POPULATION TRENDS AND THE PROVISION OF PRIMARY EDUCATION IN NAIROBI, KENYA: IMPLICATIONS FOR EDUCATIONAL PLANNING

BY

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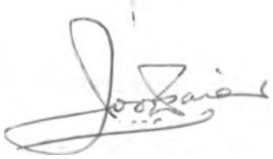
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

RODAH AWINJA MASAVIRU

This thesis has been submitted for examination with my approval as University Supervisor.



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ABSTRACT

The main objective of this study was to investigate the impact of demographic trends on the provision of primary education in Nairobi. The research therefore aimed at examining population trends in Nairobi in terms of fertility, mortality, migration, growth rates and age-sex structure. Analysis was also made of the demand for and supply of primary education in terms of school-age versus school-going population; educational facilities such as land acreage per school, and teachers; and pupil performance in Certificate of Primary Education examination.

The research, revealed that Nairobi has been experiencing fast population growth rates (averaging 7.3 per cent per annum) in the period 1962-1979. This is as a result of rising fertility, declining mortality, and in-migration in the city. In addition, Nairobi's population is becoming more youthful, with an increasing proportion of children aged 0-14, due to more children migrants and increased births from the

reproductive migrant age groups 15-49. This has affected the demand for primary education and the capacity of the city education authorities to cope with it.

Examination of the primary school-age in relation to school-going population showed that enrolment ratio has tended to be retarded at .86 despite significant annual increases in absolute numbers enrolled.

The main recommendation that arises from this Study is that the limitless increase in school-age Population, be regarded as a serious problem and programmes and policies designed to curb the factors contributing to the increase.

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NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

Although the interaction between population and economic growth has generally been realized by development planners in many developing countries, the demographic variables have not been given due attention in many of the sub-national and national plans. This failure to incorporate demographic factors in different plans results in wastage of resources and non-attainment of the set objectives. Demographic variables such as population size and growth rates, age and sex-structure, spatial population distribution, family size, migration and extent of urbanisation should be analysed in both macro-and micro-plans, since they have a direct relevance to planning for social and economic development.

This study analyses the interaction between demographic trends and the provision of primary education in Nairobi. Focus is on primary education as a basic human right and "the minimum basic requirement for take-off into the modern sector of national life." (Ominde, 1965, Para. 539)

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The present chapter examines five major issues. The first one concerns analysis of the background of the study area, in geographical, demographic and educational perspectives. Secondly analysis is made of the nature and scope of the problem, thirdly a review of related literature is given, fourthly a description of the research methodology, and finally an outline of the component chapters is given, echoing their salient features.

1.2 BACKGROUND OF THE STUDY AREA

(i) Geographical Setting

The City of Nairobi is situated almost mid-way between Mombasa and Kisumu along the Kenya-Uganda Railway, at about 1^{o} south and 37^{o} East. It is characterised by a cool attractive climate with an altitude ranging from below 1500 metres in the extreme East, through 1676 metres at the city centre, to 1905 metres above sea level in the north-west.

From a mere railway depot in 1899, Nairobi has grown into a relatively large city covering an area of 693 square kilometres.

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It is the capital city of Kenya and the core for most Industrial, Commercial, educational and other socio-economic activities in the Republic. Figure 1.1 reveals several distinct sections within the city, such as the Central Business District (CBD), the Railway Yard, the Industrial sector, residential areas and educational institutions. The CBD contains a large number of both private and public offices, big hotels and other business firms, and is therefore charaterised by modern multi-storey buildings to cater for the big range of activities within the limited space.

The city centre is surrounded by various housing estates within the different divisions of the city. One thing that strikes onlookers is the close concentration of housing estates such as Ofafa Jericho, Lumumba, Makadara, in the Eastern division in contrast with the more spacious estates such as Kileleshwa, Lavington and Loresho in the Western part of the city. Primary schools are scattered all over the city,

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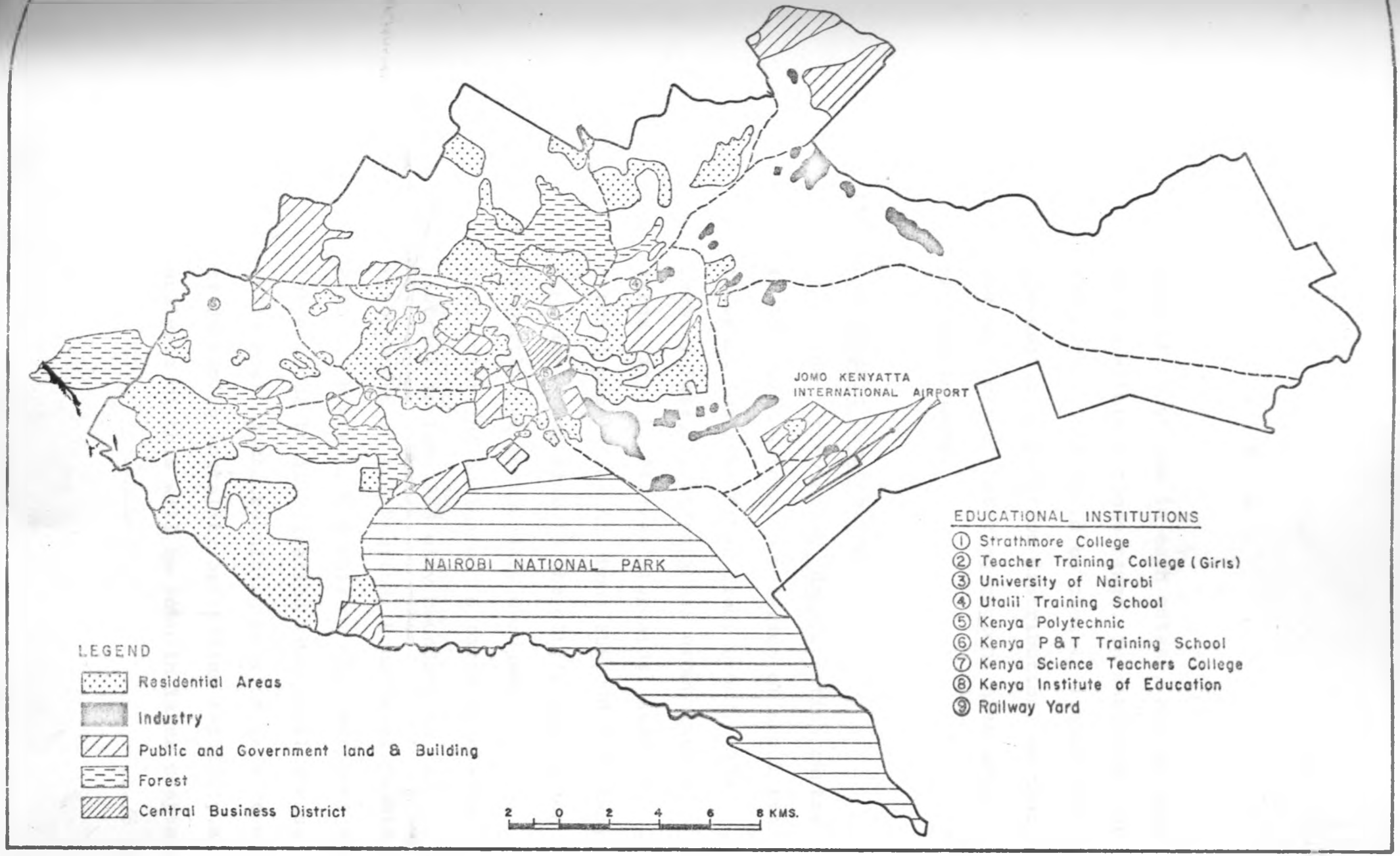
JOMO KENYATTA
INTERNATIONAL AIRPORT
NAIROBI NATIONAL PARK
EDUCATIONAL INSTITUTIONS
① Strathmore College
② Teacher Training College (Girls)
③ University of Nairobi
④ Utalii Training School
⑤ Kenya Polytechnic
⑥ Kenya P & T Training School
⑦ Kenya Science Teachers College
⑧ Kenya Institute of Education
⑨ Railway Yard
LEGEND
Residential Areas
Industry
Public and Government land & Building
Forest
Central Business District
2 0 2 4 6 8 KMS.

Fig. 1.1

with at least one in each estate, and as many as six within a close range, in eastleigh for instance. This could be closely linked with the spatial population distribution, so that the more closely settled regions have more primary schools.

(ii) Demographic Perspective

From a provincial administration centre in 1905 with a total population of about ten thousand (Nairobi Urban Study Group, 1973 Chap.2, Para.1), Nairobi has grown into a large city, by African standards, serving a total population of about 835,000 (see table 1.1). The steep rise in the city's population is partly due to boundary changes, in particular,the inclusion of parts of Kiambu District in the 1963 city boundary as was recommended in the Regional Boundaries Commission Report. However, the bulk of the increases are largely due to in-migration from rural areas, while most of the remaining portion is a result of declining mortality and rising fertility,as analysis of this will be seen in later chapters.

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Table 1.1

Population Size and Growth Rates for Nairobi, 1948-1979

Year	Total Popolation Size	Average Annual Growth Rates (per cent)
1948	118,976	
		6.0
1962	347,431[b]	
		9.7
1969	509,286	
		4.9[c]
1979[a]	827,775	

a : Provisional Census Results

b : Figure adjusted to 1963 boundary

c : Computed from the formula $\frac{P_2}{P_1} = e^{rn}$

where P_1 is the population at first Census;

P_2 is the population at second Census

r is the intercensal average annual growth rate

n is the interval(in years) between the two Censuses.

Source: Kenya, Republic of, 1948, 1962, 1969, 1979 Census Figures, Ministry of Finance and Economic Planning, Statistics Division.

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The importance of rural migrants in contributing towards population increase in Nairobi is clearly shown when analysis is made of the population composition in terms of race and sex structure (see Table 1.2).

Table 1.2

Racial Composition and Sex Ratio in Nairobi, 1962-1979

Race	1962		1969		1979	
	Total	percent of Total	Total	percent of Total	Total	percent of Total
Africans	231,744	66.7	422,912	83.0	756,994	91.9
Asians	86,765	25.0	67,189	13.2	38,854	5.2
Europeans	28,765	8.3	19,185	3.8	19,050	2.8
Sex ratio (African Adults Only)	187		159		138	

Source: Kenya, Republic of, 1962,1969,1979 Census Figures, Ministry of Finance and Economic Planning, Statistics Division

The proportion of the African population has been increasing in the period 1962-1979, while that of Asians and Europeans has been declining. One of the

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main factors underlying the changed proportions was the expansion of the 1963 boundary which resulted in more African population from part of former Kiambu district. However, the major factor has been the influx of rural migrants to the city after independence and many of the non-Africans leaving for their countries. There have also been significant changes in the sex ratio as a result of more females coming into the city, and contributing to the increase in population concentration.

Figure 1.2 broadly distinguishes three levels of population concentration. To the north-east of the city centre is the main population core of the city with extreme concentrations in the range of 16,000-40,500 persons per square kilometre. It includes Pumwani, Mathare, Maringo, Muthurwa/Shauri Moyo/Kamukunji, Maisha, Mbotela, Harambee, Uhuru and Ngara East Wards in the Eastland region.

The medium density population regions appear scattered in various places within the city, including Kariobangi, Ruaraka/Kassarani, Kangemi, and Nairobi/West/South wards, with still high

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population concentrations in the region of 6001-16000 persons per square kilometre.

Finally is the relatively low density region extending west of the city core region with densities in the range of 0-6000 persons per square kilometre. This covers areas in the western half of the old city boundary, formerly reserved as a European residential region, and now housing the high income groups from all races. It includes Kilimani, Karen/ Langata, Golf-Course/Nairobi Hill, and Embakasi wards.

The above pattern of population distribution has significant implications for the demand and supply of socio-economic services as analysis of the demand and supply of primary educational facilities in a later chapter will reveal.

(iii) Evolution and Development of Primary Education

After attaining independence in 1963, there was increased concern by the Kenya Government about the critical problems of providing more relevant education, more efficiently to larger

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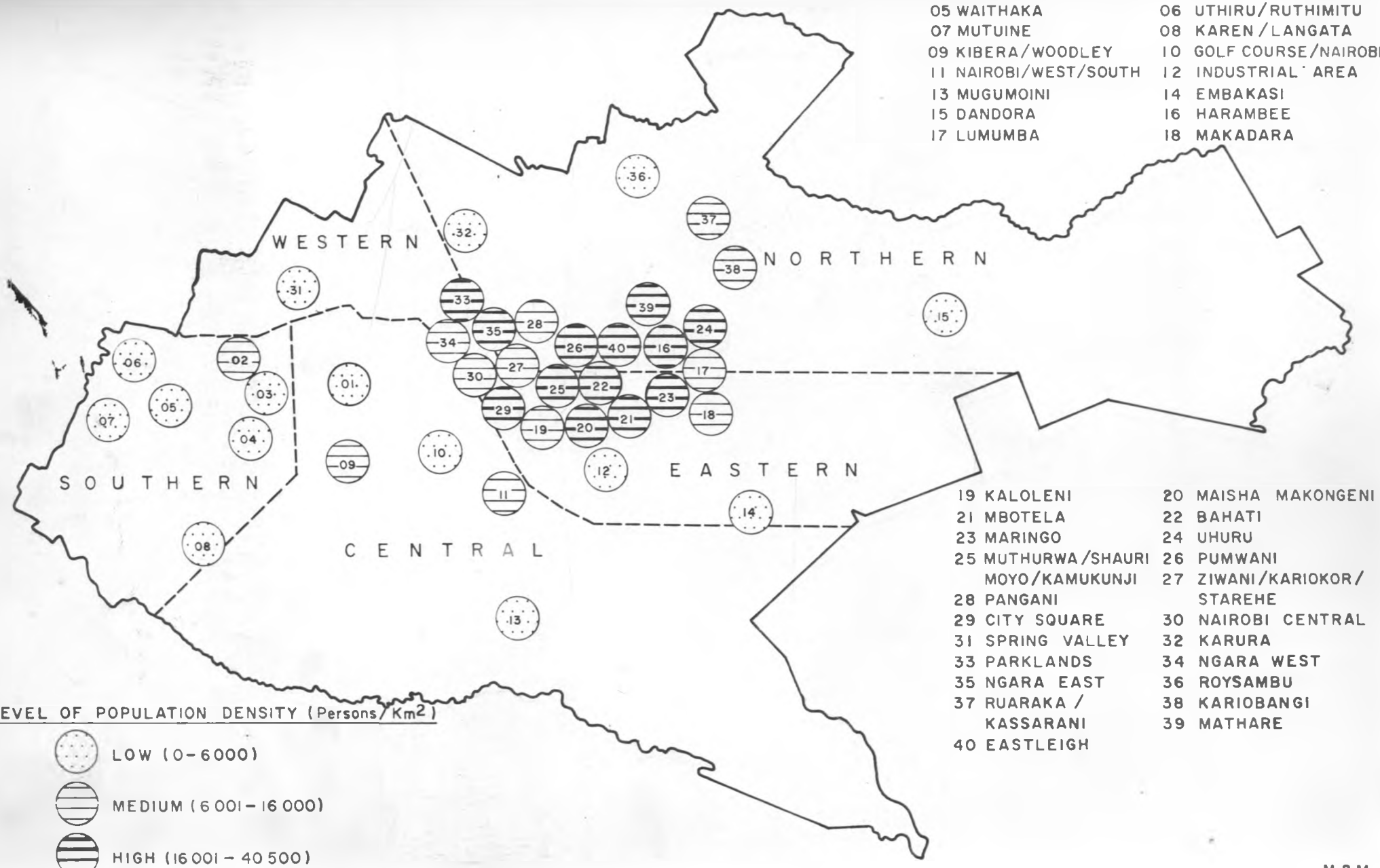
FIG 13 LEVELS OF POPULATION DENSITY IN NAIROBI – 1979



numbers, using the limited resources. Emphasis was placed on primary education as a basic human right and as a means of achieving universal literacy in the Republic. Primary school enrolment rose from 891,553 pupils in 1963 to 1,816,617 pupils in 1973, raising the enrolment ratio from 37 per cent in 1962 to approximately 73 per cent in 1973[1].

Following announcement by the Government, free primary education for the first four years of schooling was introduced in Kenya in 1974, to promote the long-term objective of universal primary education. This significantly raised primary pupil enrolment to 2,734,398 in 1974, representing about 51 per cent increase in enrolment ratio in the period 1973-1974. The percentage of the 6-12 age group enrolled rose from about 73 per cent in 1973 to 108 in 1974[2].

Elimination of school-fees was further extended to standards five, six and seven in 1978, 1979 and 1980 respectively. This provision of free primary education has had far-reaching implications for educational demand and supply, educational costs, provision of

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teachers and other school facilities. For a civic institution such as Nairobi City Council, it is no doubt an expensive service without any tangible benefits occurring to it.

Initially, the primary schools in Nairobi were run on a racial basis. The schools that were exclusively for the Europeans were labelled "Schedule C" while those for Asians and Africans were Schedules "B" and "A" respectively. Such labels no longer exist and schools are classified according to the divisions in which they are situated, and whether they are City Council maintained, City Council assisted, or private schools.

The City Council of Nairobi through its City Education Department is responsible for the provision and maintanance of more than 93 per cent of the primary education facilities. In 1979, there were 2,328 total primary streams (of 40 pupils each), of which 2,168 were City Council maintained, 103 were City Council assisted and only 57 were private[3]. The distribution of City Council maintained primary schools is shown in Table 1.3

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Table 1.3: Land Committed to City Council Maintained Schools According to Divisions, 1979

Division	Number of Schools	Total Area (Km^2)	Average area per School
Northern	23	.85	9.1
Southern	21	.72	8.4
Eastern	26	.63	6.0
Western	22	.51	5.7
Central	26	.59	5.6
Total*	118	3.3	6.88

*Only 118 schools had data on land acreage while 6 did not have.

Source: Kamari, R.N. "Educational Facilities in Nairobi", Town Planning Section, Nairobi City Council, Table 2.10 (d) PP.9.(adapted).

The City Education Department is also responsible for the recruitment of teachers through the Teachers Service Commission. In 1979, there were 2912 teachers in City Council and City Council assisted schools with varied aggregate qualifications (see Table 1.4).

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Table 1.4 : Aggregate Teacher Qualifications in City Council Schools, 1979

Qualification*	Total Number	Per cent of total City Council Teaching Force
AT	17	0.6
S_1	373	12.8
P_1	1,325	45.5
P_2	951	32.0
P_3	236	8.0
P_4	3	0.1
UT	7	0.2
Total	2,912	100.0

*For explanation of the grades, see definition of concepts in a later section of this chapter.

Source: City Council of Nairobi, City Education Department, Staffing Section Records.

Other facilities supplied by the City Council include, teachers' houses (only a few),

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course books (through Kenya School Equipment Scheme), supplementary readers, and other teaching materials.

Despite the City Council's efforts in providing the necessary educational facilities, statistics show that demand for primary education in Nairobi outweighs supply. In 1973, the total enrolment in the city was 76,375 against the projected primary school-age (6-12 years) of 88,000, resulting in an enrolment ratio of .87, which is slightly higher than the average for Kenya at that time (.73). In 1981, there were 19,709 applications received for Nairobi City Council standard 1 places, of these, only 16,657 pupils (84 per cent) were admitted to the various City Council schools[4]. On realisation of this deficiency, the City Council took 21 additional standard one classes, but still there were complaints from many parents who could not find places for their children[5].

It is therefore clear that there has been increasing demand for primary education in the city, which the City Education authorities are

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unable to cope with. The situation is likely to worsen in future, as more reproductive migrants come into the city, and the children born by those already there grow up to school-age.

1.3 NATURE AND SCOPE OF THE PROBLEM

(i) Statement of The Problem

Kenya is one of the developing countries with very high population growth rates in the range of 3.8-4.0 per cent annually[6], and under the prevailing circumstances of declining mortality and sustained high fertility, could even rise further. These unprecedented high growth rates give rise to a number of constraints to the economy,notably increasing population pressures in the high potential lands and a large percentage (50%) in the dependent age group (0-15 years).

Kenya is predominantly an agricultural country, yet only a small portion (17.4%) of its total land area can be classified as cultivable, the rest is arid or semi-arid. This results in over-crowding in the high

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agriculturally potential rural areas. Analysis of the 1969 census results revealed that about 52 per cent of the total population occupied only 5.46 per cent of the total land area. The increasing population pressures on the high potential rural land encourages migration into the major urban areas of Kenya.

Nairobi being the capital city of Kenya, and the centre for most socio-economic activities has been a major receiving area of migrants from the rural areas. Since the migrants are mostly composed of people in the reproductive ages (15-49) they add more children to the already high numbers in the city. Consequently, it is becoming extremely difficult for City Council of Nairobi and other relevant authorities to cope with the rising school-age population. There are increasing imbalances between the primary school-age population and the availability and distribution of educational facilities. This leads to wastage in terms of non-attendance of school by some children, retardation, drop-outs, and poor performance in Certificate of Primary Education (CPE) examination. Since education constitutes such an important aspect

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of socio-economic development, such wastage cannot be afforded, and therefore the need for planning authorities to look for means of curbing the situation.

(ii) Objectives

The main objectives of the study are as follows:-

(a) To examine population trends in Nairobi in terms of fertility, mortality, migration, growth rates and age-sex structure.

(b) To analyse the primary school-age population versus primary school-going pupils and relate the demand to supply of educational facilities in terms of size, quality and distribution.

(c) To provide planners and administrators with information that might guide them in preparing plans for improving primary school efficiency and equalising educational opportunities.

(iii) Operational Hypotheses

In this research, it is hypothesized that:-

(1) Nairobi has been experiencing change in most

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of the demographic variables in the last three decades. In order to be able to test this hypothesis, it is necessary to identify the actual demographic variables which have been experiencing change and in what direction, hence some minor hypotheses under the major one are stated below:-

(a) Fertility has remained more or less constant in Nairobi.

(b) Mortality has been declining in Nairobi.

(c) More than 70 per cent of the total population of Nairobi is composed of rural migrants.

(d) As a result of the above demographic changes, annual population growth rates in Nairobi have been rising.

(2) The demand for primary educational facilities in Nairobi outweighs supply of such facilities.

(3) There is uneven quantitative and qualitative distribution of primary educational facilities in Nairobi.

All the above hypotheses have been tested in order to highlight the factors responsible for high population growth rates in Nairobi, and the impact of this on the provision of primary education.

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(iv) Definition of Important Concepts

The concepts have been defined according to their application in this work.

Primary Education is the lowest form of formal education in Kenya and refers to classes I-VII.

Primary School-age Population refers to the numbers in the age group 6-12 years, which is regarded normal for primary education.

Enrolment ratio is defined in the context of primary school-going in relation to school-age population enrolled in various schools.

Pupil/Teacher ratio refers to the number of pupils per teacher.

Pupil/class ratio refers to the number of pupils per class.

Certificate of Primary Education (C.P.E) is the examination sat for by pupils in Kenya at the end of class seven. It is basically a selection examination for entry in form one.

Drop-out refers to a pupil who leaves school before completing the expected terminal level. In this case it refers to a pupil who leaves primary school before completing the expected seven years' education.

Teacher Grades - There are six categories of professionally qualified teachers in primary

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schools, namely P_4, P_3, P_2, P_1, S_1 and Graduate, in order of increasing qualifications. Formerly, these were graded according to both their academic qualifications and the number of years successfully completed in teacher training institutions. But the grading was revised and has been mainly based on the performance in the training institutions. P_4, P_3, P_2 and P_1 teachers are trained in primary teacher training colleges, S_1 in Kenya Science Teachers College, and graduates at Kenyatta University College. In addition, there are two other categories of teachers, namely Approved and Untrained. Approved teachers are the ones who have been promoted by merit from a lower status to one almost equivalent to that of a graduate teacher. Untrained teachers are the ones who have not received any professional training.

Crude Birth Rate is a ratio of total registered Births to the total population in a specified year. It is normally expressed as:-

$\frac{B}{P}K$ where B is the total number of live births registered during the year.

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P is the mid-year population

K is a constant, normally 1,000.

Age-Specific Fertility Rate is the average number of births occuring to women of a given age group. It is computed as:-

$\frac{bi}{pi}$ K where bi is the total annual registered births in the age interval i,

Pi is the mid-year population of women in the same age group

K is a constant, normally 1,000.

Total Fertility Rate is the mean number of births occurring to a woman who lives to the end of her reproductive life (15-49 years).

Crude Death Rate is a ratio of the total registered deaths to the total population in some specified year. It is expressed as $\frac{D}{P}$ K where D is the total number of registered deaths, P is the total population and K is a constant, normally 1000.

Infant Mortality Rate - Infants in demography are defined as the children below one year. Infant mortality rate is the ratio of registered infant deaths to registered live births in a specified year.

Scholastic Retardation and Acceleration Rates are measures defining the relationship between

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an enrollee's age and the class in which he is enrolled. A pupil is scholastically retarded if the class in which he is enrolled is below that which is normally expected for this age. A pupil is scholastically accelerated if the class in which he is enrolled is above that normally expected for his age. These rates measure the relative amount of progress in school classes.

(v) Scope and Limitations

The major concern of this study has been to investigate the impact of demographic trends on the provision of primary education in Nairobi. A detailed analysis has been made of the fertility, mortality and migration trends, in order to determine the rate and sources of Nairobi population growth.

From records by City Council of Nairobi, Ministry of Education Annual Reports, and a field survey, the author has also analysed in detail the enrolment pattern and the distribution of primary education facilities in Nairobi, in relation to school-age and school-going population respectively.

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Due to lack of records for the earlier periods, the author has had to confine the analysis to the post-independence period. Another limitation concerns the size of the sample chosen in the field survey. The sample size was relatively small and could affect the accuracy of the inferences made for the whole area. However, most of the analysis (about 95 per cent) was on the entire population, for which data was procured from secondary sources, such as, Census Figures, Ministry of Education Annual Reports, and City Council of Nairobi Annual Reports. The sample was mainly for the purpose of probing into the former primary school categories to find out whether there still exist any differences among them. The small sample enabled the author to make a detailed analysis of the sampled schools in the given period of time.

Despite the above limitations, the author was able to come up with important findings and recommendations regarding the study area.

1.4 LITERATURE REVIEW

A number of scholars have written about the population problems in the developing

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countries. This has perhaps been instigated by the increasing concern by world bodies of the escalating population growth rates in the less developed countries and the impact this has had on provision of necessary services, such as health, food, education and shelter. However, a minority of the scholars have focussed on the effects of the population growth rates on the provision of education in particular. A number of studies that have been carried out are either global or regional, which makes them fall short of an intensive analysis of the effects of population on provision of education in a particular area.

Papi (1966) has touched on various aspects of education which include the demand and supply of educational services and the rising government expenditure on education. He argues that "the demand for educational services tends to increase with an increase of the population, in so far as every human person has a right to be given a chance to develop his mind and skills, and society has a duty to make the best use of available resources". (Vaizey and Robinson PP.6). Added to this is the notion

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that the ratio of the school age population varies according to birth and death rates, and that, in developing countries where larger numbers of children reach school age, there is a considerable demand for education services and a corresponding expansion of expenditure (Vaizey and Robinson,1966 PP.6).

Lui (1966) analyses the importance of planning for education, especially in a country, province or city where the population is growing at such a rate that the existing school system is unable to cope with the needs of the growing population. He points out that planning will require estimation of the potential size of the school-going children, that is children who would or should be enrolled in schools of different types at each of the educational levels. This work is related to the present study in so far as it concerns school-age population, however his emphasis is on the methodology of estimating future enrolment.

Adams and Bjork (1969) have laid emphasis on "economics of education and merely mentioned the demographic aspect in passing. In surveying

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some aspects of the role of education in the progress of society, they point out general contrasts between developed and developing nations; identify some of the major persistent educational problems and related issues of improving educational quality and quantity in developing countries; argue that the developing countries have huge populations that are rapidly growing larger; and suggest that mass education could be used to depress fertility; but do not specify how the fast population growth rate is hampering the development of education.

Abela (1971) emphasizes the need for planning for provision of educational institutions in order to reserve space (Cantrelle (ed) 1971 PP.383). He stresses the need to make long-term forecasts on the expected school-age population size, population density in different areas within a region; and the expected number of classes and of class size. He concludes that the growth of urban population is very fast and "has inescapable consequences for the distribution of schools" (Page 386). His study is closely related to

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the present one in that it deals with the problem of urbanisation and distribution of schools, but he is somehow vague on the consequences of rapid urban population growth on provision of schools.

Muhsam (1971) is concerned with the dilemma the educational planner finds himself in, in trying to satisfy both the social and manpower demand for education, under situations of limited resources. He argues that countries with rapidly growing populations resulting from extremely high fertility together with relatively high, but declining mortality find themselves in such a dilemma, so that it becomes extremely difficult for them to meet both types of demand for education (Cantrelle (ed) PP.391). He stresses the broad base of the population age-structure as the main cause of the dilemma.

Muhsam's arguement is closely related to the author's, but it is very general and doesn't relate to particular levels of education.

Jones (1971) has analysed various aspects of education such as the progress and problems in expanding education; demographic obstacles

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to the attainment of educational goals; and the contribution of fertility decline to educational goals. He asserts that high rates of population growth are a barrier to the attainment of "the goals that have been set for quantitative and qualitative expansion of education" (National Academy of Sciences PP. 361). Furthermore, he cites poor physical facilities, poorly trained teachers, and irrelevant courses as a common feature of the less developed country schools (PP.317).

In another contribution, Jones (1975) emphasizes the need for "a demographic component" (Robinson, PP.71) in educational planning because of the close relationship existing between population dynamics and the dynamics of the educational system. This relationship, he argues, exists in terms of the fertility and mortality trends and the resulting age structure and implications for the provision of educational facilities.

Chau (1972) has emphasized the importance of population expansion in contributing towards increased educational costs. From case

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studies carried out in Ceylon, Colombia, Tanzania and Tunisia, Chau recognises that considerable efforts will have to be made in order to improve education under conditions of rapid population growth. He asserts that a slow down in the growth rate of the young population group combined with an increase in the population of working age would diminish the financial burden of schooling and encourage the establishment of universal primary education (Chau, 1972,PP.6).

Callaway (1973) argues that it is not "over-population" which creates the difficulties in providing schools for today's children; rather, it is the recent high rate of population growth against the background of rural under-development (Callaway, 1973, PP.23). He recognises the uneven spread of populations in Africa, with large concentration in urban centres, pointing out the demographic elements of population size; its variations in density and composition, which obviously affect the expansion and costs of education (PP.24). He therefore concludes that there is a need to forecast educational requirements

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in terms of the expected numbers in the school-age population, under the prevailing growth rates; and that increases in school-age populations require many more schools and teachers, even to keep constant proportions of school-age population in primary schools. It therefore becomes a formidable task to achieve universal primary education (PP.24).

A Sector working paper by the World Bank (1974) cautions educational planners on the need for clear understanding of the objectives that education is expected to fulfil. It asserts that rapid population growth, together with the misallocation of educational resources, has led to an increase in the number of illiterates in the developing countries (World Bank, 1974, PP.1). It estimates that if the trend continues, the number of illiterates will increase to 865 million by 1985 (World Bank, 1974, PP.1 Par. 5).

The above literature has an important bearing on the present study in that it points out the problems of providing education in areas with rapid population growth rates. However, the literature discusses the developing world in general without focussing on a particular country or area (except Chau). Some Scholars are

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mainly concerned with the economics of education and only mention population in passing, and therefore do not go into detailed analysis of population growth rates and their impact on education.

In Kenya, most of the work done has been concerned with making descriptions of the structure of education in pre-independence and post independence period, and only mentioned the need for projecting future population in order to plan for educational requirements. The present study is therefore a pioneering one as it focusses on Nairobi and treats in detail the interaction between population trends and the provision of primary education.

The first education Commission (1964-65)[7] Report was mainly concerned with analysis of the structure and content of the educational system in Kenya and making relevant recommendations to the government. However, the report drew public attention on the need to include the demographic aspect in educational planning.

Ominde (1966) analyses the structure of education in Kenya, and in passing cautions the educational planner on the continued burden of

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illiteracy resulting from rising birth rates which lead to a crisis in the primary education sector. He argues that the quality of primary education is likely to fall especially in the rural areas, which are staffed by inadequately trained staff.[8]

Hiesel (1966) has dealt with a subject most closely related to the present work. He explores some of the implications of demographic trends for educational needs in a developing society like Kenya. He first outlines Kenya's demographic characteristics and then analyses the dynamics of the age distribution "as the demographic characteristic with the greatest direct relevance to educational needs and policy". (Sheffield, 1966 PP.74). He points out that the combined effects of fertility, mortality and migration have produced a very young average age in Kenya and that the economy is therefore confronted with heavy demands of constructing new educational institutions in the face of competing demands for scarce capital (Sheffield, 1966, PP.79).

In a later contribution which is more relevant to the present study, Ominde, (1971) analyses the expected trends in primary school population based on the then observed rates of population growth

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and government expenditure, concluding that public expenditure on education is very high. He therefore contends; "Educational planning in Kenya cannot be based strictly on the need to provide places to meet demand. With a continuing high growth rate, educational planners are faced with the serious problem of decline in education. Educational planning must be supported by a programme for the moderation of the country's high rate of population increase. An accelerated growth rate would result in greater difficulties in providing free primary education." (OECD, 1971, PP.191)[9]

Ominde points out the inability of the educational planner to cope with the rising population growth rates and asserts that the only solution lies in trying to moderate the population growth rates. This situation is clearly manifested in the City of Nairobi, where there are increasing numbers in the school-age population so that the City Council and other educational authorities are unable to cope with the demand for primary education. This is particularly so when they are faced with the limited revenue sources, given the free primary education since 1974.

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Cameron (1970) has described the structure of education in the three East African Countries (Kenya, Uganda, Tanzania), and stressed the importance of educational planning. It is the latter that has some relevance to the present study, where he argues that some form of educational planning, both short-and long-term is inherent in any educational system, and this, he adds, involves making projections of growth and development with respect to enrolments; other school materials plus the finance required; all of which are related to population growth.

Meck (1971) looks at the enrolment rates in Kenya in the period 1963-1969, in both primary and secondary schools and asserts that they have been rising very gradually because of the high proportion in the school-age population (20 per cent in the age group 7-13 years) in Kenya (Cantrelle, 1971, PP.345). She further adds that despite government efforts in trying to satisfy a yearly growing demand for education, only 85 per cent of the primary school-age population is likely to be enrolled in the next one or two decades. However, Meck does

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not fully explore the relationship between the population dynamics and the increasing school-age population.

Raju (1973) has looked at the various levels of education in Kenya emphasizing the importance of comprehensive educational planning to avoid wastage in terms of high drop-outs, repetition, poor educational structure and content. She points out that there is a general tendency in Kenya for projected enrolments to exceed the actual enrolments because of the fast rate of population growth (Raju, 1973, PP.12).

Kinyanjui (1974) desribes the disparities in the provision of education in Kenya, by comparing educational opportunities between rural and urban areas and among different rural communities. He attributes the unfair distribution to colonial set up. He goes further to analyse the quality of education provided in different types of schools, in terms of teacher qualifications and examination performance, and the extent to which Kenya is able to provide education to the primary school-age population. He points out that in 1974, only 64 per cent of the total primary school-age population in

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Kenya were attending school, but if the dropout and repetition rates were to be considered, it could be argued that only 30 per cent were effectively getting primary education. This paper is closely related to the present study which analyses the distribution of educational facilities in Nairobi and the ability of City Council of Nairobi to cater for the increasing school-age population.

In a more recent contribution, Kinyanjui (1977), gives a more detailed analysis of regional and class inequalities in the provision of primary education, asserting that "the structure of the education resources and opportunities reflects the socio-economic structure of the society" (Kinyanjui, 1977,PP.3) which was inherited from the colonial period. He identifies and discusses the forces that have influenced and continue to shape the emergence of inequalities in the provision of educational resources and opportunities at the primary school level. His analysis is based on participation rates and the types of schools and teacher qualifications in different districts and major

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urban centres of Nairobi, Mombasa, Kisumu and Nakuru. He concludes that inequalities have existed and continue to be there in post-colonial Kenya.

Kinyanjui does not, however, discuss the contribution of the fast population growth rates in hampering the development of educational facilities in the areas neglected by colonialists.

Finally, much has also been said in the different development plans, which is useful to the present study. The earlier plans laid emphasis on educating more and more people both for promotion of literacy and to meet manpower requirements:-

> . . . universal free primary education is a major objective of the government. The Nation's ability to develop faster is very much dependent on the quality and quantity of the literate and numerate population. The education system . . . must promote literacy and numeracy . . . to meet national manpower requirements and to prepare citizens for gainful employment." (1974/78 Devt. Plan, Part I, PP.13).

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The government has managed to implement free primary education at the expense of deteriorating quality and increased public expenditure in the prevailing conditions of fast population growth rates. It is only the latest Development Plan (1979/83) which points out the dangers of rising population growth rates, on provision of necessary facilities, such as, health, education, food, and improvement of the standard of living in general. The plan "hopes" that the population programme will lead to a reduction in the birth rate and in consequence, a reduction in population growth rate, by the end of the planning period.

The foregoing literature reveals that all along, since the late 1960's there has been increasing concern on the problems of providing education in circumstances of fast population growth rates. A number of scholars have been concerned with the economics of education, realizing the large proportion of public expenditure that goes to education. Others have

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analysed in detail the implications of fast population growth rates on the provision of educational facilities. However, majority have discussed the developing world in general without focussing on a particular country or area. Those who have looked at particular areas have concentrated on describing the educational structure and content (Kenya) and only mentioned in passing the need for projection on the expected school-age population. However, the thing that they all seem to have pointed out, and which is important for the present study, is the need for comprehensive educational planning at all levels. The present study is therefore a pioneering one as it focusses on Nairobi and treats in detail the interaction between population trends and the provision of primary education. The literature has however been very useful in highlighting the problems of fast population growth rates.

1.5 METHODS OF DATA COLLECTION AND ANALYSIS

The research methodology was designed to serve the main objectives and test the hypotheses

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outlined. Four main steps were followed in the research, namely, planning and problem formulation, data collection, analysis and making inferences from the results. The need for and the importance of studying the interaction between population dynamics and education was realized. The problem was then identified and an intensive examination of related literature carried out. Specific study objectives, leading to the formulation of the hypotheses were set. Data were mainly procured from secondary sources which included 1962,1969 and 1979 census data, the Kenya Fertility Survey, 1977 National Demographic Survey Annual Reports of the Ministry of Education, City Council of Nairobi Records and Annual Reports of the City Education Department. The data from the censuses and the two surveys were used for analysing the population dynamics of Nairobi, while the rest was used for analysing enrolment, teachers and land acreage per school.

In addition, data on examination performance and teacher grades according to the former school categories, was obtained from field work, through use of a sample.

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Stratified random sampling was found to be the most adequate technique in the selection of the schools to be surveyed since it ensured that the various divisions were fairly represented in the sample. Random sampling was applied on each stratum using the sampling fraction (10 per cent). This ensured maximum efficiency in stratification by allowing the divisions with a larger number of schools to have more representation.

A questionnaire was administered on the respondents in order to obtain the required information (see Appendix 1.1) for the study. Two types of questionnaires were considered; a mailed one, and that based on interview. The latter was preferred since it allowed for in depth probing and explanation where necessary. The questionnaire was first pre-tested to find out if the questions were clearly understood by the respondents and as a result, some questions found to be ambiguous were reworded. The questionnaire was then administered to the head of the school.

Several problems were encountered while carrying out the research. Initially, the Heads of schools looked reluctant to tackle the problem,

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but after convincing them, they cooperated. The major problem was, however, absence of the respondents and this meant the researcher had to keep calling back several times, which involved a waste of precious time and funds.

In data analysis, both demographic and statistical techniques have been employed. Such techniques include, Sullivan model, retardation and acceleration rates, school-life tables, projections and application of descriptive statistics.

In trying to estimate mortality from data on the proportion dead of children Ever born to women in the reproductive age groups, two models were considered, the Brass and the Sullivan. The latter was found more appropriate on the basis of its simplicity and on the fact that it somehow relaxes the static mortality and fertility conditions assumed by Brass. The two models are however very similar since Sullivan's is based on Brass' on which he offers some modifications and adaptations. The Sullivan model was developed by employing regression analysis with data generated from empirically observed mortality and fertility schedules[10]. It too, like the Brass model

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assumes unchanging fertility and mortality conditions, but allows for cases of uncertainty over the prevailing conditions by recommending use of West equations which will provide mortality estimates with a standard error of estimate of less than 5 per cent. From the Sullivan formula , childhood mortality for Nairobi from 1962-1979 has been estimated (see Appendix 2.1).

The school-life tables have been used for estimating pupil (males and females separately) School life expectancy in Nairobi. These are "double decrement tables which show the joint effects of death and school drop-outs on school attendance patterns" (Stockwell and Nam, 1963). The school life-table, like the conventional life table assumes an initial cohort of births normally 1000, 10,000 or 100,000, which is subjected to mortality conditions. It also consists of the conventional life table columns but with the values expressed in terms of school enrolment. In this analysis, the school life table values have been computed for the primary school age range (5-14) in Nairobi using the 1969 stationary population estimates and data on enrolment. All the life table columns are

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explained in chapter 3.

The school-age population was projected and the expected future school-going population estimated from this. When trying to project the future school-age population for Nairobi, several methods available for projecting populations for geographical sub-divisions were considered. These included mathematical and ratio methods; methods taking account of economic variables; and cohort-component method. These were examined and the latter chosen as the most appropriate. The mathematical and ratio methods required a series of total population figures for past years, on which future population projections would be based. Since only three sets of these were available for Nairobi from the census figures, use of the method was ruled out. The other technique is very involving and requires information on economic variables such as per capita income, production, and land-use, which the author did not have. Use was therefore made of the cohort component method using the Hamilton Perry formula (see chapter 3). This is basically

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a method involving use of census cohort-change rates where the components of net migration and mortality are treated as a unit in the projections for the cohorts already alive at the base date (1979 in this case) and a single assumption made that the rates will remain unchanged[11]. The latest census figures are therefore carried forward to future years by use of census cohort-change rates which represent the ratio of the number of persons enumerated in a given age-group in one census to the number of persons in the same cohort enumerated in a previous census[12]. These rates therefore also take account of relative errors of enumeration between successive censuses.

After projections had been made of the age groups 5-9 and 10-14, they were broken down using Sprague's Interpolation formula[13], to obtain the required population size in the primary school-age group 6-12 years. Projections of the expected school-going population in 1989 were then carried out using the enrolment ratio method. This method is based essentially on the projection into the future of past and current ratios of school enrolment. Basing on the past observations, the

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school enrolment ratio for Nairobi was assumed to remain constant in the next decade. This was applied to the projected school-age population in 1989 in order to obtain the expected school-going population in the same year.

In addition to the above demographic techniques, statistical techniques were also used. These included application of descriptive statistics throughout the work, in analysing data on population dynamics and on primary education enrolment and facilities. Correlation analysis was also found very useful in trying to find out whether there exists any relationship between school population and the total land acreage allocated to various schools. The simple correlation coefficient, r was therefore applied to data on school population and the respective plot areas. The following chapters discuss the data and the results derived from the above methodology.

1.6 OUTLINE OF CHAPTERS

Chapter 2 analyses population dynamics of Nairobi in Kenya's context. A review is first made of the trend of urbanisation in Kenya and

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an analysis made of the factors accounting for the high rate of population growth in Nairobi.

Chapter 3 relates demand for, to supply of, primary education in Nairobi. Analysis is made of the school-age versus school-going population, and the school life table. Further, projections are made of the future primary school-age and school-going populations. In addition, a detailed examination of the educational facilities and pupil performance in Certificate of Primary Education (C.P.E) examination has been carried out.

Finally Chapter 4 summarises the findings of the study and outlines policy recommendations and areas requiring further research.

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Foot notes

1. Central Bureau of Statistics Ministry of Economic planning and Community Affairs "Educational Trends 1973-1977" PP.5.

   The enrolment ratio for 1962 was computed from the size of the total population in the 6-12 years age group as per the 1962 census and the total primary school enrolment for 1962, including over-aged children. The 1973 enrolment ratio was based on estimates of the size of the population in the 6-12 age group in 1973 projected by the Central Bureau of Statistics in "Population Projections by District, 1970-1980" Kenya Statistical Digest. X 3, September 1972 Series A, and the total primary school enrolment including the over-aged pupils. Therefore the enrolment ratios for both years over-estimate the percentage of the eligible age group who were enrolled.

2. Due to the introduction of free primary education, a large number of children in the primary school age (6-12 years) enrolled and a substantial number of older children also enrolled in primary schools, hence the large increase in the percentage enrolled between 1973 and 1974.

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3. Ministry of Education, 1979 Annual Report.

4. Report by the City Education Officer based on Education Committee Meeting of 19/11/80.

5. Daily Nation Wednesday, February 4, 1981.

6. According to 1979 provisional census results

7. S.H. Ominde "Kenya Education Commission Report", Government Printer, 1965, Nairobi.

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11. See Hamilton, C.H. and Perry J. (1972) - A Short Method for Projecting Population by Age from One Decennial Census to Another, in Social Forces 41(2) Pages 163-170.

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13. For a detailed explanation, See The Agency for International Development (1975) - Demographic Techniques for Manpower Planning in Developing Countries, U.S. Employment Service, Washington, D.C. Pages 114-121.

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CHAPTER 2

POPULATION DYNAMICS OF NAIROBI

2.1 Kenya's Urbanisation Trend

In order to understand the position of Nairobi as the "primate city" in the Republic of Kenya, the author has found it necessary to review the trend of urbanisation in the country.

In Kenya urban centres are defined as conglomerations of 2,000 or more inhabitants. There has been an appreciable development of urbanisation in the country in the last three or four decades, as a result of rural-urban drift. The number of urban centres doubled in the period 1948-1962, and almost doubled again in the 1969-1979 period (see Table 2.1).

Similarly, there have been significant increases in urban population from 276,240 in 1948 to 2,238,800 in 1979. However, Kenya's urban centres are still small by global standards. By 1979 there were only three urban centres with populations of 100,000 or more. Also characteristic of Kenya's urbanisation trend is the dominance of the two major urban centres of Nairobi and Mombasa, both in terms of population size and industrial and commercial activities.

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Table 2.1 Number of Towns and Total Urban Population in Kenya 1948-1979*

Size of Urban Centre	1948	1962	1969	1979
100,000+	1	2	2	3
20,000-99,999	1	2	2	13
10,000-19,999	2	3	7	11
5,000-9,999	3	11	11	22
2,000-4,999	10	16	26	41
Total Urban Centres	17	34	48	90
Total Urban Population	276,240	670,950	1,079,905	2,238,800
Percent of Kenya's Total	5.1	7.7	9.9	14.6

* Provisional Census results.

Source: Adapted from: Kenya, Republic of, 1962, 1969 and 1979 Census data, Ministry of Finance and Economic Planning, Nairobi.

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In 1948, Nairobi was the only urban centre with a population of over 100,000. Majority of the urban centres have populations of 5,000 and below. Of the total urban population in 1969, Nairobi and Mombasa accounted for about 70 per cent, while the next largest urban centre (Nakuru) accounted for only 4 per cent. The rest of the urban population was more or less evenly spread with majority of the centres having a share of less than 1 per cent of the total. 1979 census data, however, revealed less dominance by the two major urban centres of Nairobi and Mombasa, with a share of their urban population declining to 52 per cent. The trend was torwards a comparatively even spread of the urban population. Lower growth rates (less than 5^{1} per cent) were experienced by Nairobi and Mombasa in the period 1969-1979 while centres such as Kisumu, Nakuru and Eldoret experienced much higher average annual growth rates well above 7 per cent. In addition to this, many more centres have emerged in the period 1969-1979 where

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a large number of rural migrants have preferred to settle, other than add to the already crowded larger centres.

In conclusion one can say that there has been a significant rise in Kenya's urban population in the period 1948-1979, a result of fast growth rates by comparatively smaller centres and emergence of more centres. However, boundary changes make the populations of the four censuses not strictly comparable, since part of the increases could be attributed to boundary expansion.

In a country that is still largely agricultural with over 85 per cent of its total population residing in rural areas, the city of Nairobi stands out as a dominant urban centre holding a comparatively large proportion of both the urban and total population, (see Table 2.2).

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Table 2.2 Population of Nairobi as a proportion of total population of Kenya and Total Urban Population in Kenya, 1948-1979

Year	Total Population			Nairobi as percentage of Kenya	Nairobi as percentage of Urban
	Kenya	Urban	Nairobi		
1948	5,407,599	276,240	118,976	2.8	43.1
1962	8,365,942	670,950	343,500	4.1	51.2
1969	10,942,705	1,079,908	509,286	4.7	47.2
1979	15,327,061	2,238,800	834,000	5.4	37.2

Source: Adapted from, Kenya, Republic of, 1948, 1962, 1969, 1979 Census data, Ministry of Finance and Economic Planning, Nairobi.

Nairobi has been holding an increasing proportion of the total population of Kenya in the period 1948-1979. Part of the increase is attributed to expansion of the city boundary to include parts of Kiambu, while a major part of the increase is a result of in-migration from the rural areas. A detailed analysis of the effect of migration in contributing towards population increase in Nairobi will be dealt with in a later section of this Chapter.

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Conversely Nairobi has been experiencing declining proportions of the total urban population. As already mentioned,this could be a trend towards spread of urban population in later post-independence years as more urban centres emerge (for example Webuye) and the comparatively smaller urban centres experience larger population increases. This is a way of implementing the goal of growth poles to ease congestion problems in the major urban centres of Nairobi and Mombasa. 4.1

All the same Nairobi's average growth rates are still higher than those of other cities in the developing countries. According to data on annual growth rates of identical agglomerations, the cities with population sizes of 500,000 - 1,000,000 (Nairobi falls in this group),in the less developed regions had average annual growth rates ranging from 3.69 in 1965-1970 and a mean annual growth rate of 4.01 in the period 1950-1970[2]. Nairobi had a growth rate of 5.8 in the same period. Such a high rate of population growth has serious implications in terms of urban population density and the provision of necessary facilities such as housing, education, medical, food, water, employment and transportation. The factors accounting for such

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a high rate of population growth are dealt with in a later section of this chapter.

2.2 Pattern of Population distribution in Nairobi

The trend of overall population density in Nairobi appears somehow unique. In 1948 and 1962, overall population densities were very high in the range of 1,500-3,000 persons per square kilometre, while in the later periods, they declined to less than 1,000 persons per square kilometre (see Table 2.3). The much lower population density in 1963 reflects the expansion of the city boundary to include the less closely settled rural areas of Southern Kiambu.

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Table 2.3 Population by Area and Density for Nairobi 1948-1979

Year	Total	Area(Sq.Km)	Density (Pop/Km^2)
1948	118,976	83.92	1,418
1962	266,794	90.65	2,943
1963	343,500	684	502
1969	509,286	684	745
1979	834,000	684	1,210

Source: Kenya, Republic of, 1948, 1962 and 1979 Census data, Ministry of Finance and Economic Planning; Nairobi

These overall densities are however misleading since they disguise the problem of population concentration in some areas within the city. Regional analysis of population density reveals very uneven distribution, with densities ranging from 94 persons per square kilometre in Mugumoini to as high as 36,007 persons per

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square kilometre in Pumwani (see Table 2.4). The Eastland areas such as Mbotela, Pumwani, Maringo and Mathare with very high population concentrations, well above 30,000 persons per square kilometre, contrast with the less closely settled areas such as Karen, Langata, Kilimani and Lavington in the Western half of the city with densities below 500 persons per square kilometre. More detailed analysis of the population concentration zones has been given in Chapter 1.

Comparison of population figures between 1969 and 1979 shows very significant increases in the population size of most of the Eastland areas, Kibera, Mathare and Eastleigh (Tables 2.4 and 2.5). Average population densities in these areas more than doubled in the period under consideration. These are receiving areas for the mounting influx of semi-skilled and unskilled rural migrants who cannot fit in the so-called modern employment sector and therefore resort to informal jobs such as shoe-shining and street-hawking which fetch very low income; and they can only afford to stay in unauthorised settlements.

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It is estimated that one third of the city's population lives in unauthorised settlements, and that a much higher proportion lives in public housing which is critically overcrowded and inadequately serviced. This overcrowding in turn leads to strain on the existing facilities, given that there is no room for expansion.

Figures for population density by region have been given on different tables for 1969 and 1979, because the names for the two census periods do not overlap. Some regions in 1969 were deleted in 1979, others had their boundaries expanded and names changed thus making side by side comparison difficult.

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Table 2.4 Population by Area and Density for Nairobi Administrative Areas in 1969

Region	Area (sq. Km)	Total Pop.	Density (Pop/Km^2)	Region	Area (Sq. Km)	Total Pop.	Density Pop/Km^2)	Region	Area (Sq.	Total Pop.	Density Pop/Km^2)
NAIROBI	693	509,286	745	Ngara West & East	3	24,527	9,783	Maringo	-	16,910	30,690
Telecommunication	2	1,555	1,005	Muthaiga	3	2,656	762	Jericho	-	17,986	2,470
Loreto Convent	2	888	493	Juja	2	12,283	7,444	Makadara	-	15,375	29,175
Bernard	2	1,743	812	Racecourse	1	23,658	20,343	Delamere	-	2,385	1,252
Lavington	3	2,196	628	Mathare	2	21,375	8,811	West	-	5,655	2,649
Thompson	3	2,848	1,028	Eastleigh	5	1,430	290	South 'C'	-	2,977	3,561
Kilimani	2	1,748	908	Aerodrome Muthurwa	-	5,634	12,952	South 'B'	-	5,557	6,195
Woodley	2	4,019	1,833	Shauri Moyo	1	11,176	14,552				
Hospital Hill	3	6,272	2,110	Bahati	1	11,830	21,667				
Upper Hill	2	2,289	1,411	Kaloleni	-	4,787	12,868				
Nairobi Hill	4	8,493	1,954	Makongeni	-	7,756	18,164				
Kileleshwa	2	2,490	1,036	Maisha	-	6,471	21,498				
Arboretum	1	209	172	Mbotela	-	3,904	27,111				
Sclaters	4	4,850	1,351	Doonholm I	-	8,984	28,341				
Upper Parklands	4	4,562	1,162	Doonholm II	-	1,445	3,595				
Parklands	4	16,086	4,151	Jerusalem	-	3,944	9,025				
City Park	1	587	392								

Source: Kenya, Republic of Kenya, Population Census, 1969, Vol.I, Table 1, PP.2, Ministry of Finance and Economic Planning, Nairobi.

Table 2.5 Population Size and Density by Administrative Areas in Nairobi, 1979

Administrative Area	Area (Sq.Km)	Total Pop.	Density (Pop/Km^2)	Admin. Area	Area (Sq.Km)	Total Pop.	Density (Pop/Km^2)	Admin. Area	Area Sq.Km	Total Pop	Density (Pop/Km^2)
NAIROBI	693	827,775	1,210	Dandora	162	22,672	139	Nairobi Central	1.2	8,859	7,382
Kangemi	5	21,081	3,933	Harambee	0	16,257	20,321	Spring Valley	25.8	18,559	788
Kawangware/ Riruta North	4	24,413	5,261	Lumumba	1	13,544	11,286	Karura	40.3	11,031	298
Riruta South (Satellite)	5	17,165	3,433	Makadara	1	11,931	10,085	Parlands	3.8	23,965	8,886
Waithaka	4	7,365	1,521	Kaloleni	0	5,120	8,000	Ngara West	1.3	10,044	8,100
Uthiru/ Ruthimitu	6	8,140	1,218	Maisha/Makongeni	0	16,606	27,676	Ngara East	1.2	16,335	13,173
Mutuini	4	7,627	1,588	Mbotela	0.9	14,073	43,978	Roysambu/ Kahawa	49.9	30,958	2,280
Kilimani	24	45,111	1,805	Bahati	0.6	10,670	20,519				
Karen/Langata	74	13,112	176	Maringo	0.4	13,083	32,707	Ruaraka/ Kassarani	17.7	29,881	1,819
Kibera/Woodley	7	63,353	8,515	Uhuru	2	23,813	12,149				
Golf Course/ Nairobi Hill	5	16,670	2,885	Shauri Moyo/ Muthurwa	1.4	18,858	14,286	Kariobangi	13.2	43,349	3,612
Nairobi South & West	11	28,997	2,432	Pumwani	0.4	14,403	36,007	Mathare	3.2	68,456	34,228
Industrial Area	10	9,314	840	Ziwani/Kariokor	0.8	8,521	12,530	Eastleigh	7.7	53,562	7,439
Mugumoini	124	11,750	94	Pangani	1.5	17,223	10,251				
Embakasi	52	13,502	217	City Centre	1.2	18,402	15,863				

Source: Kenya, Republic of, 1979, Provisional Census Figures, Ministry of Finance and Community Affairs, Nairobi.

2.3. Factors accounting for the high rate of Population growth in Nairobi

The basic factor underlying population change in any region are changes in any one or all the demographic indices of fertility, mortality and migration. However, detailed analysis of these factors is limited by lack of complete vital registration. Although birth and death registration was made compulsory in Nairobi in 1963, there has not been a 100 per cent response. The rates may also be distorted by the significant number of people who come only temporarily from the surrounding areas for better hospital facilities (maternity and normal treatment);and inaccurate estimates of the mid-year population.

(i) Fertility

Statistics indicate that Nairobi's fertility level, though still relatively high, is much lower than that of other provinces within Kenya. This is because Nairobi extra-provincial district is in itself an urban centre, and statistics reveal that there are considerable variations in fertility levels between the urban and rural sector within

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provinces[3]. In 1969, Nairobi recorded a much lower total fertility rate of 5.5, while an average rate of 7.6. was recorded for Kenya. Provinces such as Central and Nyanza recorded total fertility rates of 8.7 and 7.9 respectively, which are well above the national average. These differentials in fertility undoubtedly reflect variations in fertility attitudes by different tribal groups and differences in values regarding marriage; and in the case of urban women, employment in the modern sector which has led to changing values regarding family roles and childbearing.

Analysis of the mean births per woman in Nairobi indicates an upward trend of fertility levels in the period 1962-1977. (See Table 2.6).

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Table 2.6 Mean Live Births Per Woman in Nairobi, in 1962-1979

Age Group	1962 a	1969 b	1977 c	1979 d	Percentage Change e		
					1962-1969	1969-1977	1969-1979
15-19	.54	.32	.34	.29	- 40.7	6.3	- .09
20-24	1.54	1.51	1.74	1.37	- 1.9	15.2	- .09
25-29	2.83	3.05	3.10	2.77	- 7.8	1.6	- .09
30-34	3.66	4.00	4.51	4.00	9.3	12.8	.01
35-39	4.09	4.64	5.28	4.70	13.4	13.8	.01
40-44	3.95	4.83	5.61	4.92	22.3	16.1	.01
45-49	3.61	4.64	6.15	4.94	28.5	32.5	.06

Source: Kenya, Republic of,

a: Kenya Population Census, 1962, Vol.III, Table x 12, PP.70. Ministry of Economic Planning and Development, Nairobi.

b: Kenya Population Census, 1969, Vol.IV, Table 4.12, PP. 31. Ministry of Finance and Economic Planning; Nairobi.

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c: National Demographic Survey, 1977.

d: Kenya Provisional Census Figures, 1979, Ministry of Finance and Community Affairs.

e: Computed.

Between 1969 and 1977, the number of mean births per woman in the age group 45-49 rose by about 33 per cent. Other women age groups, except the 15-19 group, also experienced a significant increase in the number of mean births per woman. Although the 1979 figures indicate a decline of mean births per woman by age group, analysis of the city sex structure shows that the proportion of females in the city has risen significantly in the period 1962-1979 (See Table 2.14), thus resulting in increased births (absolute numbers) which counteract the effect of a decline in mean births per woman.

The apparent rise in fertility could be attributed to improved health and nutritional status among more women with at least primary education, leading to less foetal loss and still births. The still birth rate is estimated to have declined from 0.95 in 1972 to 0.19 in 1979[4]. There has also been a tendency among educated women to abandon adherence to the traditional habits

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of breast-feeding, sexual taboos, and polygamy, all of which are said to be inhibiting factors on fertility. Without the counteracting influence of birth control practice, the result of these habits has been, lower birth intervals and increased births within the reproductive life span. Rising fertility is therefore a factor which in part contributes to the population increase in the city.

Analysis of the crude birth rates, based on City Council of Nairobi vital registration statistics does not reveal a definite trend in fertility levels. There is inconsistency in the rates, which fluctuate around 30 and 46 births per thousand population (See Table 2.7). This could be attributed to a combination of incorrect estimate of the mid-year population and under-registration of births. Adjustment of the estimated population figure of 1,030,000 for 1979, to the census figure of 827,775 for instance, brings the crude birth rate from31.98 to about 40.0. This is nearer to that in 1969 (40.8). Much more reliable data on annual crude birth rates for Nairobi have been obtained from projectionsby Henin, (1979) (See Table 2.8)

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Table 2.7 Estimated Mid-Year Population and Crude Birth Rates for Nairobi, 1963-1979

Year	Mid-Year Population	Registered Live Births	Crude Birth Rate
1963	343,000	12,316	35.9
1964	367,000	13,695	37.3
1965	385,000	16,077	43.8
1966	429,000	17,292	40.3
1967	455,000	19.239	42.3
1968	479,000	20,698	43.2
1969	509,000	22.190	43.5
1970	534,000	25,020	46.8
1971	570,000	25,389	44.5
1972	627,000	28,443	45.3
1973	674,000	29,350	43.5
1974	724,000	29,989	41.4
1975	776,000	31,681	40.8
1976	832,000	31.707	33.7
1977	893,000	30,768	30.6
1978	959,000	31,681	29.2
1979	1,030,000	32,941	32.0

Source: Nairobi City Council Birth Registration Records.

According to these, crude birth rates for Nairobi are expected to remain more or less constant at 41/1000 in the period 1978-1985.

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Table 2.8 Projected Population and Implied Births for Nairobi 1978-1985

Year	Projected Population	Implied Births	Computed Crude Birth Rates (per 1000 Population)
1978	818,000	34,300	41.9
1979	863,000	36,100	41.8
1980	913,000	38,100	41.7
1981	963,000	40,200	41.7
1982	1,016,000	42,400	41.7
1983	1,072,000	44,700	41.7
1984	1,054,000	44,000	41.7
1985	1,296,00	53,600	41.3

Source: Adapted from: Henin, R.A "Population Profiles for the Districts of Kenya", Population Studies and Research Institute, University of Nairobi.

However, the trend is likely to reverse in the late 1980's, due to the efforts being made by the Government in conjuction with the Family Planning Association, to cut down on average family sizes; and

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the realisation by many women in Nairobi that large families are a burden both in terms of opportunity costs and the high cost of living. It may be that a large proportion of the women residing in Nairobi are employed in the type of jobs (e.g. nursing) that preclude reconciling a large family size with work responsibility and would therefore prefer small family sizes. This would lead to a reduction in the proportion of school-age population in subsequent years, but the reduction would not be sufficient to ease City Council of the burden of providing additional primary school places every year, since mortality decline and migration seem to be the major factors contributing towards population increase in Nairobi.

(ii) Mortality

In the absence of accurate vital registration or other high quality sources of information, the study of both adult and child mortality must be confined to drawing tentative inferences from partial and indirect evidence. Judging from City Council records, mortality levels have declined significantly in the decade 1966-1977. Crude death rates and infant mortality rates are estimated

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to have declined from 11.7 and 69.0 respectively in 1967 to 3.8 and 44.9 in 1977. (Table 2.9). But the rates appear greatly under-estimated because of the effect of over-estimation of the mid-year population and likely under-registration of deaths.

The estimated crude death rate of 6.8 in the 1960's is too low, especially when the fact that effective public health measures were just at the initial stage after independence, is considered. The estimated crude death rate from the 1969 census data was 10.0, and this is unlikely to have declined to 3.9 by 1977. Similarly the infant mortality rates deviate from those at the 1969 census; 79 and 62 for males and females respectively, as against an average of 49.7 recorded by Nairobi City Council.

A more reliable source of information on mortality in Kenya is contained in the relationship between the number of children ever born and those still alive at census date, and the proportions of persons with parents alive at census date. From this, levels of early childhood mortality and adult mortality can be computed using advanced demographic techniques (See Table 2.10 and 2.11).

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Table 2.9 Estimated Death Rates for Nairobi 1966-1977

Year	Mid-Year Population (Estimated)	Registered Deaths	Crude Death Rate (per 1000)	Infant Mortality Rate
1966	429,000	3,300	6.8	69.0
1967	455,000	5,327	11.7	122.0
1968	479,000	3,075	6.4	54.4
1969	478,000	3,977	8.3	49.7
1970	534,000	4,252	8.0	58.0
1971	584,000	4,747	8.1	60.3
1972	627,000	3,592	5.7	55.7
1973	674,000	3,503	5.2	59.0
1974	724,000	3,808	5.3	53.5
1975	776,000	3,299	4.3	49.6
1976	832,000	3,652	4.4	48.0
1977	893,000	3,486	3.9	44.9

Source: City Council of Nairobi, Nairobi Vital Statistics Records, 1966-1977.

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Table 2.10 Children Ever Born and Proportions Alive at Census date, by Age Group of Mother, in Nairobi, 1962-1979

Age Group	Number of Children Ever Born			Proportion Alive at Census Date		
	1962	1969	1979	1962	1969	1979
15-19	.54	.32	.29	.933	.931	.901
20-24	1.54	1.51	1.37	.886	.904	.907
25-29	2.83	3.05	2.77	.840	.888	.907
30-34	3.66	4.00	4.00	.854	.873	.900
35-39	4.09	4.64	4.70	.802	.854	.883
40-44	3.95	4.83	4.92	.780	.836	.854
45-49	3.61	4.64	4.94	.822	.825	.839

Source: Adapted from, Kenya, Republic of, Kenya Population Census, 1962,1969,1979, Ministry of Finance and Community Affairs, Nairobi.

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The above information has been used for estimating the probability of dying between birth and exact ages of early childhood using Sullivan technique[5] (See Table 2.11 and Appendix 2.1)

Table 2.11 Childhood Mortality in Nairobi 1962-1979

	1962	1969	1979	Percentage Decrease 1962-1969	1969-1979
$_2q_0$	.115	.102	.096	11.3	5.9
$_3q_0$	.143	.109	.096	23.8	11.9
$_5q_0$	.139	.123	.097	11.5	21.1

Note: This table has been computed from Table 2.10. (See Appendix 2.1 for detailed computations)

There have been significant declines in child mortality in the period 1962-1979. The greatest decline of about 24 per cent was in the probability of dying from birth to age 3 in 1969. It is known that child mortality in African countries is highest

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after age two when mothers wean their children and they do not provide a balanced substitute, and this leads to diseases such as Kwashiokor, which eventually lead to death. This notion may be extended to Nairobi and an argument developed that the nutritional standards among families in Nairobi have greatly improved in the period under consideration, so that there is less incidence of diseases, and therefore less deaths resulting from early childhood weaning. Other factors underlying mortality decline are, the innovation of effective public health measures such as immunisation against measles, small pox and tuberclosis; and the availability of easily accessible and advanced hospital facilities, after independence.

Reduction in early childhood mortality leads to increased population and a larger proportion in the school-age population. The similarity of the effects of mortality reduction to those of an increase in fertility are well known and have been analysed in detail by Coale (1966) . Mortality decline is therefore a factor which has contributed to the increasing school-age population in the city of Nairobi and the inability of the City Council to

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cope with the rising demand for primary education. However, the difference between intercensal growth rate and natural increase of population, indicates that quite a substantial portion of the increase is a result of in-migration. In 1962-1969 period the intercensal growth rate was estimated at 5.8 per cent, of which natural increase was only 3.1 per cent, and migration was 2.7 per cent. The difference between Crude birth rate and Crude death rate in 1977 (See tables 2.7 and 2.9) also indicates that out of the total growth rate of about 5 per cent, natural increase accounted for about 60 per cent (3.0 natural increase), while the rest was a result of in-migration.

(iii) Migration and Age-Sex Structure

The high rates of average annual population growth in Nairobi are largely attributable to in-migration from different parts of Kenya. Analysis of population by place of birth in 1979 revealed that of the people enumerated in Nairobi, about 75 per cent were born elsewhere (Table 2.12). Tabulations of population by district of birth and district of enumeration show that the migrant streams are mainly from the densely populated rural areas in Central, Nyanza, Western and Eastern provinces (See Table 2.13).

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Table 2.12 Population by Sex, Five-Year Age Group, and Place of Birth, 1979* District of Enumeration - Nairobi

Age Group	Born in Nairobi				Born Elsewhere			
	Male	Female	Total	Percent of Total	Male	Female	Total	Percent of Total
0-4	40358	40181	80539	9.74	21105	21318	42423	5.12
5-9	24006	24783	49389	5.96	1894	21272	40217	4.86
10-14	14647	14999	29646	3.58	16523	22342	38865	4.70
15-19	8559	8710	17369	2.09	31449	38678	70127	8.47
20-24	5215	5020	10235	1.24	74869	47903	122772	14.83
25-29	3872	3277	7149	0.86	65264	35509	100773	12.17
30-34	2704	2182	4886	0.59	48084	20398	68482	8.27
35-39	1705	1574	3279	0.40	29404	12168	41572	5.02
40-44	1356	1176	2532	0.31	23431	7737	31168	3.77
45-49	993	805	1798	0.22	17478	4851	22329	2.70
50-54	720	663	1392	0.17	11209	3573	14782	1.79
55-59	522	467	989	0.12	6529	2279	8808	1.06
60-64	334	381	715	0.09	3287	1616	4903	0.59
65-69	263	279	542	0.07	2235	1148	3383	0.41
70-74	187	243	430	0.05	1033	817	1850	0.22
75+	207	295	502	0.06	1119	1068	2187	0.26
Not Stated	250	191	441	0.05	877	424	1301	0.16
Total	106607	105226	211833	25.59	372841	243101	615942	74.41

*Provisional Census Results.

Source: Republic of Kenya, Kenya Population Census, 1979 Ministry of Economic Planning and Development.

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Table 2.13 Population by Sex, District of Birth and District of Enumeration in 1979

District of Enumeration : Nairobi

District of Birth	Male	Female	Total	Percent
NAIROBI	106607	105226	211833	25.59
Kiambu	26862	24430	51292	6.20
Kirinyaga	5447	3272	8719	1.05
Muranga	40899	23897	64796	7.83
Nyandarua	2313	1573	3886	0.47
Nyeri	23813	15814	39627	4.79
CENTRAL SO STATED	27	24	51	23.24
Kilifi	1290	540	1830	0.22
Kwale	511	185	696	0.08
Lamu	189	134	323	0.04
Mombasa	4915	4083	8998	1.09
Taita/Taveta	2966	2117	5083	0.61
Tana River	239	132	371	0.04
COAST SO STATED	47	30	77	2.07
Embu	4260	2391	6651	0.80
Isiolo	942	528	1470	0.18
Kitui	17073	6829	23902	2.89
Machakos	42469	22327	64796	7.83
Maisabit	1686	900	2586	0.31
Meru	5745	3200	8945	1.08
EASTERN SO STATED	14	7	21	2.07
Garrissa	432	253	685	0.08
Mandera	947	563	1510	0.18
Wajir	665	357	1022	0.12
NORTH EASTERN SO STATED	68	55	123	0.38
Kisii	7616	4323	11939	1.44
Kisumu	19459	13540	32999	3.99
Siaya	32751	21920	54677	6.61
South Nyanza	14186	9149	23335	2.82
NYANZA SO STATED	390	313	703	14.92
Kajiado	2181	1008	3189	0.39
Kericho	3459	1436	4895	0.59
Laikipia	950	732	1682	0.20
Nakuru	5540	4442	9982	1.21
Nandi	967	593	1560	0.19
Narok	635	298	933	0.11

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Table 2.13 (Continued)

District of Birth	Male	Female	Total	Percent
Baringo	862	475	2337	0.16
Elgeyo Marakwet	528	246	774	0.09
Samburu	913	277	1190	0.14
Trans Nzoia	812	656	1468	0.18
Turkana	268	123	391	0.00
Uasin Gishu	1066	918	1984	0.24
West Pokot	154	80	234	0.00
RIFT VALLEY SO STATED	195	186	981	3.61
Bungoma	4012	2984	6996	0.85
Busia	8189	5368	13557	1.64
Kakamega	56953	35848	92801	11.20
WESTERN (so stated)	29	25	54	13.69
KENYA (so stated)	644	566	1210	0.15
TANZANIA	3495	3008	6503	0.78
UGANDA	4238	4915	9153	1.11
Born Elsewhere	18528	16020	34548	4.17
Not stated	2	5	7	0.00
Total	479448	348327	827775	100.0

Source: Republic of Kenya, 1979 Provisional Census

Majority of the migrants from Central Province came from Muranga, Kiambu, and Nyeri, while Siaya, Kisumu, and South Nyanza were the major sources of Nyanza Province migrants. In Western Province Kakamega, the most closely settled district in the area contributed more than three quarters of the migrants from the Province. Out of about 75 per cent migrant population in Nairobi, only 6 per cent were from outside Kenya, with Uganda contributing the greatest proportion (1.11 per cent). This underlines the importance of

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rural migration in contributing towards population increase in Nairobi, thus the hypothesis "a large proportion of Nairobi's population constitutes rural migrants" is accepted.

The influx of rural migrants into the city has tended to distort the age-sex structure of the city's population. The city's population is becoming more youthful with an increasing proportion of children in the age group 0-14. In 1962, this age group represented 32.0 per cent of the total population; this proportion rose to 36.0 and 40.2 in 1969 and 1979 respectively (Table 2.14). This is a consequence of a relatively high proportion of children migrants (15 per cent out of 75 per cent) and dominance of reproductive age groups 15-49 (55 out of 75 per cent in 1979) in the migrant population, whose additional births broaden the base of the population pyramid (Figure 2.1).

On the other hand, the sex ratio has been declining as more females come to the city to look for employment, school places, or to join their husbands. The sex ratio declined from 187 in

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1962 to 116 in 1979. The increasing number of females in the city in a way contributes to increased fertility levels in the country as a whole, and increased births in Nairobi, since spouses spend a larger part of their reproductive life span together; unlike in the past where it has been the tendency for women to remain in the rural areas while their husbands work in town.

In conclusion, the population of Nairobi has been increasing very fast as a result of rising fertility, decline in mortality and in-migration from the densely settled regions in other parts of Kenya. The high rate of population growth has resulted in an increasing proportion of children (0-14 years) which has important implications for the demand for and supply of primary education in the city. It is becoming extremely difficult for the City Education authorities to satisfy the increasing demand for primary education, given the limited available resources in terms of funds and space (land) especially in the high density Eastland region where the bulk of the population live.

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Table 2.14 Age Sex Distribution in Nairobi, 1962-1979

Age Group	1962 Males Percent of Total	1962 Females percent of Total	1962 Sex ratio	1969 Males percent of Total	1969 Females percent of Total	1969 Sex ratio	1979 Males percent of Total	1979 Females percent of Total	1979 Sex ratio
0-4	11.2	23.0	99.0	12.9	18.5	102.4	12.9	18.8	93.0
5-9	7.0	13.6	104.3	9.6	14.3	99.6	8.9	11.2	104.6
10-14	4.6	6.7	140.4	6.6	10.1	93.7	6.8	12.1	75.8
15-19	6.4	10.4	126.6	8.1	12.1	98.6	11.8	14.4	111.14
20-24	13.2	15.9	169.2	14.6	13.8	155.1	15.2	13.6	151.3
25-29	16.1	13.6	241.4	12.6	10.1	181.9	13.2	9.9	180.0
30-39	21.5	10.3	436.4	18.7	10.9	252.3	16.7	10.5	218.8
40-49	12.1	3.7	670.4	10.1	5.2	285.4	9.0	4.2	288.8
50-59	4.7	1.3	843.3	4.4	2.6	246.6	3.8	2.0	264.6
60+	2.0	0.6	505.0	2.4	2.1	166.9	1.8	1.4	142.3
Age not Stated	1.1	0.9	-	0.1	0.3	-	0.2	0.2	-
Total	100.0	100.0	187	100.0	100.0	147	100.0	100.0	116

Source: Adapted from, Kenya, Republic of, 1962,1969,1979 Census Data, Ministry of Finance and Community Affairs.

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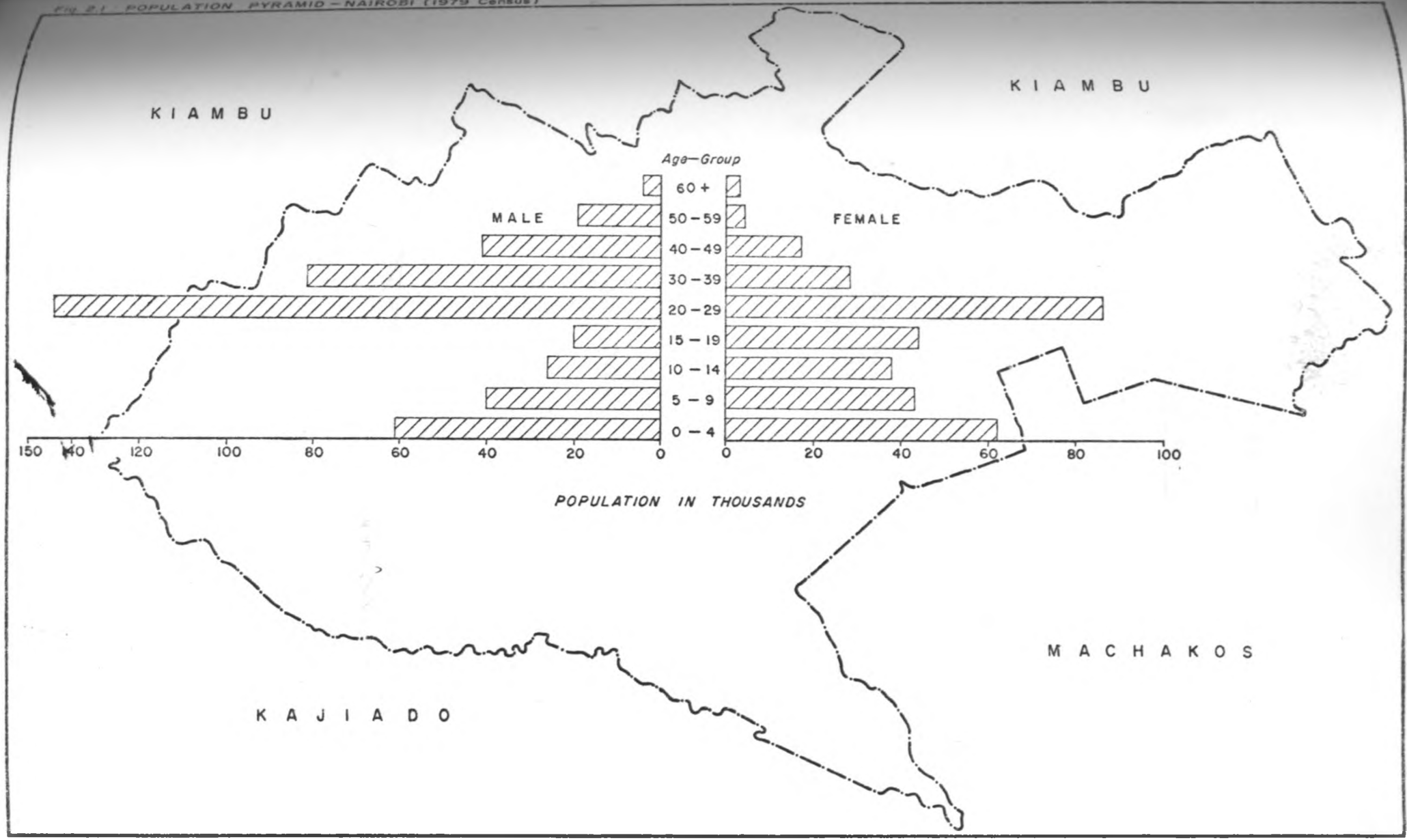
Fig. 2.1 : POPULATION PYRAMID – NAIROBI (1979 Census)
KIAMBU
KIAMBU
Age–Group
MALE
FEMALE
60 +
50 – 59
40 – 49
30 – 39
20 – 29
15 – 19
10 – 14
5 – 9
0 – 4
150 140 120 100 80 60 40 20 0
0 20 40 60 80 100
POPULATION IN THOUSANDS
KAJIADO
MACHAKOS

Fig. 1.2

Footnotes

1. Computed from the Formula $\frac{P_2}{P_1} = e^{rn}$

2. United Nations Department of Economic and Socia Affairs - Trends and Prospects in the Populations of Urban Agglomeration, 1950-2000; As Assessed in 1973-1975.

3. See Henin R.A, and Mott, F., (1979) - Recent Demographic Trends in Kenya and their implications for Social Development, Table 10, Page 15, Population Studies and Research Institute, University of Nairobi.

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CHAPTER 3

DEMAND FOR AND SUPPLY OF PRIMARY EDUCATION IN NAIROBI

The high rate of population growth in Nairobi resulting from the combined effect of natural increase and net in-migration from the rural areas has led to management problems in the city the most important of which include, acute housing shortage; unemployment; water shortage during the dry season; traffic congestion and pressure on health and educational facilities. These problems have had their impact most felt by the City Council of Nairobi which is responsible for most of the public amenities.

Considerable strain has particularly occurred in the primary education level which is directly affected by the demographic factors, notably, the changing size and age structure of the population, resulting from declining infant and childhood mortality in the face of increased births from migrants of reproductive age groups. All these demographic factors have had a profound effect on the size of the school-age population, and consequently despite efforts by the city education authorities to increase educational facilities,

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enrolment ratios have more or less stagnated.

3.1 School-age Versus School-going Population in Nairobi

There has been a considerable increase in the school-age population (6-12 years) over the last one and half decades. The 1962 census returned a total school-age population of 71,180 in Nairobi which increased to 78,710 and 110,565[1] in 1969 and 1979 respectively. This represents a rise of more than 55 per cent in less than two decades and an average annual growth rate of 2.5 per cent. The enormous increases in the school-age population are an obstacle to expansion in coverage (enrolment ratio) as analysis of this will reveal.

Analysis of the enrolment patterns has been based on projections made by the Ministry of Finance and Planning (Republic of Kenya, Kenya Statistical Digest, Volume X, No.3, 1972), since these are very close to the census estimates and are on an annual basis, unlike the census figures which are on a decennial interval. Despite the greater concentration of educational facilities in the city relative to other areas in Kenya,

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enrolment ratios are much lower than anticipated. The average enrolment ratio for Nairobi is .86 which is the same as that for Kenya in 1977. (See Table 3.1). This is probably due to the fact that many of the children whose parents were enumerated as resident in Nairobi during the 1969 census (on which the projections were based) live with their mothers and attend school in the rural communities. This is particularly the case among those in the low income groups who find it difficult to secure a place in the city schools, as gathered from observation and interviews with some of the parents. The higher cost of living coupled with the cost of fees may also place schooling beyond the reach of the poorest segment of the urban population. This is reflected in the rise in enrolment ratio to 92 per cent in 1974, when primary education for the first four years of schooling was made free in Kenya. The significant rise in the number of pupils enrolled, and consequently, in enrolment ratio may be due to the return of pupils who had previously dropped out of school and many more older children entering standard I, as is evidence from statistics on enrolment by age. However, population increase has played a more significant role in keeping the

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Table 3.1 Primary School Enrolment in Nairobi, 1971-1980

Year	Projected School-age population (6-12 years)[a]	Annual Percentage Change from one year to the next[c]	Total Number of pupils Enrolled[b]	Enrolment Ratio (Percent)[c]
1971	81000	4.9	57523	83
1972	85000	4.9	71786	84
1973	88000	3.5	76375	87
1974	91000	3.4	83435	92
1975	94000	3.3	83383	89
1976	98000	4.3	84739	86
1977	102000	4.1	86342	85
1978	106000	3.9	91540	86
1979	110000	3.8	94202	86
1980	115000	4.5	97984	85

Source: Republic of Kenya,

a -Kenya Statistical Digest, Volume X No.3, Table 6, PP. 5; Ministry of Finance and Planning.

b- Ministry of Education, Annual Reports 1971-1980

c- Computed.

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enrolment ratio low. While there has been a significant increase (70 per cent) in the total number of pupils enrolled in the city schools in the decade 1971-1980, enrolment ratios have remained more or less constant at 86 per cent. This is because of the counteracting influence of enormous annual increases in school-age population, and in part due to absorption of pupils transferred abruptly from other districts (See Appendix 3.1). The influence of the demographic factors on enrolment ratio is clearly manifested by the fact that even after free primary education was extended to standards V-VII in 1978-1980 enrolment ratios remained at 85-86 per cent.

It should be pointed out, however, that the enrolment ratios given (Table 3.1) are over-estimated and may be different from the real situation since a significant proportion (13 per cent) of the school-going population are 13 years and above (See Table 3.2).

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Table 3.2 Pupil Enrolment in Nairobi by Class and Age, 1978

Age (Years)	CLASS							Total Percent
	Std I Percent	Std II Percent	Std III Percent	Std IV Percent	Std V Percent	Std VI Percent	Std VII Percent	
5	5.7	-	-	-	-	-	-	1.0
6	59.7	5.8	-	-	-	-	-	11.6
7	26.9	52.2	8.5	-	-	-	-	15.3
8	6.2	29.8	45.7	6.6	-	-	-	14.9
9	1.0	9.4	30.5	40.0	7.5	-	-	14.5
10	0.2	2.1	11.5	32.5	33.8	6.3	0.3	13.9
11	0.05	0.3	2.8	13.7	30.2	28.9	7.1	12.7
12	0.05	0.2	0.6	5.3	18.4	32.1	28.9	1.3
13	0.1	0.1	0.3	1.5	7.2	21.2	32.9	8.7
14 & over	0.07	0.07	0.08	0.5	2.9	11.5	30.8	6.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	14,663	14,486	13,529	13,476	12,966	12,196	10,224	82,540

Source: Computed from: Republic of Kenya, Ministry of Education Annual Report, 1978 (unpublished)

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Although the assumed age of entry in standard I in Kenya is six years, only 60 per cent of the pupils enrolled in that class in Nairobi were of this age in 1978, the rest were either under or over age. Similarly only 29 per cent of the total number of standard VII enrollees were 12 years, the age regarded as eligible for the class, while 64 per cent were 13 years and above.

From the data on the age pattern of school attendance (Table 3.2) analysis will be made of the relative amount of progress in school grade advancement using scholastic retardation and acceleration rates (See chapter 1 for definition of these terms).

Table 3.3 Scholastic Retardation and Acceleration Rates, By Grade for Nairobi Primary School Enrolment, 1978

Class	Scholastic Retardation Rate	Scholastic Acceleration Rate
I	7.8	5.7
II	12.2	5.8
III	15.2	8.5
IV	20.9	6.6
V	28.5	7.5
VI	32.7	6.3
VII	30.8	7.4

Note: This table is computed from Table 3.2 using the formula explained in Appendix 3.2 .

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The Scholastic retardation rate is significantly larger than the corresponding acceleration rate at each grade. The former rate increases with higher grades, reaching a maximum at standard VI, and slightly declining at standard VII. The high rate of retardation is an indication of great wastage in the form of repetition (See Table 3.4). It should also be noted that the rate could even be higher considering the influence of grade attrition. Overall, the estimated grade progression ratio is .77[2] (See Table 3.5 a and b). This indicates that there is also wastage in the form of drop-outs who in turn lower the actual retardation rate.

The loss of pupils who leave primary school before completing the prescribed course of seven years and undue retardation by some others is wastage in terms of both expenditure and limiting the chances of new entrants. In 1980, the total expenditure on city council educational facilities was estimated at K£5,862,373[3] leading to an average of K£65 (KShs. 1,300) per pupil in that year. If a pupil is allowed to repeat, double the amount is spent on him in the same grade where he takes up a place which would have been allocated to a new entrant. This sort of wastage cannot be afforded in a developing country like Kenya where resources are limited and

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Table 3.4 Proportion of Repeaters (Percentage) By Class in Nairobi, 1971-1979

Year	Class						
	Std I	Std II	Std III	Std IV	Std V	Std VI	Std VII
1971	1.4	2.5	3.6	4.3	4.6	6.8	10.2
1972	1.4	2.4	3.6	3.9	4.4	6.6	10.1
1973	1.6	2.3	3.5	3.9	4.3	6.1	11.0
1974	1.9	3.6	5.2	6.0	6.0	9.3	8.7
1975	3.1	3.8	5.7	6.6	5.8	9.2	8.3
1976	3.6	4.9	6.0	6.3	6.7	8.1	9.0
1977	2.8	4.1	5.0	6.1	6.7	8.4	4.5
1978	3.0	4.2	5.7	7.2	7.3	9.8	8.3
1979	2.6	4.0	5.3	6.1	6.9	10.3	8.7

Source: Adapted from:

Kenya, Republic of, Annual Reports 1971-1978 Ministry of Education, Nairobi: Government Printers

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Table 3.5a Primary School Enrolment in Nairobi, by Class, 1971-1980

Year	CLASS						
	Std I	Std II	Std III	Std IV	Std V	Std VI	Std VII
1971	11,849	11164	10817	9885	8517	8107	7184
1972	12,964	11670	11127	10385	9482	8559	7598
1973	13,277	13021	11756	11118	10058	9439	7706
1974	14,814	13487	13306	11695	10941	10462	8730
1975	13,743	14125	13022	12452	10816	10550	8675
1976	13,645	13399	13580	12426	11730	10171	9788
1977	14,271	13458	13385	13153	12048	11326	8701
1978	14,663	14486	13529	1376	12966	12196	10224
1979	15,825	14373	14081	13297	12962	12958	10705
1980	16,712	15427	14412	13988	13157	13112	11176

Source: Kenya, Republic of, Annual Reports 1971-1980.

Ministry of Education, Nairobi

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Table 3.5b Computed Grade Progression Ratios

Year	Initial Cohort Enrolled in Std I X	Number Completing Std VII after 7 years Y	Grade Progression Ratio* $\frac{Y}{X}$
1971	11849	8,701	.73
1972	12964	10,224	.79
1973	13277	10,705	.81
1974	14814	11,176	.75

*The ratios may be over-estimated because of new entrants in the middle grades. This table is computed from Table 3.5a.

particularly in the city of Nairobi where revenue sources are limited and the number of applicants for primary education far exceeds the enrollees. In 1980 there were 19,709 applications received for 1981 standard I intake in Nairobi City Council schools; of this only 16,657[4] (84 per cent) were admitted. This underlines the problem of unsatisfied demand for the city primary education, which is also manifested by a common phrase "no vacancy in any class", in almost all

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the city primary schools visited. The City Council may therefore find it difficult to achieve its goal of having complete coverage between 1980-1983, particularly in the prevailing conditions of a rapidly expanding population; free primary education and therefore limited revenue sources; and limited space in a rapidly expanding city where the land is required for other competing, more economically satisfying land uses.

3.2 School-Life Table

The school life tables are very important as a means of estimating school life expectancy for the total and the enrolled population, since they combine both the effects of mortality and drop-outs on school attendance patterns[5]. The school life tables shown below illustrate the age pattern of primary school attendance in a form that permits the study of the relation of age to school enrollment and of school life expectancy. The life table values are shown for ages 5-14 the age range during which primary

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Table 3.6 Table of School-Life for the Total Male Primary School-age Population of Nairobi, 1979

Age Group (Years)	Of 1,000 Born Alive Stationary Population in Age Interval[a]	Of 1,000 Born Alive Number living at Beginning of Age interval[a]	Percent of Population enrolled in School[b]	Of 1,000 Born Alive number living in year of Age in the School Population[c]	Total Number of School Years remaining to All persons enrolled in School at each Age interval[c]	Average Number of School Years remaining to persons Alive at exact Age "x"[c]
	nLx	lx	Sx	Lsx	Tsx	esx
5-9	4250.0	863	.56515	2402	5577	6.462
10-14	4162.5	837	.76284	3175	3175	3.793

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Table 3.7 School-Life Table for the Female Primary School-Age Population of Nairobi in 1979

Age	Of 1,000 Born Alive: Stationary Population in Age interval[a]	Of 1,000 Born Alive: Number living at Beginning of Age Interval[a]	Per cent of population enrolled in School[b]	Of 1,000 Born Alive, number Living in year of Age in the School Population[c]	Total Number of School years remaining to all persons Enrolled in School at each Age Interval[c]	Average Number of School years remaining to persons Alive at exact Age "x" c
	nLx	lx	Sx	Lsx	Tsx	esx
5-9	4402.5	891	.52838	2326	4816	5.405
10-14	4330.0	870	.57513	2490	2490	2.862

Key for Tables 4.6 and 4.7

Source: a: Republic of Kenya, Kenya Population Census, 1969, Volume IV, Table 5.16, PP.56. Ministry of Economic Planning and Development, Nairobi.

b: Computed from: Republic of Kenya, Ministry of Education Annual Report, 1979, and 1979 Census data.

c: Computed from the other Life table columns.

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school attendance in Nairobi is presumed to take place (See Table 3.2 for enrolment by age).

On the basis of the table estimates, life expectancy at school for both age groups is much higher among males than females. This may be due to the tendency among girls to drop out of school before completing standard seven, and complete non-attendance of school by many of them, probably in preference of early marriage. Life expectancy at school for both sexes is lower than the expected seven years, at exact age 5, an indication of wastage both in terms of non-attendance of school and drop-outs. The fact that there are many drop-outs is even emphasized when comparison is made of life expectancy in the age group 10-14 for all persons alive and for those enrolled. The two values are 3.793 and 1.138 respectively, for males, indicating that there are many school drop-outs.

Analysis was confined to the abridged life table for which stationary population estimates are available. This may have limited detailed analysis of life expectancy at school by single years of age, and therefore a wider span of comparison. However, the abridged life table is as good as the entire life table in terms of accuracy.

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3.3 Projected School Population

Projections of the school-age population and expected enrollees at a future period are very important for purposes of planning and formulating educational policies and programmes. Especially this is so for planning adequate numbers of schools, classrooms, teachers and teaching materials. Since almost all children in the appropriate ages for primary school attendance should be attending school, projections have been made of the expected school-age population in 1989 in relation to the expected enrollees.

The estimated primary school-age population in 1989, using the Hamilton Perry Procedure (See Appendix 3.3 for formula and computations) was 193,662. This is much higher than that estimated by Henin (1979) at 166,000, probably because he based his estimates on 1969 census while the author based her projections on 1979 census (provisional) where fertility is higher and childhood mortality lower, thus resulting in an

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increase in the young population. The expected school going population is projected using the "enrolment ratio" method[6] which assumes constant enrolment ratios, based on past observations. The assumed enrolment ratio in 1989 is .86, therefore the expected school-going population will be .86x193,662= 166,549. This is slightly less than double the numbers enrolled in 1980. This has important implications for the provision of schools, classrooms and teachers, particularly on the part of the City Council Education Department which caters for about 90 per cent of the total enrollees in the city primary education sector (See Table 3.8). Given that primary education is free in the City Council maintained public schools, it may not be very easy for the department to make for all the necessary provisions.

3.4 Educational Facilities in Nairobi

There exist three official categories of schools in the city, namely City Council Maintained Schools, City Council Assisted and Private Schools. The City Council Schools are the ones maintained through public funds by the City Education Department, whereas the Assisted Schools receive only partial support (60 per cent of teachers' salaries) from public funds. Private

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schools are entirely independent with no support from Public funds.

By the end of 1980, there were a total of 137 primary schools in Nairobi of which 128 were either City Council fully maintained or assisted. Of the total number of pupils enrolled in the City Primary Schools in the same year, only 2.5 per cent were in private schools (See Table 3.8).

The City Council Schools have been holding a very significant proportion (97 per cent) of total enrolment in Nairobi, hence analysis of the educational facilities being based mainly on the public schools.

Originally the public schools in the city were run on racial lines, whereby there existed three distinct school categories, "A", "B" and "C" for Africans, Asians and Europeans respectively. Category "C" schools were the best equiped both in terms of teacher qualifications and other school facilities such as more spacious classrooms and playing ground, teaching aids, and so on. Category "A" schools were the most ill-equiped and "B" fell mid-way between the two. Shortly before independence, the racial criterion for admission into the schools was abandoned in order to encourage multi-racial

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Table 3.8 Enrolment of Primary School Pupils in Nairobi, by Management Type, in 1974-80

Year	Maintained		Assisted		Private	
	Number Enrolled	Per cent of Total Enrolled	Number Enrolled	Per cent of Total Enrolled	Number Enrolled	Percent of Total Enrolled
1974	74,094	88.8	9,019	10.8	322	0.4
1975	73,549	88.2	8,114	9.7	1,720	2.1
1976	74,637	88.1	8,070	9.5	2,030	2.4
1977	76,335	88.4	7,650	8.9	2,357	2.7
1978	80,461	87.9	8,529	9.3	2,550	2.8
1979	87,903	93.3	4,067	4.3	2,232	2.4
1980	86,958	88.7	8,606	8.8	2,420	2.5

Source: Computed from: Republic of Kenya, Ministry of Education Annual Reports 1974-1980.

composition in different schools. But the criterion was on the basis of ability to pay since the "C" schools were the high cost ones, and only the well-to-do could afford them. Later on, the labels were removed and now the schools are classified according to geographical location in the city, although there are still distinct differences between the former category "C" schools and the others, as analysis of the teacher qualifications in

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a later section will reveal.

City Council schools are distributed according to the five divisions, namely Western, Northern, Eastern, Central and Southern divisions. These divisions, roughly coincide with the population concentration zones already discussed in Chapter I. Schools in the Western Division fall within the low density residential area; most of the Central Division Schools within the Central Business District (CBD), and a few in the medium density zone in Nairobi West. Northern division schools are mainly located in the medium density zone in the north, with a few such as Mathare Valley and St. Teresa's Boys and Girls', in the high density zone. Finally,the Eastern Division Schools fall within the closely settled high density zone in the Eastlands (See Figure I.1 and 3.1).

The expected situation then should be that the region with the highest population concentration should have the highest number of schools and total land acreage committed to them, with the most plausible assumption that the largest number of school-age population in the city resides in this area. Accordingly, the Nairobi Urban Study group recommends that primary

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schools should be within residential areas, and within walking distance of 250-300 metres, in relation to population densities.[7]

A glance at Figure 3.1 gives the impression that the high density population concentration zone in the Eastern Division of the City is very well served with primary schools at a very close range. However, analysis of land acreage committed to the schools reveals that most of the Eastern division and CBD schools have a very small land area per school (See Appendix 3.4). The reason is that many of these schools were established during the Colonial days, and were designed for much smaller numbers of pupils with no anticipation for increase in intake. But with the high annual population growth rates and consequently increases in the school-age population, the schools have been taking much larger numbers of pupils without expansion of the school area. Expansion of the school areas may be almost impossible given that there are other competing and equally important land-uses such as housing and for commercial purposes.

According to recommendations by The Nairobi Urban Study Group there should be a very strong positive correlation between the total land area in a school and

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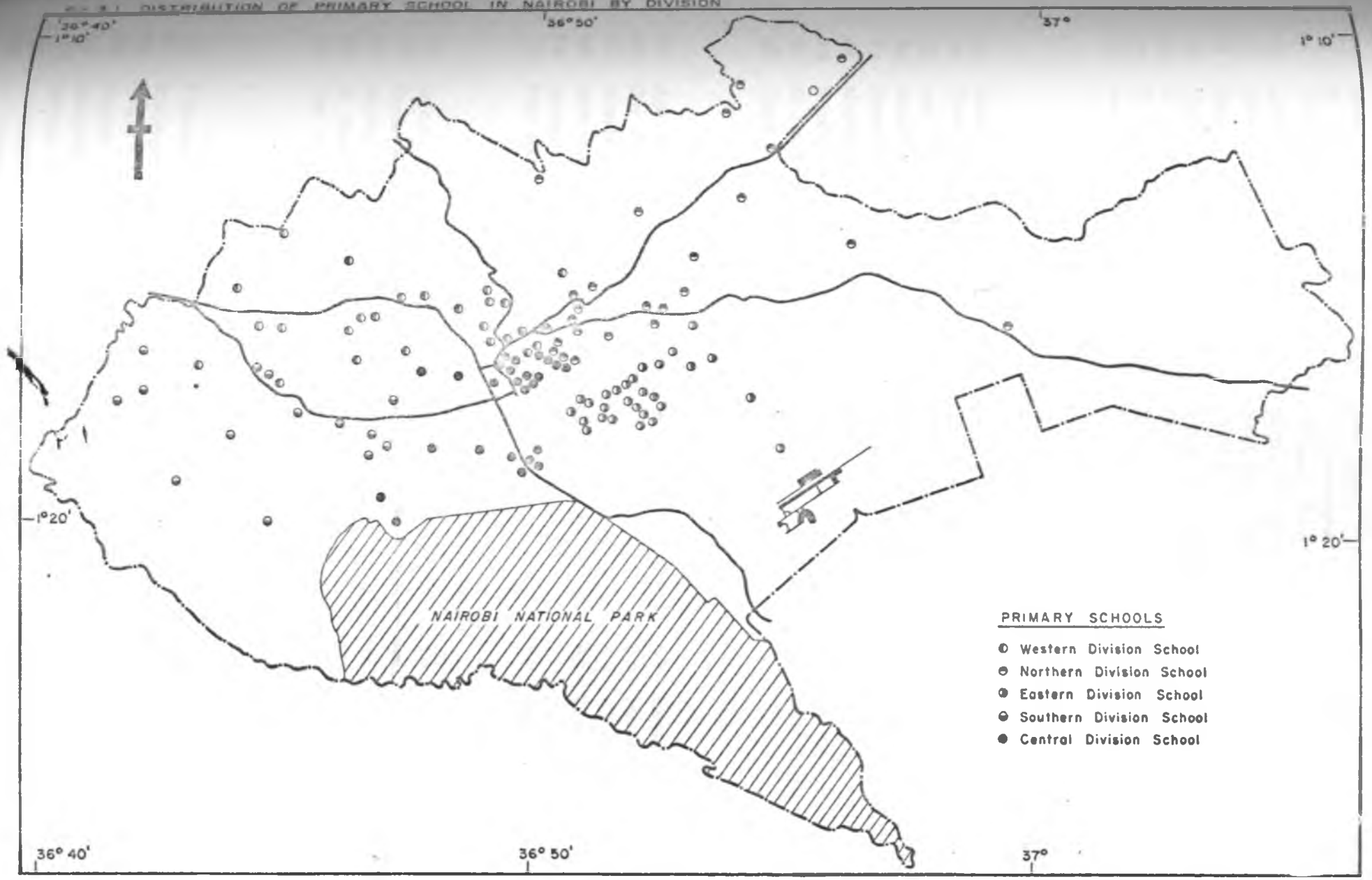
36°40'
1°10'
36°50'
37°
1°10'
1°20'
1°20'
NAIROBI NATIONAL PARK
PRIMARY SCHOOLS
Western Division School
Northern Division School
Eastern Division School
Southern Division School
Central Division School
36° 40'
36° 50'
37°

Fig. 3.1

LIST OF PRIMARY SCHOOLS BY DIVISION

E A S T E R N

1	Bahati Uhuru	2	Buru Buru	3	Canon Apolo
4	Dr. Krapf	5	Dr. Livingstone	6	Edelvale
7	Embakasi	8	Heshima Road	9	Harambee
10	Jogoo Road	11	Kariobangi South	12	Kimathi Estate
13	Makongeni	14	Makongeni West	15	Martin Luther
16	Marurani	17	Morrison	18	Nairobi
19	Ofafa Jericho	20	O.L.M Shauri Moyo	21	Rabai Road
22	St. Anne's	23	St. John's	24	St. Michael's
25	St. Patrick's	26	St. Paul's	27	Uhuru Estate
28	Umoja	29	Nile Road Special	30	Umoja II

N O R T H E R N

31	Ainsworth	32	Baba Dogo	33	Cheleta
34	Eastleigh Airport	35	Garden Estate	36	Githurai
37	Juja Road	38	Kahawa	39	Kamiti
40	Kariobangi North	41	Karura Forest	42	Kassarani
43	Kenyatta College	44	Mathari Old	45	Mathari Valley
46	Muthaiga	47	New Dandora	48	Pangani
49	Racecourse	50	St. Dominic's	51	St. Teresa's Boys
52	St. Teresa's Girls	53	Moi Academy	54	New Eastleigh
55	Thika Road	56	Huruma		

W E S T E R N

57	Aga Khan	58	Arya Girls	59	Bernard Estate
60	City Primary	61	Highridge	62	Hospital Hill
63	Kabete Vet. Lab.	64	Kangemi	65	Kihumbuini
66	Kileleshwa	67	Lavington	68	Lower Kabete
69	Muguga Green	70	Muslim Girls	71	Parklands
72	Park Road	73	Visa Oshwal	74	Westlands

S O U T H E R N

75	Gitiba	76	Jamhuri	77	Kagira
79	Kawangware	80	Kilimani	81	Mutuini
82	Ngong Forest	83	Riruta H.G.M.	84	Riruta Satellite
85	St. Mary's Karen	86	Toi	87	Dagoretti Special
88	New Kibera				

C E N T R A L

89	Catholic Parochial	90	C.G.H.U	91	Dr. Aggrey
92	Muranga Road	93	Moi Avenue	94	Islamia
95	Khalsa (Racecourse)	96	Kongoni	97	Langata Road
98	Langata West	99	Madaraka Estate	100	Mariakani
101	Mbagathi Road	102	Muslim	103	Nairobi Primary
104	Nairobi South	105	O.L.M (Nbi. South)	106	Pumwani
107	Riverbank	108	S.S.D	109	St. Brigid's
110	St. George's	111	St. Peter Clavers		

the total number of pupils in that school (Table 3.9), but this is not the case in Nairobi.

Table 3.9 Estimated land Requirement in Primary Schools

Number of streams	Number of classes and pupils per class	Total number of pupils	Land Needed (Acres) Block	Playing	Total
1	7x50	350	1.5	1.5	3
2	14x50	700	2.5	2.5	5
3	21x50	1050	3	4	7

Source: City Council of Nairobi, "Nairobi Urban Study Group Technical Paper No. 23, 1973.

Simple correlation analysis revealed that there is very insignificant relationship between the number of pupils per school and the land area committed to the school. A correlation coefficient of +0.10996 was obtained (See Appendix 3.5) and when this was subjected to the t-test, it appeared insignificant.

The reason for an insignificant correlation between the land acreage and the number of pupils per school is that schools farther away from the city centre, mostly in

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the Northern and Southern Divisions,have a very big land area per school, and since many of them are in the former Nairobi Peri-urban areas where the population densities are relatively low, the competition for school-places is not as high as that of schools near the city centre. The next better off schools in terms of land acreage in relation to pupil-density are the ones in the low density areas,such as Kileleshwa, Lavington, Hospital Hill and City Primary, all in the Western Division. The worst hit schools in terms of land shortage are mostly in the high density Eastern region and the CBD, where competition for land-use is very high. Schools such as Morrison, Heshima Road and Dr. Krapf in the high density Eastern zone have average land of less than five acres while Bohra Road,Khalsa Racecourse, C.G.H.U and Islamia have less than two acres. Many of these schools have three streams with an average number of 1050 pupils,where a minimum plot of 7 acres is considered adequate. These are schools already alluded to as being formerly designed for a much smaller school-population size. The pupils in these schools are therefore at a disadvantage since they may not have adequate playing ground, and may also be forced to learn

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in a smaller classroom area (high classroom density) or have sessions which shorten the number of class-hours per pupil, all of which may adversely affect their overall performance in school. Added to this, are also other disadvantages related to the location of these schools. Many of the CBD schools such as Khalsa Racecourse, adjacent to the Kenya Bus Station; St. Peter Claver's and Moi Avenue Primary Schools are disturbed by excessive noise from motor vehicles, music stores and clubs, all of which reduce pupil concentration on class work.

3.5 The Teachers

The qualifications of the teaching force in an educational system is taken as an important index of the quality of education provided. Both the initial level of education of the teaching staff and its professional qualifications are very important factors which contribute towards effectiveness in teaching and performance in examinations, which in part determine the upward mobility of individuals.

Generally the city of Nairobi is adequately provided with qualified teachers. In 1980 there was a total of 3008 teachers and an average pupil/teacher ratio of 32.5. Of the total number of teachers, 99

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Table 3.10 Distribution of Primary School Teachers by Grade in Nairobi, 1971-1980

Year	Total Number of Teachers	University Graduates Percent	Qualified					Other Percent	Unqualified Percent of Total
			S_1 Percent	P_1 Percent	P_2 Percent	P_3 Percent	P_4 Percent		
1971	1,993	1.8	7.3	26.1	23.9	30.8	2.0	2.5	5.7
1972	2,118	1.2	7.6	28.6	23.2	30.4	1.2	3.5	4.3
1973	2,245	1.4	10.7	28.6	27.1	25.3	1.0	2.0	3.8
1974	2,484	1.2	12.4	33.0	31.4	18.0	0.7	0.8	2.6
1975	2,540	1.1	13.7	35.3	33.5	13.5	0.4	0.8	1.6
1976	2,850	0.5	10.6	34.5	34.4	10.9	0.4	7.8	1.0
1877	2,935	0.3	12.9	36.7	32.0	9.5	0.2	6.8	1.5
1978	2,970	0.4	12.5	39.0	32.1	8.8	0.1	5.9	1.2
1979	2,883*	1.3	14.4	43.5	31.2	8.4	0.1	0.2	0.9
1980	3,008	1.5	12.3	44.9	31.5	8.3	0.1	0.1	1.0

*Likely to be an under-estimate since in the same year, the total number of teachers in City Council maintained and assisted schools only, was 2912[8].

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Source: Computed from: Republic of Kenya, Ministry of Education Annual Reports 1971-1980.

per cent were professionally qualified (See Table 3.10), as against 65 per cent for Kenya as a whole.

The total number of teaching staff has been increasing steadly in the decade 1971-1980. By end of 1980, the number of teachers in Nairobi, was one and half times what it was in 1971 (50 per cent increase). There have also been significant improvements in the teacher calibre. The proportion of high grade teachers, such as P_1 rose from 26 per cent in 1971 to 45 per cent in 1980, while low grades such as P_4 are almost being faced out.

Analysis of the quantitative and qualitative distribution of teachers by division, shows that the City Education Department has been very fair (See Tables 3.11 and 3.12). Eastern Division with the largest proportion of school-going population has also the highest percentage of teachers. Similarly, the teacher grades are more or less evenly distributed among the divisions, except the highest calibre (S_1) whose proportion is much higher in the Western Division. Western and Northern Divisions are slightly favoured with a higher proportion (over 66 per cent) of their teachers in the two grades, S_1 and P_1. However, it must be pointed out that the

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Table 3.11 Distribution of Teachers and Estimated number of pupils by Division in Nairobi, 1978

Name of The Division	Number of Teachers[a]	Percent of Total	Estimated School going Population* [b]	Percent of Total	Pupil/ Teacher Ratio (PTR)
Western	468	17.4	16,000	18.4	33.8
Northern	542	20.2	15,680	18.0	27.6
Eastern	704	26.2	23,440	26.9	34.4
Southern	409	15.2	12,680	14.6	31.0
Central	566	21.0	19,240	22.1	34.0
Total	2,689	100.0	87,040	100.0	32.3

*Estimated from the total number of streams and an assumed pupil/class ratio of 40.

Source: City Council of Nairobi, City Education Department

a: Staffing Section Annual Records, 1978

b: Annual Report of the City Education Department, 1978, PP. 46.

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Table 3.12 Percentage Distribution of Teacher Grades in Nairobi by Division, 1980

Teacher Grade	Division				
	Western	Eastern	Northern	Southern	Central
S_1	20.1	13.8	14.9	15.4	15.7
P_1	48.3	41.8	52.0	43.8	45.8
P_2	26.7	33.6	29.0	32.8	30.2
P_3	4.9	9.8	4.1	7.8	8.1
P_4	-	-	-	-	0.2
Other	0.2	1.3	-	-	-
Total	100.0	100.0	100.0	100.0	100.0

Source: Computed from: City Council of Nairobi, Staffing Section Records, 1980; City Education Department

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unit of analysis (Division) tends to shelter pronounced differences between individual schools.

In a stratified random sampling among the city schools, the following distribution of teacher qualifications were found:

Table 3.13 Percentage Distribution of Teacher Grades in Selected Schools in Nairobi, 1981

Name of the School	Former Category	Pupil/ Teacher Ratio	Teacher Grades				TOTAL
			S_1 Per cent	P_1 Per cent	P_2 Per cent	P_3 Per cent	
Muthaiga	C	29.1	54.5	45.5	-	-	100.0
Mathare Valley	A	32.7	9.1	45.5	30.3	6.1	91.0
Kibera	A		10.7	42.9	32.1	14.2	99.9
Kilimani	C	32.3	61.5	38.5	-	-	100.0
Jogoo Road	A	35.0	8.3	50.0	33.0	4.2	95.5
Morrison	A	40.0	18.8	25.0	31.3	25.0	100.0
Lavington	C		52.0	40.0	8.0	-	100.0
Ofafa Jericho	A	35.0	8.3	45.8	45.8	-	100.0
Nairobi Primary	C	32.9	46.4	53.5	-	-	100.0
Khalsa Racecourse	B	35.0	12.5	50.0	25.0	12.5	100.0
Aga Khan	B	32.9	17.6	67.6	14.7	-	100.0
Arya School	B	33.0	9.5	52.4	33.3	4.8	100.0

Note: The percents which do not add up to 100 are due to a shortfall of grades such as P_4 and U.T not considered here.

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The pattern of teacher distribution by professional qualification is clearly in favour of former "C" schools. S_1 teachers constitute an average of 54 per cent of the total number of teachers in each of the sampled category "C" schools. Three out of the four category C schools had only S_1 and P_1 teachers, and none of them had P_3 teachers. On the other hand, categories A and B schools had a small proportion of teachers professionally qualified as S_1 (8.3 - 17.6 per cent). Thus, although there is no longer racial classification and labels on schools, which mystify class differences, there still exist significant differences among schools, both in terms of teacher quality and other resources, with the former "C" schools continuing to be better off than "B" and "A". Given that most of the former category "A" schools are in the high density Eastern region of the City then this region is at a disadvantage.

Probably it may not be very easy for the City Education Department to unify all the educational facilities, since the "C" schools are just operating on what was properly established and developed in pre-independence days, while little else can be done for category "A" schools, given the limited resources, in the face of a bulging school-age population. Added to this is the fact that many of the former category "C"

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schools are high cost, and are expected to have better facilities if they have to continue attracting more pupils relative to the other schools. The implications of this on examination performance is tremendous, especially when it is realized that a pupil's achievement in the Certificate of Primary Education (C.P.E) examination mainly depends on the calibre of the teaching staff and the teaching materials available, among other factors such as socio-economic background and pre-primary school education.

3.6 Schools' Examination Performance

A school's quality is judged from its performance in Certificate of Primary Education (C.P.E.) examination which determines a pupil's entry into a good secondary school. Below is an analysis of the average performance of the schools from the three categories.

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Table 3.14 Mean Marks Attained in C.P.E. Subjects for Selected Schools in Nairobi, 1978

Name of the School	Former Category	C.P.E. Performance (Percentage)			
		English	Maths	G.P*	Average
Muthaiga	C	76.34	61.45	73.01	70.27
Mathare Valley	A	57.62	49.60	55.84	54.35
Kibera	A	53.51	48.47	50.99	50.99
Kilimani	C	85.27	62.34	69.25	72.29
Jogoo Road	A	54.90	45.99	55.76	50.88
Morrison	A	65.83	51.85	55.45	57.71
Lavington	C	77.84	64.69	71.50	71.34
Ofafa Jericho	A	63.33	55.42	56.56	58.44
Khalsa Race-course	B	69.42	56.75	59.23	61.8
Aga Khan	B	77.23	64.24	65.85	69.11
Arya School	B	75.61	64.80	63.95	68.12
Nairobi Primary	C	79.71	63.34	69.63	70.90

Source: City Council of Nairobi (1979), City Education Department, Annual Report, 1978, County Hall, Nairobi.

* G.P. = General Paper

The overall average marks attained in C.P.E were 54.47, 66.34 and 71.20, for categories "A", "B" and "C", schools respectively, indicating that the latter schools perform much better than the others, for reasons already alluded to. Given that this performance determines entry

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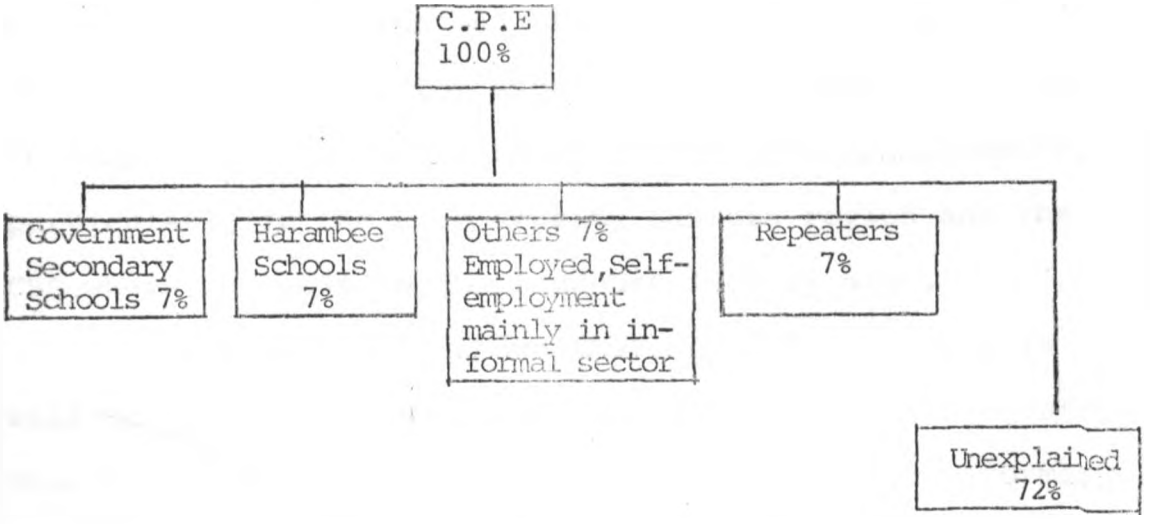
into secondary school, then, the pupils from former category C schools have a much better chance of joining secondary school after C.P.E. Whereas wastage in terms of retardation and drop-outs is not very high, the proportion who fail to obtain places in secondary school causes some concern and may be a much bigger wastage than explained here. Below is a summary of the disposition of children completing standard seven:

Figure 3.1 Outlets for C.P.E Graduates in Nairobi



Source: Kamari, R.N,
"Educational Facilities in Nairobi"
Nairobi City Council, Town Planning Section, 1979, PP. 14.

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What happens to 72 per cent of the C.P.E. graduates? Or is primary education merely for the purpose of obtaining literacy and numeracy? Answers to these questions are presented in Chapter 4. However, the percentage appears highly inflated since an average of 21 per cent was recorded in the period 1974-1977[9].

In summary, it has been indicated that Primary school enrolment in Nairobi falls short of the school-age population, and has remained more or less constant at .86 per cent. This is due to the bulging school-age population as a result of declining infant and childhood mortality, in-migration and rising fertility, in the face of limited resources for expansion. The land available to many schools falls short of the minimum requirements, particularly in the high density Eastern region and the CBD where competition for land-use is very high.

It has also been shown that, overall, Nairobi is well served with professionally qualified teaching staff. However, there is some discrimination against the former "A" schools and this seems to have an impact on C.P.E. examination performance. Finally it was found that there is significant wastage resulting from repetition, pupils who leave school before completing the prescribed course of seven years, and those who completedly drop-out of the educational system after C.P.E. The causes of such wastage are complex, ranging from the educational

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system itself, to home background and school environment.

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Footnotes

1. Republic of Kenya - Census Figures, 1962, 1969 and 1979.

2. Computed from the initial cohort who enrolled in Standard I in 1971, and those who completed Standard VII in 1977. But this is likely to be affected by new entrants in the middle classes for which information is not available.

3. City Council of Nairobi - City Education Department, Records on Expenditure, 1964-1980.

4. City Council of Nairobi - Education Committee Meeting of 19/11/80, Summary of Standard one Admissions in 1981.

5. Stockwell G.E. and Nam C.B. (1963) - Illustrative Tables of School Life, in Journal of The American Statistical Association, Vol. 58, American Statistical Association, Washington D.C., PP. 1113.

6. For a detailed illustration of the technique see Bangnee A.L. (1966), Estimating Future School Enrolment In Developing Countries, A Mannual of Methodology, United Nations/UNESCO.

7. Nairobi Urban Study Group (1963) - Technical Paper No. 23, Nairobi City Council, Town Planning Section.

8. City Council of Nairobi (1979) - Staffing Section Records, City Education Department.

9. See, Statistics on Form One enrolment, as a percentage of previous years' Standard seven enrolment - from: Republic of Kenya, Educational Trends, 1973-1977, Table 55, PP.80, Ministry of Economic Planning and Community Affairs, UNICEF, Nairobi.

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CHAPTER 4

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The primary objective of this concluding Chapter is to summarise the major findings of the study and spell out the implications of this to planning. First, a brief summary of the findings and conclusions of the research is given. Secondly policy recommendations regarding primary educational planning are outlined. Finally, suggestions of areas requiring further research given.

4.1 Summary and Conclusions

The primary objective of the research was to investigate the impact of demographic trends on the provision of primary education in Nairobi. The study therefore rotated around one major postulate that Nairobi has been experiencing fast population growth rates over the last two decades or more, and that this has had a negative impact on the provision of primary education in the city.

The research aimed at examining population trends in Nairobi, in terms of fertility; mortality; migration, growth rates and age-sex structure. Analysis was also

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made of the demand for, and supply of, primary education in terms of school-age versus school-going population; average land acreage available to different schools in relation to the school population; the size and distribution of teachers, plus their qualifications; school performance in Certificate of Primary Education Examination; and school grade advancement.

In trying to analyse the population dynamics of Nairobi, 1962, 1969 and 1979 census data were found very useful. Use was also made of the Kenya Fertility Survey and National Demographic Survey. It was found that Nairobi has been experiencing very rapid population growth rates averaging 7.3 per cent per annum in the period 1962-1979. Analysis of the demographic indices of fertility, mortality and migration revealed that all of them have in one way or another contributed to the high annual population growth rates in Nairobi.

Examination of fertility measures showed an upward trend. In the period 1962-1977, mean live births per woman aged 45-49 years rose by about 33 per cent from 3.61 to 6.15. Although the 1979 census provisional statistics show a decline of mean births per woman to 4.95, analysis of the age-sex structure revealed that the proportion of women in the reproductive age group

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15-49 has risen, thus leading to an increase in births (absolute numbers) which more than offset the decline in mean births per woman. In addition to the rise in fertility, mortality declined significantly in the period under consideration. Crude death rates and infant mortality rates are estimated to have declined from 11.7 and 69.0 respectively i 1967 9 to 3.8 and 44.9 in 1977. All these natural factors have acted together to reinforce population growth in the city.

Migration is another important factor which has contributed towards population increase in Nairobi. In 1962-1969 period, the intercensal average annual growth rate was 5.8 per cent, of which natural increase was 3.1 per cent and migration accounted for 2.7 per cent. Furthermore 1979 census provisional results showed that 75 per cent of the city's residents are migrants, mainly from rural Kenya. The continuing influx of rural migrants into the city has had an impact on its age structure. Nairobi's population is also becoming more youthful with an increasing proportion of children aged 0-14 years. In 1962, the proportion of this age group was 32.0 per cent, increasing to 36.0 and 40.2 per cent in 1969 and 1979 respectively. This is partly a consequence of an increasing proportion of children migrants and the dominance of reproductive

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age groups 15-49 in the migrant population (See Table 2.12), whose additional births broaden the base of the population pyramid.

Under the above demographic conditions, the youthful population has been increasing dramatically, thereby affecting the demand for primary education and the capacity of the society to supply the demand. A detailed examination of the primary school-age (6-12 years) versus school-going population revealed that it is becoming extremely difficult for the city education authorities to cope with the bulging numbers in this age group. In the period 1971-1979, the population in the age group 6-12 years, rose from 81,000 to 112,000, representing an increase of about 40 per cent in less than a decade. This tremendous increase in the school-age population has tended to retard enrolment ratio, despite significant increases in absolute numbers enrolled. In the decade 1971-1980, the total number of pupils enrolled in the city primary schools rose by about, 70 per cent whereas enrolment ratio remained more or less constant at 86 per cent.

Projections based on current rates of population growth indicate that there will be about 194,000 children aged 6-12 years in 1989. This represents an increase of

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about 70 per cent over the 1980 figure. From observed trends, enrolment in the same year is expected to almost double to about 167,000 pupils. This will necessitate almost doubling of the available teaching force, classrooms, books and other teaching equipment, all of which will mean increased expenditure on primary education in the city. But this will only be the case if there are sufficient public means to finance it. Already there are indications that the City Council, which caters for about 98 per cent of the primary school enrollees is finding it almost impossible to obsorb the growing number of entrants:-

> " A major crisis is looming in Nairobi's educational system . . . And unless an urgent start is made to build new primary schools, the enrolment of Standard one pupils in Nairobi could be seriously affected. The Council's slow start on constructing new schools is blamed on a shortage of funds". (Daily Nation, Monday, July 6, 1981).

Abolition of fees in primary schools has deprived the Council of a large sum of money which used to assist in financing education. The Council currently depends on loans from the Ministry of Local Government, floating

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of stocks, and harambee fundraising, all of which are very uncertain means. Added to this is the problem of limited space for expansion, in a fast growing city where land is required for other equally important purposes such as housing, administration and industry.

Correlation analysis revealed that there is no significant relationship between total land area allocated to schools and the school population. This is because schools close to the city centre and those in the high density Eastland region, formerly designed for a much smaller number of pupils have been taking additional numbers regardless of the available space (land acreage). On the other hand schools further away from the city centre, mainly in peri-urban Northern and Southern Divisions,have much bigger land areas in relation to the school population.

Examination of the teaching force revealed that generally, Nairobi is adequately provided with qualified teachers. In 1980, 99 per cent of the total number of teachers were professionally qualified, and there was an overall average pupil/teacher ratio of 32.5. But whether the same standard will continue in the prevailing circumstances of limitless increase in

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school-age population, faced with limited resources, is a question we cannot venture to answer at this juncture.

Analysis of the distribution of the teachers also indicated a fair distribution among the different divisions. But a closer look at the individual schools, on the basis of their former categories schowed some unfairness, in favour of former category "C" schools. On the basis of the sampled schools, former category "C" schools have almost 100 per cent of their teachers in the two top most primary teacher grades (S_1 and P_1) while categories "B" amd "A" have them almost evenly distributed in the middle grades. The implications of this is tremendous, given that the performance in Certificate of Primary Education Examination mainly depends on the calibre of the teaching staff.

Analysis of C.P.E. results revealed that the former "C" schools perform much better than the others. Their graduates, therefore, have better prospects for entering the limited secondary school places, thereby enhancing their chances of upward mobility both socially and economically. Of the total C.P.E. graduates in Nairobi, less than 10 per cent ever get Government Secondary school places.

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Examination of school-grade advancement showed that there is wastage through retardation and dropping out before completion of the prescribed 7-year course. A much bigger wastage was, however, seen in terms of those who drop out of the educational system completely after C.P.E. and do not engage in any productive work thereafter. These constitute 70 per cent. The causes of such wastage are, however, complex ranging from home background, through the school environment to the entire educational system.

Summarising problems and prospects of primary education in Nairobi, it has been noted that all efforts have been made towards satisfying a yearly growing demand for education. This demand will continue to increase during the next one or two decades. If the population increase does not slow down, no more than 86 per cent of the children aged 6-12 years in Nairobi will be enrolled in school by 1989. The proportion may even decline, given the problem of resource constraints in terms of space and funds. Much more could be achieved in terms of coverage if birth rates were to be reduced and effective measures taken to curb the influx of migrants. The future growth of school enrolment (ratio) will therefore be determined to a great extent by governmental policy regarding population

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increase, and the means of financing primary education in large municipalities such as Nairobi.

4.2 Recommendations to Policy Makers

The speed of urban change and its relative recency, have left national and local governments without consistent policies for dealing with the resulting problems. At the moment there is a growing awareness of urban problems, but a great uncertainty as to the best method of dealing with them. The policies adopted at their best, tend to solve one problem while creating or exacerbating several others. The above major findings as well as others cited in the analytical chapters have induced the author to hazard some worthwhile recommendations regarding population and the provision of primary education in the city of Nairobi. Such recommendations will of course not determine policy, but would help to eliminate wasteful measures, bringing into view a greater knowledge of the realities with which policies must deal.

Since primary education is a basic human right and a prerequisite for socio-economic

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development, it is necessary for the nation to ensure that all those in the appropriate ages have access to the necessary educational facilities. This can be done through expansion of the facilities in conjunction with a suitable population programme to ensure that the demand for the facilities does not outweigh the capacity of the society to supply.

More school places should be made available yearly to cater for the increasing school-age population. Short-term measures to ensure this would include, extension of the already existing schools, particularly in the low density zones (Northern and Southern Divisions) where there is relatively ample space for expansion. In addition, the recommendation by Nairobi Urban Study Group of having 50 pupils per class should be taken seriously in order to increase intake in each class. Double-day shift system, particularly in the lower classes, would ensure maximum utilisation of the available facilities and constitute an indirect saving on capital expenditure. In order to avoid lowering the standard, as a result of shorter periods per class, the terms can then be extended to cover a longer period, say five months instead of three.

In order to plan for primary education in a rapidly growing city like Nairobi, it is also important to make

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long-term forecasts concerning the school-age population so that the required facilities in terms of land, classrooms, teachers and teaching materials can be prepared well in advance. It is therefore necessary to make projections of the population, based on the prevailing demographic situation. Such projections should incorporate alternative population trends in order to allow for variations. Plans can then be made for the required educational facilities and the costs calculated in advance to see the available means of raising the funds. New schools should be designed to cater for a minimum of 3 stream large classes (50 pupils per class) and allowance made for future expansion since it is much easier to extend the existing facilities than start on new ones.

If the aim is to have a complete coverage, then all the calculations should be based on the total number of the expected school-age population. Other factors to be taken into account include, percentage of children above the age regarded as normal for primary school; drop-outs; repeaters; late entries (due to transfers) and so on.

Finally, the government should shoulder part of the responsibility of financing primary education in large municipalities like Nairobi, instead of leaving it entirely to local authorities.

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However, although universal primary education is necessary for accelerating several aspects of socio-economic development, there are other sectors of the economy which equally need immediate attention, so that limitless proportions of the nation's resources cannot be continuously allowed to be absorbed by the education sector. Also, expansion of the schools in the city should be consistent with that in the rural areas in order to discourage rural-urban drift. In addition, too much attention to the quantitative element might lead to a situation where the quality of education is neglected. It is therefore important that limitless increase in school-age population is regarded as a serious problem and programmes and policies designed to curb the factors contributing to the increase. Particular attention should be paid to high fertility and in -migration into the city so that effective measures are taken to divert the trend. Such include, population education and economic measures to redress the great disparities within the nation.

Although the Kenya Government highly supports Family Planning Services, many people have a misconception of what it involves. It is therefore necessary to improve knowledge of the entire population on both

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population and family planning methods. There should be a major campaign to draw the attention of the public to the seriousness of high population growth rates, for instance, by incorporating population education into the school curriculum and through mass media. There should also be policies designed to encourage changes in marriage patterns, such as raising the legal minimum age of marriage and ensuring that it is adhered to.

It may be accepted that migration is to a large extent economically motivated. All efforts should therefore be made to redress the great disparities between the major urban areas and rural areas, and growth poles established in source areas so as to stem the migration streams.

If the above measures are taken then the expected goal of having complete coverage in primary education might be eventually achieved. It should be noted that measures regarding population increase will take quite some time before they come into effect. But their effects will also be reflected in other sectors of the economy, such as employment, housing, health, investment, production and income.

Inputs to education should not just be regarded as a form of consumption but also as providing direct economic benefits. There should be a curriculum reform to

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make the school's work more relevant to the country's needs, and a terminal form of education for the majority of the pupils. The proposed nine-year primary education program should therefore be re-considered seriously and plans made to concentrate on teaching skills such as carpentry, masonry, home economics, metal work, and so on, during the additonal two years, so that the primary school graduates are self-equipped.

If the city council is to base pupil intake on school catchment areas, there should be frequent counts of school-age population in different areas within the city,so that planned expansion goes along with this, and efforts made to ensure that there is correlation between pupil-intake and the available educational facilities.

Finally, it is recognized that equal educational opportunity is not an easily obtainable goal,but all efforts should be made to ensure that there is a fair distribution of all the educational facilities in the public schools thus redressing the disparities established in the city schools by colonialists.

It should be noted that in dealing with the problems of the city primary education sector, an accurate grasp of the current conditions as well as a comprehensive knowledge of the patterns of change and the conditions responsible for the change is necessary for the adoption

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of effective measures. Therefore research and evaluation of policy issues may help planners allocate scarce resources more effectively.

4.3 Recommendations For Further Research

From the research it was found that there is significant wastage through high repetition and drop-out rates. There is need for studies to determine why pupils leave school before completing the prescribed seven-years' course and why large numbers repeat.

There is also need for research on methods for integrating demographic analysis with educational planning, at least at the local level.

Further, investigation into the possible effects of educational decisions such as abolition of fees, and modification of the curriculum content, on population growth is required.

Finally, there is need to investigate the relative importance of population growth in increasing educational costs. The above list is far from being exhaustive. It is likely that other fields requiring research may arise from this study.

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APPENDICES

Appendix 1.1

RODAH AWINJA MASAVIRU
POPULATION STUDIES AND
RESEARCH INSTITUTE
UNIVERSITY OF NAIROBI
P.O. BOX 30197
NAIROBI.

TO THE HEAD
---------- SCHOOL
P.O. BOX ----------

Dear Sir/Madam,

Re: FILLING IN THE QUESTIONNAIRE

I am a student at the above-named institution carrying out research for my Master of Arts (M.A) thesis. I kindly request you to fill in the enclosed questionnaire. I will be collecting it on or before 28/1/81. This will aid me in my analysis of provisions of educational facilities in Nairobi Extra-Provincial District.

This research is purely an academic undertaking and will therefore be treated with great privacy and confidentiality.

I would greatly appreciate your prompt co-operation.

Yours faithfully,

Rodah A. Masaviru

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I IDENTIFICATION

Appendix 1.1

1. NAME OF THE SCHOOL _____ 2. DIVISION IN WHICH IT IS SITUATED _____

3. FORMER CATEGORY _____

II PUPIL ENROLMENT

YEAR IN WHICH EACH CLASS WAS ESTABLISHED e.g. I: 1960		NUMBER OF STREAMS AND TOTAL NUMBER OF PUPILS IN EACH CLASS			SEX RATIO: GIVE THE NOS. OF EACH SEX IN EACH CLASS			AGE CHARACTERISTICS (SAY THE APPOXIMATE AGE OF PUPILS IN CLASS)		ENROLMENT VERSUS APPLICATION IN STANDARD 'I' EACH YEAR			DROPOUTS AND REPEATERS (APPROXIMATE THE AVERAGE OF REPEATERS AND DROPOUTS EACH YEAR)		
CLASS	YEAR	CLASS	STREAM	TOTAL	CLASS	M*	F**	CLASS	AGE	YEAR	APPLICANTS	NO. ENROLLED	CLASS	DROPOUTS	REPEATERS
I		I			I			I					I		
II		II			II			II					II		
III		III			III			III					III		
IV		IV			IV			IV					IV		
V		V			V			V					V		
VI		VI			VI			VI					VI		
VII		VII			VII			VII					VII		

M* - MALE F** - FEMALE

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SCHOOL EQUIPMENT AND FACILITIES

Appendix 1.1 (cont)

TOTAL NUMBER OF CLASS ROOMS	AVERAGE SIZE OF EACH CLASS-ROOM	WHICH OF THE FOLLOWING EQUIPMENT DOES THE SCHOOL HAVE? (TICK & SPECIFY THE NUMBER AND WHICH CLASSES USE THEM)			AVERAGE DISTRIBUTION OF TEXT BOOKS E.G. STD. I, I PER DESK		ARE THE FACILITIES ADEQUATE YES OR NO)	WHO PROVIDES THE FACILITIES: E.G. KENYA SCHOOL EQUIPMENT, THE COMMUNITY HARAMBEE, CITY COUNCIL, ETC.
			NO.	CLASS USING	CLASS	TEXTBOOKS		
		Maps			I			
		Charts			II			
		Blackboards			III			
		Radio Sets			IV			
		Television set ..			V			
		Clocks			VI			
		Adding Machines .			VII			
		Duplication machines						
		Projectors						
		Sewing Machines .						
		Badminton Rackets						
		ANY OTHER						

TEACHER CHARACTERISTICS

Appendix 1.1 (cont)

NAME OF THE TEACHER	SEX	AGE	GRADE (E.G.P_1)	YEAR OF ENTRY	CLASSES TAUGHT	TEACHER TRANSFER	REASONS FOR TRANSFER (YEAR TERM)	REPLACEMENT - YES/NO GRADE AND WHEN (E.G. S_1, 3RD TERM 1980)

SCHOOL PERFORMANCE IN C.P.E. EXAMINATION Appendix 1.1 (cont)

GRADES ATTAINED - (Write the total number of pupils who attained each grade each year in each subject)

M = MATHS; E = ENGLISH; G.P = GENERAL PAPER

YEAR OF EXAMINATION	TOTAL NUMBER OF PUPILS WHO SAT	"A"			"B"			"C"			"D"			"E"			"FAIL"		
		M	E	G.P	M	E	G.P	M	E	G.P	M	E	G.P	M	E	G.P	M	E	G.P

EXTRA - CURRICULA ACTIVITIES Appendix 1.1(cont)

GAME (SPECIFY THE TYPE OF GAMES AND WHEN SUCH GAMES ARE PLAYED)

GAME/SPORT	LEVEL REACHED (e.g DISTRICT LEVEL	YEAR	PRIZES WON	OTHERS (SPECIFY)

HARAMBEE FUND-RAISING ACTIVITIES AND OTHER WAYS OF RAISING MONEY FOR THE SCHOOL - (SPECIFY WHEN THE ACTIVITY TOOK PLACE AND APPROXIMATELY HOW MUCH MONEY WAS RAISED AND FOR WHAT PURPOSE

YEAR AND MONTHS E.G. JAN. 1981	GUES OF HONOUR E.G. MAYOR OF NAIROBI	FUNDS RAISED E.G. 150,000/-	PURPOSE E.G. MORE CLASSES	PLANNED HARAMBEE E.G. 1980

IMPACT OF THE SCHOOL ON THE COMMUNITY Appendix 1.1(cont)

INSPECTORS (Specify the dates when the Inspector was there	PARENTS	OTHER VISITORS

Appendix 2.1

Computation of Early Childhood Mortality for Nairobi, 1962, Using the Sullivan Equation

$$ {}_{X}q_{o} = (1-S_i/P_i) \quad [A+B\ (P_2/P_3)] $$

Where: P_i is the number of children ever born

${}_{X}q_{o}$ is the probability of dying between birth and exact age X

S_i is the number of children surviving and

A and B are regression coefficients based on Coale-Demony model life tables.

	(1) Age Group	(2) P_i	(3) Proportion Surviving	(4) S_i (2) x (3)
1.	15-19	.542	.933	.505
2	20-24	1.542	.886	1.366
3.	25-29	2.833	.840	2.379
4.	30-34	3.664	.854	3.129
5.	35-39	4.089	.802	3.279
6.	40-44	3.947	.780	3.078
7.	45-49	3.613	.822	2.969

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Appendix 2.1 (Cont)

Assumed Mortality Pattern = West

(i) $_2q_o$ = (1 - 1.366/1.542) [1.30+-0.54(1.542/2.833)]

= (1 - .88586) [1.30-0.54(.54429)]

= (.11414) [1.30- .29391]

= (.11414) [1.00609]

= .11483

(ii) $_3q_o$ = (1-2.379/2.833) [1.17+-0.40(1.542/2.833)]

= (1-.83974) [1.17+-0.40(.54429)]

= (.16026) [.8929]

= .14309

(iii) $_5q_o$ = (1-3.129/3.644) [1.13-.33(1.542/2.833)]

= (1-.85398) [1.13-.33(.54429)]

= (.14602) [1.13-.17961]

= (.14602) [.95039]

= .13877

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Appendix 2.1 (cont)

Computation of Early Childhood Mortality for Nairobi, 1969, Using Sullivan Technique

(1) Age Group	(2) P_i	(3) Proportion Surviving	(4) S_i (2)x(3)
15-19	.32	.931	.29792
20-24	1.51	.904	1.36504
25-29	3.05	.888	2.7084
30-34	4.00	.873	3.492
35-39	4.64	.854	3.96256
40-44	4.83	.836	4.03788
45-49	4.64	.825	3.825

(i) $_2q_o$ = (1-1.365/1.51) [1.30-.54(1.51/3.05)]

= (1-.90132) [1.30-.54(.49508)]

= (.090868) [1.30-.26734]

= (.09868) [1.03266]

= .1019

(ii) $_3q_o$ = (1-2.7084/3.05) [1.17-.040(1.51/3.05)]

= (1.888) [1.17-0.40 (.49508)]

= (.112) [1.17-.19803]

= (.112) [.97197]

= .10886

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Appendix 2.1 (Cont)

(iii) $5q_0$ = (1-3.492/4.00) [1.13-.33/3.05)]

= (1-.873) [1.13-.33(.49508)]

= (.127) [1.13-.66337]

= (.127) [.96663]

= .12276

Computation of Early Childhood Mortality For Nairobi in 1979, Using Sullivan Technique

(1) Age Group	(2) P_i	(3) Proportion Surviving	(4) S_i (2)x(3)
15-19	.29	.901	.261
20-24	1.37	.907	1.243
25-29	2.77	.907	2.512
30-34	4.00	.900	3.600
35-39	4.70	.883	4.150
40-44	4.92	.854	4.202
45-49	4.94	.839	4.145

(i) $2q_0$ = (1-1.243/1.37) [1.30+-0.54(1.37/2.77)]

= (1-.90729) [1.30+0.54(.49458)]

= (.09271) [1.30-.26707]

= (.09271) [1.03293]

= .095762

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Appendix 2.1 (cont)

(ii) $3q_o$ = (1-2.512/2.77) [1.17+-0.40(1.37/2.77)]

= (1-.90685) [1.17+-0.40(0.49458)]

= (.09315) [1.17-.19783)]

= (.09315) [.97217)]

= .090557

(iii) $5q_o$ = (1-3.600/4.00) [1.13-.33(.49458)]

= (1-.9) [1.13-.16321)]

= (.1) [.96679]

= .096679

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Appendix 3.1

Pupils transferred from other districts to Nairobi in 1978

District	Number of Pupils	Percent of Total
Kiambu	235	5.5
Kakamega	143	5.1
Muranga	115	3.3
Nakuru	111	3.3
Nyeri	106	3.3
Mombasa	99	2.1
Siaya	93	2.1
Kisumu	83	2.1
Machakos	77	1.9
South Nyanza	50	1.6
Kisii	49	1.6
Kajiado	49	1.6
Thika	32	1.3
Nyandarua	32	1.3
Kirinyaga	31	0.7
Kitui	29	0.7
Bungoma	24	0.7
Busia	24	0.3
Eldoret (Uasin Gishu)	20	0.3
Embu	19	0.3
Laikipia	19	0.2
Meru	11	0.2
Taita Taveta	10	0.1
Kilifi	10	0.1

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Appendix 3.1 (cont)

District	Number of Pupils	Percent of Total
Uasin Gishu	4	0.1
Lamu	4	0.1
Kericho	4	0.1
Kwale	3	0.1
Narok	3	0.1
Nandi	2	0.1
Isiolo	2	0.1
Garissa	2	0.1
Marsabit	2	0.1
Baringo	1	0.1
Wajir	1	0.1
Mandera	1	0.1
Total	1500	100.0

Source: City Council of Nairobi, Annual Report of the City Education Department, 1978 Page 40.

Appendix 3.2

Computation of Scholastic Retardation and Acceleration Rates for Grades 1-7 (from table 3.2)

Age Span	Grade
6-7	I
7-8	II
8-9	III
9-10	IV
10-11	V
11-12	VI
12-13	VII

(a) Scholastic Retardation Rate

$= \frac{E^r a}{Ea} \times 100$, Where $E^r a$ = Enrollees at grade a who are in ages above those regarded normal for this age.

Ea = All enrollees at grade a.

Scholastic Retardation Rates for:-

1. STD I $= \frac{153+24+8+7+19+10}{14663} \times 100$

$= \frac{1126 \times 100}{14663} = \underline{7.8}$

2. STD II $= \frac{1356+310+50+24+16+10}{14486} \times 100$

$= \frac{1766 \times 100}{14486} = \underline{12.2}$

3. STD III $= \frac{1551+381+86+34+11}{13,529} \times 100$

$= \frac{2063}{13529} \times 100 = \underline{15.2}$

4. STD IV $= \frac{1850+712+197+62}{13476} \times 100$

$= \frac{2821}{13476} \times 100 = \underline{20.9}$

5. STD V $= \frac{2386+940+373}{12,966} \times 100$

$= \frac{3699}{12,966} \times 100 = \underline{28.5}$

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Appendix 3.2 (Cont)

6. STD VI $= \frac{2586 + 1,402}{12,196} \times 100 = 32.7$

7. STD VII $= \frac{3,152}{10,224} \times 100 = \underline{\underline{30.8}}$

(b) Scholastic Acceleration Rate

$= Ea^{r*}$ Where Ea^{r*} = Enrollees at grade a, who are in ages below those regarded normal for this grade and Ea = All enrollees at grade a.

STD I $= \frac{834}{14663} \times 100 = \underline{\underline{5.7}}$

STD II $= \frac{834}{14486} \times 100 = \underline{\underline{5.8}}$

STD III $= \frac{1,154}{13,529} \times 100 = \underline{\underline{8.5}}$

STD IV $= \frac{891}{13,476} \times 100 = \underline{\underline{6.6}}$

STD V $= \frac{968}{12,966} \times 100 = \underline{\underline{7.5}}$

STD VI $= \frac{771}{12,196} \times 100 = \underline{\underline{6.3}}$

STD VII $= \frac{29+731}{10224} \times 100$

$= \frac{760}{10224} \times 100 = \underline{\underline{7.4}}$

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Appendix 3.3

Projections of School-Age Population (6-12 Years)

Formula: $$n^{pt+k}_{a+k} = \frac{n^{pt}_{a+k}}{n^{p}_{a}{}^{t-k}} \quad n^{pt}_{a}$$

Where p is population

a is the initial age of the age interval at the second census

n is the size of the age interval

t is the year of the Second Census.

k is the intercensal interval in years.

For children born during the intercensal period, child women ratios are applied.

(a) Projection of Women in the Childbearing age 15-49

(i) $$P_{1989}{}_{15-24} = \frac{P_{1979}{}_{15-24}}{P_{1969}{}_{15-14}} \quad p^{1979}{}_{5-14}$$

$$= \frac{100311}{50292} \times 93396$$

$$= \underline{\underline{186,285}}$$

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Appendix 3.3 (cont)

(ii) $P_{1989}^{25-29} = \frac{P_{1979}^{25-29}}{P_{1969}^{15-19}} \times P_{1979}^{15-19}$

$= \frac{38787}{73243} \times 47388$

$= \underline{\underline{73243}}$

(iii) $P_{1989}^{30-39} = \frac{P_{1979}^{30-39}}{P_{1969}^{20-29}} \times P_{1979}^{20-29}$

$= \frac{36322}{49496} \times 91710$

$= \underline{\underline{67300}}$

(iv) $P_{1989}^{40-49} = \frac{P_{1979}^{40-49}}{P_{1969}^{30-39}} \times P1979_{30-39}$

$= \underline{\underline{23512}}$

Total number of women in 15-49 = 186,285+73,243+67300+
23512

= 350,340

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Appendix 3.3 (Cont)

(b) Projection of Children born in the intercensal Period

(i) $$P_{0-4}^{1989} = \frac{P_{0-4}^{1979}}{P_{15-49}^{1979}} \times P_{15-49}^{1989}$$

$$= \frac{122962}{189,989} \times 350,340$$

$$= 226,742$$

(ii) $$P_{5-9}^{1989} = \frac{P_{1979}}{P_{15-49}^{1979}} \times P_{15-49}^{1989}$$

$$= \frac{89606}{189989} \times 350,340$$

$$= 165,234$$

(c) Projection of 10-14 and 15-19 age groups

(i) $$P_{10-14}^{1989} = \frac{P_{10-14}^{1979}}{P_{0-4}^{1969}} \times P_{1979}{}_{0-4}$$

$$= \frac{68511}{77268} \times 122962$$

$$= 109,026$$

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Appendix 3.3 (Cont)

(ii) $$P_{15-19}^{1989} = \frac{P_{15-19}^{1979}}{P_{5-9}^{1969}} \times P_{5-9}^{1979}$$

$$= \frac{87496}{58441} \times 89606$$

$$= \underline{134,155}$$

(d) Breaking of Age Groups into Single Years of Age to get 6-12 Years school-age Population

(i) Estimating Age Group 6-9

Age Group	Population	
0-4	226,742	N_1
5-9	165,234	N_2
10-14	109,026	N_3
15-19	134,155	N_4

$$n_1 = +0.0336(226742)+0.2272(165234)$$
$$-0.0752(109026)+0.0144(134155)$$
$$= 7619+37541-8199+1932$$
$$= \underline{38893}$$

5-9 = 165,234

6-9 = 165,234 - 38893

= 126,341

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Appendix 3.3 (cont)

(ii) Estimating Ages 10,11 and 12, from age group 10-14

The relevant panel for this age group is the mid-panel, and the rows are n_1, n_2 for 10, 11 and 12 respectively.

Thus n_1 = 0.0128(226742)+0.0848(165234)
+0.1504(109026)-0.0240(134155)
+0.0016(223832)
=-2902+14012+16398-3220+358
= 24646

n_2 =-0.0016(226742)+.0144(165234)+.2224(109026)
-.0416(134155)+.0064(223832)
=-363+2379+2424-5581+1433
= 22115

n_3 =+0.0064(226742)-.0336(165234)+.2544(109026)
-.0336(134155)+.0064(223832)
= 1451-5552+27736-4508+1433
= 20560

Total primary school-age (6-12 years) population
= 126,341+24646+22115+20560
= 193662

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Appendix 3.4

Total Land Area Committed to Selected City Council Schools and the Estimated number of Pupils

Name of Division and School	Number of Pupils	Land Area (Acres)
NORTHERN	15,680	210
Ainsworth	840	5.4
Baba Dogo	1,240	13.1
Cheleta	560	8.1
Ruai(Old Dandora)	280	6.0
Pangani(Eastleigh)	840	8.6
Eastleigh Airport	1,080	12.0
Garden Estate	720	27.5
Juja Road	840	10.0
Kamiti	560	5.5
Kariobangi North	960	5.9
Karura Forest	560	2.5
Kassarani	760	9.2
Mahiga	600	8.9
Mathari Old	560	4.5
Mathare Valley	1,080	6.9
Muthaiga	640	8.6
Racecourse	800	6.2
SOUTHERN	12,680	177
Dagorretti Muslim	760	9.3
Gitiba	560	5.1
Jamhuri	880	6.0
Kagira	560	7.1
Karen "C"	480	10.0

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Appendix 3.4 (Cont)

Name of Division and School	Number of Pupils	Land Area (Acres)
Kawangware	1120	5.8
Kilimani	840	10.7
Kirigu	680	4.1
Mukarara	560	10.0
Mutuini	720	10.5
Ndurarua	560	11.0
Nembu	560	11.3
Ngong Forest	560	11.0
EASTERN	23,440	155
Bahati Uhuru	600	8.0
Buru Buru	720	7.2
Canon Apolo	560	1.8
Dr. Krapf	1,000	4.2
Dr. Livingstone	1,120	5.1
Edelvale	560	8.9
Embakasi	840	5.0
Heshima Road	1,160	3.5
Jogoo Road	840	8.1
Makongeni	1.120	5.2
Martin Luther	1,040	11.2
Marurani	800	1.3
Morrison	640	2.7
Ofafa Jericho	840	5.7
O.L.M.(Shauri Moyo)	840	6.1
St. Ann's	1,120	1.9
St. John's	1,120	2.1

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Appendix 3.4 (Cont)

Name of Division and School	Number of Pupils	Land Area (Acres)
WESTERN	16,000	125
Aga Khan	1,120	3.0
Arya Girls	720	2.8
Bernard Estate	560	4.8
City Primary	1,120	8.6
Farasi Lane	480	9.0
Highridge	840	10.1
Hospital Hill	840	9.7
Kabete Vet. Lab.	880	7.2
Kangemi	1,080	11.4
Kihimbuini	800	9.6
Kileleshwa	560	4.9
Lower Kabete	640	5.7
Maguga Green	680	4.4
Muslim Girls	640	4.8
CENTRAL	19,240	145
Bohra	280	0.4
Catholic Parochial	440	3.8
C.G.H.U	560	0.1
Dr. Aggrey	840	5.0
Muranga Road	840	2.8
Moi Avenue	560	1.3
Islamia	280	1.3
Khalsa Racecourse	560	1.2
Kongoni	800	8.0
Langata Road	560	7.8

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Appendix 3.4 (Cont)

Name of Division and School	Number of Pupils	Land Area (Acres)
Langata West	800	5.8
Madaraka Estate	720	2.5
Mariakani	560	6.7
Mbagathi Road	1,120	5.4
Muslim	840	4.5
Muthurwa	920	9.3
Nairobi Primary	920	13.8
New Pumwani	840	5.0

Source: Kamari, R.N,
"Educational Facilities in Nairobi",
Town Planning Section, City Engineer's
Department, City Council of Nairobi,
1979.

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Appendix 3.5 Computer Print-Out

Statistical Package For the Social Sciences SPSSH-Version 5.01.

ICL 1900 Implementation - Release 3.

Run Name	Regression
Variable List/	Y,X
/of Cases	80
Input Medium	Card
Input Format	Fixed (3x/F_4.0, 3x,F_4-1)

According to your input Format, Variables are to be read as follows:

Variable	Format	Record	Columns
X	F_4-0	1	4-7
Y	F_4-1	1	11-14

The Input Format provides for 2 Variables - 2 will be read.

It provides for 1 Records ("Cards") per case.

A maximum of 14 "Columns" are used on a record.

Var Labels Y Number of Pupils/
X Land Acreage.

Regression Variables = Y, X/Regression = Y with X(1).

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File Noname (Creation Date = 10/06/81).

Variable	Mean	Standard Dev	Cases
X	765.5000	223.2777	80
Y	7.0137	4.4493	80

File Noname (Creation Date = 10/06/81)

Correlation Coefficients

Avalue of 99.00000 is printed.

If A Coefficient cannot be computed.

	Y	X
Y	1.00000	0.10996
X	0.10996	1.00000