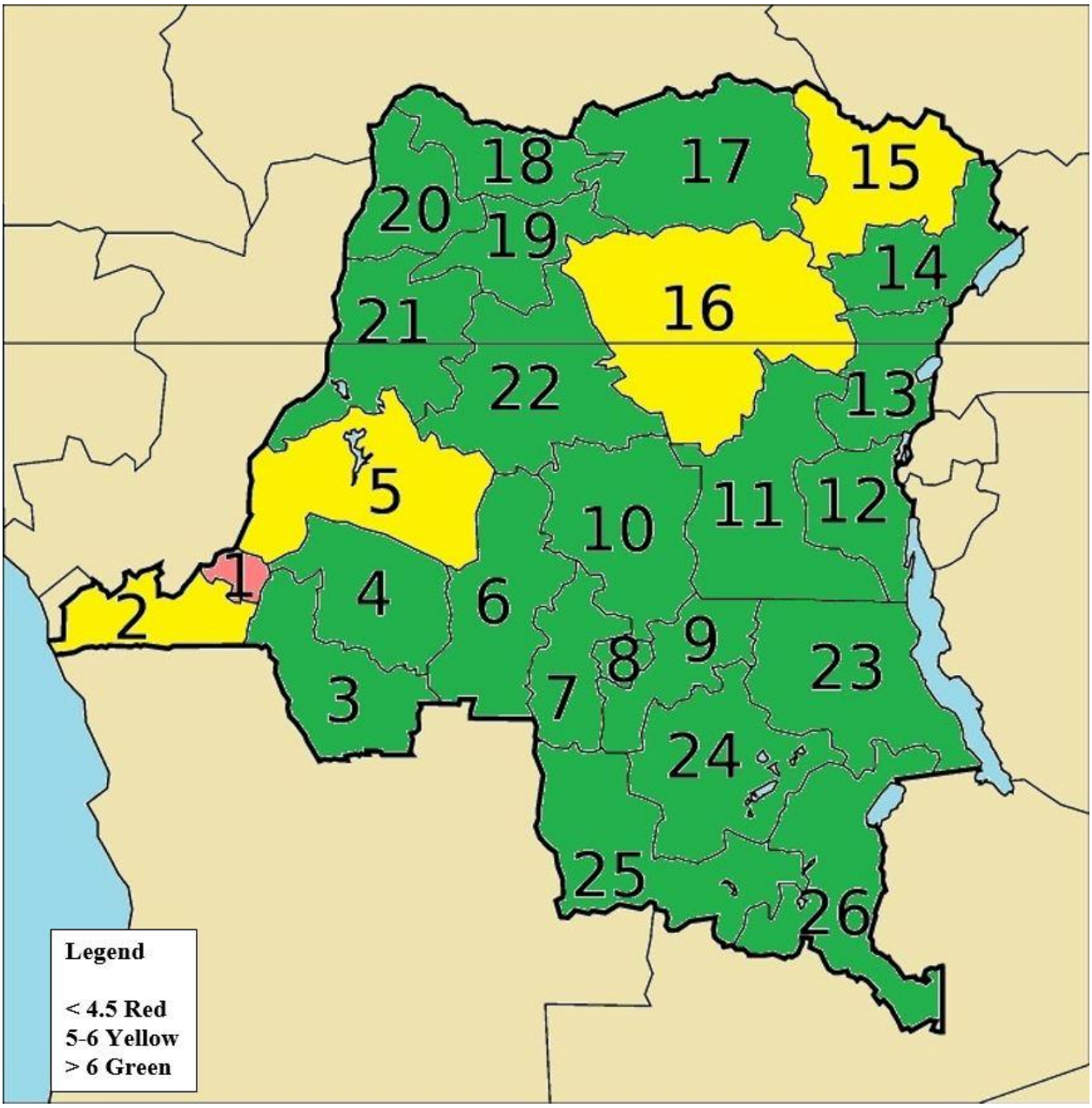


Table 2 shows the total fertility rates by ethnic group for the seven major ethnic groups, in total and separately for rural areas, urban places other than Kinshasa, and for Kinshasa. Over all, the Kasai^{+} group has the highest fertility, with a national TFR of 7.4. Also with relatively high fertility are the Balese-Komo^{+} and Ubangi^{+} groups, with TFRs of 6.9 and 6.7, respectively.

Bakongo women clearly had the lowest fertility overall, with a TFR of 5.0, and Uele^{+} women were next lowest with a TFR of 5.9.

Table 2. Total Fertility Rates by Ethnic Group and by Place of Residence, 2013-14 DHS

Ethnic Group	Total	Rural	Urban (not Kinshasa)	Kinshasa
Bakongo	5.0	7.4	4.0	3.6
Kwilu-Kwango^{+}	6.3	7.1	5.5	4.7
Cuvette Centrale	6.3	6.4	6.3	5.2
Ubangi^{+}	6.7	7.2	5.3	4.8
Uele^{+}	5.9	6.0	5.6	*
Balese-Komo^{+}	6.9	7.6	5.4	3.8
Kasai^{+}	7.4	8.2	7.0	3.6
Total	6.6	7.3	6.0	4.2

* Insufficient number of cases to calculate a TFR.
Source: Analysis of the 2013-14 DRC Demographic and Health Survey data.

Within each ethnic group, fertility is lowest in Kinshasa and highest in rural areas. TFRs in Kinshasa show a comparatively modest range, from 3.6 to 5.2 among the different ethnic groups. Overall, Kinshasa has substantially lower fertility than smaller urban places, where TFRs range from 4.0 to 7.0. Among some ethnic groups this difference between Kinshasa and other urban places is small (Bakongo and Ubangi^{+}), and among the Kasai^{+} group it is huge. Conversely, comparison of fertility between other urban places and rural areas, where TFRs range from 6.0 to 8.2, shows that the Cuvette Centrale and Uele^{+} groups have only small differences, while among the Bakongo women the difference is huge. Among rural residents, TFRs are above 7 except for those from the Cuvette Centrale and Uele^{+} women, with TFRs of 6-6.4.

Total fertility rates by educational attainment are shown in Table 3 for seven groups of women, with a) no schooling, b) incomplete primary schooling, c) completed primary schooling (six years), d) low, e) medium, and f) high secondary education, and g) post-secondary education. Rates are shown for the country overall, and for rural areas, urban places other than

Kinshasa, and Kinshasa. In total, peak fertility is among women with incomplete primary education, followed closely by those with no schooling and those with completed primary education. All three groups have TFRs in excess of seven. Fertility declines beginning with those with one or two years of secondary schooling, and following those with three or four years of secondary schooling, the declines widen as schooling increases.

When one considers fertility levels and differentials by place of residence, two key aspects emerge. First, fertility is considerably lower in Kinshasa than in other urban places, whose overall mean TFR of 6.0 is closer to average rural fertility than to the TFR in Kinshasa. This pattern is evident at each schooling level. Second, the sensitivity of fertility to education is greatest in Kinshasa and smallest in rural areas. In other urban places, a strong inverse association between education and fertility emerges only among those with at least upper-level secondary education.

Table 3. Total Fertility Rates by Schooling and by Place of Residence, 2013-14 DHS

Schooling (years)	Total	Rural	Urban (not Kinshasa)	Kinshasa
0	7.4	7.5	6.0	[a]
1-5	7.5	7.6	7.1	6.8
6	7.2	7.6	6.8	5.3
7-8	6.6	6.8	6.7	5.4
9-10	6.1	6.7	6.4	4.8
11-12	4.7	6.1	4.8	3.6
13-18	2.9	[a]	3.2	2.5
Total	6.6	7.3	6.0	4.2

[a] Inadequate sample size for calculation of a TFR.
Source: Analysis of the 2013-14 DRC Demographic and Health Survey data.

In order to assess the net impact of both education and ethnicity on fertility, we have analyzed fertility in a multivariate framework, using micro data on female respondents from the 2013-14 DHS. The dependent variable is the number of children ever born. Independent variables include a set of dummy variables identifying women with different levels of schooling.

Reflecting the differences observed in Table 3, these dummy variables entail a more refined set of distinctions than the none/primary/secondary-and-above trichotomy that is often used in fertility research controlling for women's education. This finer characterization of educational attainment has been found to yield suggestive evidence of nonlinearity in the relationship between education and fertility, with the impact of education increasing as educational attainment increases, beginning at the lower secondary level (Shapiro and Tambashe, 2003; Shapiro, 2012; Shapiro and Tenikue, 2015). Women with 1-6 years of primary school constitute the reference category.[4] In addition, a set of dummy variables identifies the seven broadly defined ethnic groups in the DHS data, as well as a small residual "other ethnicity" category. These education and ethnicity variables are the focus of our analysis, and age and age squared as well as a dummy variable for urban residence are included as control variables.

Analyses were carried out at multiple levels, as shown in Table 4. The first equation shows the coefficients for the entire sample, all women aged 15-49. All variables are highly significant except for other urban residents, and the R^2 equals 0.623. The all-negative coefficients of the education dummy variables reveal that peak fertility is among women with primary schooling only, while both women with no schooling and those with low-level secondary schooling have slightly fewer numbers of children ever born, ceteris paribus. Then, as education increases, the magnitude of the corresponding reduction in number of children ever born increases, with substantial negative coefficients for women with advanced secondary or post-secondary schooling in particular.

[4] In comparison with Table 3, in Table 4 we combine the incomplete primary and completed primary groups. These two groups have similar fertility except in Kinshasa, and combining them gives us a larger reference group for the regressions.

Table 4. Children Ever Born Regressions, by Place of Residence, 2013-14 DHS

Variable or parameter		*All Women*	*Rural*	*Urban (Other than Kinshasa)*	*Kinshasa*
Age	Age	0.479**	0.526**	0.455**	0.225**
	Age^2	-0.0040**	-0.0046**	-0.0036**	-0.00081
Schooling	None	-0.165**	-0.184**	-0.264**	0.463
	Prim1-6	-	-	-	-
	Sec12	-0.220**	-0.179**	-0.232**	-0.320*
	Sec34	-0.555**	-0.559**	-0.565**	-0.625**
	Sec56	-1.191**	-1.015**	-1.247**	-1.218**
	Univ	-2.365**	-2.544**	-2.453**	-2.152**
Ethnic group	Bakongo	-0.552**	-0.285**	-0.993**	-0.366**
	Kwilu-Kwango$^+$	-0.420**	-0.498**	-0.391**	0.010
	Cuvette Centr.	-0.327**	-0.373**	-0.173	-0.046
	Ubangi$^+$	-0.348**	-0.294**	-0.564**	0.068
	Uele$^+$	-0.657**	-0.672**	-0.635**	-0.052
	Balese-Komo$^+$	-0.184**	-0.112*	-0.328**	-0.281
	Kasai$^+$	-	-	-	-
	Other	-0.437**	-0.595**	-0.234	-0.175
Urban	Other Urban	-0.091	-	-	-
	Kinshasa	-.554**	-	-	-
Parameters	Constant	-6.154**	-6.947**	-5.822**	-2.625**
	R^2	0.623	0.615	0.642	0.568
	N	18827	12000	5023	1804

** coefficient significant at .01 level
* coefficient significant at .05 level
Source: Analysis of the 2013-14 DRC Demographic and Health Survey data.

The coefficients for the different ethnic groups show how the group in question compares to those from the reference group, Kasai/Katanga/Tanganyika. The negative coefficients for all groups indicate that the Kasai$^+$ group has the highest fertility, other things equal. Comparatively, the Uele$^+$ and Bakongo groups have the lowest fertility, other things equal. Fertility of the Balese-Komo$^+$ is only slightly below that of the Kasai$^+$ group, followed by those

from the Cuvette Centrale, Ubangi^{+}, and those from Kwilu or Kwango. These net differences by ethnicity are similar to those in the TFRs.

While the differences across ethnic groups are highly significant, the magnitudes of the coefficients are for the most part fairly modest, with a maximum absolute value of 0.66. Compared to the coefficients for the education groups, and especially the two highest ones, this makes it clear that in general, fertility differences by ethnic group, other things equal, are smaller than fertility differences by educational attainment.

The coefficients on age and age squared signify that number of children ever born increases with age, but at a decreasing rate. Fertility of women from Kinshasa is significantly lower than that of rural women by more than half a child, other things equal, representing almost 18 percent of the mean value of 3.15 for the entire sample. In contrast, fertility of women from other urban places was not significantly different from that of rural women.

The next column of Table 4 shows the coefficients for the sample of rural women. As was the case for all women, all coefficients are statistically significant, and the variables account for more than 60 percent of the variation in number of children ever born. The pattern of differences by educational attainment remains pretty much the same as with the full sample. With respect to fertility differences by ethnicity, note that the especially low fertility of Bakongo women is no longer present, reflecting the low fertility of urban Bakongo women already noted. Otherwise, the fertility differences by ethnic group remained fairly similar to those from the full sample. Reflecting the higher fertility in rural places, the coefficients of age and age squared have increased in absolute value.

The counterpart to the rural estimates just discussed would be an equation for women in urban places. Such an equation shows educational differences in fertility similar to what we've

already seen. Differences by ethnic group are a little more variable – urban Bakongo women have especially low numbers of children ever born. But this equation masks the reality that Kinshasa is a unique megalopolis in the DRC (e.g., see Romaniuk, 2011 and Shapiro et al., 2016). So instead we've divided up urban residents into two groups: those from everywhere except Kinshasa, and those from Kinshasa. Note that urban places other than Kinshasa are not only smaller, but also they are more likely to be ethnically more homogeneous (assuming that intraprovincial migration is more common than interprovincial migration) as compared to the melting pot of Kinshasa.

Column 3 of coefficients in Table 4 shows the results for urban places other than Kinshasa. Comparing these coefficients with those for all women and for rural women shows a very similar pattern of educational differences. With respect to variation in ethnic group differences, this is much more substantial. For some groups the differences with the reference group have widened (Bakongo, Ubangi^{+}, Balese-Komo^{+}), for others they've narrowed (Kwilu-Kwango, Cuvette Centrale), and in one case stayed about the same (Uele^{+}). Urban Bakongo women have sharply lower fertility than the reference group, and as noted there are changes in most of the other ethnic group coefficients.

Finally, the last column of coefficients shows the results for Kinshasa. Women with no schooling (a very small group) are not significantly different from the reference group of women with primary schooling with respect to children ever born. Beyond that the pattern of education coefficients is familiar, with widening differentials as educational attainment increases, and the magnitudes of the differences are similar to those in the other samples. With respect to ethnic group, Kinshasa is clearly unique: there is only one significant coefficient, for Bakongo women, and at a smaller level than for such women in other urban places. Hence, for the most part there

are not significant differences in fertility across ethnic groups in Kinshasa, once age and education are taken into account. Reflecting the lower overall fertility in Kinshasa, the age coefficient is substantially smaller than in the other equations.

The results from Table 4 show three important aspects. First, the magnitudes of the coefficients for education are noticeably robust, regardless of place of residence. This is not the case for the coefficients of the ethnic group dummy variables. Second, in Kinshasa, with one exception, ethnic group differences in fertility are negligible. Elsewhere in the country, however, in both rural and urban places, there are significant fertility differences across ethnic groups, other things equal, with some variation by place of residence in the magnitudes of those differences. Third, the magnitudes of these fertility differences by ethnic group in rural and other urban places are comparatively small as compared to the magnitudes of the fertility differences by educational attainment. In sum, then, in Kinshasa education has replaced ethnicity as a factor influencing fertility; elsewhere in the country, both education and ethnicity influence fertility, but the importance of differences in education attainment is clearly dominant.

6. **Exploring Fertility Differences Among the Ethnic Groups**

From our analyses of fertility by ethnicity, two groups stood out. The Bakongo women typically had the lowest fertility of any group, while the Kasai^{+} women had the highest fertility, other things equal. Apart from Kinshasa, Uele^{+} women also had low fertility[5], while women from the Balese-Komo^{+} group had comparatively high fertility. Multiple reasons may contribute to these differences in fertility. Table 5 shows the mean values by ethnic group on a number of different

[5] The Uele group in Orientale Province was the ethnic group that experienced the lowest fertility in the 1950s. Romaniuk (2013) has argued that the comparatively low fertility of this group at present likely reflects a continued, albeit reduced, presence of STIs in the region.

fertility-relevant characteristics and behaviors, and these data suggest that several factors are influencing the fertility differentials.

The mean value of the ideal number of children for those women who gave a quantitative response was 6.1. For this indicator of demand for children, the Kasai^{+} women had the highest value by far, and the Bakongo women had the lowest value. Hence, variations in ideal number of children appear to correspond well to the variations in fertility.

Mean age at the onset of sexual activity is highest for Bakongo women, but it is second highest for Kasai^{+} women. This factor is essentially uncorrelated with the TFRs by ethnic group.

Table 5. Some Fertility-Relevant Characteristics, by Ethnic Group, 2013-14 DHS

Ethnic Group	Ideal # of child -ren	Age at first sex	Pct. in union	Pct. married	Pct. living together	Pct. urban	Pct. w/ no schooling	Pct. w/ sec+ schooling	Mean years of schooling	Pct. using modern contra-ception
Bakongo	4.7	16.8	52	23	29	63	7	66	8.0	18
Kwilu-Kwan.$^{+}$	5.6	16.4	65	44	21	41	10	56	7.1	9
Cuvette Cent.	5.9	15.2	69	50	20	23	13	48	6.3	6
Ubangi^{+}	5.8	15.7	70	41	29	24	24	32	4.8	5
Uele^{+}	5.4	15.4	64	35	29	23	18	32	5.0	5
Balese-Komo^{+}	6.3	16.6	60	44	16	33	24	39	5.4	9
Kasai^{+}	7.3	16.7	67	63	4	47	14	45	6.2	6
Total	6.1	16.2	64	47	18	38	16	46	6.1	8

Source: Analysis of the 2013-14 DRC Demographic and Health Survey data.

Three columns of the table pertain to being in union. The first of these columns shows the overall percentage of women in union in each group, and the next two columns break that total group into those who reported being married and those who indicated that they were living together as if married (i.e., cohabiting). The data here suggest that the proximate determinant of union status is an important contributor to the observed fertility differences by ethnic group. Most notably, Bakongo women have the lowest overall percentage of women in union, while Kasai^{+} women have the highest percentage married by far, and very few living together. Indeed,

among Bakongo women in union, those categorized as married are a minority – the only ethnic group for which this is the case. This unique characteristic is worth teasing out the root causes. Since women who are married typically have higher fertility than those who are cohabiting[6], these differences in union status clearly contribute to the low Bakongo fertility and the high Kasai^{+} fertility.

More than 60 percent of Bakongo women are urban residents; they are the only group that is predominantly urban in the DHS data. At the same time, the second-most urbanized group is the Kasai^{+} women. And apart from the highly urbanized low-fertility Bakongo women, there is actually a positive correlation between the percentage urban and the TFR among the other six ethnic groups.

With respect to educational attainment, regardless of the measure considered, Bakongo women are clearly those with the most schooling. They are least likely to have never gone to school, most likely to have reached secondary school, and their mean years of schooling are nearly a year greater than that of the second-highest group, and nearly two years higher than the national average. This is clearly an important factor contributing to the low fertility of Bakongo women.

Finally, almost one in five Bakongo women in union uses modern contraception, twice the rate and more of the other ethnic groups. As we'll see below, in part this reflects the higher educational attainment of these women. In any case, greater use of modern contraception is an additional factor contributing to the low fertility of Bakongo women

7. **Exploring Fertility Differences Among the Education Groups**

[6] A regression similar to the first equation in Table 4, but with additional variables for type of union, shows that other things equal, the number of children ever born is lower for married women as opposed to cohabiting women by 0.4 children.

This section parallels the preceding one: we examine various characteristics and behaviors that influence fertility, and how they vary across education groups, with a view to understanding the sources of the fertility differences by educational attainment. The relevant data, for the same variables that were in Table 5 except for those pertaining to education, are in Table 6.

Table 6. Some Fertility-Relevant Characteristics, by Education Group, 2013-14 DHS

Years of schooling	Ideal # of child -ren	Age at first sex	Pct. in union	Pct. married	Pct. living together	Pct. urban	Pct. using modern contraception[a]
0	7.2	16.2	80	61	19	9	4
1-5	6.7	15.8	73	53	20	19	4
6	6.4	15.8	67	49	18	32	6
7-8	5.8	15.9	56	39	17	44	10
9-10	5.4	16.5	54	37	17	63	14
11-12	5.0	17.3	54	37	17	75	16
13^{+}	4.2	19.1	36	29	6	96	18
Total	6.1	16.2	64	47	18	38	8

[a] Women in union.

Ideal fertility declines monotonically with years of schooling, by a total of three children from the lowest to the highest education level. Only at the secondary level, however, does it fall below six, and only at the upper secondary level does it reach five. Since ideal fertility is typically close to actual fertility at the aggregate level (Shapiro, 2015b), this variable clearly helps explain the education differences in fertility.

Age at first sex is about 16 up through the group with 7 or 8 years of schooling, then rises among the three groups with the most schooling, with an especially large jump for the group with postsecondary schooling. That and the upper secondary group are the only ones with distinctly higher age at first sex, which presumably contributes to lower fertility.

The percentage of women in union declines substantially as years of schooling increase, and proportionately, more than twice as many women with no schooling are married than are women with postsecondary schooling. In addition, when we look at type of union, it is clear that the decline in the percentage of women in union as schooling increases is driven by the decline in the proportion of those who are married; except for those with postsecondary schooling, 17-20 percent of women in union in each education group are cohabiting. This figure drops sharply among those with postsecondary schooling, and indeed they are the group with the highest percentage of unions being marriages.

Place of residence is strongly and systematically linked to educational attainment: the percentage urban rises sharply as one moves across the education groups. At the extremes, more than 90 percent of women with no schooling are in rural areas, while 96 percent of those with postsecondary education are in urban places.

And finally, use of modern contraception is clearly positively related to educational attainment. This indicates that contraceptive use is also a contributing factor to the education differentials in fertility. However, since the overall level of contraceptive use among women in union is less than 20 percent for the group with the most schooling, this is likely only a modest contributing factor at best.

8. Prospects for Harnessing the Demographic Dividend in the DRC

The demographic dividend refers to the potential benefits, in terms of economic development, of changes in the age structure of a population deriving essentially from a decline in fertility. A sustained fertility decline in a previously high-fertility population contributes to reducing the ratio of dependents, young and old, to the population of working age, as a result of the

proportion of young dependents growing smaller relative to the total population. If good policies are enacted and implemented, such a favorable dependency ratio opens a time-sensitive window of opportunity for raising output and savings per capita, thereby contributing to increasing investments in quality human capital and in (more) vibrant sectors of the economy.

In 2014, based on the DHS data, the ratio of young (<15 years) and old (65+ years) dependents per 100 individuals aged 15-64 stood at 114 overall, and apart from Kinshasa, with a dependency ratio of 75, all provinces had dependency ratios in excess of 100, with a maximum value of 127. These are far from economically-friendly dependency ratios outside of Kinshasa, entailing as they do one working-age adult supporting more than one dependent.

Generating a favorable youth dependency ratio in a population via reduced fertility is a necessary but not sufficient condition for a country to open a window of opportunity for a demographic dividend and to develop an enabling environment to capitalize on the economic benefits of changes in the age structure of a population. Good health, education, labor, fiscal, gender as well as urban planning policies and efforts promoting political stability, good governance, transparency, and low corruption are some other key features that contribute to harnessing the demographic dividend, through translating a relatively large working-age population into economically productive adults, increasing productivity, and raising savings per potential working-age adult.

With respect to the country's prospects to benefit from the demographic dividend, it is clear that at present, with the notable exception of the city-province of Kinshasa, the initial condition to bring about an economically favorable dependency ratio – a sustained decline in fertility – is neither evident nor on the horizon. With an estimated overall TFR of 6.6 in 2013-14, varying from 4.2 in Kinshasa to 7 or more in five of the eleven provinces (Kasai-Occidental,

8.2; Katanga, 7.8; Sud-Kivu, 7.7; Kasai-Oriental, 7.3; and Equateur, 7.0), the country is one of the ten countries in the world with the highest TFR (Guengant et al., 2014, p. 9). Though the level of educational attainment has increased overall in the country, estimated fertility appears to have also increased modestly in the past half-dozen years or so. Ideal fertility as measured by the most recent DHS was 6.1 children per woman on average, and is higher than 7.0 in four of the five provinces where fertility is above the national average.

Also of note is that the uptake of modern contraceptives, and consequent pace and magnitude of fertility decline, has been too slow: a 0.2 percentage point gain per year over the past two decades (Guengant et al., 2014). This pace is trivial, in light of evidence suggesting that fertility declines by an average of one to two children per woman following a rise of 16 percentage points in contraceptive use (UNECA et al., 2013, p. 11). Increased efforts are needed today to initiate, accelerate, and sustain required changes in the age structure of the population. Unfortunately, there is little evidence suggesting that the country would see any contraceptive revolution anytime soon to bring about significant changes in its age structure.

Current U.N. estimates for the DRC forecast a declining TFR still in excess of 4 by 2035, and well above 3 by 2050 (United Nations, 2015). Such estimates are part of a series that trends steadily downward over time, while estimates from the most recent DHS suggest that fertility has not been declining as anticipated. Hence, the U.N. estimates appear to be overly optimistic regarding the pace and magnitude of fertility declines in the country, particularly in light of the low use of modern contraception and very slow pace of increase of that use in recent decades.[7] This calls into question the prospects for the emergence of an economically-friendly dependency

[7] Independent projections by Guengant et al. (2014, p. 45) under three scenarios on the pace of increase of contraceptive use (slow: + 1.0 percentage point per year; fast: + 1.5 percentage point per year; and very fast: + 2.0 percentage points per year) indicate that the total fertility rate will remain above 4 in 2050 under their "slow pace hypothesis," which is in fact a much faster pace of increase than actual experience in the past two decades.

ratio and attendant economic benefits, even further down the road. And even when the dependency ratio for the rest of the country besides Kinshasa will be much lower than it is at present, the prospects for the country to enact and implement enabling policies to reap the demographic dividend remain to be seen. In short, the issue of the country's poor governance has been persisting over the past five decades; putting it mildly, optimism about future policies does not seem to be warranted. Over the years, the DRC consistently ranks among the countries where perceived corruption, as measured by Transparency International, is extremely rampant and prevents successful implementation of policies.

In Kinshasa, where fertility has been declining since the mid-1970s, the age composition of the city's population has changed accordingly. Kinshasa's dependency ratio of 75 is 30 points lower than the dependency ratio of the next-lowest province, Kongo Central. However, it should be noted that the burden of dependents on those who are income generators is much higher than suggested by this gross dependency ratio. Even in Kinshasa, many of those aged 15-64 are not gainfully employed, and the majority of those working are effectively working in the informal sector (Shapiro and Tambashe, 2003; Shapiro et al., 2011; Guengant et al., 2014). The city's economy, reflecting the country's overall poor economic performance in the last several decades, has not been able to generate sufficient good jobs whose earnings, combined eventually with lower support costs for dependents, can provide households with increased savings that can be invested.

Indeed, a former Prime Minister of the DRC, looking ahead to 2025, after reviewing Kinshasa's issues of inadequate social and economic infrastructure, public and environmental health, transportation, water and electricity, housing, and unemployment, concluded that "All these problems taken together make and will make of Kinshasa a bomb, from a social, political,

and security point of view, to disarm before it is too late" (Muzito, 2015, translated loosely from French).

In conclusion, the prospects for the DRC to reap any demographic dividend in the next couple of decades are essentially nonexistent. Rather, for most of the country continued high fertility seems most likely in the short and medium terms, and hence there will not be much of a decline in youth dependency – the necessary catalyst for a demographic dividend. In Kinshasa, the recent stalling of fertility decline will slow the reduction in youth dependency. More importantly, the city's economy has been unable to generate sufficient numbers of good jobs as new entrants come onto the job market (both school-leaving youth and migrants to the city), and it seems unlikely that this will change in the near future, even if fertility decline in the city resumes.

Kinshasa's projected population growth, to 20 million by 2030 and 30 million by 2050 (United Nations, 2014), and the projected growth of other provincial capitals such as Lubumbashi, Mbuji-Mayi, Kisangani, and Kananga, which are set to count at least one million inhabitants, will make them, in conjunction with Kinshasa, home to more than a third of the country's total population. Given the prevailing inadequate urban planning policies and poor urban infrastructure (sanitation, water and electricity supply, housing, public transportation, etc.), throughout the country, we are more concerned about prospects for social instability (as described by Muzito, 2015) than we are anticipating any demographic dividend for the DRC in the coming years. This is consistent with evidence suggesting a strong correlation between countries experiencing civil unrest or political violence and those with burgeoning youth populations (Beehner, 2007; Urdal, 2011). More broadly, Goldstone (2010) highlights that youth confronting "a dangerous lack of quality education, capital, and employment opportunities" (p.

32) in conjunction with increasing urbanization in poor countries with inadequate existing infrastructure and services are two of the four major trends he discusses that constitute "The New Population Bomb."

9. **Summary and Conclusions**

This paper has examined fertility in the Democratic Republic of the Congo going back about 60 years, with the objective of determining if the supplanting of ethnicity by women's education as an important factor influencing fertility that had previously been observed for Kinshasa was true more broadly in the country at large. What we found in this regard is that while in Kinshasa fertility differentials by ethnicity are almost nonexistent, once one controls for schooling and age, elsewhere in the country such differentials are present, in both urban and rural places. At the same time, fertility differentials by ethnicity are generally smaller than the differentials by educational attainment that are evident. Hence, for the country as a whole, or more precisely, outside of Kinshasa, while ethnicity has not disappeared as a factor relevant to fertility, it has clearly been surpassed in importance by women's education.

A second major finding of this paper is that place of residence matters. We carried out analyses separately for Kinshasa, other urban centers, and rural places, and results vary, sometimes considerably, by place of residence. While in general fertility declines as education increases beyond the primary level, the TFRs by educational attainment and place of residence jointly (Table 3) suggest that this schooling effect is largest in Kinshasa, and much more modest in rural areas.

We also have categorized educational attainment in much more detail than the often-utilized trichotomy (none/primary/secondary+), using seven categories. Results show consistent

differences in fertility among these different groups. In addition, based on this more detailed categorization, the results showed that fertility declines with education tend to increase in magnitude as the years of educational attainment increase.

Finally, we discussed the prospects for a demographic dividend in the DRC, and concluded that they are quite dim for the near to medium term. Apart from Kinshasa, fertility is still pretransitional throughout the country. So the required sustained decline of fertility necessary to open the possibility of a demographic dividend is yet to happen. In Kinshasa, fertility has declined and the measured dependency burden is considerably lower than elsewhere in the country. However, the existing high unemployment and underemployment in Kinshasa, in conjunction with the anticipated growth of the city's population, current inadequate infrastructure, and slim prospects for a good policy environment to stimulate economic growth, make a demographic dividend in Kinshasa very unlikely in the near future.

We note that the comparisons of differences by ethnicity and by schooling have been made using simple descriptive tables, and without taking account of other relevant factors. Our next step in this research, then, is to examine the different characteristics and behaviors of interest contributing to these fertility differences in a multivariate framework, so as to isolate the differences associated with ethnicity and education, after controlling for other relevant factors (e.g., age).

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Table A-1. Province of Residence, by Major Ethnic Group, DHS Survey Respondents (percentage distributions)

Province	Bakongo	Kwilu-Kwango	Mongo	Ubangi	Uele	Balese-Komo	Luba	Total
Kinshasa	45	20	8	8	2	2	9	12
Bandundu	3	71	31	0	0	0	0	16
Kongo Central	50	1	0	0	0	0	0	5
Equateur	1	0	49	77	0	0	0	13
Kasai-Oc.	0	5	0	0	0	0	22	6
Kasai-Or.	0	3	10	0	0	0	33	10
Katanga	0	0	0	0	0	1	35	10
Maniema	0	0	0	0	0	15	0	3
Nord Kivu	1	0	0	0	2	41	0	9
Orientale	0	0	1	15	95	5	0	10
Sud Kivu	0	0	0	0	1	36	0	7
Total	100	100	100	100	100	100	100	100

Source: Analysis of Demographic and Health Survey data from the 2013-14 survey in the DRC.