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THE POPULATION OF ZAMBIA

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* This author is currently employed by the United Nations Economic Commission for Africa, and wishes to state that the views expressed in this monograph are not necessarily those of the United Nations Secretariat.

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PREFACE

A necessary precondition for the objective solution of a scientific problem is the formulation and implementation of structured inquiries into its origins and nature. The first step, taken in the right direction and effectively, will always be an important fulcrum from which future investigations will develop. This monograph is written in the parallel spirit of making a humble start towards charting the demographic evolution of Zambia. Although there have been several technical studies of specific aspects of population and development in the country, few have attempted to bring together the general and yet basic considerations which enter into a coherent appreciation of the demographic developments and processes in Zambia. Such an appreciation has been contingent on the recent progress made towards acquiring more and better census and survey data.

Within the framework of the demographic research programme started at the Institute for Social Research of the University of Zambia, Lusaka, this monograph represents a big leap forward over the first one prepared in 1969. Based on what was then the only complete count of Africans in the country, an introductory analysis of the structure of the population, fertility, urbanization, educational attainment, economic activity and immigration from other African countries was undertaken with a brief preamble on the history of census and survey administration in the country. That was indeed the humble beginning and indeed the forerunner of the present study, which we think has been undertaken on a higher level of scientific analysis and interpretation arising out of the improved data situation. Not only have we improved on the general presentation of the demographic measures, we have also undertaken a critical assessment of the demographic prospects and their implications for the social and economic development of Zambia.

Our expectations in producing the first monograph linger on and we sincerely hope that the experiences gained then and in writing the present one, would form useful foundations for the preparation of another monograph in the future. On a rather general note, we hope that the present analysis and results would contribute to the general appreciation of the relevance of population to social and economic planning and therefore of the need to integrate population variables in all development strategies. If the indication given in the analysis that the rates of population growth and concentration

would accelerate very rapidly and reach very high levels by the end of this century holds, then it might be hoped, as we do, that the Government of Zambia would allow population variables to enter increasingly into its social, economic and physical planning.

Since it seems impossible to list our indebtedness to specific individuals and organizations, we take the liberty to dedicate this monograph to all men of science and the humanities, notably our teachers, whose contributions, in no small measure, fertilized our ideas and thoughts. We see this work as a community enterprise and hence there may be nothing particularly unique in our approach. We only hope that all men can appreciate as we do that the germs of knowledge to which we have no monopoly antedate our individual existence. We therefore appreciate that so many scholars may find reflections of their contributions to knowledge in this presentation.

Addis Ababa
June 1974

Patrick O. Ohadike

CHAPTER I

INTRODUCTION AND BACKGROUND

Zambia lies approximately in the heart of Africa south of the equator with no outlets to the sea. It is bounded approximately on the north by 7° south latitude and on the south by 18°. From east to west, the country is situated between 20° and 35° east longitude. Consequently, its entire area of 752,600 square kilometres is situated within the tropics, surrounded by eight other countries, including Zaire, Tanzania, Malawi, Angola, Mozambique, Rhodesia, Botswana and Namibia as shown in figure 1.1. With each of these countries, Zambia reasonably entertains social, historical and economic ties. Recently however, the link between her and Rhodesia, reminiscent of the common colonial experience shared between the two countries, has suffered serious setbacks following the closure of the border between the two countries by Rhodesia. Effectively Zambia is seeking to establish self-sufficiency and closer economic ties with the neighbouring countries to the north.

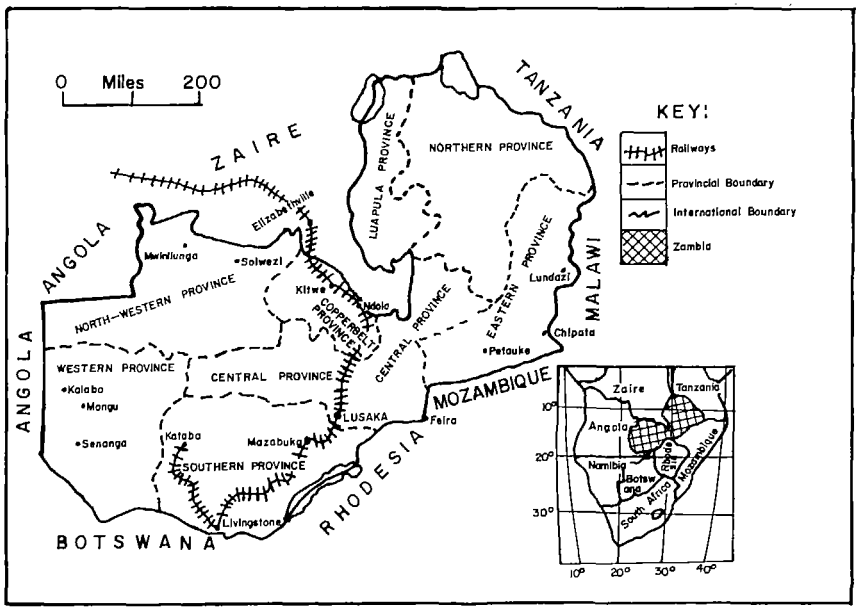

Figure 1.1. – Zambia and Her Neighbours

Zambia is typical of those African countries whose population size and density encourage the generalized inference that Africa faces no immediate population problems of the kind that have and are still plaguing some of the Asiatic countries, especially those of the Indian sub-continent. The country is certainly sparsely populated. In 1963, its total population was 3,490,170, and it increased to 4,056,995 in 1969. The national density of population which stood at 5 persons per square kilometre in 1963 however only rose to slightly under 6 in 1969. The density figures drop significantly to much lower levels in many parts of the rural area. To a significant degree, the main areas of the country under outwardly visible population pressure are the large urban areas mostly located on the Copperbelt and along the railway which together accommodate about one-third of the total population of Zambia. For example, the highest population density of 28.7. persons per square kilometre was observed in 1969 for the Copperbelt Province. Compared with many West African countries, excluding Mali, Mauritania, and Niger with very low densities, lower than Zambia, the man-land ratio in Zambia in 1965 averaged about one-twelfth that of Nigeria (1965) with the highest, and half that of Liberia (1966) with the lowest in the range in West Africa. Actually Zambia's population density in 1965 was slightly less than half of the prevailing level for Africa, about one-third that of East Africa (1965) and about 17 per cent less than the average for Central Africa (1).

But the habitable and cultivable areas of Zambia are not as large and hospitable as the low density ratios suggest. The critical density ratios as shown by the national as well as rural arable density figures are less favourable than indicated by the crude density ratios given above. In the same year 1965, the national arable density (persons per square kilometre of arable land) was 193 while the rural (rural population per square kilometre of arable land) was 160. Generally, the use and quality of land diminishes appreciably because of swamps, seasonal flooding and the risks of tsetse fly infestation over large areas of the territory. It has been estimated that over 100,000 square miles of bush are infested with tsetse fly which transmits the deadly trypanosomiasis to man, cattle and animals in general (2). Furthermore, the prevailing pattern and method of traditional land use in certain parts of the country have led to situations where population pressure on land developed (3).

Despite the generally favourable man-land ratio, Zambia has high potentials for rapid population increase. While mortality has and will continue to respond faster to improvements in sanitation, medical and general economic development, fertility has been resilient and shows no real positive signs of a

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(1) UNECA, *Demographic Handbook for Africa*, June 1971, pp. 17-19.

(2) Richard Hall, *Zambia*, Pall Mall Press, London, 1965, p. 3.

(3) W. Allan, "Studies of African Land Usage in Northern Rhodesia", *Rhodes-Livingstone Papers*, No. 15, 1949.

decline. Within reasonable margins of error, it seems safe to assume that during 1950-70, yearly population growth rate lay between 2.5 and 3.0 per cent. This level which is not significantly less than the average for tropical Africa, is high enough to ensure a rapid replacement of the population over a short period of time. The possibility and impact of this type of growth have been examined in this analysis ; the prospects are bright that, at least, a doubling of the present population (1969) will take place by the year 2000.

Whereas natural increase accounted for the major part of past growth, immigration of Europeans, Asians and mostly Africans from neighbouring countries played some part. There are genuine doubts, however, about the future role of immigration. Justifiably, it is feared that the in-flow will not at least take place on a scale as high as did occur in the past. Increased control of immigration has come into force since independence in 1964 and particularly since Rhodesia's Unilateral Declaration of Independence (UDI). There has been tighter border control as well as stricter laws restricting immigration only to those with the required skill and entry permit for employment over a fixed period of time. The control of international migration was not only aimed at immigrants. It also restricted the emigration of Zambian workers to neighbouring African countries, notably Rhodesia, South Africa and Zaire. In spite of the tighter control, illegal movements across Zambia's long and unpatrolled borders cannot be ruled out in a situation where ethnic and kinship ties cut across international boundaries between Zambia and her neighbours in all directions.

Zambia now and in the past has been at the junction of civilizations from all corners of the continent. Although starved of total access to the sea, Zambia has always been exposed to a series of social and cultural contacts with her many neighbours and also with travellers passing through from far and near on their way to other lands. Her geographical location and configuration, her high and extensive plateau, long winding rivers and their fertile valleys have particularly favoured the historical trans-migration of people especially to and from the south, and from the north-west even as late as the first quarter of the nineteenth century. This exposure to several migratory movements and historical contacts lends continuity and diversity to the social and cultural heritage of the country. In the midst of the resultant heterogeneity, its people, their traditions and ways of life share common attributes and qualities indicative of a cultural synthesis in the historical evolution of a nation composed of groups with different backgrounds.

Although it has a relatively small population in a vast territory, as many as seventy to eighty or more ethnic groups were recognized by the colonial administration (1). Of these, the major ones came in separate waves either

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(1) Richard Hall, *Op. Cit.*, p. 11.
– George Kay, *A Social Geography of Zambia*, University of London Press, 1967, p. 41.

peacefully or as conquerors from the Congo (Zaire) ; these according to Brelsford (1) include the Bemba, Lunda, Kaonde, Lamba, Lala, Bisa, Senga, Aushi, Nsenga, Chewa and Nyanja. Other groups include the Makololo who settled in Barotse territory, and the warlike Ngoni who migrated from the south in the wake of the raids of Chaka the Zulu, crossed the Zambezi and settled in the Eastern part of Zambia. Further underlining the prevailing diversity of people in the country is the fact that no one ethnic group territorially or numerically dominates Zambia (2). This is so in spite of the need felt by the groups, no matter how small, to retain their individuality in spite of the growing cultural and economic levelling-off of differences due to migration, urbanization, social, political and technological change.

Zambia enjoys economic prosperity unequalled in many places in Africa, including a good number of her neighbours. It ranks among the few countries with the highest per capita gross domestic product (GDP) of US $200 or more, and actually in 1969 had a per capita GDP equal to US $286. There is, however, an urgent need for her to diversify the sources of her national revenue. In 1969, copper and manufacturing accounted for a major share of the gross domestic product and agriculture contributed very little, only 8 per cent. This heavy reliance on copper and other minerals as the chief income earner has to be reviewed, bearing in mind the fragility of market conditions and prices and the high possibility of using several substitutes in place of copper. Since the majority of Zambians, 72 per cent, live in the rural area, agriculture has to be stimulated to contribute far more than at present to the growth of the GDP. It is not so much the encouragement of cash crops that is needed ; rather, the production of food crops, some of which Zambia imports and therefore loses foreign exchange, should be encouraged through more efficient extension services and the application of better management, cropping, distribution and storage.

Because of its pronounced contribution to the economy and its relation to allied manufacturing industries, copper mining has been very important in the urbanization process in Zambia. It transformed the Zambian economy from a stationary to a rapidly expanding one and very clearly dominates the industrial structure of the nation (3). Most of the large towns owe their major-employment potentials to this industry and to others drawn to the locality by it. Transport links have been important too. The railway running from the south to the north-west through the Southern, Central and Copperbelt Pro-

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(1) W.V. Brelsford, *The Tribes of Zambia,* Government Printer, Lusaka, 1965 (Second edition), pp. 1-7.

(2) George Kay, *Op. cit.,* table 7, pp. 45-46.

(3) Robert E. Baldwin, *Economic Development and Export Growth : A Study of Northern Rhodesia,* 1920-1960. University of California Press, Berkeley and Los Angeles, 1966, pp. 35-40.

vinces, connects most of the very large towns, no matter whether they are copper mining towns or not. Lusaka, the largest according to the 1969 census, is one city along this communication link that is not a copper mining town. It is, however, industrially very important and its administrative and political stature has grown in recent years and will continue to do so as long as it remains the national capital.

Apart from Lusaka, other cities and towns will also grow. The general indication, at least in the short run, is that urbanization which has been relatively high will increase at an accelerating pace in the future. In 1963, only 20 per cent of the population of Zambia lived in administratively defined urban centres. Six years later, in 1969, the proportion rose to 28 per cent. One of the significant points clearly demonstrated by the analysis of internal migration is the fact that the very large urban areas have been growing faster than all other urban centres. There are, however, only few large urban localities, and therefore a preponderance of small to medium size towns. This is related to the generally low density and also the highly dispersed population of the country.

Zambia, ever since attaining political independence in 1964, has been struggling to eliminate the rather serious labour and educational bottlenecks in its development programmes. These bottlenecks partly reflect the colonial legacy of inadequate training and education for Africans for whom also the only paid employment option was in the unskilled sector with low wages. Technical and highly skilled jobs which commanded disproportionately high wages were then the exclusive preserve of expatriates. "This form of dualism in the years before independence, when very few, if any, Zambians were highly skilled, was an all pervasive aspect of social organization with the result that up to relatively recent times, Africans in industrial employment were not given the scope to acquire skills through training. Even when they were given the opportunity of training, they got little scope for exercising the skills they had learnt and they were often not adequately compensated" (1). In general, the development of African education in the period was very rudimentary mainly as a result of colonial apathy (2).

The consistent efforts by the present Government to contain the bottlenecks have further brought them into sharper focus. Like most developing countries in Africa, development programmes are vigorously being pursued in Zambia. Consequently, her present rate of industrial expansion necessitates a high demand for qualified personnel to fill the many technical and professional posts occupied by expatriates, whose services are relatively expensive and not permanent since they are contractual and of short duration.

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(1) P.O. Ohadike, "Bottlenecks in the African Labour Situation in Zambia", *Journal of Administration Overseas,* Volume XI, No. 4, October 1972, p. 261.

(2) P.O. Ohadike, *Ibid.*, pp. 261-262.

The alternative to this heavy dependence on expatriate skills is national self-reliance which is one of the cornerstones of Zambia's development goals under the banner of its philosophy of humanism. The Government has expressed its awareness of the existence and dimensions of the problems, and attempts to come to grips with them through the implementation of education and training programmes. Universal free primary education is provided and secondary school facilities have expanded very significantly. Primary enrolment almost doubled between 1964 and 1968, while secondary enrolment in 1968 was three times that of 1964 (1). Training in professional, executive and administrative skills is now available at the University of Zambia, while the promotion and co-ordination of technical skills and trade in government and private sectors are being tackled by the Commission for Technical Education and Vocational Training. A measure of the remarkable achievement of the Government is the steady progress of Zambianization of responsible jobs in the civil service and in the private sector. This progress would not have been made if education and training had stagnated.

But the provision of more jobs and education is not easy, not even for the most endowed countries of the region. There are economic, social and demographic problems in the general utilization of scarce and limited developmental resources on which there are several competing claims and demands. The magnitude of the demands and the increase over time have been out of step with the magnitude and increase in the supply of amenities generally. Scarce resources and their improper utilization apart, another important factor in this disequilibrium is the already discussed growth and distribution of the Zambian population.

In the matter of effective economic development, it is the rapid rate of increase which, in the long run, is of greater concern than the current absolute population size and density. Currently and even in future, the prevailing high and constant fertility in the face of declining mortality is producing a large proportion of children and a small proportion, in consequence, of adults in the economically most productive age groups. The dependency burden imposed on the working age population by the high level of fertility in 1963, for instance, shows clearly that potentially 86 persons – of whom 83 are children, the rest being old persons aged 65 years or more – will depend on every 100 persons 15-64 years of age for support. Only 53.8 per cent of the population in 1963 were, in fact, in the working age group. This rate together with the high dependency burden, typical of developing economies, is surely less favourable than would be obtained in a less rapidly expanding population. Projections of Zambia's population under conditions of low and high fertility clearly demonstrate the long-run effect of reducing fertility. Not only will

(1) Republic of Zambia, *Zambian Manpower*, Development Division of the Office of the Vice-President, Lusaka, 1969, pp. 30-31.

there be a significant fall in the level of childhood dependency and consequently total dependency, but a noticeable improvement in the supply of educational, health, employment and other facilities for the population (1).

The marked cleavage between rural and urban population distribution has also been consequential for Zambia's development. The phenomenal growth of population in the urban areas has not been so much the question of high rural population densities encouraging migration to towns as is the case in Asia and Latin America. The exploitation of marginal lands and/or the fragmentation of land have not appeared seriously on the Zambian agricultural scene. However, agricultural density could increase in the years ahead in view of the rapid rate of population growth, the problems of acquiring increasing share of capital investment, and the limited capacity of urban areas to absorb new rural migrants.

Actually, the problems of the pronounced and continuing drift of rural dwellers to urban areas is associated with the problem of correcting the social inequities in the provision of services between town and country. The trend and pattern set in motion in the colonial era continues to impoverish the rural areas with insufficiently monetized, mixed and attractive economy. Agriculture, the main preoccupation, remains essentially on a subsistence level for nearly three-quarters of the country's population, and marketing facilities are limited by transport difficulties and the lack of adequate management and practices. In addition, there is no guarantee of continuous employment throughout the year for many rural dwellers. They are hedged in by the insufficiently diversified activities and the seasonality of farm work carried out often with insufficient capital and under risks of natural hazards.

In addition, the rural workers have enjoyed far fewer benefits from services provided by the government than urban workers. Thus confronted with so many economic and social disadvantages, the rural dwellers converge on the towns in order to take advantage of its greater supply of, indeed, better services and amenities. Unfortunately, the rural areas are left poorer, mainly because they are denuded of their valuable young and virile labour force, most of which, on the other hand, finds its way into the complex trappings of urban life, unemployed, unsheltered, and exposed to the socio-psychological tensions of city life. For many migrants, especially the unskilled primary school leavers, migration to towns represents an exchange of one form of deprivation for another.

The Government of Zambia expresses great concern about the internal imbalance of the economy as between the urban and rural areas. It has

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(1) P.O. Ohadike, *Op. Cit.*, pp. 266-268.

M.D. Veitch, "Population Growth and Health Services". In S.H. Ominde and C.N. Ejiogu (eds.) *Population Growth and Economic Development in Africa,* Heinemann, London, 1972, pp. 304-312.

therefore developed and pursued programmes aimed at making agriculture more profitable through encouraging multiple cropping, animal husbandry, poultry and vegetable growing, and through providing more and better extension services including advice and assistance to farmers. Valuable economic stimulus is being given to the rural areas through the establishment of small-scale industries. In order to improve the monetization of the rural sector, transport facilities and roads are being developed to enable farmers to market their surplus produce cheaply and with minimum difficulties. Furthermore, retail trading opportunities in the rural and other designated areas have been reserved exclusively for indigenous Africans. Because of the lack of dense rural settlements in the country, the Government has a programme of regrouping villages to encourage the optimum use and supply of services and amenities. In order to strengthen the viability of these villages, it has been variously suggested that the establishment of full-scale agricultural programmes coupled with a number of small service industries designed to cater for the needs of the villagers should precede the creation of other small-scale industries envisaged under the scheme.

So far, this review has focused rather briefly on aspects of the evolution of the emergent state of Zambia in the post World War II era. A few of the changes experienced since then are fundamentally basic and essential to the understanding of the welfare and development of the Zambian society. For the moment, they are critical for the better understanding of the complex relationship between demographic processes and economic and social change in that country. The attainment of political independence in 1964 has no doubt generated an upsurge of economic and welfare activities for the improvement of living conditions on a scale never known before.

The success of the welfare and economic programmes have been buttressed and enhanced not only by internally generated resources but also by the availability of technical assistance, knowledge and practical experience shared by Zambia as a member of the World Community. The tempo and velocity of change have been faster than would have been the case in the absence of reliance on existing inventions, knowledge, science and technology. In this respect, public health programmes for the control of infectious and contagious diseases and the improvement of sanitation and environmental hygiene have benefited a great deal. Coupled with the effect of rising standards of nutrition, the health programmes will invariably lead to a faster than anticipated reduction of the death rate. This, considering the lack of democratized and popular family planning programmes, holds great potentials for accelerated population increase in the country. As well as health programmes and as part of the drive for a more efficient economy and welfare state, the spread of education has been vigorously pursued. Like all other African countries, Zambia earmarks substantial resources for education at all levels and in all fields of human endeavour.

These then are the main features of the contemporary and future evolution of Zambia. The review, which has generally been sketchy, provides the background to the analyses and interpretations made in each of the essays in this monograph. The scope of the presentation has been necessarily influenced by the inadequacy and scarcity of census and survey data. No system of vital registration for Africans existed and so far, only two scientific censuses of the African population have been held. The first, which concentrated efforts on getting a population count rather than collecting data on population characteristics, was held in 1963. The second and the first comprehensive census of population and housing took place six years later after independence in August 1969. It marked an improvement on the previous one by counting as well as collecting information on the demographic, social and economic characteristics of the population. For this reason, much of the analysis in the essays has relied more heavily on the results of this census. In the essay on fertility levels, patterns and differentials and less so in others, extensive use has been made of the survey data collected by P.O. Ohadike during his teaching and research work at the University of Zambia, Lusaka (1).

Apart from this introductory chapter which is the first, six other essays are presented in the monograph. The second chapter presents the evaluation and adjustment of the age and sex data from the 1969 census. After taking account of the origin, pattern and correlates of errors in recording ages in censuses and surveys, estimates of the plausible age structure of the population were then made and used to derive vital rates through the application of stable population techniques and other methods developed notably by Brass and his associates. In the third chapter, a study of fertility levels, patterns and differentials, drawing on all available sources, is presented. The chapter in particular re-examines aspects of some hypotheses suggested by previous studies of fertility in the country.

Internal population movements were studied in the next essay in chapter 4. The relationship between the degree and pattern of concentration, the direction and level of migration and economic and social factors were studied in detail. Analysis was also made of the correlates of regional variations in migratory flows. The fifth essay (Chapter 5) is a comprehensive analysis of the immigration of all races and their contribution to the social and economic development of Zambia. The analysis covering all races was made because it is relevant to the understanding of the labour situation in the country, the economics of the dependence on expatriate skills and labour, and the consequent intensive drive by the Government to train and educate indigenous persons as soon as possible.

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(1) Other papers have been published from the results of this survey. It is necessary to reiterate the gratitude due to the Population Council, New York and the University of Zambia, Lusaka, for financial and material support for the survey.

Economic activity and attrition of the labour force are the subject of the analysis in the sixth chapter. Conventional life table techniques were used to derive losses from the labour force due to deaths, retirement and other causes. Finally, the seventh and last chapter, through the projection of the population from 1969 to 1999 by the component method, stresses the implications of demographic growth processes for social and economic development. For this, low, medium and high variant projections were made, indicating the variations in the size of the various functional segments of the population over the projection period.

CHAPTER II

ESTIMATION OF VITAL RATES FROM CENSUS AGE AND SEX DATA OF ZAMBIA

A. Introduction. Evaluation of age-sex data when followed by necessary adjustments is useful for obtaining plausible estimates of population characteristics and measures, including fertility and mortality and a reasonably accurate age-sex base data for carrying out population projections. The rationale for evaluating and adjusting the age-sex data of Zambia stem from the following considerations :

a) That one can hardly expect the responses to questions in the census questionnaire to be correct in a society such as Zambia where there is low level of literacy, lack of census experience and of record keeping.

b) That among the demographic variables investigated in African censuses and surveys, age is often very poorly reported. This is because the majority of the population do not know their age. They have never kept a record of it or cannot remember it during the enumeration or the ages are given by persons other than those concerned.

c) Since the majority of the population are ignorant about their age, the age-sex data are subject to errors in age reporting arising from estimation errors, digital preference and other types of age misstatements.

B. Evaluation of Age-Sex Data : Census Accuracy Tests

1) Single year Age-Sex Data

Inspection of single year age-sex data shows concentration of population reported at ages ending in digits 9, 0 and 5. Digit 7 was also preferred by males. Furthermore, digit preference was not limited to 0 and 5 and hence it is expedient to use Myers' Blended Index, (1) to measure the relative preference of the population for all terminal digits, 0,1,. . .,9.

(1) R.J. Myers, "Errors and Bias in the Reporting of Age in Census Data", Actuarial Society of America, *Transactions*, vol. XLI, 1940, pp. 411-415.

TABLE 2.1 MYERS' BLENDED INDEX BY SEX FOR ZAMBIA 1969

Terminal Digit (X)	Percentage Distribution of Population Reporting Ages with Terminal Digit (X)	
	Males	Females
0	11.4	13.2
1	9.8	10.5
2	8.9	9.2
3	8.4	9.1
4	8.5	8.7
5	11.5	8.6
6	7.7	8.1
7	11.7	10.3
8	9.3	8.4
9	12.8	13.9
Index	14.8	15.8

From Table 2.1, it can be seen that Myers' index for Zambia shows preferences for digits 9 and 0 by both sexes, even though differences in digit preference by sex exists. Males preferred digit 9 most of all followed by preferences for 7, 5 and 0 ; they disliked 6, 3, 4 and 2. Females preferred 9 and 0, but disliked 6, 8, 5 and 4.

As already indicated, digital preference in Zambia was not restricted to 0 and 5 as in many societies. Digit 9 which is the most rejected in many societies is a preferred digit in Zambia. But the preference for digit 9 in Zambia may be misleading and hence the need for further investigations. Following the suggestion of Ajit Das Gupta in his work on assessing age bias (2) the ratio of numbers returned at each end digit to total numbers in the successive decennial age ranges 10-19, 20-29,. . ., 60-69 (see Table 2.2) was computed. The calculated ratios still show that 9 was a preferred digit although preference for it was exceeded by that for 0.

It is possible that the apparent preference for digit 9 stemmed from the questions asked on age. In Zambia, enumerators were instructed to collect information, if possible, on date of birth, or alternatively, age in completed years. It has therefore been suggested that the apparent preference for digit 9 appears likely to be, in fact, a preference for years (not ages) of births ending in 0, (2) rather than a reflection of socio-cultural factors or bias of historical calendars.

(1) Ajit Das Gupta, *A Technical Note on Age Grouping. The National Sample Survey,* Number 12, Eka Press, Calcutta, 1958, pp. 21-23.

(2) Personal communication from Mr. F.M. Walusiku, Director of Census and Statistics, September 4, 1973.

TABLE 2.2 RATIO OF NUMBERS RETURNED AT EACH END-DIGIT TO TOTAL NUMBERS IN THE SUCCESSIVE DECENNIAL AGE RANGES, ZAMBIA 1969 CENSUS OF POPULATION AND HOUSING

Terminal Digits (1)	Age Distribution					
	10 – 19 (2)	20 – 29 (3)	30 – 39 (4)	40 – 49 (5)	50 – 59 (6)	60 – 69 (7)
			(a) Males			
0	13.8	11.7	12.5	14.3	15.1	18.6
1	12.0	10.8	9.5	11.4	14.0	9.7
2	12.2	11.2	9.2	9.7	5.8	6.9
3	10.4	8.8	9.6	7.4	8.0	7.2
4	9.5	9.2	8.9	7.7	5.4	8.2
5	10.6	8.8	9.2	11.2	20.6	10.2
6	8.5	8.0	7.1	5.4	6.1	5.1
7	8.6	12.1	12.8	9.7	7.8	10.8
8	6.7	8.1	9.1	9.4	6.0	12.3
9	7.7	11.3	12.1	13.9	11.2	11.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
			(b) Females			
0	13.4	12.8	15.3	17.0	18.6	23.1
1	11.7	11.6	10.9	11.5	15.1	10.0
2	11.1	10.9	9.4	9.2	7.4	6.6
3	9.7	9.4	10.2	7.9	9.0	7.6
4	8.6	9.5	8.7	7.3	6.7	7.0
5	9.8	9.7	10.1	11.5	13.8	10.9
6	8.5	7.7	6.8	5.6	6.0	5.0
7	9.2	10.2	9.0	7.4	7.2	9.2
8	7.8	7.0	6.8	7.8	5.2	9.6
9	10.2	11.2	12.8	14.8	11.0	11.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

The table of Myers' index reveals that differences in digital preference between the sexes was not pronounced. Myers' index was 14.8 for males and 15.8 for females, and hence the difference in age reporting errors between the sexes was marginal. If we compare Myers' index of Zambia with indexes obtained from other "statistically underdeveloped countries", it will be seen that the age-sex data of Zambia seem to be relatively good (see Table 2.3).

2) Five Year Age-Sex Data

In the preceding section, the evaluation of the accuracy of age-sex data by single years revealed a relatively less pronounced digital preference. We can adjust digital preference in single year age-sex data by forming five year age groups. But after this grouping, further evaluation of the data is essential

TABLE 2.3. MYERS' INDEX FOR SELECTED COUNTRIES

Country (Year)	Sex	Index	Country (Year)	Sex	Index
Zambia (1969)	M	14.8	Morocco (1960)	M	66.3
	F	15.8		F	86.7
Ghana (1970) Urban	M	17.3	A.R.E. (1960)	M	48.1
	F	23.4		F	64.1
Ghana (1970) Rural	M	35.6	Syria (1957)	M	18.3
	F	28.1		F	47.2
Botswana (1971)	M	9.2	Iraq (1957)	M	43.0
	F	10.6		F	59.8
Mainland Urban	M	36.0	Kuwait (1965)	M	50.3
	F	37.8		F	66.4
Tanzania (1969) Rural	M	30.1	Philippines (1960)		20.1
	F	38.8	U.S.A. (1960)		1.6
Liberia (1962)	M	34.8			
	F	42.2			

Source : Habtemariam Tesfaghiorghis, *A Comparative Evaluation of Age-Sex Data and Population Projection for Botswana and Zambia,* Unpublished M.A. thesis held at the University of Ghana, Legon, Accra, 1973, p. 19.

TABLE 2.4. REPORTED POPULATION ('000). AGE RATIOS AND SEX RATIOS : 1969 CENSUS OF ZAMBIA

Age – Group	Reported Population ([a])		Age Ratio		Sex Ratio
	Males	Females	Males	Females	
0 – 4	374	387	–	–	96
5 – 9	318	322	104	105	98
10 – 14	236	221	96	87	106
15 – 19	173	184	94	89	94
20 – 24	132	189	89	109	69
25 – 29	123	160	100	96	76
30 – 34	114	141	95	101	80
35 – 39	115	118	115	104	97
40 – 44	86	85	86	87	101
45 – 49	84	76	115	109	110
50 – 54	59	54	80	93	109
55 – 59	63	40	143	101	157
60 – 64	29	25	63	81	116
65 – 69	28	21	151	127	133
70 – 74	10	8	–	–	–

(*a*) Figures for persons of unknown ages were pro-rated.

because, for most practical purposes, five-year age-sex groups are used in the analysis and study of population.

Three analytical methods are used here to evaluate five-year age data, namely : age ratio test, sex ratio test and the United Nations age-sex accuracy index.

The United Nations age-sex accuracy index is defined as the mean of absolute deviations of age ratios from 100 for males, plus the mean of absolute deviations of age ratios from 100 for females, plus three times the mean of absolute successive sex ratio differences. The age range considered is 0 to 70 years. The age ratio index is the mean of the absolute age ratio deviations from 100, while the sex ratio index is given by the mean of the absolute successive sex ratio differences. Age ratio is defined as the ratio of the population in a given age group to one-half of the population in adjacent age groups times 100. Sex ratio is the number of males per 100 females. The results of applying the above methods are shown in Table 2.4.

Normally, if age reporting was accurate, then age ratios should deviate very little from 100. The calculated age ratios exhibit some peculiarities. The ratios for males show surpluses at age groups 5-9, 35-39, 45-49, 55-59 and 65-69. While there appears to have been accurate reporting at ages 25-29, a general deficit was recorded in the young ages 10-34, as well as in the age groups 40-44, 50-54 and 60-64. The female population had surpluses at ages 5-9, 20-24, 30-34, 35-39, 45-49, 55-59, 65-69 and deficits in the remaining age groups. The Zambian age data indicate the presence of substantial error. These errors arising from age misstatement, digital preference and omissions, may have caused distortions in the data. If we examine age ratios for Zambia (see Table 2.4), surplus population was reported with some minor exceptions in five year age groups ending in digits 5 and 9. In our earlier discussion of digital preference, we have seen the existence of apparent preference for digit 9 and also a lesser preference for 5 by males. Thus it seems that digital preference has contributed to some of the distortions in the data. The deficit of male population reported in the young adult ages as revealed by the age ratio analysis may be due to the out-migration of the long term male migrants. If so, then part of the distortion may be genuine. The fact that the age ratio index (see Table 2.5) shows better age reporting for females than for males may be due to the fact that age distortions caused by migration may be more for males than for females.

TABLE 2.5 AGE RATIO INDEX, SEX RATIO INDEX, AND U.N. AGE – SEX ACCURACY INDEX FOR ZAMBIA : 1969 CENSUS

Age Ratio Index		Sex Ratio Index	U.N. Age – Sex Accuracy Index
Males	Females		
17.3	9.5	15	71.8

The sex ratio pattern for Zambia can be summarized as follows :

1) Excess of females in age groups 0-4, 5-9.

2) Excess of males in age group 10-14.

3) Excess of females in age group 15-39.

4) Excess of males at age 40 and above.

The excess of females in the age group 0-9 may be due to (a) under-enumeration of male children aged 0-9 (b) transfer of male children aged 5-9 to 10-14 (c) transfer of female children who have not yet reached puberty from age group 10-14 to 5-9.

The under-reporting of females aged 10-14 is a common phenomenon in the census and demographic sample survey results of African countries. This may be due to the over-statement of the ages of females aged 10-14, some of whom were transferred to the next higher age bracket, 15-19 years.

The excess of females in the age group 15-39 is also a common feature in Africa and the reasons may be one or a combination of the following :

a) Over-statement of female ages in the range 15-39.

b) Over-statement of females aged 10-14 as they reach puberty.

c) The tendency for women over 40 years of age to under-state their age because they wish to remain young.

d) Omission or under-statement of male ages in the reproductive age group.

e) Out-migration of young adult males.

The excess of males over 40 years might be partly due to a tendency of males to over-state their age and females to under-state their age.

Generally, the following conclusions can be drawn from studying the age sex data of Zambia :

a) The sex ratio pattern for Zambia conforms to the "typical African sex ratio model". The only deviation from this African pattern is in the age group 5-9 where for Africa the ratio exceeds 100, while for Zambia it is below 100 (1).

b) Age ratio index indicates that female age reporting was less affected by age misstatement than male.

c) United Nations age-sex accuracy index for Zambia was 71.8. According to the United Nations, the quality of data is accurate, inaccurate and

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(1) E. Van de Walle, "Characteristics of African Demographic Data". In W. Brass *et al., The Demography of Tropical Africa,* Princeton University Press, Princeton, New Jersey, 1968, p. 38.

highly inaccurate depending on whether the index is less than 20, 20-40 or 40 and above (1).

Following this criterion, the age-sex data for Zambia is highly inaccurate. In most countries which lack a comprehensive statistical system, the index is either inaccurate or highly inaccurate. This can be seen from Table 2.6. However, it should be noted that the United Nations method has been criticized on many grounds. "Among these are the failure to take account of the expected decline in the sex ratio with increasing age and of real irregularities in age distribution due to migration, war and epidemic as well as normal fluctuations in births and deaths, the use of definition of age ratio which omits the central age group and which, therefore, has an upward bias ; and the considerable weight given to the sex ratio component in the formula. In addition the index is primarily a measure of net age misreporting and for the most part does not measure net under-enumeration by age" (2).

TABLE 2.6. UNITED NATIONS AGE – SEX ACCURACY INDEX FOR SELECTED COUNTRIES

Country (year)		Index	Country (year)	Index
Zambia (1969)		71.8	Tunisia (1966)	30.9
Botswana (1971)		33.1	Libya (1964)	43.9
Ghana (1970)	Urban	43.0	UAR (1960)	55.5
	Rural	52.3	Syria (1960)	58.2
Mainland	Urban	83.6	Jordan (1961)	48.2
Tanzania (1969)	Rural	72.0	Iraq (1957)	48.6
Sierra Leone (1963)		72.5	Kuwait (1965)	58.3
Liberia (1962)		58.9		
Morocco (1960)		157.0		
Algeria (1966)		38.2		

Source : Habtemariam Tesfaghiorghis, *Op. cit.*, p. 27.

3) Enumeration of Children under Five Years

With regard to the evaluation of the accuracy of the count of children under 5, the sex ratio test showed that males were relatively more under-enumerated than females (see Table 2.4). Here, it should be noted that it is possible in other circumstances for both males and females under 5 to be under-enumerated. This has been generally observed in the census returns of many countries.

(1) United Nations, *Population Bulletin,* No. 2, New York, October 1952, pp. 59-79.

(2) N.S. Shryock and J.S. Siegel, *The Methods and Materials of Demography,* Vol. I., Washington D.C., 1971, p. 222.

For checking the accuracy of the enumeration of such children, two methods will be applied. The first method involves the reverse survival ratio method. Under assumption of constant fertility, we can test the hypothesis that if the enumeration of children aged 0-4 and 5-9 were accurate, the ratio of the birth rate based on children aged 5-9 to children aged 0-4 would be close to one. In case it differs much, we can reject the accuracy of enumeration. A ratio greater than one may show that children aged 0-4 were under-enumerated if we assume that the enumeration of children aged 5-9 were correct.

The selection of the stable population model and the model life table required for the reverse projection of children aged 0-4, 5-9 and total population will be discussed in Section 4 of this chapter. Meanwhile, the results obtained by applying the reverse survival ratio method are shown in Table 2.7. The results show that children aged 0-4 in the 1969 census of Zambia may have been under-enumerated by 6 per cent. Males may have been under-enumerated by 9 per cent and females by 4 per cent. It should be noted that the under-enumeration of children aged 0-4 may have been due to the slight over-reporting of children aged 5-9 as revealed by the age ratio test (see Table 2.4).

TABLE 2.7. ESTIMATED BIRTH RATES AND CORRECTION FACTORS BASED ON REVERSE – SURVIVAL RATIO METHOD, ZAMBIA, 1969

Sex (1)	Birth Rate based on population aged 5 – 9 (2)	Birth Rate based on population aged 0 – 4 (3)	Correction factor 4 = 2 ÷ 3
Both sexes	53	50	1.06
Males	56	51	1.09
Female	51	49	1.04

In addition to the test by the reverse-survival method, a further investigation of the accuracy of the enumeration of children aged 0, 1, 2, 3 and 4 has been made. The method used consists of comparing observed and expected percentage distributions of population at ages 0, 1, 2, 3 and 4. This method developed for calculating the expected (theoretical) percentage distribution of single year age groups from the population aged 0-4 is as follows :

a) Assume an initial population of a given sex at time $t = 0$ to be 100,000.

b) Using the rate of growth for each sex separately, calculate male and female populations at time $t = 1, 2, 3$ and 4. Here use was made of r obtained from the selected stable model population.

c) Using birth rates of each sex separately, calculate total annual births

at $t = 0, 1, 2, 3$ and 4. The birth rate of the selected stable population model was used.

d) Using the l_x values of the selected model life table or life table constructed for the population, calculate $L_0, \ldots, L_4$ for each sex separately.

e) Calculate survival rates from birth to ages 0-1, 1-2, 2-3, 3-4, 4-5.

$$i.e.\ P_0 = \frac{L_0}{l_0}\ ;\ P_1 = \frac{L_1}{l_0}\ ; \ldots ;\ P_4 = \frac{L_4}{l_0}$$

f) Compute expected birth survivors by multiplying (c) by (e).

$$i.e.\ \hat{B}_i = B_i P_i\ ;\ i = 0, 1, \ldots, 4.$$

where B_i = births in time i.

$\hat{B}_i$ = expected birth survivors in time i.

g) Let $\hat{B} = \sum_{i=0}^{4} \hat{B}_i$

Then express $\hat{B}_i$ as a per cent of $\hat{B}$.

The results of this procedure are given in Table 2.8.

TABLE 2.8. OBSERVED AND EXPECTED PERCENTAGE DISTRIBUTION OF POPULATION AGED 0 – 4, ZAMBIA, 1969

Sex and Age	Observed	Expected
Males 0 – 4	100.0	100.0
0	22.7	23.0
1	20.6	20.8
2	19.5	19.6
3	18.8	18.7
4	18.4	17.9
Females 0 – 4	100.0	100.0
0	21.7	22.9
1	20.6	20.9
2	19.9	19.7
3	19.2	18.7
4	18.6	17.8

From Table 2.8, it can be seen that the comparison of the observed and expected values for male children does not show any significant under-enumeration or over-enumeration. For female children, there appears to have been some under-enumeration at age 0. Generally, considering the results of this procedure and the reserve survival ratio method, the enumeration of children aged 0-4 seems to be reasonably accurate.

4) Evaluation of the Accuracy of Age-Sex Data by Comparison with Population Models

A detailed analysis of the accuracy of age-sex data by five-year age groups can be made by comparing the reported age distribution with corresponding values of an appropriate stable population model. In doing so, we can assume stability of fertility and mortality although there may be slight deviations from conditions of stability due to recent declines in mortality.

Age ratio index for Zambia shows better female age reporting than male. As noted in the preceding section, it is likely that the female age data were less distorted by migration.

Thus in attempting to find an appropriate stable population model, the female age distribution was used. In this exercise, the cumulative percentage age distribution $C_5, C_{10}, \ldots, C_{45}$ of the reported female population was compared with the set of stable age distributions of the four families of the Coale-Demeny stable population models at different levels of mortality (in terms of $^{o}e_0$) and fertility (in terms of GRR). The selection of the stable population is based on the closeness of the observed and stable age distributions. The closeness is determined by :

a) Calculating the cumulative percentage age differences of the stable and reported population at $C_5, C_{10}, \ldots, C_{45}$.

b) Summing the absolute differences.

c) Selecting the stable population that gives the minimum sum of absolute differences.

TABLE 2.9 SUM OF ABSOLUTE DIFFERENCES BETWEEN OGIVES OF STABLE AND REPORTED POPULATION FOR FEMALES, ZAMBIA, 1969

Mortality Level	Stable Family	GRR ($\bar{m}$ = 29)						
		3.2	3.25	3.3	3.4	3.5	3.6	3.7
11	West		8.38	7.78	8.54			
	North			8.66	7.49	9.13		
	East				8.38	7.59	8.90	
	South					7.98	7.90	9.59
12	West	11.95	7.86	7.90	9.61			
	North		8.67	7.67	8.11			
	East			9.11	8.74	8.93		
	South				9.22	8.03	9.13	
13	West	9.95	8.13	9.21				
	North	8.56	7.93	8.08				
	East		8.08	8.03	8.50			
	South			10.35	8.13	8.58		

Although the stable population model selected by this method can be reasonably acceptable, the selection is not unique. It should be noted here that use was only made of the age distribution in selecting the stable population model without other population characteristics such as the rate of growth.

From Table 2.9 it can be seen that the model that gives the minimum sum of absolute differences is the North stable population model with mortality level 11 and GRR = 3.4. There are populations in the table which also give minimum absolute differences. These are : East stable model with mortality level 11 and GRR = 3.5 ; West stable model with mortality level 11 and GRR = 3.3 and mortality level 12 and GRR = 3.25, North stable model with mortality level 12 and GRR = 3.3. The small variations in the sum of absolute differences between these stable populations could have been due to chance variation and hence, the choice of the stable model population that gives the minimum sum of absolute differences in this instance may not be fully justified. As a consequence of this, we have compared vital rates obtained from these stable populations with those obtained by solving the stable age distribution formula. In the application of stable age distribution formula to estimate vital rates (r,b,d), the observed population proportions by five-year age groups were used. Since the proportions in the five-year age groups were affected more by age misstatements than the cumulative age distributions, the five-year proportions of the adjusted age distribution were used. The details of the solution of the stable age distribution formula for the estimation of vital rates will be discussed later in the section dealing with the derivation of vital rates. The vital rates obtained using the two different approaches are shown in Table 2.10.

From the Table, it can be observed that the agreement between the two sets of vital rates estimated by the two procedures is very close. This close agreement makes the selection of a unique stable population model difficult. Some arbitrary choice had to be made and so, based on the close agreement of estimated birth rates, the North stable population model, level 12, was taken to give the best fit.

A comparison of the reported with the stable age distribution is presented in tabular and graphic forms. First, comparisons by five year age groups were made by taking the ratio of five year age groups in the census $C_x(x, x+4)$ to the stable age distribution $C_s(x, x+4)$. If the reported age distribution corresponded exactly to the stable, the ratio should equal 1.0 and any deviations from 1.0 reflect under-statement or over-statement in a particular age group.

Comparisons between ogives of census and stable age distributions are presented in Table 2.12 and Figure 2.2.

TABLE 2.10. VITAL RATES FOR FEMALES, ZAMBIA, 1969

Mortality level	Stable Family	*b*	*d*	*r*
11	West Stable population	47	19	28
	Solution of stable age distribution equation	49	20	29
11	North Stable population	48	20	28
	Solution of stable age distribution equation	50	20	30
11	East Stable population	50	20	30
	Solution of stable age distribution equation	52	21	31
12	West Stable population	46	17	29
	Solution of stable age distribution equation	48	18	30
12	North Stable population	47	18	29
	Solution of stable age distribution equation	47	17	30

Following from Table 2.11, the following observations on the deviations between the census and stable age distributions are apparent :

a) Children aged 0-4 seem to be fairly well reported.

b) Children aged 5-9 were over-enumerated. This was also confirmed by age ratio analysis (see Table 2.4).

c) Males were under-reported in the young adult ages 10-34, and over-reported in the age range 35-39. The age ratio analysis also revealed under-reporting of males in the age range 10-34 (except for ages 25-29).

d) Females were under-reported in the age group 10-19 ; they were also under-reported in the ages 40 and above (except for the age group 45-49). The age ratio analysis also showed that females aged 10-19 and 25-29 were under-reported.

e) Females were over-reported in the age group 20-39. This was also confirmed by the age ratio analysis except for the age group 25-29 which was under-reported.

f) For both males and females, the population reported as aged 70 and above was less than the corresponding stable population.

If we examine Table 2.12 and Figure 2.2, the comparison shows a systematic uni-directional age misreporting over a wide age range. For

TABLE 2.11. RATIOS OF CENSUS TO STABLE AGE DISTRIBUTIONS, ZAMBIA, 1969

Age Group	Males	Females
0 – 4	0.98	1.02
5 – 9	1.07	1.06
10 – 14	0.95	0.87
15 – 19	0.83	0.86
20 – 24	0.76	1.06
25 – 29	0.85	1.06
30 – 34	0.97	1.13
35 – 39	1.17	1.14
40 – 44	1.06	0.97
45 – 49	1.29	1.08
50 – 54	1.16	0.92
55 – 59	1.60	0.86
60 – 64	0.94	0.70
65 – 69	1.34	0.83
70 +	0.92	0.57

TABLE 2.12. DIFFERENCES BETWEEN OGIVES OF CENSUS AND STABLE POPULATIONS, ZAMBIA, 1969

Age Group	Males	Females
5	–0.3	+0.4
10	+0.9	+1.4
15	+0.3	–0.2
20	–1.5	–1.6
25	–3.6	–1.1
30	–4.6	–0.6
35	–4.8	+0.2
40	–4.0	+0.9
45	–3.7	+0.8
50	–2.7	+1.1
55	–2.3	+0.9
60	–1.1	+0.6
65	–1.2	+0.1
70	–0.8	–0.1

Zambian males, there is a negative deviation relative to the stable ogive for all ages except at ages 10-15. The difference between the ogives of the observed and stable male population is "manifested in a U-shaped sequence of large differences" (1). The large negative deviation of the observed ogive relative to stable ogive does not seem to be only caused by age misreporting but also possibly by out-migration and omission.

(1) United Nations, *Methods of Estimating Basic Demographic Measures from Incomplete Data,* Manual IV, New York, 1967, p. 19.

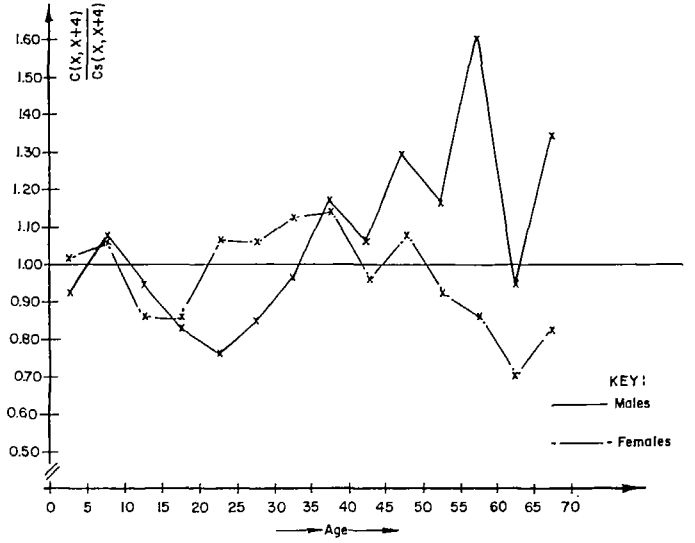

Figure 2.1. – Ratio of $C(x, x + x)$ in the 1969 Census of Zambia to $C_s(x, x + x)$ in a stable population model.

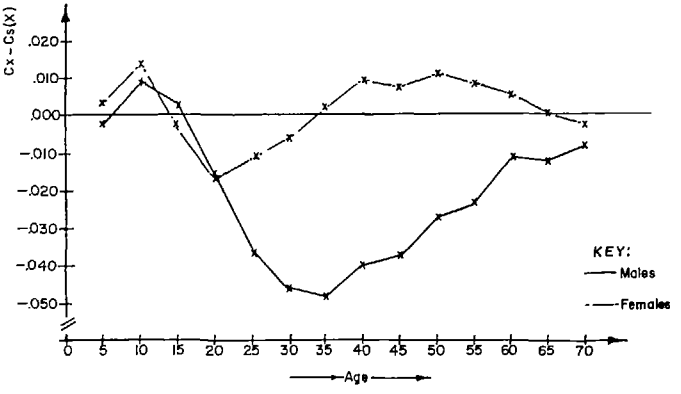

Figure 2.2. – Comparison of Reported and Stable Cumulative Age Distributions, Zambia, 1969.

The observed difference for Zambian females is positive relative to the stable ogive up to age 10, negative from age 15-30, positive from age 35 to 65 and negative at age 70 and above. The pattern of age misreporting errors for Zambian females conforms to the "African South Asian pattern (1). Generally, figures 2.1 and 2.2 show that female age reporting was less erratic than the male.

(1) United Nations, *Ibid.*, pp. 17-21.

C. Adjustment of Age-Sex Data. It has already been shown that the age-sex data for Zambia are defective. Consequently, the data should be adjusted in order to improve the quality. It should be stressed that adjustment of defective data is a very difficult task and that the improvement of the quality of the adjusted data depends very much on the usefulness of the adjustment technique employed

In this analysis various techniques have been used for adjusting different age segments. These are as follows :

a) Ages 10-74

Adjustment for ages 10-74 was based on the U.N. five point formula :

$$V_x = \frac{1}{16}(-U_{x-10} + 4U_{x-5} + 10U_x + 4U_{x+5} - U_{x+10})$$

Where :

V_x = adjusted population in the five year age group x to $x + 4$.

U_x = reported population in the same five year age group.

U_{x-10} = and U_{x-5} are reported populations in the two preceding five year age groups and U_{x+5} and U_{x+10} are reported populations in the two subsequent five year age groups.

b) Ages 0-4 and 5-9

The application of the reverse survival ratio method shows that children under 5 were slightly under-enumerated. The reported male and female children aged 0-4 were therefore multiplied by the correction factor 1.09 and 1.04 respectively.

c) The number of children 5-9 was adjusted by applying the following formula :

$P_{5\text{-}9} = 1/2(P_5 + P_{10}) + P_6 + P_7 + P_8 + P_9$, where $P_5, \ldots, P_{10}$ are reported populations at ages 5, . . . ,10.

d) Ages 75 and above

Since the proportion of both male and female population reported as aged 75 and above is negligible, it is accepted without any adjustment.

The adjusted population is given in Table 2.13. It has been noted in the previous sections that females exceeded males in the age range 15-39, after which more males were recorded. This irregularity still remains even after adjustment and it is felt that this is genuine. It is, most likely, the result of migration, although the contribution of age misstatment and omissions to the distortion cannot be ruled out.

TABLE 2.13. REPORTED AND ADJUSTED POPULATION (IN THOUSANDS) BY AGE AND SEX, ZAMBIA, 1969

Age Group	Reported ([a])		Adjusted	
	Males	Females	Males	Females
0 – 4	374	387	412	408
5 – 9	318	322	315	315
10 – 14	236	221	239	229
15 – 19	173	184	173	188
20 – 24	132	189	135	181
25 – 29	123	160	121	163
30 – 34	114	141	117	140
35 – 39	115	118	108	115
40 – 44	86	85	92	89
45 – 49	84	76	77	72
50 – 54	59	54	66	55
55 – 59	63	40	54	38
60 – 64	29	25	36	27
65 – 69	28	21	22	18
70 – 74	10	8	11	9
75 +	12	11	19	11
Total	1,956	2,042	1,991	2,058

(a) Includes pro-rated figures for persons whose ages were not stated or known.

D. Derivation of Vital Rates. In Africa, the absence of conventional vital registration data for the estimation of fertility and mortality leads one to rely on indirect methods. The indirect methods for the estimation of vital rates adopted in this paper are :

a) The reverse survival ratio method.

b) Brass' method of estimating child mortality using l_2 and proportion of population under 15.

c) Brass' $\frac{P}{F}$ Ratio Method of estimating Fertility.

d) Adjusted age distribution and stable population analysis.

e) Solution of the Stable Age Distribution Equation.

In the order given above, details of the method and the resulting estimates are as follows :

a) The reverse-survival ratio method and its application have already been discussed. The estimated birthrate obtained by this procedure was 50 per 1000.

b) Child mortality can be estimated from the report of the number of children ever born and children surviving tabulated by age of women in the reproductive ages. Using Sullivan's modification of Brass' method of estimating child mortality (1), the probability of dying before reaching age two (q_2) is given by the linear equation :

$$\frac{q_2}{D_2} = 1.30 - 0.54 \frac{P_2}{P_3}$$

Where :

D_2 = proportion of children dead to women aged 20-24,

P_2, P_3 are the average parities of women aged 20-24 and 25-29 respectively.

The solution of the above equation gives $q_2 = 155$ per 1000 and $l_2 = 845$. The value of $l_2 = 845$ corresponds to the North Model Life Table, mortality level 12 ($e_0^0 = 47.5$ for females). This mortality level for females corresponds to that derived from the age structure for females shown in Table 2.10.

The suggestion by Coale and Page that use should be made of the female age data for estimating fertility when male age data is found to be strongly distorted by migration has been followed. The birth rate was estimated as equal to that in a North stable population model with the same adjusted female proportion (.482) under 15 in conjunction with the estimated l_2. The birth rate and total fertility rate estimated by this procedure were respectively 48 per 1000 and 6.9. For this purpose, the mean age of fertility schedule ($\bar{m}$) used was 29.0 and was derived from the estimated age structure of fertility which will be discussed at the end of this section.

c) The data required for applying Brass' $\frac{P}{F}$ Ratio Method of estimating fertility are number of children ever born and number of births in the preceding year before the census or survey, tabulated by age of mothers (2). These data were collected in the 1969 census of Zambia. The $\frac{P}{F}$ ratios are calculated and presented in Table 2.14.

By applying the $\frac{P_2}{F_2}$ ratio in adjusting the level of reported current fertility, a total fertility rate of 10.2 was obtained. The estimated birth rate was 75 per 1000. The mean age of fertility schedule was 30. These estimates

(1) A.J. Coale, and H.G. Page, "Fertility and Child Mortality South of the Sahara". In S.H. Ominde and C.N. Ejiogu (eds.), *Population Growth and Economic Development in Africa*, Heinemann, London, New York, 1972, pp. 51-55.

(2) W. Brass, *et al., Op. cit.*, pp. 88-96.

TABLE 2.14. AGE-SPECIFIC FERTILITY RATES BASED ON BIRTHS IN THE PRECEDING YEAR PRIOR TO THE CENSUS, AND P/F RATIOS FOR ZAMBIA, 1969

Exact Limits of Age Interval	f_i^*	$\frac{P}{F}$
15 – 20	.0724	2.793
20 – 25	.2244	2.054
25 – 30	.2266	1.627
30 – 35	.1989	1.478
35 – 40	.1472	1.309
40 – 45	.0869	1.144
45 – 50	.0403	1.031
Total Fertility	4.9855 $m = 30$	

(*) For age intervals half a year younger than shown.

seem implausible and unrealistic. Ideally, the $\frac{P}{F}$ ratios should be equal to 1.0. Contrary to this, the $\frac{P}{F}$ ratios for Zambia show a sharp decline from a very high level. The high ratios, specifically for women aged 15-30, indicate the existence of a serious reference-period error, resulting in a gross under-reporting of current births. Coale and van de Walle (1) when preparing estimates of fertility for Kenya (1962) had observed steeply declining $\frac{P}{F}$ ratios and concluded that women were using too short a reference period (less than a year) in reporting births. Therefore, they used an adjustment based on $1/2\,(\frac{P_3}{F_3} + \frac{P_4}{F_4})$ which produced a consistent estimate of total fertility with that obtained from 1_2 and proportion of population under 15. Following this procedure for Zambia but using $1/2\,(\frac{P_4}{F_4} + \frac{P_5}{F_5})$, the adjustment produced a total fertility of 6.9, which is consistent with that derived from 1_2 and proportion of female population under 15. The birth rate, based on adjusted total fertility of 6.9, was 50 per 1000.

Furthermore, the estimate mean age of fertility schedule ($\bar{m}$) of 30 seems to be high in view of the fact that childbearing starts early in Africa. A plausible explanation for the high $\bar{m}$ is probably the over-reporting of ages of women in the reproductive ages.

d) Fertility estimates were obtained by comparing the adjusted age distribution with the age-distribution of an appropriate stable population

model. The appropriate stable model life table was the North Model life Table, level 12.

TABLE 2.15. PROPORTION UNDER GIVEN AGE (x) AND BIRTH RATES OF A CORRESPONDING STABLE POPULATION FOR FEMALES IN ZAMBIA, 1969

Age x	Proportion up to Age x (C_x)	Birth Rate (b)
5	18.5	47.78
10	33.2	46.87
15	45.6	47.07
20	56.0	47.12
25	64.7	47.07
30	72.0	47.07
35	78.1	47.02
40	83.1	47.12
45	87.3	47.22

The birth rate based on proportions to age 5, 10, . . . , 45 tends to give consistent estimates except for C_5 which tended to over-estimate and C_{10} which tended to under-estimate it. Using the median value, the birth rate would be 47.07 for females. The GRR and TFR associated with the birth rate of 47.07 are 3.3 and 6.7 respectively, (with sex ratio at birth equal to 103 and $\bar{m} = 29$).

TABLE 2.16. STABLE POPULATION ESTIMATES OF VITAL RATES FOR ZAMBIA, BASED ON FEMALE AGE DISTRIBUTION AND $^{\circ}e_{o}$ of 47.5 FOR FEMALES.

Parameters	Males	Females	Total Population
Birth rate	49.93	47.07	48.47
Death rate	20.00	17.77	18.86
Growth rate	29.93	29.30	29.61
GRR ($\bar{m} = 29$)	–	3.32	–
Total Fertility Rate	–	6.70	–

e) The solution of the stable age distribution formula also yields consistent estimates. If the observed population is stable, then there exists the following relationship :

$$C(x, x + 4) = be^{-r(x+2.5)} \frac{{}_5L_x}{5l_o} \qquad (1)$$

(1) Coale and van de Walle. In Brass *et al.*, *Ibid.*, pp. 173-174.

Where

$C(x, x+4)$ = proportion aged x to $x + 4$ in the population aged $0 - 4, \ldots, 60 - 64$

b = intrinsic birth rate

r = intrinsic rate of growth

$\frac{{}_5L_x}{5l_o}$ = proportion surviving from birth to the age group x to $x + 4$

For the moment, assume l_o to be unity.

Now, by dividing both sides of the equation by $\frac{{}_5L_x}{5l_o}$ and then taking ln (natural logarithm) we have :

$$ln \frac{c(x, x+4)}{\frac{{}_5L_x}{5l_o}} = lnb - r(x + 2.5) \tag{2}$$

Using transformation $Z = \frac{x + 2.5 - 32.5}{5}$ (2a)

$$\text{let } y = ln \frac{c(x, x+4)}{\frac{{}_5L_x}{5l_o}}$$

then $y = lnb - r(5Z + 32.5)$ (3)

or if $B = -5r$

and $L = lnb + 6.5B$

the above equation reduces to

$$y = L + BZ \tag{4}$$

By using the appropriate stable population model for females to calculate $\frac{{}_5L_x}{5l_o}$, and assuming $C(x, x+4)$ as obtained from the adjustedfemale population data, we can calculate the values $y = f(Z)$ as given in (2a). The selected stable model life table was again the North Model, level 12. The points (Z, y) are not situated on this straight line. By means of the least squares method, we can however, estimate L and B and then estimate b, r and also d.

The results of this procedure are as follows : (1)

	Birth rate	Death rate	Growth rate
Both sexes	48	18	30

(1) Equations (1) and (4) were also used by Ariaga to construct Life Tables for Peru.

f) At this juncture we can now summarize the results of the various estimates of vital rates as shown in Tables 2.17 and 2.18.

TABLE 2.17. ESTIMATES OF VITAL RATES FOR ZAMBIA BASED ON DIFFERENT ESTIMATION METHODS FOR 1969

	Method ([a]) (a)	Method ([a]) (b)	Method ([a]) (c)	Method ([a]) (d)	Method ([a]) (e)
Birth rate	50	48	50	48	48
Death rate	–	19	–	19	18
Natural rate of growth	–	29	–	30	30
Mortality level	–	12	–	12	–
e_o^o : Females	–	47.5	–	47.5	–
e_o^o : Males	–	44.3	–	44.3	–

(*a*) Methods as already given in the text.

TABLE 2.18. ESTIMATES OF TOTAL FERTILITY AND BIRTH RATE FOR ZAMBIA, 1969

Vital Rates	Adjustments based on Brass' P/F Ratio			Method ([a]) (b)	Method ([a]) (d)	Blacker	Ohadike and Okorafor
	$\frac{P_2}{F_2}$	$\frac{P_3}{F_3}$	$\frac{1}{2}\left(\frac{P_4}{F_4}+\frac{P_5}{F_5}\right)$				
Total fertility	10.2	8.0	6.9	6.9	6.7	7.0 ([b])	7.4 ([b])
Birth rate	75.0	58.0	50.0	48.0	48.0	–	54.0

(*a*) Methods as already given in the text.

(*b*) A.E. Okorafor, and P.O. Ohadike, "The Estimation of Vital Rates from Census Data in Zambia", C.O.D.E.S.R.I.A. *Workshop on Population Research in Africa*, Lome, 30 July – 3 August, 1973.

The estimated birth rate based on different procedures (excluding extreme values) ranges from 48 to 54 per 1000, and the death rate ranges from 18 to 19 per 1000. Accepting the median value, the estimated birth rate and death rate would be 49 and 19 per 1000 respectively. The median value for the rate of natural increase would be 30 per 1000.

Again, excluding the extreme values of 10.2 and 8, total fertility rate ranges from 6.7 to 7.4, giving a median value of 6.9.

The final estimates of vital rates can therefore be summarized as follows :

birth rate	49	per 1000
death rate	19	
natural rate of growth	30	
GRR ($\bar{m}$ = 29)	3.4	
Total fertility rate	6.9	
$^{o}e_{o}$ Males	44.3	
Females	47.5	

E. Estimation of Age-Structure of Fertility. As a follow-up of the estimation of the level of fertility as measured by the birth rate, gross reproduction rate and the total fertility rate, the determination of the age structure of fertility will be attempted. The age structure of fertility is essential for studying changes in fertility. It is also useful for the derivation of other demographic parameters. Since Zambian data for the determination of the age structure of fertility are defective, we have adopted the age structure of fertility models constructed by Gaisie for Ghana (1). The adoption of the Ghana age structure of fertility is based on the following grounds :

a) Ghana and Zambia are high fertility countries with comparable fertility levels. In 1968, the estimated birth rate for Ghana ranged between 49 and 50 per 1000 (2). In 1969, the estimated birth rate for Zambia was 49 per 1000. For the same period, the estimated total fertility was 6.9 for Ghana and 6.9 for Zambia.

TABLE 2.19. MODEL AGE STRUCTURE OF FERTILITY AND AGE-SPECIFIC FERTILITY RATES, ZAMBIA, 1969

Age Group	Model II (^{a})	ASFR
15 – 19	10.5	.1449
20 – 24	22.1	.3050
25 – 29	22.2	.3064
30 – 34	20.2	.2788
35 – 39	16.0	.2208
40 – 44	7.9	.1090
45 – 49	1.1	.0152
Total	100.0	1.3801
	TFR = 5 (1.3801) = 6.9 $\bar{m}$ = 29	

Source : (*a*) S.K. Gaisie, *Ibid.*, p. 159, Table V.8.

(1) S.K. Gaisie, *Determinants of Population Growth in Ghana*, Unpublished Ph.D. thesis held at the Australian National University, Canberra, 1973, p. 154.

(2) S.K. Gaisie, *Ibid.*, p. 125.

b) The populations of both countries have reasonably similar age structures characterized by a high proportion of children ; the population under 15 constituted 46 per cent in Ghana and 47 per cent in Zambia.

After comparing the model age structure of fertility for Ghana with the distribution of the reported age-specific fertility rates for Zambia, Model II (based on the 1968 Demographic Sample Survey of Ghana) was selected (1). The model age structure of fertility and the age-specific fertility rates obtained by multiplying total fertility and the percentage of the model age structure of fertility for Zambia are given in Table 2.19.

(1) The derivation of the model age structure of fertility by fitting a standard curve of ever married women by age to the recorded number of ever married women is discussed by Gaisie in his Ph. D. thesis, *Determinants of Population Growth in Ghana*, pp. 154-164, held at the Australian National University, Canberra.

CHAPTER III

FERTILITY PATTERNS, LEVELS AND DIFFERENTIALS IN ZAMBIA

A. Introduction. From the estimates of vital rates presented in Chapter 2, it can be seen that Zambia, like most African countries, lacks adequate information on the level, pattern, and correlates of fertility change. Available statistics have been meagre, defective and unreliable, and no clear-cut picture of the fertility conditions in the country has been made. On a national level, detailed fertility questions were first collected in the 1969 Census of Population and Housing. No questions on the subject featured in the only other national census of Africans taken in 1963.

In the absence of sufficient and reliable information, indirect methods of estimating vital rates have been widely employed to obtain estimates of the level of fertility beginning with the demographic sample survey of Africans in 1950. Essentially, the majority of the estimates have been made from the age-sex structure of the population. Because of the nature and quality of the age data, as has been demonstrated, the estimates have also mostly employed various demographic techniques of analysis geared specifically to estimates from limited and incomplete data (1). Some of the estimates by various authors will be presented here. The acceptability of the estimates, it should be noted, derives from their plausibility in terms of their correspondence with prevailing socio-economic and demographic conditions in Zambia and in terms of the relative correspondence of the various levels of estimates from independent sources.

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(1) United Nations, *Methods of Estimating Demographic Measures from Incomplete Data,* ST/SOA/Series A/42, Sales No.: 67.XIII.2, New York, 1967.

A.J. Coale, "Estimates of various Demographic Measures through the Quasi-stable Age Distribution", Milbank Memorial Fund, *Emerging Techniques in Population Research,* New York, 1962.

W. Brass, "Uses of Census or Survey Data for the Estimation of Vital Rates", ECA, *African Seminar on Vital Statistics,* Addis Ababa, December 1964.

W. Brass, "The Graduation of Fertility Distribution by Polynomial Functions", *Population Studies,* Vol. XIV, N° 2, 1960.

W. Brass *et al., The Demography of Tropical Africa,* Princeton University Press, Princeton, 1968.

B. Fertility Level. The level of fertility in Zambia has generally been estimated to be relatively very high. During 1931/34, estimates of the annual birth rate fluctuated between 50 and 60 births per 1000 population (1). Until the 1950 demographic sample survey estimate of 57 births per 1000, no other estimate seems to have been made. The level of the 1963 census estimate, which compares favourably well with levels for other African countries, can only pass as among the highest in the continent. Official estimates, based on a detailed analysis of the population aged 0 to 15 years, show a crude birth rate of 51, a crude death rate of 19 and a crude rate of natural increase of 32 per 1000 population.

Considering the nature and limitations of the 1963 census data, it seems obvious that a single estimate of the level of fertility may not reflect the actual conditions adequately. In this connection, a range of estimates seems to offer a better guide, taking into account the uncertainties about the actual rate of population growth. For example, a comparative analysis of the result of the 1950 demographic sample survey and of the 1963 census indicates that the rate of increase has risen progressively from 2.5 per cent in 1950 to 3.2 per cent annually in 1963. Unless over-enumeration took place on a really massive scale, the likely explanation for this rise in the rate of natural increase lies probably in the fact that the 1950 survey underestimated the actual population then.

To take account of these uncertainties, a series of estimates assuming various levels of mortality and annual rates of increase were prepared in 1969 for the period 1953-63 (2). The estimating procedure assumed that the enumeration of children aged less than 10 years was correct ; it then estimated the rates for 1953-63 by the reverse survival method for both sexes of children using the adjusted age distribution.

The derived estimates from this approach suggest that the average crude birth rate for Zambia in the ten years under consideration was probably between 43 and 52 births per 1000. The corresponding death rate was probably between 16 and 20 deaths per 1000 (3). Using a different procedure, the Development Division of the Office of the Vice-President obtained for purposes of projecting the population of Zambia, a fertility rate of 233.5 births per 1000 women of childbearing age for the period 1963-68. The corresponding crude birth rate for the same period was 50.1 per 1000 (1). This figure corresponds with the upper limit of the estimates cited above.

(1) R.R. Kuczynski, *Demographic Survey of the British Colonial Empire,* Vol. II, Oxford University Press, London, 1949, p. 493.

(2) P.O. Ohadike, *Some Demographic Measurements for Africans in Zambia : An Appraisal of the 1963 Census Administration and Results,* Communication No. 5, Institute for Social Research, University of Zambia, 1969, pp. 7-9.

(3) P.O. Ohadike, *Idem.*

(4) Republic of Zambia, *Zambian Manpower,* Government Printer, Lusaka, 1969, pp. 96-97.

TABLE 3.1. ESTIMATES OF VITAL RATES FOR ZAMBIA 1969 DRAWN FROM INDEPENDENT SOURCES

Method of Estimation	Birth Rate	Death Rate	Total Fertility	GRR
(A) Estimates by Okorafor and Ohadike ([a])				
Brass' Technique (P/F Ratio)	54	–	7.4	–
Stable Population (C (x) and r)	51	24	7.5	3.7
Stable Population 1_2 and c (15)	50	23	7.1	–
(B) Estimates by Habtemariam Tesfaghioghis ([b])				
Reverse survival ratio method	49	–	6.9	–
Brass' Technique (P/F Ratio)	50	–	6.9	–
Child Mortality (1_2) and c (15)	48	19	6.9	–
Stable Population and Reported Age	48	19	6.7	3.3
Application of Stable Age distribution Equation	48	18	–	–
(C) Other Sources				
Estimates by Page and Coale (1963 ([c])	50	–	6.8	–
Estimates by Blacker ([d])	–	–	7.0	3.2
Official CSO Estimates ([e])	48	20	7.1	3.4

Sources :

(*a*) A.E. Okorafor and P.O. Ohadike, "The Estimation of Vital Rates from Census Data in Zambia", CODESRIA, *Workshop on Population Research in Africa,* Lome, 30 July – 3 August 1973.

(*b*) See Chapter 2.

(*c*) H.J. Page and A.J. Coale, "Fertility and Child Mortality South of the Sahara", in S.H. Ominde and C.N. Ejiogu, *Population Growth and Economic Development in Africa,* Heinemann, London, 1972, p. 60.

(*d*) Personal communication from J.C. Blacker, 1973

(*e*) Republic of Zambia, *Census of Population and Housing,* Final Report, Volume III – Demographic Analysis, C.S.O. Lusaka, 1974, p. 42.

In fact, recent indications, exclusively from several estimates based on the 1969 national census, give birth rate estimates which gravitate around 50 births per 1000. The levels and the various methods of estimation used by different authors are shown in Table 3.1. As can be seen, the range of all the estimates of crude birth rates was 48 to 54. The corresponding range of total fertility rates was 6.7 to 7.5 while gross reproduction rate was from 3.2 to 3.7. Considering that the level of the various estimates demonstrates encouraging degree of agreement, despite the fact that they were separately and independently derived, the above figures probably reflect the actual level of

fertility in the country. Thus, on average, one might conclude that the crude birth rate in Zambia has been very close to 50 births per 1000 population, total fertility rate has been just about 7 while gross reproduction rate averaged about 3.5. These rates are all significantly high. They are quite as high as the estimated average for Africa in the seventies, and certainly put the women of Zambia among the most fertile in the continent.

A review of fertility levels in different African countries, mostly in the sixties, clearly emphasizes the significantly high level of total fertility which, on average, is well above six in the continent. The average level, as high as that in Zambia, approaches seven in places like Mali (6.8), Ivory Coast (6.7), Dahomey (6.7), Niger (6.8), Ghana (6.7), Kenya (6.8) ; it is either seven or more in countries such as Togo (7.2), Rwanda (7.0) and Southern Rhodesia (7.1) (1). In general, the level of fertility in Zambia accords more with that of the East and West African region than with that of the Central African area, where relatively low levels of fertility prevail in places such as Gabon and Eastern Cameroon with estimated total fertility rate below 5.0.

The social, economic and demographic implications of the high fertility rates, in the face of rapidly declining mortality, are, more often than not, considered rather lightly in planning development. This aspect of the issue will be discussed in detail when considering the implications of projected rates of population growth for Zambia's development in Chapter 7.

C. Fertility Pattern. The attainment of a high or low level of fertility is inextricably bound up with the prevailing pattern of fertility. The determinants of achieved levels and patterns are not mere manifestations of physiological maturity but encompass a complex network of learned and acquired social and psychological behaviour patterns deeply rooted in the culture and social life of the people. These determinants ultimately regulate not only the onset of fertility but also its tempo, regularity, change and ultimate level.

Among others, the age and marriage patterns of fertility offer great insight into the determination of the generally high level of fertility in Africa. Basically, maternal age and marriage duration both positively related, also correlate positively with fertility. As will be shown later, irregularities in and disruption of the duration of marriage, *ceteris paribus,* tend to generate corresponding irregularities and disruptions in the expected level and pattern of fertility. Where legitimate fertility is concerned, socially recognized marital unions not only legitimize the onset of childbearing but also its regularity

(1) United Nations Economic Commission for Africa, *Demographic Handbook for Africa,* June 1971, Table 15, pp. 72-73.

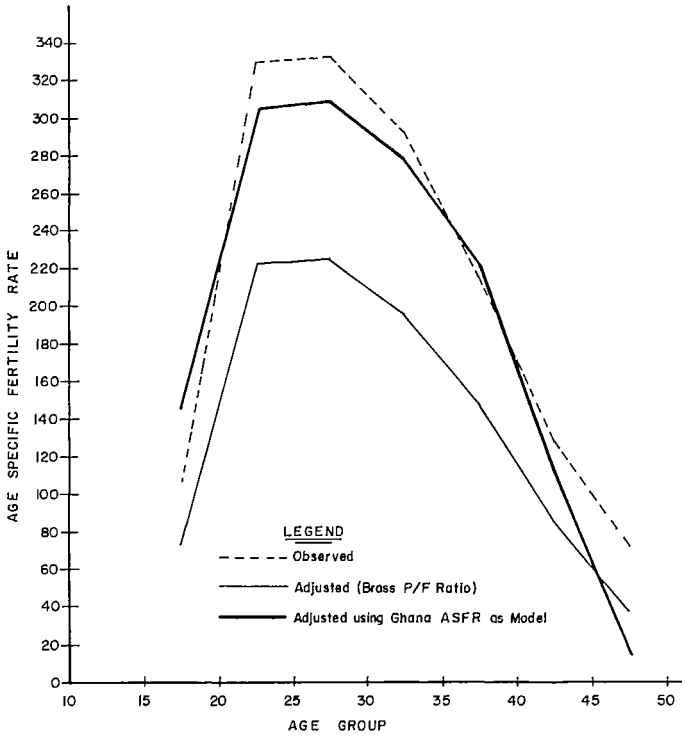

Figure 3.1. – Observed and Adjusted Age Specific Fertility Rates for Zambia, 1969.

and frequency. In terms of maternal age, the regularity and tempo of births are distributed and concentrated within age groups.

Age specific birth rates offer the best opportunity for studying this phenomenon of the spread and concentration of births according to age. The curve of the birth rates readily demonstrates the concentration pattern. In the case of Zambia, shown in figure 3.1, the peak or concentration spans the two female age groups 20-24 and 25-29, and therefore corresponds to the broad-peak type of fertility concentration mapped out by the United Nations (1). In contrast to the early-peak type, found in most countries of Africa, the broad-peak type has relatively fewer births at ages 15-19, marked concentration at 20-29, after which a gradual decline occurs until a significantly low proportion of births at the higher terminal age of 45-49 is reached. As can be seen from Table 3.2, striking differences exist mainly at both the lower and higher terminal ages. In spite of the marked and similar concentration (peak) common to both types, the early-peak type has relatively larger proportion of births, about twice as much as the broad-peak type, in the lower terminal age 15-19. The proportion is also higher in the early-peak type at age 45-49. But it is only at the lower age groups that the

(1) United Nations Economic Commission for Africa, *Ibid.*, pp. 106-109.

TABLE 3.2. COMPARISON OF OBSERVED AGE SPECIFIC FERTILITY RATES IN ZAMBIA 1969 WITH SELECTED UN MODEL DISTRIBUTIONS

Age	Observed ASFR (%)	UN Models ([a])	
		Early Peak (%)	Broad Peak (%)
15 – 19	7.2	16.2	8.9
20 – 24	22.4	24.7	23.7
25 – 29	22.5	21.9	24.4
30 – 34	19.8	17.4	19.9
35 – 39	14.6	11.8	14.7
40 – 44	8.6	5.8	6.5
45 – 49	4.9	2.3	1.9
Total	100.0	100.0	100.0
Mean ($\bar{m}$)	29.9 ([b])	28.0	29.2

(*a*) United Nations, *Population Bulletin of the United Nations,* N° 7, Sales N° 64, XIII.2, New York, 1963, pp. 104 and 110.

(*b*) In all probability, the observed mean of age specific fertility ($\bar{m}$) lies between 28 and 30 years. Various methods of computation yielded values within this range. Thus, application of Coale-Demeny empirical formula gave $\bar{m} = 27.90$; the use of the weighted proportions married gave $\bar{m} = 29.43$, while the use of the average age at birth with the distribution of births year before last (September 1967 – August 1968) gave $\bar{m} = 30.17$ years.

correspondence between the age specific fertility distribution for Zambia and that for the broad-peak type ends. At higher age groups, especially at 45-49, the Zambian pattern approaches the early-peak type more than the broad-peak type. Thus, the general shape of the observed fertility curve in Zambia shows the occurence of fewer births at 15-19, possibly due to the relatively late age at marriage (18.5 years for females in 1969) ; it further demonstrates that, with the virtual absence of family planning, as will be shown later, child bearing continues for much longer (to the end of the reproductive life) than is the case in the low fertility countries of Europe, North America, and Oceania.

But it should not be presumed that the age specific fertility rates, in view of our present state of data collection, are perfect indicators of the curve of fertility in Zambia. On the contrary, the rates are affected by response errors in recording the ages of mothers, the dating of the births and the inclusion of all births occurring in the reference period (1). Actually, it is highly probable that distortion of the current fertility data as a result of the misstatement of ages, especially over-estimation of the ages of young women, occurred. This is supported by the rather high mean age ($\bar{m}$) of 29.9 years for the recorded age specific fertility distribution, and by the location of the mode of the distribution in the age group 25-29 years. The influence of all the

(1) For a detailed discussion of these types of errors, see R.K. Som, *Recall-Lapse in Demographic Enquiries,* Asian Publishing House, Bombay, 1972.

factors associated with the distortions cannot be fully investigated here. But recognizing the relevance of the distortions to the accuracy of the resulting indexes of fertility as shown, for example, by the very low observed total fertility rate of 4.985 in the 1969 census, some attempts have been made to adjust the age specific and total fertility rates. The resulting curves of the adjusted age specific fertility rates are plotted alongside the observed in Figure 3.1 from which the results of the adjustments are obvious. In particular, it could be seen that the adjusted figures shift the curves a little to the left so as to reflect more the expected pattern of early childbearing, especially in the 15-19 age group, in communities where early marriage is the norm.

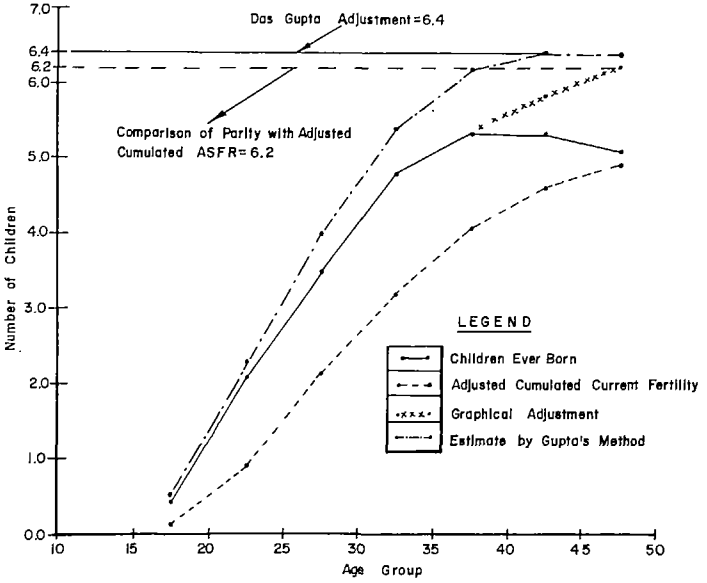

Figure 3.2. – Observed and Adjusted Distribution and Mean Number of Children ever Born by Age of Mothers.

TABLE 3.3. OBSERVED AND ADJUSTED MEAN NUMBER OF CHILDREN EVER BORN PER WOMAN BY AGE, 1969 CENSUS

Age Group	Observed	Adjusted by Das Gupta method	% Under-Reporting
15 – 19	0.4	0.5	25.0
20 – 24	1.9	2.3	21.1
25 – 29	3.4	4.0	17.6
30 – 34	4.6	5.4	17.4
35 – 39	5.1	6.2	21.6
40 – 44	5.1	6.4	25.5
45 – 49	5.0	6.4	28.0

Figure 3.2 illustrates the shape of age specific parity rates from the 1969 census of Zambia. The mean number of children ever born to women by age has been used for making estimates of fertility measures which would otherwise have been derived only from current fertility data. For example, in the absence of the latter, the average number of children ever born to women aged 50 years or more is usually regarded as an approximation of current total fertility rate. The problem, however, has been that the recording and reporting of the number of children ever born suffers from the same response errors which adversely affect the quality of the resulting fertility data.

In the absence of response errors, age specific parity rates should increase progressively with age. In the case of Zambia, the curve actually increased until after age 35 years following which a gradual decline began, falling off more precipitously after age 40 years. In order to indicate the probable level of completed family size, some adjustment was made following Brass' argument regarding the direct relationship between the mean number of children ever born to a cohort of women passing through life and their cumulated current fertility (1). The plotted values of the two types of fertility rates in Figure 3.2 show a progressively rising curve of cumulated age specific fertility rates and a curve of the mean number of children ever born rising for a while and then falling off after 35 years of age, thus indicating a serious under-enumeration of completed family size. Now, if the relationship shown in the graph remains acceptable, then the adjusted completed fertility after age 45 years climbs to 6.2 by ordinary graphical extrapolation of the age specific parity curve in relation to the cumulated fertility curve. This adjusted value, which is over 20 per cent higher than the observed appears reasonable. It is, no doubt, much closer to the adjusted estimates of total fertility rate discussed earlier on in the chapter. It should, of course, be noted that the probable level of the completed family size may be slightly higher than the above adjusted estimate of 6.2. In a survey of Lusaka city in 1968/69 organized by the writer at the University of Zambia, the recorded peak of the distribution of children ever born was 6.3 at age 45-49. Assuming that some under-enumeration occurred, adjustment by fitting a simple linear regression equation ($y = a + bx$) gave an implausibly high average of 8.05.

Further refinement of the 1969 census data using a technique developed by Ajit Das Gupta and others, (2) gave a completed family size estimate of 6.4 for females 45-49 years of age. Actually, the Gupta technique goes beyond adjusting the value obtained for those at the end of the reproductive life. It also adjusts the age specific parity rates over the whole reproductive life span.

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(1) W. Brass *et al.*, *The Demography of Tropical Africa*, Princeton University Press, Princeton, New Jersey, 1968, p. 90.

(2) A. Das Gupta *et al.*, "Population Perspective of Thailand", *Sankhyā*, Series B, Vol. 27 (1965), pp. 1-46.

The procedure involves curve fitting modelled on the simple linear regression equation. For the entire age range considered, the results obtained, also plotted in Figure 3.2, are given in Table 3.3. In general, they seem reasonable and, as well as the Brass technique employed above, further underline the dimensions of the problems of recall-lapse and memory decay in dating and enumerating vital events in Africa.

D. Macrocosmic Indications of Fertility Variations.

Viewed rather broadly, the sub-regions of Zambia are not homogeneous in terms of fertility levels and patterns. There exists some wealth of past research evidence in support of the existence of major fertility variations among regions and ethnic groups in the country (1). As can be seen from Table 3.4, recent census results seem to replicate and confirm previous analysis of regional levels and patterns, even where these were measured separately and independently. In columns 2 and 3 of the table, child-woman ratios which do not necessarily measure maternity have been presented just for the purpose of comparison between the results of the two censuses. While a high degree of consistency exists between the two, the limitations of the ratio in terms of simply comparing the number of young children with the number of reproductively active women in the various localities, should be borne in mind. It is possible that the consistent variations reported were associated with consistent differential under-enumeration, childhood migration, infant and early childhood mortality between the provinces. Part of this supposition could be illustrated by studying closely the fertility figures for the Copperbelt and Eastern Province. In the former, which constitutes the industrial as well as commercial nerve-centre of Zambia, the reported child-woman ratios, the highest of all the provinces, are incompatible with the reported relatively low mean number of children ever born to all women (fourth in rank) and to those past the reproductive age group (fifth in rank).

The most plausible explanation for this incompatibility appears strongly to be the fact that the Copperbelt, by virtue of its premier position in terms of employment and other social and physical amenities including schools and hospitals, has been attracting young migrants and their families, including children sent to be trained by better placed relatives and kinsmen. The Eastern Province is not particularly a high migrant receiving area. Many of its people migrate to the Central and Copperbelt Provinces for employment.

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(1) P.O. Ohadike, *Op. cit.*, 1969, pp. 38-40.

J.C. Mitchell, "Differential Fertility amongst Urban Africans in Zambia", *The Rhodes-Livingstone Journal,* N° 37, 1965, Institute for Social Research, University of Zambia, Lusaka, pp. 21-25 ; A.J. Evans, "The Ila V.D. Campaign", *The Rhodes-Livingstone Journal,* N° 9, 1965, Institute for Social Research, University of Zambia, Lusaka.

TABLE 3.4. INDICATIONS OF REGIONAL FERTILITY DIFFERENCES FROM THE 1963 AND 1969 CENSUSES OF ZAMBIA

Provinces	Selected fertility index					
	C.W.R. ([a]) 1963 Census	C.W.R. ([b]) 1969 Census	Mean Children ever born (1969)	Proportion ever dead (1969)	Mean Children ever born to females 45 – 49 years (1969)	Proportion dead of ever born to females 45 – 49 years (1969)
1	2	3	4	5	6	7
	(a) Selected Measures					
Western (Barotse)	592	652	2.70	.301	3.59	.340
Central	812	864	3.09	.212	5.12	.257
Eastern	707	749	3.58	.354	5.57	.383
Luapula	834	880	3.44	.293	5.49	.338
Northern	823	906	4.06	.289	6.52	.308
North-Western	563	675	2.65	.227	3.42	.304
Southern	821	868	3.04	.237	4.61	.272
Copperbelt	897	993	3.18	.167	4.99	.235
ZAMBIA	769	861	3.25	.261	4.99	.311
	(b) Descending rank order of indices					
Western (Barotse)	7	8	7	2	7	2
Central	5	5	5	7	4	7
Eastern	6	6	2	1	2	1
Luapula	2	3	3	3	3	3
Northern	3	2	1	4	1	4
North-Western	8	7	8	6	8	5
Southern	4	4	6	5	6	6
Copperbelt	1	1	4	8	5	8

Note : (a) Child-woman Ratio : children 0-4.5 to 15-45.5 years.
(b) Child-woman Ratio : children 0-4 to 15-44 years.

While it ranks very low (sixth) in terms of the child-woman ratio, the observed levels of the mean number of children ever born to all women (second in rank) and to those aged 45-49 years (also second in rank), clearly makes females of the province one of the very fertile groups in Zambia. Apart from out-migration, it seems highly probable that the level of the child-woman ratio for the province was inversely affected by its very high proportion of recorded number of children dead out of those born to all women and also to those women past the reproductive age span. Of all the eight provinces, the Eastern recorded the highest proportion in either case. As the dead children

were normally included in the parity record but not in the record of those alive as shown by the age structure, the effect would be to depress the level of the child-woman ratio.

Despite the above observations, it still remains certain that there are factors, calling for further investigations, which could explain the existence of regional variations in fertility. More seriously, North-Western and then Western (Barotse) Provinces had records of fertility which were not only lower than the national total but significantly lower than the rates observed in the other provinces. The Southern Province, though not so markedly, also recorded relatively low levels of fertility. The general rank order beginning from the lowest to the highest for all the provinces was, using only data on children ever born, as follows :

Province	Index of Low Fertility ([a])	
	Absolute	Relative
1. North-Western	16.0	100.0
2. Western (Barotse)	14.0	87.5
3. Southern	12.0	75.0
4. Central and Copperbelt	9.0	56.3
5. Luapula	6.0	37.5
6. Eastern	4.0	25.0
7. Northern	2.0	12.5

(*a*) Derived from a summation of the rank order scores in Table 3.4

In this connection, attention should be drawn to the relevance of Mitchell's interesting observation on the subject of fertility variations in the urban areas of Zambia. In an exhaustive analysis of his data, he demonstrates that urbanization and socio-economic status were only slightly associated with fertility differences (1). On the other hand, the correlation of religion and tribe is shown to be more significant. In the ethnic and regional contexts, it is important to note that most of Mitchell's zones of high and low fertility correspond to those already indicated in this study. He clearly states, for example, that "women from the Northern Province have proved to be the most fertile of all" while "the lowest fertility appears in Kabompo district, followed by those in the neighbouring Balovale district", both of which are in the North-Western province (2). Agreement also exists between the findings of this study and Mitchell's inference of low fertility among the Tonga and Ila of Southern Province and among the Lozi of the Western (Barotse) province.

(1) J.C. Mitchell, *Op. cit.*, p. 20.

(2) J.C. Mitchell, *Idem.*, p. 8.

Actually, the evidence on this question of regional and ethnic differentials is increasingly mounting, as the result of Mitchell's investigation of the Copperbelt towns are being corroborated by more urban studies. The 1968/69 sample survey of Lusaka carried out by the writer at the University of Zambia reiterates the essential view-point that persons originating from either low or high fertility areas tended to transfer their fertility behaviour patterns with them when they moved. In the Lusaka city survey, the supporting variations in descending order or magnitude for women of different linguistic (mother tongue) origins were :

Mother Tongue (Language first spoken as a child)	Main Province of Origin ([a])	Children Ever born (all ages)
1. Tumbuka	Eastern	4.2
2. Mambwe	Northern	3.9
3. Nyanja	Eastern	3.8
4. Kaonde	North-Western	3.7
5. Bemba/Lala/Lamba	Northern/Luapula	3.5
6. Lunda/Luvale	North-Western	3.3
7. Tonga/Ila	Southern	3.2
8. Lozi	Western (Barotse)	3.1
9. Nkoya	Western (Barotse)	2.5
All groups surveyed		3.7

(*a*) These origins refer to the "indigenous" homes of the languages, even though some of them, especially Nyanja and Bemba, have been metropolitanized as a result of urbanization and migration.

A review of existing literature (1) shows clearly that the observed regional variations in fertility have been known for many years and yet no firm predictions of their causality have as yet been made. As can be seen from Mitchell's article, status, urbanization, religion, diet, genetic inheritance and disease (particularly venereal diseases) have been discussed by various experts without much conclusive evidence. Clearly, not one of these variables operates or operated in isolation from the other or from any others not listed. What this implies, in order to bridge this hiatus in knowledge about such regional fertility differentials, is the necessity for an integrated inter-disciplinary study of the problem.

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(1) J.C. Mitchell, *Idem.*, pp. 21-25.

A.J. Evans, *Op. cit.*, p. 40-46.

Government of Northern Rhodesia, *Annual Report of the Department of Native Affairs*, 1934, p. 12 ; *Annual Report of the Department of Native Affairs*, 1937, pp. 95 and 102.

E. Micro Indications of Correlates of Fertility Variations.

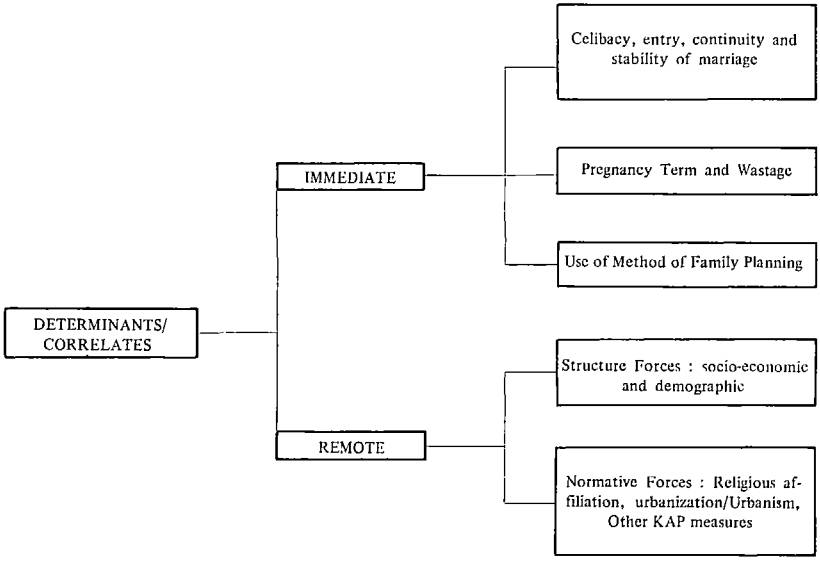
Interest in discerning the correlates of fertility variations is not only excited by the uncertainty about the genesis of the above regional, ethnic and linguistic differences, but also by the type and quality of data which, on a rather microcosmic level, point to the existence of other forms of fertility variations. These other variations strongly suggest the occurrence of social, economic and demographic changes to which people have been reacting with varying degrees of success and accommodation. The ease with which change has been accepted and accommodated depends on the type of innovations as well as people's perception of its relative value *vis-à-vis* their time-bound and almost sacrosanct traditional way of life. Fundamentally, valued institutions and behaviour patterns persist with the people unless new social, economic and ideological super-structures are created to transform the foundations of the old ways.

The family is one such valued institution in Africa which seems to be resisting rapid social change. The prevailing high level of fertility in Zambia as in most other parts of Africa has already been indicated. The level, in general, fully articulates the prevailing fertility attitudes of the Zambians. Asked about the number of children desired, given their present social and economic circumstances, most females, of whatever linguistic or ethnic group, desired no less than an average of 6 children. The mean for the entire survey group in Lusaka was 7.1. Even though an inverse relationship was found between social and economic status and the desired family size, it is significant to note that the lowest level desired by the most privileged and enlightened group (for example, white-collar workers with 5.8) was twice as large as the average family size in the developed countries.

Also reflecting the continued survival of pronatal social values is the fact that preference was shown for more children of one sex than the other. Again, in the Lusaka survey, while a large proportion, 43.2 per cent, were undecided and left the choice to God, 31.8 per cent desired an equal number of boys and girls, another 17.2 per cent desired more boys than girls and only 7.8 wanted more girls than boys. In any case, it mattered very much that a couple should have children of both sexes and, more often than not, more boys than girls if the need to choose arose. Recourse to fatalism in matters of this nature is a common African attitude. It may, however, be on the decline, for in the survey, more of the older females, even those who can no longer reproduce, accepted determinism as a causal variable. The young, educated and employed females relied more on factual explanation and evidence. This recourse to fatalism might also partly be at the root of the resistance to family planning, which many respondents, about three-quarters, did not approve of, even when established and administered under strict medical supervision. In fact, only 11.5 per cent of the survey females clearly approved of the establishment of clinics for family planning.

The negative indications are more revealing when it is considered that the females concerned were city-dwellers likely to be the most exposed to the nascent influences making for change in the country. It is therefore necessary to bear in mind the implications of this slow acceptance of innovations when examining the pattern of fertility differences. If anything, the resistance is mainly indicative of the resilience of African culture in a modernizing world.

The determination of the micro correlates of fertility variations in Zambia will draw heavily from the socio-demographic sample survey of Lusaka referred to several times in the text. The sample survey was carried out between December 1968 and March 1969. Some aspects of the survey results have been separately published elsewhere (1) and others are in preparation. In addition to the survey data, supporting information from the result of the 1969 census will also be used in the study of the correlates. In terms of the scope of available data, the following diagrammatic scheme for analysis and interpretation will be adopted :



(1) P.O. Ohadike, "Aspects of Domesticity and Family Relationship : A Survey Study of the Family Household in Zambia", *Journal of Asian and African Studies*, Vol. VI, Nos. 3-4, 1971, pp. 191-204. "The Evolving Phenomena of Migration and Urbanization in Central Africa : A Zambian Case" *Proceedings of the Eleventh International African Seminar*, Lusaka, September 1972.

In devising the scheme, thought was given to the need to distinguish those variables, determinants and correlates which directly influence the level of fertility from those which operate remotely and only influence the level of fertility indirectly through their relationship to the former. The immediate determinants therefore are those "intermediate variables through which any social factors (remote correlates) (1) influencing the level of fertility must operate" (2).

From available data, the immediate correlates embrace entry, continuity and stability of marriage, pregnancy term and wastage, and use of methods of family planning. The remote factors which operate through the immediate determinants include a number of socio-economic and demographic factors subsumed under the main title of *Structural Forces,* and also of *Normative Forces* which embrace religious affiliation, migration, urbanization/urbanism, and knowledge of and attitude towards family planning.

F. The Immediate Correlates. The variables considered here are meaningful and best appreciated within the general African context of the relationship between the individual and his society ; more so, between the person and his immediate family and kinship group. The general expectation is that individual behaviour patterns are predicated on socially defined, accepted and sanctioned normative systems and institutional arrangements.

Of major consideration here are the institutionalized provisions for procreation and ensuring the regeneration and continuity of the group. It is very safe to assert that marriage is a normal and important part of life in Zambia. It is ubiquitous as well as "precocious", even though reported ages at marriage tend to be higher than expected. Permanent states of non-marriage which are of consequence for fertility are rare, as shown by low proportion of women who remain single after 45 years of age. The result of the 1969 census shows (considering only married and never married persons) that only 3.3 per cent of females aged 45-54 years were never married. Though less significant, the proportion was 2.9 per cent for males (2). There is no doubt that marital structure and behaviour affect the level and pattern of fertility in a society. Not only the proportion celibate but also the segment widowed and divorced affect fertility perhaps in a predeterminable way. Without necessarily emphasizing the significantly high level of some correlations shown in Table 3.5, one could still draw other pertinent inferences from the direction of the relation-

(1) Authors insertion.

(2) Kingsley Davis and Judith Blake, "Social Structure and Fertility : an Analytic Framework" *Economic Development and Cultural Change,* Vol. IV, April 1956, pp. 1-2.

(2) Republic of Zambia, *Census of Population and Housing,* 1969, First Report, Central Statistical Office, Lusaka, Table 4, p. 87.

ships depicted. Apparently, some of the variables have had, in a theoretically expected manner, positive influence, while others have had negative effect on fertility. Of major interest is the proportion of persons, male and female, who were never married, those who were divorced and those who were widowed, which produced significant inverse relationships with current as well as historical fertility levels recorded in the 1969 census. Also interesting is the fact that the level of fertility also increased with the proportion of either males or females married within respective age groups.

TABLE 3.5. CORRELATION OF FERTILITY WITH MARITAL STATUS INDICES, ZAMBIA, 1969 CENSUS

Indices (For ages 15 years or more)	(Correlation (r)	
	Current Fertility	Historical Fertility
a) % males never married	– 0.1489	– 0.9591
b) % females " "	– 0.2830	– 0.8105
c) % males married	+ 0.1511	+ 0.9753
d) % females married	+ 0.4695	+ 0.2282
e) % males widowed	– 0.5697	– 0.2343
f) % females widowed	– 0.7209	– 0.2688
g) % males divorced	– 0.0304	– 0.8292
h) % females divorced	– 0.1768	– 0.5569

Despite the universality of marriage, it does not appear from records and estimates that marriage occurred as early as is commonly expected. Writing about the Ngonis, Barnes maintained that "Warfare, not domesticity, was the right and proper occupation of young men, and the age of which men married for the first time was about thirty... Wiese implies that girls were married any time after puberty, but my information stated that girls did not usually marry until they were about twenty to twenty-five" (1). While the practice among other ethnic groups in the country could be different, the fact remains that available data supports the view that the age of first marriage in Zambia has not been very early, at least not immediately after puberty for a majority of women. The estimated mean age at first marriage from the 1969 census result is 18.4 years for African females and 24.5 years for their male counterparts. The relative level of these in relation to Asians and Europeans can be studied in Table 3.6 where the differences, though relatively significant, are not that too large. Besides, the averages are in tune with those (24.2 for males and 18.4 for females) reported for Kenya in 1962, and for other neighbouring countries (1).

(1) J.A. Barnes, *Marriage in a Changing Society: A Study in Structural Change among the East Jameson Ngoni,* Oxford University Press, London 1951, p. 11.

(1) Ministry of Economic Planning and Development, *Kenya Population Census,* 1962, Vol. III (African Population), pp. 55-57. E. van de Walle, *Op. cit.,* Table 5.7.

TABLE 3.6. SINGULATE MEAN AGE AT MARRIAGE ([a]) FOR MAJOR ETHNIC GROUPS, ZAMBIA, 1969 CENSUS

Africans		Asians		Europeans		All Groups ([b])	
M	F	M	F	M	F	M	F
24.5	18.4	24.7	21.4	25.2	19.5	24.4	18.4

Note : M = Male ; F = Female

(*a*) Includes the coloured population

(*b*) See J. Hajnal, "Age at Marriage and Proportion Marrying", *Population Studies*, Vol. VII, No.2, November 1952, pp. 129 – 131. For a discussion of the limitations of the singulate mean age at marriage technique, especially with regard to age errors and effect of migration, see : E. van de Walle, "Marriage in African Censuses and Inquiries" in Brass *et al.*, *Demography of Tropical Africa*, Princeton University Press, 1968, pp. 191 – 192.

TABLE 3.7. MEAN NUMBER OF CHILDREN EVER BORN BY YEARS OF EDUCATION COMPLETED AND AGE AT FIRST MARRIAGE, LUSAKA SURVEY, 1968/69

Education of Wife (years completed)	No. of Women with years of education*	Mean Age First Marriage (wife)	Children ever Born	
			Education of wife	Education of husband
No education	8,637	17.6	4.2	4.4
0 – 3	2,445	17.2	3.9	4.3
4 – 6	5,164	17.3	3.4	3.9
7 – 8	2,858	18.1	2.9	3.3
9 – 10	893	19.6	2.7	2.9
11 – 15	196	20.1	2.7	3.1
15 or more	57	25.3	0.8	2.5
Total	20,250	17.7	3.7	3.7

* Weighted sample.

In terms of the interest in the correlates of fertility variations, age difference at first marriage among social groups is one of the most important determinants. While maternal age correlates more with the physiological maturity of the female, age at first marriage and indeed all marital norms and experience are more closely linked to the onset and periodicity of maternity. Within social expectations, age at marriage regulates and sanctions unions, sexual intercourse and reproduction, on a continuing basis. The level of efficiency in reproduction can therefore be facilitated or impaired respectively by early or late entry into marriage. Attempts to demonstrate this in Table 3.7 can only be done unfortunately on a micro level, as will be done

indeed throughout the subsequent presentations, by means of the Lusaka city survey data. There is perhaps some methodological gain in doing so, for if account is taken of the slow progress towards transforming the social structure, then it might be advantageous to focus on the nerve-centres of change such as the urban areas.

The existence of an inverse relationship between fertility and the proportion of persons never married has been indicated above. In the same vein, a similar relationship exists between the mean age at first marriage of wives and the mean number of children ever born to them. The relationship holds good for the younger females,especially those under 30 years of age, but turns out to be very weak for the older ones, particularly those of completed fertility. For the younger ones, two possible interpretations hold. They may, granting that no radical alteration in the tempo of fertility occurs and that they do not follow the pattern of fertility of the older ones, maintain the differences until their post-fertile years. On the other hand and especially if they synchronize the performance of the older females, the may end up with the rather insignificant difference in completed fertility shown for the older respondents.

In order to ensure the permanence of the variations by age at first marriage among the younger wives, it will be necessary to strengthen and maintain the influence of the factors causally connected with the differences. Of these, education happens to be the major one. As a result of being positively associated with the mean age at first marriage, it delays the exposure to the risk of pregnancy and hence maintains an inverse relationship with fertility. The longer the time individuals devote to acquiring education and training, the greater the chance of postponing marriage and family reproduction. More important, however, for the younger wives, is the need to influence fertility behaviour in a way which should encourage the appreciation of child spacing and family planning within the framework of maternal and child health care. There exist already some indications that education promotes not only support for family planning clinics but also knowledge of specific family planning methods. This was evident from the result of the survey of Lusaka.

As can be seen from Table 3.8, the proportion of wives who approved and demonstrated knowledge of specific methods used in family planning increased with the level of education reached. More important, from the point of view of assessing awareness as well as availability of family planning techniques, is the fact that a significantly higher proportion of wives, 18.1 as opposed to 11.5 per cent, knew and mentioned specific methods used than those who just approved the establishment of clinics. This is not to say that the women who knew specific methods were currently using them, for only an insignificant 3.2 per cent acknowledged that they were using contraception

at the time of the survey. But the women who knew some methods may have used them in the past or they could just as well be potential target-users.

TABLE 3.8. SELECTED FAMILY PLANNING QUESTIONS BY EDUCATION OF WIFE LUSAKA SURVEY, 1968/69

Selected Questions	Education (Completed years)								
	None	0 – 3	4 – 6	7 – 8	9 – 10	11 – 14	15 +	Others	Total
Establishment of Family Planning Clinics	Percentage Distribution								
Approve	6.2	5.6	11.4	23.3	49.0	54.9	88.0	1.7	11.5
Disapprove	79.2	83.9	78.4	68.5	32.5	43.3	0.0	36.8	74.4
Others	14.6	10.5	10.2	8.2	18.5	1.8	12.0	61.5	14.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Knowledge of Methods of Family Planning									
(a) Knows	13.4	10.6	21.6	24.7	43.8	71.3	88.0	10.4	18.1
(b) Does not	86.6	89.4	78.4	75.3	56.2	28.7	12.0	89.6	81.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N* =	9,803	2,506	5,303	2,826	853	164	50	805	22,310

* = Weighted

TABLE 3.9. CHILDREN EVER BORN BY DURATION OF FIRST MARRIAGE, LUSAKA SURVEY, 1968/69

Duration of First Marriage (Years)	Mean Children ever born by Age of Wife				N Weighted
	Under 30	30 – 44	45 +	Total	
Less than 1	1.3	2.0	–	1.3	5,369
1 – 2	3.0	4.0	–	3.1	4,922
3 – 4	4.4	4.9	–	4.6	3,331
5 – 6	5.0	6.1	–	5.8	2,352
7 +	...	6.7	6.6	6.3	2,046
Total	2.6	5.6	6.0	3.6	18,020
N	12,367	5,194	459	18,020	

Note : ... Insufficient number of cases were involved and so no averages were calculated.

– Empty celles.

The relationship of marriage to fertility goes beyond considerations of the impact of early or late entry into marriage. Once marital union has been established, there is the need to ensure its continuity and stability. This will be necessary in order to ensure, given the prevailing norms about the spacing of births, that fertility is maintained at a possible maximum level in line with the degree of exposure to the risk of pregnancy and childbirth. On the basis of this premise, the longer the duration of marriage, the higher therefore the parity level attained. This will generally be true of all social and age groups as can be seen from Table 3.9 showing the direct relationship between the duration of the first marriage and the mean number of children ever born to the Lusaka survey women.

But despite the direct relationship, instability and discontinuity of marital relationships tended to depress the fertility performance of some survey women. The negative impact of divorce and widowhood on the national level of fertility has already been indicated above. Results not at variance with this are shown in Table 3.10. In the Lusaka survey, work experience before and during marriage appeared to have impaired fertility performance. Those wives

TABLE 3.10. FERTILITY DIFFERENTIALS BY SELECTED MEASURES OF DELAYED MARRIAGE, MARITAL DISCONTINUITY AND STABILITY, LUSAKA SURVEY, 1968/69

Selected Measures (Wives only)	Mean Children ever born by Age		
	Under 30	30 – 44	45 +
N (Weighted)	*13,648*	*6,282*	*655*
Total Mean	2.7	5.6	6.0
1. *Work Experience before Marriage*			
Never worked	2.7	5.7	6.0
Worked	2.4	5.1	5.6
2. *Work Experience since Marriage*			
Never worked	2.7	5.7	6.2
Worked up to 10 years	2.6	4.8	5.1
3. *Number of Times Married*			
Once	2.6	6.0	6.8
Twice	2.9	5.0	4.7
Thrice	...	...	4.0
4. *Type of Marriage*			
Monogamous	2.7	5.7	6.2
Polygamous	2.7	4.1	...

Note : ... Number of cases too few and so means were not calculated.

who never worked before marriage and were respectively under 30 years, 30-44 years and 45 years or more had respectively 12.5, 11.8, and 7.1 per cent more children ever born than those in corresponding age groups of wives who worked. The pattern of variation was the same between those who worked and those who did not after and during their marriage. Particularly significant in this regard is the level of difference shown by women who were 30-44 years and 45 years or more. Respectively, those of them who never worked after and during marriage proved to have had 18.8 and 21.6 per cent more children than those who worked.

Being married more than once as well as being married to a polygynist also appear to have had a minus effect on the fertility of some of the survey wives. A little over 75 per cent of the wives had married only once in their life, and they proved to be the most fertile. For example 6.0 and 6.8 children were born to the once-married wives respectively in the age groups 30-44 and 45 or more years. The mean was respectively 5.0 and 4.7 for those who had married twice. Such differences further underline presumably the negative contribution of divorce and widowhood to fertility.

It is in terms of exposure to intercourse within marriage that discontinuities of marital relations have demographic implications for fertility levels. Apart from divorce and widowhood, it has been claimed rather inconclusively, that polygyny, as a result of the possible reduction of the rate of intercourse per wife, tends to depress the level of fertility. Quite a good number of demographers have demonstrated this relationship (1) while many others have tended to disprove it (2). Although, as can be seen from Table 3.10, the Lusaka survey tended, rather weakly, to support the view that polygyny impairs fertility, there still remain many imponderables about the exact operation of the polygyny variable. Issues involving definition and standardization of concepts, and the degree and intensity of polygyny have to be

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(1) Georges Olivier and Louis Aujoulat, "L'Obstétrique en pays Yaoundé", *Bulletin de la Société d'études Camerounaises,* no. 12, December 1945. (Abstract in *Africa,* vol. 17, no. 1, 1947, p. 61).

H.V. Muhsam, "Fertility of Polygamous Marriage", *Population Studies,* vol. 10, July 1956, pp. 3-16.

Vernon Dorjan, "Interrelations in Temne Society", *American Anthropologist,* vol. 60, October, 1958, pp. 838-60.

(2) P.O. Ohadike, *Patterns and Variations in Fertility and Family Formation : A Study of Urban Africans in Lagos, Nigeria,* Unpublished Ph.D. Thesis, Australian National University, Canberra, 1967, pp. 264-268.

Meyer Fortes, "A Demographic Field Study in Ashanti", In F. Lorimer *et al., Culture and Human Fertility,* UNESCO, 1954, pp. 307-308.

A.T. and G.M. Gulwick : "A Study of Population in Ulanga Tanganyika Territory", *Sociological Review,* vol. 30, N° 4, 1938, pp. 376-9. Gabriele Wuelker, "Effects of Social and Family Patterns on the Population Increase in Togo (West Africa)", United Nations, *World Population Conference,* Belgrade, 1965, Paper No. WPC/WP/42, pp. 4-5.

clearly sorted out, taking into account the regional variations in its incidence in Africa. It will especially be of interest to demonstrate whether or not *la petite polygamie,* found in Zambia and other places (1), depresses fertility as does *la grande polygamie* of some West African cultures. Even after this demonstration there would still be the urgent need to apply many statistical controls and stardardization procedures in order to eliminate the effects of spurious correlations in the data.

As originally envisaged, the immediate correlates also included pregnancy or foetal wastage. Because of the problems of measurement, this presentation cannot deal exhaustively with the whole question of how pregnancy failure rates (stillbirth and abortion) affect the measurement and level of fertility in a community. The Lusaka survey asked wives for information on the number of miscarriages (abortion) and stillbirths experienced by them. This was collected as part of the pregnancy history record. With due regard to the limitations of complete enumeration inherent in collecting such data retrospectively, the number of wastages have been used to reconstruct the average number of pregnancies ever experienced by the respondents.

It is apparent from Table 3.11 that the mean number of children ever born could have been higher than the level already reported but for the number of pregnancies that were aborted or born still. If, as has been shown elsewhere (2), a direct relationship exists between social class and the level of health and hygiene, then it could also be rightly assumed that variations in the number of reported foetal wastage partly account for some of the social class differences in the mean number of children ever born. Just as the infant mortality recorded in the survey varied from suburb to suburb, the least salubrious having the highest rate, so also is it expected that the foetal wastage rates were directly related to social status.

Survey wives of various ages reported having experienced some pregnancy wastage, miscarriages and stillbirths alike, even though it must be presumed that the suspected under-enumeration of both events occurred more among the older wives, who also had suffered from a higher degree of memory decay in reporting the number of children ever born. From Table 3.11, miscarriages were more often reported than stillbirths. Thus, while 12.3 per cent of wives under 30 years of age reported having had one or more abortions, only 3.3 per cent in the same age group reported one or more

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(1) In the Lusaka survey, only 4.3 per cent of the households were polygynous. According to the results of the 1969 Census, polygynous households appear surprisingly uncommon, forming only 5 per cent of all households. See Republic of Zambia, *Census of Population and Housing,* Final Report, Volume I, Central Statistical Office, Lusaka, November 1973, p. 5.

(2) P.O. Ohadike, "Prosperity, Existence and Survival : The Social and Environmental Realities of Rural-Urban Life in Zambia", Mimeographed copy, 1973.

TABLE 3.11. REPORTED MISCARRIAGES (ABORTIONS) AND STILLBIRTHS BY AGE, LUSAKA SURVEY, 1968/69 (PERCENTAGE)

Number of Miscarriages	Age of Wives (Years)			
	Under 30	30 – 44	45 +	Total
0	87.7	80.4	83.1	85.2
1	8.8	10.9	7.4	9.4
2	2.4	5.2	1.9	3.3
3	1.0	1.5	3.8	1.3
4	0.1	1.1	–	0.4
5 +	–	0.9	3.8	0.4
Total	100.0	100.0	100.0	100.0
Mean	0.17	0.35	0.42	0.23
Number of Stillbirths				
0	96.7	92.9	93.5	95.4
1	3.5	4.2	2.7	3.1
2	0.6	1.5	1.9	0.9
3	–	1.4	–	0.4
4	0.1	–	–	0.1
5 +	0.1	–	1.9	0.1
Total	100.0	100.0	100.0	100.0
Mean	0.05	0.12	0.16	0.01
N (Weighted)	13,774	6,545	742	21,061

TABLE 3.12. MEAN NUMBER OF BIRTHS, MISCARRIAGES, STILLBIRTHS AND PREGNANCIES, LUSAKA SURVEY, 1968/69

Selected Averages	Age Group (Years)			
	Under 30	30 – 44	45 +	Total
a) Observed mean children ever born	2.65	5.61	5.95	3.66
b) Adjusted mean children ever born ([a])	3.10	6.30	6.40	3.72
c) Observed mean number of miscarriages	0.17	0.35	0.42	0.23
d) " " " " stillbirths	0.05	0.12	0.16	0.01
e) " " " " pregnancies	2.87	6.08	6.53	3.90
f) Adjusted " " " " ([a])	3.48	7.39	8.36	4.82
g) Ratio of (f) to (a)	1.31	1.32	1.41	1.32
h) Ratio of (f) to (b)	1.12	1.17	1.31	1.30

Note :

(*a*) The adjustment was made for recall-lapse or under-enumeration.

stillbirths. For wives aged 30-44 years, the proportions were respectively 19.6 and 7.1 per cent ; for those in the post-fertile ages (45 +), they were respectively 16.9 and 6.5 per cent, while for all survey wives they were 15.8 and 4.6 per cent respectively. Although the variations may reflect the actual situation where more abortions than stillbirths have occurred, it is very important to note that stillbirths are more likely to be under-enumerated than abortions. This is principally because of the definitional problem, even in the hands of experts, of distinguishing a stillbirth from an infant death occurring immediately after birth.

With the above limitations in mind, it has been possible to calculate and adjust the mean number of pregnancies ever experienced by wives. The method of adjustment, assuming the same degree and pattern of recall-lapse, is again based on the Das Gupta method used earlier on in adjusting reported parity rates. The adjusted average of pregnancies in Table 3.12 gives the clear indication that if pregnancies were successfully carried to full term by the wives, fertility as measured by counting live births would have been much higher than was observed in the survey. As can be seen, adjusted average number of pregnancies exceeded the observed average number of children ever born generally for all wives by 32 per cent ; for the age groups : under 30, 30-44 and 45 years or more, the excess was respectively 31, 32 and 41 per cent. By comparing the adjusted mean children ever born with the adjusted pregnancy ever experienced, the overall variation was 30 per cent more pregnancies than births for all wives. For the age groups under 30, 30-44 and 45 or more years, the excess of pregnancies over births was respectively 12, 17 and 31 per cent. These figures are in a way revealing, for if we further consider the under-enumeration of infant deaths, also common in Africa, then we would be better placed to appreciate why completed fertility has been generally much lower than fecundity or fertility levels which conditions of natural fertility or the physiological capacity to reproduce would allow.

G. Remote Correlates of Variations. As already indicated, the remote determinants operate through the manipulation of the immediate variables. Based on the data available, the remote correlates considered here embrace socio-economic and normative factors which not only transform the social structure but also social values and attitudes, and consequently modify the level and pattern of fertility.

In examining the influence of socio-economic determinants on fertility, there will be no attempt to examine individual variables such as education, income, occupation and many others separately. Instead, a "synthesized" index of social background types (social class) will be used (1). This index was

(1) Social class as defined here has no ideological connotations whatsoever. The definition employed fulfils the heuristic purpose of helping to delineate socio-economic categories for better analytical presentation.

developed by scaling selected socio-economic characteristics of respondents including total household income and the number of years of schooling completed by couples. Three social classes (upper, middle and lower) were finally derived. The classes correlate reasonably well with many socio-economic variables, which could just as well be used simply as indices of social class.

In historical perspective, social class variations characterized the changes in the level of vital rates during the European and other demographic transitions. The decline of fertility began first in towns among the better-off classes and only later did it decline among the lower class in towns,followed by that among those in the rural areas. In non-European areas, it has probably been correct that the commencement of fertility change has been usually heralded by the emergence of fertility variations among social groups, even though the direction of such a change (positive or negative) remains at least initially debatable in Africa (1). As can be seen from Table 3.13, some social class differences were recorded in the survey of Lusaka city. Fertility was inversely related to social background types, and although socio-economic values and style of life may have been important, account should be taken of the effect of age differences between wives of the social classes.

TABLE 3.13. MEAN NUMBER OF CHILDREN EVER BORN BY SOCIAL CLASS AND BY AGE OF WIFE, LUSAKA SURVEY, 1968/69

Social Class	Mean Children Ever born by Age of Wife (Years)				
	Under 30	30 – 44	45 +	Total	Age Adjusted
Lower	2.8	5.6	5.7	3.8	3.7
Middle	2.4	6.0	6.6	3.1	3.6
Upper	2.3	5.1	3.5	2.7	3.2
Total	2.7	5.6	6.0	3.7	...
N (Weighted)	13,648	6,282	655	20,585	

The effect of controlling age was to render the observed inverse relationship of fertility to social class less significant. But this is not to under-estimate the relevance of the whole relationship, for in the context of determining future levels and trends, it is precisely the young, educated, white-collar and well-paid members of the upper and middle classes that one can rely on to set the pace and guide the needed social and demographic transformation. There are enough indications from the survey that the upper

(1) See a review of papers by P.O. Ohadike, P.O. Olusanya, Rushdi Henin, S.K. Gaisie, R. Clairin and D.F. Heisel in A Romaniuk, "Fertility Trends in Africa", *Proceedings of the IUSSP Conference*, London, 1969, pp. 739-742.

and middle class families were less pronatal in terms of fertility attitudes and practices. They also had been more exposed to the factors which deter early marriage and reproductive life. Both actual and ideal mean age at marriage were highest for upper class wives, higher for the middle class and lowest for the lower class wives. Also, the proportions that approved the establishment of family planning followed the same pattern of differences. More upper and middle class wives favoured the introduction of family planning and more were already using some techniques, as can be seen from Table 3.14. If the desired size of the family were indicative of the actual size of the family to be realized by wives, the probability is therefore high that the observed inverse relationship between fertility and social class will be maintained at the end of the reproductive life of the respondents.

TABLE 3.14. SELECTED SOCIAL CLASS CHARACTERISTICS OF WIVES, LUSAKA SURVEY, 1968/69

Selected Variables (Wives)	Social Class			
	Upper	Middle	Lower	Total
Reported Mean Age at First Marriage	19.9	17.9	17.5	17.7
Recommended Ideal Age at First Marriage	21.5	19.0	17.5	18.0
Mean Desired Family Size	6.4	6.9	7.2	7.1
%Approving establishment of Family Planning Clinics	34.3	28.8	10.3	11.5
% With Knowledge of Family Planning	51.9	20.1	10.7	13.3
% Reporting Specific Methods of Family Planning	61.8	26.0	15.0	18.1
% Reporting Use of Methods of Family Planning	28.3	6.2	1.7	3.2
N (Weighted)	760	4,354	17,261	22,375

Education formed an important component of the social class index used. Its overall role in fostering change and acceptance of innovations was demonstrated by its very significant correlation not only with fertility level, but also family planning attitudes and knowledge. All this reinforces the crucial need to promote universal education for all members of the community, but more so, for the female members. Household income and occupational skills of couples, both highly related to education, were also significant components of the social class index and were significantly and inversely related to fertility. Table 3.15 shows observed and age adjusted mean number of children ever born to wives of various educational, occupational and income background types. The pattern and level of variations confirm and also lend greater support to the observed relationship between social class or social background and fertility.

TABLE 3.15. MEAN CHILDREN EVER BORN BY SELECTED SOCIAL CHARACTERISTICS, LUSAKA SURVEY, 1968/69

Selected Characteristics	N Weighted	Observed Mean	Age Adjusted Mean
(1) *Education of Wife (Years)*			
None	8,637	4.2	3.9
0 – 3	2,445	3.9	3.8
4 – 6	5,164	3.4	3.7
7 – 8	2,858	2.9	3.6
9 – 10	893	2.7	3.0
11 +	253	1.8	1.9
(2) *Education of Husband (Years)*			
None	3,432	4.4	4.0
0 – 3	1,209	4.3	3.8
4 – 6	6,110	3.9	3.8
7 – 8	5,143	3.3	3.5
9 – 10	2,652	2.9	3.6
11 +	1,155	2.8	3.1
(3) *Household Income per capita*			
No Income	2,449	3.8	3.6
Under K10 (kwacha) ([a])	8,864	4.4	4.2
K10 – K19	5,647	3.2	3.4
K20 – K29	1,701	2.6	3.0
K30 +	602	2.3	2.7
(4) *Occupational Skill of Wife*			
No Occupation	17,816	3.7	3.7
White-Collar	880	2.6	3.0
Sales Worker (Trader)	321	4.5	4.1
Skilled Manual	169	4.0	3.9
Unskilled Manual	1,399	3.9	3.6

(*a*) 1 Kwacha = US $ 1.69 approximately.

Normative behaviour patterns are conditioned in many African countries by several social factors. While a majority of such factors are rooted in the traditions of the people, a significant number of them have been associated with the exposure of traditional societies to innovations and changes which accompany social and economic development. One of the factors which has traditional as well as modern origins in Africa is religion. In this respect, it is being suggested that all forms of religion, as a result of their teachings, precepts and dogmas, condition the behaviour and attitudes of their adherents to set standards of conduct. But this amounts only to expectations, for in actual life situations, people do not always conform to set standards, and even

where conformity prevailed, the intrusion of new social elements could alter the *status quo* and increase the proportion of deviants with regard to the set standards.

In socio-demographic studies, the measurement of religious conformity in regard to fertility variations has to consider the degree and intensity of religious beliefs and practices. Unfortunately, no attempt has been made in the Lusaka survey to build in indices which would permit the grouping of respondents according to the degree of their adherence and attachment to their faiths. The survey, however, collected information on religious affiliations which is, very much so, a weak indication of religious conformity. In actual life, what people say they do is often at variance with what they actually do, and, in fact, being inscribed as a member of a religious group does not imply commitment and conformity. In this regard, therefore, the data presented in Table 3.16 should be treated with caution.

TABLE 3.16. MEAN NUMBER OF CHILDREN EVER BORN BY RELIGIOUS AFFILIATION AND AGE OF WIFE, LUSAKA SURVEY, 1968/69

Religious Affiliation (wife)	Age of Wife (Years)			Observed Total	Age Adjusted Total	Education Adjusted Total
	Under 30	30 – 44	45 +			
Catholic	2.5	5.7	4.5	3.4	3.5	3.3
Protestant	2.8	5.8	7.1	4.0	3.9	3.6
Moslem	3.8	5.8	–	4.9	4.3	4.2
No Affiliation	2.6	5.0	3.0	3.2	3.3	3.2
Others	2.4	4.7	–	3.4	3.0	2.9
Total	2.7	5.6	6.0	3.7	...	...
N (Weighted)	13,648	6,282	655	20,585	...	...
Number educated	8,918	2,710	229	11,857	...	...

The substantial portion of the respondents were Christians of either Catholic or Protestant Faith. Moslems were very few, and surprisingly the group which claimed no membership of any religious group was reasonably large. The study of fertility variations will concentrate on the three groups with substantial representation in the sample. Between Catholics and Protestants, there existed a substantial fertility variation. The observed level for the Protestant wives was almost 18 per cent higher than that of the Catholic wives. Those who said they had no religious affiliation were 6 per cent less fertile than Catholics and 20 per cent less than Protestants. Since the relative stand of Catholicism and Protestantism to family planning, excluding abstinence, is very well known to be more pronatalist for Catholics, the pattern of difference between wives of the two religious groups appears surprising.

However, it is becoming increasingly clear from several studies (1) that apparent religious variations in fertility are not necessarily explained by religious membership or practices. Therefore, as can be seen from Table 3.16, an attempt has been made to examine the possible effect of other variables. By adjusting the observed mean number of children ever born for variations in maternal age, education, and age at first marriage, the level of differences between religious groups of wives was reduced considerably. Protestants, who were originally 18 per cent higher, were only 11 per cent higher than Catholics when maternal age was adjusted. The gap was narrowed more significantly by controlling education, the difference dropping to 9 per cent. It seems therefore that a substantial part of the observed religious differentials can be explained by the covariance of fertility with several variables. The possibility of this being so is strengthened by the fact that in spite of having a higher level of fertility, more Protestant wives also reported knowing and using specific methods of family planning.

When people are uprooted from their cultural area of settlement, they tend to acquire new modes of thought, behaviour and style of life. They, however, do not entirely abandon their identity with the cultural area and certainly not its customs and traditions even while living in the new areas of settlement. This has been the prevailing reaction of Africans to adjustment problems resulting from rural-urban and labour migration. In the towns, cultural continuity is maintained along with a selective acceptance of changes and innovations which normally accompany the process of social, economic and industrial development. It is against this background that one has to examine urbanization/urbanism as the other "normative variable" which affects group fertility pattern and behaviour.

As was indicated in terms of conformity to religious norms, the measurement of commitment to urban life posed some very basic problems for the study of fertility differentials in the survey. The main one was how to establish mutually inclusive as well as exclusive urban and non-urban categories. The fact is that demographic categories, though readily defined, do not correspond to normative and sociological categories.

However, some attempt was made to measure urban status by birthplace as well as by place and duration of residence. With regard to birthplace, respondents were required to state the exact place where they were born. The locations were scaled and coded according to size as shown in the first column of Table 3.17. As can be seen, wives who were born in villages were the most fertile even after differences in maternal age and education were controlled. In general, the relationship shown between the size of birthplace and the

(1) P.O. Ohadike, "Some Demographic Notes on Marriage and the Family in Lagos, Nigeria", in J.C. Caldwell and C. Okonjo, *The Population of Tropical Africa*, Longmans, London, pp. 379-392.

observed as well as standardized averages of the number of children ever born was inverse. The lowest fertility was observed for wives who were born in cities, and judging from the standardized averages it could be safely inferred that wives born in the villages and small towns were reasonably more fertile than those from large towns and cities. The result of standardizing the observed averages for educational differences underlines, however, the significance of education for the composition of migrant and urban populations. In Zambia as well as elsewhere in Africa, migration tends to select more persons with education. The urban areas where the migrants go also have more and better educational facilities than most other areas. The inverse relationship between fertility and education has already been indicated. In view of this relationship and of the direct relationship between education and urbanization, the inverse relationship between urbanization and fertility accords with expectation. It will be observed from the last column of Table 3.17 that standardizing for differences in the educational experience of wives reduced the magnitude of the variations more significantly than standardizing for variations in maternal age.

TABLE 3.17. MEAN NUMBER OF CHILDREN EVER BORN BY PLACE OF BIRTH OF WIVES, LUSAKA SURVEY, 1968/69

Birthplace by Population Size	Mean No. of Children ever born by Age of Wives (Years)					
	Under 30	30 – 44	45 +	Observed Total	Age Adjusted	Education Adjusted
Village (under 500 persons)	2.8	5.7	6.0	3.9	3.8	3.5
Small Town (500 – 9,999)	2.5	5.6	6.5	3.5	3.6	3.3
Large Town (10,000 – 49,000)	2.5	5.6	6.0	3.3	3.4	3.2
City (50,000 +)	2.7	5.1	4.0	3.2	3.5	3.2
Total	2.7	5.7	6.0	3.7	...	...

In support of the above relationship is the observation, also from the Lusaka survey, that non-migrants born in Lusaka city were found to be less fertile than migrants coming to the city from elsewhere in the country. Again, it is significant to note the effect of standardizing the educational attainment of migrants and non-migrants. Quite remarkably, the exercise virtually wiped out the observed variation, thus strengthening the observation that both migration and urbanization are directly related to educational attainment. Nevertheless the point should be made by way of depicting aspects of the imperfections of the correlation, that a positive relationship between fertility

and duration of city residence was found in the Lusaka survey. Given, as maintained above, that urbanization is inversely related to fertility, and given also that urbanism grows with the duration of exposure to urban influences, it seems logical to expect fertility to decrease with the duration of city residence. This however was not the case. Rather, the relationship was positive with fertility rising as the duration of residence increases. This contra-indication should not be taken too seriously because, *inter alia,* maternal age in the survey was positively correlated with duration of residence. In support of this is the result of controlling maternal age which more or less wiped out the fertility differences between wives of varying duration of residence in the city.

TABLE 3.18. OBSERVED AND STANDARDIZED MEAN NUMBER OF CHILDREN EVER BORN TO MIGRANTS AND NON-MIGRANTS, LUSAKA SURVEY, 1968/69

Age of Wife	Mean No. of Children ever born		
	Migrant	Non-Migrant	Total
Under 30	2.6	3.0	2.7
30 – 44	5.6	4.4	5.6
45 +	6.1	...	6.0
Total	3.7	3.2	3.7
Age Adjusted	3.6	3.3	...
Education Adjusted	3.4	3.3	...

TABLE 3.19. MEAN NUMBER OF CHILDREN EVER BORN BY DURATION OF RESIDENCE IN THE CITY, LUSAKA SURVEY, 1968/69

Duration of City Residence (Years)	Observed Total Mean	Age Adjusted Total Mean
0 – 4	3.0	3.2
5 – 9	3.9	4.0
10 – 14	4.9	4.5
15 – 19	5.4	4.5
20 +	5.3	4.5

CHAPTER IV

ASPECTS OF INTERNAL MIGRATION, POPULATION CONCENTRATION AND URBANIZATION IN ZAMBIA

A. Introduction. The implications of internal migration, especially rural-urban movements, for national and sub-regional development have come under increased scrutiny in many African countries. In many development plans, recognition is generally given to the causal nexus between the inadequate supply of urban social and economic amenities and the rapid rate of migration. The fact has been that, given the meagre resources of many African countries, the redistribution of population which accompanies internal migration often frustrates the planned implementation of regional projects with the consequent loss of time and resources. More so, the social and economic problems posed by the high rate of migration, especially those connected with the mushrooming of shanty towns, unemployment, poor housing and the general debasement of the quality of life, have tended to accentuate the level of concern shown by the governments and the public at large. While acknowledging the need for continued urban transformation, many development plans have been emphasizing and are concentrating, more than ever before, on promoting programmes of integrated rural development as a means of restraining the exodus from the rural areas to towns.

Zambia ranks among the many African countries afflicted by the severity of the problems of rapid urban growth. The Government and the ruling Party (UNIP) recognize the main genesis of the problems and have therefore evolved programmes for developing and redeveloping both rural and urban areas. In order to put the widely felt concern into proper perspective, an analysis of the level, pattern, degree, extent and intensity of recent internal migrations will be undertaken. It is expected that the analysis will contribute to appreciating better not only the accelerating rate of migration but also their implications for the successful allocation and programming of social and economic development in the country.

The entire analysis will be done in the context of existing records of both current migration in the last 12 months before the census and of life-time migration of persons as shown by data on birthplace and place of

residence. As well as delineating the pattern and characteristics of the two forms of migration, attempts will be made to indicate some of the physical, social and economic correlates of variations of the rate of migration between geographic areas and/or socio-economic groups. Throughout the presentation, the operational areal units of analysis will consist of either the 41 administrative districts or the 8 provinces. The choice of these units has been dictated by the limitations and nature of the published data drawn from the 1963 and 1969 censuses. Data for both censuses for the areal units are fairly comparable, at least territorially, since no boundary alterations have occurred. In a few cases where former names have been officially changed, indications will be given for the sake of clarity. However, it should be noted that consequent upon the evaluation of the quality of the census results undertaken in chapter 2 and elsewhere (1), there is a great need for exercising great caution in interpreting and using the census migration data for Zambia. As this analysis proceeds, indications of known errors in the migration records will be given.

B. Current Migration Level and Pattern. Current migration in the 12 months prior to the census reflects recent migratory behaviour and experience in Zambia. But this recency by no means precludes the association, either in form or intensity, of the present with the past. In fact, current migration data in Zambia cannot be studied in isolation from historical migration records. While salient differences between the two may be noted, it remains true that, as a result of the social, economic, political and administrative evolution of the country, both forms of migration have much in common. The similarities as well as the dissimilarities will unfold as this analysis proceeds.

The 1969 Census of Population and Housing in Zambia collected and published data on the province of residence at the time of the census (August 1969) and 12 months prior to the census (August 1968). Because of the retrospective reference period, it will be expected that the quality of the record of the place of residence, as in the case of current fertility, would be vitiated by faulty reporting due to reference period error, the absence of a culture of dating events when they occur, and more seriously by multiple moves of short durations which normally complicate the definition and conceptualization of the place of residence. As the census report acknowledges, the question on the place of residence 12 months prior to the census

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(1) P.O. Ohadike, *Some Demographic Measurements for Africans in Zambia,* Communication N° 5, Institute for Social Research, University of Zambia, Lusaka, 1969.

P.O. Ohadike, "Counting Heads in Africa : The Experience of Zambia, 1963 and 1969", *Journal of Administration Overseas,* October 1970, Vol. ix, N° 4.

was frequently misunderstood (1). While for the present, it is not easy to assess the extent of the error associated with this misunderstanding, the published figures do portray some very interesting results, the analysis of which might throw some light on the origins of the misunderstanding.

An important demonstration of the 1968/69 current migration data is the overwhelming importance of migration as a component of population change and redistribution. By applying an index of redistribution defined as $\frac{1}{2}\Sigma|Pi_t - Pi_{t+n}|$ to the total African population, where Pi_t refers to the percentage of population living in province "i" at time t and Pi_{t+n} at time $t+n$, it has been estimated that around 0.5 per cent of the total population in 1969 (or 19,993) will have to be redistributed in order to restore the distribution in 1968. This estimate basically assumes, of course, that there are no differences in natural increase between the provinces. Now, of this total redistribution, the amount (16,885) which is attributable to migration in the short period is reasonably very high. This value has been obtained by halving the sum of the net migration gains and losses irrespective of signs as expressed in this formula : $\frac{1}{2}\Sigma\,|NM_i|$ where NM_i refers to the estimates of net migration for province "i". By relating this average to the total redistributed population, it can be seen that migration alone could have accounted for 84.5 per cent of the total redistribution, so that the remainder would then be explained by inter-provincial variations in natural increase. Further examination of this type of relationship will be made later in the analysis of life-time migrants.

Although the migration component of the factors of population distribution in the period was very high, it has however to be noted that the inhabitants of some geographical and/or administrative areas were more prone to migrating than others. Restrictions to using only the 8 provinces as areal units in studying these differentials have been imposed by the lack of data for smaller areal units. However, it can be seen that the current migration data in Table 4.1 show clearly that of the eight provinces, major net migration gains were made in four provinces in the following order of magnitude : Southern (6,557), Central (6,142), Luapula (2,801), and Copperbelt (1,385). This pattern of positive net change accords with expectations for all the areas except Luapula which, as will also be confirmed later in the analysis of life-time migration, has been a traditional out-migrant area. The high score for Luapula, was probably compensated for by the surprisingly low gain observed for the Copperbelt, where some large under-enumeration and omission may have taken place. Considering its relative economic supremacy and the relative

(1) Republic of Zambia, *Census of Population and Housing 1969,* Final Report, Vol. I, November 1973, Lusaka, p. 4.

weakness of Luapula in this respect, it appears that many of the Copperbelt net migrants were enumerated in Luapula Province. In this regard, it will be necessary to find out if some of the migrant workers on the Copperbelt returned home to Luapula to be enumerated there. Separately or in combination with the above is the likelihood that some net migrants on the Copperbelt were wrongly tabulated with those belonging to Luapula. But all these are conjectures, and there are no strong indications that Luapula alone, and not the other provinces, was affected by this problem. Current net migration loss was highest in the North-Western Province followed closely by the Northern Province, the net migration change per 1000 being – 17.4 and – 14.6 respectively. The lowest loss was observed for the Western Province (– 6.0), followed by the Eastern Province (–8.1).

TABLE 4.1. IN, OUT AND NET CURRENT MIGRATION FOR 1968/69 BETWEEN PROVINCES OF ZAMBIA, 1969 CENSUS

Province	Resident Population 1968/69	Migrants 1968/69			Net Migration change per 1000	Turnover rate per 1000
		In	Out	Net		
1. Western	388,242	8,111	10,438	–2,327	– 6.0	47.8
2. Central	712,630	51,387	45,245	+6,142	+10.2	135.6
3. Eastern	509,515	15,642	19,528	–3,886	– 8.1	69.0
4. Luapula	335,584	17,233	14,432	+2,801	+ 9.3	94.4
5. Northern	545,096	19,995	27,134	–7,139	–14.6	86.5
6. North-Western	231,733	6,204	9,737	–3,533	–17.4	68.8
7. Southern	496,041	25,668	19,111	+6,557	+17.3	90.3
8. Copperbelt	816,309	51,721	50,336	+1,385	+ 2.0	125.0
Total	4,035,150	195,961	195,961	–	–	970,1

Source : Republic of Zambia, Op. cit., 1969, Table 15, p. 29.

A better appreciation of these variations and indeed the intensity of internal migration can be made by considering the turnover rates shown in the last column of Table 4.1. Where M_i and M_o denote respectively the number of in and out migrants for a given area in relation to all other areas, the turnover rate is measured as :

$$\frac{M_i + M_o}{P} \times 1\,000$$

This rate seeks to measure the number of moves in and out of a given area in relation to the population of that area. The Central Province (135.6 moves) had the highest turnover rate per 1000, followed by Copperbelt Province (125.0 moves). The lowest number of moves (47.8) was observed for the

Western Province ; the Eastern, Luapula, Northern, North-Western and Southern Provinces occupied a medium range between 69.0 and 94.4 per cent. The high rate for the Copperbelt accords with expectation and is therefore significant considering that it recorded the lowest absolute net migration gain. Thus, a better picture of the intensity of migratory movements in the Copperbelt and other provinces is obtained by indexes, such as the turnover rate, which measure the actual number of moves made in and out of each province.

Another interesting aspect of the current migration data for 1968/69 is that it facilitates the study of streams and counter-streams of migration between provinces. In studying these phenomena, Ravenstein who in 1885 advanced several "Laws of Migration" posited that each stream of migration in one direction generates a counter-stream from other directions (1). Unless people migrate and totally cut connections with their place of origin ; and unless location of economic opportunities are not decentralized and dispersed overtime, it can hardly be expected that counter-streams of movements would not be generated. For some time now, it has been shown that internal migration in Zambia has been basically labour migration and that migrants often return home to the rural areas to settle or visit relatives and go back again to the towns. This in itself would represent a traditional source of counter-streams. To this should be added the fact that attempts have been made to decentralize industrialization and in particular administration and political organization through involving people in all districts and provinces of Zambia. The politicizing of Lusaka as the headquarter of the Party and Government and its enhancement as the administrative capital have, for example, led firms and companies operating mostly in the Copperbelt to transfer at least their administration or part of it to Lusaka. Each provincial capital in the country has a resident minister and a nucleus of administrative personnel quite larger than any before. All these together with the job opportunities generated in the provinces by the development projects being executed by the Government would help to explain the rather criss-cross movement of persons between the major poles of attractions and the places of origin of the migrants, which are widespread in all the provinces.

Considering the provincial distribution of in and out migrants during 1968/69, a practical illustration of flows and counter-flows between provinces appears very clear as can be seen from data in Tables 4.2 and 4.3, further illustrated in figures 4.1 and 4.2. On a national basis, the percentage distribution of 195,961 migrants by whether they moved in or out of provinces was as follows : (Table p. 78).

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(1) E.G. Ravenstein, "The Laws of Migration", *Journal of the Royal Statistical Society*, No. 48, Part 2, (June 1885), pp. 167-227.

TABLE 4.2. PERCENTAGE DISTRIBUTION OF THE PROVINCIAL ORIGINS OF CURRENT IN-MIGRANTS ENUMERATED IN PROVINCES, DURING 1968/69, ZAMBIA, 1969 CENSUS

Province of Origin of In-Migrants	Province where In-Migrants were Enumerated in 1969								
	Western (1)	Central (2)	Eastern (3)	Luapula (4)	Northern (5)	North-Western (6)	Southern (7)	Copper-belt (8)	Total
1. Western	–	6.2	2.8	0.9	0.6	7.8	16.2	3.7	5.3
2. Central	30.2	–	48.9	5.7	20.6	20.3	53.9	28.9	23.1
3. Eastern	1.8	21.8	–	1.3	2.3	1.3	5.8	11.4	10.0
4. Luapula	2.0	2.7	0.7	–	19.5	1.3	1.8	16.1	7.3
5. Northern	1.8	10.2	3.8	49.5	–	2.1	6.0	21.2	13.8
6. North-Western	18.4	1.4	0.3	1.8	2.8	–	1.2	12.2	5.0
7. Southern	23.7	23.1	4.7	1.3	2.3	8.4	–	6.5	9.8
9. Copperbelt	22.1	34.6	38.8	39.5	51.9	58.8	15.1	–	25.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	8,111	51,387	15,642	17,233	19,995	6,204	25,668	51,721	195,961

Source : Republic of Zambia, *Op. cit.*, 1973, Table 15, p. 29

TABLE 4.3. PERCENTAGE DISTRIBUTION OF THE PROVINCIAL DESTINATIONS OF CURRENT OUT-MIGRANTS DURING 1968/69, ZAMBIA, 1969 CENSUS

Province of Origin of Out-Migrants	Destination of Out-Migrants									
	Western (1)	Central (2)	Eastern (3)	Luapula (4)	Northern (5)	North-Western (6)	Southern (7)	Copper-belt (8)	Total	N
1. Western	–	30.4	4.2	1.6	1.2	4.6	39.9	18.1	100.0	10,438
2. Central	5.4	–	16.9	2.1	9.1	2.8	30.6	33.1	100.0	45,245
3. Eastern	0.7	57.5	–	1.1	2.4	0.4	7.6	30.3	100.0	19,528
4. Luapula	1.1	9.5	0.8	–	27.0	0.6	3.2	57.8	100.0	14,432
5. Northern	0.5	19.3	2.2	31.5	–	0.5	5.6	40.4	100.0	27,134
6. North-Western	15.4	7.3	0.6	3.1	5.7	–	3.1	64.8	100.0	9,737
7. Southern	10.1	62.3	3.8	1.2	2.4	2.7	–	17.5	100.0	19,111
8. Copperbelt	3.6	35.3	12.1	13.5	20.6	7.2	7.7	–	100.0	50,336
All Provinces	4.1	26.2	8.0	8.8	10.2	3.2	13.1	26.4	100.0	195,961

Source : Republic of Zambia, *Op. cit.*, 1973, Table 15, p. 29.

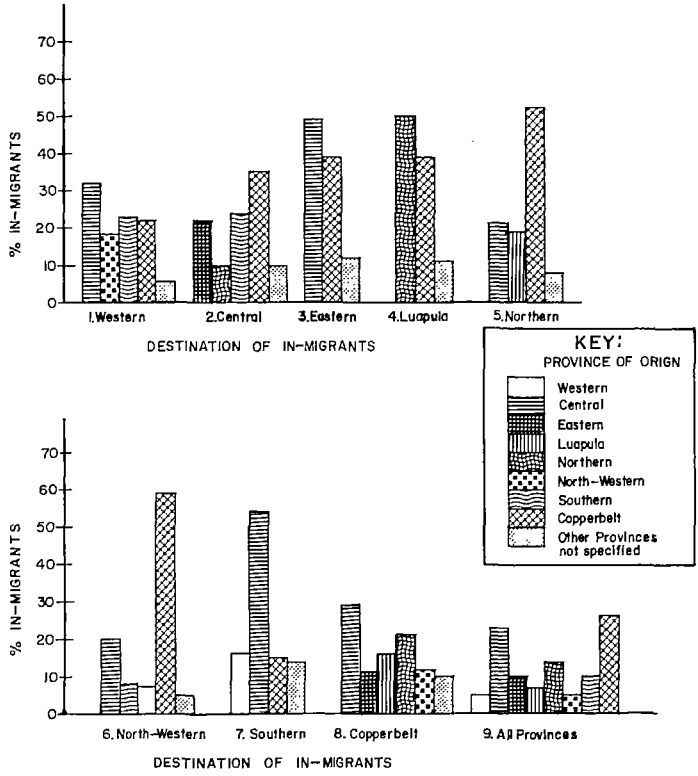

Figure 4.1. – Province of Origin and Destination of African In-Migrants during 1968,69, Zambia, 1969 Census.

	In (Stream) %	Out (Counter-stream) %	Net stream ([a]) as % of Stream
1. Western	5.3	4.1	–28.7
2. Central	23.1	26.2	+12.0
3. Eastern	10.0	8.0	–24.8
4. Luapula	7.3	8.8	+16.3
5. Northern	13.8	10.2	–35.7
6. North-Western	5.0	3.2	–56.9
7. Southern	9.8	13.1	+25.5
8. Copperbelt	25.7	26.4	+ 2.7
Total	100.0	100.0	...
N =	195,961	195,961	...

Note : (*a*) For the computation of values in this column see Table 4.1.

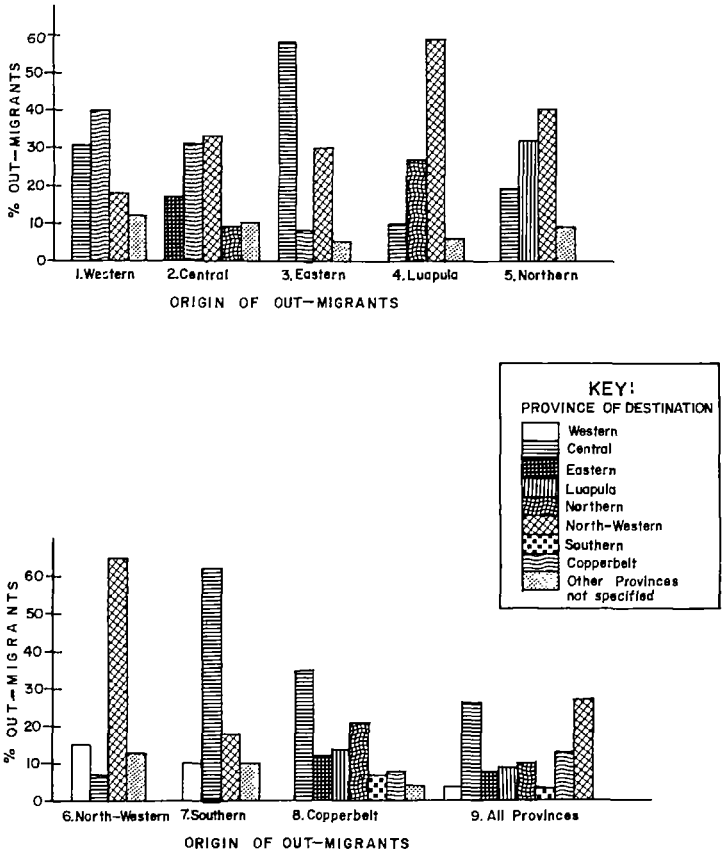

Figure 4.2. – Province of Origin and Destination of African Out-Migrants during 1968,69, Zambia, 1969 Census.

It is striking that, proportionately, the streams and counter-streams are nearly equal. However, by calculating the net stream as the difference between the stream and counterstream, the picture of the net interchange becomes clearer. Here the absolute net stream for each province has been rated as a percentage of the absolute stream in order to interpret better the magnitude of the net stream. The positive and negative signs attached to the ratings conform to the direction of the balance between the stream and counter-stream. In consonance with the earlier observation on the provincial distribution of in-migrants and out-migrants, only four provinces recorded a positive (+) net migration stream, the highest being the Southern (+ 25.5 per cent), followed by Luapula (+ 16.3 per cent), Central (+ 12.0 per cent) and Copperbelt (+ 2.7 per cent). Of the four with negative (–) net migration stream, the extent of the losses in descending order of magnitude were as follows :

North-Western (– 56.9 per cent), Northern (– 35.7 per cent), Western (– 28.7 per cent) and Eastern (– 24.8 per cent). Again, the absence of Luapula Province in this group is very striking.

Streams and counterstreams can also be discussed in terms of area of origin (departure) and area of destination (arrival). An important feature of the data in Tables 4.2 and 4.3 as well as figures 4.1 and 4.2, is the dominant position of certain provinces as the origin of streams and destination of counterstreams. In these respects, one should single out, above all else, the Copperbelt and Central Provinces, which broadly speaking constitute the economic, commercial, political and administrative nerve centres along the important line of rail of Zambia. The Copperbelt, in particular, commands economic and commercial supremacy associated with its rich copper mines and the industries drawn to it not only by the needs of the mines but also those of the miners and their families. Taking the in-migrants alone (Table 4.2), it can be seen that almost half (48.8 per cent) originated from the Copperbelt and Central Provinces. Their share of the out-migrants (Table 4.3) clearly exceeded the fifty per cent mark (52.6 per cent). In general, the relative importance of the provinces as the origin and destination of migrants conformed to the following descending order :

Descending Order	Destination of Out-migrants	Descending Order	Origin of In-migrants
1	Copperbelt (26.4 %)	1	Copperbelt (25.7 %)
2	Central (26.2 %)	2	Central (23.1 %)
3	Southern (13.1 %)	3	Northern (13.8 %)
4	Northern (10.2 %)	4	Eastern (10.0 %)
5	Luapula (8.8 %)	5	Southern (9.8 %)
6	Eastern (8.0 %)	6	Luapula (7.3 %)
7	Western (4.1 %)	7	Western (5.3 %)
8	North-Western (3.2 %)	8	North-Western (5.0 %)

It is necessary to emphasize that the above ordering is in no way synonymous with the rate of out- or in-migration in the period 1968/69. The exercise merely serves to illustrate where migrants came from and where they went to. In fact, the exercise could be extended to the more detailed aspect of the provinces where migrants originating from one province go to. There has been a tendency among scholars of the migration phenomenon in Zambia to regard certain provinces or areas as having cultivated traditional migration links with others. The implication being that migrants from certain areas tended to go mostly to a traditional destination (1). Considering the operation

(1) J.C. Mitchell, "The Distribution of African Labour by Area of Origin on the Copper Mines of Northern Rhodesia", *The Rhodes-Livingstone Journal,* N° 14, pp. 30-36.

P.O. Ohadike, *Development of and Factors in the Employment of African Migrants in the Copper Mines of Zambia, 1940-1966,* Zambia Papers, N° 4, Manchester University Press for the University of Zambia, 1969.

of factors which motivate migration, this assertion appears to be fundamentally correct, but only if the conditions favouring migration remain relatively unchanged for some time. This appears to be the case judging from the data in Tables 4.2 and 4.3, where certain provinces appear to dominate the flow from one or more other provinces.

Of all out-migrants originating from the Western Province, the highest proportion (39.9 per cent) went to the Southern Province, another 30.4 per cent went to the Central Province, while 18.1 per cent went to the Copperbelt. The proportion that travelled to the other 5 provinces was just 11.6 per cent. Of those originating from the Central Province, three provinces in this order of importance : Copperbelt (33.1 per cent), Southern (30.6 per cent) and Eastern (16.9 per cent) were their main destination. The Central Province and the Copperbelt Province received respectively 57.5 per cent and 30.3 per cent of all migrants from the Eastern Province. Most out-migrants from the Luapula Province, 57.8 per cent, were enumerated in the contiguous and rich Copperbelt Province, the other major outflow (27.0 per cent) from there being to the Northern Province. While the migrants from the Northern Province also settled more in the contiguous and rich Copperbelt Province with 40.4 per cent, it is significant that reciprocally many (31.5 per cent) also settled in Luapula province while more significantly so, many (19.3 per cent) travelled farther than the migrants from Luapula and settled in the Central Province. The Copperbelt represented the most important pole of attraction for out-migrants from the North-Western Province. Some 64.8 per cent of them were attracted there, while only 15.4 per cent went to the Western Province. The dominant stream (62.3 per cent) of out-migrants from the Southern Province flowed to the Central Province. The Copperbelt Province (17.5 per cent) and the Western Province (10.1 per cent) also had a fair share of out-migrants from the Southern Province. Out-migrants who originated from the Copperbelt went mostly to the Central Province (35.3 per cent), Northern Province (20.6 per cent), Luapula Province (13.5 per cent), and Eastern Province (12.1 per cent).

The situation with regard to the place of origin of in-migrants enumerated in various provinces was not in any major way contradictory of the above pattern of the provincial settlement of out-migrants. The symmetry merely serves to reinforce the applicability of the flow-reverse-flow pattern of movements to the Zambian situation. One basically pertinent point has been that heterogeneity and a greater balanced-spread of the origins of immigrants tended to increase positively with the economic rating of the provinces. As can be seen from Table 4.2 this is particularly true of the Copperbelt and Central Provinces. Surprisingly, however, the Western Province belonged to this category. In most of the remaining provinces there was a tendency to have one relatively remarkable dominant source of in-migration. Thus of the

in-migrants enumerated in the Eastern Province, 48.9 and 38.8 per cent originated respectively from the Central and Copperbelt Provinces. The sources for Luapula were mainly Northern (49.5 per cent) and Copperbelt (39.5 per cent) Provinces. For the Northern Province, the migrants came primarily from the Copperbelt (51.9 per cent) and secondarily from Central (20.6 per cent) and Luapula (19.5 per cent) Provinces. The sources for the North-Western Province were also primarily dominated by the Copperbelt Province and secondarily by the Central Province.

By piecing together the main strands of the above discussions, it appears possible to draw up broadly-based inferences regarding the origin and destination of internal migrants in Zambia. These inferences are once again built around the issue of the mutuality and reciprocity of the exchange of migrants between two localities in the country. Some that come to mind include :

– All the eight provinces in the country tended to send migrants to the Copperbelt, the predominant flows being from North-Western, Luapula, Northern, and Central Provinces.

– The Western and Central Provinces dominated the flow of migrants to the Southern Province and were indeed the major suppliers.

– Apart from the fairly large proportion of out-migrants to the Southern Province, most Eastern Province migrants tended to go mostly to the Central and Copperbelt Provinces.

– Probably, contiguity of destination, at least in part, influenced persons from Luapula to migrate mostly to the Copperbelt and Northern Provinces.

– While contiguity was important in the choice of destination by migrants from the Northern Province, they seemed to have been transcending their immediate horizon by travelling farther south, mainly to the Central Province.

– Out-migrants from the North-Western Province appeared to be limited in their perception of other destinations besides the Copperbelt Province where most of them went to.

– The Western Province tended to receive migrants from all the provinces (Central, Southern, and North-Western) contiguous to it as well as the more distant Copperbelt Province.

– The Central Province tended to be the sole pole of attraction for out-migrants from the Southern Province.

– Out-migrants originating from the Copperbelt Province tended to be drawn mostly to the Central Province, but more so to the contiguous provinces : Northern, Luapula and North–Western.

C. Inter-Censal Migration Level and Pattern, 1963-69.

The record or estimate of the migrations which occurred between the census dates 1963 and 1969 form the basis of the analysis in this section. These movements are not current migrations in the sense employed above of only recent movements in the last 12 months; they are not also exclusively life-time movements which normally occur between birth and the census. More precisely so, they reflect the cumulative interaction of all streams and counterstreams which occurred between the two census dates. Like life-time movements, however, the intercensal data only permits the analysis of net results without due consideration of the dynamics and impact of all intervening movements during the interval or migration period.

The intercensal population change due to migration in and out of provinces and districts cannot be evaluated directly using the census results as published. Consequently, estimates of population gains and losses due to migration had to be made. The method assumed that fertility and mortality and therefore natural rate of growth remained constant and unchanged in the migration period, 1963-69. It further assumed that enumeration in the censuses was fairly accurate so that the degree of errors in the 1963 census cancelled out that in the 1969 census. If the assumption of constant and unchanged rate of natural increase were correct, the inference was then made that the pattern of population distribution according to districts remained the same in 1969 as in 1963. Any deviations from this expected congruence was explained mostly by inter-provincial and inter-district population exchange.

The results of the estimates are presented in Table 4.4. The essence of the exercise is to highlight the extent of population redistribution and the efficiency of internal migration in the process. The rates shown in column (f) of Table 4.4 summarize the pattern and level of change due to internal migration between provinces and between districts. The pattern and level according to provinces are generally in line with those indicated in the analysis of current migration, except the odd case of Luapula Province with very marked net out-migration during 1963-69 ; this conflicts with the high level of in-migration shown by the current migration data for the period 1968/69. Other than this divergence, the symmetry between the provincial distributions during 1968/69 and 1963/69 is impressive and supports the view that the major poles of migrant attraction have not altered considerably in the recent past. Once again, the dominant position of the Copperbelt and Central Provinces in attracting migrants from the other provinces is underlined.

But the distribution by provinces masks a lot of interesting and important details about the complex cross-currents of migration in the country. The data for the provinces provide summaries of the total interaction of movements in which some of the negative and positive variations between smaller units of analysis cancel out each other and render the appreciation of

TABLE 4.4. ESTIMATE OF MIGRATION GAINS BY PROVINCE AND DISTRICTS, ZAMBIA, 1963 – 69

Provinces and Districts (a)	1963 Census Population ('000) (b)	1969 Census Population ('000) (c)	% Annual Growth 1963-69 (d)	Expected 1969 Population at 1963 Distribution level ('000) (e)	% Change due to Migration ([a]) (f) ([b])
A. CENTRAL PROVINCE	505	713	5.9	584	+22.1
1. Kabwe (Urban)	58	86	6.6	69	+23.9
2. Kabwe (Rural)	87	103	2.8	101	+ 1.7
3. Lusaka	196	354	10.4	227	+55.8
4. Mkushi	54	57	0.9	61	– 6.4
5. Mumbwa	54	60	1.9	61	– 1.2
6. Serenje	56	53	–1.0	65	–18.4
B. COPPERBELT PROVINCE	544	816	7.0	633	+29.9
7. Chililabombwe	34	45	4.7	41	+10.6
8. Chingola	60	103	9.6	69	+49.8
9. Kalulushi	21	32	7.2	24	+32.6
10. Kitwe	123	200	8.4	142	+40.7
11. Luanshya	75	96	4.2	89	+ 7.9
12. Mufulira	81	108	5.0	93	+15.5
13. Ndola (Urban)	93	160	9.5	110	+45.9
14. Ndola (Rural)	57	72	4.1	65	+11.3
C. EASTERN PROVINCE	480	509	1.0	560	– 9.1
15. Chipata	240	261	1.4	280	–22.8
16. Lundazi	122	123	0.1	142	–13.3
17. Petauke	117	125	1.1	138	– 9.2
D. LUAPULA PROVINCE	357	336	–1.0	413	–18.6
18. Kawambwa	172	165	–0.8	199	–17.3
19. Mansa	87	80	–1.2	101	–20.8
20. Samfya	98	91	–1.3	113	–20.1
E. NORTHERN PROVINCE	564	545	–0.6	651	–16.3
21. Chinsali	71	58	–3.4	81	–28.5
22. Isoka	82	78	–0.9	93	–16.7
23. Kasama	114	108	–0.9	133	–19.5
24. Luwingu	81	79	–0.3	93	–15.2
25. Mbala	91	96	0.8	105	– 9.3
26. Mpika	60	59	–0.2	69	–13.9
27. Mporokoso	65	67	0.6	77	–12.6

F. NORTH-WESTERN PROVINCE	211	232	1.6	248	– 6.5
28. Kabompo	33	34	0.2	36	– 8.6
29. Kasempa	34	33	–0.6	41	–19.5
30. Mwinilunga	46	51	1.9	53	– 2.6
31. Solwezi	45	53	2.9	53	+ 0.5
32. Zambezi	53	61	2.3	65	– 5.5
G. SOUTHERN PROVINCE	466	496	1.0	545	– 9.0
33. Choma	96	98	0.3	114	–13.8
34. Gwembe	69	76	1.7	81	– 5.8
35. Kalomo	76	77	0.0	89	–14.2
36. Livingstone	38	49	4.4	45	+ 9.9
37. Mazabuka	154	159	0.6	179	–10.7
38. Namwala	33	37	1.9	37	+ 0.2
H. WESTERN PROVINCE	363	410	2.1	423	– 3.1
39. Kalabo	96	106	1.7	114	– 6.8
40. Kaoma	47	56	3.3	53	+ 7.0
41. Mongu	105	110	0.8	122	– 9.5
42. Senanga	72	89	3.4	85	+ 4.0
43. Sesheke	43	49	2.3	49	+ 0.7
GRAND TOTAL	3,490	4,057	2.5	4,057	–

Note : (*a*) For greater precision these calculations were based on the actual values and not the rounded ones presented in this table.

(*b*) $f = 100\,[(c)/(e)] - 100$.

the subtle details between the smaller units impossible. Thus, it can be seen from Table 4.4 that many provinces which gave overall positive or negative population change due to migration, had specific results for many districts which were at variance with the overall picture for the provinces. Thus, of the six districts in the Central Province, only three, Kabwe (urban), Kabwe (rural) and Lusaka had results which conformed to the provincial pattern of overall positive change. The others, Mkushi, Mumbwa and Serenje, were mainly out-migrant areas. In the North-Western Province, every district, except Solwezi, experienced a heavy out-flow in excess of the in-flow. Livingstone and Namwala had more in-migrants than out-migrants of all the six districts in the Southern Province. Also in the Western Province, three districts (Kaoma, Senanga and Sesheke) made positive contributions as opposed to the overall provincial loss which was only matched by two districts (Kalabo and Mongu). It was only in the Copperbelt, Eastern, Luapula and Northern Provinces that total agreement existed between provincial and district pattern of migration

change. Depending therefore on the use to which migration data will be put, it should be appreciated that altering the size of the areal unit of analysis could introduce significant variations in the pattern and direction of migration. What has been shown in this analysis is that the smaller the areal unit of analysis, the greater the chances of appreciating the finer details of movements and counter-movements. For planning at the local government levels, such details are useful, and should, given the limitations of data, be undertaken.

Several measures testify to the overwhelming significance of migration as a component of population redistribution in Zambia. As already stated, where NM_i refers to the estimates of net migration for area *i*, then half the sum of the total net movements *i.e.* $\frac{1}{2} \Sigma |NM_i|$ would approximate the contribution of migration to total redistribution. This value was 311,839 in the intercensal period 1963-69. By comparing this with the estimated total redistribution of 324,000 persons in the period using again the formula : $\frac{1}{2} \Sigma |Pi_t - Pi_{t+n}$ it can be seen that approximately 96 per cent of this total was associated with migration, the slight remainder being attributed to variations in natural increase.

Further indications of the efficiency of migration in the period are given by the turnover rates and the index of efficiency for the various provinces. The turnover rate measured again by the formula : $\frac{M_I + M_O}{P}$ is the ratio of gross migration to total population and gives an indication of the total moves in and out of a province in order to achieve the expected distribution. The provincial variations here are similar to those already shown in terms of current migration during 1968/69. The number of moves implied by the rates were highest for Luapula (23.3), Central (22.7), Copperbelt (22.5) and Northern (19.8) provinces. The lowest rate (6.5) was recorded for the Western Province. Generally, the efficiency index, measured as the ratio of net migration to the gross migration $\left(\frac{M_I - M_O}{M_I + M_O} \times 100\right)$ also generally confirms the above observations. The provincial indexes clearly show that internal migration has been most effective in the Copperbelt, Eastern, Luapula and Northern provinces with scores almost equal to 100. The efficiency measure was also fairly high for North-Western (–97.1), Southern (–84.0) and Central (+79.5) provinces. Once again, migration was least effective for the Western Province (–44.3).

In Table 4.5, use has been made of the estimates in Table 4.4 to infer the size and distribution of net migration gains and losses by provinces and districts in the country. The bulk of the areas that had net migration gains was in the Central (42.5 per cent) and Copperbelt (53.9 per cent) Provinces, both of which therefore had 96.4 per cent of all positive net flows. The remaining

few were thinly spread among North-Western, Southern and Western Provinces. Chingola, Kitwe and Ndola districts in the Copperbelt Province had very marked concentration of the net positive flows. The major losses were located in all and every district of the Eastern, Luapula, and Northern Provinces. Between them, they shared 69.5 per cent of the total, while the remainder was shared by some districts in the Central, North-Western, Southern and Western Provinces, which also contained some districts which recorded net migration gains.

Since internal migration largely influenced the level and pattern of a population redistribution, it would also be expected to have affected to a large extent the level and pattern of growth of population in the regions and sub-regions of the country. To underline this important role, it was considered necessary to infer the relative contribution of natural increase and net migration to growth and redistribution. As in Table 4.4, the procedure adopted estimated the total intercensal population change for 1963-69 by calculating the difference between the 1963 and 1969 enumerated populations. Population redistribution in the same period was estimated by calculating the difference between the actual and the estimated population in 1969 on the assumption that the pattern of distribution by districts and provinces remained the same as in 1963. With these estimates, net migration and natural increase were calculated as residual categories. Table 4.6 presents the results.

The published results of the 1969 Census of Population and Housing in Zambia clearly state that the rural population increased by an average annual rate of 0.5 per cent, while the urban population grew by an average rate of 8.9 per cent during the period 1963-69 (1). This large disparity is apparently a function of the remarkable population gains through migration from the rural to the urban areas. That migration more than natural increase has been responsible for the marked variation in growth between regions and sub-regions could be further appreciated by studying the results of the estimates in Table 4.6. It can be seen that in the Central as well as the Copperbelt Provinces, which throughout this analysis have been shown to have made large population gains, 61.9 and 67.2 per cent of the total inter-censal increase were respectively due to net migration gains from other provinces in the period. That is to say that both provinces in their population growth gained from net migration as well as natural increase of their base population. The Copperbelt gained 89,427 through natural increase and 183,417 through net migration ; the figures for the Central Province were respectively 79,044 and 128,422 persons.

(1) Republic of Zambia, *Op. cit.*, p. 3.

TABLE 4.5. ESTIMATE OF THE SIZE AND DISTRIBUTION OF NET MIGRATION GAINS AND LOSSES BY PROVINCES AND DISTRICTS, ZAMBIA, 1963 – 69

Province and District	Gains (+) (1)		Losses (–) (2)		Provincial Net Balance (1) – (2)
	Number	%	Number	%	
1. Kabwe (Urban)	16,468	4.8	–	–	–
2. Kabwe (Rural	1,682	0.5	–	–	–
3. Lusaka	126,783	37.2	–	–	–
4. Mkushi	–	–	3,863	1.1	–
5. Mumbwa	–	–	717	0.2	–
6. Serenje	–	–	11,931	3.5	–
Total Central	144,933	42.5	16,511	4.8	+128,422
7. Chililabombwe	4,292	1.3	–	–	–
8. Chingola	34,323	10.1	–	–	–
9. Kalulushi	7,930	2.3	–	–	–
10. Kitwe	57,803	17.0	–	–	–
11. Luanshya	7,028	2.1	–	–	–
12. Mufulira	14,491	4.3	–	–	–
13. Ndola (Urban)	50,247	14.7	–	–	–
14. Ndola (Rural)	7,303	2.1	–	–	–
Total Copperbelt	183,417	53.9	–	–	+183,417
15. Chipata	–	–	18,863	5.5	–
16. Lundazi	–	–	18,861	5.5	–
17. Petauke	–	–	12,627	3.8	–
Total Eastern	–	–	50,351	14.8	– 50,351
18. Kawambwa	–	–	34,358	10.1	–
19. Mansa	–	–	21,083	6.2	–
20. Samfya	–	–	22,789	6.7	–
Total Luapula	–	–	78,230	23.0	– 78,230
21. Chinsali	–	–	23,126	6.8	–
22. Isoka	–	–	15,611	4.6	–
23. Kasama	–	–	26,064	7.6	–
24. Luwingu	–	–	14,147	4.2	–
25. Mbala	–	–	9,849	2.9	–
26. Mpika	–	–	9,591	2.8	–
27. Mporokoso	–	–	9,693	2.8	–
Total Northern	–	–	108,081	31.7	–108,081

28. Kabompo	–	–	3,137	0.9	–
29. Kasempa	–	–	7,914	2.3	–
30. Mwinilunga	–	–	1,343	0.4	–
31. Solwezi	238	0.1	–	–	–
32. Zambezi	–	–	3,588	1.1	–
Total North-Western	238	0.1	15,982	4.7	– 15,744
33. Choma	–	–	15,611	4.6	–
34. Gwembe	–	–	4,689	1.4	–
35. Kalomo	–	–	12,683	3.7	–
36. Livingstone	4,436	1.3	–	–	–
37. Mazabuka	–	–	19,132	5.6	–
38. Namwala	87	0.0	–	–	–
Total Southern	4,523	1.3	52,115	15.3	– 47,592
39. Kalabo	–	–	7,703	2.3	
40. Kaoma	3,709	1.1	–	–	
41. Mongu	–	–	11,587	3.4	
42. Senanga	3,405	1.0	–	–	
43. Sesheke	335	0.1	–	–	
Total Western	7,449	2.2	19,290	5.7	– 11,841
GRAND TOTAL (Balance of all Flows)	340,560	100.0	340,560	100.0	0,0

TABLE 4.6. ESTIMATE OF THE CONTRIBUTION OF NET MIGRATION TO INTER-CENSAL POPULATION CHANGE BY PROVINCES, ZAMBIA, 1963 – 69

Province	1963 Census Population P_1	1969 Census Population P_2	1969 Expected Population P'_2	% Contribution of Migration to 1963/69 population change $\frac{P_2 - P'_2}{P_2 - P_1} \times 100$
Central	505,164	712,630	584,208	+ 61.9
Copperbelt	543,465	816,309	632,892	+ 67.2
Eastern	479,866	509,515	559,866	–169.8
Luapula	357,018	335,584	413,814	+365.0
Northern	563,995	545,096	653,177	+571.9
North-Western	211,189	231,733	247,477	– 76.6
Southern	466,237	496,041	543,638	–160.2
Western	362,480	410,087	421,928	– 24.9

Through further examination of changes, the two provinces (Copperbelt and Central) gained substantially from a redistribution of the natural increase of many of the remaining six provinces. For example, assuming that there was no redistribution between 1963 and 1969, an increase of 80,000 persons would have been recorded in the Eastern Province. Instead, the observed increase was only 29,649, implying a loss of 50,351 persons to other migrant receiving provinces. Similar losses in the North-Western, Southern and Western Provinces were respectively 15,744, 47,597, and 11,841 persons. This negative impact of net migration appears to have affected Luapula and Northern Provinces most of all. The pattern of losses not only wiped out the expected inter-censal increase, had there been no redistribution, but also reduced the size of the base population in 1963. Overall, therefore, a loss of 78,230 was sustained by Luapula Province and 108,081 by Northern Province.

D. Indications of Corresponding Population Concentration. Given the very significant role of migration in the growth and redistribution of population in the regions and sub-regions of the country, a study of the pattern, level and degree of population concentration is necessary. Population concentration is a necessary by-product of the redistribution of population and underlies the entire process of migration. Urbanization in all its forms and manifestations all over the world represents just one aspect of the process of population concentration. Consequently, both total and urban concentration will be dealt with in this analysis as complementary parts of a common phenomenon.

1) Total Population Concentration

Zambia, judged by available indications, has a relatively low total population concentration. In a previous study of the degree and extent of urbanization in Zambia, the size of urban areas and the general pattern of settlement based on the 1963 census results were analysed (1). It was shown that the population of Zambia has been very dispersed and fragmented into very small units. The population density then and even now is very low when compared to other African countries. Traditionally, large settlements are uncommon and village regrouping with the object of maximizing the benefits occurring from the allocation of resources has engaged the attention of the Government. This prevalence of highly dispersed traditional settlements has been associated with the preponderance of small-size towns. Thus of the 63 administratively defined towns in 1963, 49 representing 77.8 per cent of the total number of urban localities had only 11.5 per cent of the aggregate town

(1) P.O. Ohadike, "The Nature and Extent of Urbanization in Zambia", *Journal of Asian and African Studies,* Volume IV, Number 2, April 1969.

population. The balance of 14 towns had 88.6 per cent of all urban dwellers. Actually six of these 14 towns with populations well over 50,000 had 69.6 per cent, while only two, Lusaka and Kitwe, had 31.2 per cent of all urban dwellers (1). On a larger regional scale, the highly dispersed population concentration in the country in 1963 was also evident from the uneven distribution of urban areas between provinces. Thus, not one of Western, Eastern, Luapula, Northern and North-Western Provinces had an urban area with 10,000 inhabitants or more. The Southern province with Livingstone had just one, while the Central and Copperbelt Provinces had two and seven respectively.

Invariably, the pattern and level of concentration have been changing since 1963. Aspects of this tendency have been given in the analysis of the redistribution of population between sub-regions of Zambia. In the following presentation, some conventional quantitative measures of population concentration have been applied to the 1963 and 1969 census results as can be seen from Table 4.7.

For the country as a whole, the degree of concentration as shown by the spread of population in either the 41 administrative districts or 8 provinces has been assessed. Three indices : (a) Gini Concentration Ratio (b) Duncan Index of Concentration and (c) the Lorenz Curve of Concentration, were employed. The index developed by Gini takes into account the spread of population among the various areal sub-units in the country. It compares the cumulative proportion of total population in the sub-units (districts or provinces) with the cumulative proportions of the area of the sub-units briefly stated :

$$\text{Gini's Ratio} = \left(\sum_{i=l}^{n} X_i \, Y_i + 1 \right) - \left(\sum_{i=l}^{n} X_i + l \, Y_i \right)$$

where X_i and Y_i are respective cumulative percentage distribution and n is the number of areal sub-units. The calculated ratio for 1963 and 1969 were 0.104 and 0.246.

The index developed by Duncan as can be seen from the formula given in Table 4.7, is closely related to the Gini ratio and also the Lorenz curve in that it also compares the proportions of population with proportions of the land area of sub-units. The major difference is that Duncan's index uses uncumulated proportions.

Hence in the formula $\Delta = 1/2 \sum_{i=l}^{k} |x_i - y_i|$, x_i and y_i represent respectively the uncumulated proportions of population and land area of sub-

(1) P.O. Ohadike, *Ibid.*, pp. 110-112.

TABLE 4.7. SOME INDICES OF POPULATION CONCENTRATION AND URBANIZATION IN ZAMBIA, 1963 AND 1969 CENSUSES

Unit of Measurement	Type of Index	Index	
		1963	1969
1. *Districts/Provinces*	(a) Gini Concentration Ratio	0.104	0.246
	(b) Duncan "Index of Concentration" given by $\Delta = \frac{1}{2} \sum_{i=l}^{k} \lvert x_i - y_i \rvert$ where x_i and y_i are respectively uncumulated % population and land area	0.193	0.239
2. *All Designated Urban Areas*	(c) $CI = \sum^{N} \lvert \frac{P_l}{P} (100) - \frac{100}{N} \rvert$	18.38	23.82
3. *Urban localities with 5000 or more persons*	(d) $CI = \sum^{N} \lvert \frac{P_l}{P} (100) - \frac{100}{N} \rvert$	10.51	23.82
4. *All Designated Urban Areas*	(e) Durand/Palaez Index of change of % urban during 1963 – 1969 given by : $\frac{U_t - U_0}{U_0} \times 100$ where U_0 and U_t are urban populations at time 0 and t respectively	–	43.40
	(f) H.I. Eldridge' index of the pace of urbanization given by : $\frac{U_t - U_0}{100 - U_0} \times 100$ where U_0 and U_t are the same as above	–	11.20
5. *All Designated Urban Areas (1963 – 69)*	(g) Annual rate of Growth given by $r = \frac{(\text{Log } \frac{Pt}{P})}{t} - 1$		8.80
6. *All Designated Rural Areas (1963 – 69)*	"	–	0.60

units (1). Applying the above formula yielded an index equivalent to 0.193 for 1963 and 0.239 for 1969.

The result of applying the Lorenz curve of concentration to census data for 1963 is depicted in figure 4.3. In the graph, the cumulative per cent distribution of population in 41 districts (X axis) is plotted against the cumulative per cent distribution of the areas of the 41 districts (Y axis). The theoretical expectation is that the curve should follow the diagonal, if there were an even distribution of population. On the contrary, the degree of uneven distribution would be depicted by the deviation of the curve from the diagonal (2). The implicit assumption in drawing the curve and in fact in calculating the Gini ratio is that population density varies positively with the size of the sub-areal units. Consequently, the size of the major area between the curve and the diagonal indicates the density level. This area for the two censuses appears relatively small and therefore indicates the prevalence of low concentration of population which is also supported by the rather low Gini ratios of 0.104 for 1963 and 0.245 for 1969. But the fact that the area defined by the 1969 curve is larger than that by the curve for 1963 shows a growing tendency towards achieving higher levels of concentration. Not only the areas, but also the maximum vertical distances from the Lorenz curve to the diagonal depicted as Δ in figure 4.3 attest to the growing level of concentration. In fact, the Gini ratio which gives the ratio of the area of the graph bounded by the Lorenz curve and the diagonal to the total area below

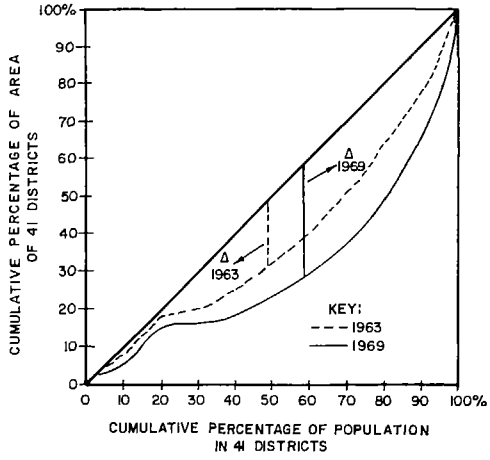

Figure 4.3. – The Lorenz Curve of Population Concentration for Zambia, 1963 and 1969

(1) Otis Dudley Duncan, "The Measurement of Population Distribution", *Population Studies,* Vol. 11, N° 1, July 1957.

(2) M.O. Lorenz, "Methods of Measuring the Concentration of Wealth", *Quarterly Publications of the American Statistical Association,* 9(70), pp. 209-219, June 1905.

the diagonal also supports the move towards further concentration. The index shows that concentration was over twice as high in 1969 as in 1963. Though not quite as spectacular, the Duncan index also illustrates the same tendency between the two dates.

2) Urban concentration

Because population concentration in Zambia appears to be highly correlated with urbanization, measures of concentration employing data for designated or administratively defined urban localitites have also been computed. The degree of concentration within all the designated urban localities and those with 5000 persons or more has been measured by the following index :

$$CI = \sum^{N} \left(\frac{P_i}{P} (100) - \frac{100}{N} \right)$$

where P_i is the population of the urban area at the census date, P is the population of Zambia at the same date, and N the number of urban localities in Zambia. The theoretical expectation is that the value of this index would be zero if population were equally spread or shared among the urban areas ; it would attain a maximum value equal to $\left(100 - \frac{100}{N}\right)$ if the entire population was concentrated in one urban locality. In practice, the index lies almost always between the two extremes, and the higher the value the greater the degree of concentration in selected localities as against an even spread among them.

From the values of this index given in Table 4.7, concentration appears to be low but definitely increasing with time. The increase is more apparent in the case of urban localities with 5000 or more persons (1) where the index rose from 10.51 in 1963 to 23.82 in 1969. This increase corresponds to that already shown for the total population of Zambia. The correspondence together with the closeness of the urban indices to those for the total population, further strenghten the observation that the pattern of urban population concentration is indeed positively related to that of the total population of Zambia.

In countries such as Zambia, the level and pace of urbanization provide reasonably reliable indicators of overall tendency towards concentration of population. Urbanization which occurs mainly because of the movement of people from rural to urban areas clearly involves significant regional shifts in population. Consequently, some indices of change in urbanization in Zambia have been calculated and shown in Table 4.7. The John Durand-Palaez index :

(1) For details of the classification of urban areas into sizes see P.O. Ohadike, *Op. cit.*, April 1969, p. 121.

$\frac{U_t - U_o}{U_o} = 100$ where U_o and U_t are percentages of urban population at time o and t respectively, gives the per cent change in per cent urban between times o and t. Granting the adequacy of the official definition of urban areas, the index shows that the percentage of the urban population of Zambia increased by 43.4 per cent (1).

The index of the speed of urbanization ($\frac{U_t - U_o}{100 - U_o} \times 100$) suggested by Eldridge gives also a significantly high rate of 11.20 per cent for Zambia during 1963-69. Some of the rates calculated for other African countries for the period 1950-60 were Mali (2.1), Senegal (3.3), Sierra Leone (2.2), Ghana (10.5), Liberia (8.4) and Nigeria (9.9). From these it can be seen that the pace of urbanization in Zambia compares with some of the fastest in the African region. In order to put the rapid rate into proper perspective one should compare the annual rate of urbanization of 8.8 per cent with the annual rate of growth of 2.5 per cent for the total population and 0.6 per cent for the rural population, using again the officially published figures for 1963-69. Apparently these differences imply that, in the period, the urban population was increasing at an average rate equal to almost 15 times the rate for the rural area and exactly $2\frac{1}{2}$ times the rate for the total population of the country. It is interesting to note that while the annual rate of urban growth exceeds those shown for North Africa (4.3 per cent), West Africa (6.9 per cent), and East Africa (5.5 per cent), the rural rate clearly deviated significantly from the rates 1.7, 2.9, and 2.2 per cent respectively for the above sub-regions (2).

While the rate and speed of urbanization has been generally rapid, there have certainly been variations according to the size of localities. The most striking of these is the tendency towards greater degree of concentration in the large towns and cities. Compared with the calculated average rate of growth of 8.8 per cent for all urban areas, the really big cities with 100,000 or more persons urbanized faster. Thus, during 1963-69, these cities experienced rates of urban growth as high as : 15.7 per cent for Lusaka, 11.9 per cent for Kitwe, 13.0 per cent for Ndola, and 12.6 per cent for Chingola. Apart from this marked rate of growth, it is also worth noting that the number of these cities with 100,000 or more persons had increased from two

(1) For the figures on the per cent urban population in 1963 and 1969 see Final Report, *Census of Population and Housing*, Vol. I, 1973, p. 1.

(2) K. Davies, *World Urbanization 1950-70, Vol. I, Basic Data in Cities, Countries and Regions*, Population Monograph Series 4, University of California, Berkeley, 1969.

(Lusaka and Kitwe) in 1963 to five in 1969. Excepting Lusaka, all the other cities are located in the rich Copperbelt Province.

3) Primacy Index of Concentration

Studies of the primacy of the first city have also been used to delineate trends in urban population concentration, especially in the developing countries. Primacy defines a situation where in a country the first or principal city shares a significantly higher proportion of the urban population of the country. Examples, which include : Cairo in Egypt, Accra in Ghana, Casablanca in Morocco, Dakar in Senegal, Tunis in Tunisia, Abidjan in Ivory Coast, Bamako in Mali, Tananarive in Madagascar, Port-Louis in Mauritius, Mogadiscio in Somalia, Kampala in Uganda and Dar-es-Salaam in Tanzania, abound in Africa.

But the above categorization of primate cities employs demographic definitions related only to population size. This could hardly be regarded as adequate. In the first place, primacy should be seen as a passing phase in the development of cities and national economies ; the relationship between the factors of urban growth cannot be presumed static giving efforts towards improving and decentralizing development. More important, however, is the fact that primacy as well as being a demographic phenomenon has also socio-economic and geo-political features which regulate individual and national life. Where only demographic variables are taken into account, the tendency will be to under-rate the primacy of cities which do not have a commanding demographic dominance over all other cities and towns. A case in question is Lagos (665,000 persons in 1963) which when compared to Ibadan (627,000 in 1963) implies that it was not a primate city in 1963 ; and yet Lagos by all accounts is the economic, political, administrative and communication nerve-centre of Nigeria. Given such discrepancies, it seems better to consider primacy as a demographic, economic, political and sociological phenomenon. This accords more with the Jeffersonian first and original concept of the primate city which is supereminent not merely in size but in national influence, and exceptionally expressive of national capacity and feeling (1).

But the demographic measurement of primate city, especially for purposes of international comparability, constitutes another difficult issue. The problem is basically one of determining how large a first city should be in order to pass as a primate city. In the literature, it has been shown that the principal city can be identified by applying G.K. Zipf's formula or rank-size rule. This rule supports the existence of a non-linear relation between city size and number of cities. More precisely, the size of the first city is held to be

(1) Mark Jefferson, "The Law of the Primate City", *Geographical Review*, Vol. xxix, 1939, pp. 226-232.

equal to the size of any other city in the country times its rank. Hence by the formula : $P_i = K/r_i$, where P_i is population of city "i" in the rank, K the size of the first city and r_i the rank of city "i", the expected size and distribution of cities can be reconstructed, and deviations of the expected from the observed calculated.

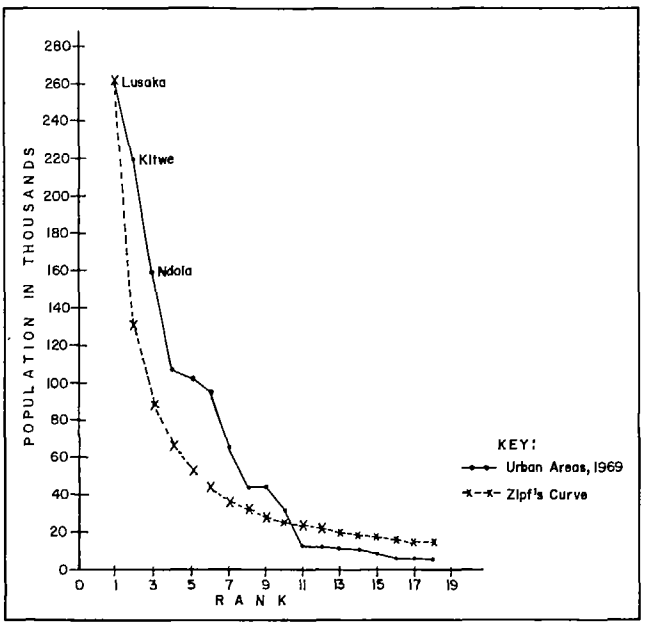

Figure 4.4. – Rank and Size of Urban Areas of Zambia, 1969 and Curve of Zipf's Rank-Size Rule ($P_i = k/r_i$).

The rank-size rule has been applied to the 18 designated urban localities in Zambia in 1969. Of the eighteen, only five were cities of 100,000 or more persons, and Lusaka with a population of 262,425 was the master city. Non-city localities, less than 100,000 persons, were included in order to be able to study the symmetry in the pattern of urban population concentration. The result of the application of Zipf's formula is shown in figure 4.4. As can be seen, the primate city of Lusaka is according to rule clearly located at the top of Zipf's rank-size curve, and is far removed from the large majority of the other urban areas. But Kitwe and Ndola were also outstanding in their rank-size. Thus it could be maintained that while Lusaka was the overall national primate city, Kitwe in particular and less so Ndola demonstrated regional primacy in terms of the Copperbelt and surrounding provinces. Kitwe is the chief copper city while Ndola thrives mostly by commerce and satellite industries attracted by copper mining. Lusaka combines a lot more functions

than these. It is the national capital, the chief window to the world by air, the focus of internal transportation routes and the principal social, economic and cultural centre.

Another point clearly demonstrated by the Zipf's rank-size rule in figure 4.4 is the lack of proper balance in the pattern of urbanization in Zambia. Contrary to the expected closeness of fit, there are wide deviations of the curve for urban areas in 1969 from Zipf's rank-size curve. This improper balance in the pattern of urbanization further supports the point made several times in the analysis that low and uneven concentration of population prevails in Zambia.

In the area of international comparison, attempts have been made to coin an adequate primacy index. Notably, Kingsley Davis and his associates at the International Urban Research Centre, Berkeley, USA, developed and used a formula which directly computes the population of the largest city in a country as a percentage of the total population of the next four largest cities. Briefly the formula for the four city index is :

$$PR = \frac{P_1}{P_2 + P_3 + P_4 + P_5} \quad \text{where}$$

PR is the index, and P_1, P_2, . . .,P_5 are the respective populations of the first, second . . . and fifth city in the country. Applied to Zambia, a primacy rate of 0.46 was obtained. By standards prevailing elsewhere in and outside Africa, the index for Zambia is relatively low. (1). It approximately corresponds, however, to the rate of 0.45 shown for the former Federation of Rhodesia and Nyasaland for 1955 (2).

An index of primacy developed by the writer has also been applied to the population of Zambia with some success. The method takes its cue from the Davis four-city primacy index just discussed. Its development has been prompted by the need to add some refinement to the measure of primacy.

The method has been formulated as follows :

If P_1, P_2, P_3, P_4 and P_5 represent respectively the population of cities 1, 2, 3, 4 and 5 in descending order of magnitude ; and if

---

(1) In 1955, for example, Morocco had an index of 0.55 ; Egypt, 0.62 ; Libya, 0.60 ; Sudan, 0.64 ; Uganda, 0.66 ; Ethiopia, 0.67 ; and Angola, 0.69 ; Outside Africa, France recorded 0.75 ; Peru, 0.82 ; Thailand, 0.94 ; and Mexico, 0.74.

(2) All rates are taken from Norton Ginsburg, *Atlas of Economic Development*, Table 12, University of Chicago Press, 1961.

$$U_5 = \frac{P_1}{P_2 + P_3 + P_4 + P_5} \quad (1)$$

$$U_4 = \frac{P_1}{P_2 + P_3 + P_4} \quad (2)$$

$$U_3 = \frac{P_1}{P_2 + P_3} \quad (3)$$

$$U_2 = \frac{P_1}{P_2} \quad (4)$$

Then :

$$\text{Index (OPI) } ^{(1)} = \sqrt[n]{U_2 \times U_3 \times U_4 \times U_5} \quad (5)$$

$$= \frac{\text{Log } U_2 + \text{Log } U_3 + \text{Log } U_4 + \text{Log } U_5}{n} \quad (6)$$

For Zambia 1969 $U_5 = 0.46$; $U_4 = 0.56$; $U_3 = 0.73$; $U_2 = 1.31$; Substituting in (5) above, Index OPI = 0.70

By comparison with the four-city index by Davis and his associates, it can be seen that the Ohadike Primacy Index gave a significantly higher value of primacy for Zambia, 0.70 as against 0.46. The reason for this can best be appreciated by examining the implications of the ratios derived separately by equations (1) to (4) above. Respectively each equation gives the ratio of the population of the first city to the combined populations of four cities next to the first in size, and then of three, two and one, all next to the first city in that order. Four different ratios of unequal weights were therefore derived and in order to ensure that the weights of the ratios and variations are taken into account, a geometric mean (equation 5) of the four ratios is calculated to give the index of primacy for Zambia. It is mainly due to this fact that the weights of the individual ratios are given due recognition in determining the index that helps to explain the higher index of primacy derived by the Ohadike Index.

E. Socio-economic and Biological Characteristics of Migrants.

Not everyone in the population migrates at the same rate. The correlates of migration behaviour necessarily imply the existence of differential response rates among the different segments of society.

(1) OPI = Ohadike Primacy Index.

Thus for certain economic, social, psychological or cultural reasons, migration tends to select more persons from certain population segments than the other. Correspondingly, the selectivity manifests itself in the socio-economic and biological characteristics of migrants. In particular, the urban areas, especially the very large and complexly industrialized ones, depict more clearly these characteristics than any other areas.

The fundamental biological variations between migrants and non-migrants are often discussed by demographers in terms of age and sex.

TABLE 4.8. AGE AND SEX STRUCTURE OF MIGRANT AND NON-MIGRANT POPULATION, ZAMBIA, 1969 CENSUS

Age	Non-Migrants (Born in District of enumeration)	Migrants Born:		Total
		Elsewhere in Zambia	Outside Zambia	
		(a) Males		
0 – 4	24.1	12.2	5.6	18.8
5 – 19	41.9	32.4	27.8	37.8
20 – 49	24.2	46.2	51.7	33.6
50 +	9.8	9.2	14.9	9.8
Total	100.0	100.0	100.0	100.0
		(b) Females		
0 – 4	21.9	13.8	6.7	18.6
5 – 19	36.2	35.6	32.5	35.8
20 – 49	33.4	44.4	50.8	37.7
50 +	8.5	6.2	10.0	7.9
Total	100.0	100.0	100.0	100.0
		(c) Both Sexes		
0 – 4	23.0	13.3	6.1	19.0
5 – 19	38.8	31.9	30.1	36.1
20 – 49	29.1	46.8	51.2	36.0
50 +	9.1	8.0	12.6	8.9
Total	100.0	100.0	100.0	100.0
		(d) Sex Ratio (M/F)		
0 – 4	964	955	952	962
5 – 19	1,014	1,193	983	1,002
20 – 49	635	1,124	1,169	850
50 +	1,010	1,623	1,696	1,202
Total	876	1,080	1,147	953

Source : Republic of Zambia, *Op. cit.*, November 1973, p. 27.

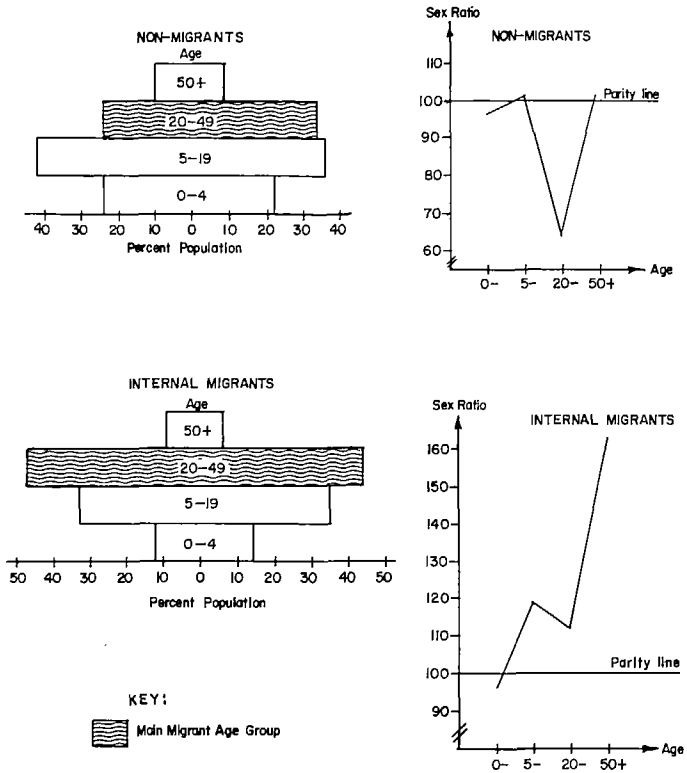

Figure 4.5. – Age-Sex Structure of Migrants and Non-Migrants, Zambia, 1969 Census.

Evidence of such biological variations exists in the age-sex data obtained from the 1963 as well as the 1969 censuses of Zambia. The effects of migration on the rural and urban population of Zambia in 1963 have been fully analysed elsewhere (1). Briefly, as a result of movements into towns, the rural population aged between $22\frac{1}{2}$ and $45\frac{1}{2}$ years showed signs of depletion, while a large proportion of old people were present. Thus, the population over $45\frac{1}{2}$ years comprised 13.6 per cent of persons in the rural areas, 8.6 per cent of the European Farm inhabitants, and only 4.4 per cent of urban dwellers. In the same 1963 census, Zambia's sex ratio showed a preponderance of females over males contrary to the fact that males predominated markedly in the European farm areas and in the towns. Emphasizing the selective male migration pattern, rural sex ratio at 90 in 1963 was clearly in favour of more females as opposed to 106 and 128 respectively for European Farm and urban areas with more males.

(1) P.O. Ohadike, *Some Demographic Measurements for Africans in Zambia, An Appraisal of the 1963 Census Results and Administration,* Communication N° 5, Institute for Social Research, University of Zambia, 1969, pp. 9-16.

According to the 1969 census, the above pattern of age-sex variations persists as can be seen from Table 4.8. Irrespective of sex, there was a greater concentration of population in the age group 20-49 years for migrants than for non-migrants. For the total population for example, 46.8 per cent of internal life-time migrants and 51.2 per cent of international life-time migrants were aged 20-49 in contrast to only 29.1 per cent of all non-migrants. The implied migrant/non-migrant variation is further illustrated in Figure 4.5, showing a higher proportion of children, 0-4 years and of adults, 50 years or more among non-migrants than internal migrants with a preponderance of those aged 20-49 years. The general effect of the age variations is that migrants on average proved to be much older than the non-migrants as shown by the following figures on the median age to the migrant/non-migrant groups :

Migrant Status	Median Age (1969 Census of Zambia)	
	Males	Females
Non-Migrants	12.24	14.94
Internal Migrants	22.71	20.22
International Migrants	30.73	24.85
Total (Zambia)	19.28	17.50

Sex ratio variations in 1969 were also in agreement with the pattern in 1963. As illustrated in Figure 4.5, there continued to be a marked deficit of males among non-migrants mostly in the rural areas, and a marked preponderance of males among migrants. The non-migrants had lower sex ratios mainly because of the greater migration of males to urban areas and job centres. To appreciate this better, the sex ratio of non-migrants in the main migrant age group of 20-49 may be compared with the sex ratio of the migrants in the same age group. As can be seen from Table 4.8, internal migrants born elsewhere in Zambia had a sex ratio of 112 males to 100 females. This, compared to a ratio of 64 males to 100 females for the non-migrants, implies an approximate difference of 75 per cent in favour of migrants. With a sex ratio of 117 males to 100 females for international migrants aged 20-49, the difference in their favour was as high as 83 per cent. The variations apart, note should be made of the marked deficit of females among internal migrants of school age population, 5-19 years. This may have been due to more male migration to towns for education, and for employment, particularly of primary school leavers and drop-outs. Given African attitudes toward the rearing and education of the sexes, male children and adolescents were more likely to be sent to the city for education ; male drop-outs were also more

likely to be free to migrate for employment and other opportunities in the rather "hostile" world of the cities, where family cohesion tends to be fragile.

Barring the influence of age and sex, the selectivity of migration affects also educational and occupational categories. Up to the time of writing, no additional relevant data from the 1969 census has been published. Consequently, assuming that no radical changes occurred, reliance has been placed on data from the 1963 census for indicating the relationship between migration and education, and migration and employment. In this census, the favoured position of urban areas in educational attainment was very much in evidence. Only 52.7 per cent of urban inhabitants were uneducated as against 68.7 per cent and 72.1 per cent respectively of persons found in European farm areas and the African rural areas. Not only had the urban areas attracted more educated migrants, it also had more and better educational facilities, so that migrants when living in towns acquired or improved their education. Associated with the rural-urban differentials is the variation according to size of urban localities. There was a tendency for the proportion of educated persons to grow as the size of urban areas increased. In addition to greater and better educational opportunities in the more urbanized areas, the industrial advantage of the larger urban centres would have attracted more educated persons in search of employment.

Social and regional variations in employment and economic activity were also evident from the 1963 census results. Basically, wage labour tends to be attracted mostly to areas that will absorb them, and this, given the limitations of the data, is clearly underlined by the rural-urban pattern of male employment, there being no information about females. Thus the urban and European farm areas in the census had a marked proportion of their male population in paid employment. Slightly over two-fifths were so designated in contrast to just 5.1 per cent in the African rural areas. As for those seeking paid employment, the proportion was about twice as high in the urban areas as in the rural. It was also about thrice as high as in the European farm areas. Thus the proportion of unemployed males in the rural areas unexpectedly exceeded that in the European farm areas. The reason for this, quite apart from over-enumeration, might possibly be a return migration to rural areas of persons who failed to secure jobs in the urban and European farm areas. Dominating the employment scene in the rural areas was the self-employed group, 62.2 per cent and 17.1 per cent of whom were respectively farmers and fishermen. The proportion there was just over twice as high as in the European farm areas and well over six times as high as in the urban areas.

Paid employment and unemployed were also highly localized according to the degreee of urbanization. Some 50 per cent of Zambian male wage earners were in the urban areas. Similarly, about 38 per cent of all males seeking to be employed were also in the urban areas. Of greater significance,

however, is the fact that the bulk of the urban wage earners, about nine-tenths, and representing 53.5 per cent of all male employees were found in the ten major towns of Zambia in 1963, including Chililabombwe, Kabwe, Chingola, Kalulushi, Kitwe, Livingstone, Luanshya, Lusaka, Mufulira and Ndola. Their combined male population in 1963 was only 18.6 per cent of the country's total. Two of these towns, Kitwe and Lusaka, had the largest pool amounting to well over one-fifth of Zambia's wage earners. This pattern of localization is consistent not only with their being the two largest cities in Zambia but also with their socio-economic status as important industrial and administrative centres. Further evidence of the functional significance of towns was indicated by the fact that the main Copperbelt towns alone harboured 40.2 per cent of all male wage earners in Zambia and, in fact, 67.6 per cent of those in the urban areas (1). Located mostly along the country's economically important railway, the main Copperbelt towns include all those listed above with the exception of Lusaka and Livingstone.

F. Some Correlates of Regional Variations in Migration Flows.

Explaining migration behaviour and the implied differential response of individuals and groups to the need to migrate are difficult and sometimes very confusing. The fact is that there is just no single variable which can completely account for the differences in migration behaviour patterns. Rather, a complex network of social, economic, psychological and personal variables, each interacting with the other, affects the rate and flow of migration from one region to another.

Not all of the variables, however, are amenable to easy measurements. This is particularly true of the personal and psychological variables which, in addition to the problems of quantification, are severely subject to time variations due to changes in personal and social circumstances. Judging from the literature, economic and related variables appear to have lent themselves to easier quantification. In any case, several variables, economic or otherwise, would act in concert to generate streams and counter-streams of migration between regions. But the variables do not have equal significance.

Previous studies of the phenomenon in Zambia and Central Africa demonstrate a consensus of opinion on the overriding influence of economic necessity on the level and pattern of migration (2). The general theoretical

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(1) P.O. Ohadike, *Op. cit.*, April 1969, Table 8, pp. 118-119.

(2) P.O. Ohadike, "Migrants in the Copper Mines of Zambia, 1940-66". In S.H. Ominde and C.N. Ejiogu (eds.), *Population Growth and Economic Development in Africa*, Heinemann, London, 1972, pp. 255-260.

J.C. Mitchell, "Factors Motivating Migration from Rural Areas". In *Present Interrelations in Central African Rural and Urban Life*, Proceedings of the Eleventh Conference of the Rhodes-Livingstone Institute for Social Research, January 14-17, 1958, Lusaka, 2nd Edition (1968), pp. 12-23.

TABLE 4.9. SELECTED CORRELATES OF CURRENT IN-MIGRATION (1968/69) TO THE COPPERBELT AND CENTRAL PROVINCES

Province of Origin	Total Population 1969 ('000)	Current In-Migrants 1968/69	Rate of In-Migration per 1000	Mean Distance of Districts (Miles)	Stewart's Gravitational Index N/D	Zipf Index PoPd D	Population Density per 1000 Hectares	Per cent Population Urban 1963	Per cent Population Urban and in European Farms 1963
				A. Copperbelt Destination					
Western	410,087	1,893	4.6	740	554	452	32	3.0	3.0
Central	712,630	14,974	21.0	221	3,225	2,633	61	32.1	43.8
Eastern	509,515	5,900	11.6	667	764	623	74	2.7	6.5
Luapula	335,584	8,336	24.8	183	1,834	1,498	66	4.3	4.3
Northern	545,096	10,965	20.1	418	1,304	1,064	37	3.6	4.9
North-Western	231,733	6,307	27.2	348	666	542	18	3.0	5.3
Southern	496,041	3,346	6.7	390	1,272	1,038	58	11.8	29.1
				B. Central Province Destination					
Western	410,087	3,175	7.7	385	1,065	759	32	3.0	3.0
Eastern	509,515	11,233	22.0	379	1,344	959	74	2.7	6.5
Luapula	335,584	1,367	4.1	401	837	597	66	4.3	4.3
Northern	545,096	5,223	9.6	547	997	710	37	3.6	4.9
North-Western	231,733	713	3.1	432	536	382	18	3.0	5.3
Southern	496,041	11,897	24.0	175	2,777	2,021	58	11.8	29.1
Copperbelt	816,309	17,779	21.8	218	3,744	2,669	26	82.0	88.6

approach in these studies shows the heavy reliance placed on situation-oriented models for explaining variations between areas. Thus the size of migration from one region to another is attributed to the push-pull factors among which are economic opportunities and distance.

The prevalence of several streams and counter-streams between district and provinces has already been demonstrated in the present analysis. Also illustrated however is the other important fact that the flows and counter-flows from all directions were very significantly marked for the Copperbelt and Central provinces. This clearly accords with the already demonstrated fact that the two provinces combined command the lion's share of the major migrant attractions. Consequently, in the delineation of the correlates of variation in migration flows, attention will be focused on the situation as shown by the rate of current in-migration during 1968/69 to the two provinces taken separately. This amounts to treating them as separate destinations of migrants from other areas of Zambia.

In a previous study of migration to the copper mines, the relative significance of intervening economic and wage opportunities, distance between origin and destination, Stewart's and Zipf's gravitational indices, and the population size of sending areas, was established with some degree of success (1). Given the limitations of data, the study then focused on male migrants alone. The present analysis will use the data for all migrants irrespective of sex. Table 4.9 provides the framework for the present re-assessment of the impact of these situation-oriented correlates.

1) Population Size and Density of Sending Areas

Among the factors operating within the area of origin of migrants are the physicosocial variables which generate moves to other areas. Prominent among these are the size and density of population. In generating moves, these variables are thought to impose demographic as well as economic pressures which "push" population to other areas. They may operate effectively in rural as well as in urban areas. Thus rural fragmentation of agricultural land may be due to population pressure on arable land, while over-urbanization and the attendant shortage of amenities may reduce rural-urban migration and even encourage return and out-migration from the urban areas. Generally, the significance of size and density of population in generating migration stems from the economic disequilibrium brought about by unequal distribution of resources and a lack of correspondence between the distribution of population and economic opportunities. The inequality, depending on the individual's perception of opportunities elsewhere, encourages out-migration.

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(1) P.O. Ohadike, *Op. cit.*, 1972, pp. 258-259.

TABLE 4.10. CORRELATION COEFFICIENTS AND COEFFICIENTS OF DETERMINATION BETWEEN RATES OF IN-MIGRATION TO THE COPPERBELT AND CENTRAL PROVINCES AND SELECTED MOTIVATIONAL VARIABLES

Selected Variables	Copperbelt Destination		Central Province Destination	
	r	(r^2) 100 (%)	r	(r^2) 100 (%)
Distance (miles)	−0.79	62.41	−0.77	59.29
Stewart's Index (N/D)	+0.41	16.81	+0.86	73.96
Zipf's Index (P_oP_d/D)	+0.41	16.81	+0.86	73.96
Population Density	−0.05	0.25	+0.48	23.04
% urban population (1963)	+0.16	2.56	+0.27	7.29
% urban and European Farm population (1963)	+0.12	1.44	+0.66	43.56
Population of sending areas	−0.30	9.00	+0.65	42.25

Given the above theoretical basis, it is surprising that neither the size nor the density of the population of the places of migrant origin was significantly (not at the 5 per cent level) associated with the rate of migration to either the Copperbelt or Central Province. The surprise is even greater when it is considered that migration (gain or loss), as can be seen from Table 4.11, clearly affects population density and the carrying capacity of land in provinces and districts.

It is however important to note that the amount of variations explained by the two variables, taken separately, was much higher in the Central than in the Copperbelt Province. For example, only 0.25 per cent of the variation in the rate of in-migration to the Copperbelt was explained by population density, and only 9.0 per cent by population size. The corresponding values for the Central Province, were respectively 23.04 per cent and 42.25 per cent. This striking difference between the two provinces is intriguing and suggests areas for further research.

However, the Copperbelt result is in line with the findings of the study of male migrant workers to the copper mines. That study, like the present one, reported an inverse relationship between population size and the rate of in-migration (1). The relationship was also inverse for population density in this study. In contrast to the result in the Copperbelt, the Central Province, with regard to the two variables, did not only show more significant correlation but also positive rather than inverse relationship. There appears therefore to exist in the Copperbelt many other explanatory variables, social, economic and geographical, which explain better the variations in the volume of in-migration to the province.

(1) P.O. Ohadike, *Idem.*

TABLE 4.11. THE RELATION OF MIGRATION FLOWS TO POPULATION DENSITY OF PROVINCES AND DISTRICTS, ZAMBIA, 1969 CENSUS

Province and District (a)	Population Density per 1000 hectares (1969)				
	Total Census Population Density (b)	Total less net In-Migrants (c)	Total plus Out-Migrants (d)	% Change	
				Land carrying more by : (e) ([a])	Land carrying less by : (f) ([a])
Provinces :					
1. Central	61	49	–	24.5	–
2. Copperbelt	261	202	–	29.2	–
3. Eastern	74	–	81	–	8.6
4. Luapula	66	–	82	–	19.5
5. Northern	37	–	44	–	15.9
6. North-Western	18	–	20	–	10.0
7. Southern	58	–	64	–	9.4
8. Western	32	–	34	–	5.9
Some Districts :					
1. Kabwe (Urban)	544	439	–	23.9	–
2. Kabwe (Rural)	40	39	–	2.6	–
3. Lusaka	162	104	–	55.8	–
4. Chililabombwe	436	394	–	10.7	–
5. Chingola	615	411	–	49.6	–
6. Kalulushi	448	338	–	32.5	–
7. Kitwe	2,562	1,820	–	40.8	–
8. Luanshya	189	110	–	71.8	–
9. Mufulira	657	569	–	15.5	–
10. Ndola (Urban)	1,453	978	–	48.6	–
11. Ndola (Rural)	31	28	–	10.7	–
12. Solwezi	18	17	–	5.9	–
13. Livingstone	343	312	–	9.9	–
14. Kaoma	20	19	–	5.3	–
15. Senanga	30	28	–	7.1	–

Note : "–" means "not applicable".
([a]) % change = 100 [b/c] – 100.

2) Distance from Origin to Destination

Distance, as an explanatory variable in the study of variations in the flow of migrants to any destination, should be assessed against the background of its economic, social and psychological implications for migrant behaviour. Given the prevailing wide geographical distribution of population and economic opportunities in Zambia, distance, transport and accessibility to employment centres go a long way in guiding the choice of where to migrate

to and in deciding to move finally. At the socio-psychological level, it will be found that the desire to maintain social and personal links in the place of origin could be a positive factor in the decision not to migrate to distant destinations. Migration normally disrupts interpersonal relationships ; the farther the destinations, the stronger the expectations about the occurrence and consequences of the disruption. With low levels of literacy, education and skill, this expectation will indeed be pronounced. To a much lower degree, the better trained and educated will be less affected as more of these would normally travel long distances for employment.

Distance, in the absence of any other indications, has been measured as the most direct route by road between sending district headquarters and Kitwe as the central point in the Copperbelt destination, on the one hand, and Lusaka as the rallying point in the Central Province destination, on the other. This assumption is a bit simplistic since it assumes only one mode of travel for all migrants who are also assumed to start off initially and always from the district headquarter irrespective of the distance between actual place of residence and the headquarters. Nevertheless, these limitations are not all that too serious as to constitute important sources of bias in the analysis and interpretation of the implied relationship.

In both the Copperbelt and Central Provinces, distance bore a statistically significant relationship to the rate of in-migration from the other provinces. With the Copperbelt as destination, the correlation and coefficient of determination were respectively $r = -0.79$ and $r^2(100) = 62.41$. First, the inverse relationship shown accords with the expectation that, quite apart from social and psychological disruptions, the longer the distance from origin to destination, the higher the transport costs, and therefore the less the incentive and ability to migrate (1). With the Central Province as destination, the negative correlation was $r = -0.77$. With 5 degrees (N–2) of freedom, the correlations for the two provinces are significant at .05, but not at .01 level.

3) Gravitational Indices incorporating Distance and Population Size

The gravitational indices are situation-oriented and while generally considering distance as relevant, also reckon that there exists a gravitational attraction analogically (in the Newtonian sense) between population at points of origin and destination. The indices have been applied, tested and verified with some degree of success all over the world. Of these, the ones developed respectively by J.Q. Stewart and George K. Zipf are among the most commonly used.

Steward and Zipf assumed that the relation between distance and migration is inverse-linear. On this basis, Stewart postulated that the number

(1) P.O. Ohadike, *Idem.*

of migrants to any destination from other points of origin is proportional to the population of each point of origin divided by the distance from the destination. Thus his formula $M = N/D$ (where M is the relative attraction of population at the two ends, N is population and D is distance) is a measure of relative movement. The index proposed by Zipf maintains that the number of migrants between two locations is proportional to the product of their population divided by the shortest distance between locations. This proposal has been built into his formula, $M = P_o P_d/D$ (where M is the relative attraction between populations at origin and destination, P_o is population at the point of origin, P_d is population at the destination and D the shortest distance between origin and destination).

The application of the two gravitational indices yielded some reliable results, which however varied between the two destinations. In the Copperbelt, both Zipf and Stewart indices produced a correlation with migration of $r = +0.41$ and so individually accounted for 16.81 per cent of the variations. The correlation, though important, was not significant at the .05 level. The results for the Central Province were more significant. Respectively the two indices were correlated separately with migration to the tune of $r = +0.86$. This is significant at the .01 level and helps to account for 73.96 per cent of the variations. In order to understand the difference in the results of the two provincial destinations, it should be recalled that neither population size nor density was significantly associated with the rate of in-migration to the Copperbelt Province. It therefore seems that the lower levels of correlation between migration and the two indices in the Copperbelt and not the Central Province may be related to the less significant relationship of population size and density to the rate of migration to the Copperbelt.

4) Intervening Economic Opportunity

The intervening opportunities hypothesis represents another essential modification and extension of the distance hypothesis. As propounded by Samuel A. Stouffer, the theory assserts that "the number of persons going a given distance is directly proportional to the number of opportunities at that distance and inversely proportional to the number of intervening opportunities([1]).

The hypothesis is explicit and interesting. However, it has not been generally easy to find a simple definition of economic opportunity as such. For want of any substitutes, given the data situation in Zambia, this analysis assumed that the size of the urban population approximated the size of economic opportunity. In terms of in-migration to the Copperbelt, economic opportunity as defined above was not significantly related to the differences

(1) Samuel A. Stouffer, "Intervening Opportunities: A Theory relating Mobility and Distance", *American Sociological Review,* Vol. V, N° 6, December 1940, pp. 845-867.

in the rate of migration between the supplying provinces. Only 2.56 per cent of the variations in the provincial rate of in-migration to the Copperbelt was due to the proportion of urban population found in the urban areas of the sending districts. The amount of variation explained fell to 1.44 per cent when account was taken of the proportion of urban population together with the proportion enumerated on European Farms. The basic conclusion from the analysis is that economic opportunity at the points of origin was not important in accounting for the variations in the flow of migrants to the Copperbelt. It was however more significant in the analysis of movements to the Central Province. The proportion urban produced a correlation of $r = +0.27$, while the proportion urban and in European farms yielded $r = +0.66$. The combination of the population in towns and European farms represents, from the point of view of analysis, the maximum index of economic opportunity seen in terms of areas which offer wage employment in the country. That this index, as defined, was important in accounting for the variations in the Central Province and not the Copperbelt is perhaps an indication of the variation in the economic status of the two provinces. The Copperbelt is remarkably superior to any other province economically and so the economic opportunities there attract large numbers of migrants, and counterbalances the pool of economic opportunities in the sending areas. The Central Province, less significant economically, lacked less of this counterbalancing force and hence economic opportunities in the sending provinces were more relevant.

It should however be stressed that treating economic opportunity only in terms of those at the terminal ends of the migration streams is inadequate. Opportunities at any point or points between origin and destination enter into the calculus of factors which facilitate or hinder migration. For example, the volume of movements from the Eastern and Southern Provinces to the Copperbelt would, no doubt, have been affected by the job opportunities along the economically rich, industrial and agricultural railway running through the Central Province and in particular Lusaka and Kabwe. The administrative, political as well as the industrial and commercial status of Lusaka has already been indicated. Kabwe mainly with its lead and zinc mines constitutes like Lusaka a buffer zone of employment and economic opportunities for migrants to the Copperbelt from the East and South. The effect of the line of rail and, in particular, Lusaka and Kabwe on the volume of male migration to the copper mines especially from the Central, Southern and Eastern Provinces has been carefully studied along with the influence of external opportunities to the south of Zambia (1). Intervening opportunities between two points has greater interpretational utility when measured spatially.

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(1) P.O. Ohadike, *Idem.*

CHAPTER V

ASPECTS OF INTERNATIONAL MIGRATION IN ZAMBIA

A. Introduction. It generally takes a plurality of factors to achieve social, economic and technological change. The variety and complexity of the factors have almost always necessitated the pooling of resources and consequently inter-dependence among nations and peoples in ensuring the adequate supply of factors for development. Few nations would have succeeded in generating internally the entire resources needed for their survival independently. In terms of the human and physical requirements for development "symbiosis", at least in part, has proved more useful than total isolation and independence.

One of the fruitful ways through which nations have maintained the symbiotic links has been by allowing the movement of people, internally for their nationals and inhabitants, and externally for non-nationals and non-inhabitants. In Africa, such movements have always been significant. More specifically, within the broad geopolitical area covered by East, Central and Southern Africa, a long-standing criss-cross movement occurred mostly from various immigrant countries of origin to the nerve centres of national economies in the area. In many ways, the flows and counter flows generated have been socially, economically and politically significant in shaping the development processes in the countries of the area. In the context of this development, analysis of the growth and significance of immigration in any country of the area will be clearer if it examines past, present and future developments.

Four possible indices of immigrant status in Zambia exist in both census and annual migration statistics for various years. These are those from data on birth-place, nationality, citizenship and country of last permanent residence. Of these, birthplace appears to be the most useful in terms of providing a reliably inclusive as well as exclusive category of migrant status. The use of the other three measures presents certain legal and practical difficulties. For example, nationality and citizenship laws were complicated and as acknowledged in the 1951 population census, "... nationality and citizenship analysis ... reflects individual preferences rather than the true position" (1)

(1) Northern Rhodesia Government, *Census of Population*, Lusaka, 1951, p. 15.

B. European Immigration and Immigrants. Available records show that between 1938 and 1953, Europeans constituted an average of 95.5 per cent of all the annually recorded non-African immigrants in the country. Thus, less than five per cent were Asians (mostly Indians), coloureds and persons of other races (1). Of the entire European communities recorded during seven censuses taken almost decennially between 1911 and 1961, the proportions that were immigrants ranged from 93.6 per cent in 1911 to 78.5 per cent in 1961 (2). There are no present indications that the proportions have significantly altered in recent times, for in the absence of birthplace statistics, immigration data for recent years, say 1965, indicate that about 79.4 per cent of non-African immigrants were of European stock.

Three countries stand out prominently as the birthplaces of the large majority of Europeans. On average, the largest number between 1911 and 1961 was born in South Africa, the 1911 census being the only one which shows a higher proportion of European immigrants born in the United Kingdom than in South Africa. Otherwise, in all the censuses between 1921 and 1961, the latter country contributed proportions between one-third and two-fifths of all Europeans in Zambia. The next important source of European immigrants was the United Kingdom and Ireland which contributed between 16.5 per cent and 45.4 per cent of all Europeans in the censuses held between 1911 and 1961. Although Rhodesian-born immigrants never exceeded eight per cent of the total European population in any census year, they have, however, constituted the third largest group of European immigrants in the period 1911-61. What the relative position was at the time of the 1969 Census is hard to tell mainly because of the unavailability of comparable data. But one thing is very clear, and that is that persons born in the United Kingdom formed in 1969 a significant proportion of the immigrants born in Europe, U.S.A., Canada and Oceania. They represented 70.3 per cent of the total number of persons born in the listed areas, while persons born in Europe as a whole made up a significantly large proportion, 95.1 per cent of persons from the same listed areas.

Annual statistics of immigration for the period 1938-1953 (3) also illustrates clearly the preponderance of migrants from South Africa, United Kingdom, and Rhodesia. In particular, they bring into greater focus, the significantly large South African component of the European immigrants. It is

(1) P.O. Ohadike, "Aspects of Growth, Characteristics, and significance of European Immigration to Zambia", *African Population Conference,* Accra, 9-18 December 1971, POP/CONF., p. 1.

(2) Northern Rhodesia Government, *Population Census Reports,* 1911 ; 1921 ; 1931 ; 1946 ; 1956 ; and 1961, *passim.*

(3) P.O. Ohadike, *Op. cit.,* Table 2, p. 4.

easy to understand the preponderance of persons born in those three countries. Britain's colonial ties with Zambia as well as South Africa and Rhodesia were, apart from other economic considerations, associated with the large proportion of immigrants born in the United Kingdom and Ireland. Actually, the bulk of the colonial administrators were British, even though many immigrants would have come out to Zambia in private capacities as workers on the mines and other industries.

The colonial association, quite aside from proximity, has also facilitated the influx of South Africans and Rhodesians for employment and other economic reasons. This phenomenon is easily understood from the fact that most of Zambia's industries have some international connections with established firms in South Africa or Southern Rhodesia.

Numerically, the absolute number of European immigrants charts a straight line increase from 1911 to 1961. This, however, conceals not only the relative strength of the flow over the census years but also the variations in the flow between censuses.

TABLE 5.1. PROPORTION OF EUROPEAN IMMIGRANTS AND INTERCENSAL INCREASE IN EUROPEAN IMMIGRATION TO ZAMBIA, 1911 – 1961

Census Year	Population	Immigrants		Intercensal Immigration Increase	Per cent Intercensal Immigration Increase
		Number	%		
1911	1,497	1,402	93.6	–	–
1921	3,634	3,219	88.8	1,817	130
1931	13,846	12,555	90.7	9,336	290
1946	21,907	17,908	81.7	5,353	43
1951	37,079	30,525	82.3	12,617	70
1956	65,277	53,958	82.7	23,433	77
1961	74,549	58,422	78.5	4,464	8

Source : Northern Rhodesia Government, *Population Census,* 1911-61 passim.

Table 5.1 clearly illustrates the recorded intercensal variations. While the pattern of increase illustrated in the table is very erratic, the trend has been towards a significant decline in the proportion of European immigrants. Very marked increases occurred between 1911 and 1921 and between 1921 and 1931, when increases of the order of 130 and 290 per cent were recorded respectively. Subsequent intercensal increases have been smaller, for between 1931 and 1946 the increase was only 43 per cent, though it rose to 70 per cent between 1946 and 1951 and to 77 per cent between 1951 and 1956, but slumped dramatically to 8 per cent between 1956 and 1961. The figure has presumably slumped further for, although it is not easy to figure out the actual number of European immigrants by birthplace from the 1969 census

results, there is a clear indication that the size of the European community dropped significantly from 74,549 in 1961 to 43,390 in 1969. Also the number of Europeans in employment dropped less considerably from 30,826 in 1961 to 23,635 in 1969. One of the principal reasons for the decline in the number of Europeans appears to be the fact that many of the older and larger families left the country, while in their place have come younger and much smaller families (1).

The flow of immigrants in the period under consideration shows peaks and troughs which correspond to national and international business cycles. This suggests that for a meaningful examination, the socio-economic conditions within and without Zambia ought to be considered.

By 1911, 93.6 per cent of all Europeans were immigrants, who, apart from missionaries and colonial administrators, were persons attracted to the country in the hope of finding great mineral wealth on a scale comparable to that found in the south. There were also farmers amongst them who settled around Fort Jameson (2) and Abercorn (3) and along the then developing railway. Though the conditions of the world economy at this time were favourable, the speculative optimism about finding minerals was undoubtedly important in attracting Europeans to Zambia.

However, up to 1910 very little progress was made in establishing either a thriving mining or agricultural economy, (4) so that a significant decline in the proportion of immigrants between 1911 and 1921 followed. From constituting 93.6 per cent of the European community in 1911, the proportion fell to 88.8 per cent in 1921. Industrial progress in other spheres was virtually stagnant, even though the railway had been important in attracting European settlements. Farming, which started along the railway in the first decade of the century continued to make slow progress. It was these conditions that made it difficult to attract sufficient migrants, and in any event, the disruptions of the First World War checked the flow of immigrants from Europe to most parts of the world. Generally, 1911-21 was a period of crisis. Apart from the short-lived recovery during 1919-1920, the prevailing conditions were not conducive to economic progress and immigration to Zambia.

By 1925 the world economy was recovering from the depression, and Zambia was able to make appreciable progress especially in mining through

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(1) Republic of Zambia, *Census of Population and Housing,* 1969, p. A12.

(2) Renamed 'Chipata' since independence.

(3) Renamed 'Mbala' since independence.

(4) George Kay, *A Social Geography of Zambia,* University of London Press, 1967, p. 30. Besides, it is known that by 1910 copper was not yet discovered and the only mining then was carried out at the Broken Hill Lead and Zinc Mine.

the discovery and development of copper. Eventually world consumption of copper increased and large highly capitalized companies were formed. Mineral prices soared and capital investments in the industry increased, accompanied by a phenomenal increase in the number of European immigrants from 3,219 in 1921 to 12,555 in 1931.

The next census of European immigrants was in 1946 and it indicated a proportionate decline in immigration. This might have been remotely associated with the world-wide depression which affected primary producers like Zambia more severely. The recovery from the crisis which began in 1933 was partial and was checked by World War II, as a result of which general economic conditions again became unfavourable, even though copper mining in Zambia was stimulated by defence expenditure.

Between 1946 and 1951, another upward trend in immigration followed. During this time Zambia's agriculture and mining showed marked improvement, especially in the form of increased acreage under maize cultivation (1), and also in the increased mineral production, the value of which climbed from £ 15 million in 1945 to £ 95 million in 1953 (2). Generally, it was these favourable economic conditions that enticed migrants.

The further slight increase in the flow of immigrants between 1951 and 1956 was a continuation of the earlier trend. This, however, was to be the last of its kind during the period under consideration ; for although mining and agricultural output remained relatively high, the politics of the Rhodesian and Nyasaland Federation were already beginning to militate against Zambia's economic progress. The new industries were attracted to Southern Rhodesia, and the relatively scant economic growth generated did not permeate Zambia and Malawi. Added to this, the economic development of Zambia was checked after 1956 by an alarming decline in the price of copper which fell from over £ 400 per ton in 1956 to £ 158 in 1958(3). Consequently, as Figure 5.1 further shows, a decline in the volume of European immigration between 1956 and 1961 occurred. Apart from these economic factors outlined above, there were transfers of civil service and other personnel to Rhodesia.

The observed decline in the volume of immigration in the census data between 1956 and 1961 continued up to and after independence. The position in 1969 has already been indicated above and annual recorded net migration figures, published by the Central Statistical Office, show yearly

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(1) Maize is one of the important staple food-crops in Zambia. Others include cassava, millet and keffir corn, but maize is the only one presently associated with advanced methods of cultivation.

(2) Richard Hall, *Zambia,* Pall Mall Press, London, 1965, p. 270.

(3) *Ibid.*, p. 280.

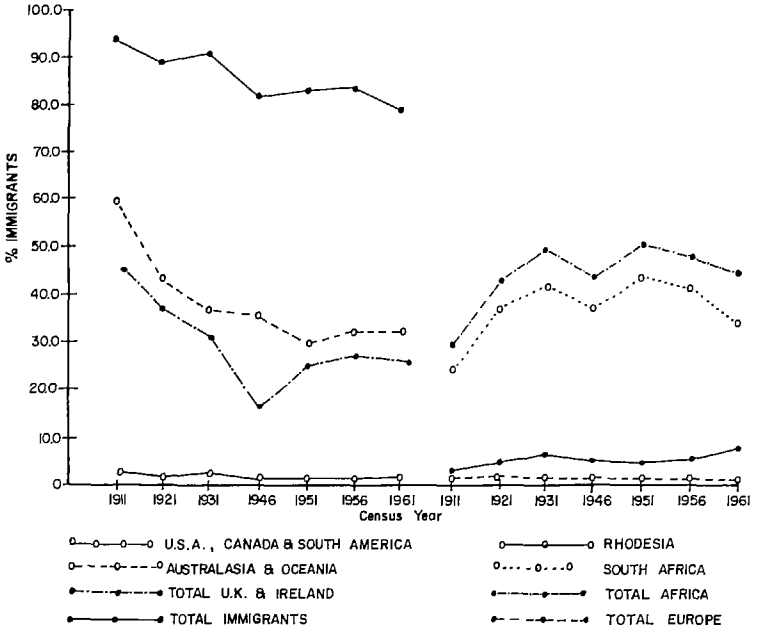

Figure 5.1. – Record of European Immigration to Zambia by Place of Birth, 1911-61.

TABLE 5.2. PERCENTAGE DISTRIBUTION OF EUROPEAN POPULATION BY COUNTRY OF CITIZENSHIP, 1961 AND 1969 CENSUS REPORTS

Citizenship	1961 %	1969 %
AFRICA		
(a) Zambia/Rhodesia/Malawi	38.1	9.2
(b) South Africa	26.1	9.0
(c) Others	0.0	0.1
Total Africa	64.2	18.3
EUROPE		
(a) United Kingdom	28.8	61.2
(b) Others	....	....
Total Europe	28.8	61.2
OTHER COUNTRIES	7.0	20.5
GRAND TOTAL	100.0	100.0
N (Total Persons)	74,411	43,390

losses of significant magnitude (1). Fears about insecurity during this period, which were exacerbated by events in Zaire (formerly Congo) and national independence movements in Zambia and elsewhere also led to large volumes of emigration, mostly to South Africa and Rhodesia.

Thus while European citizens of Rhodesia and South Africa were remarkably depleted proportionately between 1961 and 1969, as can be seen from Table 5.2, the proportion claiming to be citizens of the United Kingdom and other European and American countries rose significantly. The changes, despite the already observed limitations of data on citizenship, are no doubt very significant in showing the realignment of socio-economic and political interests as well as the forging of new links and friendship with a wider international community covering not only England, but also United States, Canada, Australia, New Zealand and others.

C. African Immigration and Immigrants. The history of African migration is as old as the history of the continent. Africans have all through the ages moved about, perhaps in a less systematic fashion, as pastoralists, invaders, pilgrims, refugees and traders to lands far and near all over the continent.

There are, however, no quantitative records of the above varieties of movements in earlier times, and even if attempts were made to do so, their recurrent and sometimes seasonal character and the lack of clearly defined boundaries would adversely affect the reliability of the results. Even after the establishment of political boundaries between territories following the colonization of the continent, it cannot be said with certainty that records of African inter-territorial migration, which then came under more systematic surveillance and regulation, reflects accurately the exact volume and pattern of movements. In many ways, the boundaries were, culturally speaking, arbitrarily drawn and they did actually split ethnically related groups with the result that the boundaries were not duly recognized and a lot of unchecked boundary-crossing occurred especially in countries with very long and unguarded borders.

Currently, the boundaries created by the metropolitan powers have been retained by the new nations of Africa, and assertions of their sovereignty, have, no doubt, created greater awareness of the existence of these boundaries, which nevertheless, but to a significantly lesser degree, continue to pose the same age-long problems of obtaining accurate records of all border crossing.

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(1) Central Statistical Office, Lusaka, *Migration Statistics*, 1965, Table 1, p. 1. Ministry of Finance, Lusaka, *Economic Report*, 1965, p. 17.

In Zambia, evidence of African immigration and emigration in recent times is also very tenuous and scanty. Most of the in-movements could nevertheless be traced to two main sources. The first and the greater part of this could be traced to some forms of international labour movement between Zambia and her neighbours. The second and invariably less significant source relates to the in-flow of refugees also from the countries bordering Zambia. On the whole, neither the records of the refugee stream nor that of the international labour migrants have been very faithfully recorded, especially when account is taken of the more regular and reliable record of non-African immigration in the same country in the past.

1) African Refugees in Zambia

Very little space will be devoted to the in-flow of refugees mainly because the reliability and accuracy of data on their movements are very suspect. The available figures from the office of the U.N. High Commissioner for Refugees are regarded as approximations (1), and therefore no depth analysis of the problems will be undertaken here. It is, however, important to emphasize that whatever be the definition of African immigrants, whether by birthplace or citizenship as variously defined in the censuses, the ultimate volume, at least in recent years, will be influenced by the number of in-coming recorded and unrecorded refugees.

Available records of the number and origin of refugees in Zambia were compiled for the first time in 1966, and there were no published figures for the preceding years for which records exist for some other African countries. It was only in December 1965, almost a year after independence, that the Government of Zambia requested the assistance of the international community in coping with an increasing number of refugees, which by the end of 1966 had reached an estimated 5,800 mark. Of these, 3,800 came from Angola, 1,800 from Mozambique, and the rest were of diverse origins, mainly southern Africa.

Between 1966 and 1967, the number of refugees in Zambia fluctuated greatly for, in spite of the reported influx, the number on the 1st. of January in the two years were respectively 5,100 and 5,600. The implied difference, therefore, reflects very slight increase in terms of the number entering Zambia. The situation has been explained by the fact that during 1966, some 5,600 refugees arrived, while 5,000 were voluntarily repatriated to their countries of origin.

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(1) Sven Hamrell, "The Problem of African Refugees" in Sven Hamrell (ed.), *Refugee Problems in Africa*, Scandinavian Institute of African Studies, Upsala, 1967, p. 12.

TABLE 5.3. SOME REFUGEE GROUPS IN ZAMBIA AS AT THE BEGINNING OF 1966, 1967 AND 1968, AND AT 1 DECEMBER 1972

Refugee Groups in Zambia	1966 ([a])	1967 ([a])	1968 ([b])	1972 ([c])
Angolans	100	3,800	11,400	12,000
Mozambiquans	5,000	1,800	3,000	3,500
Others	n.a.	n.a.	n.a.	1,500
Total	5,100	5,600	14,400	17,000

Sources : ([a]) Sven Hamrell (ed.), *Refugee Problems in Africa,* Upsala, 1967, p. 14 – 15

([b]) Unpublished data supplied by U.N. High Commissioner for Refugees, New York.

([c]) Provisional figures from U.N. High Commissioner for Refugees, Addis Ababa, 1 December 1972.

Compared with neighbouring countries such as Zaire (formerly Congo), Tanzania, and Uganda, Zambia has a relatively low number of refugees. In Zaire, the situation in January 1966, 1967, 1968 and 1971 showed a total of 317,000, 357,000, 435,000 and 490,000 respectively as against 5,100, 5,600, 14,400 and 17,000 for Zambia respectively over the same period. The total for Tanzania was 28,500, 33,300, 41,500 and 71,500 respectively, while that for Uganda was respectively 137,000, 156,000, 167,300 and 180,000 (1). These variations apart, it is, for lack of data, difficult to show what the subsequent trend after 1971 has been. However, broad guesses could be made within a wide margin of errors.

The first possibility is that the number of refugees, considering the geo-political position of Zambia vis-a-vis its neighbours, has been on the increase. Presumably, any form of upheaval in some or any of the neighbouring States could have precipitated some occasional and unexpected increase. The other less probable possibility is that the number may not have risen as significantly as in the past because the number of refugee infiltrators would have been checked by the increased vigilance in guarding the borders between Zambia and its neighbours. Hopes for independence in Angola and Mozambique have been raised following recent political developments in Portugal. In the event that independence materializes, some significant changes in the movement of refugees would follow. The chances are, judging from previous experience, that the number of refugees in Zambia will be greatly reduced.

(1) Sven Hamrell (ed.), *Idem.*

United Nations, *Background Paper on the Office of the UN High Commissioner for Refugees (UNHCR),* MHCR/85/71, September 1971, p. 21.

Zambia however has not, at least since independence, been receiving refugees without sending some out. Some of its people have also found asylum in neighbouring countries as a result of at least one major internal political storm. The number of refugees of Zambian nationality recorded as of the 30th of June 1968 by the United Nations High Commissioner for refugees was 20,000 in Zaire. Most of these were persons fleeing from the aftermath of the Lenshina religious rebellion. In spite of the apparent control of the situation by the Government of Zambia, there were still many Zambian refugees in Zaire. Thus at the beginning of 1971, it was reported that the 490,000 refugees in Zaire were from Angola, Rwanda, Sudan and Zambia (1).

2) Census Data on African Immigrants

Two complete counts of Africans have so far been carried out in Zambia, and these were in 1963 and 1969. The result of the censuses provide, individually, a reasonable wealth of information on the national origin of persons. According to the 1963 census, African immigrants, born outside Zambia but in Africa, formed 6.7 per cent of the national African population. The overall proportion of foreign-born persons of African descent has probably decreased since 1963. When due account is taken of the fact that the available figure from the 1969 census includes some persons of other races, the proportion of African immigrants could have been fairly lower than the 5.1 per cent reported. No doubt, the great majority of the foreign-born Africans in 1963 as well as 1969 would be nationals of other African countries, although a few would be of Zambian parentage, born outside the country.

Three countries including Malawi, Rhodesia and Angola provided the majority of African immigrants in Zambia in 1963. Respectively, they contributed 27.6, 23.4, and 26.2 per cent, representing altogether over three-quarters of the total in that year. Some 7.6 per cent came from Mozambique, 7.3 from Zaire, while Tanzanians only contributed 5.4 per cent of total immigrants recorded in 1963. Assuming again that the 1969 Census reasonably describes the African situation then, it can be seen that while the preponderance of Angolans, Rhodesians and Malawians persisted, the proportion of Angolans decreased rather dramatically. The same thing could be said of immigrants from Mozambique, and it is highly possible that the decline in the proportion of persons from the two Portuguese territories is associated with the overall decline observed between 1963 and 1969.

The most plausible reason for the decline, quite apart from the fluctuations in the number of refugees already referred to above, stems from

(1) United Nations, *Idem.*

Zambia's political connections with the Portuguese rulers of the two territories. With little faith in each other's political goals, the Portuguese as well as the Zambians have taken and tightened security measures on the borders between their two territories. This, in addition to tighter immigration controls related to the granting of entry visa and work permit, could have checked the flow of immigrants to Zambia in the period.

TABLE 5.4. PERCENTAGE DISTRIBUTION OF CENSUS DATA ON BIRTHPLACE ZAMBIA 1963 AND 1969

Country of Origin	1963 Census		1969 Census	
	Africans born in Africa including Zambia %	Africans born in Africa excluding Zambia %	Persons born in Africa including Zambia* %	Persons born in Africa excluding Zambia* %
Zambia	93.3	–	94.9	–
Malawi	1.8	27.6	1.2	24.0
Rhodesia	1.6	23.4	1.5	29.4
Tanzania	0.4	5.4	0.6	11.2
Zaire	0.5	7.3	0.4	7.4
Congo (Brazz.)	–	–	0.1	2.7
Angola	1.8	26.2	0.7	13.7
Mozambique	0.5	7.6	0.2	4.3
South Africa	–	–	0.3	5.3
Others	0.1	2.5	0.1	2.0
Total	100.0	100.0	100.0	100.0
N (Total)	3,405,218	288,150	3,965,980	203,622

**Note :* A significantly large majority are Africans and only a few persons of other races would have been included.

Apparently, most of the African immigration into Zambia was confined to movements over relatively short distances. The migrants came mostly from countries bordering Zambia (1). Apart from contributions from places already enumerated, migrants coming from other countries constituted only 2.6 per cent of the total influx in 1963.

Whereas it has been shown that European immigrants gravitated towards towns, the Africans did not mostly do so. The 1963 census showed that about 60 per cent of the African immigrants were in the rural areas, 7.7 per cent in

(1) P.O. Ohadike, *Some Demographic Measurements for Africans in Zambia : An Appraisal of the 1963 Censusa Administration and Results,* Communication No. 5, Institute for Social Research, University of Zambia, 1969, pp. 30-35.

the European farm areas, and 32.3 per cent in the urban areas (1). This pattern of rural immigration might be associated with the fact that a good number of African immigrants, due to the unfunctional demarcation of boundaries between Zambia and her neighbours, may have just crossed borders unchecked into the country. Of these, the better qualified and the skillful proceeded more to the towns for jobs, and the less fortunate remained and engaged in rural economic activities.

Special studies of the foreign sources of African labour in industries in Zambia provide supporting evidence on the above pattern and composition of African immigrants as shown by census records (2). In this connection, immigration to the country's rich copper mines merit special mention both from the point of view of adequate documentation, and of the movements involved in relation to those of other industries.

Apart from European immigrants, Africans, mostly from neighbouring countries, have been coming in large numbers to work in the copper mines of Zambia. The total number of foreign Africans in the mines rose, with some fluctuations, from 25,011 during 1940-44 to 51,791 during 1960-64, the peak period in the flow being 1950-59 when they represented over one quarter of all employees in the copper mines. Since 1960, however, their proportion in the labour force has been declining, and from constituting 24.21 per cent during 1960-64 they only formed 19.89 per cent of the mine workers in 1966. In consonance with the already observed decline in the proportion of immigrants between 1963 and 1969, the decline promises to continue in view of recent economic and political developments. Political independence in Zambia and in the neighbouring countries of origin of the immigrants has introduced economic and legal constraints on the exchange of migrants between countries. In Zambia, visa and work permit regulations are in operation, while in the sending countries political independence has ushered in alternative and competing economic opportunities, which negatively affects immigration to Zambia.

Considering the average number of all yearly employment of males during 1940-44, it is clear that Malawians followed closely by Tanzanians contributed the largest pool of immigrant mine workers (3). Respectively, they constituted 37.76 and 31.41 per cent of the total flow, and were distantly trailed by the Angolans with 15.73 per cent and the Zairians with only 7.84 per cent. The flow from Mozambique, Rhodesia and other African countries

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(1) Central Statistical Office, Lusaka, *Final Report of the 1963 Census of Africanssr, pp. 47-48.*

(2) P.O. Ohadike, *Development of and Factors in the Employment of Africans in the Copper Mines of Zambia,* Zambian Papers No. 4, Manchester University Press for Institute for Social Research, University of Zambia, 1969.

(3) P.O. Ohadike, *Ibid.,* Table 1, and pp. 2-5.

was relatively small. The very negligible number of Rhodesians in the mining industry is striking in view of the fact that the 1963 census of Zambia shows that they represented over one-fifth of all Africans born outside Zambia and also accounted for 49.1 per cent of all immigrant employees in Zambia in 1963. The most obvious implication of this is that the Rhodesian Africans are employed in industries other than mining, the one in which they have demonstrated relative efficiency being agriculture. By 1961, for instance, 17.2 per cent of all Rhodesian African employees in Zambia, as against 4.9 per cent in mining and quarrying, were in agriculture. The majority of them, 47.3 per cent were in the service industries, while 22.3 per cent worked in commerce and finance, construction, transport and communication. In the same year (1961), 22.3 per cent of the Malawians, 61.8 per cent of the Tanzanians, 20.0 per cent of the Angolans, and 14.1 per cent of the Zairians were engaged in mining (1).

D. Asian Immigration and Immigrants. Asians, judging from the literature, have tended to be the forgotten and neglected partners in the study of the development of Zambia. Probably because of their relatively fewer numbers, not enough attention has been paid to analysing the flow and significance of their immigration to the country. The scarcity and inadequacy of data cannot be blamed for the neglect for, unlike Africans, Asians, like Europeans, have been enumerated in censuses dating back to the beginning of this country.

Following various census reports, by 1911, there were just 39 Asians in Zambia ; by 1946, their number had reached 1,117, rising rather remarkably to 5,450 in 1956 and 10,785 in 1969. The growth of the Asian population was clearly accompanied by its demographic transition from a highly migrant to a fairly settled population in which the age and sex structure have been approaching a normal distribution less affected by migration.

The normalization has been due to the marked increase in immigration of both sexes and to the relatively large number of births by wives of the immigrants. Gradually through the years, the proportion of children under 14 years of age increased from barely 15.3 per cent of the total population in 1931, through 25 per cent in 1946, 39.6 per cent in 1956, to 48.3 per cent in 1961. Even after independence when the age and sex structure had been

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(1) Central Statistical Office, *Final Report of the 1961 Census of Non-Africans and Employees,* Lusaka, 1965, pp. 29-31.

J.C. Mitchell, "Wage Labour and African Population Movements in Africa South of Sahara" in Barbour and Prothero (eds.) *Essays on African Population,* Routledge and Kegan Paul, London, pp. 215-216.

relatively distorted by emigration, the proportion was still as high as 40.6 per cent in 1969. The proportions in 1961 and 1969 are comparably close to those of the African population also with relatively high fertility. In terms of sex ratio, the normalization occurred through a considerable reduction of the disproportion in the sexes owing to the immigration of wives. Thus the sex ratio, which was 450 (M/F) in 1931, slumped in thirty years to 111 in 1961.

The linear growth of the Asian population was not matched by a correspondingly large inter-censal growth. In effect, the peak of the intercensal increase was reached in 1946, after which there followed some marked decline to a very low ebb in 1961 and after. The tendency towards a decline accords very well with the trend already illustrated for European immigrants. Both groups, therefore, appear, with minor variations, to have responded to similar internal and external economic and political pressures, particularly in the period immediately before and after independence in Zambia.

TABLE 5.5. PROPORTION OF ASIAN IMMIGRANTS AND INTERCENSAL INCREASE IN ASIAN IMMIGRATION TO ZAMBIA, 1911 – 1969

Census Year	Population	Immigrants (Birth place)		Intercensal Immigration Increase	% Intercensal Immigration Increase	% Intercensal Population Increase
		Number	%			
1911	39	n.a.	n.a.	n.a.	n.a.	–
1921	56	n.a.	n.a.	n.a.	n.a.	44
1931	176	161	91.5	–	–	214
1946	1,117	905	81.0	744	462	535
1951	2,524	n.a.	n.a.	n.a.	n.a.	126
1956	5,450	3,875	71.1	2,970	328	116
1961	7,790	4,526	58.1	651	17	43
1969	10,785	n.a.	n.a.	n.a.	n.a.	38

Note : n.a. = not available.

The core and the majority of Asian immigrants were from Asia, and were preponderantly either Hindu (over two-thirds) or Moslem (slightly under one-third). Respectively in 1931, 1946, 1956 and 1961 the following proportions : 82.0, 94.3, 92.3 and 93.0, of all immigrants, came from Asia, mostly India ; most of the others had come from or were born in Rhodesia and South Africa. The major part of the decline in the flow of Asian immigrants is accounted for by the decline in the flow of the Asians from Asia. This is supported by the fact that the intercensal rates of growth of the total Asian immigrants from all sources and of immigrants born in Asia were virtually of the same order of magnitude.

E. Significance of Immigration and Immigrants for Zambia. The social and economic implications of immigration, like the trend in the flow, has to be examined in retrospect and prospect so as to be able to appreciate the real dimensions of the issues involved. At the same time, the three major groups considered in the analysis cannot be given equal treatment mainly because of the varying impact they made in an environment and economy in which the stage was separately set for each group to act out its role in isolation. In many ways separate development with interdependence, where necessary and inevitable, underlay the co-existence of the various immigrant groups with the host community.

The European population in Zambia and generally the entire immigrant groups (Asians and Africans included) have consisted largely of young persons in the working age group, with an insignificant minority of the aged. In fact, at no time in Zambia's census history between 1911 and 1969 has the European population over 60 years of age hardly exceeded five per cent (1). Among the Asians, persons aged 60 years and over in 1946, 1956, 1961 and 1969 amounted respectively to 1.1, 0.8, 0.9 and 1.4 per cent of the total population. This age selective pattern of movement into Zambia has also been true of Africans. Thus according to the 1963 census, approximately three-quarters of the immigrants were over 21 1/2 years whilst only 42.5 per cent of non-immigrants were in the same category. Also for all racial groups, variations in the sex structure between immigrants and non-immigrants were in the normally expected direction of marked preponderance of males among the immigrants. This sex-ratio pattern clearly underlines the past significance of employment motivations in migrant behaviour. According to the 1961 census, European immigrants born in Africa had a sex ratio of 107 while those born in Europe scored 123. The report on Africans in the 1963 census gave a sex ratio of 122 for immigrants as against 97 for non-immigrants. The corresponding figures also for Africans were respectively 113 and 95 according to the 1969 census. For Asians, the sex ratio had declined from 450 in 1931 to 110 in 1969.

The economic behaviour of immigrants in Zambia is further underlined by the fact that the majority were wage and salary earners. Three groups of Europeans had migrated to Zambia. These were administrators, missionaries and the largest and heterogeneous group of adventurous miners, farmers, ranchers, traders, craftsmen and professionals employed for salary and wages by large industrial and commercial concerns. These evolved to become the largest group of European immigrants.

In the same vein, the employment status of Zambia's international African migrants differed clearly from that of the indigenous born persons. A

(1) P.O. Ohadike, *Op. cit.*, POP/CONF., 1971, p. 8.

far higher percentage of the African immigrants were employed in wage-earning occupations than were found to exist among the Zambian-born males. In addition, more of the latter were self-employed. Two main reasons can be given for this difference. As already indicated, migration is partly motivated by a desire to secure paid employment at the migrants destination, hence more migrants are likely to be wage earners. In addition, most self-employed persons in Zambia were subsistence farmers. The African immigrants were, therefore, less likely to have right to and ownership of land in Zambia to facilitate their participation in farming and related activities. The higher proportion of unemployed males seeking work found among those born in Zambia than outside the country might reflect the selectivity of migration in thus rendering migrants better equipped in terms of skill and education for employment. This will be very true of a situation, such as exists in Zambia, where indigenous skilled manpower is in short supply.

Generally, all non-Africans in Zambia including Asians appear to have more salaried persons than Africans. As can be seen from Table 5.6, the 1969 census shows that 63.5 per cent of all employed ethnic groups were employees. The proportions were 62.6, 93.0, and 73.6 respectively for Africans, Europeans and Asians.

TABLE 5.6. DISTRIBUTION OF EMPLOYED MALES BY ETHNIC GROUPS BY EMPLOYMENT STATUS : 1969 CENSUS OF ZAMBIA

Employment Status	African %	European %	Asian %	Total %
Self-employed	24.6	4.0	18.4	24.0
Employer	1.8	2.2	5.5	1.8
Employee	62.6	93.0	73.6	63.5
Unpaid Family Worker	11.0	0.8	2.5	10.7
Total	100.0	100.0	100.0	100.0
N (Males)	555,532	17,706	2,532	575,770

In consequence of the above observations, one is tempted to say that such economic and social development as Zambia experienced in the past was very much dependent on an adequate supply of trained people and indeed of capital. As these were scarce and could not be generated internally they had to be imported. European immigrants supplied the bulk of the skilled staff ; Africans from neighbouring countries also brought some skills, mostly in the lower paid jobs. The Asians excelled in commerce, the large majority being gainfully occupied as shopkeepers, salesmen and traders. They were to be found wherever opportunities for commercial enterprise existed.

The economic significance of immigration is further underlined by the industrial grouping of employees by race. Emphasizing the importance of mining to Zambia's economy, the industry over the years attracted a significant proportion of immigrants ; and it attracted more skilled and trained non-African employees than Africans. The annual industrial grouping of non-African adult immigrants to Zambia demonstrates that during 1949-1953, between 12.6 and 19.0 per cent of all adult immigrants went to the mines. The proportion was 17.6 per cent in 1964 (1). The census of 1961 also tells the same story with a record of 22.6 per cent of non-Africans in mining and quarrying as compared with 16.3 per cent of Africans in the same industry (2). Figures from the 1969 census are even more convincing and show that 16.7 per cent of non-Africans as opposed to 7.2 per cent of Africans also were employed in mining and quarrying.

Other vital industries which significantly employed and still have proportionately more non-Africans than Africans include services, manufacturing, commerce and finance, and transport and communication. Figures for 1969 shown in Table 5.7 clearly illustrate the relative economic significance of immigration for the operation of industries in Zambia.

But it is not just non-African immigrants that have demonstrated this significance. A comparison of African immigrants with non-immigrants also shows that the former were contributing proportionately more to the labour force of certain industries. Thus according to the 1961 census of employees, proportionately more immigrant Africans than non-immigrants were employed in mining and quarrying, manufacturing and construction but not in others. Zambian-born Africans were in excess in agriculture, commerce and finance, and most significantly services (3).

In terms of occupational placement, the economic differences between immigrants and non-immigrants appear even more striking as can also be seen from Table 5.7. Briefly, it seems certain that immigrants dominated, and still do, professional, technical, administrative and managerial posts. Commerce and even clerical and related services belonged to the same category, while almost the same proportion of Africans and non-Africans were in production and related jobs. In the past, the most advanced farmers had been mostly Europeans. The situation, presently, as in many other occupations, is gradually changing as more and more Africans are acquiring training, skill and capital.

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(1) Northern Rhodesia Government, *Economic and Statistical Bulletin,* March 1954, p. 10 ; Republic of Zambia, *Migration Statistics,* 1964 and 1965, Central Statistical Office, Lusaka.

(2) Republic of Zambia, *Final Report of the September 1961 Census of Non-Africans and Employees,* pp. 26-28, Central Statistical Office, Lusaka, August 1965.

(3) Republic of Zambia, *Idem.*

TABLE 5.7. WORKING POPULATION, 15 YEARS OF AGE AND OVER IN ZAMBIA CLASSIFIED BY BROAD OCCUPATION AND INDUSTRIAL GROUPS : AFRICAN AND NON-AFRICAN, 1969 CENSUS

Occupational Group	African	Non-African	Total
	%	%	%
Professional, Technical & Related	1.6	35.6	2.8
Administrative & Managerial	1.0	9.3	1.3
Clerical and Related	8.1	15.2	8.4
Sales worker	5.2	7.7	5.3
Service worker	11.9	2.2	11.6
Agricultural & Allied	45.1	3.7	43.6
Production and Related	27.1	26.3	27.0
Total	100.0	100.0	100.0
Industrial Group	%	%	%
Agriculture, Forestry & Fishery	45.1	4.4	43.6
Mining and Quarrying	7.2	16.7	7.6
Manufacturing	4.5	8.9	4.7
Electricity, Gas & Water Supply	1.0	1.9	1.1
Construction	7.4	18.9	7.8
Commerce	5.4	8.5	5.5
Transport & Communication	4.5	10.0	4.7
Services	24.9	30.7	25.0
Total	100.0	100.0	100.0
Number of Persons	729,800	27,000	756,800

The analysis of the economic significance of and motivations for migration has so far left out the refugees from neighbouring African countries. This is because refugee movements are essentially political in origin ; the refugees being uprooted suddenly from their homes are compelled to seek and find asylum, legal protection and material assistance. All these services invariably entail large physical, material and human investment and sacrifice by the country of asylum and the international community acting through its agencies such as the United Nations High Commissioner for Refugees and the League of Red Cross Societies. In the African as well as Zambian experience, these sacrifices and expenses occur initially with very little contribution from the refugees in terms of their skill and training. Subsequently, however, there follows a period of resettlement during which refugees, provided with minimum infrastructural equipment and services in health and education, build up self-reliance. They grow their own food as well as crops which can be sold for cash to meet the cost of other necessities. Beyond this self-supporting stage, wider development projects designed to assist the refugees and the local population alike are developed. For instance, the Nkumbi International

College (secondary school) serves refugees as well as Zambians. The latter were intended to make up 25 per cent of the student body. Also in the Mkushi Agricultural Project, participants have been both Zambians and refugees (1).

In spite of these rehabilitation efforts, other social problems manifest themselves in dealing with refugees in Zambia. There is for example the problem of absorbing into the labour market some very educated and skilled refugees who find life at lower levels intolerable. These cannot and are not easily allowed to compete for jobs with Zambians even if they (the refugees) were better trained. It is largely these educated refugees and, of course, many others less qualified, who drift to the big cities of Zambia and help to precipitate various forms of economic and sociological problems common to migrants anywhere in Africa.

Industrial participation apart, material and physical innovations of significant economic importance resulted from the immigration of Europeans in particular. In order to realistically effect their economic ambitions, it was necessary to develop a viable transport system. A railway was built from the South across the Zambezi river and then extended to the Copperbelt. According to George Kay :

> "The railway not only brought great benefits to the mines that lay near its route but it immediately assumed a vital role in the development of the country. It provided the cheapest and easiest means of carrying goods to and from and within Zambia . . . the railway remains the most important means of moving heavy and bulky goods . . . ".

Transport and other infrastructural growth permitting, the enormous growth of the copper industry and the emergence of the Copperbelt with its relatively dense urban centres are further economic manifestation associated with immigration and the supply of capital and skill. So remarkable has been the development of the copper industry that since the depression, it has dominated the economy of Zambia and encouraged significant growth in other fields of economic activity including agriculture.

Demographically, the inflow of immigrants has had some effects on the indigenous African population. Obviously, the entire flow, mainly of Europeans and Asians, has not modified the relative population size of the major ethnic groups. This has been mainly because of the small proportion which the immigrants constituted of the total population. Nevertheless, immigration has helped to determine the pattern and dynamics of population growth and distribution. Apparently, European immigration generated income especially in mining and manufacturing ; the income in turn has been diffused among Zambians through employment and higher wages. Coupled with the resulting higher standard of living, the relatively low level of mortality due to medical

(1) Sven Hamrell, *Op. cit.*, p. 40.

and sanitary improvements together with prevailing high level of fertility, have produced rapid natural increase of the indigenous population.

Apart from natural increase, population distribution and redistribution have also been more significantly affected by immigration. For Europeans, the building of the railway line and the growth of the Copperbelt encouraged rapid urbanization and continued European urban settlement mostly in the towns. In 1961, the ten largest towns, seven in the Copperbelt, accommodated 85 per cent of Europeans. In addition, they were spread in many small-size rural towns, most of which were either administrative headquarters of provinces and districts or just mission centres. Generally, Asians also lived mostly in the urban areas, not so much on the Copperbelt, but elsewhere wherever trading opportunities existed. This urban concentration of Europeans and Asians encouraged Africans to migrate to urban areas where their labour was in demand. Apparently, the horizon of the African widened not only beyond his village to the cities, but also to countries far and near, and he emigrated, to South Africa, Rhodesia and Zaire for work.

Compared to European immigrants in the country, the Africans settled more in the rural than in the urban areas, a fact which is also associated with their settlement in provinces which in Zambia share common borders with their original home areas. Apparently, socio-economic considerations of skill, training and education have been important in redistributing African immigrants in Zambia. Those coming with better skill and higher education tended to move on beyond provinces near their home areas to the industrial and employment-offering centres on the Copperbelt and in the Central Province. Apart from proximity and cultural links which might impel people to settle across national boundaries, it seems highly likely that the rural settlement of the African immigrants was a stage in their movement to the towns. Having settled in the rural areas, urban links could then be established and followed-up by migration to the towns. It may not even be necessary to develop urban links, because some migrants, ill or well-equipped will just drift to the cities.

Sociologically, relations between immigrants and indigenous Africans affected various aspects of life and really created cultural, social and economic gulfs between the two groups. The black-white-Asian colour differences corresponded to the variations in social and economic status, with the Africans worse off than either Europeans or Asians. In consequence, immigrant adjustment in the period has been relatively easy because there have been little or no social and economic problems of absorbing them. From the start, the friction-catalysing agents were dormant mainly because the Europeans certainly constituted the dominant political and economic group, while the Asians dominated commerce. The two groups were not of the same occupational grouping as the Africans, and being mostly young and skilled, they invariably occupied the upper reaches of Zambia's occupational structure in

disproportionate numbers. Not only have their economic advantages and style of life rationalized their 'reference group' status in the country, but these factors have also bolstered their acculturative and educative influences. There are, however, beginning to emerge signs of social friction as Africans, following political independance, are acquiring skills and education necessary for their advancement to positions which have formerly been the preserve of immigrants. As well as such changes of occupational status, racially oriented patterns of intra-urban settlement are radically being discarded with Africans living side by side in the same suburbs as the Europeans and Asians. In many Zambia cities, territorial segregation of racial settlements appear now in principle to be a thing of the past.

In spite of the stark racial differences, acculturative and educative influences have been spread among indigenous Africans. It has been shown in areas particularly along the railway that some African farmers have improved their techniques and output through adopting European methods. In many ways the European has left his cultural imprints in Zambia. The adoption of European dress, dance, music, religion, and many other cultural traits indicate some of the ways in which Africans have assimilated European ways of life. Though there have been recent attempts to rejuvenate interest in traditional African culture, it seems that changes in such a direction would almost certainly involve accommodating "desirable" elements of the "foreign" culture and not total rejection of it. Possibly except in the area of commerce and retail trading, Asians made limited acculturative impact on the indigenous Africans. Apart from their insular cultural behaviour patterns and ways of life, the Asians had no political power and were numerically a minority group. As a reference group *vis-a-vis* African aspirations, they attracted little attention. The cultural contribution of African immigrants, although hard to discern as a result of areas of common identity has probably been remarkable. One apparent area among others, denoting cultural intermingling and exchange, has been language. The major languages of Zambia have a wealth of vocabulary borrowed from African and non-African languages. As well as words loaned from Swahili and other African languages, English and Indian words and expressions have found their way into local Zambian languages (1).

F. Considerations of the Prospects for Immigration in Zambia.

The tendency towards a decline in the flow of immigrants of all races has already been indicated in the analysis. This development has been taking place despite the important social and economic contributions of immigrants to the evolution of the Zambian nation.

(1) Mubanga E. Kashoki, "Migration and Language Change ; The Interaction of Town and Country", *International African Seminar on Town and Country in Central and Eastern Africa,* Lusaka, September 1972, *passim,* but especially pp. 21-26.

Since independence in 1964, successful attempts have been made by the Zambian Government to promote national self-reliance in addition to indigenization and Africanization of jobs (1). Significant stride has no doubt been made in these directions, and the drive has to be encouraged, if for no other reasons, for the economics of having to rely for ever on the relatively expensive manpower of immigrants.

Apparently, expatriate skills and services have been very much needed in Zambia, but the cost of hiring these has certainly been very high for a country with a large proportion of its population dependent on rural farming. Actually, the expatriate non-African wage level, especially that for Europeans, has been consistently high and above levels in most industrialized societies ; it has also been much higher than that for Africans and, despite recent narrowing of the renumeration gap, it still remains higher than that for even the very highly trained and skilled Zambians.

It is not so much the wage disparity as the drain imposed by the high expatriate wages on the Zambian economy that has influenced post-independence development. For example, because expatriate salaries have been so high, a considerable proportion of the income has and is consumed on imported goods and/or repatriated with losses to the Zambian economy.

Given the above developments, account should also be taken of the fact that reduced opportunities for social and economic domination by migrants would also help to understand not only the cut-back in the flow but also the return to countries of origin of long-standing immigrants. Those most affected by this were Europeans, especially South Africans and Rhodesians. Of greater relevance for African immigrants in terms of the cut-back has been that their flow into Zambia was checked by the post-independence social and economic development which was taking place in their countries about the same time as in Zambia. Such developments afforded them alternative economic opportunities. Favouring a cut-back in Asian immigration has been the reservation of retail trading in rural areas and some parts of the cities for Africans as embodied in the Mulungushi Reforms promulgated by the Zambian Government (2).

Politically, Zambia could hardly have allowed the liberal entry of Europeans and even Africans from Portuguese territories, Rhodesia and South Africa. For her security, this appeared and continues to be regarded as politically expensive and inexpedient in view of the racial, social and economic policies pursued by the authorities in these neighbouring territories.

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(1) Republic of Zambia, *Zambia Manpower*, Government Printer, Lusaka, 1969, pp. 5-7.

(2) Bastiaan de Gaay Fortman (ed.) *After Mulungushi ; the Economics of Zambian Humanism*, East African Publishing House, Nairobi, 1969.

But the decline in the number of immigrants has not been all that dramatic. It has been shown in the analysis that the marked drop in the number of South Africans and Rhodesian whites was compensated for, at least manpower-wise, by the increased flow of immigrants from Europe. In many areas of the civil service, industry and business, qualified immigrant Europeans, Asians and Africans continue to be employed. Such dependence will, in the short run, continue. In the long run, however, trained Zambians will increasingly displace them. The rate at which this displacement will occur will depend on how rapidly and successfully technical and higher education programmes are executed. It is of course appreciated that such educational and indeed other programmes in the national development plan will require continued but temporary reliance on expatriate labour. With the passage of time, the flow of such immigrant labour is bound to be more and more selective, depending on the scarcity of supply of indigenous manpower for specialized tasks. In the immediate future, therefore, a policy of at least selective expatriate immigration will be necessary for Zambia's economic growth. The supply of such expatriates could in fact be negotiated bilaterally with friendly governments in and outside Africa.

Finally, the issues discussed in this section of the analysis raise fundamental policy problems in African development. In many parts of the region, the ordinary man's attitude to immigration is that it is wasteful and expensive. There might be some sense in such an assessment, but whether this carries much weight depends on the internal and external dynamics of the process. Each country's position has to be seen in the light of prevailing circumstances. Research in each area has to demonstrate the alternative cost to African countries, including Zambia, of encouraging or discouraging immigration at any stage of their development. The question whether immigration, be it in the long or short run, provides a meaningful approach to the ills of skilled labour shortage in African development must be answered with profound insight and objectivity.

CHAPTER VI

ECONOMIC PARTICIPATION AND ATTRITION OF MANPOWER IN ZAMBIA (1969)

A. Introduction : The Problem. It would, in principle, be expected that the labour force of any country, as its members graduate through life, suffers depletion as a result of death, emigration, retirement and/or withdrawal from service. The depletion constitutes an important drain on the manpower output of any country, for after account has been taken of the many years needed to develop and train persons, the existing stock of manpower for development and planning suffers attrition and wastage which should be replenished or the level adjusted at least if stocks are to be maintained at a "dynamic optimum" level conducive to achieving defined targets of national economic growth.

In view of the huge investment in education and the prevailing scarcity of manpower resources, together with the bottlenecks in their speedy development (1), a study of manpower attrition rates will surely excite interest among African planners. The extent of the wastage from an existing stock of manpower, given certain limitations, can be estimated by calculating tables of working life.

The principles and procedures of the working life table for the labour force, 15-64 years of age, are mainly predicated on those of the complete or abridged life table for all age groups in the population. In effect, working life tables attempt to estimate the mean number of years of working life available to workers of a given age. To establish this "expectation of working life", the technique traces the yearly experience of a hypothetical group or cohort of workers as they pass through life, indicating how their original size gets depleted by death and retirement or withdrawal.

The likelihood that estimated attrition rates will approximate to reality hinges very much on the assumptions that observed mortality and labour force

(1) P.O. Ohadike, "Bottlenecks in the Zambian Labour Situation", *Journal of Administration Overseas,* Volume XI, N° 4, October 1972.

participation rates of the immediate past, upon which the wastage probabilities are based, will remain the same in the future. In the developing countries of Africa with marked variability in social and economic relationships, the construction of composite working life tables for the national labour force could be misleading not only for understanding developments in different employment sectors but also in the different geographical and social areas of the country. For instance, in connection with rural-urban variations, the 1969 Census of Zambia makes it quite clear that only 17.4 per cent of those seeking work were in the urban areas. Consequently, the bulk of them was in the rural areas. Even so, working life tables have been useful in predicting the number of expected retirements, withdrawals and deaths in several developing countries (1).

B. Adequacy of Data on the Economically Active Population in Zambia.

The 1969 Census provides the most comprehensive attempt ever made to collect nation-wide data on the economically active population in Zambia. During the census, information on economic activity was collected from all persons aged 15 years or more from all the statistically defined urban areas and from a 10 per cent sample of the remaining non-urban areas. Consequently, the published results to be used in this presentation are based on the actual counts for the urban areas as well as estimates for the non-urban areas. The overall results therefore are estimates of the actual situation.

The definition of the labour force in the census included all persons who contributed to the supply of labour for the production of economic goods and services ; it therefore included persons who were working and those who were unemployed but seeking work. A person was working if he received reward in cash (wages and profits) or in kind (boarding and/or lodging). Persons working on a family farm or business, but not housewives entirely engaged in home-keeping activities, were therefore included. Working persons also "included those who had a job and would normally have worked for pay or profit or return in kind but who were (a) on vacation, (b) prevented from working by temporary illness, bad weather, industrial dispute, etc.), (c) persons who had got a new job but had not yet reported for work" (2). From this quotation, there is the likelihood that the working population seeking

(1) Saw Swee-Hock, "Tables of Male Working Life, Malaya, 1957", *Journal of the Royal Statistical Society,* vol. 128, 1965, pp. 421-443. Kpedepko, G.M.K., "Working Life Table for Males in Ghana 1960, *Journal of the American Statistical Association,* vol. 64, 1969, pp. 102-110.

(2) Republic of Zambia, *Census of Population and Housing 1969.* First Report, Central Statistical Office, Lusaka, August, 1970, p. A18.

work might have been over-estimated, particularly in the rural areas where the number of persons prevented from working by had weather could indeed be very high, considering the timing of the census. The census was held at the end of August when agricultural activities are known to be comparatively slack. However, the error of over-estimation here, more or less, depended on how well the enumerators applied the relevant definitions. In the circumstances, the timing of the census during the off-farming season would tend to inflate the number of the unemployed and of those seeking work. With little or no farming activities, people were more likely to slot themselves into these categories in the hope of being given a job. In this connection, it is worth observing that the census result clearly recognized the fact that enumerators and supervisors found it rather difficult to understand the full implications of the definitions of economic activities used. The effects of the enumeration errors were presumably compounded by subsequent errors in the coding of the data in the office (1). Both forms of error would generally have affected the entire survey of economic activities.

Members of the labour force who were seeking work included persons who had taken some positive steps towards obtaining a job. Such steps included registration with the employment exchange, visiting employers for jobs, writing application letters, asking acquaintances about the availability of jobs and so on. Most of these steps were of course feasible in the urban areas and much less so in the rural areas where employment exchanges do not exist and employers are generally very few or totally absent.

Field and coding errors involving definition and interpretation of concepts apart, there is ample evidence that age errors occurred during the census. The pattern of errors were the common heaping and misreporting errors observed in many developing countries, except that the preferred digits in Zambia showed some peculiarities not uncommon in some African countries (2). The Myers Index of digit preference in Zambia in 1969 was 14.8 for males and 15.8 for females. Compared with rates as low as 1.2 for Sweden in 1939 and 3.0 for the United States in 1940, the heaping errors in Zambia have been relatively pronounced. The major peculiarity in the pattern of heaping shows that as well as being attracted to even numbers and those in multiples of 5, the Zambian population also demonstrated preferences for odd numbers, especially 1, 7, and 9 (3). Generally, the observed pattern of age

(1) Republic of Zambia, *Idem.*

(2) M.H. Nagi, E.G. Stockwell and L.M. Snavely : "Digit Preference and Avoidance in the Age Statistics of Some Recent African Censuses : Some Patterns and Correlates" ; *International Statistical Review*, Vol. 41, N° 2, 1973, pp. 166-168.

(3) See Chapter 2 for more detailed discussion of age errors.

errors, especially that for females, conforms to the pattern typical of tropical Africa, India, Indonesia, Morocco and Pakistan in which the age distribution has a surplus at 5-9 and a deficit at 10-19 followed by a surplus in the central ages of childbearing 15-34 years (1). Reflecting perhaps the impact of education at younger ages, errors were more pronounced at adult ages above 15 years than below.

The above evaluation throws important light on the quality of the data on the economically active population in Zambia. However, the observed statistical and conceptual problems are basically relative and only further illustrate the types of difficulties encountered in statistical and demographic analysis in Africa. What this suggests for Zambia as elsewhere in the continent is the exercise of caution in the use and interpretation of results derived from available and limited data. Presently, such caution is very much called for in appreciating the economic activity rates and working life tables for Africans in Zambia. Africans in contrast to the other races constituted well over 97 per cent of the labour force in 1969, and hence this paper will deal only with them.

C. Labour Force Participation Rates in Zambia.

In 1969, the African labour force participation rate or the ratio of their labour force to their total population aged 15 years and over was 51.7 per cent. Participation rates were higher in the urban than in the rural areas. As shown by the data for the total population (Africans, Europeans and others), the rate was 57.9 per cent in the urban areas, and 49.4 per cent in the rural areas (2). This accords with the fact that of the 372,550 African employees, 51.1 per cent were in urban districts and 49.9 per cent in the rest of the country. Two-thirds of the entire labour force was working, while one-third was seeking work. The bulk of the latter, 82.6 per cent, was in the rural areas. The census result clearly highlights the significance of agriculture and allied occupations which accounted for 44.8 per cent of the national working population of 756,800 persons. Services, domestic and others, accounted for 25.1 per cent and was next in importance to agriculture.

A number of significant variations related to the employment conditions in Zambia have been observed by studying the age and sex specific economic activity rates presented in Table 1. From a figure of 41.6 per cent at the age group 15-19 years, male economic activity rates rose steeply to fairly stable

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(1) United Nations, *Methods of Estimating Basic Demographic Measures from Incomplete Data*, (U.N. Sales Publication N° E.67.XIII.2), pp. 19-20.

(2) Republic of Zambia, *Op. cit.*, p. A19.

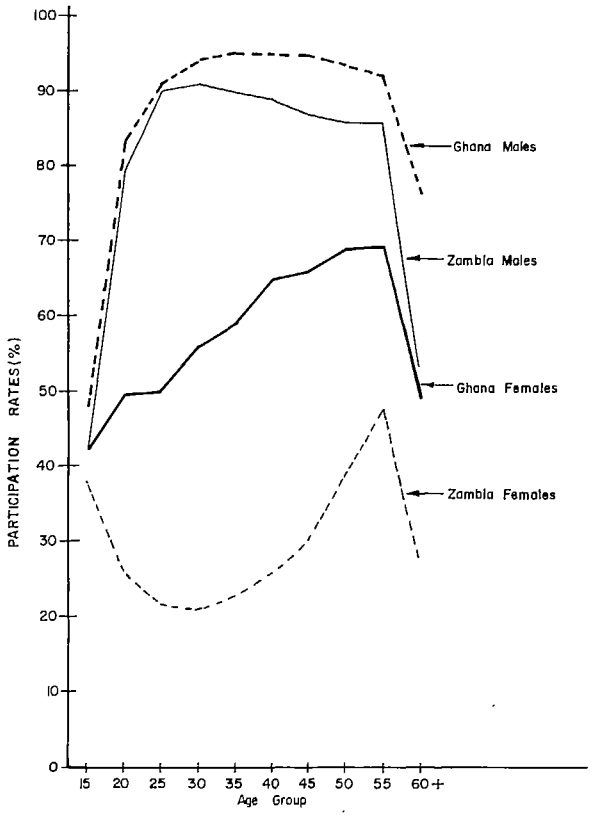

Figure 6.1. – Age and Sex Specific Participation Rates for Zambia (1969) and Ghana (1960).

TABLE 6.1. AGE AND SEX SPECIFIC PARTICIPATION RATES FOR ZAMBIA 1969 CENSUS AND GHANA 1960 CENSUS

Age Group	Zambia		Ghana ([a])	
	Males	Females	Males	Females
15 – 19	41.6	38.3	47.6	42.4
20 – 24	79.4	26.2	80.3	49.5
25 – 29	90.0	22.2	90.7	50.1
30 – 34	90.8	21.4	93.7	56.3
35 – 39	89.9	22.6	94.6	58.6
40 – 44	88.7	25.7	95.0	64.6
45 – 49	87.1	30.4	94.6	65.6
50 – 54	86.5	39.4	93.8	68.9
55 – 59	86.3	48.3	92.3	69.0
60 +	53.1	28.0	76.4	48.9

Source : ([a]) G.M.K. Kpedekpo, "On Working Life in Ghana with Particular Reference to the Female Working Population" *The Journal of the Royal Statistical Society,* Series A., (General), Vol. 132, Part 3, 1969, p. 443.

levels between age groups 25-29 and 55-59, after which it plunged precipitously to a low level. The peak of the distribution was attained at the age group 30-34 with 90.8 per cent of the males in the labour force. The decline which followed was very gradual reaching only 86.3 per cent at the age group 55-59 years. Barring the effect of age errors, the wide inverted U-shape curve suggests a delayed entry into the labour force before the age of 20 for the bulk of the population mainly because of training and education for skills. Entry accelerated after this age; it grew and stabilized up to age 55, after which people began to retire gradually from active economic life. Apart from the possible impact of mortality at the older ages, it is likely that the statutory retirement and pensionable age in the country has been around 60 years.

Female age-specific participation rates differed markedly from those of the males (Figures 6.1), and showed marked deviations from some patterns known to exist elsewhere in the continent (1). The rates are significantly much lower than those published for countries in West Africa as shown, for example, by the rates for Ghana in 1960. They are however higher than those for some North African countries, where specific cultural constraints connected especially with the seclusion of women in purdahs and the accompanying sharp traditional division of labour exacerbate the already adverse educational and economic conditions against the employment of females in general (2). Thus, female crude economic activity rates "range from over 50 per cent (65 per cent in Lesotho, 63 per cent in Portuguese Guinea, 52 per cent in Dahomey and 51 per cent in Madagascar) to the unusually low rates in the Moslem countries (6 per cent in Morocco and Niger, 5 per cent in Egypt, 3 per cent in Libya and Tunisia, and 2 per cent in Algeria) (3).

In Zambia, female labour has been unsufficiently tapped by employers in government and industries. All discussions of labour migration, particularly in the pre-independence days concerned the movement of males who for most of the period came to towns unaccompanied by their families. With the liberalization of the restriction on family migration and more importantly with better social programmes of housing, health and general urban development, more and more females especially those who had benefited from the

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(1) D. Turnham, *The Employment Problem in Less Developed Countries*, O.E.C.D., Development Centre, Paris, 1970, p. 22.

(2) For example, the published rates for Egypt (1957-58) were : 10-14 (12.1) ; 15-19 (11.7) ; 20-24 (7.4) ; 25-34 (6.1) ; 35-44 (7.8) ; 45-54 (8.7) ; 55-64 (7.1) ; and 65 or more (1.9).

See also UNECA, *Demographic Handbook for Africa*, June 1971, Tables 26 and 27, pp. 110-113.

(3) UNECA, *Ibid.*, p. 108.

country's improved education programmes have been getting employment more easily than before in industries and government offices. The picture has been much better since political independence and promises to improve further in the future.

Apart from the lower participation rates, the contrast between the male and female curves is significant. While training for skill and education delayed the entry of the two sexes into the labour force, the males tended to have less constraints in engaging in economic activities. Thus their economic participation more generally rose upwards in contrast to the generally downward slope of the female curve during the childbearing ages. It appears that before marriage and before embarking on raising families, more females participated in economic activities ; subsequently many of them dropped out to become housewives and mothers ; much later, between 40 and 45 years of age, when family responsibilities have been partly or completely fulfilled, an increased number of the females commenced or recommenced participation in economic activities. Actually, after the initial peak at ages 15-19, the secondary and more pronounced peak of their participation was reached in the age group 55-59, after which a dramatic decline of the type shown for the males followed.

Compared, for example, with the female activity curve for Ghana, the female curve for Zambia is really intriguing. The almost J-shape curve shown between 15 and 59 years of age in Zambia was the opposite of the inverted J-shape in Ghana, suggesting, among other alternatives, that marriage and family responsibility did not so much interfere with female participation in economic activity in Ghana as it did in Zambia. So much, of course, is known and has been written about the remarkable versatility and ingenuity of the West African market women, a class yet to be established on a comparably large scale in many other parts of the continent.

D. Working Life Table for Zambia, 1969. A preliminary step in the calculation of a working life table is the determination of the actual as well as the hypothetical percentage working in age groups. Three values ($5^{W}x$, $5^{W'}x$ and ^{W}x) have to be determined as follows :

(a) $5^{W}x$ refers to the actual percentage working in an age group from exact age x to $x + 4$;

(b) $5^{W'}x$ is the hypothetical percentage working in age group from exact age x to $x + 4$. This value, derived from (a), is essential for calculating expected years of working life and retirement at each age group. As it is expected to measure the total working life of a generation, it will necessarily include the economic activity of those generation members who have not

joined the labour force. Using observed or actual percentages under (a), one selects the highest actual value of the percentages to represent the hypothetical proportion, covering in this case the proportion already working as well as those expected to join later on. Thus, the hypothetical reflects both actual and potential economic activity rates.

(c) ${}^{W}x$ is the hypothetical percentage working at exact age x. It gives the size of the working population that has attained their x^{th} birthday. The values may be calculated from (b) as follows :

$$ {}^{W}x = \frac{1}{2} \left(5^{W'}x + 5^{W'}x - 5 \right) $$

The three basic values calculated for males and females in Zambia in 1969 are shown in Table 6.2. The maximum of the actually recorded values in column 1 (90.80 for males and 48.3 for females) have been used in column (2) to represent the highest value of the hypothetical percentage in age group from exact age x to $x + 4$. The ${}^{W}x$ values derived from column (2) are shown in column (3).

The most important prerequisite for calculating a working life table is the determination of relevant mortality functions (${}^{l}x$, $5^{L}x$ and ${}^{T}x$) of the ordinary life table appropriate to the economic and demographic conditions in the country. Where reliable mortality data exist, the derivation of these functions is relatively easy. This, however, is not the case in Zambia, where vital registration for all Africans has been non-existent. Recent attempts have been made to launch a system of vital registration in selected areas. It is, however, too early to judge the reliability of the results. Consequently, the only alternative has been to make simple estimates of mortality deemed consistent with the recorded age and sex structure of the population in 1969. The estimates derive mainly from the appraisal of the quality of the age and sex data for the estimation of vital rates in Zambia (1).

On the assumption that the African population in the country has not experienced major demographic fluctuations, the level of fertility and mortality was estimated by locating the model stable population that corresponded best to the observed age distribution and average rate of yearly growth in the intercensal period 1963 to 1969. This estimated average rate of annual increase was 2.7 per cent for both sexes. The female rate of 2.8 per cent was higher than the 2.4 per cent per annum for males (2). The implied mortality figures from a comparison of the observed age distribution with that of the stable were an expectation of life at birth of 43.6 years for females and 35.4 for males ; the crude birth rate was 48.7 per thousand for females and

(1) A.E. Okorafor and P.O. Ohadike, "The Estimation of Vital Rates from Census Data in Zambia", *Proceedings of C.O.D.E.S.R.I.A., Workshop on Population Research in Africa,* Lome, 30 July – 3 August 1973, CONDOC-2-17.

(2) A.E. Okorafor and P.O. Ohadike, *Ibid.*, p. 11.

52.3 for males. The corresponding crude death rates was 20.7 per 1000 for females and 28.3 for males. With these indications, corresponding life table functions were selected, using appropriate interpolation techniques where necessary.

TABLE 6.2. ACTUAL AND HYPOTHETICAL PERCENTAGE OF THE WORKING POPULATION, 1969 NATIONAL CENSUS OF ZAMBIA

Age	Actual % working in age group from exact age x to $x + 4$	Hypothetical % working in age group from exact age x to $x + 4$	Hypothetical % working at exact age x
	(1) $= {}_5^{W}{}_x$	(2) $= {}_5^{W'}{}_x$	(3) $= {}^{W}{}_x$
		Males	
15 – 19	41.57	90.80	90.80
20 – 24	79.43	90.80	90.80
25 – 29	90.01	90.80	90.80
30 – 34	90.80	90.80	90.80
35 – 39	89.93	89.93	90.36
40 – 44	88.72	88.72	89.32
45 – 49	87.08	87.08	87.90
50 – 54	86.54	86.54	86.81
55 – 59	86.29	86.29	86.41
60 +	53.06	53.06	69.67
		Females	
15 – 19	38.26	48.31	48.31
20 – 24	26.16	48.31	48.31
25 – 29	22.21	48.31	48.31
30 – 34	21.35	48.31	48.31
35 – 39	22.56	48.31	48.31
40 – 44	25.70	48.31	48.31
45 – 49	30.35	48.31	48.31
50 – 54	39.43	48.31	48.31
55 – 59	48.31	48.31	48.31
60 +	27.95	27.95	38.13

Apart from the possible element of errors inherent in the mortality estimates, it should also be recognized that this blanket application of one set of rates for the whole population will not be adequate for specific occupational groups. This is because differences in the social and economic circumstances of respective groups invariably imply corresponding variations in mortality experience. Consequently, mortality rates for certain specific occupational groups will differ from that of the whole population.

Bearing these limitations in mind, the respective values of the working life table for Zambia in 1969 have been developed in Table 6.3 for males and Table 6.4 for females, using the ordinary life table values implied in the

TABLE 6.3. WORKING LIFE TABLE FOR ZAMBIA, 1969 CENSUS (MALE)

No. of working population per 1000 born alive							Losses from the working population					
							Total		Due to death		Due to other causes	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Age Group x to $x+4$	At exact age x	Per cent of working population	At exact age x	From exact age x to $x+4$	Exact age x and above	Expectation of working Life at exact age x	Number	Per 1000 in working population	Number	Per 1000 in working population	Number	Per 1000 in working population
x to $x+4$	l_x	W_x	$l_x^W = l_x W_x$	${}_5L_x^w$	T_x^w	${}^0e_x^w$	${}_5S_x^w$	$1000\ {}_5m_x^s$	${}_5d_x^w$	$1000\ {}_5m_x^d$	${}_5r_x^w$	$1000\ {}_5m_x^r$
15 – 19	6,370	90.80	5,784	28,415	212,019	36.7	201	7.1	176	6.2	25	0.9
20 – 24	6,149	90.80	5,583	27,230	183,604	32.9	274	10.1	240	8.8	34	1.3
25 – 29	5,847	90.80	5,309	25,820	156,374	29.5	290	11.2	281	10.9	9	0.3
30 – 34	5,528	90.80	5,019	24,250	130,554	26.0	337	13.9	301	12.4	36	1.5
35 – 39	5,181	90.36	4,682	22,420	106,304	22.7	395	17.6	325	14.5	70	3.1
40 – 44	4,800	89.32	4,287	20,320	83,884	19.6	445	21.9	354	17.4	91	4.5
45 – 49	4,371	87.90	3,842	18,090	63,564	16.5	448	24.8	380	21.0	68	3.8
50 – 54	3,910	86.81	3,394	15,795	45,474	13.4	470	29.8	414	26.2	56	3.6
55 – 59	3,384	86.41	2,924	12,215	29,679	10.2	961	78.7	409	33.5	552	45.2
60 +	2,818	69.67	1,963	–	17,464	8.9	1,963	112.4	782	44.8	1,181	67.6

No. of working population per 1000 born alive							Losses from the working population					
							Total		Due to death		Due to other causes	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Age Group x to $x+4$	At exact age x	Per cent of working population	At exact age x	From exact age x to $x+4$	Exact age x and above	Expectation of working Life at exact age x	Number	Per 1000 in working population	Number	Per 1000 in working population	Number	Per 1000 in working population
x to $x+4$	l_x	W_x	$l_x^w = l_x W_x$	${}_5L_x^w$	T_x^w	${}^0e_x^w$	${}_5S_x^w$	1000 ${}_5m_x^s$	${}_5d_x^w$	1000 ${}_5m_x^d$	${}_5r_x^w$	1000 ${}_5m_x^r$
15 – 19	7,216	48.31	3,486	17,165	142,716	40.9	105	6.1	96	5.6	9	0.5
20 – 24	6,999	48.31	3,381	16,580	125,551	37.1	129	7.8	119	7.2	10	0.6
25 – 29	6,732	48.31	3,252	15,910	108,971	33.5	139	8.7	137	8.6	2	0.1
30 – 34	6,443	48.31	3,113	15,185	93,061	29.9	151	9.9	149	9.8	2	0.1
35 – 39	6,131	48.31	2,962	14,410	77,876	26.3	160	11.1	159	11.0	1	0.1
40 – 44	5,801	48.31	2,802	13,595	63,466	22.7	165	12.2	164	12.1	1	0.1
45 – 49	5,459	48.31	2,637	12,745	49,871	18.9	175	13.7	172	13.5	3	0.2
50 – 54	5,096	48.31	2,462	11,770	37,126	15.1	215	18.3	195	16.6	20	1.7
55 – 59	4,652	48.31	2,247	9,545	25,356	11.3	675	70.7	210	22.0	465	48.7
60 +	4,124	38.13	1,572	–	15,811	10.1	1,572	99.4	492	31.1	1,080	68.3

mortality estimates. As can be seen from the tables, thirteen values of the working life tables have been calculated in the thirteen columns of each table. No doubt, the respective values are interrelated as can be seen from the following description of the columns :

(a) *Column 1* : This column which defines the age intervals in self explanatory.

(b) *Column 2* : The derived l_x function of the ordinary life table is shown here.

(c) *Column 3* : W_x denotes the hypothetical percentage working at exact age x ; the derived values here are the same as those in column 3 of Table 6.2.

(d) *Column 4* : The value l_x^w is the link-pin in the process of deriving most other values. As the column shows

$$l_x^w = l_x W_x$$

(e) *Column 5* : ${}_5L_x^w$ is derived from l_x^w in column 3 as follows :

$${}_5L_x^w = 2\,\tfrac{1}{2}\,(l_x^w + l_x^w + 5)$$

(f) *Column 6* : T_x^w = the age-specific cumulated ${}_5L_x^w$ values with the proviso that $T_{60}^w = {}_5W'_{60} x\, T_{60}$, where W_{60} denotes percentage of working population aged 60 ; T_{60} is equal to the years lived collectively.

(g) *Column 7* : The expectation of working life is shown here and is measured as follows :

$${}^0e_x^w = T_x^w / l_x^w$$

(h) *Column 8* : The total number of losses expected from the working population of the country is calculated in this column as follows :

$${}_5S_x^w = l_x^w - l_x^w + 5$$

(i) *Column 9* : Here the total number of losses expected per 1000 from the working population of the country is shown as a function of :

$${}_5m_x^s = {}_5S_x^w / {}_5L_x^w$$

(j) *Column 10* : The total number of losses expected from the working population in column 8 is made up of those who will die and those who will be lost because of retirement and other reasons. In this column, the losses due to death are shown as follows :

$${}_5d_x^w = {}_5L_x^w / {}_5m_x$$

where ${}_5m_x$ = age specific death rate of an ordinary life table.

(k) *Column 11* : Here the losses due to death per 1000 in the working population are shown as :

$$_5m_x^d = {}_5d_x^w / {}_5L_x^w$$

(l) *Column 12* : In this column the number of losses due to retirement and other reasons is depicted as follows :

$$_5r_x^w = {}_5S_x^w - {}_5d_x^w$$

(m) *Column 13* : The losses due to retirement and other factors are shown in terms of per 1000 persons (male or female) in the working population thus :

$$_5m_x^r = {}_5r_x^w / {}_5L_x^w$$

The salient features of the working life table for Zambia are obvious from the preceding brief description of the interrelationships between the respective columns of each of Table 6.3 and 6.4. For our present purpose, the age-specific expectation of working life at exact age x (column 7) is one of the very important features of the tables. As can be seen, the male and female levels exhibited similar patterns ; both tended to decline rather gradually with age and showed, as would be expected, higher levels of working life expectancy in the lower age groups. Between the two sexes, however, females appeared to have longer working life expectancy than males, and this accords with the difference observed between Ghanaian males and females in 1960 as can be seen in Table 6.5. From this table also, the apparent difference between developed countries, such as the United States and England and Wales, and developing countries including Zambia and Ghana, can be studied. The developed countries have higher longevity which presumably helps to explain their higher levels of expectation of working life. It does not follow,

TABLE 6.5. EXPECTATION OF LIFE AT BIRTH AND OF WORKING LIFE AT SELECTED AGES AND FOR SELECTED COUNTRIES

Expectation of life and of working life	Zambia 1969 ([a])		Ghana 1960 ([b])		USA 1950 ([c])	England ([c]) Wales and 1961
	Males	Females	Males	Females	Total	Total
$^0e_0$	35.4	43.6	37.1	40.8	65.5	65.8
e_{15}	39.5	44.5	39.4	41.3	53.4	53.7
e_{15}^w	36.7	40.9	38.1	39.5	41.5	46.2

Sources : (*a*) P.O. Ohadike, 1974 estimates.

(*b*) G.M.K. Kpedekpo, "Methods of Manpower Calculations : Estimation of Attrition Rates by the Use of Working Life Tables", *African Population Conference,* Accra, 9 – 18 December 1971, Table 6B.

(*c*) United Nations, *Demographic Aspects of Manpower,* No. 1, 1962, pp. 58 and 70 – 72.

TABLE 6.6. ESTIMATED LOSSES FROM THE WORKING POPULATION OF ZAMBIA, 1969 CENSUS (MALE)

Age	Working Population (P)	1000 ${}_5m_x^s$	Total Losses P (${}_5m_x^s$)	Due to Death		Other Causes	
				1000 ${}_5m_x^d$	Losses P (${}_5m_x^d$)	1000 ${}_5m_x^r$	P (${}_5m_x^r$)
1	2	3	4 = 2 x 3	5	6 = 2 x 5	7	8 = 2 x 7
15 – 19	70,988	7.1	504	6.2	440	0.9	64
– 24	103,732	10.1	1,048	8.8	913	1.3	135
25 – 29	109,926	11.2	1,231	10.9	1,198	0.3	33
30 – 34	102,322	13.9	1,422	12.4	1,269	1.5	153
35 – 39	102,762	17.6	1,809	14.5	1,490	3.1	319
40 – 44	75,420	21.9	1,652	17.4	1,312	4.5	340
45 – 49	72,401	24.8	1,796	21.0	1,520	3.8	276
50 – 54	50,288	29.8	1,499	26.2	1,318	3.6	181
55 – 59	53,557	78.7	4,215	33.5	1,794	45.2	2,421
60 +	40,968	112.4	4,605	44.8	1,835	67.6	2,770
Total	782,364	–	19,781	–	13,089	–	6,692

TABLE 6.7. ESTIMATED LOSSES FROM THE WORKING POPULATION OF ZAMBIA, 1969 CENSUS (FEMALE)

Age	Working Population (P)	1000 ${}_5m_x^s$	Total Losses P (${}_5m_x^s$)	Due to Death		Other Causes	
				1000 ${}_5m_x^d$	Losses P (${}_5m_x^d$)	1000 ${}_5m_x^r$	P (${}_5m_x^r$)
1	2	3	4 – 2 x 3	5	6 = 2 x 5	7	8 = 2 x 7
15 – 19	69,610	6.1	425	5.6	390	0.5	35
20 – 24	48,955	7.8	382	7.2	353	0.6	29
25 – 29	35,082	8.7	305	8.6	302	0.1	3
30 – 34	29,833	9.9	295	9.8	292	0.1	3
35 – 39	26,314	11.1	292	11.0	289	0.1	3
40 – 44	21,652	12.2	264	12.1	262	0.1	2
45 – 49	22,746	13.7	312	13.5	307	0.2	5
50 – 54	20,839	18.3	381	16.6	346	1.7	35
55 – 59	19,353	70.7	1,368	22.0	426	48.7	942
60 +	18,021	99.4	1,791	31.1	560	68.3	1,231
Total	312,405	–	5,815	–	3,527	–	2,288

however, that the developing countries would necessarily enjoy greater economic prosperity by increasing the level of life expectancy as well as of working life. In the context of the overriding impact of fertility over

mortality on the rate of population growth and the age structure, increases in economic productivity cannot *per se* enhance individual prosperity. This is because such increases and the accruing revenue will be used to service the rapidly expanding and youthful population with a high dependency burden. In order to reap fully the benefit of improved expectation of working life, a corresponding decline of the presently high level of fertility in the developing countries is necessary so as to achieve improvements in per capita standard of living through a reduction of the youth dependency burden.

The important part played by mortality in determining manpower attrition rates is further illustrated in Tables 6.6 and 6.7 showing cause-specific as well as age/sex-specific losses from the observed census working population of Zambia in 1969. The estimation procedures are related to the calculations made in developing the working life tables discussed above. The age-specific death rates and the age-specific retirement or withdrawal rates of the life tables have been assumed to apply to the actual enumerated working population. Columns 4, 6 and 8 respectively show the expected total losses, the losses due to death, and the losses due to other causes apart from death.

The major part of the total losses (66.2 per cent for males and 60.7 per cent for females) were accounted for by deaths ; the balance was due to retirement, withdrawal immigration and other factors. It is significant that while the losses due to deaths tended to be fairly spread among all the age groups, concentration being higher at the older ages, the losses attributed to other causes than death showed very marked concentration at the relatively very old ages (55 years and above) when the majority of pension retirements and/or voluntary withdrawal occurred. This pattern of concentration was as marked for the Zambian males as it was for the females, although in general, far more males of ages below 55 years tended to contract-out of the labour force for reasons other than death. The emigration of Zambian males to other countries may be related to this, since this form of long-distance movement tended, in the past, to attract more males than females.

For manpower planning purposes in Zambia, the estimated levels of attrition due to deaths and causes other than death provide a useful basis for assessing the prospective supply of employment opportunities. Any decisions on the number of additional jobs demanded by the community should presumably take account of the vacancies created by the losses due to deaths and other factors. Thus, according to the calculation for 1969, some 19,781 male and 5,815 female job vacancies would be available during 1970/71 as a result of deaths, retirements and other causes. Given that the number of unemployed Zambians in the period is known, policy-makers in the country can, with a fair degree of precision, determine the number of additional jobs required to satisfy the total demand for employment in the country.

Another way the planners could operate is to apply the attrition rates implied by the calculated losses in 1969 to the working population in

subsequent years. This, of course, could only be done on the assumption that no radical changes in the employment and unemployment situation occur to render predictions doubtful. In the absence of such changes, planners could apply the attrition rates to a given and defined labour force in order to estimate the number of vacancies likely to occur at least in the most immediate future as a result of deaths and other factors. The estimated total attrition rate for Zambia in 1969 was 25.3 per 1000 male working population. Of this, the attrition rate due to deaths was 16.7 per 1000, while for other causes, it was 8.6 per 1000 males in the labour force. The rates for females gave a total attrition rate of 18.6 per 1000 female working population. This was made up of 11.3 per 1000 due to deaths and 7.3 per 1000 due to causes other than deaths.

TABLE 6.8. CAUSE-SPECIFIC ATTRITION RATES FOR SELECTED COUNTRIES

Countries	Rates per 1000 Working Population		
	Total	Due to Death	Other Causes
Zambia (1969)			
Males	25.3	16.7	8.6
Females	18.6	11.3	7.3
Ghana (1960)			
Males	23.3	20.9	2.4
Females	20.5	16.0	4.5
Malaya (1957)	14.1	10.4	3.7
Great Britain (1951)	18.1	8.4	9.7

A comparison of the Zambian rates with those of other countries, though impressive, indicates the existence of appreciable differences. Such variations, however, conform to expectations founded on the existence of differences between countries in the level of mortality and the various forms of social, cultural and economic constraints which impinge on the degree and pattern of participation in economic activities. These fundamental differences between regions or countries render extrapolation of results and inferences from one area to another very difficult. In the African context, there is a need for a concerted attack on the problems of defining, collecting and analysing information on economic activity. As already shown in the introduction to this chapter, the assessment of the manpower output of any nation has, in addition to calculations of time and cost of training, to analyse the existing stock of labour, the demand for it and the wastage resulting from deaths, retirements, net migration and other factors. Besides, a common approach to the problems will invariably enhance comparability of data as well as improve their validity and reliability for development planning.

CHAPTER VII

POPULATION PROSPECTS AND IMPLICATIONS

A. Background Analysis. The population data obtained from the 1969 census of Zambia, after making the necessary adjustments for defectiveness, have been used to carry out projections for estimating Zambia's future population size, composition and characteristics. The projection period is 30 years, covering 1969 to 1999.

The component method of projection was employed (1) and the following data were required :

(1) Base period age-sex data by quinary ages

(2) Fertility estimates and assumptions

(3) Mortality estimates and assumptions

(4) Estimate of sex ratio at birth

(5) International migration assumption.

1) Base period Age-Sex Data

The adjusted base period age-sex data by quinary ages given in Table 2.13 of Chapter 2 was used without further modifications.

2) Fertility Estimates and Assumptions

It is very difficult to predict the probable future course of fertility and when changes would set in. Bearing this limitation in mind, the following assumptions were made :

(a) Initially, total fertility would remain constant throughout the projection period. The present level of fertility in Zambia is high and it is possible that it will remain so in future. This is in line with some important pronatalist welfare measures pursued in Zambia. For example, it is known that families are given some rebate or allowances in respect of income tax for the first six children. This, by itself, constitutes an incentive to high fertility.

(1) United Nations, *Methods of Population Projections by Sex and Age*, Manual III, New York, 1956, pp. 2-3.

(b) Based on the anticipated social and economic development in the country, a possible decline in fertility was assumed. In doing so, due attention was given to the fact that a certain stage of social and economic development (threshold development) would be required to initiate a fertility decline. It was therefore assumed that the onset of fertility decline would be around 1980. The tempo and velocity of the change in fertility was taken to vary between a slow and a rapid rate of decline.

Consequently, it was first assumed that total fertility would remain constant during 1969-1979, after which a decline of 5 per cent every quinquenium will follow. The second pattern of the decline also assumed that total fertility will be constant during 1969-1979 and thereafter attain a 10 per cent decline every quinquenium. The projected total fertility rates according to the three assumptions made are given in Table 7.1.

TABLE 7.1. PROJECTION OF TOTAL FERTILITY RATE FOR ZAMBIA : 1969 – 1999

Period	Constant Fertility	5% decline after 1980	10% decline after 1980
1969 – 74	6.9	6.9	6.9
1974 – 79	6.9	6.9	6.9
1979 – 84	6.9	6.7	6.5
1984 – 89	6.9	6.4	6.0
1989 – 94	6.9	6.1	5.5
1994 – 99	6.9	5.8	5.0

In order to project births under the assumption of constant fertility, the base period age specific fertility rates as estimated in Chapter 2, Table 2.19 were used to derive the expected annual births. The age-specific fertility rates were multiplied by the average female population of childbearing ages at the beginning and end of each five-year projection period and then cumulated. Under the assumptions of declining total fertility rate, the annual births calculated on the basis of the constant schedules of age-specific fertility rates were multiplied by a ratio of projected total fertility for a given period to the total fertility in the initial period so as to get annual births adjusted for declining total fertility rate. "Use of total fertility rate in this way is equivalent precisely to assuming that the age-specific birth rates change uniformly by age by the same percentage as the total fertility rate" (1).

To obtain births for a five-year period, the expected annual births were multiplied by five. Male births for a five-year period were obtained by multiplying five-year total births by a ratio of male births to total births, in

(1) H.S. Shryrock and J.S. Siegel, *The Methods and Materials of Demography*, Vol. II, Washington, D.C., 1973, p. 782.

this case 0.507. Multiplying the expected five-year period male and female births by appropriate survival rates from birth, gave estimated male and female populations aged 0-4, respectively at the end of every five-year period.

3) Mortality Estimate and Assumptions

In the past two to three decades, a universal decline in the trend of mortality in the world has been observed. In line with this observation, the United Nations has made a generalized assumption of an average increase in expectation of life at birth of half a year per year (1). However, due to improvements and expansion of medical and public health facilities, an increase in expectation of life at birth of about three-quarters of a year per year has been observed in some developing countries. Since considerable improvement and expansion of medical and public health services are also taking place in Zambia, an orderly decline in the level of mortality resulting in improvements of expectation of life at birth of half a year per year from 1969 to 1979, and three-quarter of a year per year from 1979 to 1999 were assumed. The expectation of life at birth of 47.5 years for females and 44.3 years for males estimated for 1969 were assumed to represent the base period (1969-74) mortality level. The projected mortality levels and expectation of life at birth are presented in Table 7.2.

TABLE 7.2. PROJECTION OF MORTALITY LEVELS AND EXPECTATION OF LIFE AT BIRTH ($^0e_0$) FOR ZAMBIA, 1969 – 1999

Period	Mortality level	e_0^0
1969 – 74	12	46
1974 – 79	13	48
1979 – 84	14.5	52
1984 – 89	16	56
1989 – 94	17.5	59
1994 – 99	19	63

4) Sex ratio at birth

Sex ratio in Africa has been variously guessed to be between 102 and 104 (2). Since there is no information on sex ratio at birth in Zambia, for the purpose of our projection, we have assumed sex ratio at birth to be 103.

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(1) United Nations, *World Population Prospects*, New York, 1966, p. 45.

(2) United Nations, *Methods of Estimating Basic Demographic Measures from Incomplete Data*, Manual IV, New York, 1967, p. 21.

5) International migration assumption

Assumptions about migration as a component of growth and change were not made mainly because net international migration of Africans has not been very substantial in the recent past. In addition, African immigration has not been very faithfully recorded. Even with the currently low level, the prospects, given the vigorous education and training programmes of the Government, are that migration will decline rather than increase (1).

B. Future Population Growth. On the basis of the three assumptions about the possible trend of fertility and mortality outlined above, the population of Zambia by five-year age and sex groups has been projected up to the end of the present century (1999). The projected figures are given in full in Tables A7.1, A7.2 and A7.3 in the appendix.

TABLE 7.3. TOTAL POPULATION (IN THOUSANDS) AND INDICES OF TOTAL POPULATION GROWTH (1969 = 100) FOR ZAMBIA : 1969 – 1999

Year	Projection (^{a})	Projection (^{b})	Projection (^{c})
1969	4,049	4,049	4,049
1974	4,710	4,710	4,710
1979	5,499	5,499	5,499
1984	6,474	6,436	6,400
1989	7,726	7,567	7,442
1994	9,315	8,938	8,649
1999	11,315	10,371	10,015
	Indices of population Growth		
1969	100	100	100
1974	116	116	116
1979	136	136	136
1984	160	159	158
1989	191	187	184
1994	230	221	214
1999	279	256	247

The total African population in Zambia as of 1969 was 4049 thousand. This may reach 4710 thousand in 1974 (16 % increase), 5499 thousand (46 % increase) in 1979. According to projection (a) based on constant fertility, the total population would reach 6474 thousand in 1984, 7726 thousand in 1989, 9315 thousand in 1994 and 11315 thousand in 1999. Also, according to projection (b) based on a slower decline of fertility, the population for the same years would be 6436, 7567, 8938 and 10371 thousands, respectively.

(1) P.O. Ohadike, "Immigrants and Development in Zambia", *International Migration Review* (In Press).

Fertility will start declining in 1984 and thereafter the population increase, both under projections (b) and (c) are smaller in absolute and relative terms, and both differ from the increase to be attained under constant fertility assumption in projection (a).

However, the three series of projections suggest that the population of Zambia would double in 20-25 years as can be seen from Table 7.3. The rate of natural increase would continue to remain very high throughout the projection period (see Table 7.4). Between 1969 and 1999, the population would be growing at 3.5 per cent per annum according to projection (a), 3.1 per cent per annum according to projection (b) and 3 per cent per annum according to projection (c). An examination of the trends in birth and death rates clearly shows that the high rate of natural increase will be brought about by the high birth rate accompanied by declining mortality as illustrated in Table 7.4.

TABLE 7.4. ESTIMATES OF FUTURE VITAL RATES FOR ZAMBIA : 1969 - 1999

Period	Projection ([a])	Projection ([b])	Projection ([c])
	Births per 1000		
1969 - 74	49.80	49.80	49.80
1974 - 79	47.80	47.80	47.80
1979 - 84	47.50	46.20	45.00
1984 - 89	47.60	44.50	42.00
1989 - 94	47.60	43.20	39.80
1994 - 99	47.17	37.60	37.20
	Deaths per 1000		
1969 - 74	18.80	18.80	18.80
1974 - 79	16.80	16.80	16.80
1979 - 84	14.50	15.20	15.00
1984 - 89	11.60	11.50	12.00
1989 - 94	9.60	10.20	9.80
1994 - 99	7.17	7.60	7.20
	Rates of Natural Growth per 1000		
1969 - 74	31.00	31.00	31.00
1974 - 79	31.00	31.00	31.00
1979 - 84	33.00	31.00	30.00
1984 - 89	36.00	33.00	30.00
1989 - 94	38.00	33.00	30.00
1994 - 99	40.00	30.00	30.00
1969 - 1999	35.00	31.00	30.00

Birth rates, under the three series of projections, would still remain relatively high throughout the projection period. Under the assumption of constant fertility, birth rates would decline from 50 to 38 per 1000 under

projection (b) and 50 to 37 per 1000 under projection (c). The likelihood appears to be that mortality during the projection period would decline considerably from a death rate of around 19 per 1000 to about 7 per 1000.

C. Implications of Population Projections. The projections undertaken imply that basic changes will occur in the composition of population in Zambia and in the provision of social and economic services. The fundamental implications will be discussed below.

A detailed analysis and interpretation of the causes and consequences of rapid population growth could be made by studying changes in age structure and the growth of the different population sub-groups.

TABLE 7.5. AGE STRUCTURE OF THE POPULATION OF ZAMBIA : 1969 - 1999

Age Group	0 – 14			15 – 64			65 +		
Year	Projection (a)	Projection (b)	Projection (c)	Projection (a)	Projection (b)	Projection (c)	Projection (a)	Projection (b)	Projection (c)
				('000)					
1969	1 917	1 917	1 917	2 047	2 047	2 047	83	83	83
1974	2 175	2 175	2 175	2 433	2 433	2 433	102	102	102
1979	2 623	2 623	2 623	2 745	2 745	2 745	131	131	131
1984	3 050	3 012	2 972	3 259	3 259	3 259	165	165	165
1989	3 668	3 509	3 384	3 862	3 862	3 862	196	196	196
1994	4 496	4 119	3 830	4 576	4 576	4 576	243	243	243
1999	5 537	4 640	4 316	5 473	5 426	5 394	305	305	305
				In Percentages					
1969	47.3	47.3	47.3	50.6	50.6	50.6	2.1	2.1	2.1
1974	46.2	46.2	46.2	51.7	51.7	51.7	2.1	2.1	2.1
1979	47.7	47.7	47.7	49.9	49.9	49.9	2.4	2.4	2.4
1984	47.1	46.8	46.4	50.3	50.6	50.9	2.6	2.6	2.7
1989	47.5	46.4	45.5	50.0	51.0	51.9	2.5	2.6	2.6
1994	48.3	46.1	44.3	49.1	51.2	52.9	2.6	2.7	2.8
1999	48.9	44.7	43.1	48.4	52.3	53.9	2.7	3.0	3.0
				Indices of Growth					
1969	100	100	100	100	100	100	100	100	100
1974	113	113	113	119	119	119	123	123	123
1979	137	137	137	135	135	135	158	158	158
1984	159	157	155	159	159	159	199	199	199
1989	190	183	177	189	189	189	236	236	236
1994	234	215	200	224	224	224	293	293	293
1999	287	242	225	267	265	263	367	367	367

Table 7.5 gives the age structure of the population by the three broad age groups 0-14, 15-64, and 65 and above in absolute and relative terms showing the percentage distribution and indices of growth for the three series of projections.

The population aged 0-14 will grow from 1917 thousand in 1969 to 2175 thousand in 1974 and 2623 thousand in 1979. This will represent growth of 13 per cent and 37 per cent respectively. Variations in the absolute size and growth of this age group appear after 1979 mainly as a result of differences in fertility between the projection series. By 1999, the age group 0-14 would reach 5537 thousand, 4640 thousand and 4316 thousand according to projections (a), (b) and (c) respectively, representing growths of 187, 142, and 125 per cent.

For the three projection series, the working age population (15-64 years) will increase from 2047 thousand in 1969 through 2433 thousand in 1974, 2745 thousand in 1979, 3259 thousand in 1984, 3862 thousand in 1989 and 4576 thousand in 1994, representing growth rates of 19, 35, 59, 89, 124 per cent respectively. It is only after 1994 that some difference in the size of the working age population will emerge. Consequently in 1999, the working population will under projection (a) be 5473 thousand ; under the projection (b), 5426 thousand and under projection (c), 5394 thousand. To understand this change, it will be remembered that fertility was assumed to decline after 1979. The effect of the decline on the working ages 15-64 will not be immediate but will be felt only after 15 years (i.e., 1999), when the reduced cohort of births born fifteen years ago begin to enter the labour market. Thus the observed variation is a result of the expected fertility decline built into the projections.

The population aged 65 years and over will double in 15 years, and in 30 years time will be more than $3\frac{1}{2}$ times its 1969 population of 83 thousand.

From the foregoing analysis, a number of significant observations can be made. In the first place, a close examination of the size and growth of the various population sub-groups by age reveals that the growth of the sub-groups will be rapid and substantial. This will be so even when both fertility and mortality are assumed to decline. But the observed growth rates of the three population sub-groups are uneven with some age groups growing faster than others. According to projection (a), the population aged 0-14 and 65 and over will grow at a faster rate than those aged 15-64 years. Furthermore, the growth rate of the population aged 65 and over will surpass the rates for those aged 0-14 and 15-64 years. For example, it will take 15 years for population aged 65 years and above to double ; 20-25 years for population aged 0-14 and 15-64 to double. In a period of 30 years, the population aged 0-14, 15-64 and 65 and over will be 2.87, 2.67 and 3.67 times their 1969 population size. This difference is due to the fact that the rapid decline of

mortality will give rise to higher rates of growth in the youngest and oldest age groups than in the adult working age groups. Furthermore, under projections (b) and (c), the growth rate of the 0-14 population will lag behind that of the population 15-64, and 65 and over. This is due to the fact that the assumption of declining fertility will reduce the proportion of the population 0-14 relative to that of those aged 15 and above.

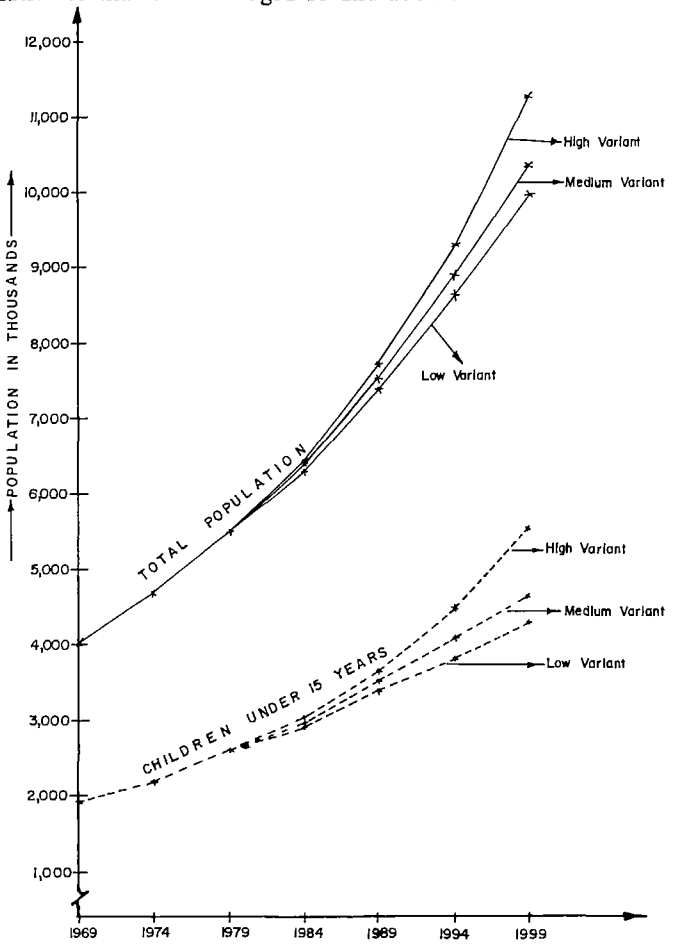

Figure 7.1. – Growth of Total Population and of Children under 15 Years of Age : 1969/1999.

According to projection (a), the percentage of children under 15 will increase from 47 in 1969 to about 49 per cent in 1999. By 1999, almost half of the population will be children. The percentage of children under 15 will decline from 47 to 45 per cent according to projection (b) and 47 to 43 according to projection (c).

The population aged 65 and over form a negligible proportion of the total population and in a period of 30 years the percentage will increase from 2.1 to 2.7 per cent according to projection (a), 2.1 to 3 per cent according to projections (b) and (c).

Further examination of the percentage distribution of the population under the three broad age groups reveals that there will be large proportions of children in the population, and that the population will therefore continue to grow young throughout the projection period. The high proportion of children amounting to at least 43 per cent of the population throughout the projection period is characteristic of populations with large growth potentials due mainly to the incidence of high fertility and declining mortality. This balance between fertility and mortality will produce a population pyramid broad at its base, and tapering off as it advances to higher age groups.

The rapid growth of the size of the population sub-groups by age have social and economic implications for planning education, manpower, housing and other social requirements. Analysis of these will concentrate on the social and economic implications of the dependency burden, school age population, labour force and total number of households.

1) Dependency Burden

It is commonly recognized that developing countries of the world have high dependency burdens which impede their economic development. Dependency burden measured as the ratio of population aged 0-14 plus population aged 65 and above to population aged 15-64 times 100 are presented in Table 7.6.

TABLE 7.6. DEPENDENCY RATIOS FOR ZAMBIA : 1969 – 1999

Year	Projection (^{a})	Projection (^{b})	Projection (^{c})
1969	97	97	97
1974	94	94	94
1979	100	100	100
1984	100	97	93
1989	100	96	92
1994	103	95	89
1999	106	91	85

According to projection (a), dependency ratio is increasing from 97 to 106. Under projections (b) and (c), the dependency ratio for the first fifteen years will be as high as the one under projection (a). After 1979, a slight decline will follow. In the case of projection (b), the ratio will decline from 97 to 91 in the period 1984-99, and from 93 to 85 in the case of projection (c) during the same period. The high dependency burden, as a result of a large number of children, suggests that governments will have to invest large amounts of funds in servicing and maintaining the population.

2) Population of Primary (7-13) and Secondary (14-18) School-Age

In Zambia, the lower age limit of entry into primary school is 7 years. Primary and secondary education takes 6 and 4 years respectively. The primary school age population is thus defined to include those aged 7-13 years ; and the secondary school age population as those aged 14-18. The primary and secondary school age population for the thirty years projection period are presented in Table 7.7.

TABLE 7.7. PRIMARY AND SECONDARY SCHOOL AGE POPULATIONS (IN THOUSANDS) FOR ZAMBIA : 1969 – 1999

Year	Primary School			Secondary School		
	Projection (a)	Projection (b)	Projection (c)	Projection (a)	Projection (b)	Projection (c)
1969	740	740	740	382	382	382
1974	930	930	930	485	485	485
1979	1 084	1 084	1 084	622	622	622
1984	1 238	1 232	1 228	759	746	737
1989	1 480	1 454	1 409	850	844	830
1994	1 789	1 696	1 623	984	980	923
1999	2 230	2 029	1 852	1 207	1 157	1 116
	(Indices of Growth (1969 = 100))					
1969	100	100	100	100	100	100
1974	126	126	126	127	127	127
1979	146	146	146	163	163	163
1984	167	166	165	198	195	193
1989	200	196	190	222	220	218
1994	242	229	219	259	256	242
1999	300	274	250	316	302	292

According to projection (a), the primary school age population which was 740 thousand in 1969 will reach 930 thousand in 1974, 1084 thousand in 1979, 1238 thousand in 1984, 1480 thousand in 1989, 1789 thousand in 1994 and 2230 thousand in 1999. The primary school age population under projections (b) and (c) for 1974 and 1979 will be the same as that under projection (a) because of the similar fertility assumptions used. For the years 1984 and 1989, the difference between the three series of projections is marginal. Subsequently however, a reduction in the primary school age population as a result of fertility decline is suggested for 1994 and 1999 especially under projection (c), which assumed a faster rate of fertility decline.

The expected growth in the size of the primary school age population is substantial. So also is the expected growth of the secondary school age population. The primary school age population will double in 20 years according to projection (a) and in about 20-25 years according to projec-

tions (b) and (c). As for the secondary school age population, it will double in about 15-20 years. According to the projection based on assumptions of constant fertility, both primary and secondary school age populations would treble in 30 years.

As of 1969, the enrolment ratio in primary education was 88 per cent (1), and the Government's aim for the future is universal primary education. It therefore seems certain that the rapid and substantial growth in primary and secondary school age populations in conjunction with the Government's policy of universal primary education will call for a heavy drain on national resources. Educational services measured in terms of the number of teachers, classrooms and additional facilities are expensive and sometimes inaccessible because of the time and cost of training and developing the needed resources. Scarce as the resources may be, they have to be provided in proportion to the school age population, taking into account the effective resource/pupil ratio needed for achieving good results and the replenishment of wasted resources. All these will, no doubt, take up a large chunk of the available resources for national development.

3) Future size of the labour force

To estimate the future size of the labour force (working and seeking work) projections for the period 1969-1999 were made, using the projected total population by age and sex and the base economic activity rates calculated in Chapter six. Of the three variants of projections, use was made of the medium variant or projection (b). As regards the choice of activity rates, it was assumed that the rates for 1969 estimated in Chapter six remained unchanged or constant all through the period. This assumption may not be wholly correct considering that activity rates, given changing social and economic conditions, may be subject to a wide range of variations. Such variations are likely to affect young men and women more than adults who are more likely to have attained stability in their jobs.

The projected labour force for the period 1969-1999 by sex for ages 15-19, . . ., 55-59, 60 + is given in Table 7.8. The total labour force for Zambia in 1969 was estimated to be 1094.8 thousand. This estimate may reach 1245.1 thousand by 1974 ; 1462.5 thousand by 1979 ; 1744 thousand by 1984 ; 2080 thousand by 1989 ; 2473 thousand by 1994 and may approach 2946.7 thousand by 1999. This implies that in 30 years time (1969-1999), the absolute addition to the Zambian labour force would be nearly 2 million. This would correspond to a relative change of 169 per cent. Of the total increase, male labour force would account for 70 per cent (1308.5

(1) Y.K. Libakeni, "Primary Education and Population Growth in Zambia", In *The Demographic Transition in Africa,* Proceedings of an Expert Group Meeting, Paris, 17th - 19th November 1970, OECD, Paris, 1971, p. 218.

thousand) and female, 30 per cent (543.4 thousand). The relatively small contribution of females to the total labour force is due to the initial low female activity rates already discussed in Chapter six.

TABLE 7.8. FUTURE SIZE OF THE LABOUR FORCE (IN THOUSANDS) IN ZAMBIA : 1969 – 1999

Age Group	1969	1974	1979	1984	1989	1994	1999
				Males			
15 – 19	71.0	96.9	123.1	148.9	168.9	197.6	232.1
20 – 24	103.7	132.6	179.4	228.7	277.9	316.0	370.8
25 – 29	109.9	117.0	144.9	197.1	252.0	307.8	351.0
30 – 34	102.3	105.3	113.5	141.6	193.4	247.9	304.2
35 – 39	102.8	100.7	99.9	107.9	135.7	186.1	240.0
40 – 44	75.4	90.5	94.9	94.0	102.9	129.5	179.2
45 – 49	72.4	74.9	83.6	88.0	88.0	97.6	122.8
50 – 54	50.3	61.4	69.2	77.9	82.2	83.0	92.6
55 – 59	53.6	50.9	55.2	63.0	71.6	76.8	77.7
60 +	41.0	54.7	66.4	77.0	89.2	104.6	120.5
Total Males	782.4	884.9	1 030.1	1 224.1	1 461.9	1 746.9	2 090.9
				Females			
15 – 19	69.6	85.8	114.1	136.7	157.0	183.1	213.7
20 – 24	49.0	47.9	57.4	76.5	92.0	105.8	123.9
25 – 29	35.1	38.9	39.5	47.5	63.5	76.6	88.6
30 – 34	29.8	33.6	36.2	37.0	44.8	60.1	72.8
35 – 39	26.3	30.3	34.1	37.1	38.0	46.1	62.4
40 – 44	21.7	28.3	32.9	37.3	40.9	42.1	51.4
45 – 49	22.7	25.5	31.9	37.4	42.6	46.8	48.6
50 – 54	20.8	22.9	31.1	39.4	46.1	53.2	58.7
55 – 59	19.4	24.6	26.1	35.7	45.4	53.6	62.3
60 +	18.0	22.4	29.1	35.3	47.9	58.2	73.6
Total Females	312.4	360.2	432.4	519.9	618.2	725.6	856.0
Total both sexes	1 094.8	1 245.1	1 462.5	1 744.0	2 080.0	2 473.0	2 946.7

It will be observed that the rapid and large percentage increase in the Zambian labour force of 169 per cent between 1969 and 1999 clearly calls for a substantial increase in the creation of employment opportunities. Another point evident from Table 7.8 is that planners and policy makers should also direct more attention to creating opportunities for greater female participation in economic activities. Furthermore, it should be noted that the difference

in the future size of the labour force between the three variants of projections would be very small. This is because fertility was assumed to decline after 1980. Consequently, the estimated size of the labour force (1969-1999) is not affected by the assumed fertility decline except those aged 0-4 in 1984 and who will be 15-19 in 1999. Should it be necessary to achieve a rapid reduction in the size of the labour force, in the immediate future, it will be necessary to set in motion not only a faster decline in fertility but also ensure that the decline commences earlier than assumed in the projections.

4) Number and Size of Households

Use has also been made of the projection of total population to assess the total number and size of households by age and sex.

Household projection through estimating future total household size, aids planners in estimating housing needs and improving housing conditions. By making the projections by age and sex it is possible to indicate the magnitude of the effort that should be made to meet the social services and consumption requirements of households.

The projection of households for Zambia is based on the most widely used headship rate method (1). The data required for the use of this method include projection of total population by age and sex and sex-age specific headship rates or the ratio of the number of household or family heads to the number of persons in the same age group (2). The total number of future households in year $t + x$ is mathematically represented as follows :

$$\sum_i \sum_j H(i, j, t+x) = \sum_i \sum_j P(i, j, t+x)\, h(i, j, t+x)$$

where

$H(i, j, t+x)$ = total number of households of sex i, age j and year $t + x$.

$P(i, j, t+x)$ = population of sex i, age j, and year $t + x$

$h(i, j, t+x)$ = sex-age specific headship rate for sex i, age j and year $t + x$

The 1969 Census of Population and Housing in Zambia did not give a tabulation of the number of household heads by sex and age groups. Thus, it is impossible to calculate sex-age specific headship rates. The Census only gives the total number of male heads as equal to 651,994 and female heads as equal to 204,118 (3). The total population in 1969 was 4049 thousand and

(1) United Nations, *Methods of Projecting Households and Families,* Manual VII, pp. 31-40, New York, 1973.

(2) United Nations, *Ibid.*, p. 33.

(3) *Census of Population and Housing, 1969,* Table 6, Central Statistical Office, Lusaka.

the total number of households 856,112, giving an average household size of 4.73 persons.

Since it was not possible to estimate headship rates directly from the census, use has been made of the average sex-age headship rates of 8 countries with similar economic conditions as Zambia. These average sex-age specific headship rates apply to low income countries with per capita income under US$400 (1). When the assumed male headship rates were applied to the enumerated male population, it gave an expected number of male heads of 582,370 as compared to the observed figure of 651,994. Also, the application of the female headship rates to the female population gave an expected value of 134,810 household heads as compared to the observed figure of 204,118. Thus for both sexes, the assumed sex-age specific headship rates seem to have under-estimated the number of households in Zambia. It was therefore necessary to apply a correction factor to raise the assumed rates to the likely level for Zambia. The raising factor for males was 1.112 and 1.51 for females. These were then used to multiply the assumed headship rates for males and females in column 3 of Table 7.9 to give the corrected rates in column 5 of

TABLE 7.9. SEX-AGE SPECIFIC HEADSHIP RATES FOR SOME LOW INCOME GROUPS OF COUNTRIES AND ADJUSTED HEADSHIP RATES FOR ZAMBIA (IN PERCENTAGES) 1969

Age Group	Population ('000) (2)	Headship Rate of low income Group (3)	Household Heads ('000) (4) = (2) x (3)	Adjusted Headship Rates (5)
		Males		
15 – 24	308	14.4	44.35	16.1
25 – 34	238	58.9	140.18	66.0
35 – 44	200	80.5	161.00	90.2
45 – 54	143	86.1	123.12	96.4
55 – 64	90	87.1	78.39	97.6
65 +	45	78.5	35.33	87.9
Total			582.37	
		Females		
15 – 24	369	2.5	9.22	3.8
25 – 34	303	8.6	26.06	13.0
35 – 44	203	16.1	32.68	24.3
45 – 54	127	24.7	31.37	37.3
55 – 64	65	32.6	21.19	49.2
65 +	38	37.6	14.29	56.8
Total			134.81	

(1) United Nations, *Op. cit.*

TABLE 7.10. PROJECTION OF HOUSEHOLDS IN ZAMBIA : 1974 – 1999, ASSUMING CONSTANT SEX-AGE SPECIFIC HEADSHIP RATES

Age Group	Headship Rates. %	Projected population ('000)						Projected Households ('000)					
		1974	1979	1984	1989	1994	1999	1974	1979	1984	1989	1994	1999
							Males						
15 – 24	16.1	400	522	646	756	873	1 025	64.4	84.0	104.0	121.7	140.6	165.0
25 – 34	66.0	246	286	375	493	615	725	162.4	188.8	247.5	325.4	405.9	478.5
35 – 44	90.2	214	218	226	267	353	469	193.0	196.6	203.9	240.8	318.4	423.0
45 – 54	96.4	157	176	191	196	208	248	141.3	169.7	183.1	189.1	200.5	239.1
55 – 64	97.6	106	116	130	148	164	171	104.4	113.1	126.9	144.4	160.1	166.8
65 +	87.9	56	73	88	103	122	146	49.2	64.1	77.4	90.5	107.2	128.3
							Females						
15 – 24	3.8	407	517	649	761	882	1 031	15.5	19.6	24.7	28.9	33.5	39.0
25 – 34	13.0	332	347	387	495	626	739	43.2	50.3	50.3	64.4	81.4	96.1
35 – 44	24.3	244	279	309	327	368	476	59.3	67.8	75.1	78.5	89.4	115.7
45 – 54	37.3	142	184	223	257	289	309	47.3	68.6	83.2	95.9	107.8	115.3
55 – 64	49.2	85	100	123	162	198	233	41.8	49.2	60.	79.7	97.4	114.6
65 +	56.8	46	58	77	93	121	159	26.1	32.9	43.7	52.8	68.7	90.4
Total both sexes		4 710	5 499	6 436	7 567	8 938	1 037	947.9	1 099.5	1 280.3	1 532.1	1 810.9	2 172.0
Average Household size								4.97	5.00	5.03	4.94	4.94	4.74

the same table. On the assumption that the corrected rates remain constant during the projection period, estimates of the size and number of households have been made.

Table 7.10 gives the result of the projections and shows that the number of households will grow from 856,112 in 1969 through 947,900 in 1974, 1,099,500 in 1979, 1,280,300 in 1984, 1,532,100 in 1989, 1,810,900 in 1994 to 2,172,000 in 1999. These values clearly indicate that the growth in the number of households will be very substantial. Over the same projection period, average household size is expected to rise gradually from 4.73 persons in 1969 to 5.03 persons in 1984, after which a gradual decline will follow reaching 4.77 persons by the year 1999. The gradual decline after 1984 may be due to the in-built effect of fertility decline in the projections. The trend in the evolution of the household corresponds very closely to that of the total population. The calculated index of growth with 1969 as a base shows that in the foreseeable future, households will grow at about the same rates as the total population. The correspondence is one further evidence of the strong relationship between fertility level and the size of household.

TABLE A 7.1. PROJECTION (a) : POPULATION OF ZAMBIA IN (000's) BY AGE AND SEX UNDER ASSUMPTION OF CONSTANT FERTILITY AND DECLINING MORTALITY : 1969 – 1999

Age Group	1969	1974	1979	1984	1989	1994	1999
			Males				
0 – 4	412	457	524	621	765	937	1 147
5 – 9	314	376	423	492	591	737	913
10 – 14	239	303	365	413	482	582	729
15 – 19	173	233	296	358	406	475	576
20 – 24	135	167	226	288	350	398	467
25 – 29	121	130	161	219	280	342	390
30 – 34	117	116	125	156	213	273	335
35 – 39	108	112	111	120	151	207	267
40 – 44	92	102	107	106	116	146	202
45 – 49	77	86	96	101	101	112	141
50 – 54	66	71	80	90	95	96	107
55 – 59	54	59	64	73	83	89	90
60 – 64	36	47	52	57	65	75	81
65 +	45	56	73	88	103	122	146
Total	1 991	2 315	2 703	3 182	3 801	4 591	5 591
			Females				
0 – 4	408	459	521	616	757	925	1 127
5 – 9	315	375	426	492	590	733	905
10 – 14	229	305	364	416	483	582	726
15 – 19	188	224	298	357	410	478	577
20 – 24	181	183	219	292	351	404	473
25 – 29	163	175	178	214	286	345	399
30 – 34	140	157	169	173	209	281	340
35 – 39	115	134	151	164	168	204	276
40 – 44	89	110	128	145	159	164	200
45 – 49	72	84	105	123	140	154	160
50 – 54	55	58	79	100	117	135	149
55 – 59	38	51	54	74	94	111	129
60 – 64	27	34	46	49	68	87	104
65 +	38	46	58	77	93	121	159
Total	2 058	2 395	2 796	3 292	3 925	4 724	5 724

(a) Total fertility declining by 5 % every quinquenium after 1980.

TABLE A 7.2. PROJECTION ([b]) ([a]) POPULATION OF ZAMBIA IN (000's) BY AGE AND SEX UNDER ASSUMPTION OF DECLINING FERTILITY AND MORTALITY : 1969 – 1999

Age Group	1969	1974	1979	1984	1989	1994	1999
			Males				
0 – 4	412	457	524	602	704	825	858
5 – 9	314	376	423	492	573	679	804
10 – 14	239	303	365	413	482	564	671
15 – 19	173	233	296	358	406	475	558
20 – 24	135	167	226	288	350	398	467
25 – 29	121	130	161	219	280	342	390
30 – 34	117	116	125	156	213	273	335
35 – 39	108	112	111	120	151	207	267
40 – 44	92	102	107	106	116	146	202
45 – 49	77	86	96	101	101	112	141
50 – 54	66	71	80	90	95	96	107
55 – 59	54	59	64	73	83	89	90
60 – 64	36	47	52	57	65	75	81
65 +	45	56	73	88	103	122	146
Total	1 991	2 315	2 703	3 162	3 722	4 403	5 117
			Females				
0 – 4	408	459	521	597	696	814	844
5 – 9	315	375	426	492	571	674	796
10 – 14	229	305	364	416	483	563	667
15 – 19	188	224	298	357	410	478	558
20 – 24	181	183	219	292	351	404	473
25 – 29	163	175	178	214	286	345	399
30 – 34	140	157	169	173	209	281	340
35 – 39	115	134	151	164	168	204	276
40 – 44	89	110	128	145	159	164	200
45 – 49	72	84	105	123	140	154	160
50 – 54	55	58	79	100	117	135	149
55 – 59	38	51	54	74	94	111	129
60 – 64	27	34	46	49	68	87	104
65 +	38	46	58	77	93	121	159
Total	2 058	2 395	2 796	3 274	3 845	4 535	5 254

(*a*) Total fertility declining by 5% every quinquenium after 1980.

TABLE A 7.3. PROJECTION ([c]) ([a]) POPULATION OF ZAMBIA IN (000' BY AGE AND SEX UNDER ASSUMPTIONS OF DECLINING FERTILITY AND MORTALITY : *1969 – 1999*

Age Group	1969	1974	1979	1984	1989	1994	1999
			Males				
0 – 4	412	457	524	584	658	740	821
5 – 9	314	376	423	492	556	634	721
10 – 14	239	303	365	413	482	549	627
15 – 19	173	233	296	358	406	475	543
20 – 24	135	167	226	288	350	398	467
25 – 29	121	130	161	219	280	342	390
30 – 34	117	116	125	156	213	273	335
35 – 39	108	112	111	120	151	207	267
40 – 44	92	102	107	106	116	146	202
45 – 49	71	86	96	101	101	112	141
50 – 54	66	7	80	90	95	96	107
55 – 59	54	59	64	73	83	89	90
60 – 64	36	47	52	57	65	75	81
65 +	45	56	73	88	103	122	146
Total	1 991	2 315	2 703	3 145	3 659	4 258	4 938
			Females				
0 – 4	408	459	521	579	651	731	808
5 – 9	315	375	426	492	554	630	715
10 – 14	229	305	364	412	483	546	624
15 – 19	188	224	298	357	410	478	541
20 – 24	181	183	219	292	351	404	473
25 – 29	163	175	178	214	286	345	399
30 – 34	140	157	169	173	209	281	340
35 – 39	115	134	151	164	168	204	276
40 – 44	89	110	128	145	159	164	200
45 – 49	72	84	105	123	140	154	160
50 – 54	55	58	79	100	117	135	149
55 – 59	38	51	54	74	94	111	129
60 – 64	27	34	46	49	68	87	104
65 +	38	46	58	77	93	121	159
Total	2 058	2 395	2 796	3 255	3 783	4 391	5 077

(*a*) Total fertility declining by 10% every quinquenium after 1980.

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