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ECONOMIC DETERMINANTS OF FERTILITY IN KINSHASA, ZAIRE: AN ANALYSIS OF THE PUBLISHED DATA

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Since the demographic inquiry of 1955-57, [12],several socio-demographic surveys have been conducted in Zaire. For only one, however,--the 1967 socio-demographic survey of Kinshasa--are there comprehensive published results.[1] The 19 Kinshasa survey, is based on a 10% systematic drawing from all parcelles (roughly equivalent to compounds). This survey is composed of 86,546 individuals and 17,938 households.[2] Another related survey, for which there is published data, is the 1970 family budget study of Kinshasa. This study, described in a doctoral dissertation by Joseph Houyoux [7], is based on a 1 percent sample drawn from the 1967 survey parcelle list, updated.

The purpose of this paper is to analyze the published results of these two surveys and compare them with those of the 1955-57 demographic inquiry. This, it is hoped, will facilitate an investigation of the fertility response to changes in economic and demographic structure accompanying development in central Arica.

I. Changes in Fertility over time

One of the most important results contained in the published data is the marked increase in the age-specific birth rates indicated by the retrospective fertility data obtained in 1955 and 1967. Presented in Table I are retrospective fertility estimates for women in each of the six age groups. These estimates represent the total number of children ever born divided by the total number of women in each of these age groups. These ratios appear to have risen markedly during the 1955-67 period, as shown in Table I. The lowest increase in a birth rate is8 percent for the 15-19 year old age category; the other birth-rate increases rise progressively with the age of the woman. These figures should, however, be interpreted cautiously.

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[1]Other socio-demographic surveys included ones of Kisingani (1972 Bukavu (1972), Lumbumbashi (1973), and Matadi (1972).

[2]For a critique of 1967 survey, particularly the uniformity of sampling, see [14].

To begin with, it must be recognized that retrospective fertility estimates are biased downward as a consequence of memory lapse. This is particularly true in a country such as Zaire. In the case of the 1955-57 demographic inquiry, Romaniuk showed that total fertility rates estimates tended to be a good deal higher for women in comparable age groups than estimates of retrospective fertility. [13, pp. 325-8].

The memory lapse bias is related to the infant death rate. In the 1967 survey, each household was asked about the number of children ever born and the number of surviving children. From this information a survival table was constructed. This mortality configuration seemed to conform most closely to the West model, while that in the 1955-57 inquiry conformed most closely to the North model. The implied quotient of infant survival (one year) was 91% in the case of the 1967 survey and 78% in the case of the 1955 survey. This indicates a rather marked decline in infant mortality rate between the two samples. This decrease is important since downward bias due to memory lapse in retrospective fertility estimates is much less pronounced when infant mortality is relatively low than when it is relatively high. Hence 1967 retrospective fertility estimates may be a good deal less biased downward than are the 1955-57 retrospective fertility estimates, which would lead to a biased upward estimate of the increase in fertility between 1955 and 1957. This may explain why the percentage increase in retrospective fertility is a good deal less in the 15-19 year old age group than it is for older women. The memory lapse bias is probably least significant for the youngest age group.

If accurate data are available on births during the 12 months proceding the sample, cumulative age specific birth rates may be computed and used

as an unbiased estimate of retrospective fertility . Romaniuk [13] provides average cumulative age-specific birth rates for each of the female age groups shown in Table I for the year 1955. The ratio of estimated to reported retrospective fertility is substantial, particularly in the higher age groups. See Table I. Comparing reported retrospective fertility in 1967 with average cumulative age-specific birth rates in 1955 will understate the fertility increase, since the 1967 estimates are substantially biased downward. Nevertheless, despite this tendency, there was a large increase in retrospective fertility according to this criterion from 1955 to 1967. In Table I, we see that in the prime child bearing age groups there was a marked increase in retrospective fertility even though a higher base-year estimate was used. At the extreme ends of the age distribution the change was neglibible. Weighting the increases by the percentage of births accounted for by each of the age groups in 1955, we find an average increase of 11 percent in the retrospective rates.

The general fertility rate is defined as the ratio of children ever born in the current year to women 15-44 years of age. It is clear that this ratio did not increase as much percentage wise as the age-specific retrospecti fertility rates. In Table II,we see that this measureincreased by only 1.2 percent from 1955 to 1967. This is true partly because of the large increase in the proportion of women 15-19 years of age, whose age-specific birth rates remained at their 1955 level, the general fertility rate would have declined from 24.4 to 22.9 percent between 1955 and 1957 owing to the change in the female age distribution. In addition, the general fertility rate is a measure of current rather than retrospective fertility. Hence,

Table I

Increase in Retrospective Fertility in Leopoldville District

(adjusted for memory lapse bias)

Age of Mother	Retrospective Fertility 1955: Children ever born/ total women	Average Cumulative Age-Specific Fertility in 1955	Column 2 divided by Column 1	Retrospective Fertility 1967: Children ever born total women	Percentage Change between Columns
	(1)	(2)	(3)	(4)	(5)
15-19	.48	.531	1.106	,52	-.021
20-24	1.47	1.856	1.263	2.12	+.142
25-29	2.55	3.354	1.315	3.70	+ .03
30-34	3.42	4.656	1.361	5.03	+.080
35-44	3.74	*5.745	*1.536	5.70	-.008

Sources: Brass, William et al. The Demography of Tropical Africa
The Congo: by Anatole Romaniuk, Princeton University Press. 1968. p. 327.

Etude Socio-Demographique de Kinshasa 1967
Institut National de la Statistique. Annee 1969. p. 63.

* Note: This is heavily biased upward since the proportion of women between 34.5 and 39.5 is much greater than the proportion between 39.5 and 44.5.
Brass: p. 265, p. 31.

it is not sensitive to the fact that children born to migrant women prior to their coming to the city was substantially higher for post 1958 than it was for pre-1958 migrant women. This point will be examined in detail in section III.

It is clear that one of the main causal factors lying behind the fertility increase between 1955 and 1967 was a reduction in involuntary sterility. In Table III,we see that the percentage of women childless in the most fertile age groups fell off extensively between 1955 and 1967.

The increase in fertility between 1955 and 1967 is subject to an important caveat to the extent that it was influenced by the political and military disturbances occurring mainly outside Kinshasa during early 1960. The effect of these disturbances on retrospective fertility is ambiguous since birth rates are usually depressed during the time of hostilities and increase afterwards. Nonetheless, it is by no means obvious that this episode had a neutral effect on retrospective fertility in Kinshasa and reaction to the uprisings may have caused a temporary rise in the general fertility rate in 1967. The latter contention is supported by the fact that there was a marked decline in the child-woman ratio (surviving children 0-4 years of age/women 15-44 years of age) between 1967 and 1970. See Table II. Moreover, the absolute number of surviving children 0-4 years of age fell from 182,400 in 1967 to 163,500 in 1970.

This reduction seems, however, to be in large part attributable to a reduction in the proportion of women married between 1967 and 1970 due in part to a decline in the ratio of men to women of marriageable age. Note that, in Table II, the ratio of surviving children to married women

Table II

Alternative Fertility Measures

Fertility Measure	Year		
	1955	1967	1970
General fertility rate (ratio of children ever born 0-1 years/total women 15-44 years)	.258	.261	
# of children surviving 0-4 / #of women 15-44	.91	1.11	.90
# of children surviving 0-4 / # of married women 15-44	1.07	1.56	1.50

Sources: Romaniuk, A., "The Demography of the Democratic Republic of the Congo," Republique Democratique du Congo, Etude Socio-demographique de Kinshasa 1967: Rapport General,

Houyoux, J., Resultals Partiels de l'Enquete sur les Conditions de vie a Kinshasa

Table III

Percentage of Childless Women by Age Groups

	Age Groups					
Year	15/19	20/24	25/29	30/34		
1955	63.9	22.2	14.1	18.6	35-44 / 21.8	45-54 / 35.7
1967	69.9	16.8	7.7	5.3	35-39 / 7.4	45-49 / 5.7

Sources: Romaniuk, A., "The Demography of the Democratic Republic of the Congo," p. 331.

Republique Democratique du Congo, Etude Socio-demographique de Kinshasa, 1967: Rapport General, p. 164.

falls by a much smaller percentage between 1967 and 1970 than does the ratio of surviving children to total women 15-44 years old. Also, a statistic such as the number of children 0-4 years of age has been found in other countries to be highly sensitive to reporting errors. See Barclay [1, p. 172] and Kuznets [5].[1]

II. Age-Sex-Specific Migration and Marital Status

As already indicated, there have been marked changes in the proportion of women 15-44 years of age married. In Table IV, it is clear that the proportion of women married in the younger age groups has decreased between 1955 and 1970, while that for women over 35 has risen somewhat. The main explanation for this phenomenon seems to be the decline in the ratio of men to women in Kinshasa during this period. Up until independence in 1959, male migrants for the most part exceeded female migrants. Subsequently, particularly in the early 1960's during the uprisings, female exceeded male migrants. This has had a profound effect on the sex distribution of the population that is evident from Figure 1, which shows a substantial reduction in the proportion of men in the population particularly in the 20-35 age groups.[2] This decrease in ratios of men to women has been associated with a decline in the proportion of women in the prime child-bearing age groups married.

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[1] On the whole, the distortion in demographic statistics due to the post independence uprisings are not nearly so great in Kinshasa as they are in Kisingani. An age distribution taken from Houyoux's published study of Kisingani[8] shows a large short fall in the male population 5-10 years of age relative to the female population in the same age group. For this reason, the Kisingani study is not discussed in this paper.

[2] Note that Houyoux feels that his 1970 survey of Kinshasa may have missed some single males (i.e. 1-person households) 20-30 years old,, particularly the unemployed who were never home for surveying. However, this creates only a minor distortion in the 1970 age distribution.

Table IV

% of Women in Population Who are Married by Year and Age

Year	Age Group										
	15/19	20/24	25/34	35/44	45/54	55et +					
1955	63.9	91.5	91.0	81.5	68.5	32.7					
1967	34.6	78.6	85.5	82.0	66.5	31.6					
1970	15/19	20/24	25/29	30/34	35/39	40/44	45/49	50/54	55/59	60/64	65/69
	22	71	81	86	82	83	75	52	56	41	40

Sources: Republique Democratique du Congo, Etude Socio-demographique de Kinshasa 1967: Rapport General, p. 48.

Houyoux, J., Budgets Ménagers, Nutrition et Mode de Vie à Kinshasa, p. 81.

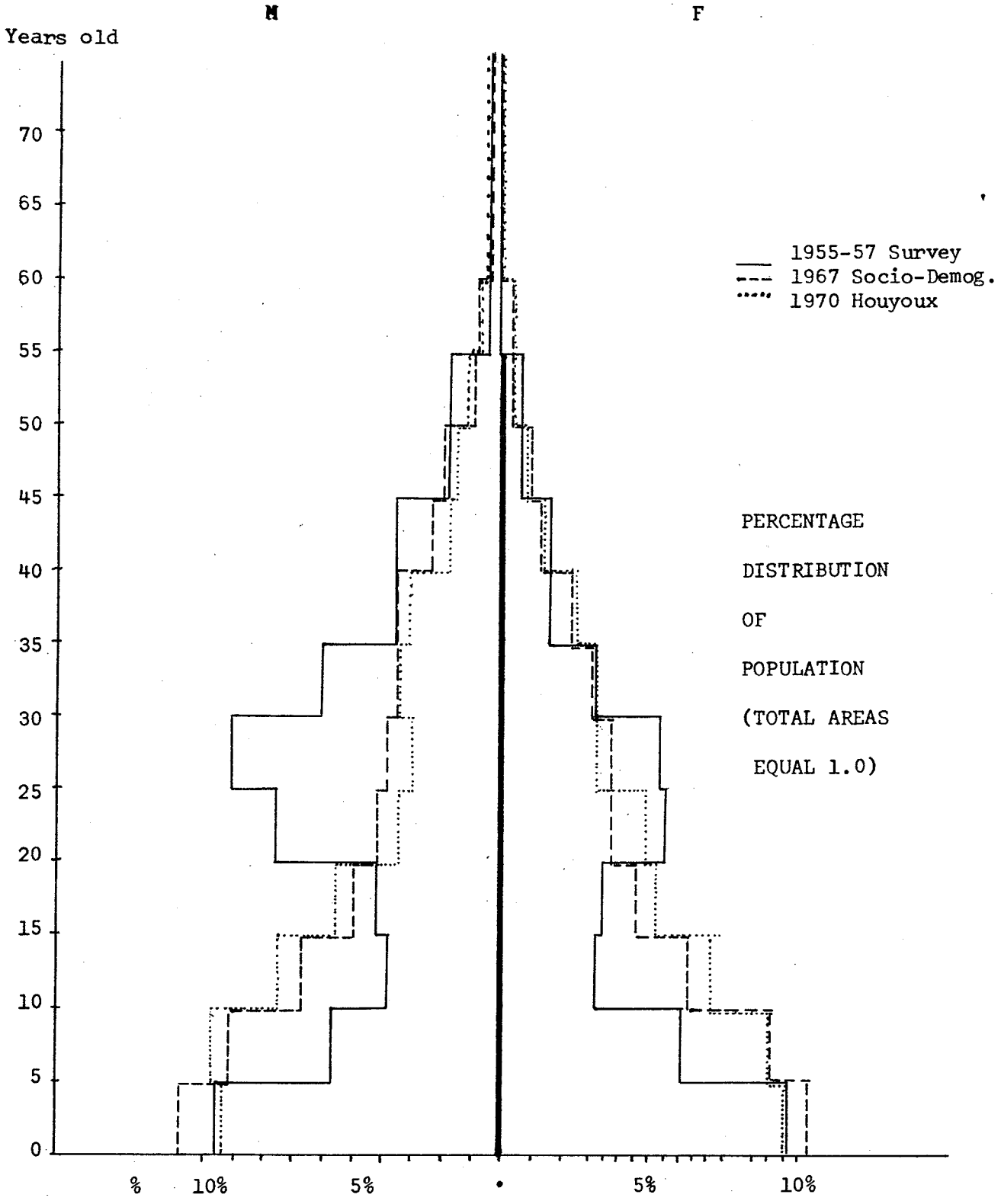
M
F
Years old
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1955-57 Survey
1967 Socio-Demog.
1970 Houyoux
PERCENTAGE
DISTRIBUTION
OF
POPULATION
(TOTAL AREAS
EQUAL 1.0)
%
10%
5%
•
5%
10%

Figure 1

One should also point out that the age pyramid in 1955 is by no means normal. The proportion of persons in the 20-35 age category is considerably larger than the proportion in the 5-20 year age category, for one thing. This is no doubt due to the large inflow of migrants in the 20-35 year age category. Given the high rate of childlessness among women of this age in 1955 shown in Table III, it appears that childlessness may have been a major permissive factor allowing married persons to migrate during the pre-independence period. Also, it should be recognized that the Belgian's restricted the migration of children.

III. Fertility and Migration

Romaniuk has observed, on the basis of the 1955-57 Demographic Survey, that natality in urban areas is substantially above that in rural areas, even after controlling for differences in age and marital status, [12,pp. 174-6]. But he does not analyze differences in age-specific birth rates for migrant and non-migrant groups within urban areas. The impact of migration on aggregate birth rates depends on the extent to which migration is selective. If, for example, persons migrating have essentially the same fertility behavior as established urban residents, there will be no change in the aggregate birth rate as a result of migration.

In Table V, I have presented child-woman ratios and ratios of migrant to total population for each of nineteen communes in Kinshasa; omitted from this sample are Gombe and Ngaliema which contain large numbers of Europeans. Because only gross age intervals were available in the published data, the child woman ratio was defined in this connection as the ratio of surviving

children 0-4 years of age to women 15-39 years rather than 15-49 year of age. Also presented in the table is the ratio of women 20-39 years of age to those 15-39 years of age. Given the age-specific birth rate schedule computed by Romaniuk, [13, Table 6.39] the higher this ratio, the higher we would expect the general fertility rate to be, other things constant. The communes have been ordered from the lowest to the highest on the basis of the percentage of migrants. Here there is some indications of an inverse relationship between the share of migrants in the commune and the child-woman ratio. For one thing, if the sample is broken down into two approximately equal sub-groups, the one with the higher share of migrants has the lower child-woman ratio. The mean child-woman ratio for the first nine communes is 1.252 and for the next eleven, 1.187. In addition, there is no apparent systematic relationship between the ratio of women in the prime child bearing age groups to total women and the ratio of migrants to total population.

A more rigorous test of the relationship between the share of migrants and the child-woman ratio is provided by multiple regression analysis. Regressing the child-woman ratio (c) against the ratio of women 20-39 to women 15-44 (a) and the ratio of migrants to total population (d) yielded:

$$c = .46 - \underset{(2.9)}{.009d} + \underset{(4.0)}{1.649a} \qquad (3.1)$$

$$R^2 = .54 \qquad F = 9.3$$

The numbers in parentheses represent t-ratios.
Note that both the age distribution and the share of migrants variables have the hypothesized sign and are significant at the five percent level.

Table V

Migration & Fertility

Commune	%born outside of Kinshasa (1967)	# of children 0-4 yrs. / # of women 15-39 yrs. (1967)	# of women 20-39 yrs. / # of women 15-39 yrs. (1967)	Mean expenditure per household (1970)
1. Ndjili	43.04	1.203	.654	29.73
2. Tshangu	44.18	1.305	.757	20.25
3. Selembao	47.48	1.323	.801	17.44
4. Matete	50.44	1.283	.757	38.46
5. Makala	51.13	1.292	.789	19.20
6. Bandalungwa	51.15	1.282	.737	46.12
7. Dendale	51.40	1.099	.723	29.06
8. Kisenso	51.41	1.368	.761	25.56
9. Kalamu	51.77	1.110	.699	38.18
10. Ngiri Ngiri	52.86	1.096	.684	26.36
11. Bumbu	53.70	1.296	.798	21.71
12. Kintambo	53.73	1.139	.719	25.16
13. Saint Jean	55.88	1.185	.748	34.78
14. Lemba	56.03	1.336	.752	41.06
15. Barumbu	56.30	1.123	.754	19.90
16. Kinshasa	60.49	1.010	.742	29.56
17. Limete	62.75	1.210	.773	87.00
18. Ngaba	63.11	1.177	.722	22.17
19. Masina	64.22	1.301	.853	17.12
Mean of 19 Communes	53.74	1.218	.749	
Mean of 1st 9 Communes	49.11	1.252	.742	
Mean of last 10 Communes	57.91	1.187	.755	

Source: Etude Socio-Demographique de Kinshasa 1967.

Institut National de la Statistique. Annee 1969.

Houyoux, J., Universite Nationale du Congo, Campus de Kinshasa IRES, Resultats Partiels de l'Enquete sur les Conditions de vie à Kinshasa, September 1971

However, the migrant coefficient may well overstate the difference in marital fertility between the migrant and non-migrant groups for a number of reasons. First, the infant mortality rate may well be higher among migrants than it is among non-migrants. Second, migrants tend to be more often single than non-migrants. We have controlled for the latter effect by including the proportion of women over 15 married (m) in the regression equation. Such a modification yielded:

$$c = .47 + \underset{(1.3)}{.435}a - \underset{(4.1)}{.008}d + \underset{(5.2)}{1.17}m \qquad (3.2)$$

$$R^2 = .84 \qquad F = 25.6$$

The coefficient for the proportion of migrants declines slightly in absolute magnitude, but remains highly significant. The percentage of women married has a significantly positive coefficient at the 5 percent level. With the introduction of this variable into the regression equation, the age-distribution coefficient becomes insignificant.

One has reason for suspecting that the birth rate differential between migrant and non-migrant groups reflected in the above regression equation is less than that existing during the 1955-57 survey. This follows from the fact that there is evidence of an increase in the proportion of women with children migrating. As a percentage of the population migrating to the city between 1958 and 1967, the number of children 5-9 is almost 4 times as high as the number of persons 15-19 in the same population who migrated prior to 1958. The lower sex ratio of the 1958-67 migrants relative to that of the pre 1958 migrants could account for an increase in women of child bearing age of no more than 30 percent. Hence the 5-9 child-woman ratio

appears to have been substantially higher for migrants in the 1958-67 period than it was for pre 1950 migrants. This may account for the very large retrospective fertility increases between 1955 and 1967, particularly when recognized that these were highest in the 20-24 year age group with a high concentration of migrant women.[1]

IV. Occupational Status and Fertility

The preliminary data published by Houyoux, from his 1970 survey, provides information on the age distribution by sex for each of eight occupational-status categories [5]. This information allows us to compute the ratio of surviving children 0-4 years of age to women 15-44 years of age in each of these categories. It also enables us to compute two other important demographic variables, namely, the ratio of women 20-29 years of age to women 15-44 years of age and the percentage of persons over 15 currently married. Finally, from the information published by Houyoux, the average monthly expenditure per consumer equivalent unit for households with heads in each of the eight occupational-status categories may be computed. See Table VI.

The published data do not indicate a systematic relationship between occupational status and child-woman ratios. Since the percentage of independent women married is negligible, child-woman ratios in this category are not comparable to those in the other. Examining, then, child-woman ratios in the remaining seven categories, the lack of a systematic relationship between occupational status and the child-woman ratio becomes evident. For instance, both the category skilled and semi-skilled workers and the

[1] 42% of the women in this age group migrated to Kinshasa between 1953 and 1967. See [10, Annex IX and XIII].

Table VI

Relationship between Occupational Status & Fertility-- Kinshasa (1970)

Group	# of women 20-29 yrs. / # of women 15-44 yrs.	Average month Expenditure per Consumer equivalent unit	# children 0-4 yrs. / # of women 15-44 yrs.	Percentage of persons over 15 currently married
Executives	.45	17.57	1.0	53.9
Independent Women	.70	11.91	.42	.5
Salaried Employees	.47	8.41	1.04	58.8
Self-employed	.34	7.47	.73	49.8
Others	.30	6.57	.38	36.0
Workers (skilled & semi-skilled)	.38	5.89	1.04	65.6
Workers (unskilled)	.37	5.16	.99	63.9
Unemployed	.29	4.09	.86	63.3

Sources: Houyoux, Joseph, Budgets Managers, Nutrition et Mode de Vie à Kinshasa. Presses Universitaires du Zaire, 1973
p. 181 Table 11.2, p. 83 Annex 1.20

Université nationale du Congo, Campus de Kinshasa, IRES, Résultats partiels de l'enquête sur les conditions de vie a Kinshasa, September 1971.

category unskilled workers have substantially lower expenditures per consumer equivalent unit and proportions of women in the child-bearing age groups than do the executives (cadres). Yet the skilled and semi-skilled workers have a slightly higher and the unskilled a slightly lower child-woman ratio than the executives. The salaried employees have a slightly higher child-woman ratio than do the executives but this is explained by a slightly higher proportion of women in the prime child-bearing age group and a higher percentage of persons married. The relatively low child-woman ratios of the category self-employed and the category others are explained by their low percentage of persons married and shares of women of prime child-bearing age, not by per-capita expenditure differences. The relatively low child-woman ratio of the self employed may also be attributable to the fact that this group is not subject to the family allowance program; hence, we might expect both lower marriage rates and lower married fertility for this group.

Additional evidence on the relationship between husband's earnings and the child-woman ratio may be obtained from data for the 19 communes. Houyoux [7, Table 11.13] provides average salary earning for each of 4 occupational status categories. The individual commune data provides data on the percentage of persons employed in each of these 4 occupational status categories. By combining this information, we obtain an estimate of the average monthly professional earnings rate for each of the communes. Adding this variable, which is denoted by y, to the regression equation, we obtained:

$$c = .29 + 53a - .009d + 1.23m + .006y \qquad (4.1)$$
$$\qquad\quad (1.7) \quad (4.9) \quad (6.0) \quad (2.0)$$

$$R^2 = .87 \qquad F = 24.2$$

where a = the ratio of women 20-39 years to women 15-44 years d = the ratio of migrants to total population married, and m = the proportion of women over 15.

The coefficient for professional monthly wage rate is positive and significant at the five percent level using a one-tailed test and significant at the 10 percent level using a two-tailed test.[1] This result indicates that there is a positive association between husband's predicted salary and the infant survival rate and/or the birth rate. Unless there is a considerable positive association between husband's predicted income and infant survival, our results contrast significantly with the inverse relationships between fertility and occupational status and income variables observed by Kuznets [4] and Blau and Duncan [3] for the United States.

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[1] When the predicted professional monthly wage rate is included in the regression, the F ratio falls relative to that in equation (3.2). This indicates that the joint explanation is more significant in equation (3.2) than it is in equation (4.1). On the other hand, the individual coefficients are more significant in equation (4.1).

V. Predicted male earnings rate, Child Quality, and the Willingness to Accept Unemployed Relatives

There are biological explanations for the significantly positive association between the predicted salary rate and the child-woman ratio just cited, aside from the possible positive effect of income on the infant-survival rate. For example, the ability to buy animal milk, which increases with income, may make abstinence during lactation unnecessary. Such a birth control practice is common among many tribes in rural areas.[12,pp. 280-2]. Ruling out these effects and assuming that fertility varies directly with predicted salary, an economic explanation for such an income-fertility relationship is available which is consistent with other data. For one thing, most married women in Kinshasa work in retail trade--an occupation with highly flexible hours controlled directly by the married woman. Consequently, the time which a wife devotes to household activities may be increased as her husband's wage income is increased simply by the woman devoting less time to the market. This may be done in such a way that total family income and wife's time devoted to the household are increased in the same proportion.[1]

Suppose this were not true, and husband's income rises while the wife's income remained fixed. Then the opportunity cost of children, which are presumed to be relatively intense in the wife's time, would increase relative to that of commodities. Thus there would be a substitution effect,

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[1] Denote total household income by Y, return to wife's time in the market by w_f and husband wage income by w_h. Denote total time of wife by T and time devoted to household activities by t_h. Then we may write $Y = w_h + w_f(T-t_h)$

If w_h increases by a proportion λ, then t_h and Y can increase by the same proportion θ, where $\theta = \frac{\lambda w_h + w_f T}{(Y + t_h w_f)}$

which alone would cause the demand for children to decrease; but, with most women engaged in retail activity, the relative opportunity costs of children and goods can remain constant as husband's income rises, through declines in female retail activity. Hence, there remains only the income effect, which implies that desired family size will be an increasing function of the husband's wage rate, provided that children are not inferior goods and quality per child is fixed.

This explanation is perfectly consistent with the Kinshasa data except in one crucial respect: there is evidence of child quality increasing significantly with husband's income. For example, regressing the school attendance rate (SA) against predicted monthly wage rates (Y) and the ratio of persons 5-14 to persons 15-39 yields:

$$SA = -16.4 + \underset{(1.87)}{3.23Y} + \underset{(6.2)}{168.}\frac{N_{5-14}}{N_{15-39}}$$

$$R^2 = .74 \qquad F = 22.2$$

The coefficient for the predicted wage rate variable Y has the hypothesized positive sign and is significant at the 5 percent level using a one-tailed test. This is evidence against the economic explanation for a positive association between the predicted wage rate of the husband and desired fertility given above. Becker [2] among others has argued that the relevant variable in any analysis of household fertility decisions is the number of children adjusted for quality. It is perfectly possible, then, for quality adjusted children to increase even though the number of children has declined simply because quality per child has risen by a greater percentage. If the pure

income elasticity of demand for quality is substantially greater than that for quantity and there is substantial opportunity cost associated with quality increases, a negative association between husband's income and desired children might well appear. This would be true simply because the opportunity cost of children rises as income rises, leading to a substitution effect, which more than offsets the pure income effect.

Female time and to some degree money income may be required to increase quality per child in the kinshasa case for the following reason. There is empirical evidence that older children not attending school and otherwise unemployed may well be taking care of younger children, while their mother earns income from retail activity, particularly if there is more than one child less than school age.[1] In this situation, a rise in school attendance rates, and hence quality per child, would be associated with increases in time spent by the mother with younger children. As a result there would be a reduction in time allocated to commodity services like food processing or a decrease in female activity and hence family income. Such factors cause the opportunity costs of additional younger children to rise with the school attendance rates of older children. Thus the opportunity cost of children relative to commodities will rise with income if, other things constant, school attendance rates rise with income.

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[1]Empirical evidence supporting this relationship may be obtained by regressing the school attendance rate against the 0-4 child woman ratio as well as predicted wage rate, Y, and the ratio of persons 5-14 to persons 15-39. Such a procedure yields:

$$SA = \underset{}{150.5} + \underset{(1.1)}{189.y} - \underset{(2.5)}{220.c} + \underset{(6.6)}{260.}(N_{5-14}/N_{15-39})$$

$$R^2 = .813 \qquad F = 21.8$$

Here there is a significantly negative association between the 0-4 child-woman ratio and school attendance of older children.

This last effect, however, does not seem to be significant in the Kinshasa context. To begin with, there is evidence that female earnings increase in proportion to male earnings across households except in the highest income brackets [7, Table 11.13]. Thus, one might conclude that female retail activity increases even though the number of surviving children rises and the school attendance rates of older children increases. The explanation for this apparent paradox is that the ratio of relatives to immediate family members rises as family income rises. The extent of this relationship is brought out in Table VII and VIII derived from the published data in Houyoux's dissertation. While only 5.2% of the persons in households with monthly expenditures less than 15 Zaires (30 U.S. dollars) shown in Table VII are relatives outside the immediate family, 14.3% are relatives outside the immediate family for households with expenditure levels above 60 Zaires (120 U.S. dollars). Moreover, the unemployment rate of household members other than the head in Table VIII is very high and decreases with total expenditure less than proportionately to the increase in the number of relatives (shown in Table VII). Therefore, since there is very little difference between expenditure and total income, the ratio of unemployed relatives to total household members probably increases with the income of the head. The time of these relatives may well substitute for that of the wife in child-care or housekeeping activities. The increasing use of otherwise unemployed relatives in this crypto-servant role would account for the simultaneous increase in the wife's market activity and the school attendance of her children, as the husband's wage rate rises.

Table VII

Importance of Heads of Households and Their Spouses, Their Children, and Their Children by Economic Level

Economic Level	Total Population	Percentage of the population in each group		
		Head of Household and spouse	Children	Relatives
Less than 15 Zaires	1.331	39.5	55.3	5.2
From 15 to 19.99 Zaires	1.340	35.1	58.4	6.5
From 20 to 24.99 Zaires	1.515	32.2	61.1	6.7
From 25 to 34.99 Zaires	1.626	31.0	60.8	8.2
From 35 to 59.99 Zaires	1.648	28.0	62.6	9.4
More than 60 Zaires	1.171	23.7	62.0	14.3
TOTAL	8.631	31.5	60.2	8.3

Source: J. Houyoux, Budgets Ménagers, Nutrition et Mode de vie à Kinshasa, p. 57.

Table VIII

Occupation of People other than Head of Household by Economic Level

Economic Level	(1) Children under 15 without employment		(2) Students		(3) Housekeepers		(4) Employed		(5) Adults older than 15 without employment		(6) Unemployment rate (5)/(4) + (5)	TOTAL	
	Number	%	Number	%	Number	%	Number	%	Number	%	%	Number	%
Less than 15Z.	392	38.0	334	32.5	237	22.9	17	1.7	51	4.9	79.0	1,033	100
From 15 to 19.99Z	359	33.2	422	39.1	225	20.8	22	2.0	53	4.9	70.7	1,081	100
From 20 to 24.99Z	410	32.7	522	41.6	247	19.7	25	2.0	59	4.0	70.3	1,254	100
From 25 to 34.99Z	450	33.3	575	42.5	242	17.9	27	2.0	59	4.3	68.6	1,353	100
From 35 to 59.99Z	402	28.6	675	47.9	235	16.7	32	2.3	64	4.5	66.6	1,408	100
More than 60Z	288	27.9	515	50.0	159	15.4	24	2.3	45	4.4	65.3	1,031	100
TOTAL	2,301	32.1	3,045	42.5	1,345	18.8	147	2.1	322	4.5	68.7	7,160	100

Source: Houyoux, J., Budgets Ménagers, Nutrition et Mode de vie à Kinshasa, p. 58.

Conclusions

1. Migrant women in 1967 had lower child-woman ratios than non-migrant women even after controlling for age and marital status.

2. The sex ratio has risen substantially between 1955 and 1967 due to changes in migration patterns. This has been associated with a decline in the proportion of women married in the younger age groups.

3. There is evidence of substantial rises in age-specific fertility between 1955 and 1967. This rise is much greater in measures of total children ever born for females of different age (both inside and outside the city) than it is in measures of current fertility such as the general fertility rate. It occurred even though migrant women with possibly lower fertility have increased as proportion of total women between 1955 and 1967 and marriage rates have decreased. This puzzle may be explained by the fact that the ratio of total children ever born to a migrant woman of a given age has risen substantially between 1955 and 1967.

4. The child-woman ratio in different communes is positively correlated with the predicted monthly salary when one controls for female age distribution and marital and migration status. On the other hand, there is no statistically significant relationship between predicted monthly income of the husband and the proportion of women of child bearing age married. This is consistent with a positive effect of husband's wage rate on marital fertility. Evidence that the opportunity cost of children does not increase appreciably relative to that of commodities as income rises also supports the possibility of a positive effect of income on fertility. But such a hypotheses is by no means supported conclusively due to a lack of child mortality data.

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