

II
**INTERCENSAL POPULATION CHANGE: A
COMPARATIVE STUDY OF KANO LOCATIONS
AND THE SUGAR-BELT; 1962-1973.**

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

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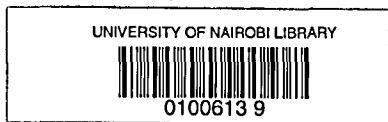
DECLARATION

This thesis is a manifestation of collaborative efforts of various people whose contributions deserve mention.

This Thesis is my original work and has not been presented for a degree in any other university. My foremost appreciation is directed to the University of Nairobi which awarded me a scholarship for the (M.A.) program in Population studies. Furthermore, I am extremely grateful to my supervisors, namely, **E. H. O. AYIEMBA** (Candidate) Professor S.H. Ominde and Mr. J.M. Muinde, both of Geography Department at the University of Nairobi, for their invaluable advice and for according me free access to departmental facilities.

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Mr. J. N. Muinde
University supervisor



not making it ACKNOWLEDGEMENTS in the relevant material.

In conclusion, neither the supervisors nor those who con- This thesis is a manifestation of collaborative efforts of various people whose contributions deserve mention. contents of the Thesis, the responsibility for any such My foremost appreciation is directed to the University of Nairobi which awarded me a scholarship for the (M.A.) programme in population studies. Furthermore, I am extremely grateful to my supervisors, namely, Professor S.H. Ominde and Mr. J.N. Muindo, both of Geography Department at the University of Nairobi, for their invaluable advice and for according me free access to departmental facilities.

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those who contributed in any form whatsoever to the
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numerical changes of house-holds, for this phenomena has become problematic to regional and urban planners of today.

Furthermore, most migrational topics have exhaustively probed into problems and causes of rural-to-urban migration in different sections of the universe although little has been achieved in the analysis of urban-to-rural population mobility, especially in developing nations probably because the significance of this spatial phenomena in national development context has not been fully grasped.

ABSTRACT A conspicuously over-looked aspect of spatial mobility is rural-to-rural population mobility at micro-regional dimensions. Demographic literature on population dynamics tends to evaluate mostly determinants of fertility and mortality variables. Furthermore, the contribution of these factors in overall population growth has seemingly received tremendous analysis as signified by mathematical formulae and models on the subject. It is somehow evident in demographic literature that the bulk of migrational topics tends to examine at depth determinants of migration in the sending and recipient regions at the expense of a thorough probe into the contribution of human spatial mobility towards numerical changes of homo-sapiens, for this phenomena has become problematic to regional and urban planners of today. Furthermore, most migrational topics have exhaustively probed into problems and causes of rural-to-urban migration in different sections of the universe although little has been achieved in the analysis of urban-to-rural population mobility, especially in developing nations probably because the significance of this spatial phenomena in national development context has not been fully grasped. The environment selected encompasses an area

of 1073 square kilometers and a population of 139,000 people by 1973. A more seriously over-looked aspect of spatial mobility is rural-to-rural population mobility at micro-regional dimension. It is this neglected aspect of human spatial mobility phenomena which the thesis examines at length within a section of Kano Plains of Kisumu District of Nyanza Province in Kenya.

The fundamental notions in the thesis could therefore be twofolds, namely, to identify regional differentials in human numbers between 1962-1973, and to put migration into its proper perspective in the evaluation of intercensal population growth within the study-region. called sub-locations, hence, to have a 50% of area representation, area sampling frame selected

The thesis pivots on a null hypothesis that migrational factors are relatively more significant in determining the magnitude and direction of inter-censal population changes than either fertility or mortality factors within the designated region.

The analysis utilizes population numbers "plot-owners" in their respective sub-locations. The only as the object of analysis in estimation of population changes between 1962-1973. In other words, the thesis will not examine socio-economic and cultural changes under the title "population changes" as is characteristic of sociological and economic approaches on the subject.

The environment selected encompass an area

were realized in data could be mainly attributed to the of 1073 square kilometres and had approximately 136,000 influence of migration and, to a lesser extent, to the people by 1969. The entire area contains two contrasting effects of non-sampling errors. Furthermore, inter-environments in relation to their physical and socio-correlation analysis was employed to test similarities economic characteristics, and a unique history of in the work of different groups of enumerators who were population settlement pattern. All these features have working in their respective sub-locations and values over contributed substantially to the different components ($\sigma = +0.70$) were realized thus indicating that greater of pull and push factors which influence tremendously similarities in enumeration characterized the work of human spatial mobility which could produce regional enumerators.

differentials in demographic structure and growth of communities. The cause of the problem was then examined through a brief evaluation of the natural and social

The study-region constituted twenty-five environments. Environmental analysis revealed that micro-regions called sub-locations, hence, to have a regional variations in environmental perceptions induced 50% of area representation, area sampling-frame utilized regional differentials in spatial mobility balance. This a stratified systematic sample based on population demographic phenomenon produced unfavourable impact on density rank of the sub-regions. Furthermore, selecting the demographic structure of the regions heavily affected whom to interview was achieved through probability sample with out-migration.

technique involving "householders", "village-owners", and "plot-owners" in their respective sub-locations. The cultural norms of the Luo society also tended to stimulate high fertility rates. The cultural population sample-size therefore constituted approximately 2.8% of the aggregate population size in the sampled high fecundity. These safety-valves mechanisms functioned environments.

usually in the form of taboos and beliefs on sexual relations and growth of family institutions. Socio-computation of Whipples index, age-ratios, and sex-ratios. economic status of the Luo community was found to encourage These statistical values indicated that whatever anomalies

were realized in data could be mainly attributed to the influence of migration and, to a lesser extent, to the effects of non-sampling errors. Furthermore, inter-correlation analysis was employed to test similarities in the work of different groups of enumerators who were working in their respective sub-locations and values over ($r = +0.70$) were realized thus indicating that greater similarities in enumeration characterised the work of enumerators in these locations, hence, only 5% of the demographic problem was then examined through a brief evaluation of the natural and social environments. Environmental analysis revealed that regional variations in environmental perceptions induced regional differentials in spatial mobility balance. This demographic phenomenon produced unfavourable impacts on the demographic structure of the regions heavily affected without migration. Luohat nevertheless experienced a remarkably high fertility rate. The cultural norms of the Luo society also tended to stimulate high fertility rates. The cultural system also provided safety-valves to check the effects of high fecundity. These safety-valves mechanisms functioned normally in the form of taboos and beliefs on sexual relations and growth of family institutions. Socio-economic status of the Luo community was found to encourage

the existence of high fertility rates whereas mortality rates were found to be declining at an average of 50/1000 persons per annum.

The research found a relatively high intercensal growth rate ranging between a mean of 2.2% per annum in the sugar-belt to approximately 4% per annum in Kano locations. Evaluation of migration data exposed that approximately 95% of children in Kano locations were born within Kano locations, hence, only 5% of the aggregate number of children could be categorized as in-migrants. But, in the sugar-belt approximately 82% of the children were (in-migrants) born outside the sugar-belt and only 18% could be classified as non-migrants.

Out-migration statistics further revealed that about 15% of the children born in their respective sub-locations within Kano locations had out-migrated elsewhere. The sugar-belt nevertheless experienced a remarkably low percentage of out-migrating children. The major causes of out-migration were seeking employment, re-settlement motives, marriage obligations, and education.

Among the adults, approximately 52% were categorized as non-migrants within Kano locations as opposed to about 98% who were classified as in-migrants into the sugar-belt. Male adults within the sugar-belt

that if net intercensal migration and fertility rates
constituted two-thirds of in-migrants to the Sugar-belt
regions, constant then population size can only be reduced
through the natural process of population dynamics
To identify which factor of population dynamics
was more important in determining intercensal population
growth, partial correlation analysis was employed. Table 59
gives a summary of the results and reveals that $r_{12.34} =$
 0.9782 for Kano locations and that $r_{12.34} = 0.9986$ for the
Sugar-belt. In other words, if one correlated absolute
intercensal population change with absolute intercensal
births, but holding absolute intercensal deaths and
absolute intercensal net migrants constant, then population
growth during 1962-1969 and 1969-1973 within the study Kano
region was positive and very strongly associated with the
number of absolute intercensal births because coefficients
of partial correlation were approaching a unit. This
result endorses the hypothesis that if net migration rates
and mortality rates are assumed constant, then population
size is greatly determined by the natural process of
reproduction. But in reality this situation hardly exists.
Furthermore, correlation between absolute intercensal
population change and absolute intercensal deaths, holding
absolute intercensal births and net migrants constant,
revealed $r_{13.24} = -0.8826$ for Kano locations and $r_{13.24} =$
 -0.9986 for the Sugar-belt. This again endorses the view

that if net migrational influence and fertility rates are assumed constant then population size can only be reduced through the natural process of death as revealed by strong negative associations. Furthermore, if one correlated absolute population change with absolute number of net intercensal migrants but holding constant fertility and mortality rates then $r_{14.23} = -0.8030$ for Kano locations and $r_{14.23} = +1.0000$ for the sugar-belt. This reveals that out-migration reduced population growth in Kano areas whereas in the sugar region in-migration was more important in influencing population growth.

In summary, the study found out that within Kano locations as a whole positive population growth was a function of fertility rates, but that negative population growth was mostly determined by mortality rates and to a lesser extent by migration. In the sugar-belt positive population growth was mostly a function of migration and to a lesser extent fertility rates whereas negative population growth was mostly determined by mortality rates. The null hypothesis could therefore be more relevant to the demographic situation in the sugar-belt and the alternative hypothesis more relevant to the situation in Kano locations. However, micro-regional variations exist and the future pattern is bound to alter due to increasing impact of modernization processes.

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planning is basically focused on human resources. Information on "Vital Events" is therefore instrumental in carrying planning projects, as well as the realization of their success.

INTRODUCTION AND THE SCOPE OF THE THESIS Informa-
Introductory Remarks

Developing nations realize that the process of population change accounted for in population change is most problematic variable in overall population change is of demographic transition. ⁴ Demographers convincingly argue that the rural-urban population mobility changes demographic growth migration is ineffectual in determining demographic growth rate of most industrialized nations. ¹ This hypothesis ised therefore renders fertility and mortality as pre-eminence variables in dynamics of population growth. ² Since mortality in developing nations is declining, ⁵ fertility has thus become the most significant factor in population change. ² The impact of fertility is furthered reinforced by its contribution to population age-distribution which is a function of fertility trends. ³ The thesis there-fore reviews the overall impact of fertility rate in determining population change within Kano locations and the relation change in other parts of the sugar-belt, and puts migration into its proper perspective. contribution of population dynamics in inducing

The Objectives of the Study The research then tables spatial micro-regional differentials in population dynamics, population density, and available research data on population change is of paramount significance to regional-urban planners as

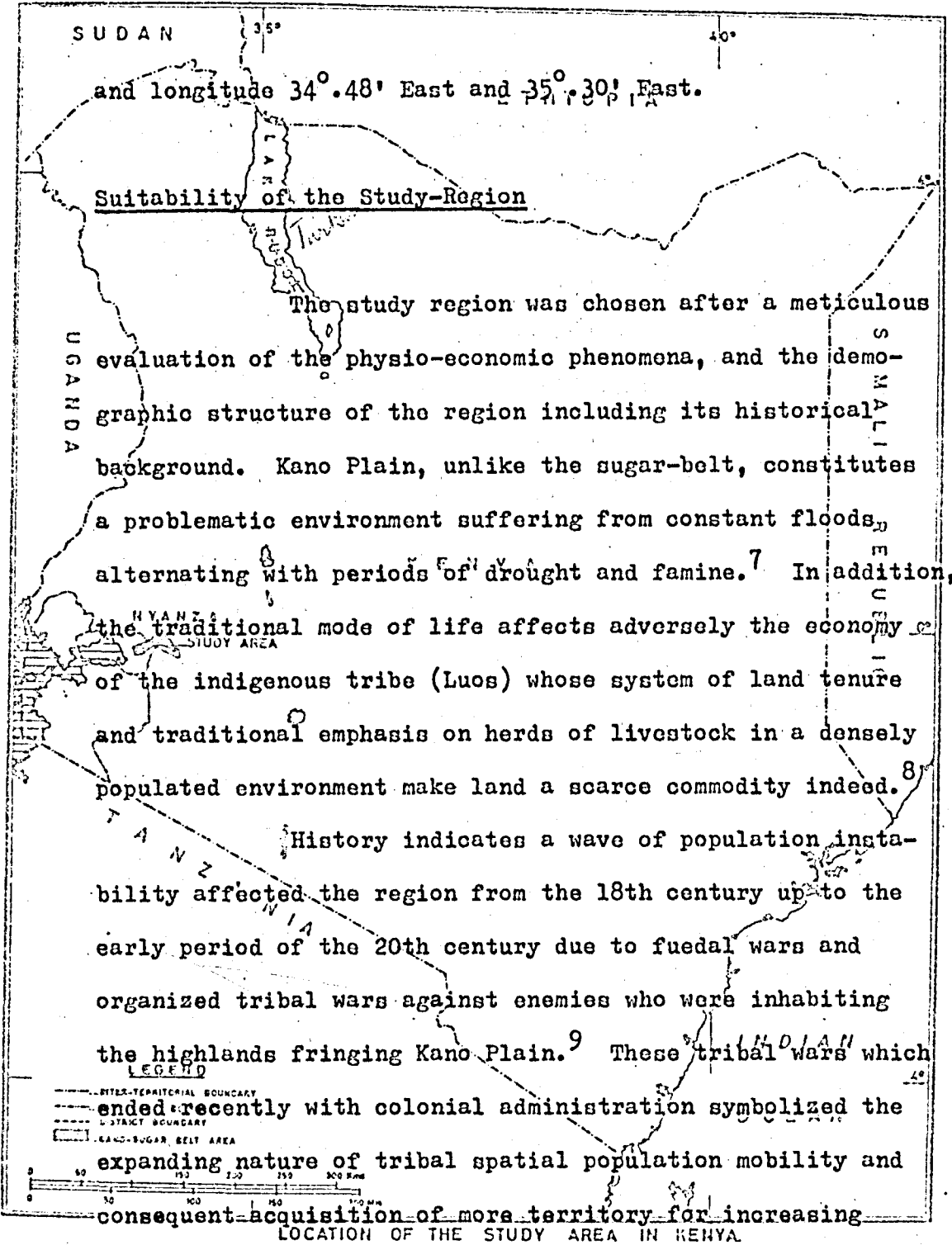
planning is basically focussed on human welfare. Information on "Vital Events" is therefore instrumental in governing planning projects, as well as the realization of their success.

Developing nations are experiencing a process of population change accounted for by the theory of demographic transition.⁴ Equally significant is the rural-urban population mobility change causing demographic imbalance between the rural environments and the polarized centres of development. The growth rate of primate cities in developing nations is therefore causing concern because of the high rate of rural-urban population mobility.⁵

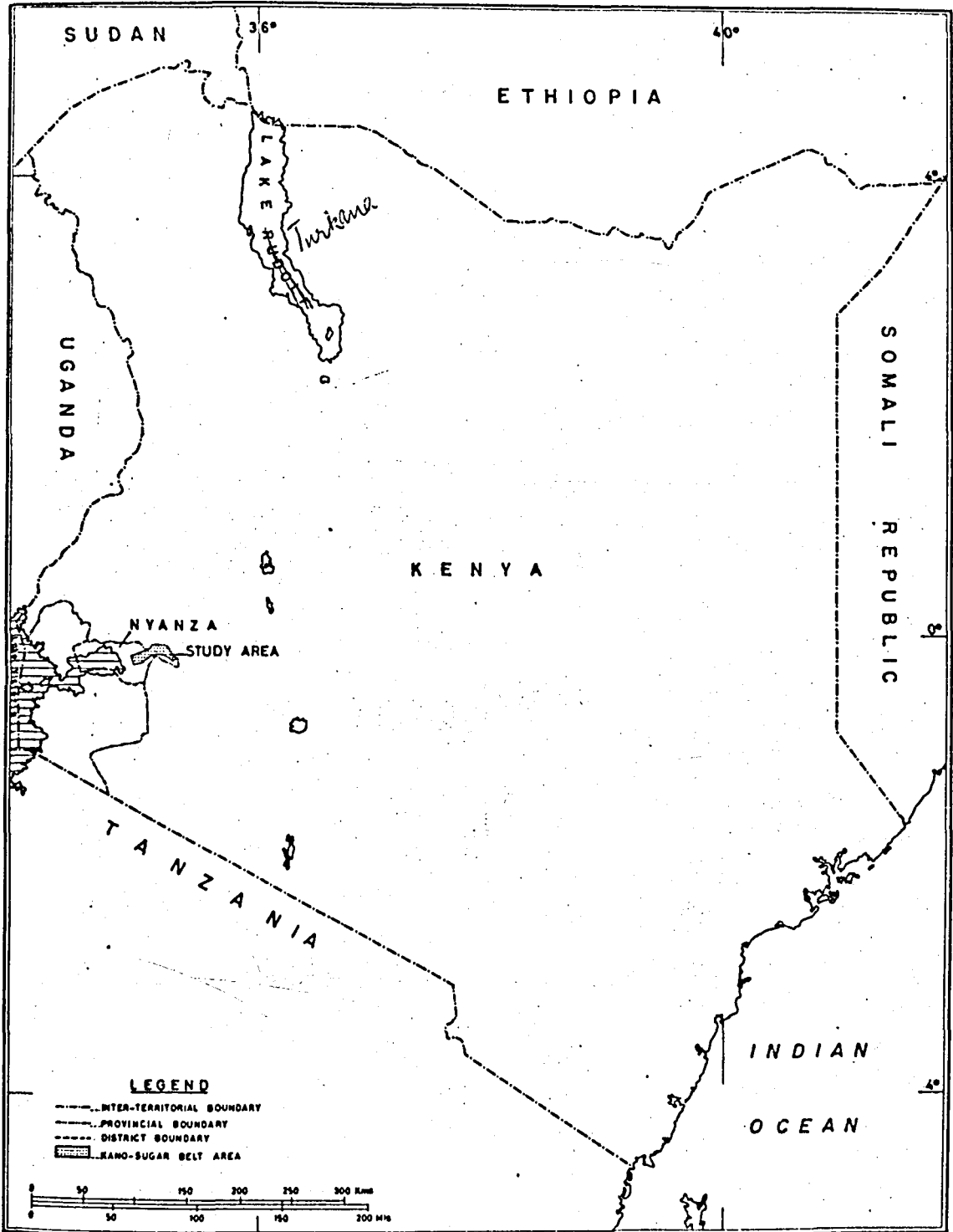
The purpose of this population research is to identify aggregate population change within designated regions between 1962-1969 and 1969-1973. Furthermore, it endeavours to project the magnitude of numerical change for regional planners up to 1980. A brief evaluation of physio-economic and socio-cultural phenomena influencing population change is attempted, but with a greater bias towards the contribution of population dynamics per se in inducing or affecting population change. The research then tables spatial micro-regional differentials in population dynamics, population density, and sex-ratio.⁶ In addition, an explanation for regional similarities and differences in the pattern of growth

SUDAN

intercensal population change is given, followed by recommendations for preventive measures desirable in alleviating the region's demographic instability. Lastly, the research suggests some solutions to problems prevalent in demographic surveys within communities which are basically rural and in which the degree of illiteracy is relatively high. of the region including its historical background. Kano Plain, unlike the sugar-belt, constitutes a problematic environment THE STUDY REGION from constant floods alternating with periods of drought and famine.⁷ In addition, Location and Size of life affects adversely the economy of the indigenous tribe (Luca) whose system of land tenure and traditional Kano locations and the sugar-belt occupy nearly almost the entire Kano Plain, except the portion of the plain south-wards and south-eastwards forming North Nyakach Location. The portion of the plain to the North-West of the River Nyamasaria-Kibes occupied by Kolua and Kajulu and locations, to the east of Kisumu township, is also excluded. Eastwards, the sugar-belt forms a tongue of land penetrating into the Rift-Valley Province. The study-region is therefore bordered by the Nyando Fault to the North, and the Nandi and Fault to the East while the southern portion is bounded by the Nyabondo Escarpment.⁶ Precisely, the area covers 1073 sq. kilometers within latitude $0^{\circ}.03'$ South, and $0^{\circ}.15'$ South in



The relatively low gradient of the entire plain



LOCATION OF THE STUDY AREA IN KENYA.

makes it vulnerable to constant flooding by the major rivers traversing the plain, hence, the region is dotted with extensive swamps which create ideal ecological conditions for disease vectors. On that account, the region is bound to be unhealthy with a probable high mortality rate ceteris paribus. The inauguration of Ahero Rice Scheme (1967) and the extension of the sugar-estates indicated a realization of the agricultural potential of the study-region. Therefore, the importance of the region in population resettlement policy and agricultural investment has far-reaching consequences on the demographic structure of the region. Lastly, though Kano plain has a relatively poor network of communication system compared to the sugar-belt, the region is appropriate for intimate questions characteristic of demographic questionnaires because its inhabitants are apparently more enthusiastic about researches.¹⁰ A plausible, unquantified hypothesis supporting the statement is that comparatively more researches have been carried out in the region by individuals and institutions from different disciplines and these researches have yielded fruitful results to the people. The sugar-belt, on the other hand, emerged from a buffer zone created by the imperial powers to absorb tension

between dwellers on the plain and their enemies on the fringing highlands.¹¹ The buffer zone therefore became predominantly a farming zone in the hands of Asians and European settlers who recruited inhabitants of the sugar-belt as labourers. The demographic growth of the sugar-belt for a long time was therefore determined by requirements of economic activities in the region till after independence (1963) when the government purchased sections of the region from original settlers for national re-settlement programmes. The sugar-belt unlike Kano Plain has become an island of greater economic activities and has a comparatively greater ethnic agglomeration. Furthermore, the region has relatively good network of communication system. change as used throughout in literature. In summary, the above selected study-regions constituted an ideal environment with distinctive spatial structure differentials because one is basically a monetized space whereas the other has a dual structure with subsistence and monetized spaces adjacent. The two micro-regions therefore differed significantly in their components of pulling and push factors which have been fundamental in initiating population instability in different dimensions within their territorial organization. of population had not changed significantly.¹²

Population change does not necessarily occur

through the HYPOTHESES of reproductive change and migration, but could also involve a multiplicity of factors. Statement of Hypotheses location of regional boundaries, changes

in residential category resulting from intercensal growth in population and The null hypothesis for the research is that migration has influenced ¹³ much more intercensal population

changes; whereas, the alternative hypothesis is that fertility and mortality influence on intercensal population change exceeds migrational influence. refers to actual number of deaths experienced. In-migration and out-

Definition of Terms been employed to refer to inter-regional population spatial mobility characterized by crossing of micro-regional. The term population change as used throughout in literature is synonymous with population growth. Change is non-directional for it could be positive (increasing) or negative (declining). Population change is therefore defined as absolute and relative change of the sum of population of well defined sub-groups between two or more defined base years. Furthermore, component changes affecting sex and age composition of the sub-groups was analysed for this could indicate net transfer of particular groups even where the aggregate number of population had not changed

and significantly. ¹² in the plain, whereas, in the sugar-belt Mahoroni, Population change does not necessarily occur

covered. The entire region has twenty-five micro-regions through the normal processes of reproductive change and called sub-locations which were the smallest administrative migration, but could also involve a multiplicity of factors regions used as enumeration areas for the 1909 National Census survey (see Map 1).

namely shifts in the location of regional boundaries, changes in residential category resulting from intercensal growth in financial limitations could pose serious population and through official territorial adjustment for problems in any attempt to cover adequately the entire political and economic motives.¹³

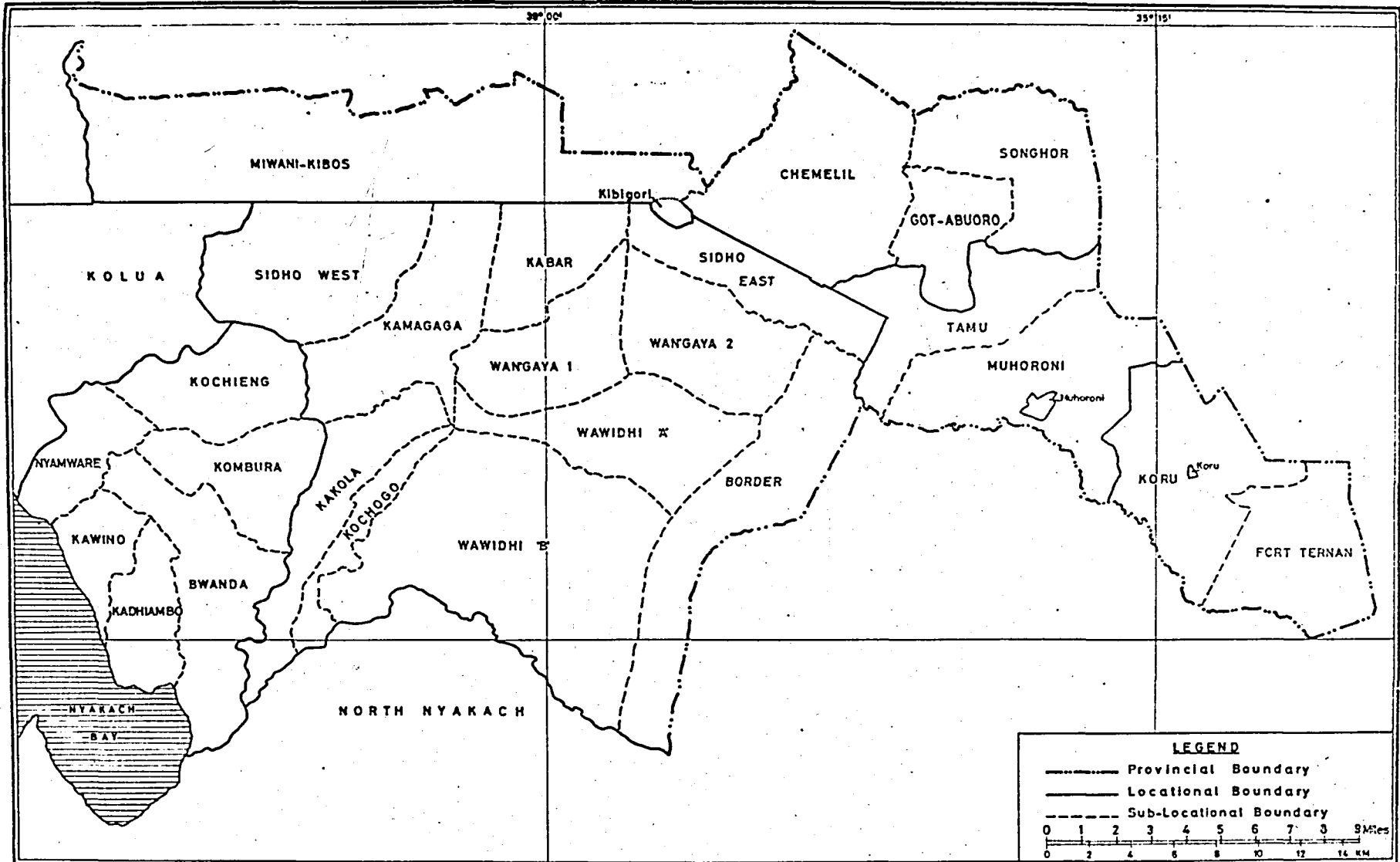
region. This necessitated selecting only a few sub-locations for the survey from which generalization were made to hold for the omitted regions. Overcoming this problem in area sampling refers to actual number of births experienced by the population sub-groups whereas "mortality" refers to actual methodology required utilization of population density as a number of deaths experienced. In-migration and out-migration have also been employed to refer to inter-regional

population spatial mobility characterised by crossing of micro-regional administrative units called sub-locations. Critics of the population density concept would oppose the approach on the ground that the population distribution of population reveals no close relation between population density and economic prosperity. and concept of population settlement within a period of over six-months only in the context of the thesis. density is further criticised for its illusive picture of the balance between population size and natural resources; population density is a function of a myriad of physical, socio-economic and cultural phenomena. Nevertheless, the population density concept could become a suitable yardstick in measuring

Area Sample-Frame

relationship between population numbers and available resources for "the ratio between population and surface area remains as the index which appeals readily to the imagination and is useful and West Kano locations in the plain, whereas, in the sugar-belt Muhoroni, Chemelil, and Miwani-Kibos locations were provided its severe limitations as a measure of population pressure is fully kept in view. Furthermore, areas of

This micro-demographic study covered East Kano and West Kano locations in the plain, whereas, in the sugar-belt Muhoroni, Chemelil, and Miwani-Kibos locations were provided its severe limitations as a measure of population pressure is fully kept in view. Furthermore, areas of



MAP 1 SUB-LOCATIONS OF THE STUDY REGION

POPULATION DENSITY DISTRIBUTION

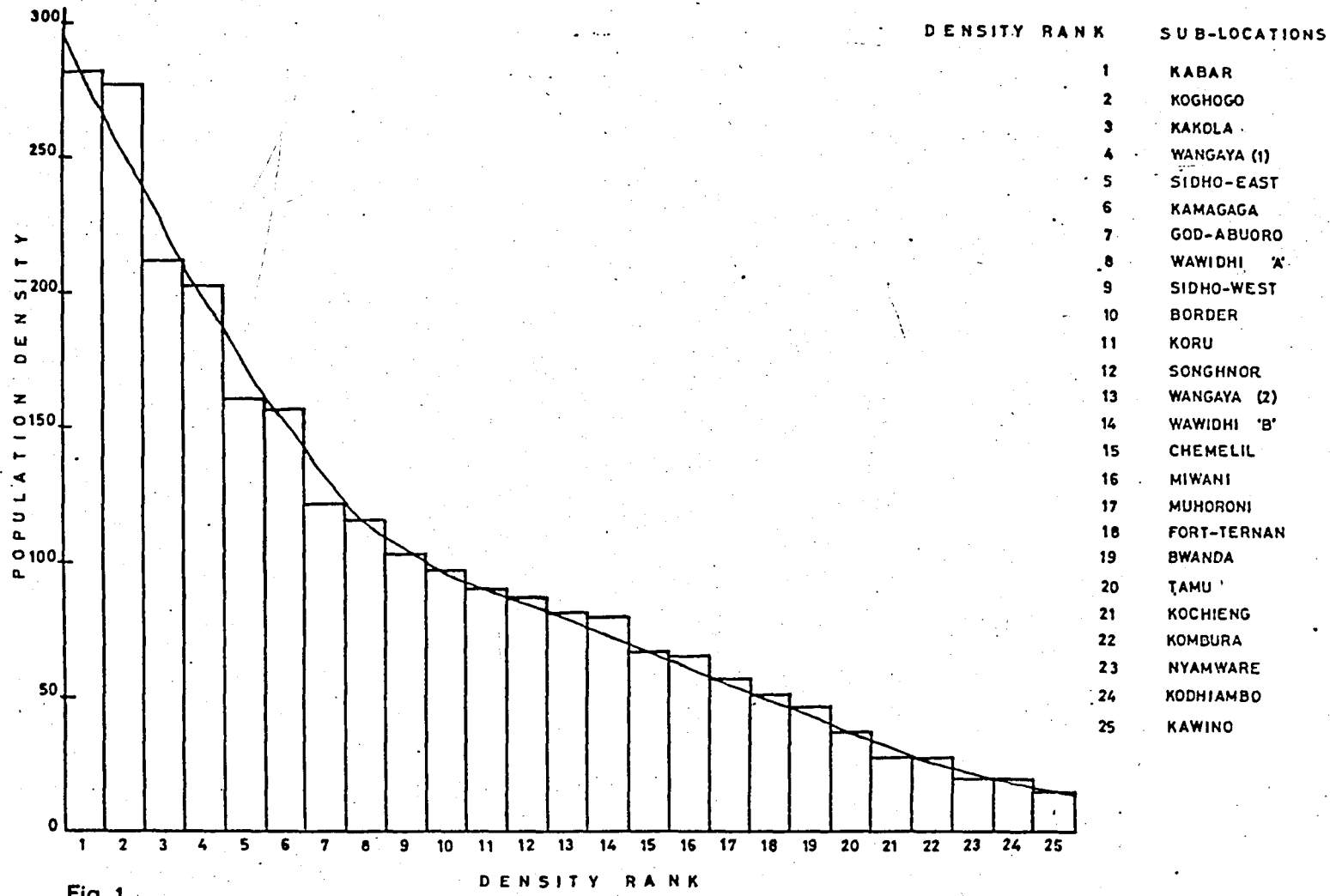


Fig. 1

analysis because of greater contiguity of the spatial pieces. Greater coverage by a simple random sample-frame could yield a more representative character, especially when the ratio is not all ratios of the Kano sub-locations to the sugar-belt sub-locations was in the order of 17:8. Because the majority of the sub-locations were economic, and in the sparsely populated density stratum, a simple random sample-frame could elicit a higher probability of excluding the minority high density regions.

The alternative method was to use a simple stratified systematic sample-frame, for the technique could yield the desired accuracy, lessen sampling bias in area representation, and reduce substantially problems in framing. The technique involved ranking the sub-locations according to their population density figures of 1969 under the assumption that the present spatial pattern and magnitude of population distribution did not diverge significantly from that of 1969. In addition, the 1969 data were the only reliable current information at hand. After ranking the sub-locations according to their densities of 1969, regions for the survey were selected on the basis of a formula 1st and qth number, ¹⁹ hence, the series were 1, 3, 5, 7, 9, ... etc. Although area sampling is highly supported in scientific previous place-of-residence statistics. This problem of

analysis because, as R.A. Henin has argued, there is a greater tendency towards homogeneity in area and population characteristics of rural areas,²⁰ it was discernible that not all rural areas were perfectly homogenous because each spatial unit was subjected to a slightly different intensity of interaction between physio-economic, and socio-cultural factors. Some respondents wanted to be tipped before they could refuse information.

Data Collection Problems

Solution to the Problems

The selection of the twelve sub-locations was proceeded by a survey of the study-region. The pre-survey helped in identifying non-sampling biases and problems associated with data collection. The first problem was traditionalism featured by taboos and superstition on head count.²¹ Moreover, concealing sexes of the babies especially male babies was commonplace. The problem of illiteracy and poor memory threatened the accuracy of retrospective data on fertility and mortality. Associated with this was also a high probability of over-enumeration or under-enumeration due to mis-statement of ages. The multiplicity of similar place names among the locations in the Kano Plain apparently threatened coding questionnaires dealing with place-of-birth and previous place-of-residence statistics. This problem of

multiplicity of names is explained by a common ancestry and historical background of the Luos inhabiting the plain. Another problem was connected with obtaining data on families who had all emigrated, or were all dead. Minor problems involved isolated cases of suspicion and reserve on the part of respondents when intimate questions covering fertility and mortality were asked. Lastly, some respondents wanted to be tipped before they could release information.

In summary, the role of local enumerators further helped in Solution to the Problems and secured from some sample areas. The enumerators have a school certificate level of education. This education Steps taken to minimize non-sampling bias and errors were to recruit local resident enumerators who were well known to the indigenous residents in their respective sample areas. Local enumerators had a better chance of knowing practically all villages within their sub-urban locations and, whenever possible, female enumerators were employed for they could elicit better information on fertility and mortality from the women folks. The choice of local enumerators could therefore aid in improving the quality and quantity of response, because these enumerators were known by the people.²² The fear that governmental or political motives were reinforcing the survey disappeared.

after several barazas were held in the respective sub-located locations. The public support was therefore unanimous as it was exemplified by mass public endorsement for the chiefs, head-men, and clan leaders to make the survey a success. The assistance from local administrators thus proved extremely valuable. Christopher H. Hood supported utilization of clan leaders in a demographic survey for he likened their role to that of ten-house chairman in Tanzania Ujamaa Villages.²³ In summary, the role of local enumerators further helped in reducing errors which could accrue from area sample-frame. The enumerators were of school certificate level of education. This educational background boosted their geographical knowledge of the entire province, as well as, other areas within the republic. The enumerators were thoroughly trained on coding questionnaires and on rules of courtesy to respondents. After their training, pre-sample survey tests were carried out, which enabled them to identify on the spot problems and better methods for interview. The interview and determination of the population. The utilization of an Age-Calender, which is a chronology of remembered events dated absolutely by historical records, helped in solving the problem of illiteracy and poor memory. J.C. Mitchell (1949) used a similar technique among the Yao of Nyasaland (Malawi).²⁴ Each sub-location in the had emigrated, or were working elsewhere, or were even dead.

study-region had unique historical events which were sought from local leaders and these were dated without much problem. The survey was carried out during the April-May school holidays when most of the pupils were expected to be at home. Although this was a period of the long rains, the research had the blessings of the rainy season coming unusually late.

On that account, communication problems were greatly reduced. The defacto enumeration was carried out in the evenings in the sugar estates when most labourers were expected to be in their homes. On the other hand, in the rural areas local enumerators could make calls in the evenings, or mornings and make re-calls in cases where some members of the village commune were absent.

Population Sample-Frame The problem of who to interview and determination of the population sample size was solved indirectly by employing a sample frame consisting of settlement units in both regions. Other alternatives as the lists of tax-payers were rendered unscientific for most administrative records were not exhaustive and in most cases included individuals who had emigrated, or were working elsewhere, or were even dead.

The other method of demarcating the sub-locations into a network of grid-lines, randomly selecting a few blocks and then interviewing all people within the blocks chosen theoretically proved sound but practically more laborious and expensive. In addition, interviewing adults within selected settlement units from aerial photographs of the region could not be attempted as aerial photographs were too expensive to produce.

The only feasible method yielding equally satisfactory results was to obtain a list of all "village-holders" in every sub-location within Kano locations. This proved rather easy for the hierarchy of administrators ranging from the Chief down the scale to the clan leader, corresponded pretty well with regional hierarchy ranging from the location down the scale to the clan's regional boundaries. The system therefore required each clan elder commonly called mlango to know practically all the subjects under his jurisdiction. This therefore made it possible for all mlangos to enlist the name of all village-owners (see Plate 1). It is customary for Luos to live in nucleated settlements bearing the name of the father whether he is dead or alive, and all members of his family mostly sons who have not migrated, or built their own homes (villages) reside in the same village. The survey however excluded all



PLATE 1 A rural settlement in West Kano location

rural townships as exemplified by Plate 2 in order to lessen complications in the survey.

The situation in Chemelil Sugar-Estate was simpler because the entire estate had residential camps. Each camp had a unit of houses as shown by Plate 3 numbered and the authority had a record of householders and their designations as well. This system was similar to that of Muhoroni Estate and other estates throughout the sugar-belt. The situation in re-settlement sectors of the sugar-belt required listing "plot-holders". These plots were numbered except in the regions where squatters were settled in camps (see Plate 5). Even in squatters camps each camp had a camp elder who was an administrator for the whole camp (see Plate 6). He too, had a list of all squatters in his camp. In summary, population sample-frame required an exhaustive list of all owners of settlement units in their respective sub-locations, but excluded settlements in predominantly rural townships or marketing centres as in Plate 7.

The sample-frame required only a 5% sample size of the sum of "village-holders", "householders" and "plot-owners". These were then written on small pieces of paper which were later mixed up and selection was then carried out without replacement until the required number



PLATE 2 Ahero Town. (A typical rural township)

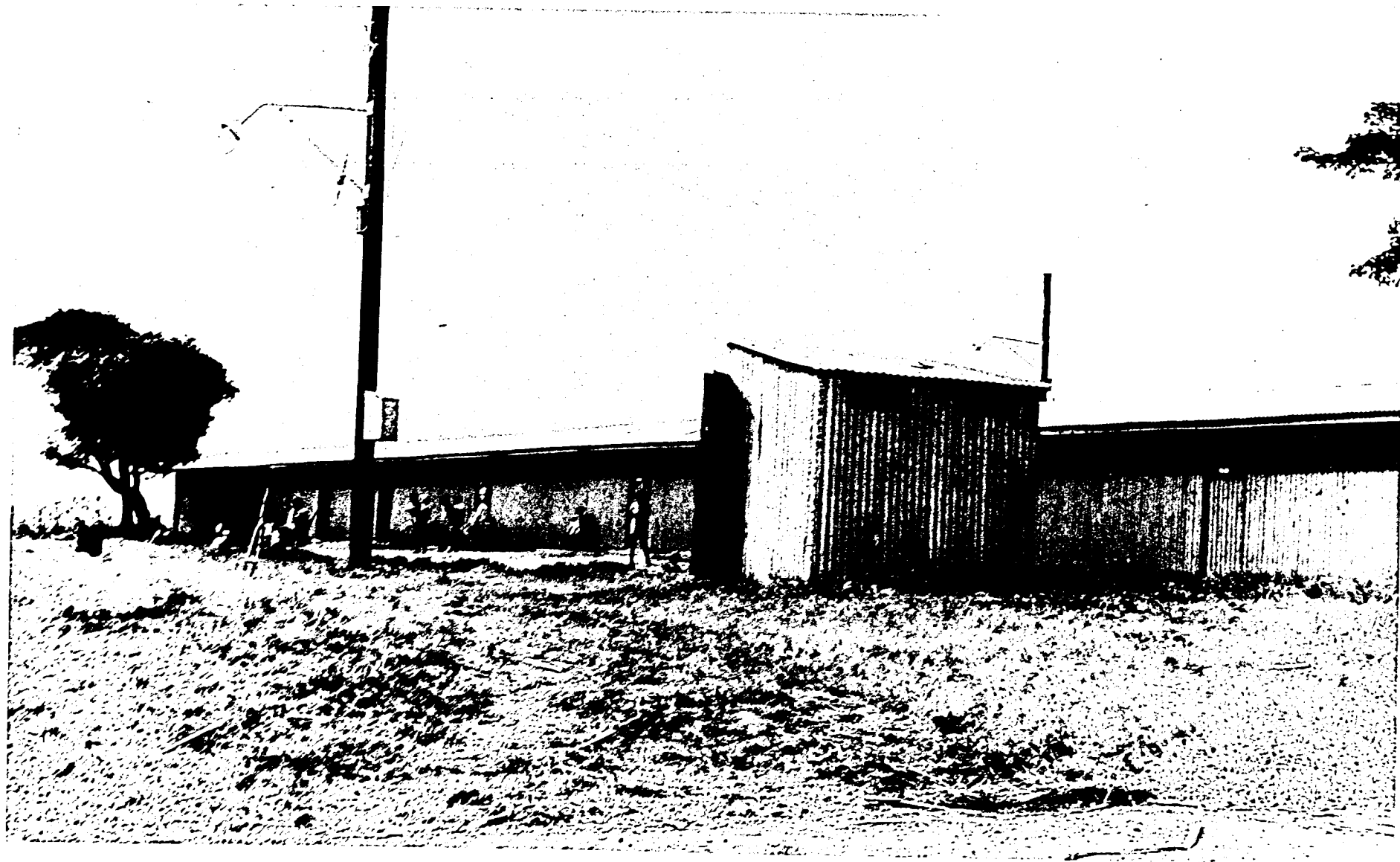


PLATE 3 Low grade housing units at Muhoroni



PLATE 4 Middle income housing units at Muhoroni Sugar Estate



PLATE 5 A typical plot-owner in the Sugar-belt

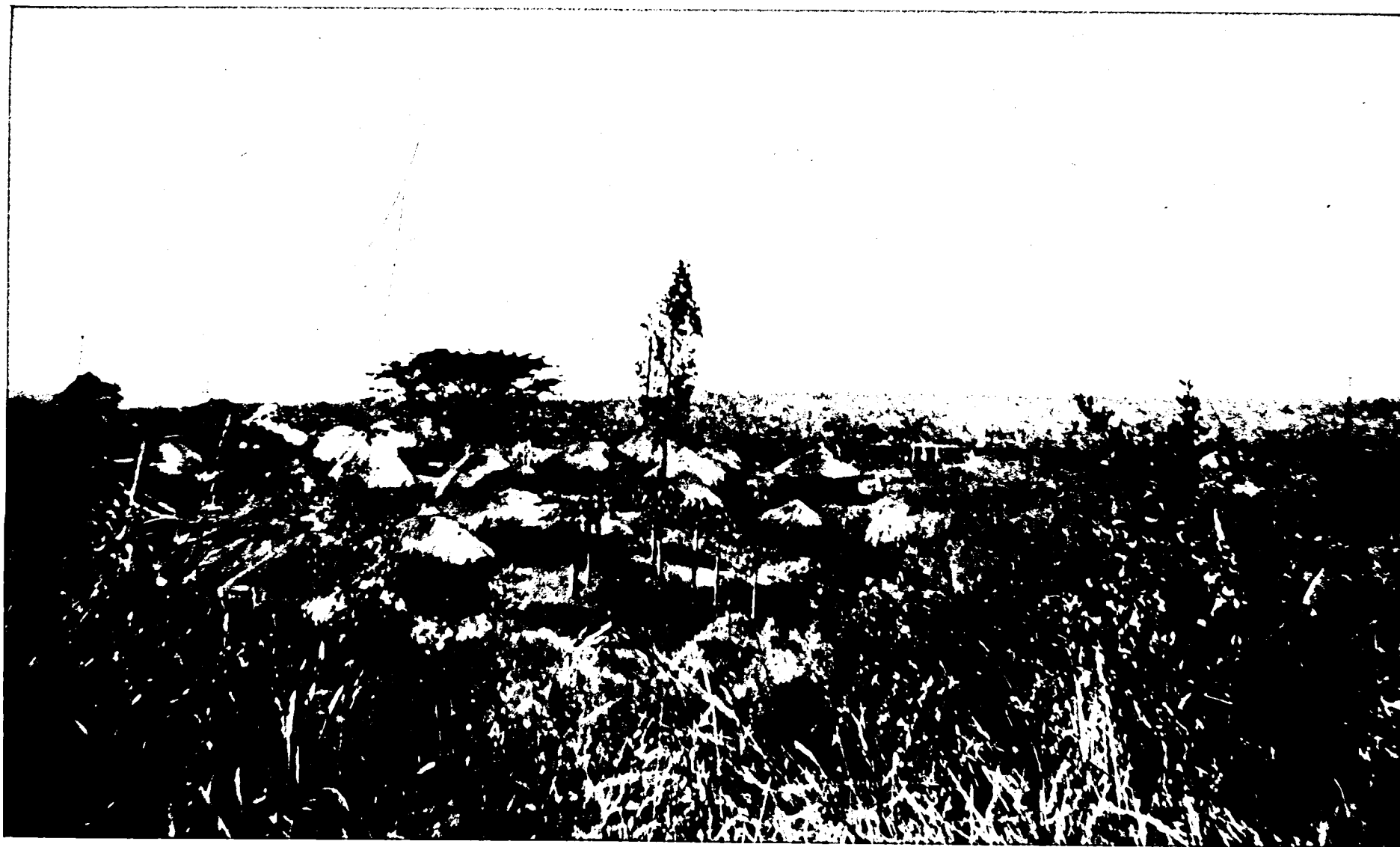


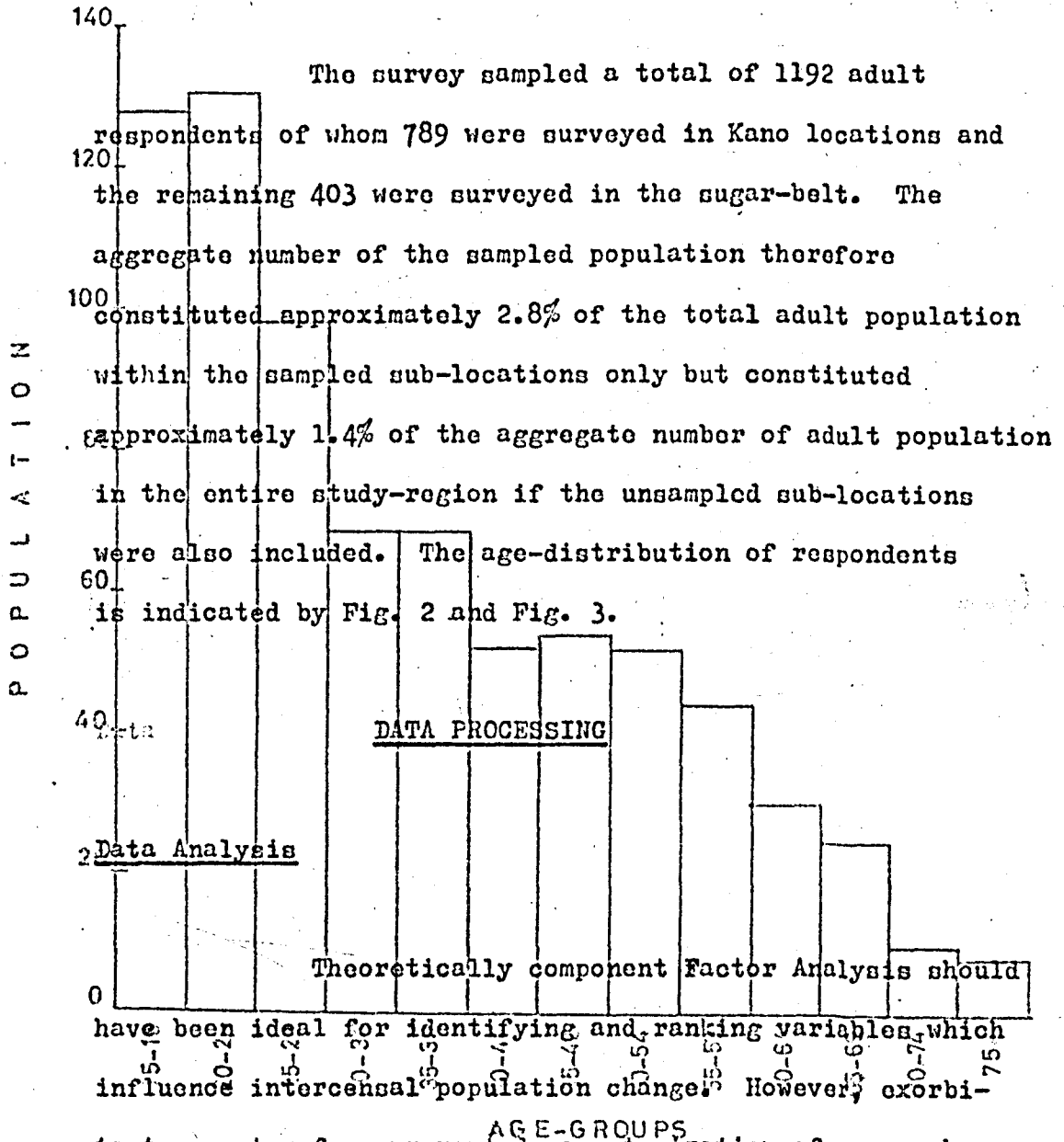
PLATE 6 Squatters camp at Muhoroni



PLATE 7 Muhoroni Town. A typical township in the Sugar-belt

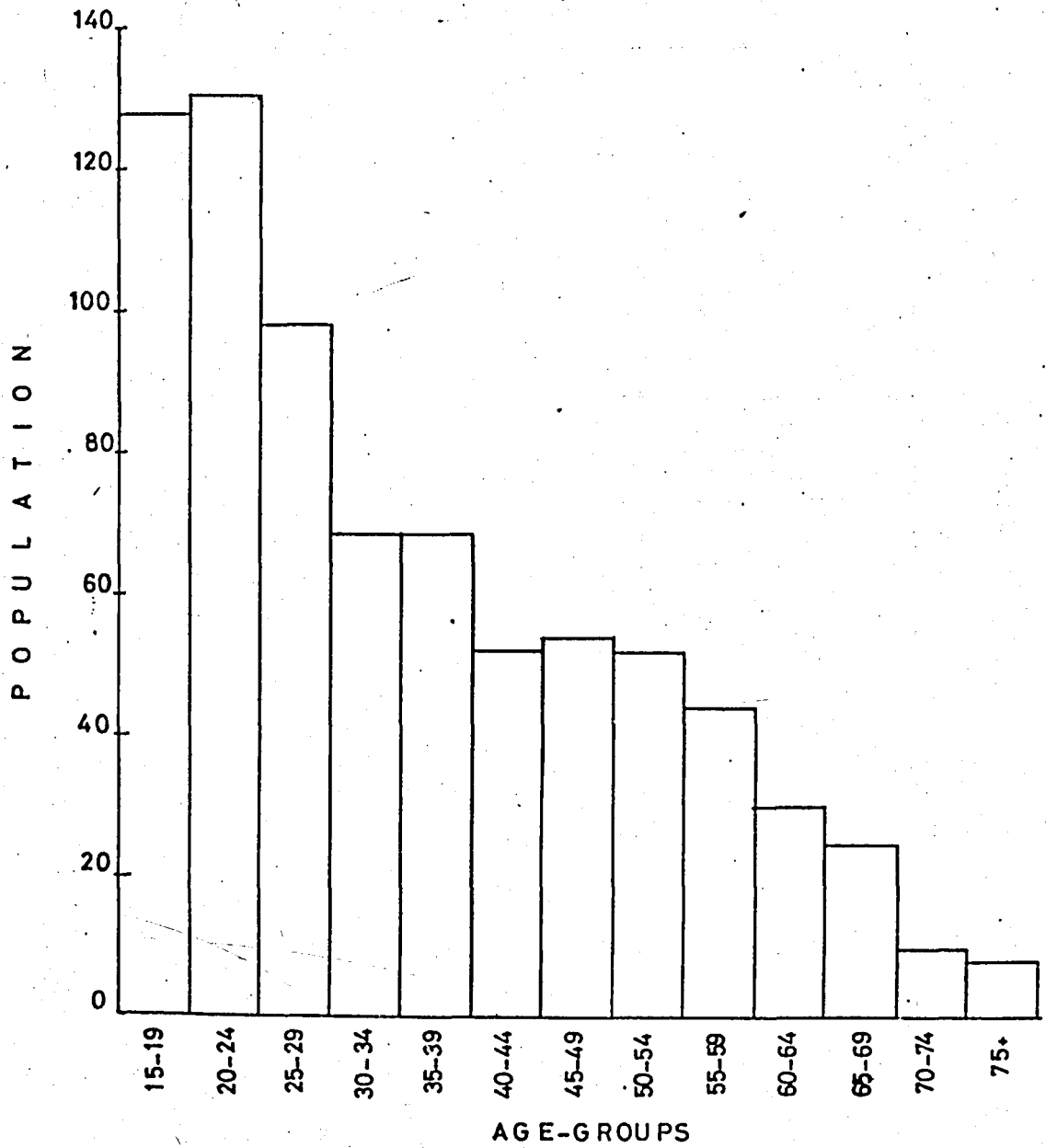
making 5% of the total was attained. This procedure which is similar to a simple random method was carried systematically for all sub-regions separately. The utilization of names made it easier to visit particular settlements thus reducing the role of personal bias in choosing whom to interview. Whenever an enumerator failed to find occupants of a settlement unit after three visits, the adjacent settlement unit was taken as a substitute. Cases of refusals were minimal and because these yielded an insignificant statistical value they have been omitted in statistical computations. Enumeration in every home covered only adult population who were aged fifteen years and above according to official statements of 1969 census survey. Information on children was furnished by their respective mothers only and each adult enumerated furnished information about himself. The questionnaire first designed was pre-tested to determine its practicability and adjustments were made where necessary. This procedure helped in reducing non-sampling errors which could accrue from either mis-interpretation of the questions or inaccuracy in the phraseology of the questions which were in the three major languages spoken in the region, namely English, Dholuo, and Swahili. on which research data were based were too few as the computer required a minimum of twenty-five enumeration areas.

POPULATION AGE-DISTRIBUTION OF RESPONDENTS IN KANO LOCATION



However, exorbitant computer fees prevented computerization of research data, and, experts also believed that the enumeration areas on which research data were based were too few as the computer required a minimum of twenty-five enumeration areas.

FIG. 2 AGE-DISTRIBUTION OF RESPONDENTS IN KANO LOCATION



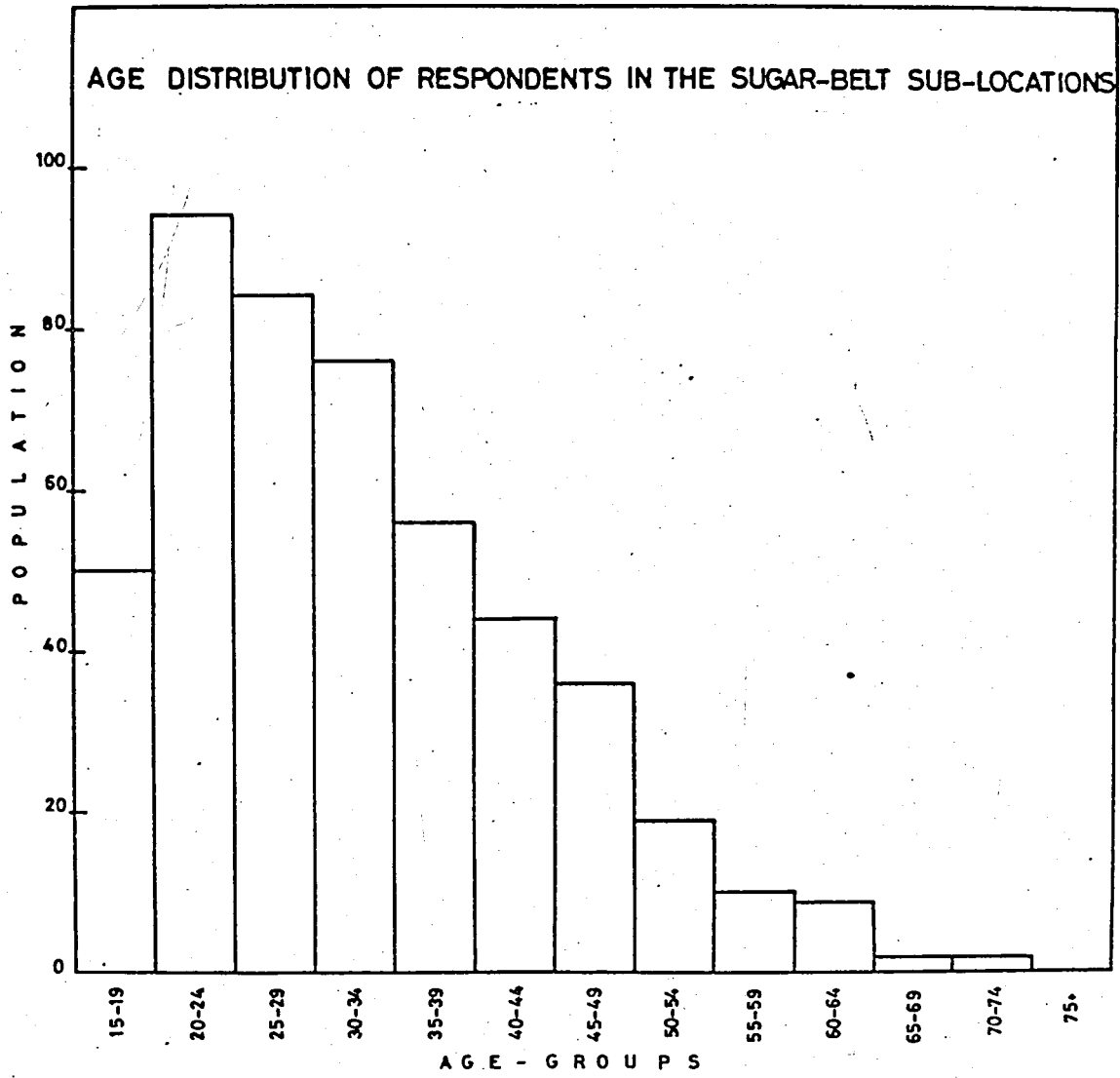


Fig. 3

averages was ~~The other feasible alternative was to use~~ partial correlation analysis in identifying the contribution of individual variables of population dynamics in intercensal population change. Partial correlation analysis could enable one to hold several dependent variables constant while the relationship between one dependent variable and the independent variable is determined. But, the amount of labour involved in the analysis induced a reduction in the number of dependent variables to a manageable size. ~~ing-units and~~ In summary, computer costs compelled the writer to code and analyse data manually although with the help of an electronic calculator the work was manageable. ~~ity in coverage of aggregate number of villages in each~~

Testing Accuracy of Settlement Data

~~deviation for the sugar-belt settlement units did not~~
reflect gross The 5% sample size of aggregate number of villages in Kano sub-location is indicated by Table 2, whereas Table 3 portrays similar information for the sugar-belt regions. The mean and standard deviation of the sample size of villages in Kano were approximately 26 and 2.75 respectively whereas the same measurements for settlement units within the sugar-belt were approximately 59 and 45.8 respectively. On that account, The difference between the two arithmetical

averages was statistically significant as the means referred to different strata of the same universe because in the rural areas clusters of villages were employed as a single unit of settlement in contrast to housing-units or plot-units utilized in the Sugar-belt regions. The plot-units obviously contain a cluster of houses in most instances, consequently, the margin of difference between the designated statistical parameters was expectedly large especially in the Sugar-belt where amalgamation of single housing-units and plot-units was substantial. The summary of analysis is as follows: The low statistical value of rural settlements standard-deviation depicted to a reasonable extent uniformity in coverage of aggregate number of villages in each sub-location. Furthermore, the moderately high standard-

deviation for the Sugar-belt settlement units did not reflect gross error in complete coverage of settlement units,

but mirrored slightly different strata of settlement within the sub-locations which were entirely for re-settlement

and those which were privately owned as sugar-estates or those with a mixture of settlement modes as Muhoroni. The

re-settlement regions therefore had the population enumerated according to plot-units, whereas the sugar-estates had

the population interviewed according to housing-units. On that account, God-Aburo and Koru had a sum of 341 and 495

Source of Variation	Sum of Squares	D.F.	Variance
Between sample	2975.8	2	$\frac{2975.8}{2} = 1487.9$
Within sample	8467.0	10	$\frac{8467.0}{10} = 846.7$

plot-owners respectively while Chemelil and Muhoroni had an aggregate of 2660 and 1220 householders respectively. The computer Variance Estimate technique was employed for identification of further discrepancies in the extent of complete coverage of settlement units. The null hypothesis for variance analysis stated that the mean of sample sizes of settlement units in Kano location did not diverge significantly from the mean of settlement units in the sugar-belt. But, the alternative hypothesis accepted a significant difference between the means. The summary of analysis is given by Table 4 and the data analysed contained in Table 5. The aggregate number of adult population enumerated from the Table 4 of settlement units for Kano location is contained in Table 2. Data analysis

Source of Variation	Sum of squares	Degrees of Freedom	Mean Square	F
Between sample	2975.8	2	$\frac{2975.8}{2} = 1487.9$	1.8
Within sample	8467.0	10	$\frac{8467.0}{10} = 846.7$	

motors for the sugar-belt were 100.75 and 49.8 respectively. The f distribution test = $\frac{1487.9}{846.7}$ approximately = 1.8 therefore, the observed value of f approximately = 1.8 Kano Plain and the sugar-belt regions in their mode of

but, the expected value at 5% level approximately = 4.10 and the expected value at 1% level approximately = 7.6. The computation therefore revealed our observed value of χ^2 was well below the 5% level and 1% level, hence, there was no significant departure from our null hypothesis. One could therefore conclude that the coverage of settlement units which constituted an important part of the total sample-frame was reasonably accurate. summarized as shown on Table 7 and the original data contained in Table 6.

Testing Accuracy of Population Data

Table 7

The aggregate number of adult population enumerated from the sample size of settlement units for Kano location is contained in Table 2. Data analysis revealed that Kabar, Nyamware, and Sidho East had the largest number of adult population enumerated, whereas in the sugar-belt Chemelil and Muhoroni had the largest turnover. The measures of central tendency used again were the mean and standard-deviation which were 87.7 and 18.7 respectively for Kano locations. But, the same parameters for the sugar-belt were 100.75 and 49.8 respectively.

The value of these statistical parameters further revealed observed value of F approximately = 0.1871 but the expected a significant difference between rural environments of Kano Plain and the sugar-belt regions in their mode of

settlement at 5% level approximately 4.10 and the expected value Variance Estimate technique was again utilized for testing the null hypothesis stating that the mean of adult sample population in Kano did not vary significantly from the mean of adult sample population in the sugar-belt. The alternative hypothesis, however, accepted a significant departure in their mean statistical values. The results of analysis were summarized as shown on Table 7 and the original data contained in Table 6. On Table 2 and Table 3 respectively, there was a higher degree of accuracy in completing the enumeration task.

Enumeration Correlation

Source of Variation	Sum of Squares	Degrees of Freedom	Variance Estimate
Between sample	488.5	2	$\frac{488.5}{2} = 244.2$
Within sample	13048.3	10	$\frac{13048.3}{10} = 1304.8$

The f distribution test = $\frac{244.2}{1304.8} = 0.1871$, therefore, the observed value of f approximately = 0.1871 but the expected value of (p=0.56) to a very strong relation of (p=0.88). The data for West Kano and the Sugar-belt which were analyzed separately also showed stronger associations for

value of f at 5% level approximately = 4.10 and the expected value of f at 1% level approximately = 7.6 we therefore accept the null hypothesis and reject the alternative hypothesis as the observed value was well below the expected value both at the given percentage levels. In summary, though Kano locations and the Sugar-belt vividly revealed a different association between the sample size of settlement units and the population enumerated ($r=+0.44$) and ($r=+0.86$) respectively, as depicted in Table 2 and Table 3 respectively, there was a higher degree of accuracy in completion of the enumeration task.

mean age for West Kano was approximately 35 years according to Enumeration Consistency sub-locations sampled in West

Kano had their mean age approximately 35 years except Vochieng. Testing consistency in the accomplishment of sample enumeration by different groups of enumerators in their respective regions was achieved through inter-correlation analysis of their data. The analysis followed the pattern given in Table 8 and Table 9 for Kano locations and the Sugar-belt respectively. The inter-correlation data for West Kano ranged from a moderately strong association of ($r=+0.56$) to a very strong relation of ($r=+0.88$). The data for East Kano and the Sugar-belt which were analysed separately also showed stronger associations for

no value was below ($r=0.72$). These strong associations not only reflected similarities in the spatial pattern of population distribution within the sub-locations but also mirrored similarities in the accomplished task of enumeration between different groups of enumerators. recorded in Koro whereas Chemelil and Muboroni deviated by values of about

Age-Distribution The analysis of the mean age for the region therefore indicated relative youthfulness of the populace in the sugar-
 Testing the accuracy of age-distribution portrayed by Fig. 2 and Fig. 3 was achieved through computation of age-ratios, sex-ratios, and Whipples index. The mean age for West Kano was approximately 36 years according to Table 10. The entire sub-locations sampled in West Kano had their mean ages approximately 36 years except Kochieng' which had a relatively large deviation of approximately +1.2 years. East Kano similarly had a mean age approximating 36 years which most of its sub-locations approximated well except Sidho-West, Kakola, and Sidho-East with a deviation of about -2 years, +2 years and +1.3 years respectively. These somewhat insignificant deviations in age structure of the adult population sampled not only mirrored similarities in the distributive pattern of cohorts within the sub-locations surveyed but also reinforced the hypothesis that there was a greater uniformity in completion of enumera-

Whipple's indices for Kano locations and
tion by different groups of enumerators.
The age-structure for the sugar-belt as
depicted in Table 14 and Table 17 for the two regions
contained in Table 11, reflected somehow a greater discrepancy
respectively. These indices therefore indicated that
from the sugar-belt region mean of approximately 32 years.
The greatest deviation of -5 years was recorded in Koru
whereas Chemelil and Muhoroni deviated by values of about
+2 years each. The analysis of the mean age for the region
therefore indicated relative youthfulness of the populace
in the sugar-belt which was a potential area for in-migrants
thus endorsing the hypothesis that migration is selective of
youthful population. Moreover, the life expectancy of
cohorts above 20 years in West Kano was generally low due to high mortality rates which
increase with old age, hence the number of adult population
pattern in Nigerian demographic structures. The Nigerian
above cohorts aged 45 years was relatively small in rural
regions.
The standard-deviation for age distribution
in West Kano and East Kano were approximately 14 years and
15 years respectively. For the sugar-belt it was also
about 11 years. Thus whereas the difference in these stati-
stical values was significant, the difference between the
going age for secondary education is between 14-15 years and
same parameters for Kano locations was obviously insignificant.
Further tests on accuracy of age-distribution revealed some
discrepancies which could be attributed to migration, mortality
pattern, or faulty enumeration.

Whipples indices for Kano locations and

The cohort aged 30-34 years also featured a the Sugar-belt were approximating 100% in each case as ranked deficiency in age distribution and this definitely depicted in Table 14 and Table 15 for the two regions was a product of out-migration of adult males whose numbers respectively. These indices therefore indicated that in the Sugar-belt out-balanced males in other cohorts. This there were no preference for ages ending with the digit zero or with the digit five.

The cohorts aged 45 years also showed features of both

migrational influence and mortality effects.²⁹ Furthermore, Age-Ratio

fairly obvious features of age mis-reporting among adults could be identified. Of the males, the cohort aged 15-19 years in West Kano definitely revealed effects of either migration or faulty enumeration for it had values lower than those of cohorts above 20 years. O. E. Umoh, who analysed the Nigerian census results of 1963 identified a similar distributive pattern in Nigerian demographic structure.²⁷ The Nigerian pattern was attributed to political motives because only males aged 20 years and above were eligible to register as voters; therefore, most of the males within the 15-19 age cohort opted for the next higher cohort. A similar demographic structure identified in Kano regions, however, could be explained by the realization that the common school-going age for secondary education is between 15-19 years and most teenagers not attending secondary schools often migrate to the major economic islands of development where job opportunities are more abundant.

The cohort aged 30-34 years also featured a marked deficiency in age distribution and this definitely was a product of out-migration of adult males whose numbers in the Sugar-belt out-balanced males in other cohorts. This is because migration tended to be selective of these ages. ²⁸

The cohorts aged 45 years also showed features of both migrational influence and mortality effects. ²⁹ Furthermore, phenomena is that among Luo women it is commonplace to fairly obvious features of age mis-reporting among adults conceal the sex of male babies due to a traditional taboo, could be identified in cohorts aged 50-54 years and 65-69 years. The age-ratio for East Kano sub-locations were apparently more realistic according to Table 16 and Table 17. Nevertheless, apparent features of under-enumeration might have affected the cohorts aged 10-14 years for its distributive pattern in African communities should elicit an excess number of children aged above 5 years and below 14 years. ³⁰ The remaining male cohorts however revealed discrepancies similar to those of West Kano and were caused by similar phenomena.

Age-ratios for females in West Kano illustrated

even greater discrepancies for the age-ratio of 1.7680 for the cohort aged 1-4 years elicited features of over-enumeration. This finding contradicted the United Nations Report which stated: affected again the cohort aged 5-9 years and under-estimation or out-migration affected teen-age years. Other cohorts

showed a fair distribution except for probable features of "Age mis-reporting among females in Africa and India is due to over estimate of the age ratios also revealed a similar distributive pattern except for the extremely low values for cohorts aged 25-29 years and 35-39 years which could be attributed to relative deficit in 0-4 years." ³¹

According to Table 16.

A sound explanation for this demographic

phenomenon is that among Luo women it is commonplace to

~~Sex-Ratio~~ conceal the sex of male babies due to a traditional taboo,

hence, during childhood male babies are commonly dressed

as female babies and are readily presented as females to strangers. The childhood age therefore had inflated values

Female dominance. In other words, male dominance featured for East Kano as well according to Table 17. Furthermore, prominently throughout childhood but was transformed into an features of under-enumeration affected heavily cohorts

excess of females up to the age of 64 years. V.R. Dorjahn aged 10-14 years and 15-19 years especially in West Kano

attributed this demographic phenomenon to the result of sex differentials in mortality. ³² This demographic structure was

sely affected. Features of age mis-statement amongst older typical of rural regions which were heavily plagued by out-migration of male proletarians. Furthermore, the excessive number of males in cohorts above 65 years revealed features

of age mis-reporting. The demographic structure of East

The age-ratios for males in the sugar-belt Kano yielded a sex-ratio which depicted female dominance depicted a unique pattern. Features of over-estimation throughout childhood according to Table 17, except for cohort affected again the cohort aged 1-4 years and under-estimation aged 5-9 years. The negative factor of this demographic pattern was probably either over-estimation of the female or out-migration affected teen-age years. Other cohorts

showed, a fair distribution except for probable features of ³³ age-mis-statement affecting older cohorts. The female age-ratios also revealed a similar distributive pattern except for the extremely low values for cohorts aged 25-29 years and 35-39 years which could be attributed to out-migration according to Table 18. led male dominance in childhood 0-4 years followed by female dominance in late childhood, and Sex-Ratios before changing into male predominance above 25 years onwards. In summary, the pattern of age distribution reflected that West Kano featured male dominance in cohorts aged 0-4 except for cohorts aged 1-4 years which revealed female dominance. In other words, male dominance featured prominently throughout childhood but was transformed into an excess of females up to the age of 64 years. V.R. Dorjahn attributed this demographic phenomenon to the result of sex differentials in mortality.³² This demographic structure was typical of rural regions which were heavily plagued by out-migration of male proletariats. Furthermore, the excessive number of males in cohorts above 65 years revealed features of age-mis-reporting. The demographic structure of East Kano yielded a sex-ratio which depicted female dominance throughout childhood according to Table 17 except for cohort aged 5-9 years. The causative factor of this demographic pattern was probably either over-estimation of the female

number, or the high infant mortality rate which affects mostly males.³³ The pattern for East Kano is however very irregular

above the age of 10 years; probably due to in-migrational and out-migrational features affecting the region.

The sex-ratio for the Sugar-belt region in

Table 18 vividly revealed male dominance in childhood 0-4 years, followed by female dominance in late childhood, and

early youth before changing into male predominance above 25

years onwards. In summary, the pattern of age distribution

reflected theoretically more the effects of migration than

either faulty enumeration or mortality rates in determining

differentials in population distribution within the two

regions. The last chapter concerned itself with population

projection and the role of population change in regional-

urban planning followed by a general conclusion

and recommendations for other avenues of research.

The Outline of Chapters

Chapter two gives a brief exposition of the regions, or the geography of the regions with a bias towards the contribution of ecological variables in determining demographic pattern and variations within the study region. The contribution of historical background and socio-cultural phenomena in influencing the structure of population dynamics

is also expounded.

Chapter three is for literature review on theories of population change. Other literature discussing actual studies on population change in selected countries, as well as available literature discussing methods used for calculating intercensal population changes, are also reviewed.

Chapter four analyses the raw data of the survey and discusses at length causative factors yielding the type of data analysed. Chapter five focusses on the null and alternative hypotheses of the thesis and highlights the techniques used to arrive at the given conclusions. The last chapter concerns itself with population projection and the role of population change in regional-urban planning followed by a brief general conclusion and recommendations for other avenues of research.

6. Guinda, S.H. and Ojany, P.F. - "The Koro Plain - A Geographical Challenge" In *African Scientist* edited by T.R. Ochieng, East African Publishing House, Nairobi, 1969, p. 7.

7. Guinda, S.H. - *Land and the Population in the Western Districts of Nyassa Province, E.A. Shariq (London)*

REFERENCES April, 1963, in University of
Nairobi Library, p. 63.

18 Freedman Ronald - "The Sociology of Human Fertility."
In: Social Demography, edited by
Thomas R. Ford and G.S. de Jong,
Englewood Cliffs, N.J.; Prentice-
Hall, 1970, pp. 40-45. Challenge on
Freedman Ronald - ibid p. 44. Department of Geography,
University of Nairobi, 1967, p. (x).
Blacker, C.P. = "Stages in Population Growth,"
(1949) by B.H.C. In: The Eugenics Review, Vol. 39,
1947, pp. 87-102. In: National
Republic of Kenya (1973) - Kenya National Report to the United
Nations on Human Environment, 1973
Government Printers, Nairobi,
pp. 1-8. Population in the U.N.A.S.
Ominde, S.H. and - "The Kano Plain - A Geographical
Ojany, F.F. Challenge". In: African Scientist.
edited by T.R. Odhiambo, East
African Publishing House, Nairobi,
1969, p. 7. Population and
Ominde, S.H. - Land and the Population in the
Western Districts of Nyanza
Province, Ph.D. Thesis (London) 1966,
p. 66.

- 15 United Nations -- April, 1963, in University of Nairobi
Nairobi Library, p. 63. No. 58.
- 8 Whisson Michael -- Change and Challenge - Luos Societal
16 Ominde, S.H. -- and Economic Structure. Printed by
17 Afalabiojo, C.J. -- Acme Press Ltd., Nairobi, p. 88.
- 9 Ominde, S.H. -- Ph.D. Thesis (London), 1963, p. 101.
- 10 Millman, R.N. -- Settlement Change and Challenge on
Kanor Plains, Department of Geography,
University of Nairobi, 1967, p. (x).
- 11 Millman, R.N. -- ibid. pp. 29. See A. Co. Ltd., 1968.
- 12 Eversley, D.E.C. -- "Population Changes and Regional
Zopf, F.E. Policies since War." In Regional
Studies, Vol. 5, Pergamon Press, 1970,
Great Britain, 1970, pp. 211-228.
- 13 Zelinsky Wilbur -- "Changes in the Geographic Patterns
19 Yates, P. -- of Rural Population in the U.S.A.
1790-1960." In Geographical
Review, Vol. 52, 1962, pp. 492-524.
- 14 Notestein Frank, -- "Some Economic Aspects of Population
20 Wainin, R.A. -- Change in the Developing Countries" in
Population Dilemma for Latin
America, Edited by J. Mayone, J. Caldwell
Stycos and Jorge Arias, the American
Assembly, Columbia University, 1966,
p. 88.

- 15 United Nations = "The Future of World's Population"
In ST/SOA/SER/28 Sales No. 58:page
X III:2, New York. edited by
- 16 Ominde, S.H. - ibid. p. 128.
- 17 Afalabiojo, G.J. - "Some Cultural Factors in the
Critical Density of Population in
Tropical Africa". In Population
and Gaiois, S.K. C.J. Caldwell and C. Okonjo, In
Longmans, Green & Co. Ltd., 1968.
- 18 Smith, T.L. and - "The Numbers and Geographic
Zopf, P.E. Distribution of Population". In
Demography: Principles and Methods,
Davis Co. Ltd., Philadelphia, 1970,
P. 41. - A Preliminary Report on
- 19 Yates, F. - Sampling Methods for Censuses and
Surveys. 3rd edition, 1960, Charles Griffin & Co. Ltd., publishers,
London, p. 29. African Studies
- 20 Henin, R.A. - "Second Thoughts on Sudan's Population
Census." In The Population of
Tropical Africa, edited by C.J. Caldwell
and C. Okonjo, Longmans, Green & Co.
Ltd., 1968, pp. 142-151. Africa,

- 21 Dorjahn, V.R. - "Incidence and Intensity of - 308.
- 25 Dorrie, H.D. - Polygny" In: Continuity and Change in African Cultures. edited by Philip W.R. Basson and Melville J. Herskovits, University of Chicago Press, 1959, pp. 109-110. Vol. 5.
- 22 Caldwell, J.C. - "Methods of Population and Family Planning Research Problems in and Gaisie, S.K. their Application in Africa." In Rural Africana No. 14, editor: David Radel, A publication of the African Studies Centre, Michigan State University, 1971, p. 57.
- 23 Hood Christopher - "Gathering Vital Statistics in Africa: A Preliminary Report on the Recording of Births and Deaths in Tanzania." In Rural Africana No. 14, editor David Radel, A publication of African Studies Centre, Michigan State University, 1971, p. 25.
- 27 Umoh, O.E. - 1971, p. 62.
- 28 Dorrie, H.D. - "An Estimate of Fertility in Some United Nations - Yao Hamlets of Liwonde District of Southern Nyasaland." In Africa,

- XIX, October, 1949, pp. 293-308.
- 25 Borrie, W.D. - "International Migration as
32 Related to Economic and Demographic
Problems of Developing Countries."
In: E/CONF./41, World Population
Conference: Proceedings Vol. I,
United Nations, New York, 1965,
Chapter 9.107.
- 26 Craig, J. George, - "Estimating the Age and Sex
N. Structure of Net Migration for a
Sub-region: A Case Study: North
and South Humberside, 1951-1961."
In Regional Studies, Vol. 4,
Pergamon Press, Great Britain,
1970, pp. 333-347.
- 27 Umoh, O.E. - "Demographic Statistics in Nigeria"
In Population Growth and Economic
Development in Africa. Edited by
S.H. Ominde and C.N. Ejiogu,
Heinemann Publishers, 1972, pp. 21-25.
- 28 Borrie, W.D. - Loc cit.
- 29 Craig, J. (1970) - ibid, pp. 345-346.
- 30 United Nations - Manual IV; Methods of Estimating
Basic Demographic Measures from

Incomplete Data, ST/SOA/SER/42;

New York, 1956, pp. 1-26.

- 32 Dorjahn, V.R. - "Incidence and Intensity of Polygny" In Continuity and Change in African Culture; editor, W.R. Bascon and M.J. Herskovits; University of Chicago Press, 1959, p. 107.

- 33 Barclays George, - Techniques of Population Analysis, W. ~~CHAMBER~~ WILEY, (1958) New York.

ECOLOGICAL BACKGROUND AND ECONOMIC ACTIVITIES

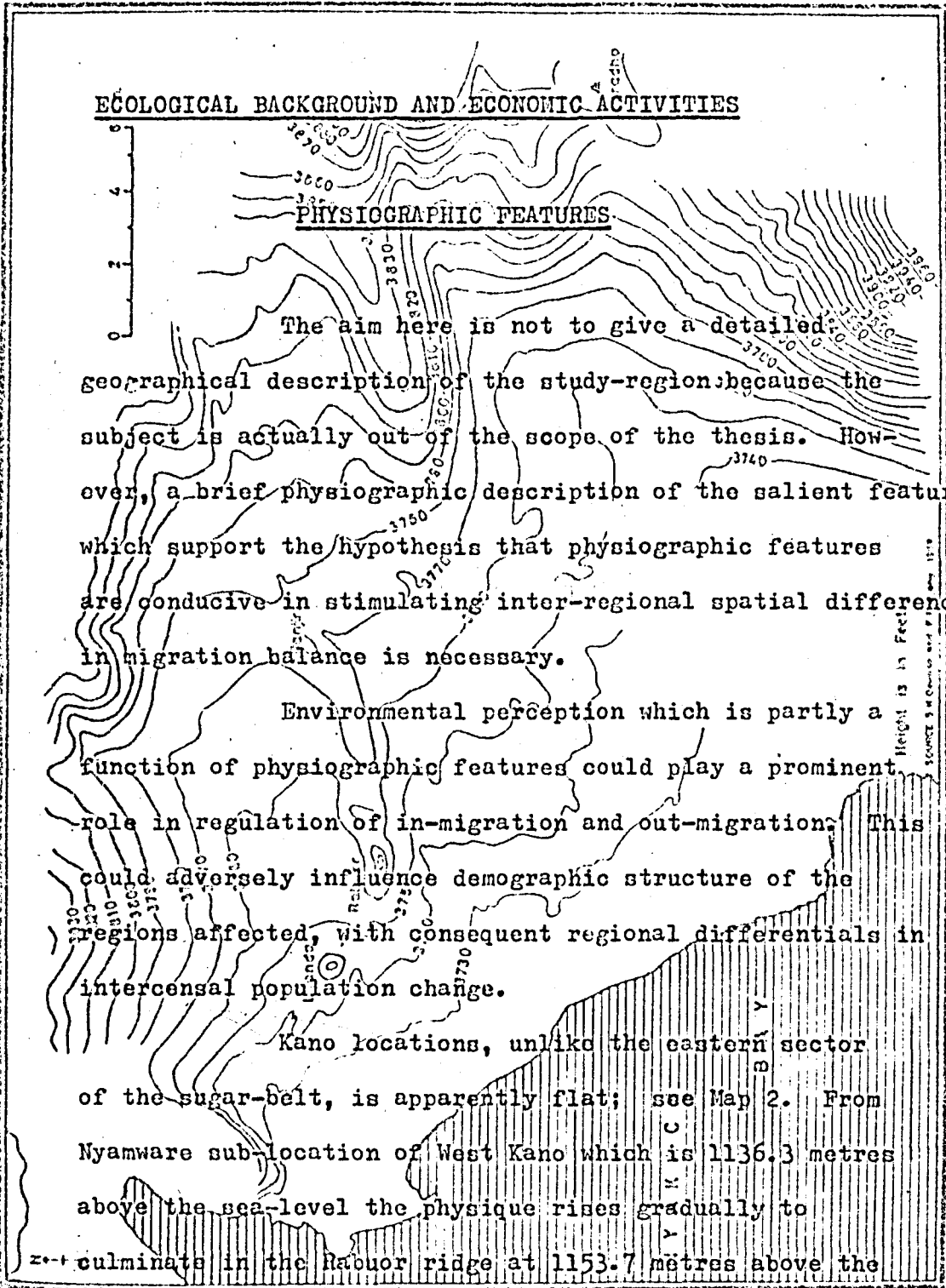
ECOLOGICAL BACKGROUND AND ECONOMIC ACTIVITIES

PHYSIOGRAPHIC FEATURES

The aim here is not to give a detailed geographical description of the study-region because the subject is actually out of the scope of the thesis. However, a brief physiographic description of the salient features which support the hypothesis that physiographic features are conducive in CHAPTER II inter-regional spatial differences in migration balance is necessary.

Environmental perception which is partly a ECOLOGICAL BACKGROUND AND ECONOMIC ACTIVITIES prominent role in regulation of in-migration and out-migration. This could adversely influence demographic structure of the regions affected, with consequent regional differentials in intercensal population change.

Kano locations, unlike the eastern sector of the sugar-belt, is apparently flat; see Map 2. From Nyamware sub-location of West Kano which is 1136.3 metres above the sea-level the physique rises gradually to culminate in the Rabbor ridge at 1152.7 metres above the sea-level. East Kano has similar ridges of phonolitic lava forming Waradho Hill in Ketele Mawidhi 1243.6 metres, Anasi,



ECOLOGICAL BACKGROUND AND ECONOMIC ACTIVITIES

PHYSIOGRAPHIC FEATURES

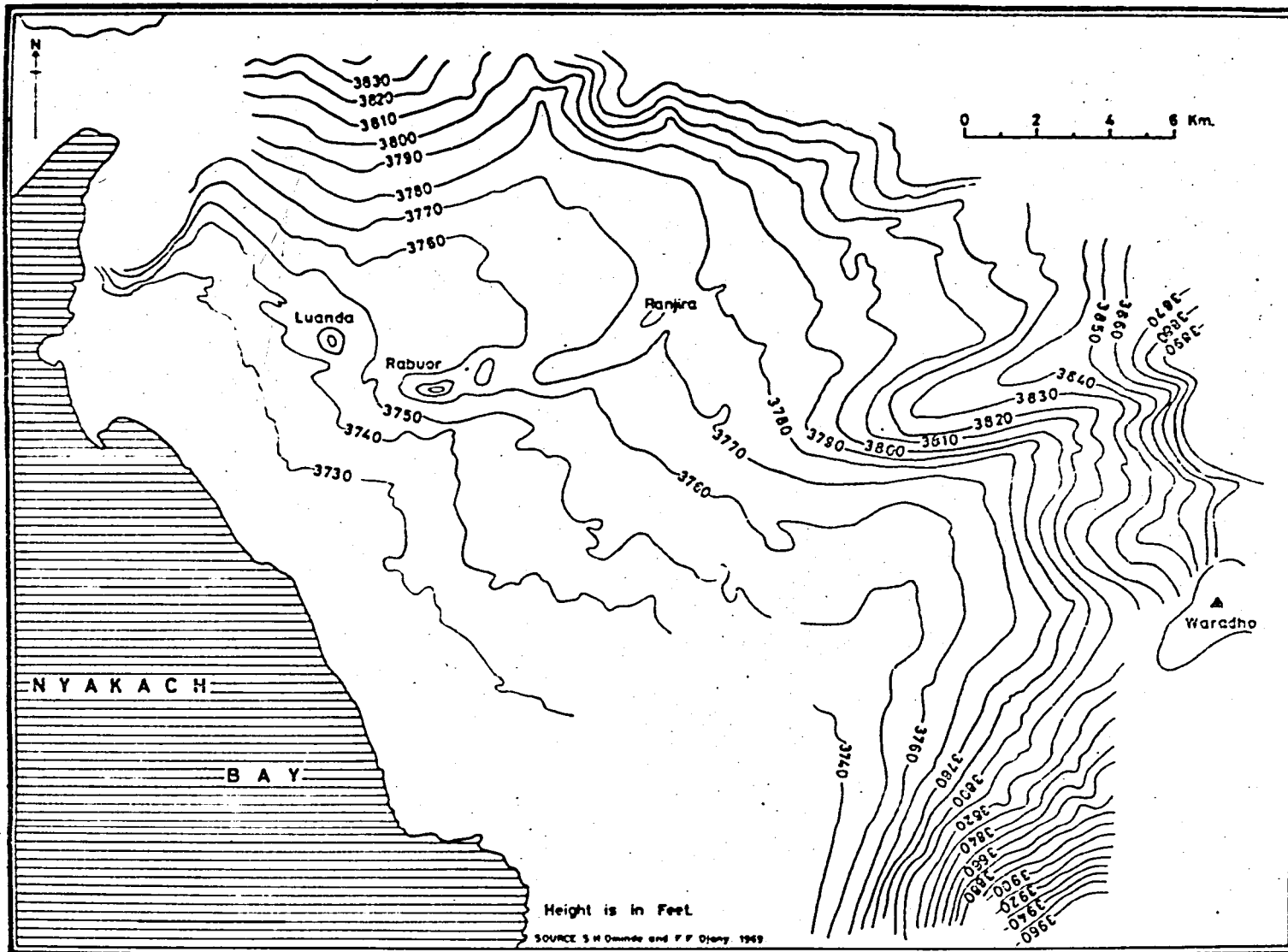
The aim here is not to give a detailed geographical description of the study-region because the subject is actually out of the scope of the thesis. However, a brief physiographic description of the salient features which support the hypothesis that physiographic features are conducive in stimulating inter-regional spatial differences in migration balance is necessary.

Environmental perception which is partly a function of physiographic features could play a prominent role in regulation of in-migration and out-migration. This could adversely influence demographic structure of the regions affected, with consequent regional differentials in intercensal population change.

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MAP 2 KANO LOCATIONS AND THE SUGAR-BELT AREA: MICRO-RELIEF.



MAP 2 KANO LOCATIONS AND THE SUGAR-BELT AREA: MICRO-RELIEF.

Obudho, and Minyange ridges.¹ In a nutshell, the bulk of West Kano is apparently a flat plain while most of East Kano is a comparatively undulating low plateau. Lava outcrops which bear the micro-relief features of the region is best summarized by the physical report of Sir Alexander Gibb and Partners (1956) which identifies two micro-regions in Kano locations. The report categorizes West Kano as a "flat zone" having a gradient of 1:49 metres, while the bulk of East Kano forms the "irregular sub-units" with a gradient of 1:46 metres. This zone however extends into parts of the sugar-belt region of Kibos, Chemelil, and Muhoroni.² The sugar-belt on the other hand has a "complicated physique with tongues of lava flow from both the Kericho Volcanics and Tinderet groups. Rivers incision have now divided it into ridges which wedge out into the plain."³ The physical report of Sir Alexander Gibb and Partners categorized the region as falling within the "foothill-proper zone" which has a gradient of 1:30 metres and rises to 1219.2 metres above sea-level. Unlike the Kano locations this zone does not have a deranged drainage system and never experiences floods. The low gradients of Kano locations encourage frequent river meandering and migration of river courses. Expected consequences during torrential downpour are

disruption of settlement units; and ultimate loss of lives caused by submersion of cultivatable land and other modes of traditional economy. Furthermore, pockets of lava outcrops which become dry islands during floods become attractive areas for settlement, hence, these interiorized ridges suffer from acute population pressure. The physical structure of the plain therefore has stimulated inter-regional migration from the constantly flooded lower portions of West Kano to the relatively higher and drier parts of East Kano. The sub-locations heavily affected in West Kano are Kawino, Kadhiambo, Bwanda, and parts of Nyamware; whereas, in East Kano, the sub-locations most affected are Kakola and Kochogo. One would therefore expect heavy out-migration from these sub-locations with a consequent depressing effect on positive intercensal growth amongst these sub-locations.

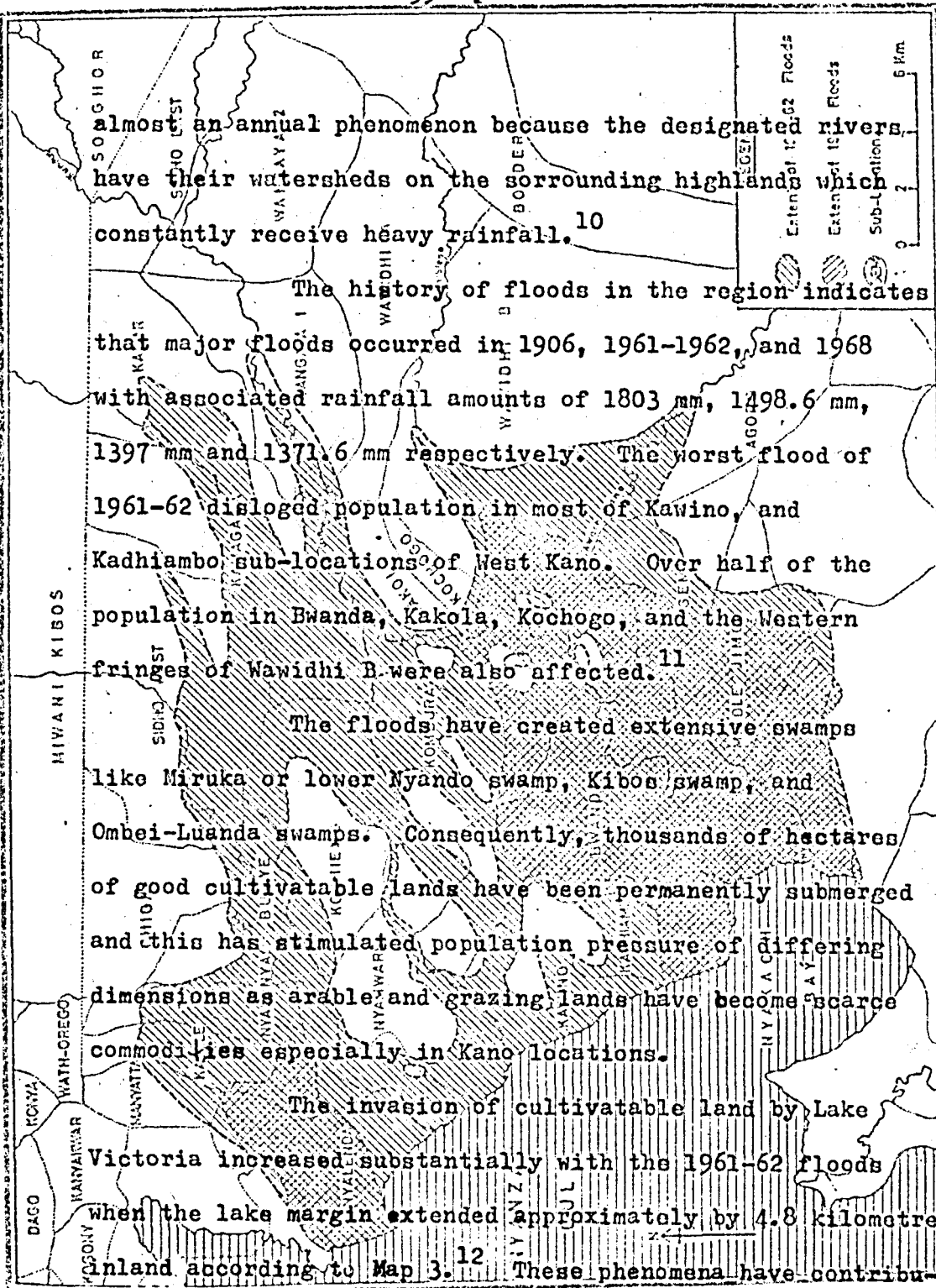
of the long rains before cultivation and planting crops are

Soil Features Farming has therefore become a risky business in a region where rainfall occurrence is highly unpredictable. Furthermore, The floor of Kano locations and the Sugar-belt consists mainly of pleistocene lacustrine deposits which form black-cotton soils.⁴ The predominant soil types are sandy clays and clayey loams which are brown to black in colour. The clay content in these soils vary

from 35% to 60% in the top soil and 40% to 70% in the sub-soil respectively. Furthermore, the silt content in these soils is approximately 20% in the top soils.⁵ The eastern sector of the Sugar-belt has "banded fossiliferous argillaceous sediments around Koru, Songhor and Orudho which areas are pockets of sedimentary rocks; miocene sediments, and tuffs locally called Koru beds, also exist."⁶ The soil structure affects mostly the drainage system and agricultural economy of the region. When these soils are moistened, they become impermeable thus encouraging water-logging for several days. Black cotton soils therefore become problematic to rural farmers because during a prolonged drought these soils crack and become stony hard.⁷ Cultivation with traditional tools is thus become difficult without the blessings of early showers. This situation normally compels farmers to wait for the onset of the long rains before cultivation and planting crops are initiated. Farming has therefore become a risky business in a region where rainfall occurrence is highly unpredictable. Furthermore, black cotton soils quickly lose their fertility after a long duration of cultivation as their blackness is not due to organic contents, but is the result of prolonged water logging and poor aeration of the soils.⁸ The soils in Kano locations which are apparently impoverished as a

result of excessive cultivation now require constant re-fertilization, and farms which are not fertilized rarely produce enough grain for consumption. ¹⁰ X The alluvial soils eroded from the fringing highlands are mostly deposited into the scattered swamps, or lower areas of the plains which are mostly submerged. These extensive tracts of land are only suitable for cash-crops like paddy-rice and sugar-cane. The subsistence requirements of the natives whose preference for millet and maize exceeds that for rice, produce obstacles to the success of commercial farming in the region. It is therefore common that even during periods of good harvests majority of the indigenous tribe still suffer from famine. The sugar-belt on the other hand has well drained soils because of its gradient. Moreover, tectonic activities in the region produced several lava outcrops whose slopes offer good settlement zones. The lower regions are therefore suitable for extensive farming. Lands have become scarce commodities especially in Kana locations.

Drainage The invasion of cultivatable land by Lake Victoria increased substantially with the 1961-62 floods when the lake. The major drainage channels in the region are Nyando, Luanda, and Kibos. These rivers occasionally migrate from their courses and meander over the plain during periods of heavy rainfall. Flooding has in fact become



MAP 3 EXTENT OF THE 1961-62 AND 1968 FLOODS

almost an annual phenomenon because the designated rivers have their watersheds on the surrounding highlands which constantly receive heavy rainfall. ¹⁰

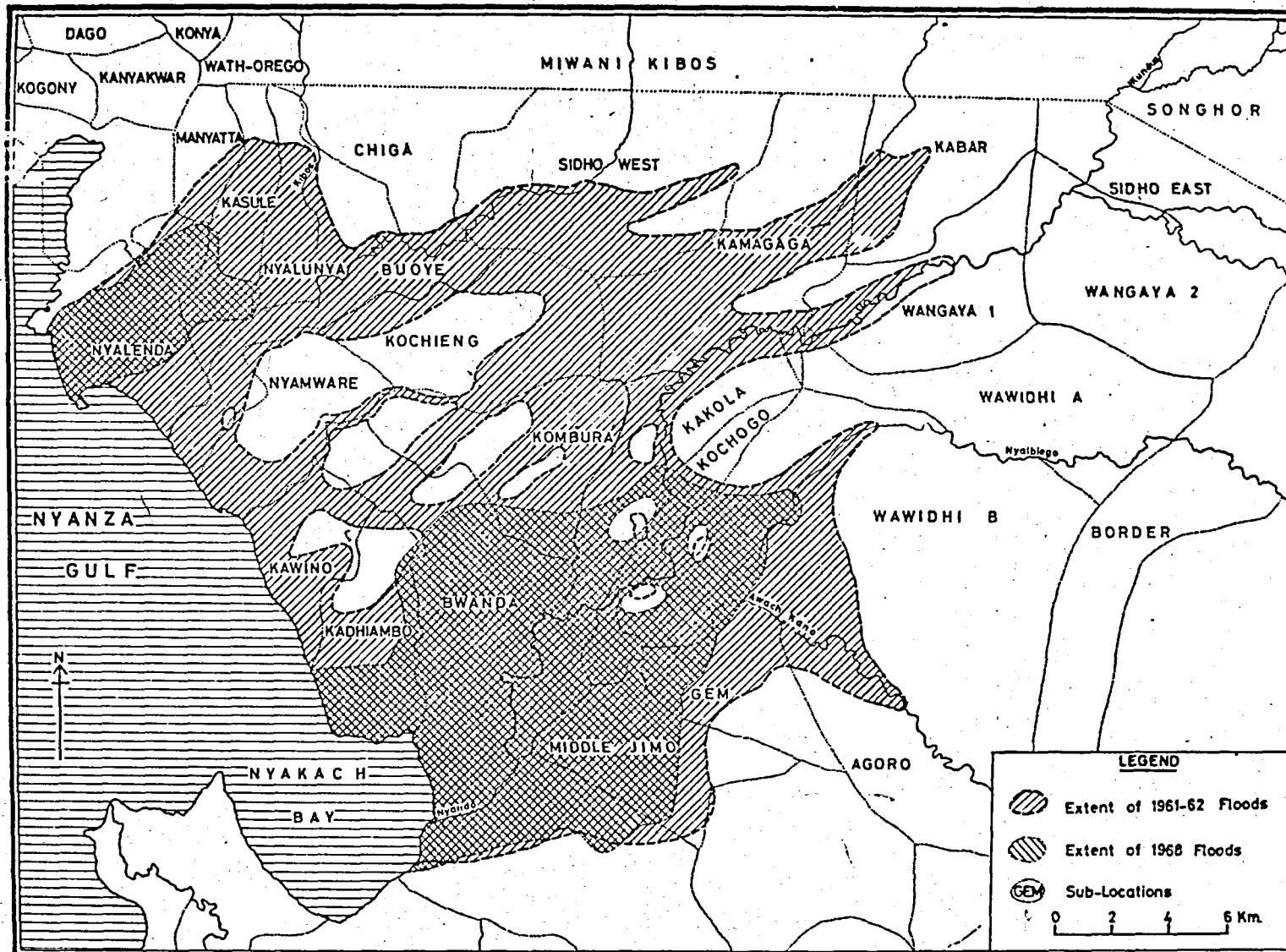
The history of floods in the region indicates that major floods occurred in 1906, 1961-1962, and 1968 with associated rainfall amounts of 1803 mm, 1498.6 mm, 1397 mm and 1371.6 mm respectively. The worst flood of 1961-62 dislodged population in most of Kawino, and Kadhiambo sub-locations of West Kano. Over half of the population in Bwanda, Kakola, Kochogo, and the Western fringes of Wawidhi B were also affected. ¹¹

The floods have created extensive swamps like Miruka or lower Nyando swamp, Kibos swamp, and Ombei-Luanda swamps. Consequently, thousands of hectares of good cultivatable lands have been permanently submerged and this has stimulated population pressure of differing dimensions as arable and grazing lands have become scarce commodities especially in Kano locations.

The invasion of cultivatable land by Lake Victoria increased substantially with the 1961-62 floods when the lake margin extended approximately by 4.8 kilometres inland according to Map 3. ¹² These phenomena have contribu-

ted to the scarcity of good habitable land and a subsequent mass out-migration from Kano Plain to other potential

SOURCE: S. O. Oduro and P. P. Oduro, 1963



SOURCE: S.M. Omide and F.F. Ojary 1983.

MAP 3 EXTENT OF THE 1961-62 AND 1968 FLOODS

1
60
1

Climatic regions for settlement as Olambwe Valley in South Nyanza, or the sugar-belt region. It is therefore hypothesized

that floods have encouraged differences in inter-regional Thomsite (1948). Such a climate is characterized by a balance of net migrants. A

high rate of erosion and siltation causing transformation in the soil which has impeded drainage. Furthermore, a deranged drainage pattern which characterises the relatively lower sectors of Kano experiences a high annual rainfall total ranging from 990.6

locations could yield suitable ecological conditions along the lake margin to 1000 mm, the amount increases favouring multiplicity of water borne diseases vectors.

eastwards to the Sugar-belt. The prevalence of water borne diseases could also contribute

substantially to mortality rates of the regions depending on the degree of infestation and protection accorded. The study-region therefore has a bimodal pattern of rainfall distribution with the second peak becoming more prominent in the higher portions of the

Moreover, ecological factors cause tremendous Sugar-belt. The least rains for both regions occur between variations in "environmental perception" among inhabitants.

March-May according to Fig. 4 while the second maxima The variations in evaluation of a place utility definitely occur between August-September, encourage imbalances in population spatial mobility and a

The second peak is highly unreliable on the consequent depressing effect on the demographic structure plain and is usually preceded by 9 months of drought. of the sub-groups.

The unreliability in the time of occurrence of the first

In summary, almost in every 50 years disastrous maxima and unreliability in the occurrence of the second floods occur and this phenomenon has encouraged the govern-

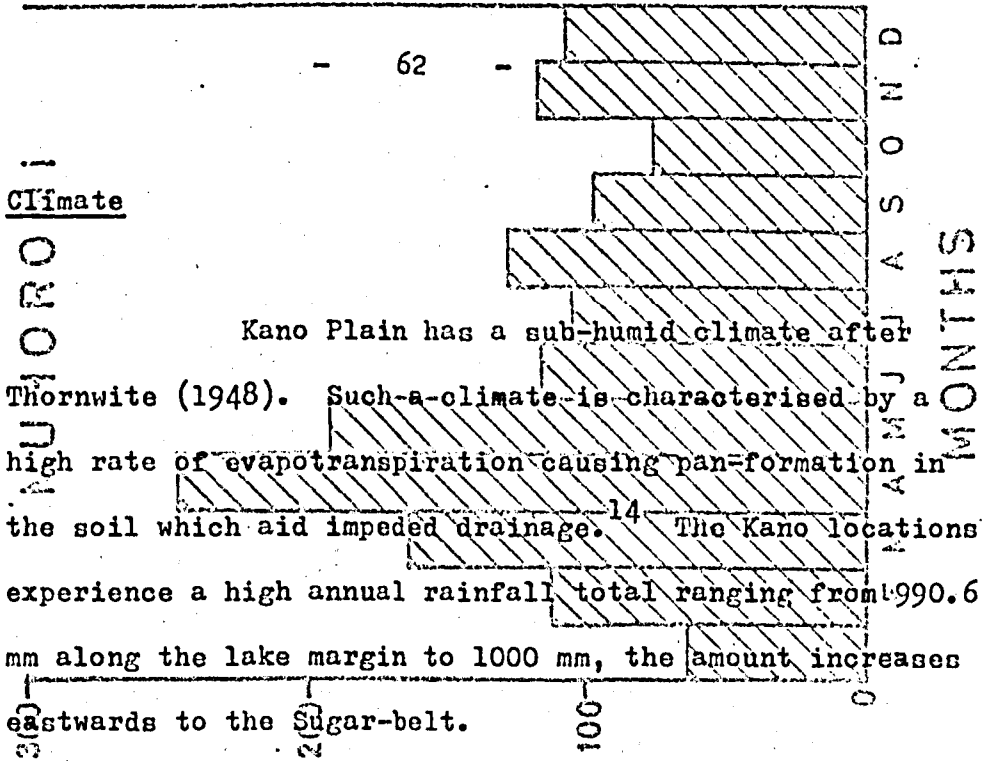
maxima create obstacles for subsistence farmers. Parity ment to initiate re-settlement schemes in the region.

have to plant crops at the right time otherwise the onset The re-settlement policy could also adversely influence the

of drought may upset them. The problem is aggravated by demographic structure of the communities affected because

the need for early sowing is within the desert-like it has conditioned some or whole members of families in sandy soils after prolonged drought. Planting must most instances to migrate.

MONTHLY RAINFALL DISTRIBUTION IN (mm).



Kano Plain has a sub-humid climate after Thornthwaite (1948). Such a climate is characterised by a high rate of evapotranspiration causing pan-formation in the soil which aid impeded drainage.¹⁴ The Kano locations experience a high annual rainfall total ranging from 990.6 mm along the lake margin to 1000 mm, the amount increases eastwards to the Sugar-belt.

The study-region therefore has a bimodal pattern of rainfall distribution with the second peak becoming more prominent in the higher portions of the Sugar-belt. The long rains for both regions occur between March-May according to Fig. 4 while the second maxima occur between August-September.

The second peak is highly unreliable on the plain and is usually preceded by 9 months of drought.¹⁵ The unreliability in the time of occurrence of the first maxima and unreliability in the occurrence of the second maxima create obstacles for subsistence farmers. Farmers have to plant crops at the right time otherwise the onset of drought may upset them. The problem is aggravated by the need for early showers to moisten the cement-like sandy soils after a prolonged drought.¹⁶ Planting must

FIG. 4

MONTHLY RAINFALL

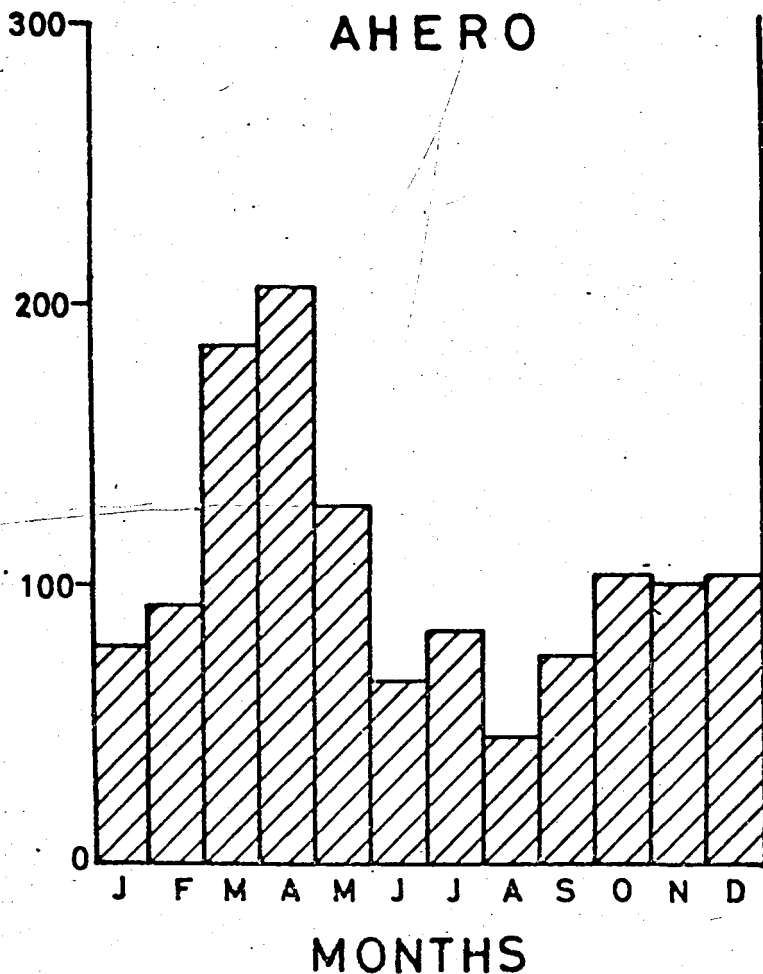
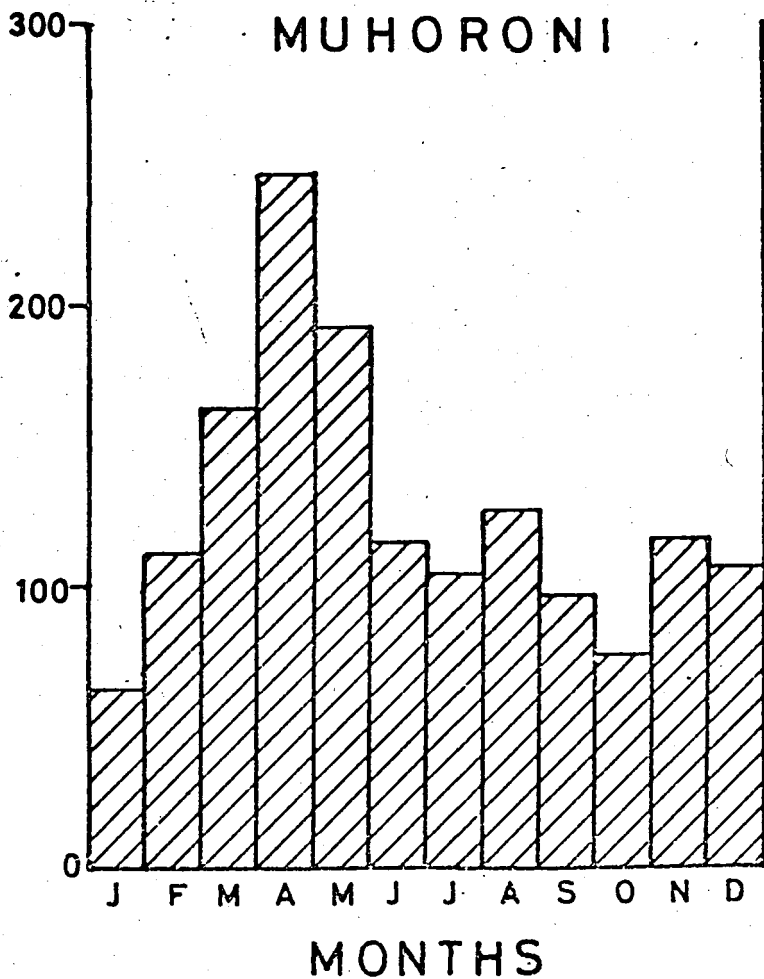


FIG. 4

DISTRIBUTION IN (mm).



commence when the first light showers come before the "soil interstices swell with moisture and the ground becomes intractable."¹⁷ It is therefore the unreliability of the short rains which induces farmers to ignore farming activities even during better years.¹⁸ On the lower parts of the plain. In summary, the torrential nature of tropical rain encourages heavy sheet-wash and hailing of agricultural crops, hence, the nature of rainfall occurrence and associated landform characteristics are responsible for the almost annual crop failures. As a result, famine and malnutrition have become almost an annual phenomena among the bulk of the inhabitants of the study-region especially in Kano locations.

One should therefore expect greater population instability in the sub-regions caused by man's attempt to re-adjust in response to environmental problems. of such regions is quite recent and one could hypothesize that Vegetation of trypanosomiasis could still be traced in the demographic profile of the communities which have long inhabited. The widespread occurrence of acacia spp. reflects the impact of aridity throughout the region. These trees are generally scattered due to intensive human exploitation. Acacia seyal dominate outcrops of phonolitic lavas in East Kano where extensive communities of acacia spp.

have isolated strands of balanite spp and euphorbia.

Ridges within the sugar-belt also have acacia spp associated with Red Oats grass Themeda triandra; ¹⁹ whereas, the heavily grazed areas have hypparrhenia filipendula. Grass vegetation on the lower parts of the plain have been reduced to tufts of hypparrhenia because of intensive grazing. The impact of vegetation in stimulating population instability is somehow difficult to assess. However, the ecological history of the areas indicates that the original vegetative blanket offered suitable habitat for tse-tse flies which caused heavy tolls on human life and livestock.

The prolonged prevalence of tse-tse flies in certain sections of the region until a few decades ago retarded settlement in these areas; settlement of such regions is quite recent and one could hypothesize that the impact of trypanosomiasis could still be traced in the demographic profile of the communities which have long inhabited the region. The dense populace has intensified the use of every available piece of land for agricultural activities, hence, narrow corridors are increasingly being left for communal grazing and these tracts too are likely to

disappear when land consolidation in rural Kano is completed. which has been... Over-grazing has therefore become a factor reinforcing soil erosion in a region where cultivatable land is scarce indeed and long dry spells common. The scarcity of grazing land will in the immediate future compell farmers to switch from maintaining large herds of cattle in preference for a few goats and sheep which are relatively hardy and can thrive on poor vegetation. It is possible that majority might decide to have no livestock at all.

In summary, vegetation paucity has indirectly played a prominent role in determining sub-regional variations of environmental perception, and this phenomenon definitely influence human decision to move.

Diseases

Kano locations were apparently settled in the late 18th century by the splinter-groups of a migratory wave of the... The most prevalent disease is ^{Kifidu pidi!} Malaria which is transmitted by mosquitoes breeding in stagnant waters especially in Kano locations where deranged drainage pattern is commonplace. Malaria cases are high amongst infants and children who have not acquired enough immunity against the attack. Mortality cases resulting from pulmonary complications and malnutrition also contribute to the high infant mortality figures of the region.

West Kano Loc. Another water borne disease is Bilharzia,

which has plagued sections where surface drainage is relatively poor and where people are fond of bathing in pond water. *Cholera*

In summary, despite the existence of suitable ecological habitat favouring the spread of the designated diseases which are responsible for the high mortality rates, medical innovations are permeating rural areas to ameliorate the effect of high mortality rates on population growth.

Asian large-scale farmers. Asian farmers thus began settlement around 1920 POPULATION GEOGRAPHY

1922 at Niuchi. ²¹ These areas were strategic corridors of Population Settlement

zones between the wandering Luo tribes and the Masai. The first route created was Niwani Sugar Ketata which Kano locations were apparently settled in the late 18th century by the splinter-groups of a migratory wave of Luo sub-tribes comprising Gem, Asembo, Kisumu, etc.

These clans were traversing the plain from the Western sector to the east where they encountered bitter resistance from the remnants of the Masai and the Kisii whom they succeeded in driving farther eastwards. ²⁰

The splinter-groups forming Kajulu sub-tribe occupied the present Kajulu Location fringing the west and north-western parts of West Kano. The ka-no group also occupied the present

Substantiated? Obvious! -16 True

WEST!

o

West Kano Location by the 19th century. The Ka-no people succeeded in pushing out remnants of the Kisii and the Masai while those who remained were absorbed by the Luo especially in the present sub-locations of Sidho East, Sidho West, Wangaya I, Wangaya II and Border sub-location of East Kano.

*Substantiated?
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The sugar-belt has a more recent history. Settlement within the region was started by the colonialists who gazetted the region as a crown-land for European and Asian large-scale farmers. Asian farmers thus began cultivation around 1920 and the first sugar-factory operated in 1922 at Miwani.²¹ These spots were strategic corridors of land chosen as buffer zones between the warring Luo tribes and the Nandi. The first estate created was Miwani Sugar Estate which had to absorb constant feuds between Kajulu sub-tribes and Ka-no sub-tribes.²² The present re-settlement of the sugar-belt however started from late 1950's. Muhoroni started in 1964, Tamu 1964, God-Abuoro 1964, Koru 1966 etc. The farms were bought from Europeans and re-settlement policy gave priority in settlement to the ex-labourers of the European farms.

The effect of historical pattern of settlement was rooted in the traditional wars of land acquisition ~~for~~ for the sub-tribes growing population and livestock. The

PLATE 8 Settled farmers in the Sugar-belt



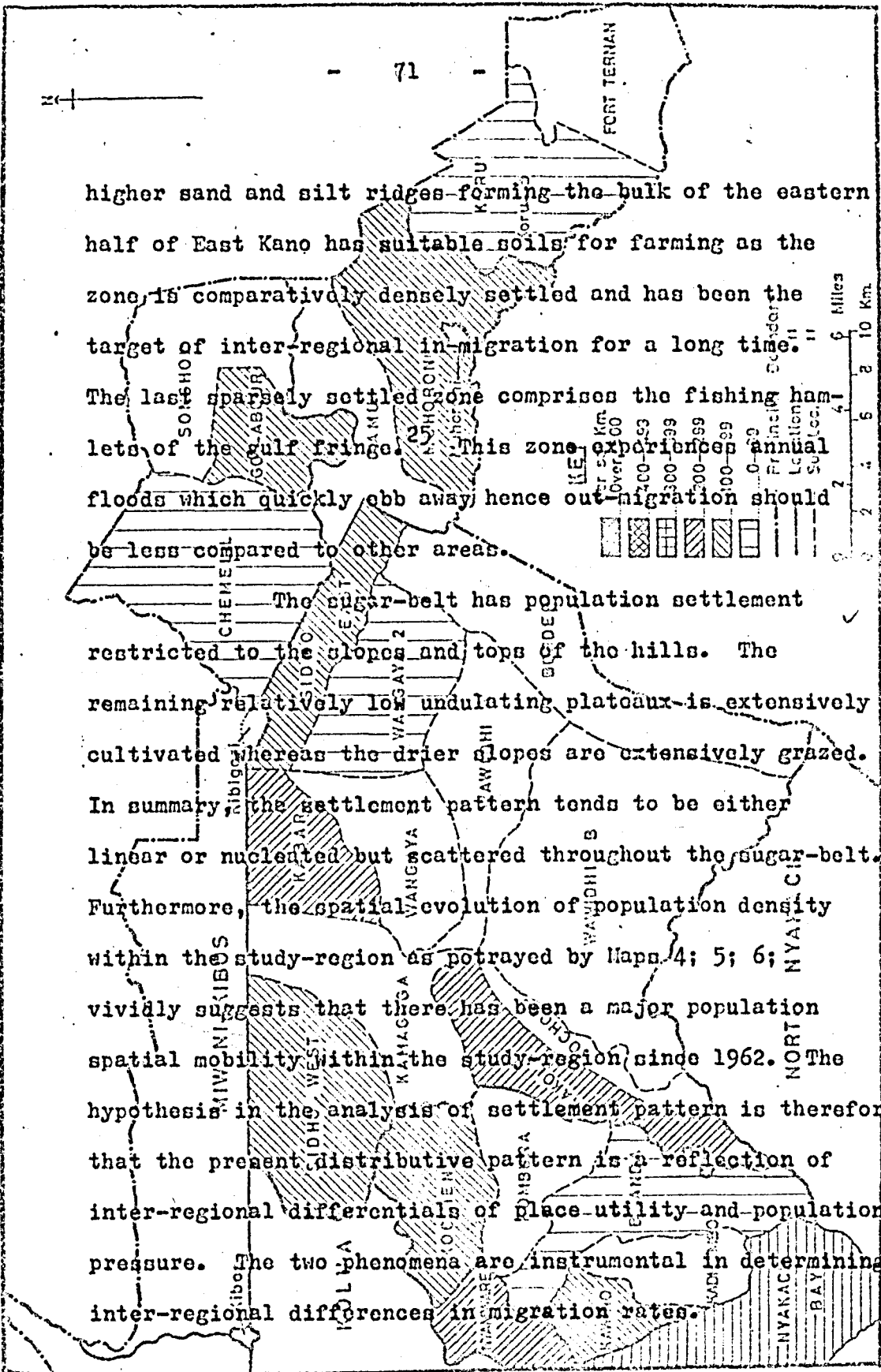
PLATE 8 Settled farmers in the Sugar-belt

feudal wars influenced the spatial pattern of population density and territorial demarcation. On that account, population pressure today is a function of historical pattern of settlement ceteris paribus. The present demographic structure of the two regions definitely bears imprints of historical waves of instability that affected the region. Furthermore, warring between Luos and Nandis retarded the early settlement of these regions, and the traditional hatreds forced Luo farm labourers in the sugar-belt to leave most of their families at home because of constant reprisals from Nandi tribesmen.²³ is extensively cultivated whereas the drier slopes are extensively grazed.

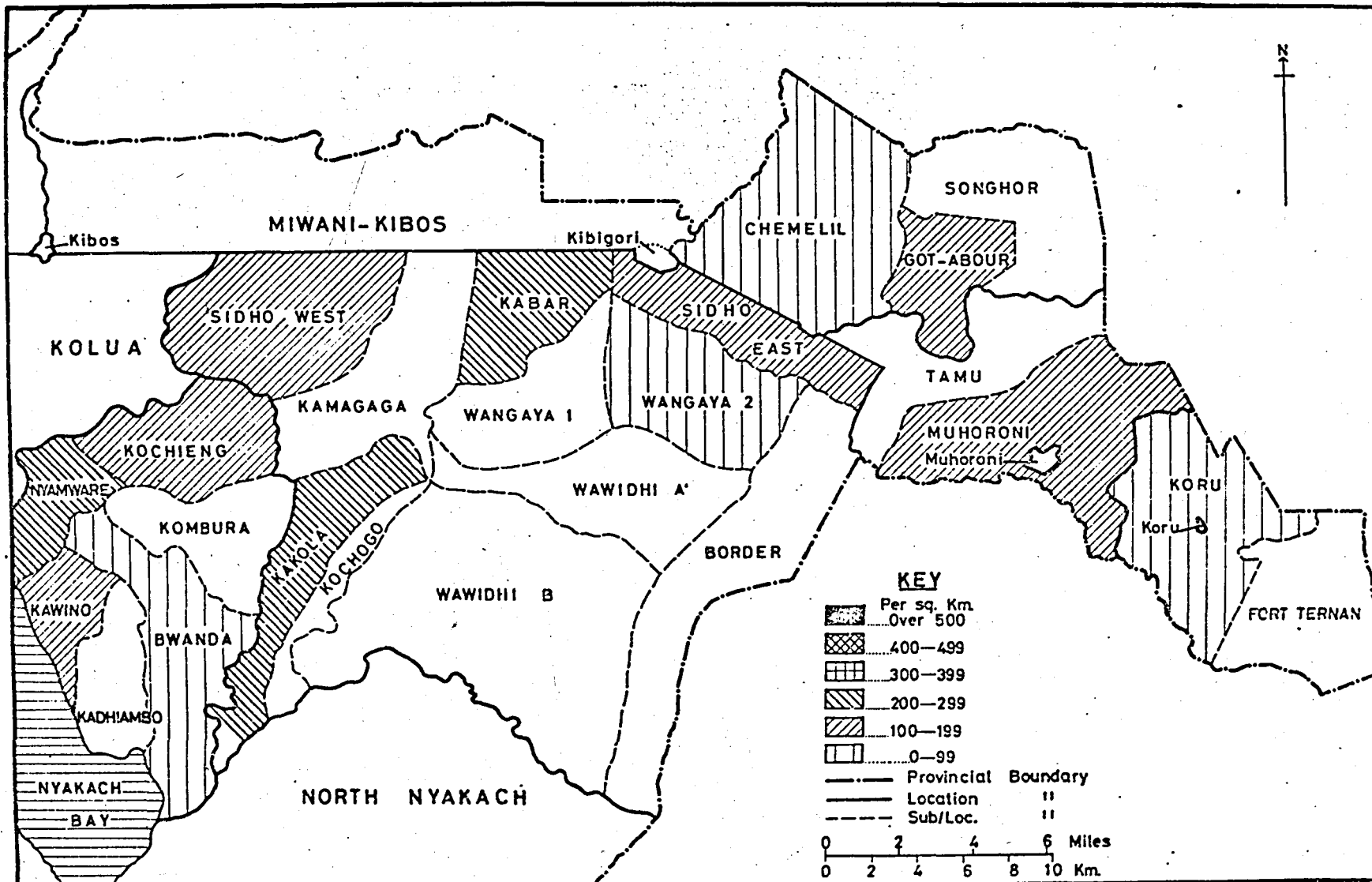
Population Distribution pattern tends to be either linear or nucleated but scattered throughout the sugar-belt. Furthermore, Population distribution has been categorized into three broad zones. The first zone is designated the lake beach settlement and the drowned coastal zone including other marshy portions.²⁴ Practically all settlers in this zone were dislodged by the 1961-62 floods of 1.85 metres. The other zone consists of knolls of relatively high ground in Western and Eastern Kano locations. These knolls of levees stand as dry islands during extensive flooding, hence, they carry an evenly distributed though relatively sparse population density. The last zone of

higher sand and silt ridges forming the bulk of the eastern half of East Kano has suitable soils for farming as the zone is comparatively densely settled and has been the target of inter-regional in-migration for a long time. The last sparsely settled zone comprises the fishing hamlets of the gulf fringe. This zone experiences annual floods which quickly ebb away hence out-migration should be less compared to other areas.

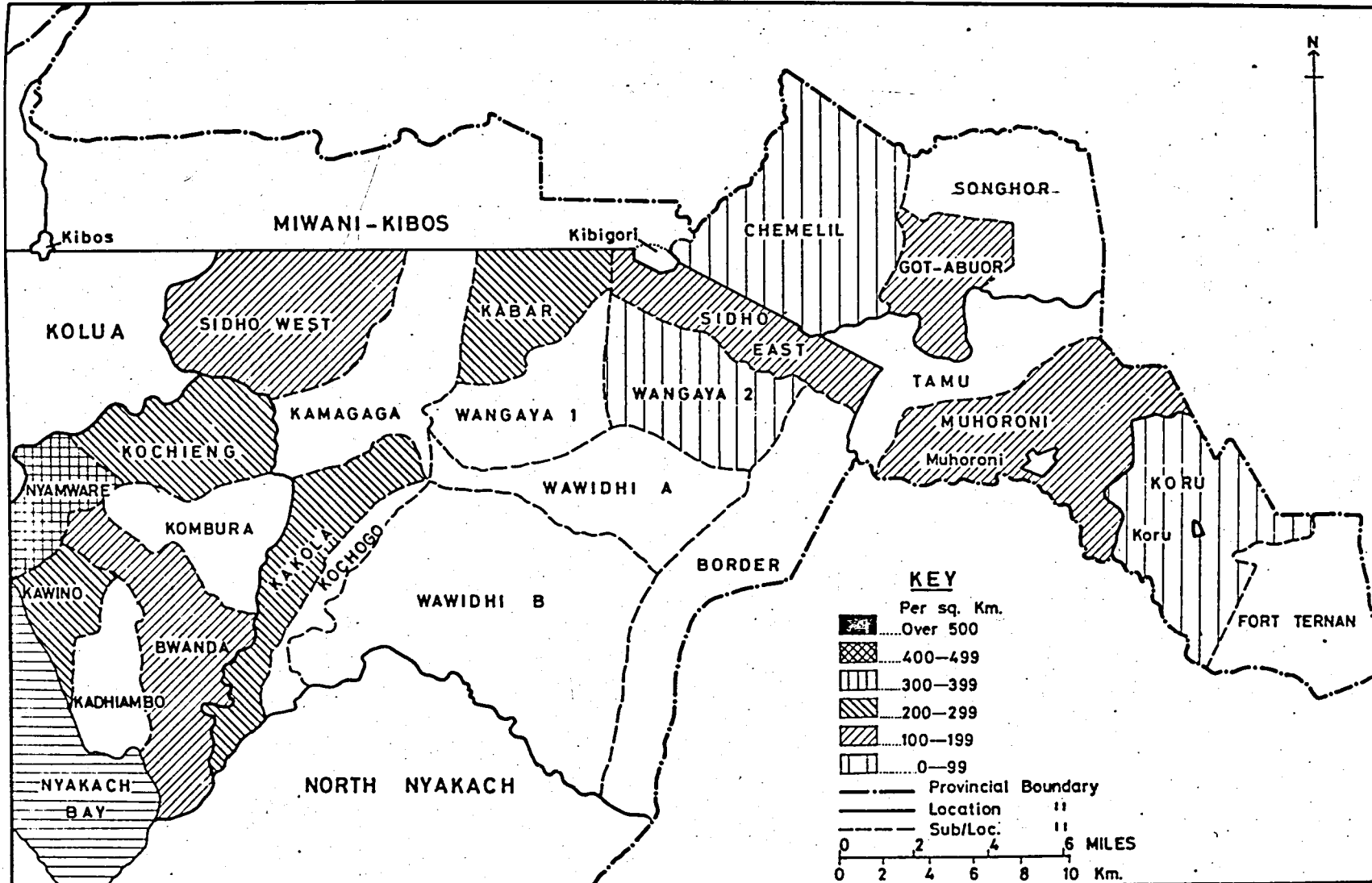
The sugar-belt has population settlement restricted to the slopes and tops of the hills. The remaining relatively low undulating plateaux is extensively cultivated whereas the drier slopes are extensively grazed. In summary, the settlement pattern tends to be either linear or nucleated but scattered throughout the sugar-belt. Furthermore, the spatial evolution of population density within the study-region as portrayed by Maps 4; 5; 6; vividly suggests that there has been a major population spatial mobility within the study-region since 1962. The hypothesis in the analysis of settlement pattern is therefore that the present distributive pattern is a reflection of inter-regional differentials of place utility and population pressure. The two phenomena are instrumental in determining inter-regional differences in migration rates.



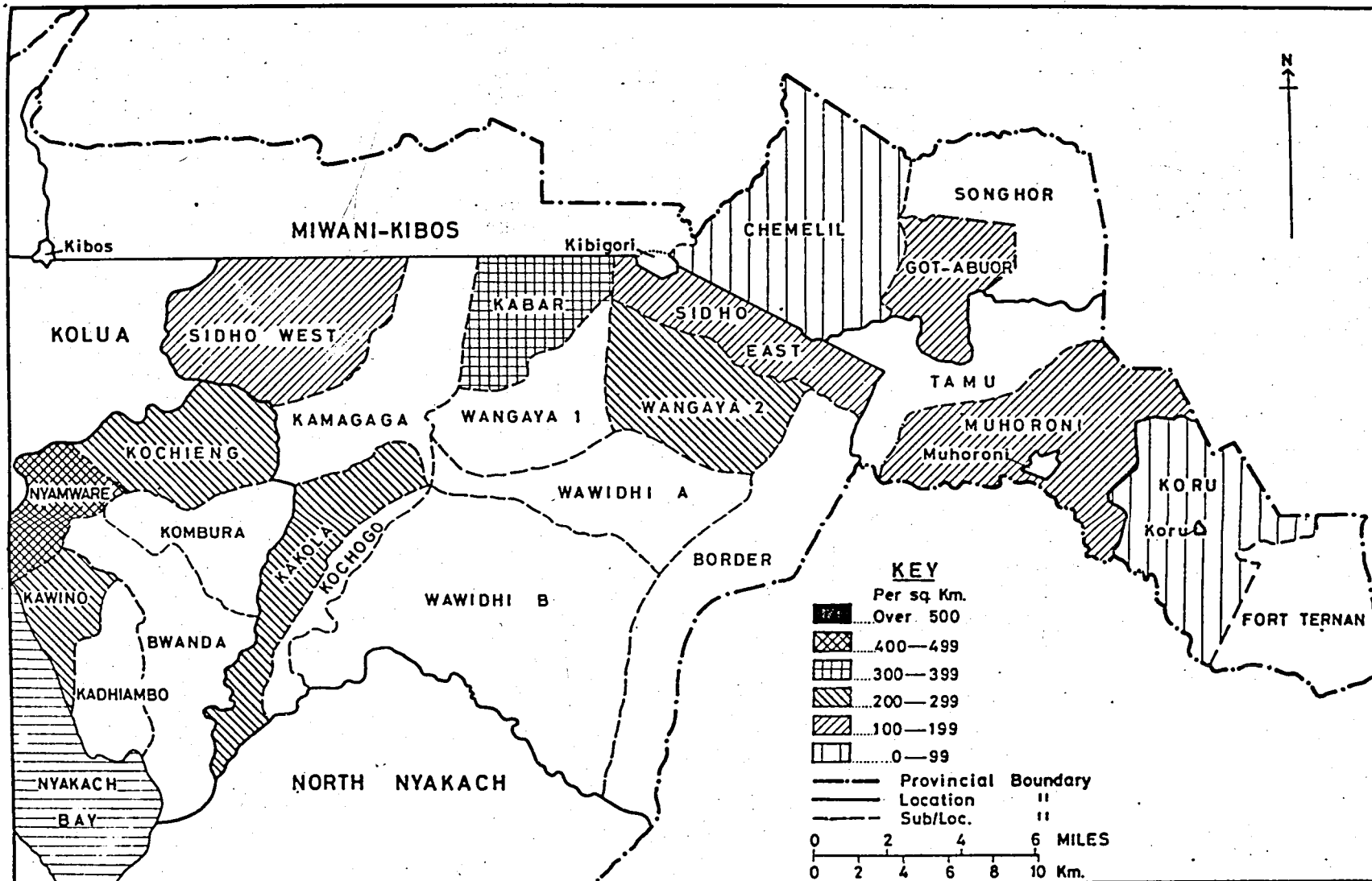
MAP 4. POPULATION DENSITY 1952



MAP 4 POPULATION DENSITY 1962



MAP 5 POPULATION DENSITY 1969.



MAP 6 POPULATION DENSITY 1973.

Population pressure on agricultural activities in West Kano is indicated by Table 19. The percentage of uncultivable land mostly (swamps) is higher in Nyamware followed by Kawino and Bwanda. The percentage figures are 50, 33, and 25 respectively. On the other hand, the sub-locations with most land occupied by settlement units and grazing land are Koochieng', Bwanda, and Kawino. The corresponding percentage figures are 75, 50 and 34 respectively. These figures clearly indicate the impact of population pressure within these sub-locations for the percentage of arable land for all except Kawino is only 25 according to Table 19. Furthermore, Table 20 indicates East Kano had comparatively more hectares of cultivatable land for only 2.31% of the total acreage was occupied by permanent swamps. The agricultural pattern in the face of population pressure and associated environmental problems should encourage inter-regional population mobility which is measurable through analysis of intercensal population change.

△ The world-wide decline in cotton prices during 1950's made West Kano lack a cash-crop for a long time, however, some farmers in Bwanda have now been experimenting with sugar-cane cultivation through co-operative societies.²⁸ The lack of cash-crops cultivation has encoura-



PLATE 9 A sugar-cane farm near Ahero Market - (an example of a small scale commercial farming organized by co-operative societies in rural areas).

ged young adults to migrate to islands of economic activities in the Republic. When the Ahero Pilot Scheme started functioning in 1966 most of the people welcomed the move as an alternative source of revenue. The area covers 8000 hectares at present and has an estimated population of 6000 circa (a circa has 1000 families).²⁹ The establishment of the scheme had a significant influence causing a change in place-of-residence for most people in Kano.

The situation in East Kano has been relatively good because it is adjacent to the main sugar-estates, and this has influenced inhabitants of East Kano to have their own sugar plantations on co-operative basis. In addition, its proximity to the sugar-belt enabled recruitment of commuter labourers, hence, family institutions for these people are not greatly disrupted through separation of couples. Land tenure system has inflated population pressure within the region as land inheritance within Luo communities is passed through mothers³⁰ and it's commonplace to find many polygynous homes.

The increasing desire for land consolidation has therefore brought about problems which have resulted into loss of life or emigration caused by family quarrels and court cases. "Culture on the other hand gives the father complete economic control over his sons until they own their

FIGURE 10: One of the settlement camps at Ahero Pilot Scheme.

Handwritten notes: "All these are... Sp... water"



PLATE 10 One of the settlement camps at Ahero Rice-Scheme.

homes or die."³¹ In the face of present social revolution, demand for money has forced the young adults to migrate to islands of economic activities where their cash requirements can be met. Furthermore, social change is increasingly forcing parents to seek financial assistance from their children and this too has contributed substantially to mass out-migration of the young adults from rural regions to polarized centres of development. The situation in the Sugar-belt was quite different for the entire Sugar-belt, was practically under commercial farming. The region has three large factories with about 66 jaggeries (see Plate 11). These economic activities have increased the potentials of the entire region as an in-migration area.

Summary

In summary, the entire Kano locations experience more severe environmental hazards than the adjoining regions of the Sugar-belt. Assuming man is rational in his reaction to natural problems, then it could be argued differences in environmental problems could stimulate spatial population mobility from hard-hit regions to regions with tolerable environmental problems. In other words, assuming other things constant, we should

PLATE 11. Muhorosi factory. One of the two major factories in the Sugar-belt.



PLATE 11 Muhoroni factory. One of the two³ major factories in the Sugar-belt.

expect mass migration from the Kano locations to the Sugar-belt: socio-economic changes. These youths should therefore be There is also a high probability of finding high mortality rates in the study-region because the occurrence of famine and malnutrition, especially in the Kano locations, render most people particularly children prone to diseases. The region is heavily infested with malaria and bilharzia, which have caused death to many people.

The demographic profile between the two regions is, therefore, expected to be different as the Kano locations have experienced a much longer period of human settlement than the Sugar-belt. Furthermore, a large section of the Kano locations was plagued with trypanosomiasis and this could have retarded population growth in some sections of the region. The Sugar-belt, on the other hand, should elicit youthful demographic features as substantial settlement in the region commenced a few decades ago. Moreover, the agricultural potential of the Sugar-belt has made it an attractive economic island for economic activities and associated labour force.

In conclusion, the traditional mode of economy create problems in the social environment, which

REFERENCES

- make rural life unpleasant to the Luo youths, who are receptive to socio-economic changes. These youths should therefore be expected to dominate migration streams from rural areas to other economic islands.
- 1 Ominde, S.H. and Ojany, F.F. - "The Kano Plains - A Geographical Challenge" In African Scientist, editor T.R. Odhiambo, East African Publishing House, 1969, p. 8.
 - 2 Ominde, S.H. and Ojany, F.F. - ibid. p. 10.
 - 3 Ominde, S.H. and Ojany, F.F. - ibid. p. 8.
 - 4 Ominde, S.H. and Ojany, F.F. - ibid. p. 9.
 - 5 Hillman, R.H. - Settlement Change and Challenge on Kano Plains, Department of Geography, University of Nairobi, 1967, p. 18.
 - 6 Ominde, S.H. and Ojany, F.F. - ibid. p. 9.
 - 7 Hillman, R.H. - ibid. p. 18.
 - 8 International Bank for Reconstruction and Development (World Bank) - Report on Concretion in Central Nyanza 1965. In R.H. Hillman's book, "Settlement Change and Challenge on Kano Plains", p. 19.

REFERENCES

9 - Author's conversation with
District Agricultural Officer,
1 Ominde, S.H. and - "The Kano Plain - A Geographical
Ojany, F.F. - "Challenge" In African
10 Ominde, S.H. and - ibid. p. 11
Ojany, F.F. - Scientist, editor T.R. Odhiambo,
East African Publishing House,
11 Ominde, S.H. and - ibid. pp. 12-13.
1969, p. 8.
12 Millman, R.N. - ibid. p. 6.
2 Ominde, S.H. and - ibid. p. 10.
13 Millman, R.N. - ibid. p. 7.
Ojany, F.F.
14 Millman, R.N. - ibid. p. 12.
3 Ominde, S.H. and - ibid. p. 8.
15 Ominde, S.H. - Ph.D. Thesis (London), 1961.
Ojany, F.F.
16 Ominde, S.H. - ibid. p. 71.
4 Ominde, S.H. and - ibid. p. 9.
17 Millman, R.N. - ibid. p. 17.
Ojany, F.F.
18 Ominde, S.H. - ibid. p. 74.
5 Millman, R.N. - Settlement Change and Challenge
19 Ojany, F.F. - Notes on Ecological Regions of
on Kano Plains, Department of
Geography, University of Nairobi,
1967, p. 18.
20 Ominde, S.H. and - ibid. p. 9.
Ojany, F.F. - Ph.D. Thesis (London), 1963, p. 98.
21 - Author's conversation with
7 Millman, R.N. - ibid. p. 18.
8 International - Report on Observation in Central
Nyanza 1965, In R.N. Millman's
22 Bank for Recon- - Basic Features of Regional Planning
struction and (1968) book, "Settlement Change and
Development in the Region of Nyanza, Kenya;
(World Bank) Challenge on Kano Plains,
Deutscher Institut für Entwicklung
p. 19.
Lange Politick, Berlin.

- 29 - Author's conversation with
District Agricultural Officer,
Kisumu Region.
- 10 Ominde, S.H. and - ibid. pp. 110-111.
- 25 Ojany, F.F. - ibid. pp. 53-57.
- 11 Ominde, S.H. and - ibid. pp. 12-13. Unpubl. - In press
- 12 Millman, R.N. - ibid. p. 6. 6th Economic Structure
- 13 Millman, R.N. - ibid. p. 47. Asian Press, Ltd.
- 14 Millman, R.N. - ibid. p. 12. 43.
- 15 Ominde, S.H. - Ph.D. Thesis (London), 1963.
- 16 Ominde, S.H. - ibid. p. 74. conversation with the
- 17 Millman, R.N. - ibid. p. 17. Agricultural Officer,
- 18 Ominde, S.H. - ibid. p. 74.
- 19 Ojany, F.F. - Notes on Ecological Regions of
- 30 Whisson Michael - Kenya - unpublished in Department
- 31 Whisson Michael - of Geography, University of
- 32 Millman, R.N. - Nairobi, 1970.
- 20 Ominde, S.H. - Ph.D. Thesis (London), 1963, p. 98.
- 21 - Author's conversation with
Assistant Agricultural Officer,
Muhoroni.
- 22 Waller, P.P. - Basic Features of Regional Planning
(1968) in the Region of Kisumu, Kenya;
Deutsches Institut fur Entwick-
lungs Politick, Berlin.

- 23 - Author's conversation with
Assistant Agricultural Officer,
Muhoroni.
- 24 Millman, R.N. - ibid. pp. 53-97.
- 25 Millman, R.N. - ibid. pp. 53-97.
- 26 Whisson Michael - Change and Challenge - Luos
Societal and Economic Structure,
Printed by Acme Press, Ltd.,
Nairobi, p. 43.
- 27 Whisson Michael - ibid. p. 51.
- 28 - Author's conversation with the
A REVIEW OF METHODOLOGY AT Assistant Agricultural Officer,
Ahero.
- 29 Millman, R.N. - ibid. p. 92.
- 30 Whisson Michael - ibid. p. 86.
- 31 Whisson Michael - ibid. pp. 43-119.
- 32 Millman, R.N. - ibid. p. 22.

A REVIEW OF METHODOLOGY AND THEORIES ON POPULATION CHANGE

Introductory Remarks

The analytical framework of the discussion in this Chapter could be dichotomized into the review on published materials on population change in diverse regions of the world, especially available research documents on

CHAPTER III

population change covering the study-region in the context of the thesis. The second aspect briefly evaluates

literature on parameters of population dynamics which aims A REVIEW OF METHODOLOGY AND THEORIES ON POPULATION CHANGE at theoretically identifying the contribution of individual variables to overall population change.

REVIEW OF STUDIES ON INTERCENSAL

POPULATION CHANGE

Techniques of Analysis

Literature on techniques of estimating intercensal population changes is scarce indeed probably because of mathematical requirements for such studies.

H.A. Withington (1967) employed birth-place statistics to estimate intercensal net migration.¹ The utilization

A REVIEW OF METHODOLOGY AND THEORIES ON POPULATION CHANGE

For knowing whether or not the place of birth to the place of enumeration took several steps. Furthermore,

Introductory Remarks

and in the study-region could cause confusion owing to multiplicity of similar place-names in rural areas.

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in U.S.A. used population numbers, sex-ratios, and age-ratio to estimate REVIEW OF STUDIES ON INTERCENSAL population

change.³ J.E. Sizer POPULATION CHANGE equations with migration-and-natural statistics to estimate intercensal

Techniques of Analysis statistics and studies. He argued that arithmetical and geometric extrapolation techniques are

less accurate. Literature on techniques of estimating intercensal population changes is scarce indeed probably

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⁵

of birth-place data is criticised for there is no method for knowing whether movement from the place of birth to the place of enumeration took several steps. Furthermore, the use of this method in the study-region could cause confusion owing to multiplicity of similar place-names in rural areas. (1966) discussed various methods for estimating population change. G.T. Trewartha and W. Zelinsky (1955) in their Korean study used child-woman ratio to assess regional variations on fertility and to measure regional differences in the impact of net migration.² A similar study was carried out by S.H. Ominde (1966) for Kenya. The major weakness with these studies was that they were highly theoretical and lacked statistical tests to validate their research conclusions. A similar study by J.F. Davis (1972) in U.S.A. used population numbers, sex-ratios, and age-ratio to estimate the magnitude of intercensal population change.³ J.S. Siegel (1954) used two equations with migration-and-natural statistics to estimate intercensal population change for cities and states. He argued that arithmetical and geometric extrapolation techniques are less accurate for estimating population growth.⁴ J. Webb (1963) in his attempt to separate the contribution of natural and migrational factors in population growth, used factor analysis to produce a typology of population change.⁵

He too concluded that net migration was more important than natural increase in influencing population in the regions covered. His typology was also too theoretical and complicated to be useful for areas with similar patterns of change for these could fall into any of his classes of change. D.F. Heisel (1966) discussed various methods for estimating population change when frequent enumeration and continuous registration statistics are available.⁶ United Nations, Manual II, III, and IV propose some useful methods for estimating intercensal population change using parameters of population dynamics. The methods proposed except those of Manual IV were more useful in advanced countries where vital registration is more accurate or census enumeration more complete.

Studies on Population Change

This view was endorsed by G.P. Eastman and W. Melinsky. A study on spatial changes of population distribution in relation to spatial evolution of economic structure and resource base was done by W.A. Withington (1967). A similar study emphasizing historical perspectives of population density changes in relation to the history of social and physical forces on the rate of change was carried out by R.J. Johnston (1967) who emphasized the

effect of migration in influencing population change. He gave a typology of change and attempted to isolate the role of migration from fertility and mortality in determining population change. Unlike his predecessors he ~~was~~ accepted in his study that past studies on population change were inadequate for they failed to expose the great contribution of migration taking place in micro-regions.⁷ As a measure of spatial variations in change he employed dependency ratio, percentage of married females, mortality and migration indices. However, H. B. Horton and H. J. Jeffrey (Sigur Dur Thorarinson (1961) analysed population change in Iceland but utilized archaeological information to assess changes in spatial distribution of population. He argued that environmental perception was an important variable in the amount of population change because of its ultimate cause of in-migration or out-migration.⁸ This view was endorsed by G. F. Trewartha and W. Zelinsky (1955) who carried out a study on population change in Korea and they concluded "it's safe to assume much of the change in population distribution was attributable to migration."⁹ Moreover, W. Zelinsky (1962) carried out a similar study in U.S.A. and gave a typology of change based on characteristics of different regions.¹⁰ In their Korean study, Trewartha and Zelinsky noted that acute

problems are encountered in attempts to isolate the elements of migration, from natural elements of fertility and mortality in determining areal pattern of population change especially when data are crude and migration great in the area. ¹⁰ Similar studies approaching net change of population based on hypotheses of natural increase and migrational increase methods have yielded different conclusions regarding which of the two variables contributes most to net population change. However, M.P. Newton and R.J. Jeffrey (1951) estimated that net change figures caused by migration in their study was probably less than 5% of the gross pattern of change. ¹¹ This conclusion cannot hold for other areas for regions vary in their intensity of migratory waves, data accuracy, and governmental policies influencing human spatial mobility.

The study by Calvin L. Beale (1969) discussed the role of in-migration and out-migration in determining net population change. ¹² He argued that migration has a direct effect on age distribution and fertility of a society. This view was endorsed by E.E. Arriaga (1972) who discussed at length the effect of migration on fertility and mortality. ¹³ A more enlightened study by P. Neal Ritchey et al (1972) discussed population growth

differentials between non-migrants and migrants. He argued that "fertility behaviour of migrants was a product of social and cultural influence at both points in time."¹⁴ Friedlander (1969) also supported the notion that out-migration could be instrumental in causing adjustment in reproductive behaviour of a community.¹⁵ Furthermore, R.J. Johnstone in his study concluded that migration was an important factor in population change. This conclusion was endorsed by J.W. Webb (1963) who supported the notion that net-migration was more important than natural increase in influencing population change. He based his conclusion on the fact that population of his study area had acquired increasing individual mobility especially in the young adult population and among old-age brackets. In addition, he noted the average rate of natural increase was too low than was formerly characteristic of the area.¹⁶

Relevant studies in East Africa on the subject included the work of M.A. Hirst (1972) who attempted to isolate the role of migration in influencing population change in the mainland of Tanzania. His computerized results supported the view that natural increase played a more prominent role in overall population change than migrational increase.¹⁷ Nevertheless, the accuracy of his data which were extracted from the national census surveys

need questioning. C.J. Martins (1953) also attempted to estimate intercensal population change for East African Communities but emphasized too fertility differentials among Arab women and African women of Zanzibar.¹⁸

Moreover, these more recent work by Roger Van Zwanenberg (1963) gave a historical perspective into the population change affecting East African countries.¹⁹ In his study,

he has identified some major socio-economic and political, as well as, cultural variables determining the magnitude and direction of population change. The work of S.H. Ominde (1968) also gave some estimates of intercensal population change in Kenya and he utilized sex-ratios and age-ratios to measure regional differentials in change.

His analysis emphasizes the prominent role of rural-urban migration in causing inequalities in regional demographic structure.²⁰

Research work on intercensal population change affecting the study-region is non-existent. The

work of R.N. Hillman (1967) tended to collectively identify some geographical phenomena, as well as, socio-economic, cultural, and political factors challenging the spread of innovative processes in Kano region.²¹ E. Muga

(1971) on the other hand attempted to reveal sociological factors challenging the institution of developmental

projects within the study-region.²² the region is extra-

polished for regional planning. In summary, most of the studies on inter-censal population change are really theoretical treatises lacking statistical tests to validate their conclusions.

Moreover, these studies have been carried out in communities where data were more accurate and the trend of fertility and mortality has been declining as in Europe and America.

On the other hand, some studies carried out in developing nations where data were less accurate and the fertility-mortality balance relatively high have tended to produce contradicting results on the influence of migrational increase or natural increase in overall population growth.

This research, is therefore, the first to attempt a study of changes in population numbers within the study-region. Like other studies evaluation of inter-censal population changes is given an areal dimension, and a brief theoretical approach on the contribution of natural increase and migrational increase in overall population growth is incorporated in the methodology for this could help to clarify the expected influence of the individual variables of population dynamics in population growth.

Partial correlation-analysis is also utilized to verify the results. In addition, unlike most previous studies

on the subject, population size in the region is extrapolated for regional planners.

The present analysis of the relationship between numerical changes of population and the ecosystem. THEORIES ON POPULATION GROWTH. In this group are

optimal population theories, under-population theories,

Introductory Remarks theories. In addition, the group

embraces the bulk of literature on population change and

resource utilization including resource planning.

One prominent problem in the discussion of natural theories on population change is to identify

theoretically the rate of individual variables in absolute

population change as these factors of population dynamics

are mutually interrelated in their contribution to popula-

tion growth en masse. ²³ Still remains within the domain of

actuarial interests. A general perusal of current literature on

population growth could be categorized broadly into three

major groups. The first group embraces theories on popula-

tion growth as determined by fertility, mortality, and ²⁴

migration; this group contains theories on the rate of

population change.

Theories on determinants of population

change are usually studied under biological theories, ²⁵

socio-cultural theories, and economic theories, whereas

theories on the rate of population change could be explained

by logistic curve models, demographic transition cycles,

and arithmetic growth models. Population growth ought to exemplify this. The second component analyses the relationship between numerical changes of population and the pre-ecosystem. Theories commonly discussed in this group are optimum population theories, under-population theories, and over-population theories. In addition, the group also embraces the bulk of literature on population change and resource utilization including resource planning. The discussion of the third group contains basically literature on techniques of analysing population change. Available literature on this aspect of population change is scarce indeed probably because it requires a mathematical approach, hence, it still remains within the domain of actuarial interests. (environmental) theories of Thomlinson and Thomlinson Ralph (1965) divided the history of literature on population growth into three phases namely, pre-Malthusian, Malthusian, and post-Malthusian.²⁴ A theory of population growth according to S.H. Coontz should endeavour to elucidate the basic factors determining population growth.²⁵ The analysis should therefore exclude the bulk of literature relating population aggregate to resource exploitation and planning for these theories inadequately explain the dynamics of population change. Environmental features change in response to the state of change.

modernity.²⁵ A theory on population growth ought to exemplify "historically observed changes in population dynamics and should provide a fundamental frame for predicting with reasonable accuracy the expected future topology pattern of population dynamics of a country in view of its stated stage in economic development."²⁶ Moreover, review of literature on the rate of population growth is exempted because the subject is of peripheral interest in the discussion of hypotheses on which the thesis pivots.

W. Thompson and D.T. Lewis (1930) broadly categorized theories on population growth as natural theories and social theories.²⁷ His classification corresponded respectively to the primary (natural) theories, and secondary (environmental) theories of for Thomlinson Ralph (1965). Natural theories have often emphasized the law of nature as influencing greatly that numerical changes of mankind. It minimizes man's numerical ability to adapt himself to natural forces, hence, the theory is a pro-environmental determinism. Social theories on the other hand, have attempted to account for demographic variations between human communities as a function of civilisation, hence, the analysis welcomes the theory that demographic features are capable of changing as environmental features change in response to the state of

modernity.²⁸ as population density increases. In other words, Sadler: The pattern of population change is illustrated well by a typology of population pyramids constructed by W. Thompson and D.T. Lewis (1930). Briefly, the typology could be explained by biological theories, socio-economic, and cultural theories.²⁹ The major phenomena discussed in each of the designated theories are mutually interrelated and interact to produce variations in population growth.

that fecundity varies directly with mortality failed to exemplify the of NATURAL THEORIES fertility rate in retarding population growth among those who are highly fecund.

Biological Theories Malthus's general law of population growth stated that "fecundity varies inversely with the amount and variety of Biological theories attempt to account for determinants of fecundity, fertility, and mortality. The basic philosophy contained in biological theories is that homo-sapiens tend to pursue a natural law in their numerical growth just as other living organisms. Under biological theories is Thomas Sadler's theory of density principle and mortality principle. I used a different variable in the analysis. Thomas Sadler has argued that fecundity of human being under similar circumstances varies inversely with their numbers on a given space.³⁰

This hypothesis therefore supports the notion that ability to conceive pro-

diminishes as population density increases. In other words, Sadler's view was pro-Malthusianism for his view endorsed the notion that increase in human numbers was determined by the ratio between numbers and resource output. This is a rather fluid argument for as W. Thompson and D.T. Lewis (1930) argued, Asia is the most densely settled and the most fecund as well. They have argued too that Sadler's mortality principle in which he stated that fertility varies directly with mortality failed to exemplify the effect of high mortality rate in retarding population growth among those who are highly fecund. as natural for Doubleday's general law of population growth stated that "fecundity varies inversely with the amount and variety of food."³¹ He reinforced his hypothesis by claiming that the rapid growth of Chinese and Irish people was a consequence of their inadequate diet. He further quoted the work of Pliny which²³ revealed that fat people were less fertile than lean people, to validate his conclusion. Doubleday's approach was therefore similar to Sadler's except that each used a different variable in the analysis namely diet and density. Moreover, W. Thompson and D.T. Lewis further argued that Doubleday's conclusions were invalidated because he employed fecundity as synonymous with fertility. Nevertheless, there is still contro-

versy about the rôle of nutrition in determining fecundity although its indirect influence on mortality is widely accepted. the risk of child-bearing due to suppression of the knowledge Hebert Spencer rejected Doubleday's thesis which hypothesized that increased nutrients decrease fertility.³⁴ Spencer, however, accepted the anti-thesis that increased fertility is the necessary result of an increased subsistence.³² He further endorsed the notion that man has a rational behaviour for whenever population growth threatens the availability of resources, individuation steps in to ameliorate the problem. In other words, as natural resources become scarce individual struggle³⁵ that for survival force man to postpone marriage contracts and this act ultimately retards population growth. Spencer also attributed differential fertility among different societal groups as rooted in differences in individuation among the groups.³³ Like their marriage by having offspring. Culture further influences the degree of sexual relations.

SOCIO-ECONOMIC THEORIES of the society.³⁶ A famous thesis under cultural theory is Cultural Theories by Durand. The philosophy behind the theory is that as an individual climbs up the social ladder Cultural thesis asserts the philosophy that culture works through attitude and behaviour. Hartley

(1972) asserted that culture works through beliefs and knowledge of the society. The effect has therefore been great on the risk of child-bearing due to suppression of the knowledge of contraceptive methods particularly whenever several beliefs and goals of the society are in conflict.³⁴ Kingsley Davis (1963) illustrated how culture modifies human behaviour which indirectly influences parameters of population dynamics within specified situations. To exemplify, he designated these cultural factors as intermediate variables which he argued influence timing of intercourse, abortion, marriage, etc. and all these determine family sizes.³⁵ Lorimer (1954) demonstrated that age at marriage may influence fertility and the age at marriage is a cultural phenomena. In developing nations women are married young, thus all their reproductive years are available for child-bearing. The subordinate status of women requires women to legitimize their marriage by having offspring. Culture further influences the degree of sexual relations, and the size of family institutions of the society.³⁶ A famous thesis under cultural theory is the social capillarity thesis by Dunmont. The philosophy behind the theory is that as an individual climbs up the social ladder he becomes more individualistic and his attitude towards children declines. He spends more energy

on social things which rob him of pleasure for sexual activities.³⁷ The social capillarity thesis cannot function in societies where status and caste are rigid, barriers to individual advancement. On the other hand, the thesis is more effective in societies where social mobility is high thus fertility³⁰ declines as children become a great liability to personal progress. Fetter, after studying the demographic structure of several societies, proposed the theory of voluntarism in which he argued that human will is more important in influencing man's progress than natural sex instincts. An Italian economist, S. Nitti, introduced the principle of increasing individuality which stated that individuation and genesis were in fundamental opposition. He, therefore, like Spencer, endorsed the view that excessive fecundity hinders great strides in modernization and like others concluded that poverty increases fertility.³⁶

The theory of increasing prosperity was dual program. The theory of increasing prosperity was advocated by Brentano who argued that man is basically a creature of pleasure. He therefore accounted for fertility differentials amongst different communities as rooted in diverse sources of pleasure enjoyed by these communities. The poorer classes he advocated had fewer alternatives for pleasure except in sexual indulgence, furthermore, he argued that among the wealthy group there is much pleasure

outside the family circle and their attitude towards children is much refined.³⁹ Furthermore, among the higher castes the status of women is different, hence, Brentano concluded that fertility was bound to decline, and mortality decline was expected too owing to tremendous technological advancements.⁴⁰ Brentano was blamed for his failure to differentiate sexual enjoyment from the pleasure of parenthood because as S.H. Coontz (1961) argued among the poor people sexual enjoyment is apparently identical with the desire for children, whereas, among the wealthier castes it is the opposite. Ungern-Sternberg noted too that fertility declined among workers, and this encouraged him to hypothesize the theory of rationalism as the cause for fertility differentials. He argued that capitalistic mentality favoured a decline in population growth as children were more of a liability than an asset in individual progress.⁴¹ The Malthusian view was soon challenged as interest in the social sciences spread, and an technological Economic Theories the use of contraceptive methods and stimulated industrial revolution, agricultural revolution and transport revolution. The philosophy supporting economic theory is based on material principle. The economic theory realizes that the chief factors influencing human development are rooted in social change which also rely heavily on economic

factors. The economic factors explain mostly the historical pattern of population dynamics as being associated with the history of economic development and an ultimate decline in fertility. The classical economic theory of population and growth associated with Malthus hypothesized that increment in incomes particularly among the lower classes stimulated an increase in birth rates, and caused a decrease in death rates which ultimately induced a decline in birth rates.⁴² This view was widely supported by Richard Cantillon who argued that population changed as the prevailing economic system changed and that as the standard of living improved, population grew at a decelerating rate. Moreover, he explained that the distribution of wealth was fundamental in determining population numbers.⁴³ These classical views made people like R. Wallace bitterly oppose the institution of poor laws for they argued that such poor laws encouraged increased fertility. The Malthusian view was soon challenged as interest in the social sciences spread, and as technological advances enabled the use of contraceptive methods and stimulated medical revolution, agricultural revolution and transport revolution. Initially the technological impact stimulated a rise in birth rates and a decline in death rates but in the long-run its impact induced a decline in birth rates associated with rapidly falling death rates.

inspired by Socialist writers of the 19th century such as Marx argued that societal reorganization was essential in achieving mortality decline and an ultimate decline in fertility. Socialist writers therefore argued that societal reorganization embracing improvements in the standard of living and curbing exploitation of child-labour (a feature which was common in capitalistic mode of economy) was highly desirable since socialist philosophers believed that capitalistic economy tended to reduce population growth to an extent in which ultimate decline in growth threatened the existence of the society. Socialist economy, they contended, had a relatively healthy growth rate because the philosophy of family planning was widely disapproved.⁴⁴

The most recent theory on population growth was the theory of demographic transition. In a nutshell the theory relates stages of demographic change to stages of economic development. Its emphasis on temporal aspects of population change therefore covers adequately the concept of time and space which are essential in understanding population change.⁴⁵ The demographic transition could be asserted to be a theory indicating the direction and rate of population change of a given community when the level of modernity for the community is specified. However, the theory is greatly criticized for it could be rendered

ineffectual by migration. Furthermore, nearly two-thirds of the world's population reveal no evidence of fertility decline because these countries have not completed the demographic transition circle. Although this hypothesis is safe-guarded by lack of statistical data from most developing nations, with modern international co-operation and trade it is possible to reduce substantially death rates without major re-organization of the economy, and to educate the masses on the need for family planning. In addition, governmental policies have also been instrumental in altering the structure of variables of population dynamics. In conclusion, the bulk of demographic literature on primary and secondary theories on population growth discusses mostly determinants of fertility and of mortality. However, the perspective given to fertility makes it a pre-eminent factor in population growth. Crude birth rate could be a crude measure of fertility rate in a region: the analysis of this demographic parameter within the study-region depicted that the entire area had a high birth rate approximating 4.3% per annum as characteristic of the Luos and Luhya ethnic groups.⁴⁶ The research found a relatively high intercensal population growth of 5.1% per annum and this

value approximates the statistical findings of the Kenya Committee on Human Environment which found a birth rate of 50/1000 per annum in some parts of Kenya.⁴⁷ These statistical results prove that fecundity is high among the inhabitants of the Lake-shore regions ceteris paribus. Also The cultural norms of the Luo community who dominates the region somehow encourage the existence of a high fertility rate in the region because it is customary to marry young amongst women thus all women's reproductive years become vulnerable to the risk of child-bearing. Furthermore, Table 21 and Table 22 indicate that a greater percentage were married, hence, we expect the majority age of the couples to be relatively young as the mean age for the study-region was 36 years and 32 years for the Kano locations and the Sugar-belt respectively. With most of the youthful population married, we should expect fertility to contribute substantially to population aggregate in cases where mortality rates are low although this is hardly the case for the study of ecological conditions within the region, makes one expect a high mortality rate especially among infants.

The effect of a high fertility rate could also be reduced by the cultural phenomenon of polygynous marriages. The role of polygny in influencing fertility

is still controversial. Culwick and Culwick for example concluded in their study, that polygyny has no effect on birth rates.⁴⁸ Others have challenged this conclusion based on some sound arguments that polygynous wives are less fertile because such unions are less stable, and also because extra-marital intercourse becomes common thus increasing the probability of contacting venereal diseases which in some instances may lead to partial sterility. In addition, it is common for wealthier older men to marry younger fertile women whose fertility may be reduced in the long-run.⁴⁹ do not have proper medical training to be able to do so. The study by E. Muga found that the average number of wives in a polygynous family were two and the highest number was seven.⁵⁰ The author, in his survey of the region, found that in sampled areas the percentage of polygynous males were moderately low in most regions except in Bwanda sub-location which had 37% as depicted in Table 21. This low number of polygynous males reflects the influence of dowry price in traditional marriages. Otherwise most men in the Luo community would marry as many wives as possible. The desire for a large family is widespread because children are valuable assets in the traditional mode of economy and in the perpetuation of lineage.

E. Muga vividly demonstrated that most parents diverge on their concept of a few children and many children.

He has argued that there is institutional resistance to family planning because children are valued.⁵¹

The rejection of family planning could be attributed to the techniques employed in spreading the information. In some localities it is commonplace to find unmarried, divorced, or childless women who have a low social reputation trusted with the responsibility of spreading the knowledge about contraceptives. Furthermore, most of the agents do not have proper medical training to be able to answer adequately questions raised or to instruct the masses properly on methods of contraception.

E. Muga has further argued that the low educational status of the inhabitants probably contributes to their rejection of family planning for most of them complained that the instructions given on contraceptive methods were too cumbersome.⁵²

The low education, especially among the rural folks as depicted by Table 23 and Table 24, if scrutinized further should have revealed that generally women were the least educated in the region. This poor education of women therefore indicates that women have not been liberated socially, hence, the status of women in

the Luo community could not have a depressing effect on fertility for it is realized that the higher a woman's level of education the more likely it is for her to use the most effective contraceptive methods and consequently to have fewer children.⁵³ The reason is that such a woman has a greater probability of being aware of the best contraceptive methods and can afford to utilize the methods.

the mortality Natural theories assume that an increase in fertility rate is associated with a decrease in mortality rate. This demographic feature is being experienced in certain parts of Kenya where mortality is declining at a rate of 0.5/1000 per annum,⁵⁴ and we can assume that the study-region is no exception although micro-regional differentials could be great. The highest intercensal death rate of 133/1000 per annum was recorded in Kakola.

face of socio-The effect of economic activities on fertility rates within the region was assumed to be weak because the occupational structure showed that only a minority of those employed received a monthly income suitable for a reasonable standard of living as depicted by Table 25 and Table 26. Since the provision of these services was inadequate within the Sugar-belt the majority received a monthly salary though of a low value. Furthermore, the majority of these people had low educational status and

were mostly bachelors, hence, the effect of occupation and income on fertility could be further reduced.

The impact of technological advancements on mortality is definitely substantial as new dispensaries are erected in rural regions and the increasingly good communication network begins penetrating the rural environments; hence, it's not grossly inaccurate to assume that the mortality rate has assumed a declining trend within the region.

It has been stated by some demographers that migrations major role of re-distribution of population spatially indirectly influences the age-distribution structure of population within areas heavily affected.

The cultural norms of the Luo community create a psychological frustration to youths who in the face of socio-economic revolution have often sought for freedom from the chains of traditionalism and parental "tyranny." Furthermore, the increasing desire for higher education and subsequent white collar jobs are factors which have caused regional differentials in out-migration.

Since the provision of these services were inadequate within the study-region, especially in Kano areas, one could hypothesize that mass regional out-migration was evident. The impact of economic theories



PLATE 12 A railway line crossing the Sugar-belt.



and cultural theories have therefore been more effective in analysing determinants of migration rather than analysing determinants of fertility and mortality within a developing region like Kano-Sugar-belt environment.

migrants. The regional disparities in economic activities created by spatial inequalities in distribution of factories, settlement schemes, etc.; and the increasing demand for land consolidation were features which had contributed much more to population spatial mobility.

In a nutshell, the intercensal population change should therefore elicit much more features of migration rather than features of fertility because cultural phenomena regulate the level of fertility through taboos and customary beliefs influencing sexual relations, re-marriage of widows, nursing babies etc. For example, sexual relations outside marriage is prohibited and also sexual relations when a woman is breast-feeding her baby is also restricted.

Rural population mobility has involved mostly proletariat whose family institutions have been partially disrupted. Moreover, it could be hypothesized that Luos who form the bulk of the population sampled have a more competitive behaviour in acquisition of wealth and educational pursuits. This competitive attitude has encouraged individuals or families to migrate to areas of

economic potentials since their regions, especially Kano areas, were characterised by constant floods alternating with droughts whereas areas of high economic potentials as the (Sugar-belt) were therefore recipient areas for migrants.

1. Spatial Changes in the Population of Rural Sumatra, Indonesia In: Zeitschrift fuer Wirtschafts- und Sozialgeographie Vol. 4, 1957.
2. Frohman, G.F. and Selinsky, W. (1955) "Population Distribution and Change in Korea, 1945-1949". In: Geographical Review, Vol. 45, January, 1955, No. 1, pp. 1-26.
3. Davis, J.F. (1972) "The Changing World - United States Population Changes, 1950-1970". In: Geography Vol. 57, part II, April, 1972, pp. 140-143.
4. Siegel Jacob, S. et al "Accuracy of Post-Censal Estimator of Population for States and Cities" In: American Sociological Review, Vol. 9, August, 1954, No. 4, pp. 440-442.

5 Webb, J.H. REFERENCES The Natural and Migrational
Components of Population Changes
1 Withington W.A. - "Migration and Economic
(1967) In Development - Some Recent 39,
1966 Spatial Changes in the
6 Haisel, D.E. - "The Population of Rural Sumatra,
the Indonesia" In: Tijdschrift
10 Voor Economische en Sociale
of Geografie, Vol. 4, 1967.
2 Trewartha, G.T. and - "Population Distribution
Zelinsky, W. (1955) Pop and Change in Korea 1925-1950
1951-1949" In: Geographical
of Review, Vol. 45, January,
1955, No. 1, pp. 1-26.
33 Davis, J.F. - "The Changing World Today"
(1972) Anson In United States Population
Vol Changes, 1960-1970" In:
9 Trewartha, G.T. - The Geography Vol. 57, part II,
and Zelinsky, W. April, 1972, pp. 140-143.
14 Siegel, Jacob, S. - "Accuracy of Post-Censal
et al For Estimates of Population
in for States and Cities" In
American Sociological Review,
1954 Vol. 9, August, 1954, No. 4,
pp. 440-441.

- 5 Webb, J.W. = "The Natural and Migrational
 12 Beale Calvin L. - "Natural Causes of Population
 Changes in England and Wales 1921-1931"
 In Economic Geography, Vol. 39,
 1963, pp. 130-148.
- 6 Heisel, D.F. - "Measuring Current Population
 Changes" In Institute for
 13 Arrigo, E.F. - Development Studies, University
 of Nairobi, 1966.
- 7 Johnston, R.J. - "A Reconnaissance Study of
 1972 Population Change in Nidderdale
 14 Ritchey P. Haul - "Residence Background and
 1951-1961" In Transaction
of Institute of British
Geographers, 1967, p. 113.
- 8 Sigur Dur - "Population Changes in Iceland"
 15 Thorsarinson D. - "Demographic Parameters and
 Population Change" In Geographical Review
 Vol. 51, 1961, pp. 519-533.
- 9 Trewartha, G.T. - Ibid, pp. 1-26. November, 1969.
 16 Webb J.W. and Zelinsky, W. - Ibid, pp. 133-148.
 17 Hirsch, M.J. - "Population Growth in Finland
 10 Zelinsky Wilbur - "Changes in the Geographic
 Patterns of Rural Population
 in U.S.A. 1790-1960" In
Geographical Review Vol. 52,
 1962, pp. 492-524.
 Rainemaru Educational Books, 1972.

- 11 Johnston, C.R.J. - Ibid, pp:113-114: The General
- 12 Beale Calvin L. - "Natural Decrease of Population
Re: The Current and Perspective
Status of an Emergent American
Phenomenon" In Demography,
Vol. 6, No. 2, May, 1969; 81-199.
- 19 Roger Van ... - pp. 191-100. of Population
- 13 Arriaga, E.E. - "The Impact of Population"
Changes on Education Cost" In
Demography, Vol. 9, No. 2, May,
1972, pp. 275-294. of Nairobi,
- 14 Ritchney P. Neal - "Residence Background and
Migration and Fertility" In
Demography, Vol. 19, No. 2, May,
1972, pp. 217-230.
- 15 Friedlander, D. - "Demographic Responses and
Population Change". In Demography
Vol. 6, No. 4, November, 1969.
- 16 Webb, J.W. - Ibid, pp. 130-148.
- 17 Hirst, M.A. - "Population Growth in Mainland
Tanzania 1948-1957" In Case
Population Growth and Economic
Development, edited by M.A. of
S.H. Ominde and C.N. Ejiogu,
Heinemann Educational Books, 1972.

- 18 Martins, C.J. - "Some Estimates of the General Age Distribution, Fertility and Rates of Natural Increase of African Population of British East Africa" In Population Studies, VII, 1953, pp. 181-199.
- 23 Kingsley Davis - "A History of Population Growth in Kenya and Uganda" Working Paper No. 91 at the Institute for Development Studies, University of Nairobi, March, 1973.
- 19 Roger Van Ralph Zwanenberg - Land and Population Movements in Kenya, Heinemann Educational Books, 1968.
- 25 Coontz Sydney H. - Settlement Change and Challenge on Kano Plains, In, Department of Geography, University of Nairobi, 1967.
- 26 Coontz Sydney H. - Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains" In Republic of Kenya National Report on the
- 21 Millman, R.N. and Lewis, D.T. - Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains" In Republic of Kenya National Report on the
- 22 Muga, Erastus - Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains" In Republic of Kenya National Report on the
- 29 Hartley Shirley Foster (1972) - Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains" In Republic of Kenya National Report on the

- 30 Thompson Warren S. - Human Environment, Kenya,
and Lewis, D.T. - Nairobi, 1971.
- 231 Kingsley Davis G. - "Theory of Change and Response
and Lewis, D.T. - in Modern Demographic History"
- 32 Thompson Warren S. - In Population Index, No. 4,
and Lewis, D.T. - October, 1963, pp. 345-366.
- 243 Thomlinson Ralph - Population Dynamics Causes
Foster, (1972) and Consequences of World
- 34 Kingsley Davis - Demographic Change, Random
House, New York, 1965.
- 25 Coontz Sydney H. - Population Theories and Index,
Economic Interpretation, 1967
- 35 Hartley Shirley - London Routledge and Kegan
Paul Ltd., 1961, pp. 5-12.
- 266 Coontz Sydney H. S. - Ibid, pp. 13-20.
- 27 Thompson Warren S. - Population Problems, McGraw-
37 and Lewis, D.T. H. - Hill, Book Company, 5th edition,
(1961) 1970.
- 283 Thompson Warren S. - Ibid, pp. 61-68.
- 39 and Lewis, D.T. - The Doctrine of Malthus and
29 Hartley Shirley - Population Quantity Versus
Foster (1972) Quality, Prentice-Hall, Inc.
Englewood Cliffs, New Jersey,
1948.

- 30 Thompson, Warren S. - Ibid., p. 38.
- 31 and Lewis, D.T. - The Causes of the Decline in
- 31 Thompson, Warren S. - Ibid., pp. 39-40. in European
and Lewis, D.T. Spheres of Civilization,
- 32 Thompson Warren S. - Locating Harbour, New
and Lewis, D.T. York, August, 1931, p. 66.
- 33 Hartley, Shirley - Ibid., p. 47. of Economic
Foster, ver, D.M. Development on Population
- 34 Kingsley Davis - "The Theory of Change and
Response in Modern Demographic
History" In Population Index,
No. 4, October, 1963, p. 9.
- 35 Hartley, Shirley - Ibid., p. 61.
- 44 Foster Nations - "History of Population Theories"
- 36 Thompson Warren S. - Ibid., p. 46. Theory and
and Lewis, D.T. Policy, edited by J.S. Spengler
- 37 Coontz Sydney H. - Ibid., pp. 66-68. Canadian, The
(1961) Free Press of Glencoe, 1963,
- 38 Coontz Sydney H. - Ibid., pp. 67-68.
- 39 Brentano, Leon T. - "The Doctrine of Malthus, and
Increase of Population during
the Last Decades", In p. 51.
- 46 Republic of Kenya - Economic Journal, September,
1910, p. 384. Kenya, prepared

- 40 Brentano, L. - Ibid. by the Working Committee for
- 41 Roderick Von - The Causes of the Decline in
 Ungern-Sternberg Development. In: Universities
of Nairobi Library, June, 1971,
Spheres of Civilization,
 Cold Spring Harbour, New
- 47 Republic of Kenya - Ibid., p. 8
 York, August, 1931, p. 86.
- (1971)
- 42 Coale Ansley J. - "The Effects of Economic
- 43 Galwick and Galwick- "The Study of Population" In
 and Hoover, E.M. Development on Population
Growth" In Population Growth
African Cultures, edited by
and Economic Development in
Low Income Countries, Princeton
University Press, 1958, p. 9.
- 43 Thomlinson Ralph - Chicago Press, 1959, p. 110.
Ibid., p. 51.
- 44 Davids, V.R. - "Incidence and Intensity of
 United Nations - "History of Population Theories"
 (1953) Polymer" In Continuity and
In Population Theory and
Change in African Cultures,
Policy, edited by J.J. Spengler
edited by H.R. Duncan and
and Otis Dudley Duncan, The
Malville F. Markovits, 1963,
Free Press of Glencoe, 1963,
University of Chicago Press,
pp. 22-23.
- 45 Trewartha Glen T. - 1959, p. 111.
A Geography of Population
- 50 Muga, Enoch - "Problems of Rural Development
 (1971) World Patterns, John Wiley
in Kenya - A Sociological Case
and Sons, Inc., 1969, p. 51.
- 46 Republic of Kenya - Study of Social Change in the
National Report on the Human
Environment in Kenya, prepared

- by the Working Committee for U.N. Conference on the Human Environment, In University of Nairobi Library, June, 1971,
- 51 Muga, Erasto (1971)- p.17., p. 15.
- 52 Muga, Erasto (1971)- Ibid., p. 8.
- 47 Republic of Kenya - (1971)
- 48 Gulwick and Culwick- "The Study of Population" In Continuity and Change in African Cultures, edited by W.R. Bascon and Melville, J. Herskovits, University of Chicago Press, 1959, p. 110.
- 49 Dorjahn, V.R. - "Incidence and Intensity of Polygyny" In Continuity and Change in African Cultures, edited by W.R. Bascon and Melville J. Herskovits, University of Chicago Press, 1959, p. 111.
- 50 Muga, Erasto (1971) - "Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains" In Republic of

Kenya National Report on the
Human Environment in Kenya,

1971, Nairobi, p. 7.

51 Muga, Erasto (1971)- Ibid., p. 15.

52 Muga, Erasto (1971)- Ibid., p. 15.

53 Hartley Shirley - Ibid., p. 202.

Poster

54 Republic of Kenya - Ibid., p. 8.

CHAPTER IV

ANALYSIS OF SURVEY DATA

ANALYSIS OF SURVEY DATAAge and Sex Pyramids

Age and sex pyramids were employed to measure regional differentials in spatial population mobility. The illustration, however, is based on randomly selected sub-locations which included Kabara and Kawino sub-locations in West Kano, Kurewa, in East Kano, Kalaru and Maraya in West Kano. For the North Belt, Baharoni, Chomali, and God-Aburo were selected as depicted CHAPTER IV

ANALYSIS OF SURVEY DATA

The natural sex pyramid for developing countries should be broad at the base and taper towards the top in the absence of migrational influence. This ideal age-sex pyramid structure was not duplicated in Kano locations as cohort irregularities exemplified such more features of migrational influence.

The sub-locations in rural Kano revealed some distinctive structured features, namely, a small proportion of male children aged 0-4 years as compared to those aged 5-9 years. This was particularly pronounced in Kabara sub-location as depicted by Fig. 7. This phenomenon could possibly be explained by under-enumeration

ANALYSIS OF SURVEY DATA

Females

Age and Sex Pyramids

Age and sex pyramids were employed to measure regional differentials in spatial population mobility. The illustration, however, is based on a few randomly selected sub-locations which included Bwanda and Kawino sub-locations in West Kano, whereas, in East Kano Kabar and Wangaya II were selected. For the Sugar-

belt Muhoroni, Chemelil, and God-Abuoro were selected as depicted by Figs 5 to Fig 11.

The natural sex pyramid for developing countries should be broad at the base and taper towards the top in the absence of migrational influence. This ideal age-sex pyramid structure was not duplicated in Kano locations as cohort irregularities exemplified much more features of migrational influence.

The sub-locations in rural Kano revealed some distinctive structural features, namely, a small proportion of male children aged 0-4 years as compared to those aged 5-9 years. This was particularly pronounced in Kabar sub-location as depicted by Fig. 7. This phenomenon could possibly be explained by under-enumeration

BWANDA AGE AND SEX PYRAMID

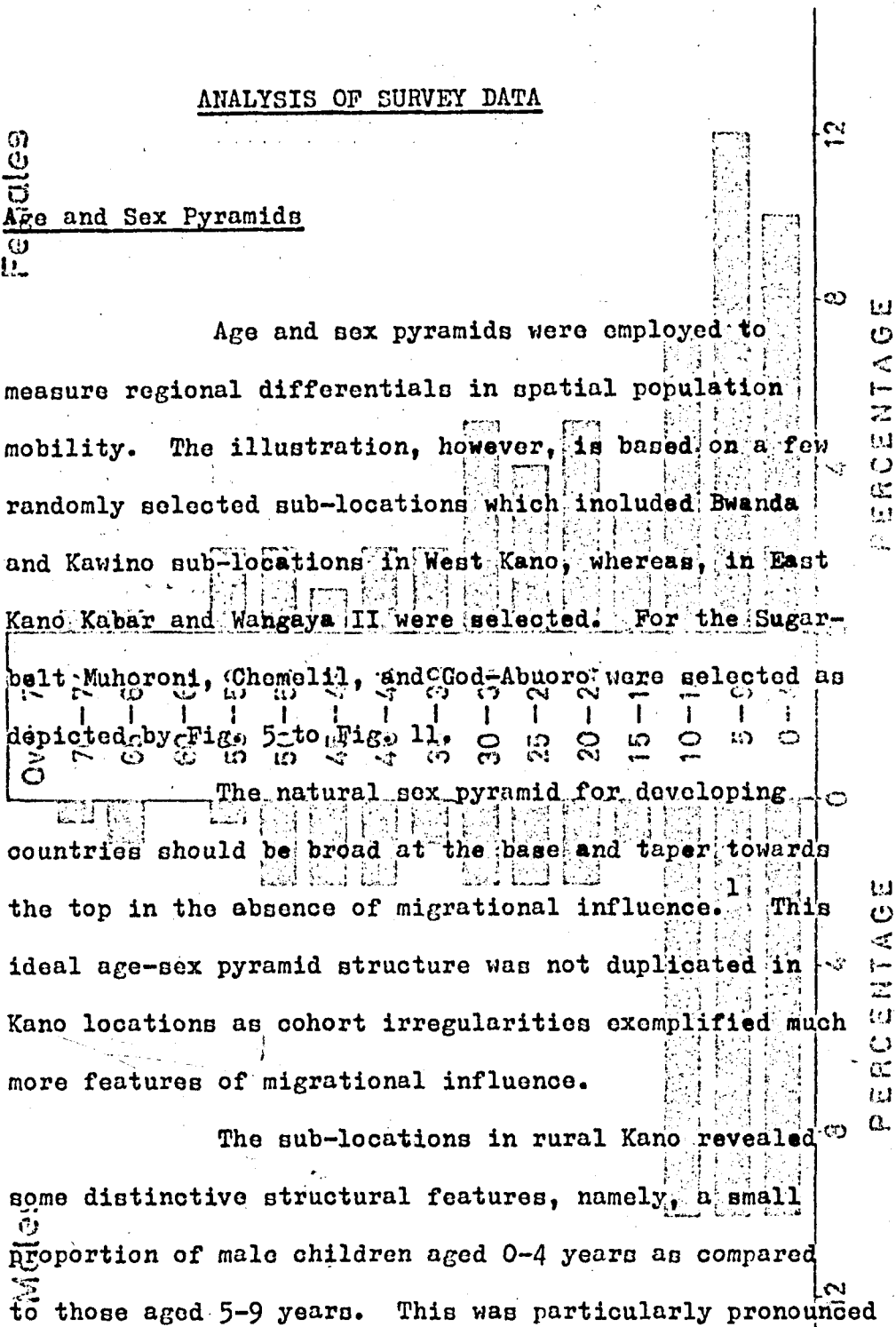


FIG. 5

BWANDA AGE AND SEX PYRAMID

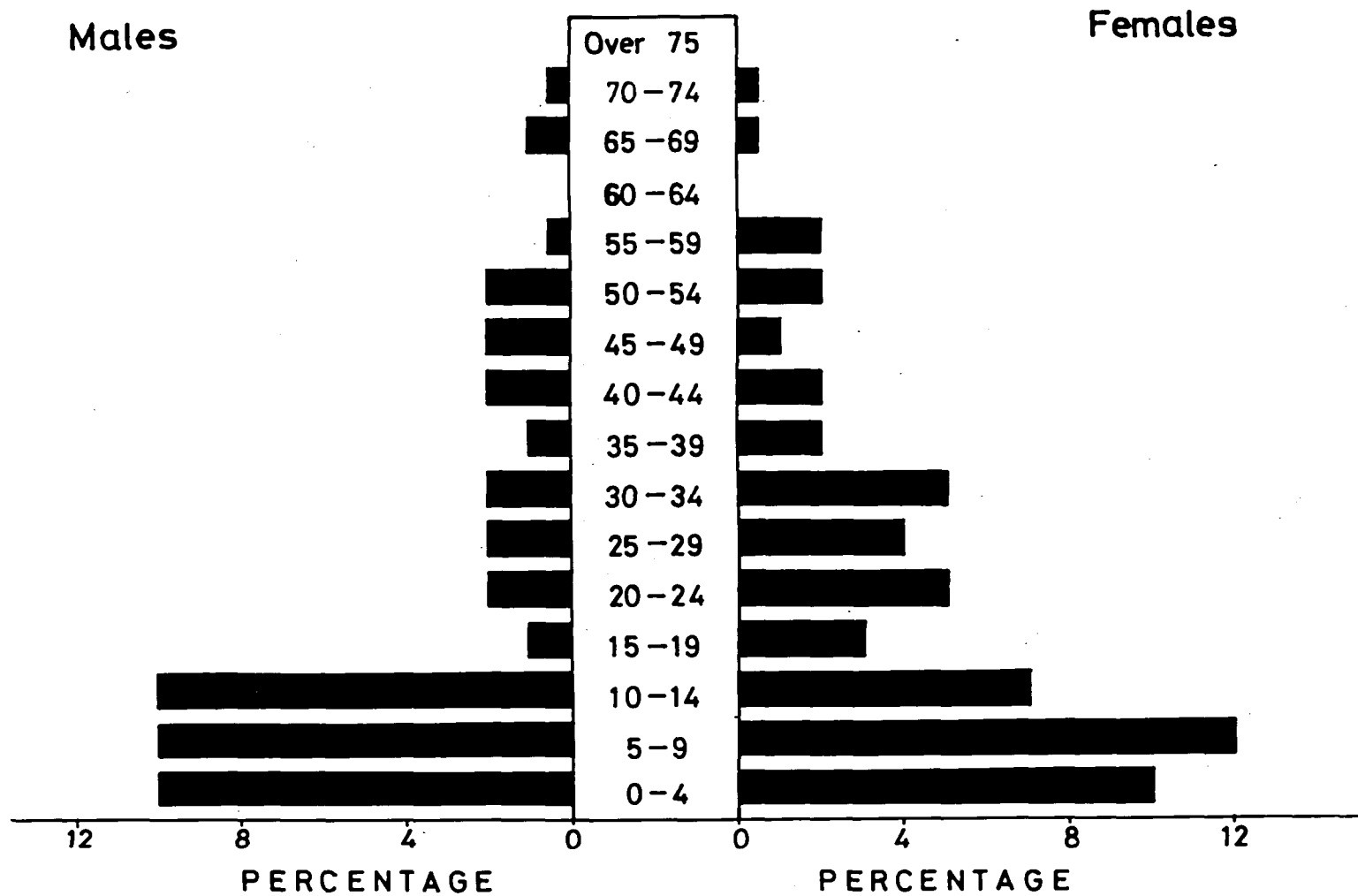


Fig. 5

KAWINO AGE AND SEX PYRAMID

Males

Females

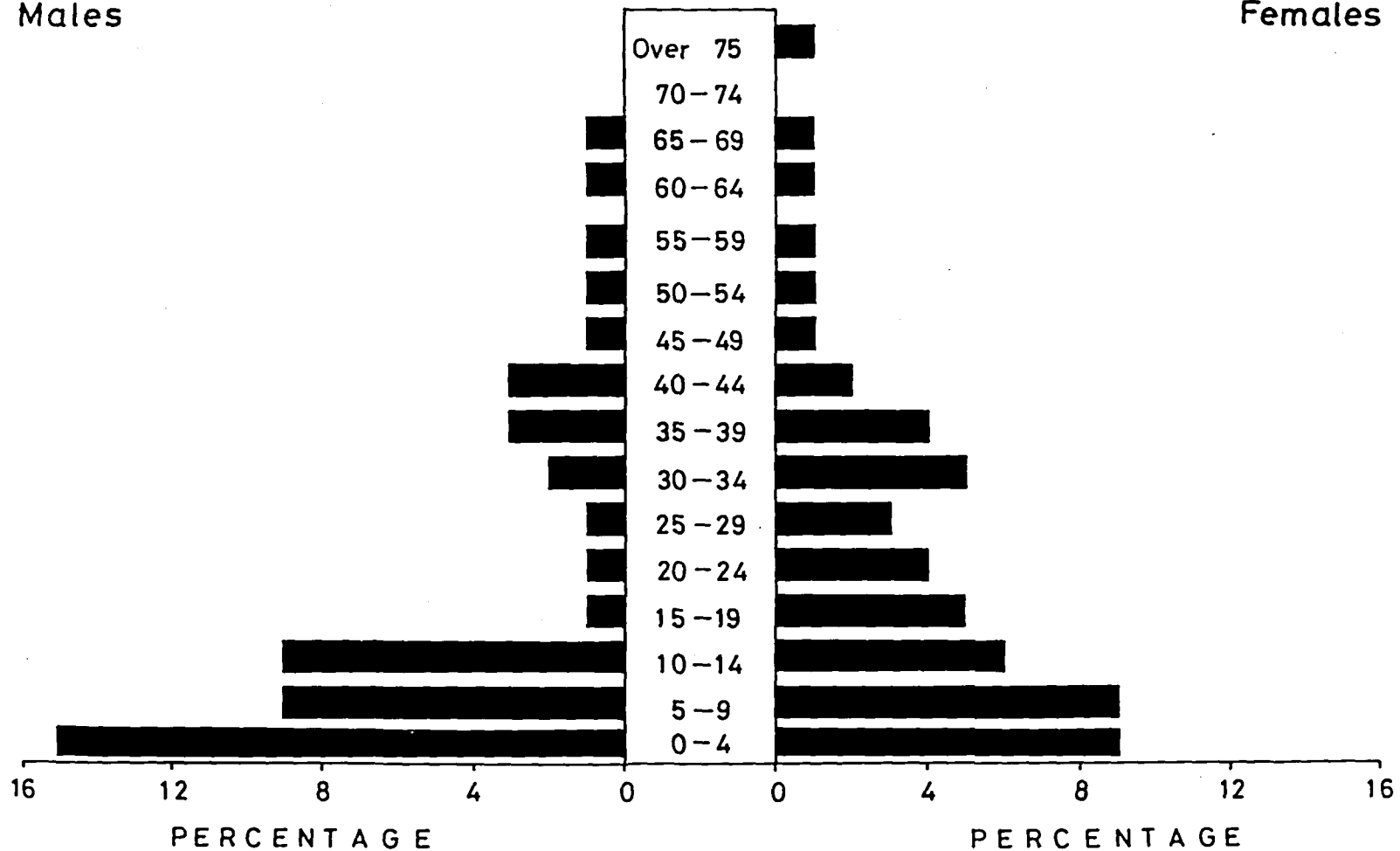


Fig. 6

KABAR
AGE AND SEX

Males

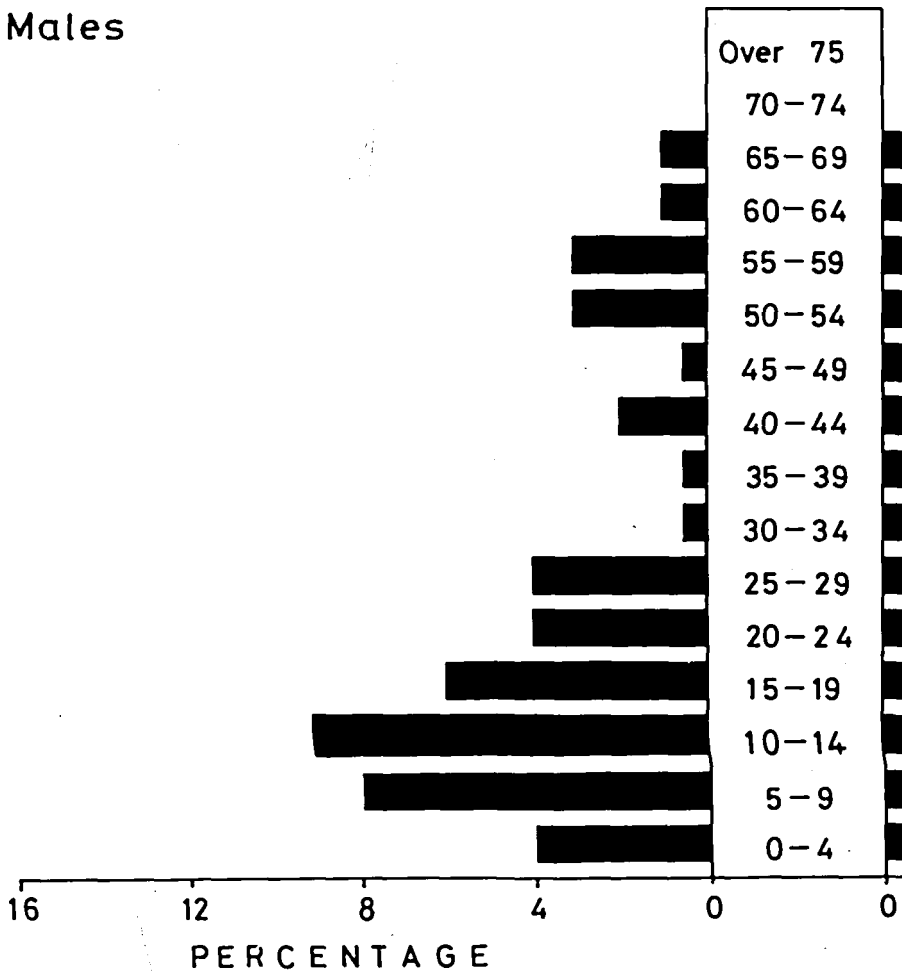
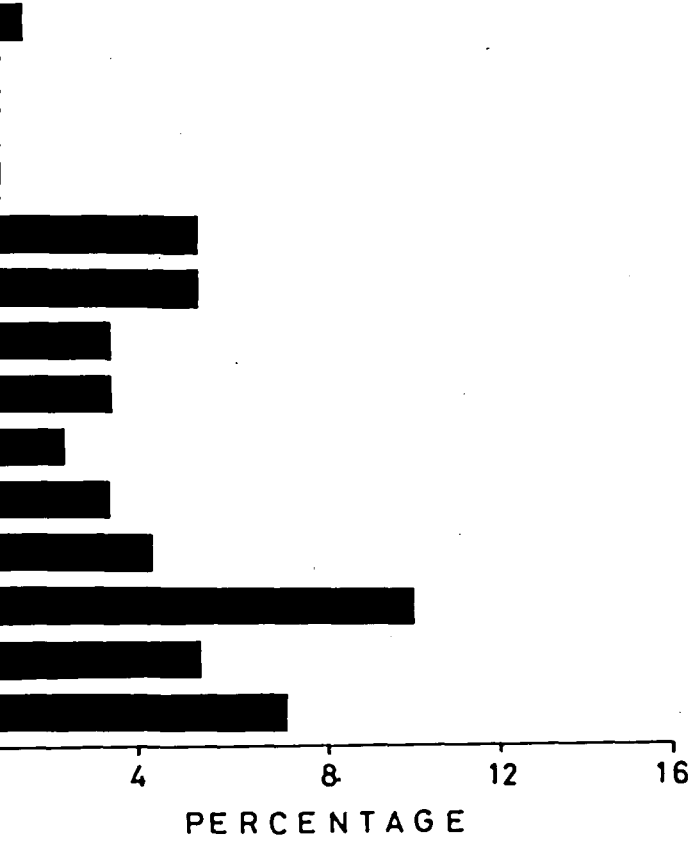


Fig. 7

PYRAMID

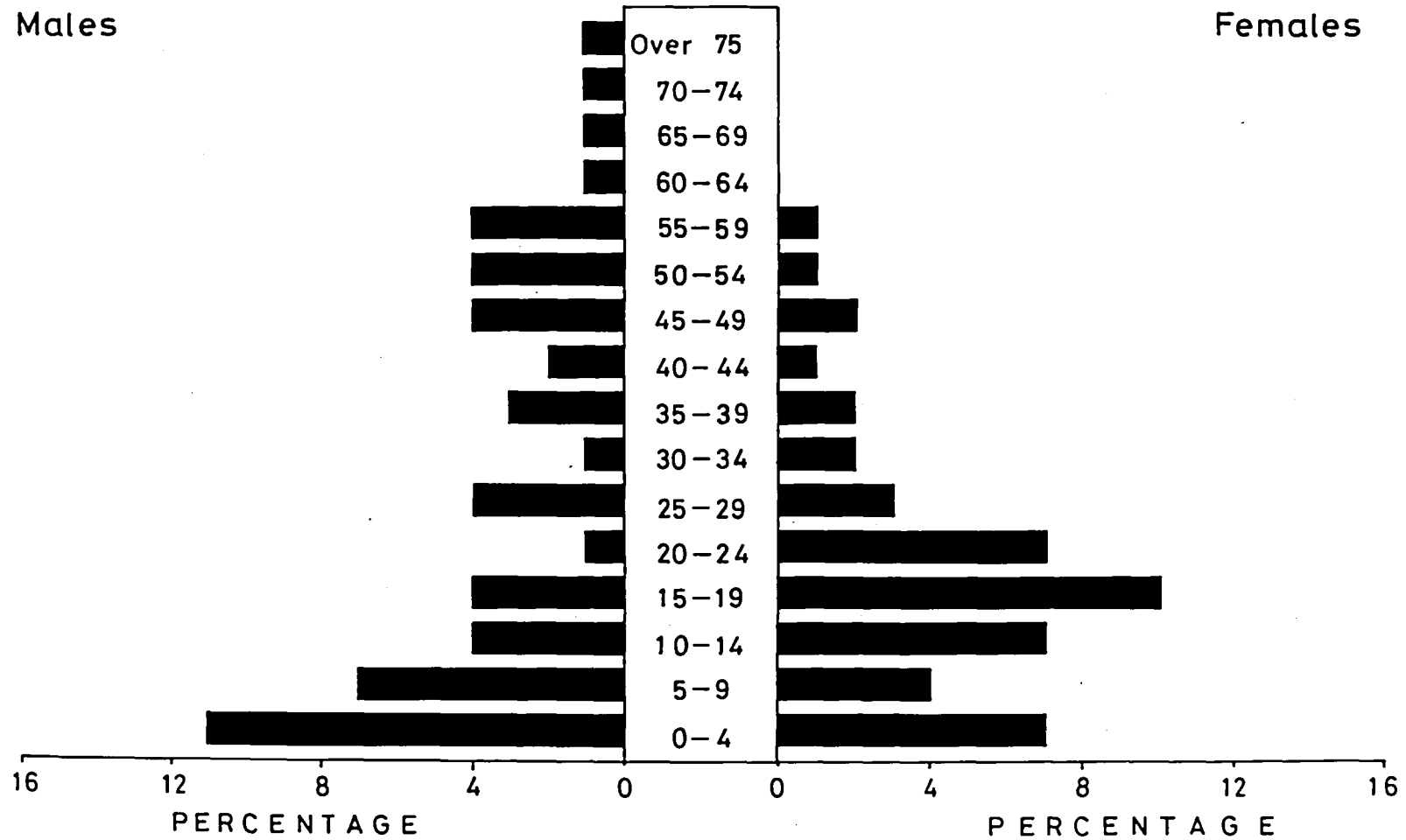
Females



WANGAYA '2'
AGE AND SEX PYRAMID

Males

Females



130

Fig. 8

CHEMELIL
AGE AND SEX PYRAMID

Males

Females

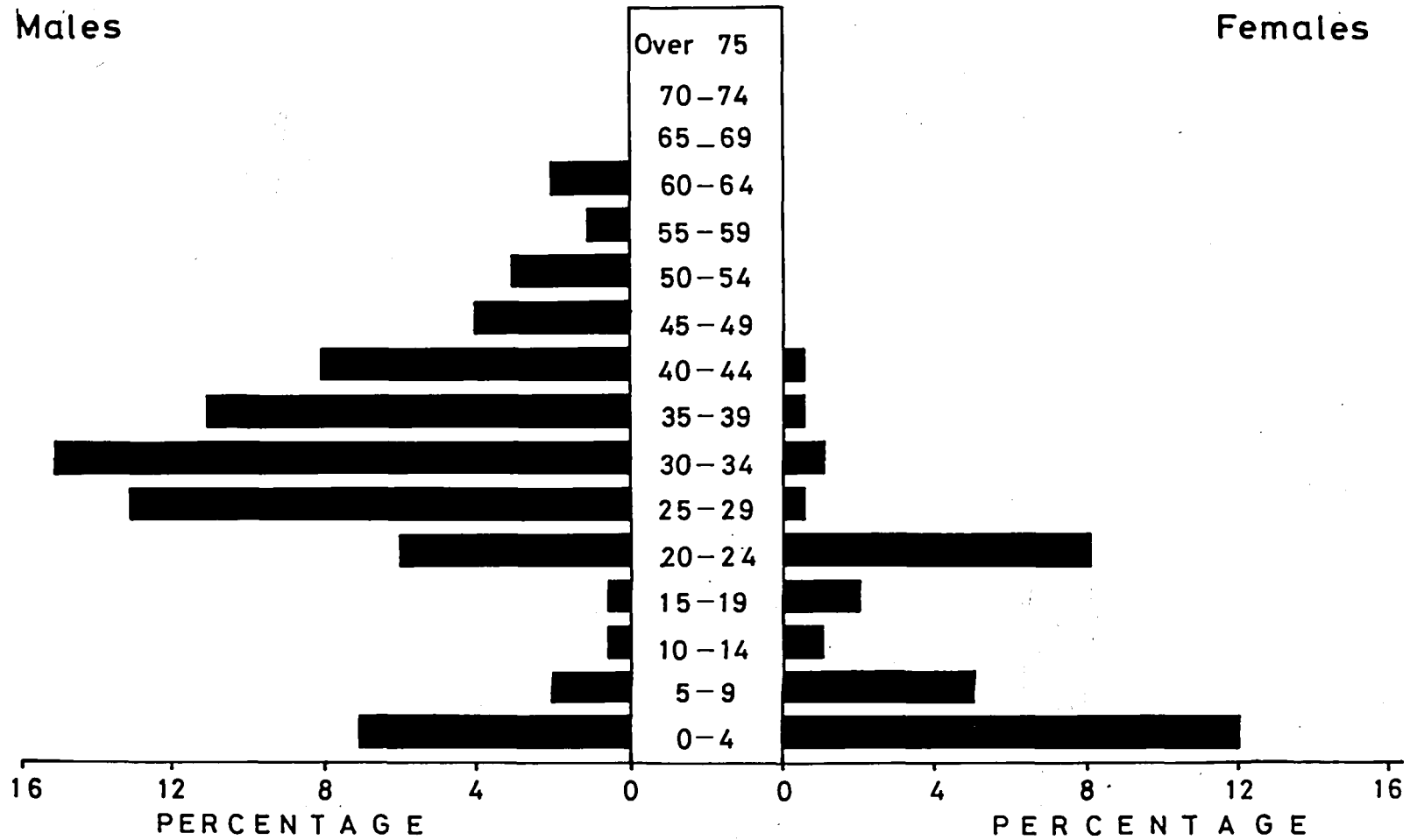


Fig.9

MUHORONI AGE AND SEX PYRAMID

Males

Females

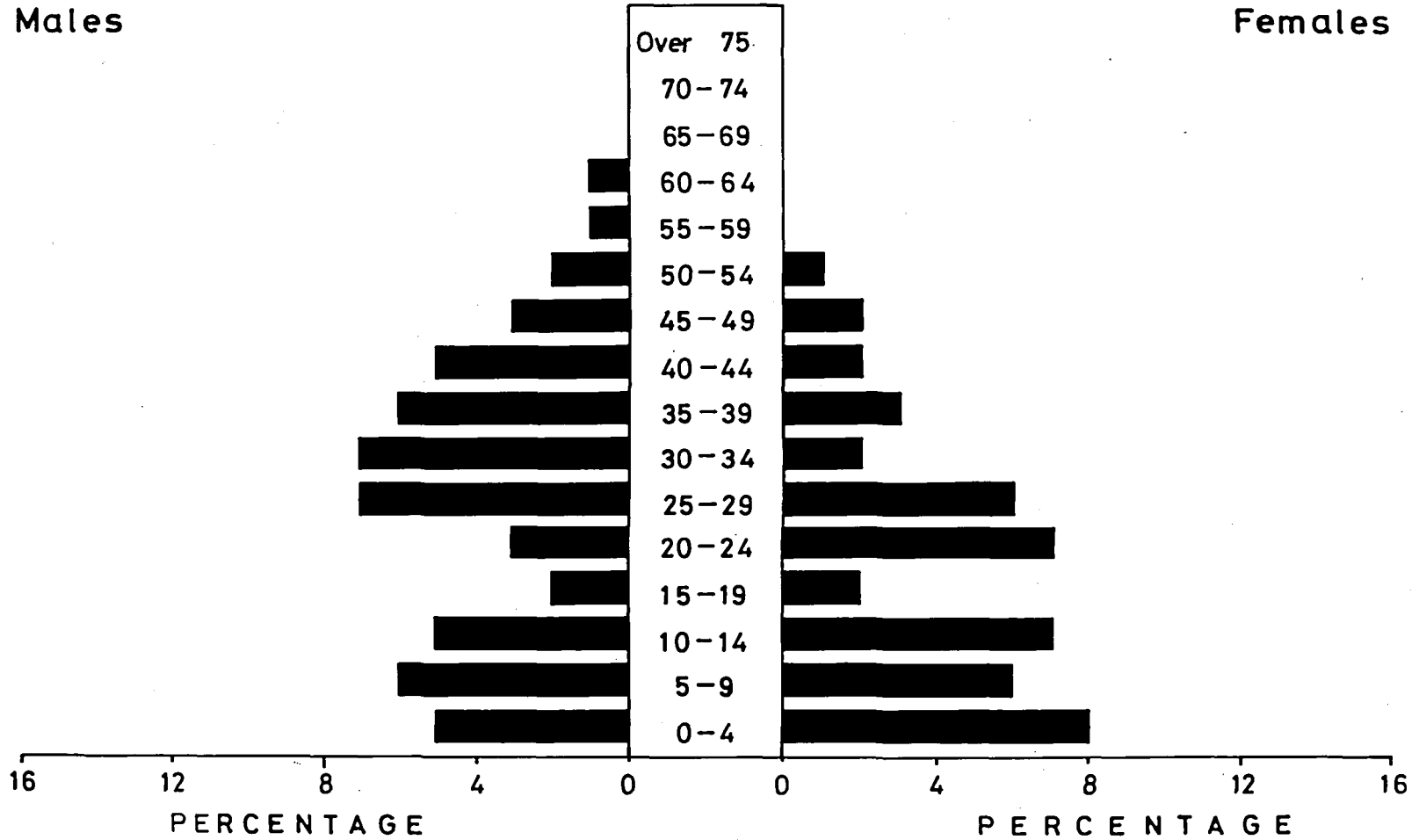


Fig. 10

GOT-ABUORO
AGE AND SEX PYRAMID

Males

Females

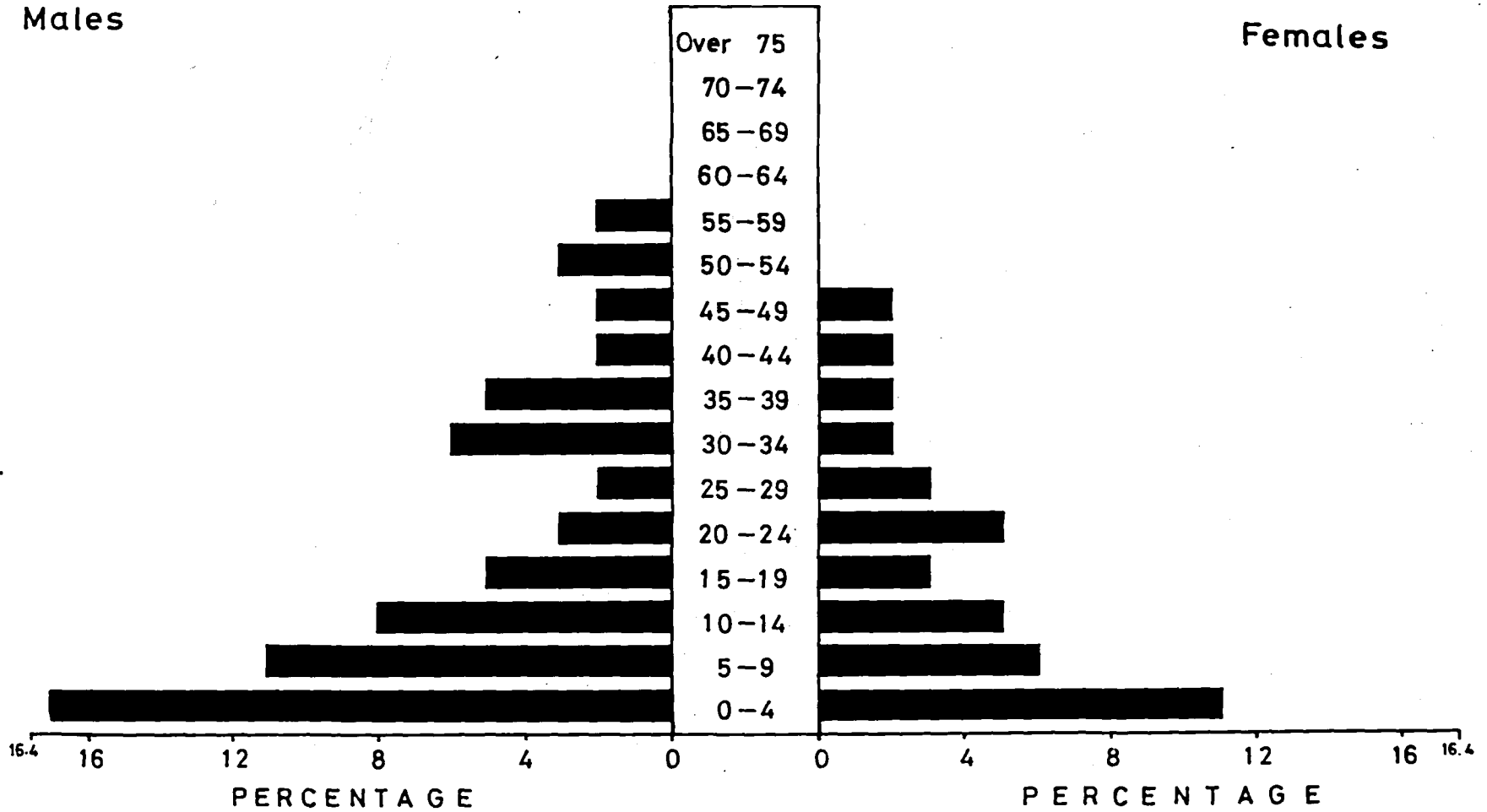


Fig. 11

regions. This could be attributed to the effects of
of the male babies in these regions. Furthermore,
militarization which often required some members of the
cohorts in the broader age group of 5-14 years were
family, mostly males, to pioneer into new regions.
succeeded by a deficient representation of males aged
This demographic feature could also be attributed to the
15-44 years particularly in West Kano. The cohorts in
effects of traditional behaviour among the Luo and
this age zone further indicated small irregularities
who often leave their wives behind to farm the land and
especially in East Kano. The noted irregularities could
safeguard their property while they go to work elsewhere.
be attributed to either in-migration as was in the case
One could therefore hypothesize that the partial disruption
of some sub-locations in East Kano, or out-migration
of the frequency of sexual relations amongst the majority
as was in most sub-locations of West Kano. The age-
of the females could contribute to a slow rate of natural
distribution of these cohorts in regions of potential
growth in rural areas despite the high fertility of women
in-migration as the Sugar-belt was relatively high;
in such regions. Yet, one could also argue that the
therefore, one could hypothesize that out-migration was
actual number of those involved in family disruption is
selective of these cohorts especially among males. But,
generally too small to have a significant effect on the
young adults aged between 15-24 years were relatively
general rate of natural population growth
few in the Sugar-belt. This, does not however rule
out the possibility that most of the young adults might
have migrated elsewhere, since Luo youths usually like
white-collar jobs. Furthermore, the small proportion
in age-distribution of cohorts between 15-44 years
indicate the impact of industrialization of male proletarians
characterised all sub-locations in Kano thus probably
returning home during old age. These cohorts have succeeded
proving that faulty enumeration played a relatively
minor role in the structure of age-sex pyramids.
older age-groups. This probably reflected the impact of
The cohorts between 15-44 years on the
high mortality rates during old age particularly among
other hand depicted female dominance in all rural sub-

~~See
Sheet
10~~

regions. This could be attributed to the effects of split-migration which often required some members of the family, mostly males, to pioneer into new environments. This demographic feature could also be attributed to the effects of traditional behaviour among the Luo males who often leave their wives behind to farm the land and safe-guard their property while they go to work elsewhere. One could therefore hypothesize that the partial disruption of the frequency of sexual relations amongst the majority of the females could contribute to a slow rate of natural growth in rural areas despite the high fecundity of women in such regions. Yet, one could also argue that the actual number of those involved in family disruption is generally too small to have a significant effect on the general rate of natural population growth.

The last structural feature affecting the age-sex pyramids was a general increase in population age-distribution among cohorts aged 50-59 years especially among the males of East Kano. This feature again could indicate the impact of in-migration of male proletariats returning home during old age. These cohorts are succeeded by a gradual decline in population size in cohorts of older age-groups. This probably reflected the impact of high mortality rates during old age particularly among

females because in Wangaya II and Sidho-East no females were recruited only those who are above 21 years of age, females were enumerated. It might be plausible to hypothesize that the high mortality rate among females during old age was indirectly associated with the effects of child-birth and strenuous domestic responsibilities African women undertake. Further analysis reveals that minor discrepancies affecting ages above 70 years, particularly among the males, could be attributed to the effects of age-misstatement, which was common among old people. In summary, the unique structure of age-sex pyramids in rural Kano could be greatly attributed to regional differences in net migration. The typology of age-sex pyramids for the Sugar-belt environments revealed a different picture because their structural patterns were characterised by a small portion of children, mostly males, in the cohorts between age 5-19 years. A possible explanation for this demographic structure could be under-enumeration of male babies. It was also noted that both males and females aged between 10-19 years were relatively few especially in Chemelil and Muhoroni Estates. It is speculated that the young adults in these cohorts who were not in secondary schools might have migrated to other economic islands to seek white-collar jobs as the Sugar-Estates

recruit only those who are above 21 years of age for both of in-migration of male labourers in ~~the~~ demographic manual work and technical training.

Nevertheless, all the sub-locations depicted reporting among inhabitants of the Sugar-estates a small female dominance during childhood. A plausible explanation indeed as part of the reason when they were born. For that reason, the age-sex irregularities in the age-pyramid featured non-migrational influence rather (who were relatively many) to have young female relatives than non-gambling careers. In summary, the slightly higher statistical representation of females between ages 20-24 years could represent only the married lot and household-distribution involving ages between 25-44 years in most sub-locations. These cohorts contained the bulk of the

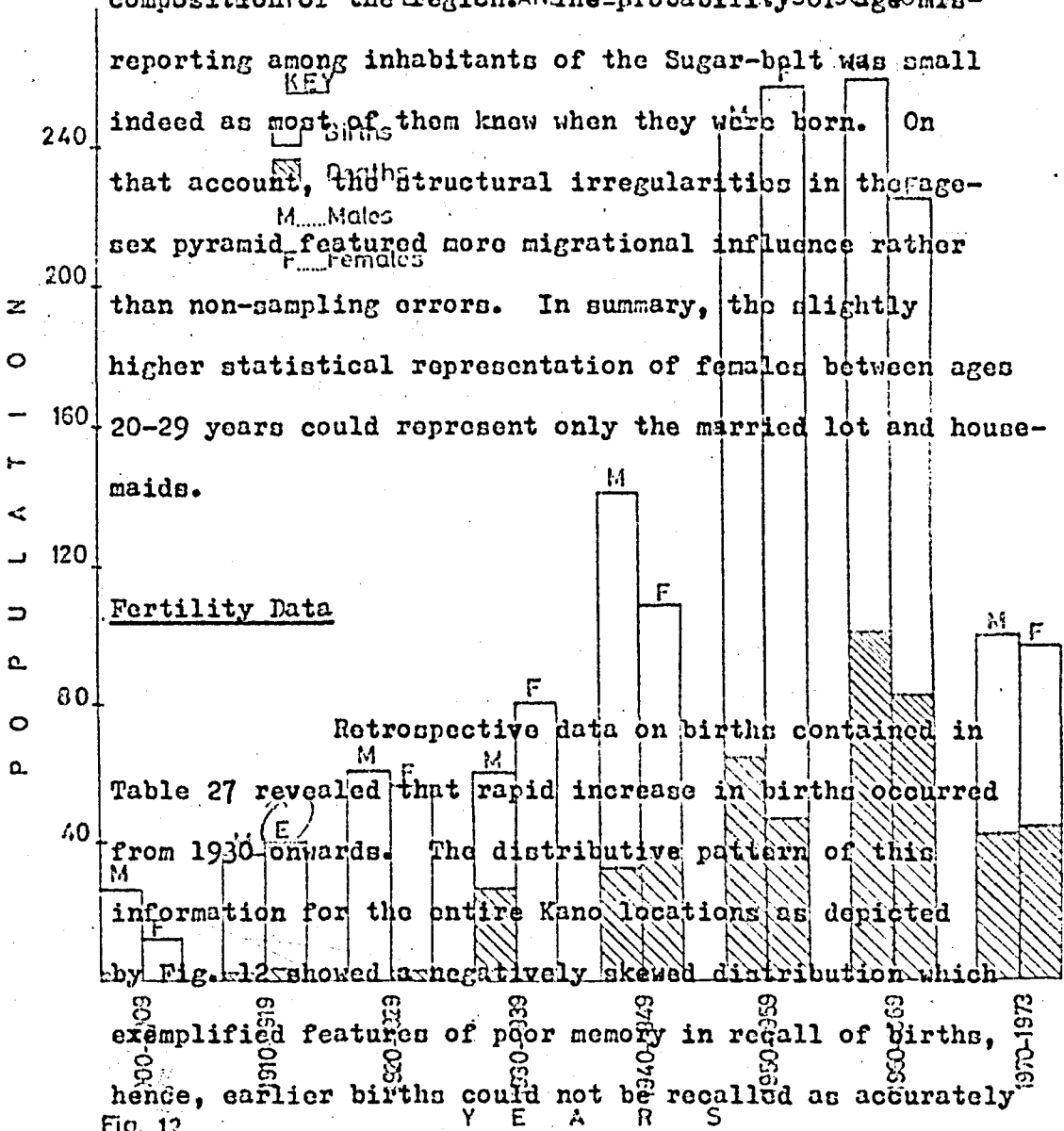
labour force in the Sugar-Estates, as it is the age zone where desirable skills are more abundant and human physical energy is generally great for exploitation particularly in manual work.

Retrospective data on births contained in Table 27 revealed that rapid increase in births occurred from 1930 onwards. The female age-sex pyramid revealed a broader pattern affecting cohorts aged 20-24 years, and information for the entire Kano location as depicted by Fig. 12 showed a negatively skewed distribution which exemplified features of poor memory in recall of births. The cohorts above showed an abrupt decline with practically no females enumerated above age 54, 44, and 49 years for Muhoroni, Chemellil, and Koru respectively. In addition, earlier births could not be recalled as accurately as the more recent births. Table 27 further reveals that West Kano had a comparatively higher aggregate number of births, whereas, East Kano had comparatively more births prior to 1930. In addition, child-woman

The pattern in the Sugar-Estates and re-settlement regions, therefore, vividly mirrored the influence of the

of in-migration of male labourers in the demographic composition of the region. The probability of over-reporting among inhabitants of the Sugar-belt was small

indeed as most of them knew when they were born. On that account, the structural irregularities in the age-sex pyramid featured more migrational influence rather than non-sampling errors. In summary, the slightly higher statistical representation of females between ages 20-29 years could represent only the married lot and housemaids.



Retrospective data on births contained in Table 27 revealed that rapid increase in births occurred from 1930 onwards. The distributive pattern of this information for the entire Kano locations as depicted by Fig. 12 showed a negatively skewed distribution which exemplified features of poor memory in recall of births, hence, earlier births could not be recalled as accurately as the more recent births. Table 27 further reveals that West Kano had a comparatively higher aggregate number of births, whereas, East Kano had comparatively more births prior to 1930. In addition, child-woman

DISTRIBUTION OF BIRTHS AND DEATHS IN KANO LOCATIONS

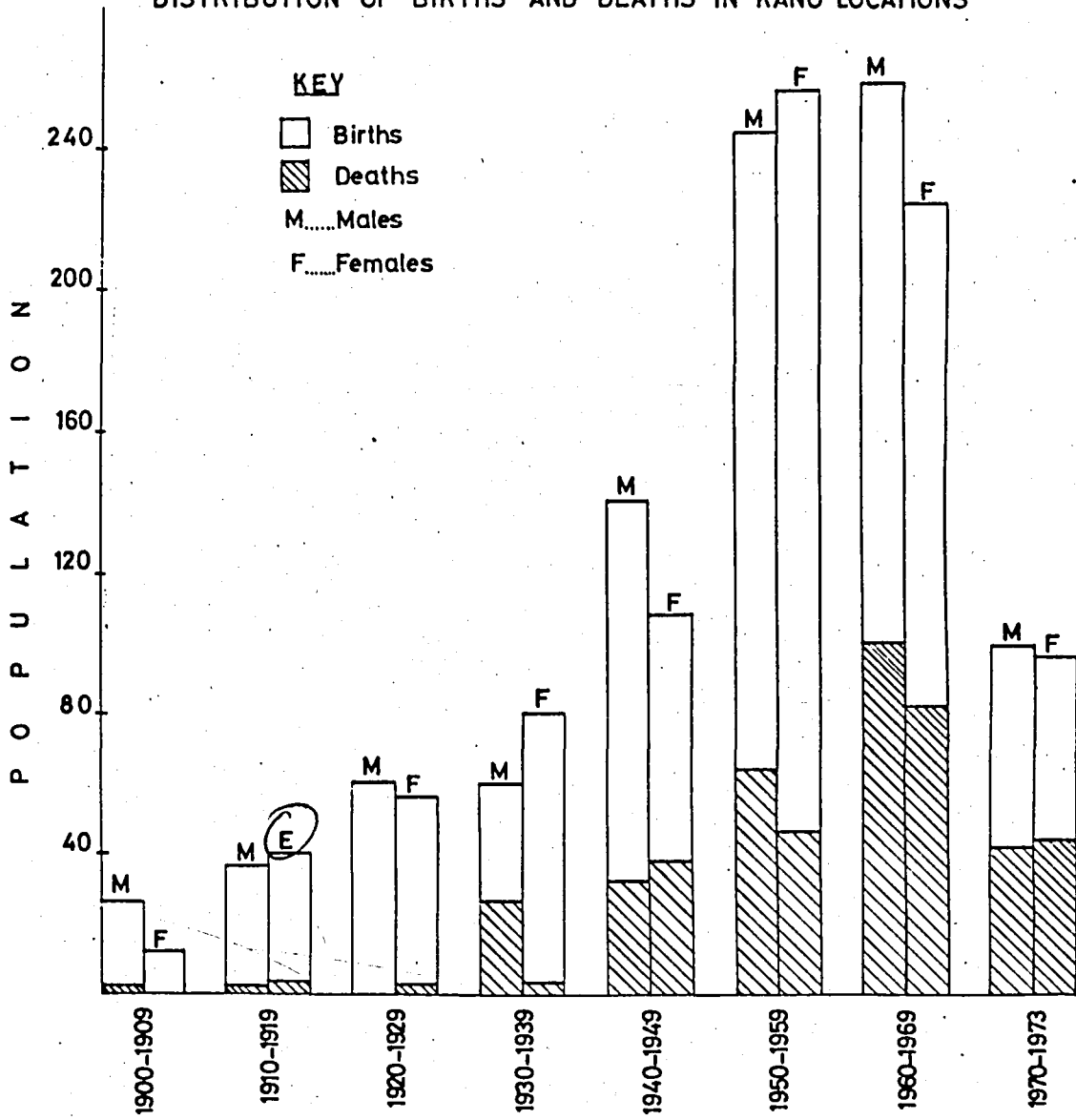
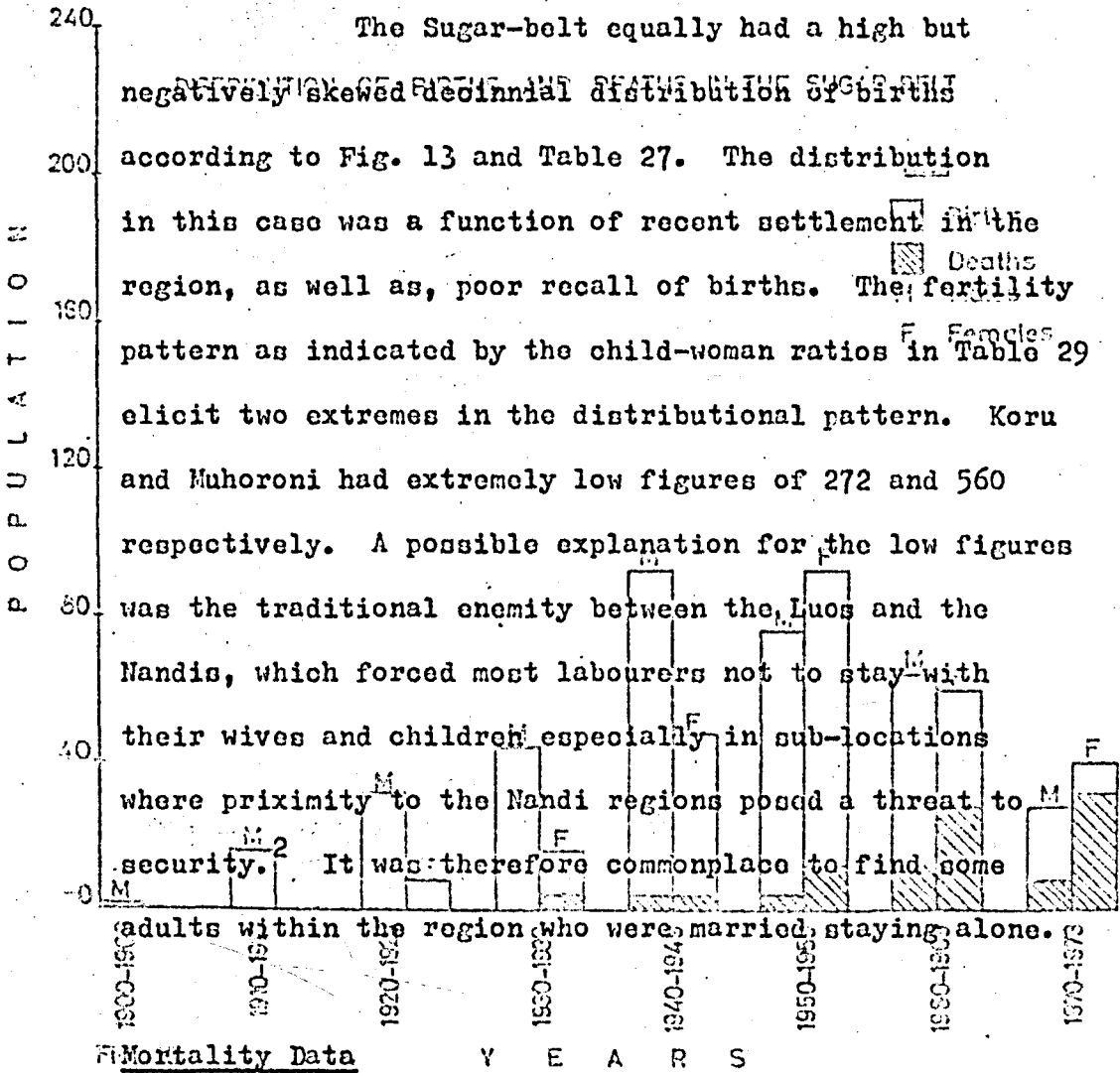


Fig. 12

Y E A R S

ratio data from Table 28 equally justifies the hypothesis that West Kano had a relatively high fertility.



The Sugar-belt equally had a high but negatively skewed decennial distribution of births according to Fig. 13 and Table 27. The distribution in this case was a function of recent settlement in the region, as well as, poor recall of births. The fertility pattern as indicated by the child-woman ratios in Table 29 elicit two extremes in the distributional pattern. Koru and Muhoroni had extremely low figures of 272 and 560 respectively. A possible explanation for the low figures was the traditional enmity between the Luos and the Nandis, which forced most labourers not to stay with their wives and children especially in sub-locations where proximity to the Nandi regions posed a threat to security. It was therefore commonplace to find some adults within the region who were married, staying alone.

Mortality Data

Data on decennial deaths for the study-region is depicted by Table 30. The distribution of deaths as portrayed by Fig. 12 again featured a negatively

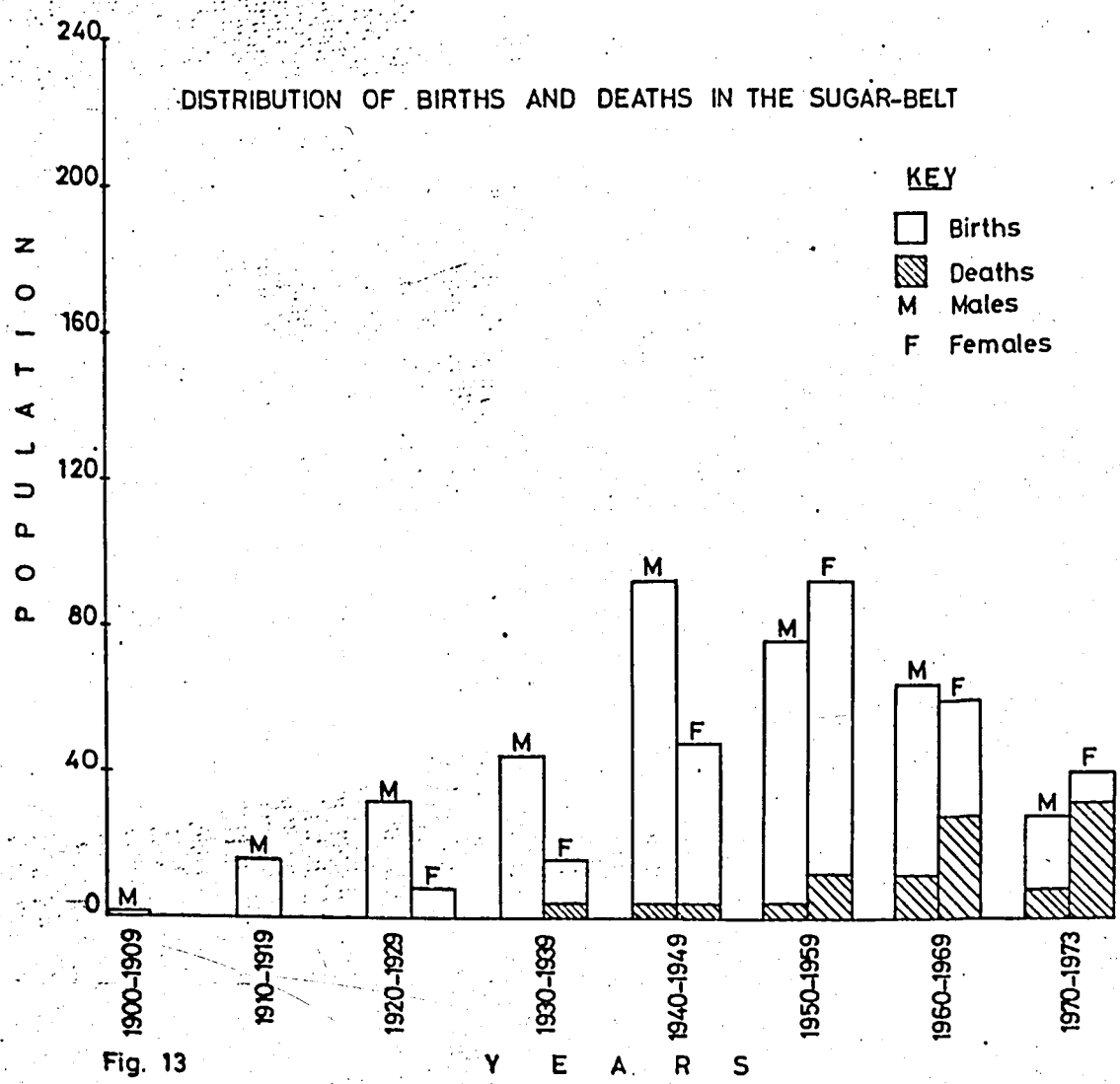


Fig. 13

... were recorded in each sub-location. It was, however, a skewed pattern for the entire study-region. The modal period was between 1960-1969, whereas, prior to 1930 comparatively fewer deaths were recorded. This pattern could be explained by poor recalls of deaths as well as the low life expectancy among Africans; which meant that the majority of those born prior to 1930 were now dead. Furthermore, the study of the age-calender in the appendix reveals that prior to 1930 more disease epidemics were experienced than after 1930. Death statistics unlike that of births indicated that East Kano had comparatively more deaths throughout the first seven decades in rural areas in relatively poor during the 19th and early 20th centuries in remote areas where they therefore hypothesized that the high mortality rate characteristic of East Kano was a function of re-adjustment amongst the higher proportion of in-migrants in the location to their new environment which was ridden with tse-tse flies. The distributional pattern was bimodal for females and the U-shaped pattern was duplicated by ages 0-20 years. The second peak again was between 25-34 years due to maternal mortality because this pattern was succeeded by an irregular decline in mortality affecting cohorts between 15-34 years then a slight rise in mortality affecting ages between 35-64 years. In addition, hardly no death statistics above age 64 years

of the hypothesis that in African communities most women were recorded in most sub-locations. It was, however, also relatively young due to child-birth and strenuous domestic activities which could indirectly lower their life expectancy. The poor provision of medical facilities especially between the ages 0-39 years where reporting of age-distribution of deaths was expectedly more accurate in rural regions also contributes to the high rate of maternal mortality. The irregularities affecting ages above 39 years could

therefore be attributed to poor recall of deaths. Furthermore, in summary, the analysis of natural factors more, it was found that mortality among the females was of population growth reveal vividly that fertility was mostly concentrated between age 20-24 years. The exceptionally high mortality rates experienced among females in the Sugar-belt. Furthermore, mortality rates were of this cohort could be attributed to early marriages apparently high in both regions, so the rapid growth rate and pregnancies resulting into pre-mature deaths as experienced in some sub-locations during the last decade. medical care in rural areas is relatively poor during births and poor communication in remote areas make easy access to medical institutions during such cases difficult.

Environmental Perception
The proportion of deaths recorded in the Sugar-belt was relatively small as revealed by Table 32 and Fig. 13. The distributional pattern was bimodal for females and the U-shaped pattern was duplicated by ages between 0-20 years. The second peak again was between 20-25 years due to maternal mortality because this is the general age during which women give the first few births in order to legitimize their marriage contracts. Above the age of 59 years no data indicating female deaths were obtained. This again confirmed the validity

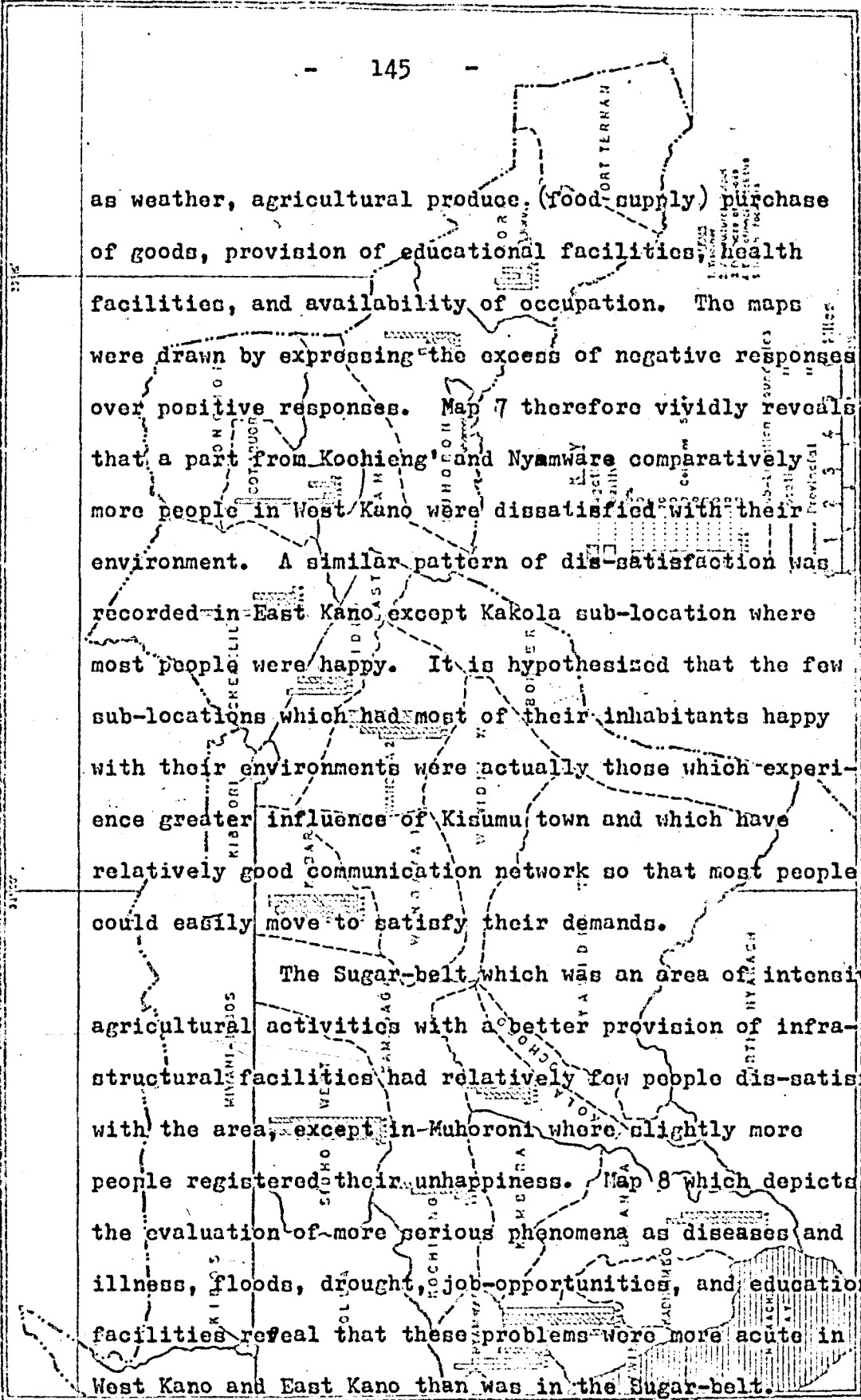
of the hypothesis that in African communities most women die relatively young due to child-birth and strenuous domestic activities which could indirectly lower their life expectancy. The poor provision of medical facilities in rural regions also contributes to the high rate of neonatal and maternal mortality rates. Map 7 therefore vividly reveals that a part of In summary, the analysis of natural factors of population growth reveals vividly that fertility was potentially high in Kano regions but relatively low in the Sugar-belt. Furthermore, mortality rates were apparently high in both regions, so the rapid growth rate experienced in some sub-locations during the last decade could partly be attributed to the effects of in-migration. The greater influence of Kano towns and which have

Environmental Perception network so that some people could easily move to satisfy their demands.

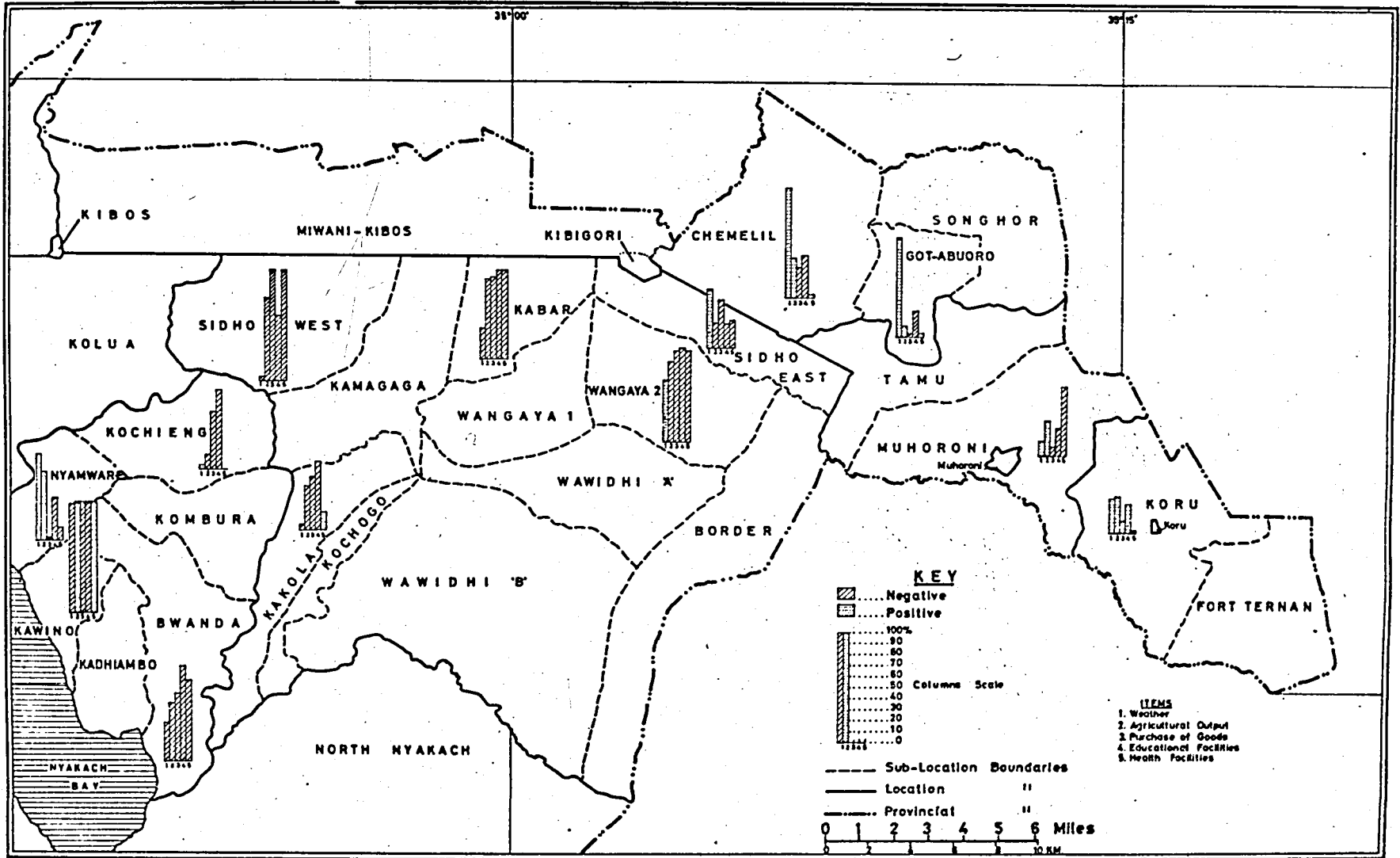
A person's evaluation of his environment's utility in relation to other environment's utility may be instrumental in influencing his decision to move to a new environment. On that account, inter-regional population spatial mobility to a reasonable degree is a direct function of environmental perception. The two maps, namely Map 7 and Map 8 show regional differences in human evaluation of the environment in relation to designated phenomena West Kano and East Kano that are in the Sugar-belt.

as weather, agricultural produce, (food supply) purchase of goods, provision of educational facilities, health facilities, and availability of occupation. The maps were drawn by expressing the excess of negative responses over positive responses. Map 7 therefore vividly reveals that a part from Koochieng' and Nyamware comparatively more people in West Kano were dissatisfied with their environment. A similar pattern of dis-satisfaction was recorded in East Kano, except Kakola sub-location where most people were happy. It is hypothesized that the few sub-locations which had most of their inhabitants happy with their environments were actually those which experience greater influence of Kisumu town and which have relatively good communication network so that most people could easily move to satisfy their demands.

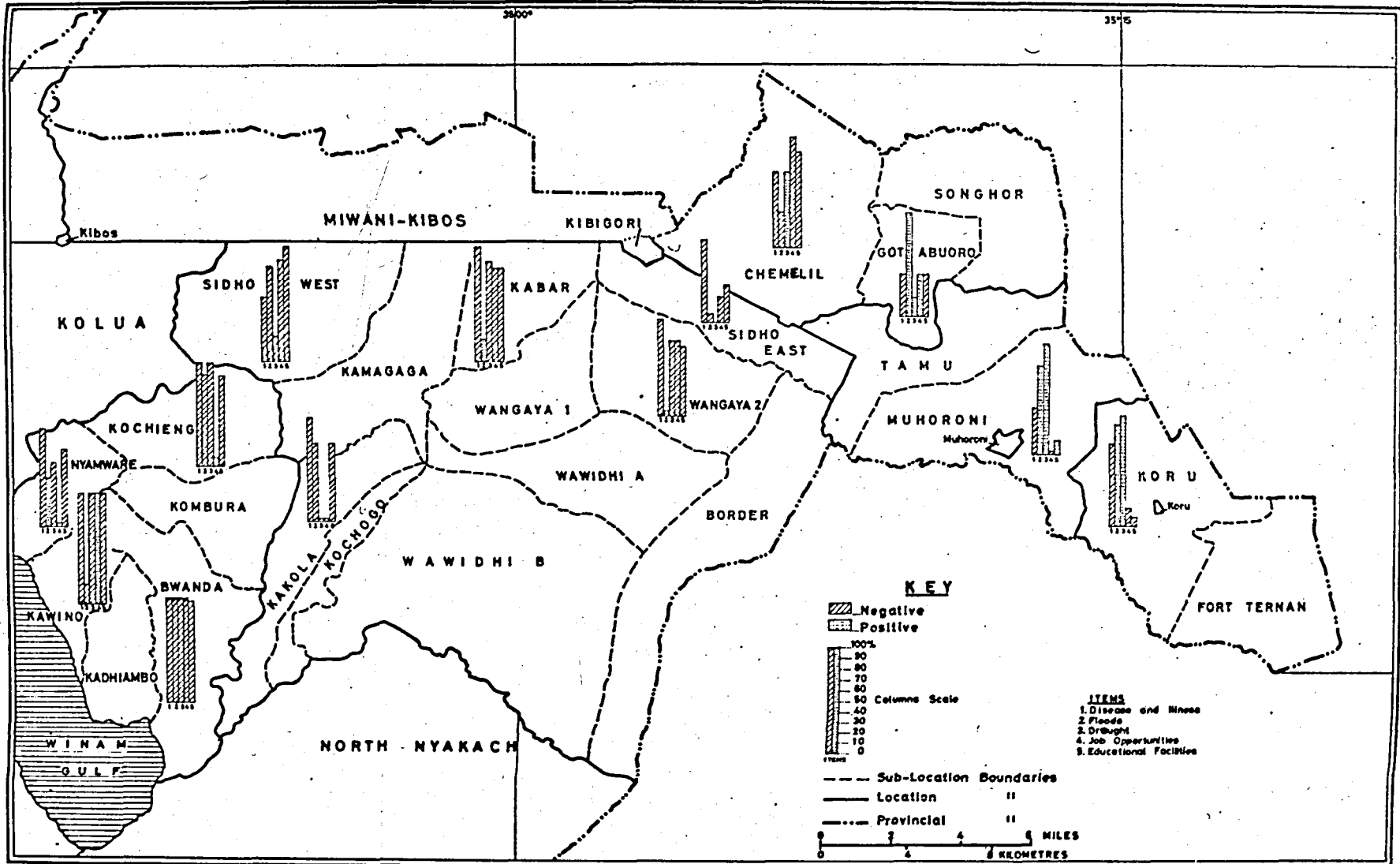
The Sugar-belt which was an area of intensive agricultural activities with a better provision of infra-structural facilities had relatively few people dis-satisfied with the area, except in Muhoroni where slightly more people registered their unhappiness. Map 8 which depicts the evaluation of more serious phenomena as diseases and illness, floods, drought, job opportunities, and educational facilities reveal that these problems were more acute in West Kano and East Kano than was in the Sugar-belt.



MAP 7 ENVIRONMENTAL DISSATISFACTION (D)



MAP 7 ENVIRONMENTAL PERCEPTION (I).



MAP 8 ENVIRONMENTAL PERCEPTION (II).

In summary, the environmental problems have stimulated inter-regional spatial population mobility in different dimensions. West Kano has therefore suffered heavily from out-migration while East Kano had most of her sub-locations experiencing in-migration and a few sub-locations experiencing out-migration. The Sugar-belt on the other hand experienced substantial in-migration although the trend has now assumed a decelerating rate of increase.

The Kano locations had approximately 58% of the adults interviewed being migrants.

Place-of-Birth Data

comparatively higher figure of 56% as opposed to the low figure of 47% for West Kano,

according to Table 32. Further analysis reinforced by consideration of the period of residence in the place of birth as portrayed by Table 35 and Table 36 revealed that both Kano locations had approximately 95% of their children born in their respective sub-locations. In other words, only 5% of the aggregate number of children who were still alive could be regarded as in-migrants. But, a detailed analysis of sub-locational data revealed minor irregularities, viz, in West Kano, Bwanda had approximately 10% of the sum of her children regarded as in-migrants, while Kochieng' had only 7%. In East Kano, Sidho-East had approximately 21% of her

children regarded as in-migrants whereas Kakola had about 10% only and accounted for 69% of the total as depicted by 1. The Sugar-belt revealed a unique pattern, for approximately 18% of the aggregate number of children could be regarded as non-migrants and about 82% were regarded as in-migrants. Micro-regional differentials also revealed a similar high pattern with Muhoroni and in the Chemelil sub-locations scoring 90% and 60% respectively. 2% of her adult population. The entire Kano locations had approximately 52% of the adults interviewed being sedentees. East Kano, however, had a comparatively higher figure of 56% as opposed to the low figure of 47% for West Kano, according to Table 39. Further analysis of Table 39 portrays that micro-regional differences depicted better population instability waves as affecting the sub-locations, for Bwanda and Kawino sub-locations of West Kano, which suffer heavily from annual floods, had 36% and 38% of their population regarded as non-migrants respectively. Moreover, Kakola sub-location of East Kano, which is equally hard-hit with floods and which suffers from acute population pressure, had only 48% of her adult population enumerated as non-migrants. Regional differences: In the Sugar-belt only 2% of the adult population were categorized as sedentees, thus, the

remaining 98% could be classified as in-migrants of which males alone accounted for 69% of the total as depicted by Table 40. In their respective enumeration areas. In other words, if the analysis of place-of-birth statistics is extended to encompass all sub-locations within the two Kano locations, and regions outside the Kano locations (according to Table 41) then the entire West Kano in the context of the sampled sub-locations had approximately 2% of her adult males and approximately 21% of her adult females born in some sub-locations within Kano location boundaries. Regional contrasts depicted relatively low statistical values of which the highest (4.9% and 4.8%) were realized by Kochieng' and Kawino sub-locations respectively. Further analysis revealed approximately 8% of adult males. It was therefore evident that the majority of the adult males enumerated in West Kano were non-migrants within the broader territorial context of the Kano locations because males who were born outside the Kano locations constituted about 2% of aggregate adult males. But, a significant contrast characterised female statistics for approximately 67% of adult females in West Kano accepted they were born outside Kano locations. Regional differences of female data were relatively small for they ranged between about 60% to 76%. These

high statistical values thus indirectly justify the hypothesis that the majority of females within West Kano were non-migrants in their respective enumeration areas. In other words, inter-regional marriage involving women born within Kano locations delimitation was relatively small. Statistics depicted extremely low deviations from the grand Table 41 further reveals a slightly different picture for East Kano had approximately 4% of her adult males born somewhere within the larger Kano locations. Approximately 40% of her adult females sampled had a similar response, hence, the number of females within East Kano who were born somewhere within Kano locations almost doubled the number of the corresponding females in West Kano. Further analysis revealed approximately 8% of adult males in East Kano were born outside Kano locations, whereas, approximately 39% of the females fell into this category. The low statistical value for women in East Kano when compared to the data of women in West Kano vividly vindicates the hypothesis that inter-regional marriage involving women born within Kano result locations territory was comparatively greater. according to Table 43. The Sugar-belt statistical evaluation according to Table 42 reveals that approximately 1% of her adult males enumerated and about 2% of her adult females

enumerated said they were born within the Sugar-belt territory. On that account, the majority of the Sugar-belt populace constituting about 98% and 96% of males and females respectively were born outside the Sugar-belt territory and could be classified as in-migrants. Micro-regional statistics depicted extremely low deviations from the grand values and in some cases the entire population enumerated were migrants in the sub-locations they were interviewed.

Place-of-Residence Data scrutiny of micro-regional patterns further depicted that East Kane generally had comparatively a higher number of male in-migrants. Utilization of place-of-birth statistics in demographic analysis could be of little value because where a child is born is not necessarily the mother's usual place-of-residence or where the child is expected to live for the rest of his life. On the strength of this argument the previous analysis of place-of-birth data considered too the duration of residence in the area after birth. Even though, the information could not indicate how often a person migrated and as a result places of residence were asked for, although according to Table 43 and Table 44 only the previous place-of-residence statistics were compiled for analysis.

Analysis of previous place-of-residence

data similarly revealed that women folks dominated the stream of inter-locational migration. A plausible explanation for this high spatial mobility amongst women could be regarded as social obligation of marriage which compelled adult females to migrate from their home environments to new environments of marriage. In other words, data for the entire Kano locations revealed that approximately 48% of their adult population sampled were in-migrants in the sub-locations they were interviewed. A detailed scrutiny of micro-regional pattern further depicted that East Kano generally had comparatively a higher number of male in-migrants as compared to the higher number of female in-migrants for West Kano. This regional distributive pattern therefore revealed that inter-locational marriage tended to be higher in East Kano than it was in West Kano. This difference could be attributed to the historical background of settlement waves which influenced East Kano where the Luos succeeded in absorbing pockets of less resistant Nandis and the Kisii in their migrational waves.⁴ This historical incident could therefore stimulate greater inter-tribal marriages in East Kano which could help in reducing female out-migration for the purpose of marriage. A macro-regional evaluation of place-of-in

residence data as contained in Table 43 revealed that about the entire West Kano had approximately 4% of the males enumerated and 23% of the females enumerated responded that their last place-of-residence was within the Kano locations boundaries.

Duration of Stay similar analysis for East Kano indicated that approximately 4% of the males and about 43% of the females had similar experience. Those whose last place-of-residence were outside the Kano locations constituted approximately 5% and 36% of the males and the females respectively. Macro-demographic analysis for the Sugar-belt indicated approximately 4% of the males and 11% of the females had their last place-of-residence within the Sugar-belt, whereas, about 96% of the males and 98% of the females had their last place of residence outside the Sugar-belt region as portrayed by Table 44. and below the other 84%. In summary, regional variations pertaining to previous place-of-residence data were apparently not more significant in both Kano locations and the Sugar-belt. Significant differences were noticed in female statistics especially in East Kano. Furthermore, it could be deduced that inter-regional spatial population mobility at micro-regional level involving crossing of sub-locational boundaries for the purpose of settlement was greater in

Kano locations than was within the Sugar-belt. But, such movements involved whole families in contrast to movements into the Sugar-belt region which involved mostly a few members of the family. less than 10 years as constituting 80% of the total population.

Duration of Settlement analysis reveals that the entire Kano locations had only 2% of her adult population reporting that they had resided in other locations for less than 10 years. It was essential to analyse this information because the longer a person lives in an area the more he acclimatizes himself to the surroundings and the less are his chances of returning to the original home, ceteris paribus. Furthermore, other things being equal, duration of residence gives fertility and mortality chance to alter population growth. Table 47 reveals that in the entire Kano, only 16% of the adults sampled resided in their respective sub-locations for 10 years and below; the other 84% could be termed permanent residents, for they had resided in Kano locations for over 10 years. West Kano had 82% of her adult populace categorized as permanent migrants while East Kano had a corresponding value of 86%.

Micro-regional differential were not great for Kakola sub-Location in East Kano which experiences more environmental problems had only 16% of her adult

migration were seeking employment, re-settlement, population having been residents for less than 10 years. marriage contracts, etc. In the Sugar-belt, in-migrational features were indirectly revealed that out-migration was high in Kano and Kano revealed by the higher percentages of those who had of West Kano which had 20% and 15% respectively. In resided in the area for less than 10 years as constituting West Kano, Kano, Kano, and Kano had figures 80% of the total population.

Further analysis reveals that the entire Sugar-belt revealed a slightly different situation for Kano locations had only 2% of her adult population responded low figures, except Kano sub-location which had about 20% of her children regarded as out-migrants 10 years whereas about 45% only said they had resided as portrayed by Table 43. outside their respective sub-locations for over 10 years.

This group again contained mostly women who had to attain marriage age in their place-of-birth before migrating to

form new homes. The analysis of the situation in the Sugar-belt according to Table 46 revealed too the impact mobility in the context of the thesis involves an examination of migration for over 63% of the adults sampled in the entire Sugar-belt had settled outside the Sugar-belt for over 10 years, compared to about 38% of the adults who involve population spatial mobility across locational boundaries. This latter approach is useful in identifying

the magnitude and direction of migration because Out-Migration Data of its relative simplicity.

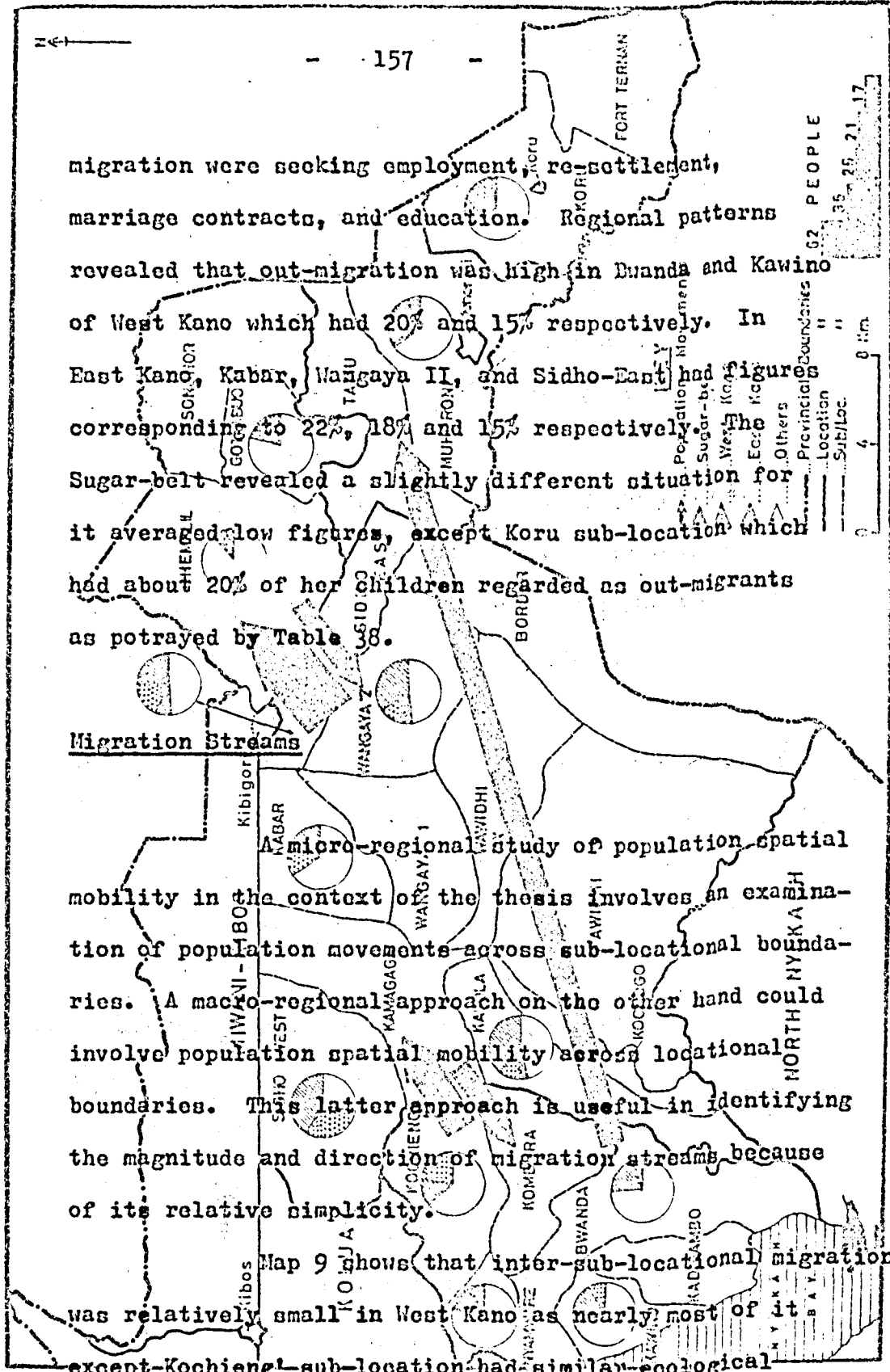
Map 9 shows that inter-sub-locational migration The analysis of out-migration data also was relatively small in West Kano as nearly most of it showed that Kano locations had only 15% of their children except Kano sub-location had similar sociological (Table 37) residing elsewhere. The major causes of out-

migration were seeking employment, resettlement, marriage contracts, and education. Regional patterns revealed that out-migration was high in Dunda and Kawino of West Kano which had 20% and 15% respectively. In East Kano, Kabar, Wangaya II, and Sidho-East had figures corresponding to 22%, 18% and 15% respectively. The Sugar-belt revealed a slightly different situation for it averaged low figures, except Koru sub-location which had about 20% of her children regarded as out-migrants as portrayed by Table 38.

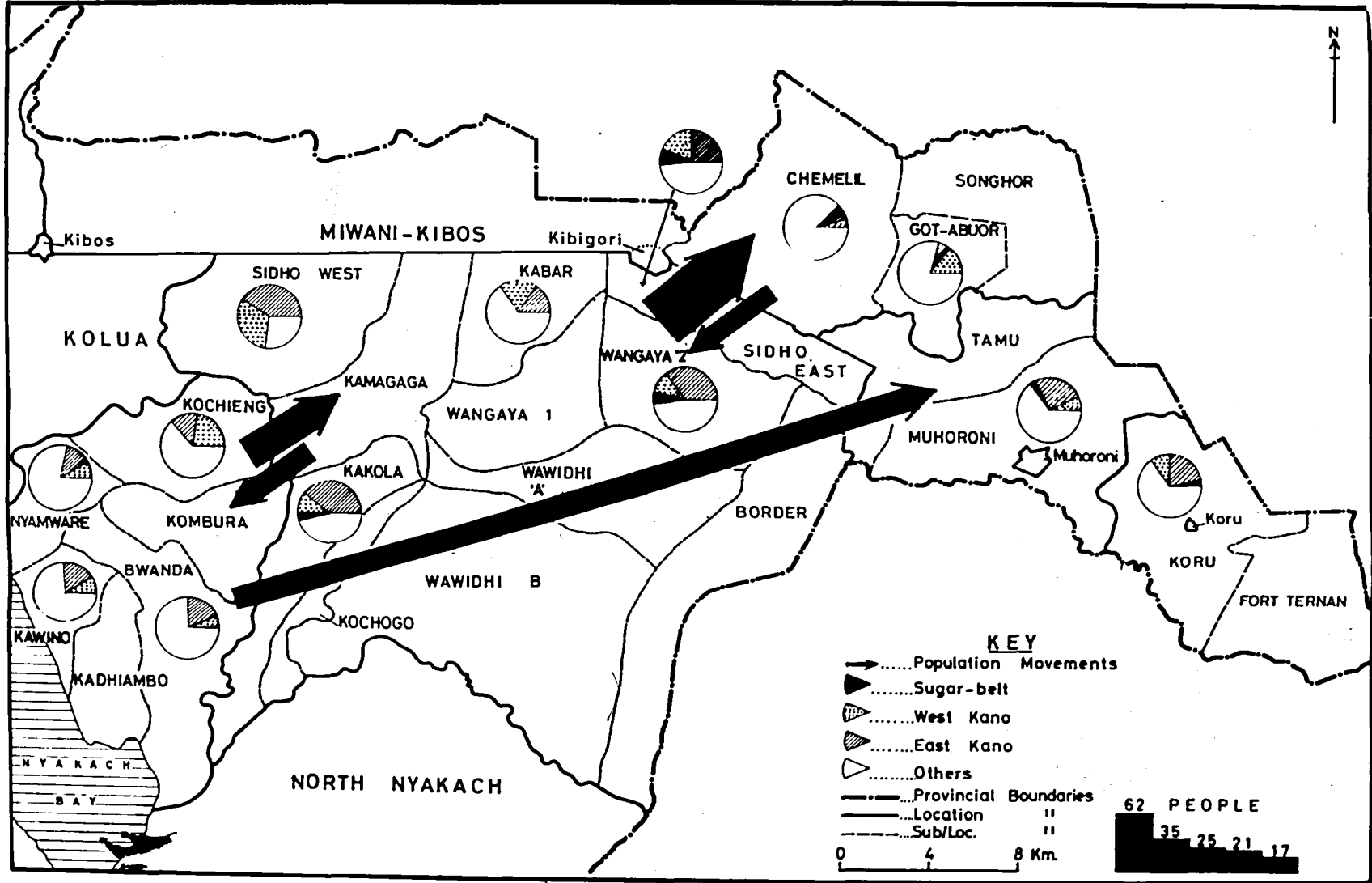
Migration Streams

A micro-regional study of population spatial mobility in the context of the thesis involves an examination of population movements across sub-locational boundaries. A macro-regional approach on the other hand could involve population spatial mobility across locational boundaries. This latter approach is useful in identifying the magnitude and direction of migration streams because of its relative simplicity.

Map 9 shows that inter-sub-locational migration was relatively small in West Kano as nearly most of it except-Kochieng sub-location had similar ecological



MAP 9 SOURCES OF MIGRANTS.



MAP 9 SOURCES OF MIGRANTS.

region had the better geological characteristics and environmental problems. However, Kochieng' sub-location tended to be the focal point of migration streams into West Kano because its lava out-crops as discussed in Chapter II were generally free from annual floods and thus offered a suitable periodically fertile portions of the western half comprising Makola and Keshi sub-locations which were not

The stream of migrants from East Kano to West Kano was relatively small because practically the whole of the western half of East Kano experiences similar environmental problems as those of West Kano. Migrants from East Kano were therefore mostly females who were married into West Kano. Others were those

In addition, some people also were dislodged from their lands in 1967 when the Ahero Pilot Scheme was started. The majority of in-migrants into West Kano were categorized as "others" and the group included migrants from South Nyanza, Kisumu West, Siaya District, and Nyakach location. Although some of those regions were experiencing population pressure, male migrants from these regions were in fact quite small for females again dominated migration streams from these regions into West Kano. A plausible explanation for

this female dominance could only be the social obligation of marriage. It was also noted that there were no migrants from the Sugar-belt into West Kano as the Sugar

region had far better ecological conditions. Residents within the East Kano, according to Map 9 experienced relatively more inter-sub-locational migration than West Kano. A greater portion of the eastern half of the region is free from annual floods, hence, out-migration periodically affects sections of the western half, comprising Kakola and Kochogo sub-locations, which experience annual floods. Furthermore, the historical background of the region reveals that the region experienced a great mixture of tribes for some of the Kisii and Nandi people had been absorbed by the Luos in the region. This has encouraged inter-sub-locational marriage in the region. In addition, some people who were rendered landless by the Ahero Pilot Scheme had to settle in the other parts of East Kano. It was also found that in-migration into East Kano from the Sugar-belt was negligible and those involved were mostly those retired from work in Sugar-Estates or those whose lands were annexed by the Sugar-Estates and had to settle elsewhere. and brought in the region. The Sugar-belt, according to Map 9 also experienced a very small inter-sub-locational migration: the major in-migration streams were dominated by people from Kisumu District, Siaya District, and South Nyanza District (see Table 49 and Table 50). Since the Sugar-belt is

within Kisumu District we should expect most residents within the Sugar-belt to have come from parts of this region District which suffers from acute population pressure as Kano locations and the densely settled and rocky parts of Kisumu West and Kisumu East locations. Before, and Fort-term when parts of the Sugar-belt were purchased by the Government to resettle landless people a national outlook in resettlement procedure was expected. Any landless person who could raise the required deposit of sh. 1,000/- was eligible for settlement regardless of where he came from. This policy was partly fulfilled when those rendered landless by the Ahero Rice Scheme were given priority for resettlement within the Sugar-belt. This action could account for the higher percentage of migrants from East Kano as depicted by Table 50. Migrants from West Kano, North Nyakach, Kolu location, and parts of Kisumu West and Kisumu East were also many because these regions suffer from acute population pressure created by alternating floods and drought in the region. In absence of most were "idle hands for hire."

Migrants from Siaya District and Southern Nyanza District were also many compared to those from the neighbouring districts as Kericho, Kakamega and Kisii districts. It should be realized that there were two towns,

categories of migrants into the Sugar-belt: the first category comprised employees of the major Sugar factories and privately owned sugar plantations. The second group comprised those who were re-settled by the Government in the re-settlement areas as God-Aburo, Koru, Sognor, and Fort-ternan. The source areas of migrants according to research could be summarized to be Kisumu District, Siaya District, and South Nyanza District. The neighbouring districts which belonged to non-Luos had little representation in the Sugar-belt probably because they have good, agriculturally backed environments which offer alternative commercial activities to their inhabitants. It could also be argued that some anomalies might have affected the recruitment procedure within the sugar-factories and privately owned plantations as one tribe tended to dominate the labour structure. Furthermore, since the majority of those re-settled were the "big shots" from the Luo land they preferred to have members of their families or relatives to manage their farms during their absence as most were "telephone farmers."

In summary, two major migration streams could be identified. The first major one came from the West and contained those from Siaya District, West Kisumu location and East Kisumu location and Kisumu town,

whereas the other streams came from the South and contained migrants from South Nyanza, Nyakach location and Kano locations.

- 1 D.T. Lewis and - "Age and Sex Composition of Populations" In Population Problems, 5th edition, McGraw Hill Book Company, 1970, pp. 103-109.
- 2 - Author's conversation with the Agricultural Officer at Muhoroni.
- 3 Gainde, S.H. - (Ph.D. Thesis, London), 1963, p. 98.
- 4 Millan, R.W. - Settlement Change and Challenge on Kano Plains, Department of Geography, University of Nairobi, 1957.

REFERENCES

- 1 Thompson Warren and D.T. Lewis - "Age and Sex Composition of Populations" In Population Problems, 5th edition, McGraw Hill Book Company, 1970, pp. 108-109.
- 2 - Author's conversation with the Agricultural Officer at Muhoroni.
- 3 Ominde, S.H. - (Ph.D. Thesis, London), 1963, p. 98.
- 4 Millman, R.N. - Settlement Change and Challenge on Kano Plains, Department of Geography, University of Nairobi, 1967.

CHAPTER V

MEASUREMENT OF INTERSEXUAL POPULATION CHANGE

MEASUREMENT OF INTERCENSAL POPULATION CHANGE

Introductory Remarks

The spatial distributive pattern of rural population indirectly betrays the occupational structure of rural population which B. Stamp (1949) divided into three broad categories.¹ The first group he designated as primary population which rely solely on the exploitation of land resources, whereas, the second group consti-

CHAPTER V

tuted secondary population which rely partially on land resources, and welfare services to the rural communities;

MEASUREMENT OF INTERCENSAL POPULATION CHANGE

and, the last category he called dependent population and included those rural inhabitants without a direct or indirect tie with primary activities. This group comprises also rural residents who work in towns, or persons in industrial activities located in rural environments.²

The occupational characteristics of rural populace could therefore be indicative of the latter's propensity to move; this could be especially so amongst those engaged in agricultural activities which are at the mercy of weather in most instances. The spatial distribution pattern of population therefore forms an essential framework in the formulation of regional develop-

MEASUREMENT OF INTERCENSAL POPULATION CHANGE of physical and social changes upon the people.³ Policy measures

Introductory Remarks desirable distributive effects should therefore rely on migration data.

The spatial distributive pattern of rural population indirectly portrays the occupational structure of rural population which D. Stamp (1949) divided into three broad categories.¹ The first group he designated as primary population which rely solely on the exploitation of land resources, whereas, the second group constituted secondary population which rely partially on land resources, and welfare services to the rural communities; and, the last category he called adventitious population and includes those rural inhabitants without a direct or indirect tie with primary activities. This group comprises also rural residents who work in towns, or persons in industrial activities located in rural environments.²

The occupational characteristics of rural populace could therefore be indicative of the latter's propensity to move; this could be especially so amongst those engaged in agricultural activities which are at the mercy of weather in most instances. The spatial distribution pattern of population therefore forms an essential framework in the formulation of regional develop-

ment plans because such patterns mirror effects of physical and social changes upon the people.³ Policy measures and tactics ideal for curbing undesirable distributive effects should therefore rely on migration data.

Map 5 which shows population density is titled Population Density Distribution; that one-third of the sampled sub-locations had substantial population density gains because the series of maps, namely, Maps 4, 5, and 6, indicate estimated population density for the periods 1962, 1969, and 1973 respectively. The backward projection technique employed in estimating aggregate numbers of population for 1962 in each sub-location is fully discussed in the appendix. Furthermore, population estimate for 1973 was based on the sample survey data for the period as explained in the appendix, brackets, for 1973.

Nyamware had Map 4 depicting population density for the entire region reveals that population distribution was generally sparse in most regions, particularly in the Sugar-belt region where population density was definitely less than 299 persons per sq. kilometre in all sub-locations. However, in Kano locations only Nyamware, Kabar, and Kakola sub-locations had their population density falling between 200-299 persons per sq. kilometre. The remaining three-quarters of the sub-locations had population density of

Intercensal Population Density Changes
less than 200 persons per sq. kilometre, hence, the proba-

bility of the unsampled sub-locations having their densities

below the 200 persons per sq. kilometre mark was apparently high. The magnitude of intercensal population density change for Kano sub-locations is indicated by

Table 51 and Map 10. The statistical estimation of change Map 5 which shows population density accord-

revealed a positively high percentage change for most ing to 1969 census data reveals that one-third of the sub-locations in West Kano except Nyamware sub-location sampled sub-locations had substantial population density which experienced a relatively low change of 17.2% per gains because Nyamware had over 300 persons per sq.

the period 1952-1969. This moderate percentage change kilometre whereas Kawino, Kakola, Kochieng', and Kabar which affected Nyamware was probably attributable to the sub-locations had population density surpassing the 200 percentage increase in settled land during the intercensal persons bracket. There were, however, no changes in period. But, the generally high percentage change which population density brackets in the Sugar-belt.

characterized the remaining sub-locations was partly attributed to the decline in territory for occupation of the sampled sub-locations experienced once more positive during the intercensal period. Furthermore, the period shifts in population density brackets, for in 1973

witnessed great environmental hazards resulting from the Nyamware had over 400 persons per sq. kilometre, Kabar 1961-1962 and the 1969 floods which definitely stimulated on the other hand had over 300 persons per sq. kilometre a wave of population out-migration from the hard-hit portions whereas the remaining half of the sub-locations in Kano

of West Kano locations had over 200 persons per sq. kilometre. However, the Sugar-belt sub-locations tended to have their popula-

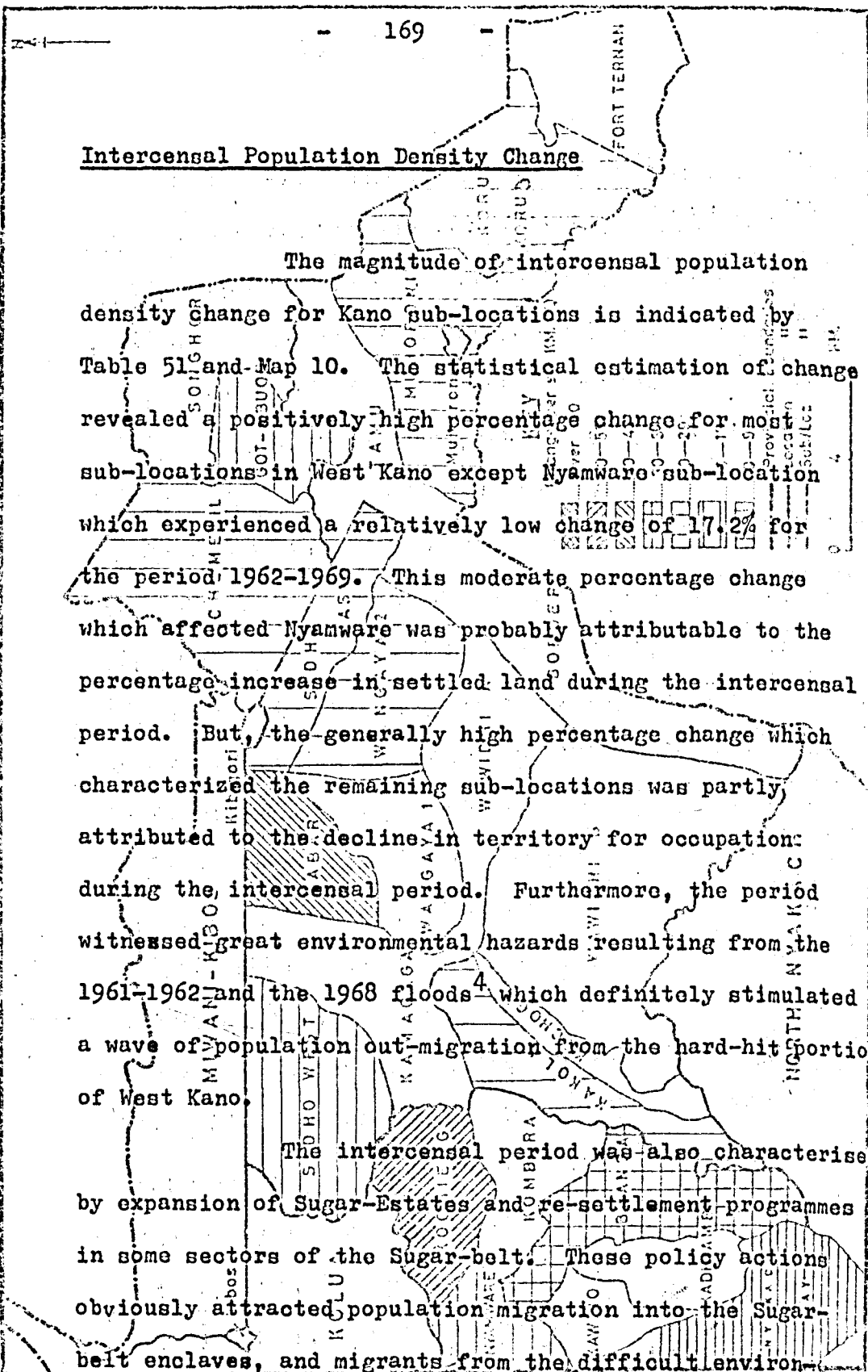
tion density brackets constant. by expansion of State Estates and re-settlement programmes in some sectors of the Sugar-belt. These policy actions obviously attracted population migration into the Sugar-belt enclaves, and migrants from the difficult environ-

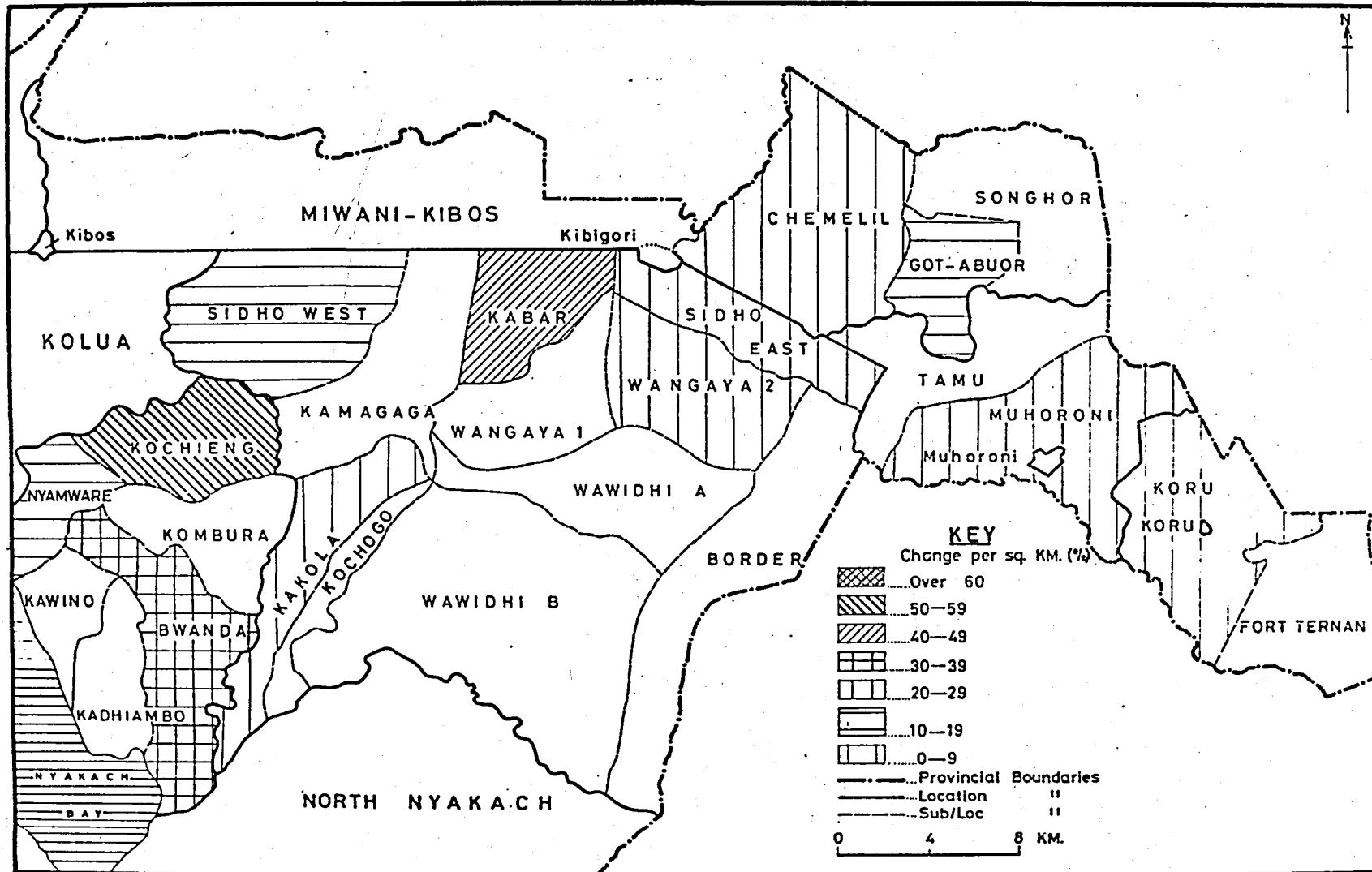
Intercensal Population Density Change

The magnitude of intercensal population density change for Kano sub-locations is indicated by Table 51 and Map 10. The statistical estimation of change revealed a positively high percentage change for most sub-locations in West Kano except Nyamware sub-location which experienced a relatively low change of 17.2% for the period 1962-1969. This moderate percentage change which affected Nyamware was probably attributable to the percentage increase in settled land during the intercensal period. But, the generally high percentage change which characterized the remaining sub-locations was partly attributed to the decline in territory for occupation during the intercensal period. Furthermore, the period witnessed great environmental hazards resulting from the 1961-1962 and the 1968 floods which definitely stimulated a wave of population out-migration from the hard-hit portion of West Kano.

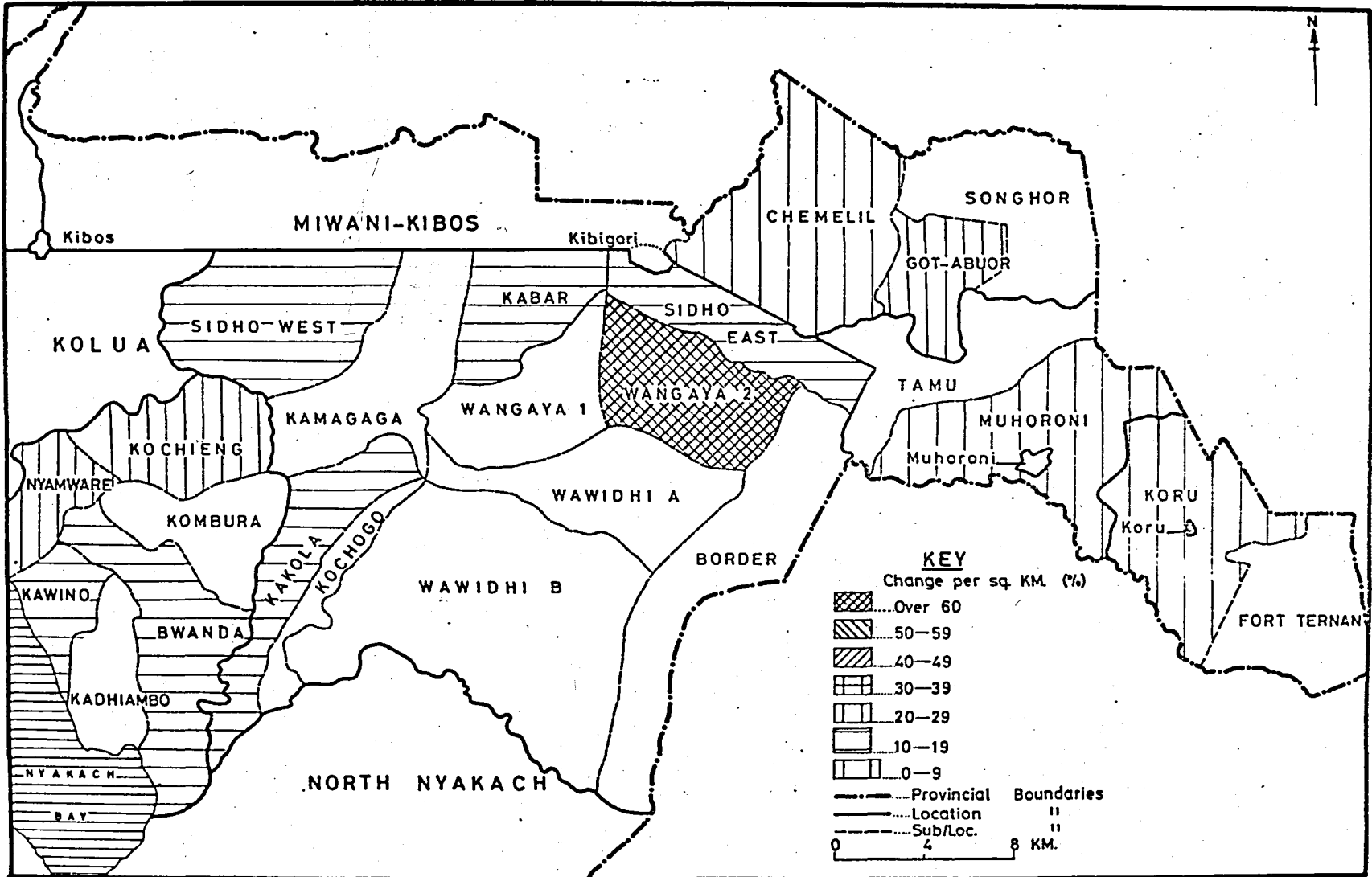
The intercensal period was also characterised by expansion of Sugar-Estates and re-settlement programmes in some sectors of the Sugar-belt. These policy actions obviously attracted population migration into the Sugar-belt enclaves, and migrants from the difficult environ-

MAP 10 INTERCENSAL POPULATION DENSITY CHANGE BETWEEN 1962-1969.





MAP 10 INTERCENSAL POPULATION DENSITY CHANGE BETWEEN 1962-1969.



MAP 11 INTERCENSAL POPULATION DENSITY CHANGE BETWEEN 1969-73

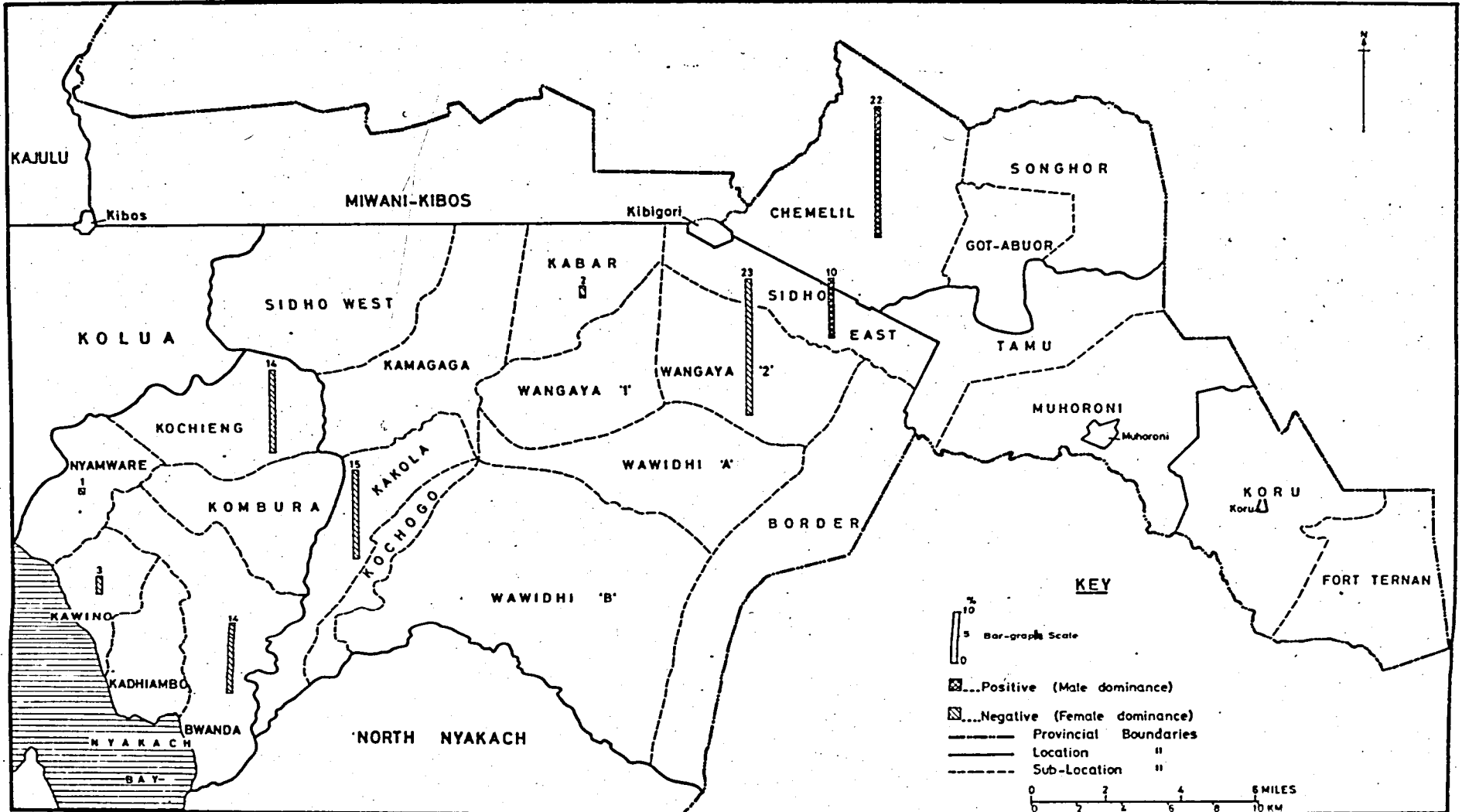
doubled in some cases. Since regional boundaries were constant, this high score therefore mirrored indirectly the impact of in-migrational waves which affected these sub-locations for even high fertility rates alone did not provide adequate explanation. The remaining two-fifths of the sub-locations which experienced a decline in population density partly had higher mortality rates or experienced features of out-migration as already noted. The research findings endorse the hypothesis advocated by Bogue, Shyrock, and Hoerman (1957) that recipient areas of high in-migration experience too a counter-balancing trend of out-migration waves.⁶ and Map 12 expose the magnitude of population change. The intercensal population density change for the Sugar-belt for the period 1962-1969 revealed a moderate percentage change especially among the privately owned Sugar-Estates as Chemelil (see Table 52 and Map 10). A plausible explanation was that re-settlement in these regions commenced rather late in 1960's and the demand for labourers who formed the bulk of population in these areas tended to be rigidly controlled by requirements of the sugar factories, hence, the large administrative regions could not show marked differences in population density between 1962 and 1969 especially when the 1969 enumerated population was projected backwards to give 50% of the

estimated population size for the same territory in 1962. Nevertheless, the percentage change for the later period of 1969-1973 tended to show a moderately increasing percentage change and this could be attributed to population re-settlement policy of the 1970's which encouraged in-migration into these regions. This trend, however, has assumed a downward direction as the demarcated plots for occupation have been all occupied, especially in Muhoroni.

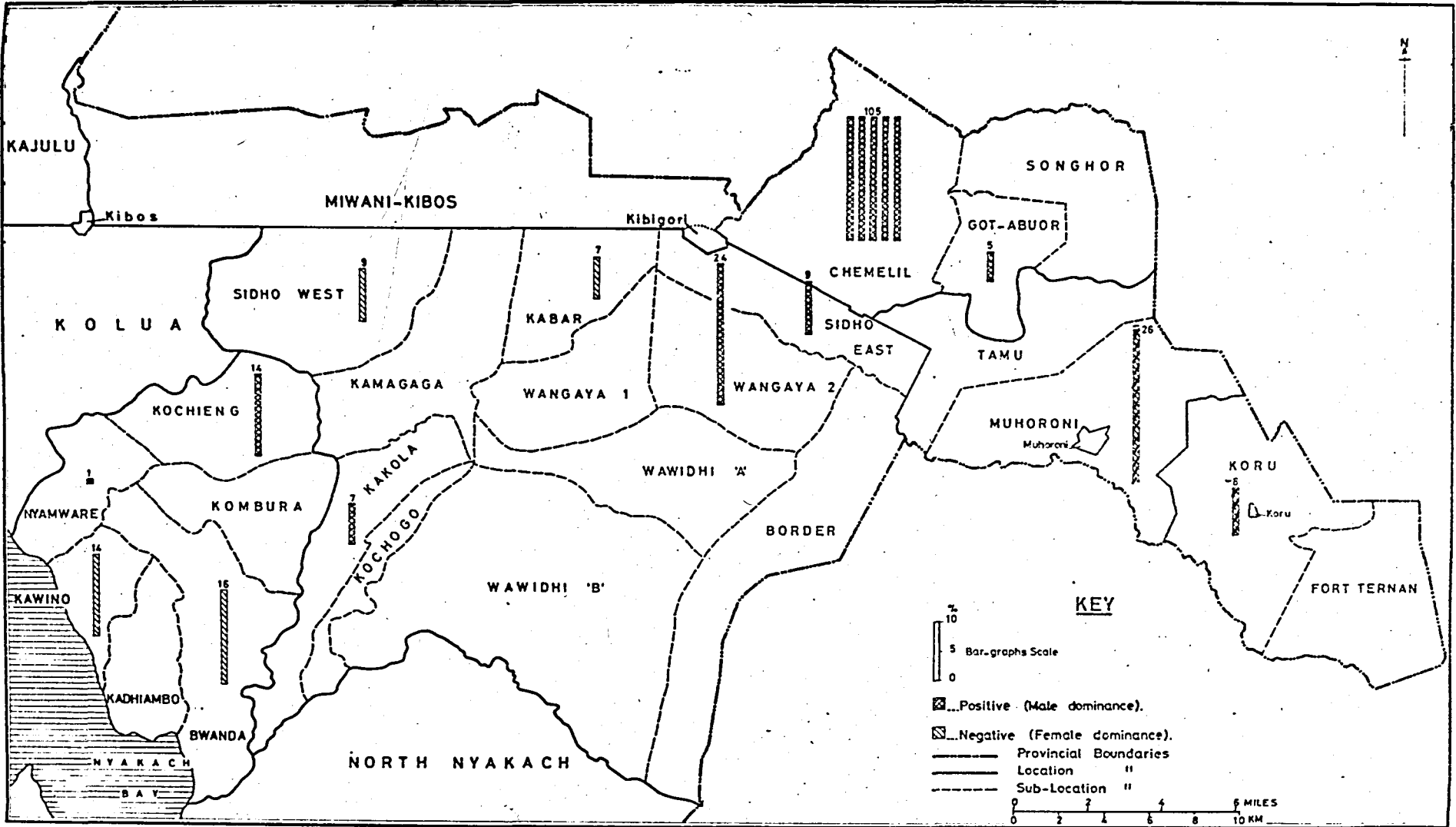
a slightly different dimension for over 50% of the sub-

Sex-Ratio Change revealed further percentage declines ranging from -14% to -19% for Kawino and Bwanda. This negative trend Table 53 and Map 12 expose the magnitude of sex-ratio change for Kano sub-locations during the intercensal period of 1962-1969. The demographic structure for 1962 revealed male predominance in rural environments of West Kano. The sub-locations surveyed had a sex-ratio ranging from 103 to 109 for Kawino and Bwanda. Kano revealed a 100. For most African communities, the general pattern of sex-ratio in the absence of migration or environmental upheavals fluctuates between 1.02 and 1.04 because of the approximate constancy of the sex-ratio at birth.⁷

The demographic structure of 1962, however, had been completely upset by 1969, in most sub-locations, for the structural pattern showed female dominance in about 50% of the



MAP 12 INTERCENSAL SEX-RATIO CHANGE (1962-69)



MAP.13 INTERCENSAL SEX-RATIO CHANGE (1969-73)

to be declining. In summary, although it is realized that regional differences in sex-ratio among regions could exist for reasons not attributable to migration,⁸ it is plausible to accept the rôle of migration as having been instrumental in influencing the direction of intercensal population growth within the sub-locations. But, Glenn Trewartha and W. Zelinsky (1955) argued that separation of the elements of migration from natural increase is a real dimension of population change could be extremely difficult with crude data from areas where migration is great.⁹ Yet, with modern statistical techniques of analysis one could to a reasonable extent determine the contribution of these variables of population dynamics in causing population change over born and those surviving...¹²

However, W. Brass advocated a strong case against utilizing Intercensal Population Growth sample inquiries for he argued that retrospective data inadequately furnish suitable info. The current realization that the most problematic variable in population growth is fertility rate is widespread. Demographers have established that the growth rate in most industrialized nations is least affected by migration. On that account, population change in the industrialized societies have depended entirely on fertility and mortality rates. But, mortality rates have been noted

to be declining thus leaving fertility as the sole problematic variable in determining population growth.¹⁰

The downward trend in mortality rates have been realized also in some developing nations thus leaving fertility rates as the major factor influencing the high growth rates which have tremendously altered the age-

structure of the communities affected.¹¹ The stated

hypothesis has however under-estimated the contribution

of migration in altering the demographic structure of a

community through re-distribution of human population

over a given space.

In African communities "fertility and mortality could be estimated on the basis of retrospective

data on children ever born and those surviving..."¹²

However, W. Brass advocated a strong case against utilization of such data obtained at sample inquiries for he

argued that retrospective data inadequately furnish

suitable information for studying population changes

because errors accruing from poor recall of births and

deaths including chance errors are substantial. He

further argued that estimates based on such data are

approximations and may be obsolete if the region in

question experiences a rapid population growth.¹³

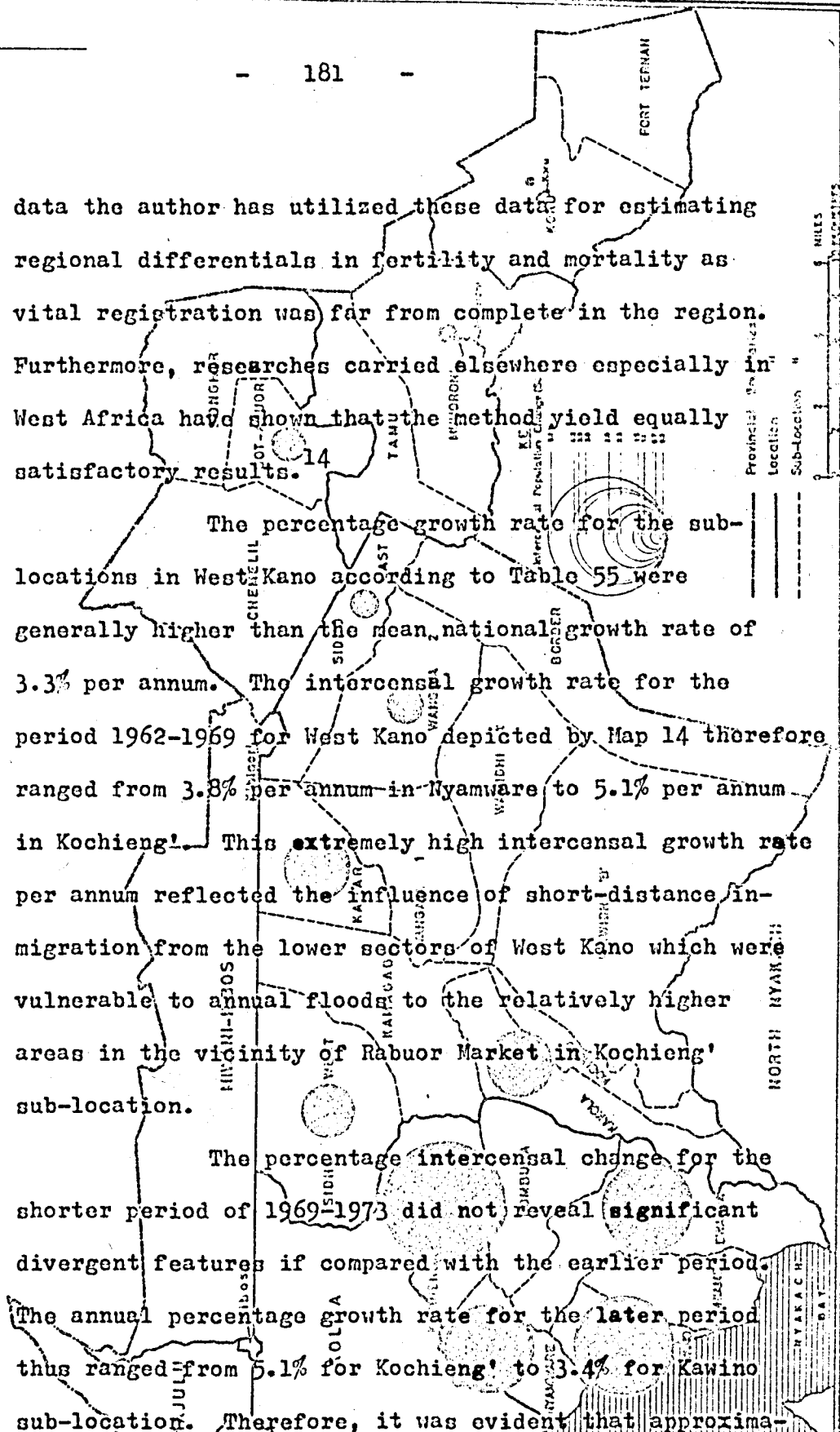
Despite this strong case against retrospective

sub-location.

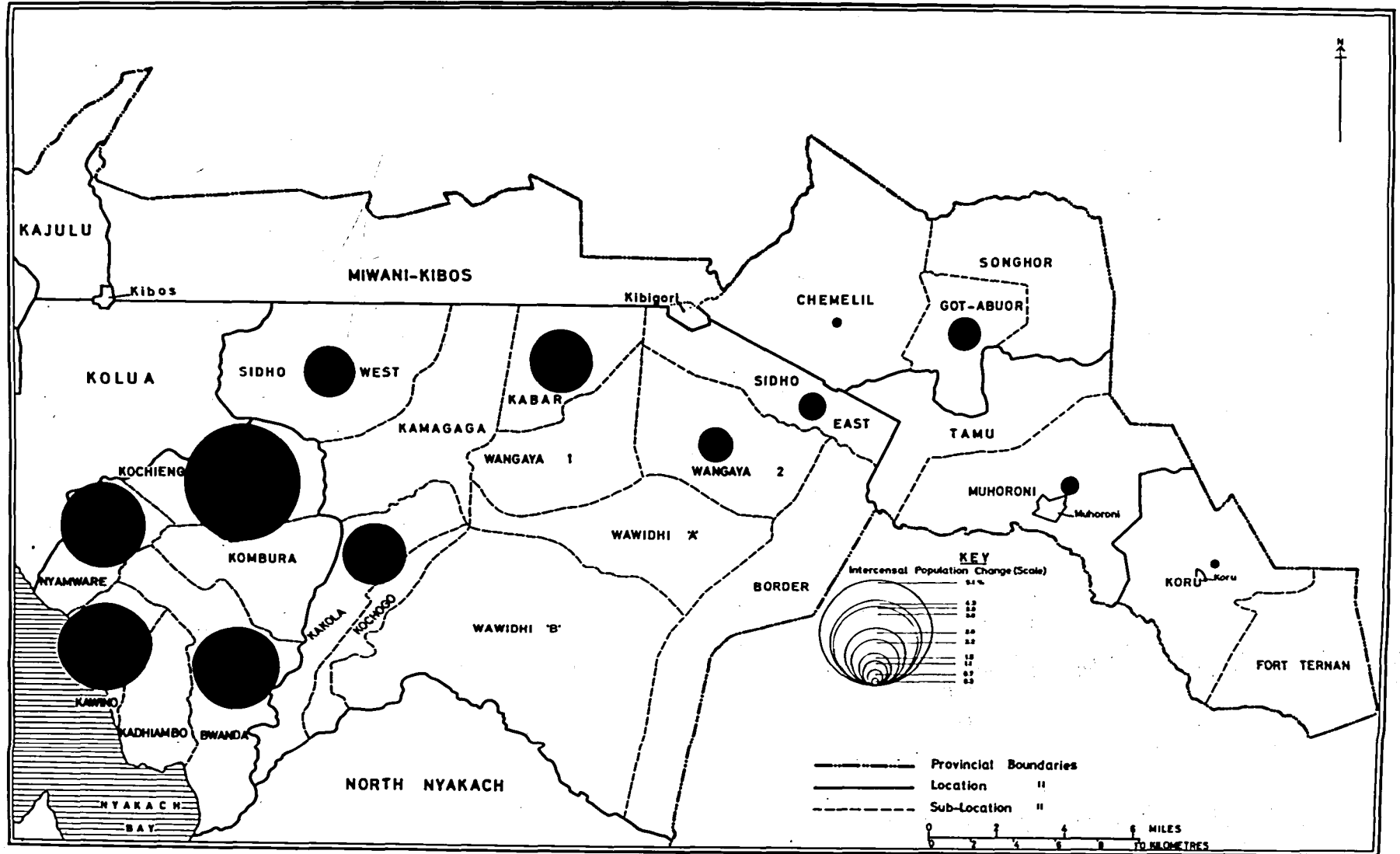
data the author has utilized these data for estimating regional differentials in fertility and mortality as vital registration was far from complete in the region. Furthermore, researches carried elsewhere especially in West Africa have shown that the method yield equally satisfactory results.

The percentage growth rate for the sub-locations in West Kano according to Table 55 were generally higher than the mean national growth rate of 3.3% per annum. The intercensal growth rate for the period 1962-1969 for West Kano depicted by Map 14 therefore ranged from 3.8% per annum in Nyamware to 5.1% per annum in Kochieng'. This extremely high intercensal growth rate per annum reflected the influence of short-distance in-migration from the lower sectors of West Kano which were vulnerable to annual floods to the relatively higher areas in the vicinity of Rabuor Market in Kochieng' sub-location.

The percentage intercensal change for the shorter period of 1969-1973 did not reveal significant divergent features if compared with the earlier period. The annual percentage growth rate for the later period thus ranged from 5.1% for Kochieng' to 3.4% for Kawino sub-location. Therefore, it was evident that approxima-



MAP 14: INTERCENSAL POPULATION CHANGE (ANNUAL INCREASE 1962-69)



MAP 14 INTERCENSAL POPULATION CHANGE (NATURAL INCREASE 1962-69)

tely 50% of the sub-locations revealed insignificant per deviation in their annual growth rates which varied between -0.9% per annum for Kawino sub-location to +1.31 percent for Nyamware. In spite of the low deviations, however, the demographic change had taken a declining trend for most sub-locations except Nyamware sub-location which featured an increasing trend in growth by 1.3% per annum. The realized decline in population growth could be attributed only to mass regional differentials in out-migration. The demographic pattern of East Kano rural featured a unique pattern for the period 1962-1969. The mean annual intercensal growth rate for the period, according to Table 55 was somewhat below the national average of 3.3% per annum. The growth rate in these sub-locations thus fluctuated between +1.1% per annum in Sidho-East to +2.8% per annum in Kabar. This moderate growth rate could be partly attributed to the high mortality rate which affected most regions prior to 1969 as has been noted previously. The low intercensal growth rate could also be attributed to the effects of out-migration which influenced two-fifths of the sub-locations as already noted. The period 1969-1973, unlike that for West Kano, showed an abrupt trend in demographic growth because most of the sub-locations in East Kano depicted an increasing

experienced an extremely low annual rate of increase between growth pattern which fluctuated between 2.7% and 3.8% per annum for Wangaya II and Kabar sub-locations respectively. In other words, most of the sampled sub-locations tended to approximate the mean national growth rate of 3.3% per annum. The unfavourable demographic composition of the settled area

The difference between the two intercensal growth rates for East Kano therefore exposed features of Furthermore, substantial re-settlement towards the an increasing growth rate which deviated by +0.3% annually and of 1960's, and averaging the added population numbers for and +2.1% annually in Kakola and Sidho-East respectively. Furthermore, the entire Kano had an annual mean inter- value of yearly increase. However, the latter period of censal growth rate of approximately 3.1% for the period 1969-1973 experienced a substantial increase in the rate of of 1962-1969 and approximately 4% for the period 1969- population growth as depicted by Map 15. This demographic 1973 according to the sampled regions only. It is, however, plausible to hypothesize that the probability of The percentage of the married settlers also increased from- unsampled sub-locations approximating those statistical means were high indeed.

The comparison of the two intercensal growth rates for the entire Kano locations could induce one to accept that fertility rates for the whole region were actually increasing although micro-regional differences were significant. The increased provision of

infrastructural facilities and medical innovation in the Intercensal Net Migration

rural environments have effect on mortality rates which have now taken a declining trend especially among infants and women.

Table 57. Most sub-locations sampled according to the

Table 56 reveals that the Sugar-belt

experienced an extremely low annual rate of increase between 1962-1969 because the growth rates in the region varied between +0.3% per annum and 1.5% per annum for Chemelil and God-Abuoro. This slow growth rate was partly a function of the unfavourable demographic composition of the settlers for the percentage of the married group was extremely small. Furthermore, substantial re-settlement commenced towards the end of 1960's, and averaging the added population numbers for the intercensal period must have drastically reduced the values of yearly increase. However, the latter period of 1969-1973 experienced a substantial increase in the rate of population growth as depicted by Map 15. This demographic pattern was the result of increased in-migration of settlers. The percentage of the married settlers also increased tremendously thus enabling fertility rates to influence population size. The annual growth rate for the period varied from +0.9% per annum in Muhoroni to +4.9% per annum in God-Abuoro. A general comparison of the two growth rates for the Sugar-belt featured an increasing growth pattern with a deviation ranging from +0.3% per annum in Muhoroni to +3.4% per annum in God-Abuoro.

Intercensal Net Migration

The volume of intercensal net migrants for Kano locations for the period 1962-1969 is portrayed by Table 57. Most sub-locations sampled according to the

24

FORT TERMAN

1 MILE
1.6 KM

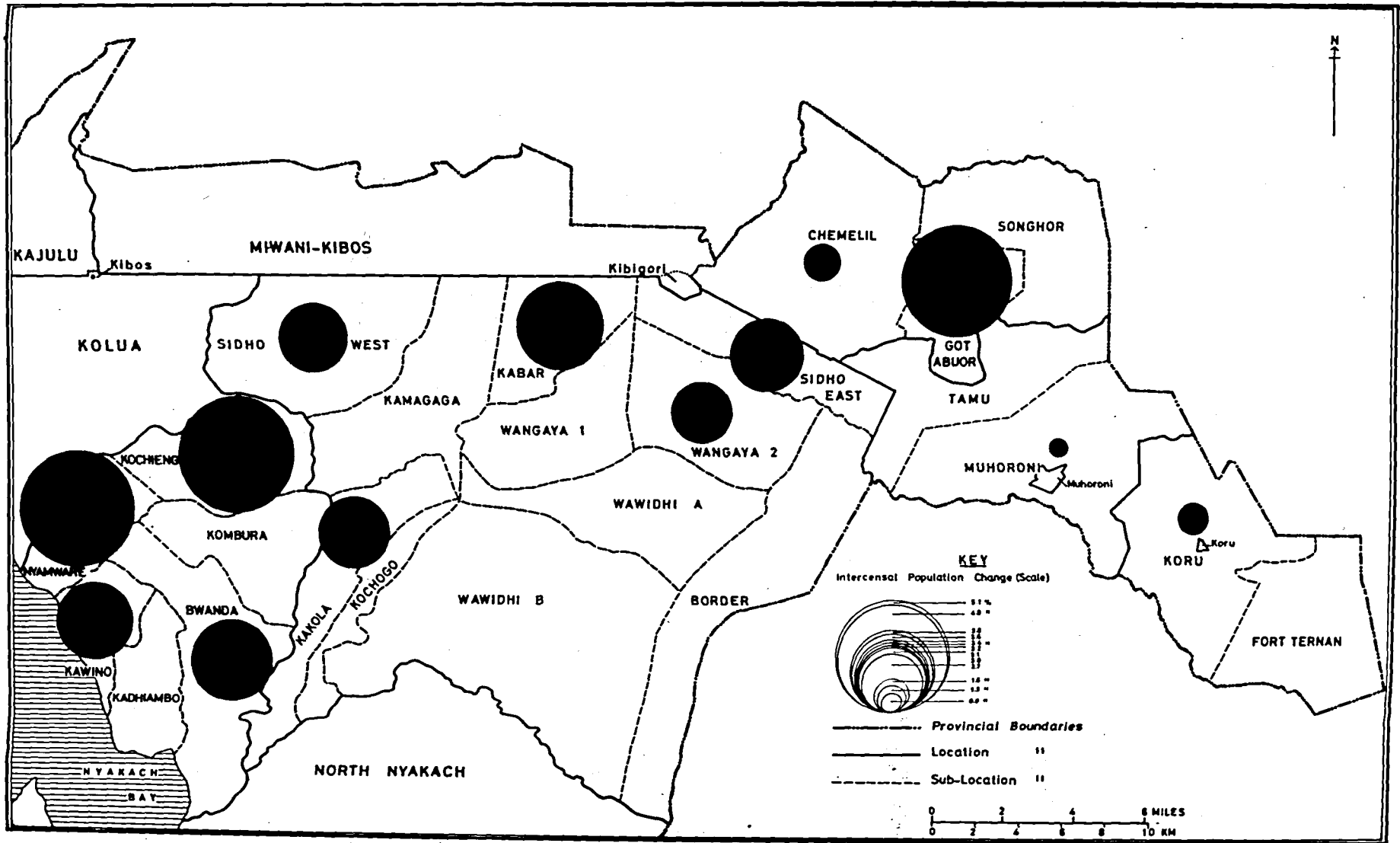
MAP 15. INTERCENSAL POPULATION CHANGE (NATURAL GROWTH 1962-73)

Intercensal Population Change

Provincial
Localities
Sub-locations

JULY 1963

BAU

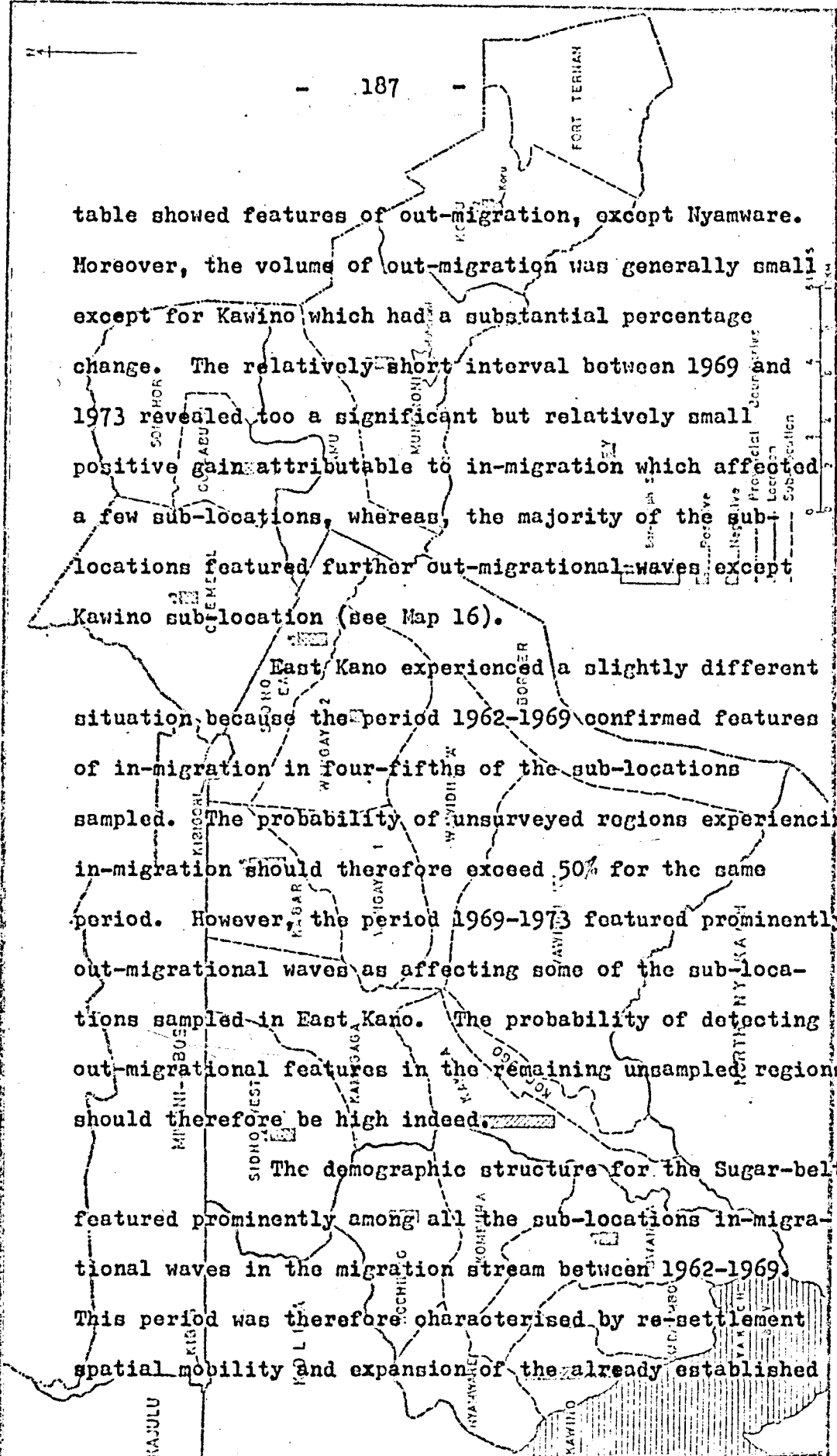


MAP 15 INTERCENSAL POPULATION CHANGE (NATURAL INCREASE 1969-73)

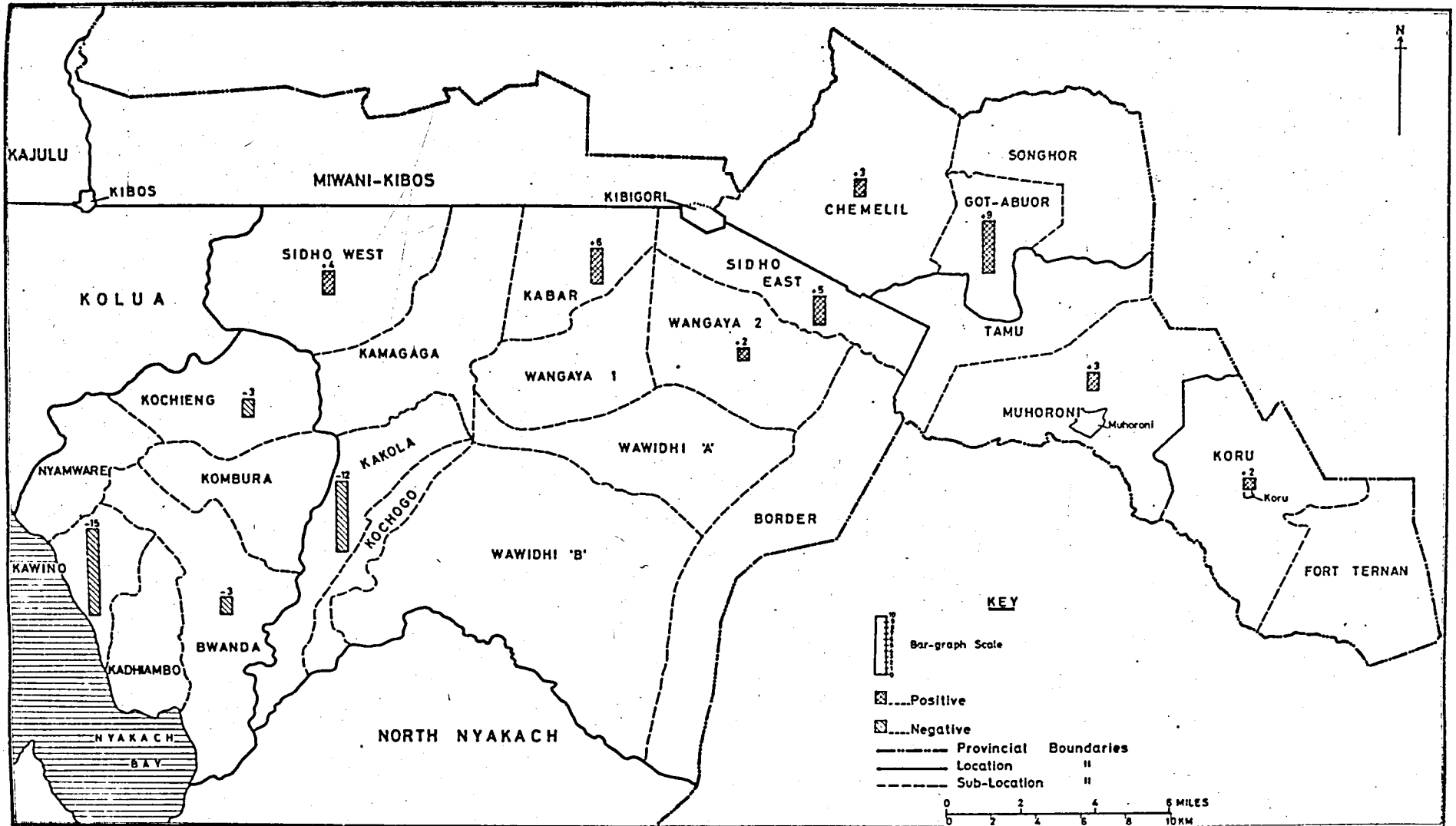
table showed features of out-migration, except Nyamware. Moreover, the volume of out-migration was generally small except for Kawino which had a substantial percentage change. The relatively short interval between 1969 and 1973 revealed too a significant but relatively small positive gain attributable to in-migration which affected a few sub-locations, whereas, the majority of the sub-locations featured further out-migrational waves except Kawino sub-location (see Map 16).

East Kano experienced a slightly different situation, because the period 1962-1969 confirmed features of in-migration in four-fifths of the sub-locations sampled. The probability of unsurveyed regions experiencing in-migration should therefore exceed 50% for the same period. However, the period 1969-1973 featured prominently out-migrational waves as affecting some of the sub-locations sampled in East Kano. The probability of detecting out-migrational features in the remaining unsampled regions should therefore be high indeed.

The demographic structure for the Sugar-belt featured prominently among all the sub-locations in-migrational waves in the migration stream between 1962-1969. This period was therefore characterised by re-settlement spatial mobility and expansion of the already established



MAP 16 INTER-CENSAL POPULATION CHANGE: ABSOLUTE NUMBERS OF NET MIGRANTS 1962-69.

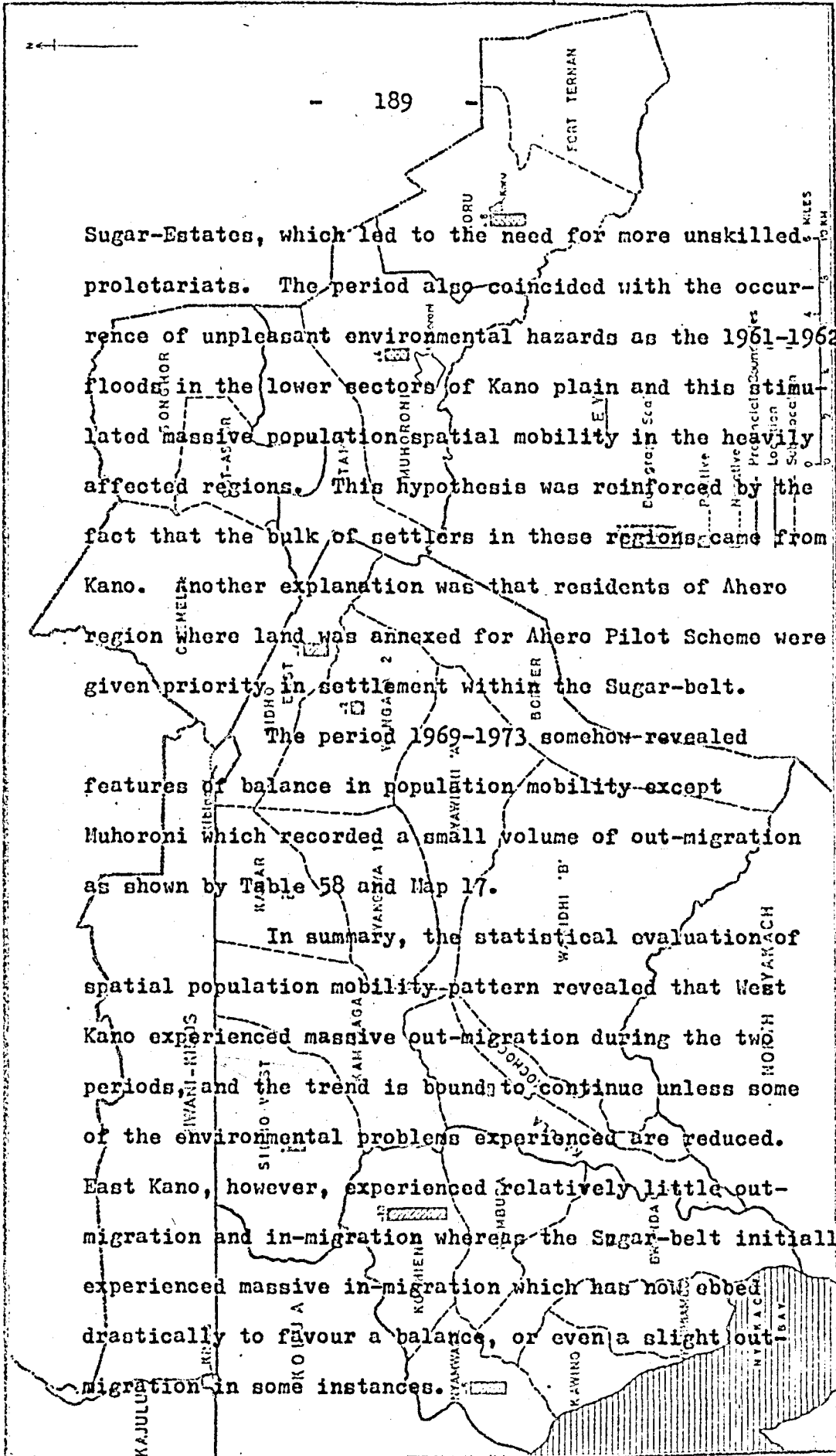


MAP.16 INTERCENSAL POPULATION CHANGE; ABSOLUTE NUMBERS OF NET MIGRANTS 1962-69.

Sugar-Estates, which led to the need for more unskilled proletariats. The period also coincided with the occurrence of unpleasant environmental hazards as the 1961-1962 floods in the lower sectors of Kano plain and this stimulated massive population spatial mobility in the heavily affected regions. This hypothesis was reinforced by the fact that the bulk of settlers in these regions came from Kano. Another explanation was that residents of Ahero region where land was annexed for Ahero Pilot Scheme were given priority in settlement within the Sugar-belt.

The period 1969-1973 somehow revealed features of balance in population mobility except Muhoroni which recorded a small volume of out-migration as shown by Table 58 and Map 17.

In summary, the statistical evaluation of spatial population mobility-pattern revealed that West Kano experienced massive out-migration during the two periods, and the trend is bound to continue unless some of the environmental problems experienced are reduced. East Kano, however, experienced relatively little out-migration and in-migration whereas the Sugar-belt initially experienced massive in-migration which has now ebbed drastically to favour a balance, or even a slight out-migration in some instances.



MAP 17 INTER-CENSAL POPULATION CHANGE: ABSOLUTE NUMBERS OF NET MIGRANTS FOR 1962-73

Determinants of Change : (1962-1969)

words, intercensal fertility rates revealed pre-eminent influence on absolute population growth during the same period if the influence of mortality rates was held constant. This would endorse the general demographic hypothesis that in a closed economy where there is no net migration accounted for only 3.4% of population change. To realize the contribution of natural increase or migration to population size, one should determine statistical numbers in population growth attributed to fertility rates minus mortality rates of non-migrants. One should also identify additional population numbers caused by the size of net migrants as well as their fertility rate minus mortality rate. This is a difficult task especially when one is dealing with areas of poor vital registration system or crude retrospective data.

The intercensal period 1962-1969 according to Table 59 depicted coefficients of partial correlation of $r_{12.3} = 0.9505$ for Kano locations and $r_{12.3} = 0.8125$ for the Sugar-belt regions. These statistical results signify that if intercensal number of absolute deaths were held constant and absolute intercensal number of net migrants omitted in the analysis then intercensal population change was positive and strongly associated with the

growth is weakly associated with absolute number of inter-censal births during the period. In other words, intercensal fertility rates revealed pre-eminent influence on aggregate population growth during the same period if the influence of mortality rates was held constant. This result endorses the general demographic hypothesis that in a closed community where there is no

migrational influence population change becomes a function of fertility and mortality rates. Since mortality rates are lower than fertility rates in the study-region (as mortality rates are increasingly reduced by improved medical services) fertility rates are liable to become more effective in influencing positive demographic growth.

Table 59 depicts that coefficient of partial correlation of $r_{12.4} = 0.8995$ for Kano locations. This again vividly portrays the influence of intercensal fertility rates in determining population change when net migration rates are assumed constant. But, when net migration is assumed constant, the demographic situation in the Sugar-belt is altered because absolute population and absolute births were omitted in the computation for

-
- Note:** 1 - absolute numbers of population growth.
 2 - absolute numbers of intercensal total births.
 3 - absolute numbers of intercensal total deaths.
 4 - absolute numbers of intercensal net migrants.

growth is weakly associated with absolute number of intercensal births as $r_{12.4} = 0.3394$. A plausible explanation for this relatively weak association could be that the variable held constant and the omitted variable, namely, inter-censal mortality data, could both have a greater impact on population growth in the Sugar-belt than fertility rates.

Table 59 reveals that during the same intercensal period absolute intercensal deaths had a strong negative correlation with absolute intercensal population growth if absolute births were held constant for $r_{13.2} = -0.8033$ for Kano locations and $r_{13.2} = -0.7627$ for the Sugar-belt. This finding shows that population growth is negatively associated with mortality rates for as the number of deaths increases population size diminishes if birth rates are assumed constant, especially in a closed society where there is no influence of net migration. But intercensal absolute deaths showed a very weak positive association with absolute intercensal population growth when net migration was assumed constant and absolute births were omitted in the computation for $r_{13.4} = 0.1320$ for Kano locations and $r_{13.4} = 0.0448$ for the Sugar-belt. The Sugar-belt example shows that if fertility rates are not considered then intercensal population growth for the region was completely independent of mortality rates.

of intercensal deaths if net migration during the period was assumed constant. In the case of Kano locations the association was also too low to be of statistical significance. These statistical values prove that positive population growth in the absence of fertility and net migration was independent of mortality rates. Further analysis of Table 59 shows that absolute intercensal net migration was positively associated with absolute population growth in the Sugar-belt but negatively associated with absolute population growth in Kano locations when absolute intercensal births were assumed constant because $r_{14.2} = 0.8613$ for the Sugar-belt and $r_{14.2} = -0.6530$ for Kano locations. These statistical results may also show that in Kano locations if mortality rates are not considered then net migration could be negatively associated with population growth. In other words the strong significant inverse association found suggested that absolute intercensal growth declined in regions of increasing out-migration. M.A. Hirst in his study of mainland Tanzania also found a low but significant inverse association between fertility and net migration.¹⁷ Yet, the value of negative association in this case is seen to have less impact than the effect of mortality rates.

found reveals. The demographic situation in the Sugar-belt was rather different because a very strong positive association of $r_{14.2} = +0.8613$ was found. This indicates that in the absence of mortality rates (but birth rates assumed constant) population growth in the Sugar-belt during the period was a function of in-migration. The growth attributed to the influence of net migration was comparatively higher than the growth attributed to fertility rates. In addition, the association between inter-censal absolute population growth and net migration, assuming mortality rates constant, is $r_{14.3} = -0.5431$ for Kano locations and $r_{14.3} = +0.8736$ for the Sugar-belt. These figures again confirm that if mortality rates are assumed constant then net migration had a depressing effect on population growth, particularly in Kano locations as opposed to an increasing effect on population growth in the Sugar-belt. With fertility in Kano locations due to out-migration. During the same period if absolute number of births were correlated with absolute number of deaths, but assuming migration constant in computation, then the two show a moderate correlation of $r_{23.4} = 0.5144$. In other words, in a closed society without the influence of migration, births need not necessarily equal deaths as in a stable population theory. The moderate association

found reveals the influence of their different characteristics because while fertility rates are subjected to biological and socio-cultural features, mortality rates could also be associated with biological and socio-cultural features of different nature hence identical results cannot be achieved. Mortality rates have been greatly affected by technological factors in a negative direction because of the general conscience that man has a right to live. So in some developing nations mortality rates have assumed a downward trend whereas fertility rates are constant, if not rising. In addition, correlating birth statistics with net migration statistics but keeping death statistics constant, reveals that $r_{24.3} = -0.3380$ for Kano locations and $r_{24.3} = 0.4258$ for the Sugar-belt. These results show too that net migration had a weak but significant inverse association with fertility in Kano locations due to out-migration whereas it had a weak but significant positive association with fertility in the Sugar-belt because of in-migration into these regions. A generalized summary for the period 1962-1969 according to Table 59 reveals a partial correlation coefficient of $r_{12.34} = 0.9782$ for Kano locations. In other words, if one correlated absolute intercensal

population growth and absolute intercensal births but keeping both mortality rates and net migration rates constant then population growth during 1962-1969 within Kano locations and the Sugar-belt was strongly associated with the number of intercensal births because partial correlation coefficient values were approaching a unit. This finding confirms the hypothesis that under the assumption of constant net migration rates and mortality rates population size could be a function of the natural law of reproduction. But in reality this situation hardly exists because of the interplay of socio-economic factors which influence mortality and net migration rates in different dimensions. The partial correlation coefficients between absolute intercensal deaths (keeping births and net migration influence constant) revealed $r_{13.24} = -0.8826$ for Kano locations and $r_{13.24} = -0.9982$ for the Sugar-belt. This again endorses the natural law that if fertility influence and migration impact were assumed constant then population decline could occur only through the natural process of death. The association found was very strong and negative; however, the result for the Sugar-belt should be treated cautiously as most of mortality cases reported to have been realized in the Sugar-belt were actually realized by respondents before they migrated into

the Sugar-belt. (1963-1973)

The partial correlation coefficient between absolute population change and absolute intercensal net migration (but now holding births and deaths constant) revealed $r_{14.23} = -0.8030$ for Kano locations and $r = +1.0000$ for the Sugar-belt. The earlier result that net-migration influence depressed population growth in the Kano locations is again confirmed. This demographic situation could be attributed to mass out-migration because of environmental problems experienced in the region. Furthermore, the strong positive correlation of a unit indicating population growth in the region was identical with net migration influence which again exposes the impact of in-migration into the region. In conclusion, one could rank these variables of population dynamics in the following order; for Kano locations, fertility rates were the sole factors influencing positive population growth, whereas, negative population growth was comparatively more influenced by mortality rates and, to a lesser extent, by net migration rates. In the Sugar-belt, positive population growth was mostly a function of net migration and, to a lesser extent, fertility rates. Furthermore, population decline in the area during the period was basically a function of mortality rates. Another anomaly in computation was noted

Determinants of Change, 1969-1973 4.3) especially for the Sugar-belt. Similar computations for 1962-1969 depicted very strong positive results of analysis for 1969-1973 were similar to those of 1962-1969. However, a few anomalies were noted in the later computations which could be attributed to the relatively short interval in the later period. Although mortality rates are influenced by socio-cultural factors they could to a reasonable extent be influenced also by the interplay of physical environmental factors i.e. as noted in Chapter II, the occurrence of environmental catastrophes tends to be periodic. In addition, the later period probably had better data due to better recall of deaths and births as the time period involved was relatively small. Others have argued that the first anomaly as depicted by Table 59 is was with $r_{12.4} = 0.1229$ for the Sugar-belt during 1969-1973, whereas, the same computation for 1962-1969 was $r_{12.4} = 0.3394$. A plausible explanation could be that during the later period more people had settled in the Sugar-belt and had more members of their families joining them, especially in the re-settlement sector of the Sugar-belt. The increasing number could be associated with more births and deaths realized in the area during the period. Another anomaly in computation were noted

in the results of (r14.2) and (r14.3) especially for the Sugar-belt. Similar computations for 1962-1969 depicted very strong positive associations, whereas in the later period rather weak, negative associations were found. This could be explained by the fact that net migration tended to depress fertility rates in some areas as features of out-migration were being experienced slightly.

The hypothesis that migrants have compara-

Summary

lower fertility than non-migrants was tested by Masicec (1968) who found that migrant women had less children than non-migrant women. One could realize from the analysis that net migration probably affects fertility rates which ultimately should greatly influence the rate of natural population growth. Most demographers nevertheless have argued that the effect of migration on fertility rates is apparently inconclusive. Some demographers have endorsed the hypothesis that migration depresses the fertility of sending areas. This notion is supported by the realization that migration encourages long separation of spouses and disrupts marital status in communities affected because the unmarried tend to dominate migration stream. In addition, N.O. Addo (1968) has argued that economic motivation among migrants encourages migrants to postpone marriage contracts, thus increasing the average age of

for West Kenya indicates that fertility was apparently higher among migrants than non-migrants and this could adversely affect fertility rates of migrants. This hypothesis could be relevant if the majority of the rural population were conscious of socio-economic problems associated with many children accruing from early marriage. It is however the opinion of most demographers that time practical observation of population mobility between rural environments and urban centers in Kenya is still too early.

The hypothesis that migrants have comparatively lower fertility than non-migrants was tested by Masisco (1968) who found that migrant women had less children than non-migrant women.¹⁹ Other studies gave

contradicting results for Hutchison (1961)²⁰ and Colberg (1959)²¹ both revealed features of higher fertility amongst in-migrants of rural origin than among non-migrants in

going out-migration. The feature of low fertility could therefore be partly attributed to migration and partly the hypothesis that out-migration depressed fertility of

to high mortality rates. But, he argued, in most countries in Southern Europe. In conclusion, statistical evaluation of developing nations as Africa where economic growth may be lagging behind population growth, out-migration could high in West Kenya though it had taken a declining trend foster an acceleration of growth by increasing per capita due to significant features associated with out-migration food resources but lower the rate of growth in recipient

areas by reducing capita resources thereby raising mortality level.

Kenya, however, reported a moderately increasing growth pattern attributable to immigration. Table 28 depicting child-woman ratio data

for Kano locations indicates that fertility was apparently higher in West Kano despite mass out-migrational waves which affected it, especially amongst males. This demographic finding was consistent with the findings of A. Southall who stated that "male migrants made every effort not to let their wives lie fallow when left at home"²³ Practical observation of population mobility between rural environments and urban centres in Kenya vividly reveals predominance of women folks as travelling to and from and their husband's places of work, otherwise men make occasional visits home in turn leading to population increase.

East Kano on the other hand featured low fertility and was experiencing in-migration in most of her sub-locations while a few sub-locations were experiencing out-migration. The feature of low fertility could therefore be partly attributed to migration and partly to high mortality rates on occasions and other members of the family may go. In conclusion, a statistical evaluation of the survey data revealed that growth rate was relatively high in West Kano though it had taken a declining trend due to significant features associated with out-migrational

waves in the area. Partial correlation coefficient values could be high because of the small sample size and the functional relationship, however, exposed a moderately increasing growth pattern attributable to in-migration

and a counter-balancing effect of out-migration in a few sub-locations. The Sugar-belt region initially had a rapid growth rate although this pattern later began to decline and will probably decline substantially in the near future as in-migration will be subjected to availability of job opportunities, and expansion of a new 15, territory for settlement. 1967, pp. 169-181.

2 Johnston But the analysis revealed an increasing feature of in-migration of females into these areas, and this will definitely increase fertility rates within the region which will in turn lead to population increase.

Furthermore, it could be important to consider the correlation between absolute population change and duration of residence within the region and outside the region because as has already been noted, most rural-to-rural migrations involve whole families although initially split-migration occurs and other members of the family may join later. In addition, total number of infant births and the decision to return home may be a function of time if other things are assumed constant. House, 1969,

pp. 12-13.

NOTE: Partial correlation co-efficient values could be high because of the small sample size and the functional relationship between the three variables.

Hukerong Area

- 6 Eogue, D.J. REFERENCES Ibid. p. 502.
- 7 United Nations - Methods of Estimating Basic
- 1 Johnston, R.J. - "Components and Correlates
of Victorian Population Change
1954-1961." In Australian
Geographical Studies, Vol. 15,
8 Glen, Margaret - 1967, pp. 165-181. Migration and
- 2 Johnston, R.J. - Ibid, pp. 1-2. In 1935-1949"
- 3 Eogue, Donald J. - "Internal Migration" In The
Study of Population; An
Inventory and Appraisal.
- 9 Glen, Margaret - editors. Phillip M. Hauser
and W. Zelinsky and Otis Dudley Duncan,
10 Ronald Freedman - pp. 486-488, University of
Chicago Press, 6th Edition,
1969. Geography. edited by
- 4 Ominde, S.H. and - "The Kano Plain" - A Geographical
Ojany, F.F. Challenge" In African Scientist
editor: T.R. Odhiambo, East
- 11 Ronald Freedman - African Publishing House, 1969,
- 12 United Nations - pp. 112-13. Estimating Basic
- 5 - Author's conversation with the
Agricultural Officer for IV,
Muhoroni Area, 42, Chapter I,
New York.

- 16 Bogue, D.J. = Ibid, p. 502. Data Needs for
- 7 United Nations - Methods of Estimating Basic
Demographic Measures from
Incomplete Data, Manual IV,
ST/SOA/SER A/42, Chapter I,
New York. Population Books,
- 8 Glen, Trewartha - "Population Distribution and
14 and Wilbur, Zelinsky. Change in Korea in 1925-1949"
(1965) In The Geographical Review
Vol. 45, January, 1955, No. 1,
pp. 1-26. Edited by W.L. Freedman
- 9 Glen Trewartha - Ibid, p. 24. Population University
and W. Zelinsky Press, 1963.
- 10 Ronald Freedman - "The Sociology of Human
Fertility". In Social
Demography. edited by
T.R. Ford and G.S. de Jong.
Englewood Cliffs, N.J., C.N.
Prentice-Hall, 1970. Population Books,
- 11 Ronald Freedman - Ibid. pp. 10-35.
- 12 United Nations, - Methods of Estimating Basic
Demographic Measures from
Incomplete Data, Manual IV,
ST/SOA/SER A/42, Chapter I,
New York.

- 13 Brass, W.I. - "Population Data Needs for
15 Addo, N.O. - Development Planning" In
Population Growth and Economic
Development, edited by
Ominde, S.H. and Ejiogu, C.N.
Heinemann Educational Books,
1972, pp. 343-347.
- 19 Harisco, J.J. - "Characteristics of African
of al - Demographic Data" In
14 Etienne Van De Walle - The Demography of Tropical
Africa, edited by W.I. Brass,
et al., Princeton University,
20 Hutchinson, B. - Press, 1968.
(1962)
- 15 Hirst, M.A. - "Population Growth in Mainland
Tanzania, 1948-1957" In
21 Goldberg David - Population Growth and Economic
(1959) Development, edited by
Ominde, S.H. and Ejiogu, C.N.
Heinemann Educational Books,
1972, p. 152.
- 22 Forrie, W.D. - "The Sociology of Human
16 Ronald Freedman - Fertility" In World
Population Conference; In
Proceedings Vol. I, p. 36.

- 17 Hirst, M.A. - Ibid, pp. 152. Vol. IV, United
- 18 Addo, N.O. - "Population Movements in
- 23 Southall, S.A. - West Africa" In West African
Conference on Population,
Ghana, Unpublished. Africa" In
- 19 Masisco, J.J. - "The Effects of Labour Force
et al Participation and the Relation
between Migration Status and
Fertility in San Juan, Puerto
Rico" In Milbank Memorial
Fund Quarterly, 48, pp. 51-70.
- 20 Hutchison, B. - "Fertility, Social Mobility,
(1961) and Urban Migration in Brazil"
In Population Studies, No. 14,
pp. 182-189.
- 21 Golberg David - "The Effects of Fertility of
(1959) Two Generation Urbanites" In
Population Studies, No. 17,
pp. 214-222.
- 22 Borrie, W.D. - "International Migration as
related to Economic and
Demographic Problems of
Developing Countries" In
World Population Conference

Proceedings, Vol. IV, United Nations, New York, 1965.

- 23 Southhall, S.A. - "The Demographic and Social Effects of Emigration on the Population of East Africa" In World Population Conference Proceedings, Vol. IV

CHAPTER VI

ESTIMATED POPULATION CHANGE 1973-1980

ESTIMATED POPULATION CHANGES BETWEEN 1973-1980

Introductory Remarks

Spatial variations of population change mirror differences in human environmental perception and values. Maps 7 and 8 depict regional differentials in environmental perception within the study-region. A detailed knowledge of environmental perception and values is basic for CHAPTER -VI urban planning purposes because perception and value affect quite considerably human spatial behaviour and consequent governmental policy formulations and as ESTIMATED POPULATION CHANGES 1973-1980 demographic changes could "measure social, political, and economic changes".¹ The influence of these phenomena in creating regional inequilibrium in spatial population mobility is portrayed by Map 9.

The laws of economic operation and current world problems in a way pivot on human rates of growth in relation to the existing level of technological advancement. The urgency to acquire basic information on the direction and rate of population change for short-term and long-term planning purposes has thus become an issue of prime importance to governments and an international concern. It is this

aspect of population change that made it necessary to
ESTIMATED POPULATION CHANGES BETWEEN 1973-1980
project population growth in the study-region up to 1980.

Omitting this vital information could render the study

Introductory Remarks

omitted, as the rate of population change affects

provision of welfare services and may hinder provision of

Spatial variations of population change
such services especially in areas of rapidly declining

mirror differences in human environmental perception and
growth rates. Future plans for provision of welfare

values. Maps 7 and 8 depict regional differentials in
services, and, other facets of the economy, should incor-

environmental perception within the study-region. A
parate, expected, future pattern in population dynamics.

detailed knowledge of environmental perception and values
Despite the realization that unplanned population growth

is basic for regional and urban planning purposes because
could create unaccountable problems for planners, the

perception and value affect quite considerably human spatial
communist orthodox view still accepts that human problems

behaviour and consequent governmental policy formulations
are rooted in past political structure and economic systems

and assessment. As I. Bowen (1960) puts it, demographic
and not in human aggregate size." This view is prevalent

changes could "measure social, political, and economic
in most-developing nations especially in Africa.

changes".¹ The influence of these phenomena in creating
In summary, population change is therefore a

regional inequilibrium in spatial population mobility is
gauge of the degree of modernity found in a nation. (It

potrayed by Map 9.

that account, a successful decision-making with regard to

The laws of economic operation and current
planning projects requires up-to-date and accurate data

world problems in a way pivot on human rates of growth in
enhancing population size, rates of population growth, and

relation to the existing level of technological advancement.
parameters of population dynamics.

The urgency to acquire basic information on the direction

and rate of population change for short-term and long-term

planning purposes has thus become an issue of prime import-

ance to governments and an international concern. It is this

aspect of population change that made it necessary to project population growth in the study-region up to 1980. Omitting this vital information could render the study incomplete, for the rate of population change affects provision of welfare services and may render provision of such services uneconomic in areas of rapidly declining growth rates. Future plans for provision of welfare services, and other facets of the economy, should incorporate expected future pattern in population dynamics. Despite the realization that unplanned population growth could create unsurmountable problems for planners, the communist orthodox view still accepts that human problems are rooted in poor political structure and economic systems and not in human aggregate size.² This view is prevalent in most³ developing nations especially in Africa. In summary, population change is therefore a gauge of the degree of modernity found in a nation. On that account, a successful decision-making with regard to planning projects requires up-to-date and accurate data embracing population size, rates of population growth, and parameters of population dynamics. the high, medium, and low levels of natural population growth.

Note: The procedure used in extrapolation is explained in the Appendix IX.

Estimated Population

The levels for geometric extrapolation were not taken arbitrarily but were based on previous analysis of population growth rate in the study region, and on the expected fertility pattern in the future (see Tables 64 and 65). In other words, the anticipated greater degree of accuracy since the period the 1980 fertility pattern in the region would not deviate for projection was relatively short. Furthermore, component projection was deemed unnecessary because of the relatively small cohorts distribution and irregularities attributed to migration.

To cater for expected peculiarities in age structure due to social and economic conditions it is recommended that geometric rate of growth, if applied, should be carried under different levels of population growth. Population projection for the sampled sub-regions was, therefore, attempted under several levels of assumed natural rate of growth namely at 4% level per annum, 3.3% per annum, and 3.0% per annum for the Kano region. If the rising trend of fertility rates, or population growth rate in general has to decline, then this could probably be attributed to the increasing effects of out-migration which is selective of the youthful population in reproductive age brackets, and causes partial disruption of family institutions (see

Figures 6 to 8). Furthermore, the work of Family Planning Note: The procedure used in extrapolation is explained in the Appendix II.

The levels for geometric extrapolation were Association if Anticipation in the region could also cause not taken arbitrarily but were based on previous analysis fertility rates to decline as more people could use of population growth rate as characteristic of the study-contraceptives methods. region, and on the expected fertility pattern in the near future (see Tables 64 and 65). In other words, the natural population growth will slightly increase as more geometric growth rate was based on the assumption that permanent employees will increase their families to join the 1980 fertility pattern in the region would not deviate them if better working conditions are implemented. Improve- significantly from the pattern of 1973 portrayed by Tables needs should affect family housing conditions, income levels, 64 and 65. Furthermore, demographers accept that within a and security. Moreover, it is assumed that the occurred relatively short time (as in this case) it is in order to persons will increasingly enter into marriage contracts assume that population increases at a geometric rate.⁴ The if better conditions of service prevail. In fertility rates sample survey found that most sub-regions had their natural in the Sugar-belt have to decline, it will be due to the rate of growth approximating the national average of 3.3% intensive work of Family Planning Association which will per annum. But, in the face of a declining mortality rate reduce more people to use contraceptive methods. In- due to improved medical technology, personal hygiene, and migration rates into the Sugar-belt could also be reduced improved provision of foodstuff and communication network substantially in new Sugar-belt areas because operative in etc., we would expect population growth rates to begin other sections of the District, or in other similar rising in rural environments. If, the rising trend of economic islands are inaugurated outside the Sugar-belt fertility rates, or population growth rate in general has region. to decline, then this could probably be attributed to the Table 60 shows population migration for the increasing effects of out-migration which is selective of sampled regions under the above assumed basis of geometric the youthful population in reproductive age brackets, and rates of growth. Another useful, but admittedly crude causes partial disruption of family institutions (see data depicted by Table 61 give estimates of the number of Figures 5 to 8). Furthermore, the work of Family Planning years in which population in the sampled regions would

Association if intensified in the region could also cause fertility rates to decline as more people could use into contraceptive methods. For the Sugar-belt, it was assumed that natural population growth will slightly increase as more permanent employees will encourage their families to join them if better working conditions are implemented. Improvements should affect mostly housing conditions, income levels, and security. Moreover, it is assumed that the unmarried persons will increasingly enter into marriage contracts if better conditions of service prevail. If fertility rates in the Sugar-belt have to decline, it will be due to the intensive work of Family Planning Association which will educate more people to use contraceptive methods. Immigration rates into the Sugar-belt could also be reduced substantially if new Sugar-Estates become operative in other sections of the District, or if other similar economic islands are inaugurated outside the Sugar-belt region. Table 60 shows population estimates for the sampled regions under the above assumed levels of geometric rates of growth. Another useful, but admittedly crude data depicted by Table 61 give estimates of the number of years in which population in the sampled regions would

double if it was assumed that their rates of population growth as manifested by the sample survey could continue into the distant future. Table 61 therefore reveals that Sugar-population in most rural sub-locations could double between 14 years to 26 years. The proportion of the children for the sampled sub-locations. These seemingly long periods taken by sub-locations in the Sugar-belt to double their populationable require careful judgements because population growth rates utilized were merely crude rates of natural increase. Migration rates were not considered and estimating future migration rates is rather complex because migration rates become a function of the future growth rates of economic investments in the region. The future growth rates of economic investments is thus difficult to estimate accurately because it is influenced by political factors, environmental factors, and human factors which cannot be easily determined. Nevertheless, it is anticipated that Sugar cultivation may extend on to the plains. Table 29 and Map 15 show that fertility rates within the Sugar-belt are somewhat low and if natural increase rates were the only variables to rely on then the Sugar-Estates could take a longer period to double their population. Fertility rates which were found in

Table 63 shows what the number of children in the study-region is expected to be by 1980. It is by population to double is explained in Appendix II.

evident that the proportion of children population will generally be slightly over 50% in West Kano, over 40% in East Kano and probably the same percentage in the Sugar-belt region (see Table 62). The analysis of 1969 census data reveals the mean proportion of the children for the sampled sub-locations in West Kano was approximately 51% of the total population of the sampled regions. (see Table 62). The sample survey estimate recorded a proportion of approximately 52% for 1973. The slight percentage increase could be attributed to the slight decline in infant and child mortality in West Kano. In Chapters III, IV, and V, it is vivid that West Kano has higher fertility rates than Eastern Kano, whereas, East Kano has higher mortality rates. It is anticipated that both regions will experience mortality declines as stated previously. Only 50% of the sampled sub-locations in West Kano, the sampled sub-regions had a mean of about 46% as constituting the population of children in relation to the total population aggregate. The sample survey in East Kano during 1973, however, recorded a proportion of about 37% as constituting the children population size. The decline could be attributed to the effects of high mortality rates which were found in briefly discussed in Chapter II. In addition, population

Note: The procedure used for estimating years taken by population to double is explained in Appendix II.

the region as discussed in Chapter IV, or it could be a feature of low fertility rates as noted in the region. It could also be due to the effects of under-enumeration of the children. The remarkably low proportion of children in the Sugar-belt is expected as most workers in these regions are unmarried, whereas, the married group tend to have most of their family members staying behind at home. In summary, the most problematic factor in rural areas today is associated with free primary education and provision of other infrastructural facilities. Estimation of future size of children population could therefore, provide useful data when provision of social services are planned for. (But, it should be realized that population estimate for 1980 has constituted only 50% of the entire sub-locations in the study-region.

In 1960's within the study-region. There is an increasing mobility particularly in the 1960's within the study-region. There is an increasing mobility particularly in the 1960's within the study-region. There is an increasing mobility particularly in the 1960's within the study-region.

Solutions to Population Instability

are victims of political decisions in their sister countries.

Population spatial mobility in the study-region reflects regional contrasts in economic development and differences in the influence of environmental problems

briefly discussed in Chapter II. In addition, population migration constitutes a useful

instability in the region reflects the influence of the government's resettlement policy in the region, i.e. the inauguration of Ahero Pilot Scheme (1967) in East Kano, and resettling landless in the Sugar-belt sub-regions of Muhoroni, Got-Aburo, and Koru-Fort-Ternan. Furthermore, problems resulting from family and clan politics have stimulated migration in some regions. One could therefore categorize population problems in the area as partly resulting from forced migration, split-migration, and voluntary migration. Forced migrations are usually caused by environmental catastrophes as the 1961-62 and 1968, or floods which claimed many lives and destroyed property in Kano plains, (see Map 3). The government's policy on resettlement, and annexation of land by private investors caused massive population spatial mobility particularly in 1960's within the study-region. There is an increasing number of return migrants from Tanzania and Uganda, who are victims of political decisions in these sister countries. Split-migration, on the other hand, is caused by work conditions in the new environment, and by the general attitude to leave some members of the family behind to safeguard property left behind. Furthermore, voluntary migration constitutes mostly those seeking unskilful

employments, etc.

Forced migrations caused by environmental upheaval have become annual phenomena which need a more serious attention. The few embarkments built along the major rivers like Nyando need to be extended to cover the entire length of major rivers. These embarkments should also be widened to prevent parts of it breaking down to cause more destructive floods as in the past. The magnitude of split-migration could be reduced if better housing conditions were provided to the employees in the Sugar-Estates. The colonial housing architecture of a single-roomed hut provided in most of these estates, especially in privately owned sugar plantations, are not in harmony with the African social way of life. The Ahero Pilot Scheme for example, has created a negative attitude amongst people in these regions to similar schemes because the housing conditions did not incorporate the social way of life between a father, his wife, and children. It is against tradition for a father to share a single-room with his grown-up children. It is therefore, recommended that for future re-settlement schemes a thorough research into the peoples social way of life and attitudes which could be injured should be identified and solutions for these laid out in the

settlement plans. Furthermore, the growth of these institutions. The general problem of rural-to-urban drift which has hard hit the study region as signified by female dominance in rural areas (see Fig. 5 to 8) requires an even more immediate attention. Rural environments should be made more attractive by improving rural infrastructure and creating more recreation facilities in rural areas. The price system for agricultural produce should be studied and improved to make farming an attractive occupation as other jobs in the towns. The income level of rural farmers particularly in Kano locations, could be raised through properly managed co-operative societies. *Handwritten note: "Handwritten note" with a scribble* and since the reclaimed land a major drift into the towns has been caused by the provision of better educational facilities in towns, health facilities, and occupation. Maps 7 and 8 depict that majority of rural inhabitants in Kano locations were unhappy about the provision of these services. On that account, out-migration was found to be relatively high in areas where these facilities were least provided. It is possible that by providing diversified forms of these facilities of commercial education, technical education, health facilities, etc., to the rural regions these areas could be made more attractive, and in this way rural-to-urban population drift in the region could be

substantially reduced. Furthermore, the growth of these institutions in similar problematic environments could create markets for small industries in rural regions, and in the long-run decentralization of industries from a few growth poles could be easily achieved.

Lastly, the large hectares of good cultivatable land invaded by Lake Victoria in 1961-62 should be reclaimed following the Dutch Polder Schemes. The move will require concrete walls to be erected along the entire lake-shore margin on the eastern sector, and that the submerged land be drained. The author believes that such a project could receive international aid since the reclaimed land could be set for extensive cultivation of paddy-rice or sugar-cane and this offer alternative settlement to the return migrants.

Money problem

1 Classification of Factors Affecting Population Change
 in Population. Wigzell
 2 James Hisset and Co. Ltd., Cambridge University Press, 1960.
 3 Population Growth in Kenya
 in Research Report No. 12.
 The Scandinavian Institute of African Studies, Uppsala, 1978.
 4 United Nations - Manual III, Methods for Population Projection by Sex and Age, ST/STAT/SER A/Population Studies No. 24,
 United Nations, New York, 1958, pp. 1-2.
 4 United Nations - Manual III, op.cit.

REFERENCES

- 1 Bowen, I. - "Classification of Factors Affecting Population Change" In Population. Digswell Place, James Nisbet and Co., Ltd., Cambridge University Press, 1960.
- 2 Lars Bondestam - "Population Growth in Kenya" In Research Report No. 12. The Scandinavian Institute of African Studies, Uppsala, 1972.
- 3 United Nations - Manual III, Methods for Population Projection by Sex and Age, ST/SOA/SER A/Population Studies No. 25, United Nations, New York, 1956, pp. 1-2.
- 4 United Nations - Manual III, op.cit.

9
CONCLUSION AND RECOMMENDATIONS

In this section, a theoretical discussion of research findings on population change is attempted and suggestions made on aspects that require further research. The classical population theories attempted to account for population changes through natural laws. Such natural theories were environmentally deterministic in that they subjected population growth as a function of fertility rate indirectly determined by environmental factors such as the 'quantity' and 'quality' of food, population density, and diseases. Diseases, as it were, mortality rates. As confirmed in the previous chapters, ecological conditions in the Kano-Bagor-belt region were found to create suitable habitats for the proliferation of distinct disease vectors of which mosquitoes and snails were the most preponderant. These disease vectors are responsible for the high incidence of malaria and bilharzia in the region in general, and Sokoto sub-location in East Kano in particular; in point of fact, the mentioned sub-location has a crude death rate of 33/1000 and this rate is probably the highest in the region.

9
CONCLUSION AND RECOMMENDATIONS: have high fecundity, hence, fertility rates are bound to be extremely high. ecological conditions: In this section, a theoretical discussion of research findings on population change is attempted and suggestions made on aspects that require further research. rates of 51/1000. The classical population theories attempted to account for population changes through natural laws. Such natural theories were environmentally deterministic in that they subjected population growth as a function of fertility rates which were indirectly determined by environmental factors such as the 'quantity' and 'quality' of food, population density, and diseases. Diseases, as it were, caused sterility and increased mortality rates. marginally confirmed in the previous chapters, ecological conditions in the Kano-Sugar-belt region were found to create suitable habitats for the proliferation of distinct disease vectors of which mosquitoes and snails were the most preponderant. These disease vectors are responsible for the high incidence of malaria and bilharzia in the region in general, and Kakola sub-location in East Kano in particular; in point of fact, the mentioned sub-location has a crude death rate of 33/1000 and this rate is probably the highest in the region. An attitude towards family institutions reflect

indirectly see The indigenous inhabitants have high fecundity, hence, fertility rates are bound to be extremely high ceteris paribus. This demographic feature was strikingly present in the Kano locations, and even more so in Kochieng' and Nyamware sub-locations of West Kano where crude birth rates of 51/1000 were recorded. a spatio-temporal dimension is greatly a Furthermore, nutrition in the region is normally basically quantitative rather than qualitative for starchy foodstuffs are the major staples. Consequently, the bulk of the inhabitants have become less resistant to diseases. On that account, mortality rates are generally high in the Kano sub-regions where accessibility to medical facilities is relatively poor. Natural theories, however, are only marginally supported today because human fertility rates and mortality rates are influenced by a host of other community's factors. This hypothesis does not deny the direct and indirect influence of diseases on fertility rates and mortality rates, but rather suggests that increased medical technology, to mention but one factor, could ameliorate the adverse effects of diseases. fabrics of the Ibo peoples We should further realize that, human will has become important in influencing man's desire for controlling the size of family institutions, and the direction of attitude towards family institutions reflect

indirectly socio-economic and cultural impact on these social institutions. In Chapter III, the degree of socio-economic revolution experienced in the region studied is briefly discussed. We should note further that, cultural theorists argue that population growth in a spatio-temporal dimension is greatly a function of societal culture. Cultural norms could create conditions favouring either a high balance of fertility and mortality rates, or a low balance of both. In addition, cultural norms could also create conditions favouring particularly high fertility rates and not, vice versa. The components of a society's culture directly or indirectly reflect environmental qualities and the state of technology of the community concerned. But, external relations through trade could greatly influence a community's culture. It is the interaction between regions which encourages population spatial mobility between them and just such spatial interaction was quite prominent in the region studied.

An analysis of the cultural fabrics of the

Luo peoples who dominate the area surveyed reveals that cultural norms are significant in determining fertility rates. Children are regarded as social assets and re-marriage of widows is a common phenomenon. Yet, the

cultural system also provides safety-valve mechanisms to check rapid rates of population growth. These checks function through beliefs, taboos, and customary laws which determine the age at marriage, sexual relations outside marriage, and during pregnancies etc., and divorce. were to be found in the more attractive and productive Sugar-belt. Like in most other societies incest is illegal in the Luo society; as such most marriages are exogamous. Since on marriage, women move over to the husband's locality, it is this movement by women that dominates rural migration streams particularly in West Kano as revealed in Chapter IV. The pattern of migration in East Kano witnessed is interesting in a different respect. Here, the presence of the ethnically different Kishi and Nandi who were absorbed during the early periods of settlement encouraged intra-sub-regional marriages. Moreover, with the introduction of Sugar-cane as a cash-crop in East Kano, the region began to attract migrants from distant areas with the result that today marriage from close villages is commonplace. In addition, population spatial mobility has been substantial in Kano locations because of the onslaught of westernizing influences, land pressure, and environmental problems. As such, a sizeable portion of the Luo youths

and young adults are away trying to obtain education, and a livelihood in the modern wage sector. It is therefore not surprising that the field survey disclosed that majority of the males in cohorts aged 15-49 years were away from the Kano locations. And in fact, quite a number of them were to be found in the more attractive and productive Sugar-belt.

The penetration of socio-economic changes has thus encouraged whole families to migrate to areas of better economic opportunity. The necessity to win a livelihood on the part of the males has resulted in female dominance in rural areas as depicted by Figures 5 to 8. Moreover, the future pattern is bound to elicit greater spatial mobility unless environmental problems are reduced substantially and the rural parts of Kano locations made attractive to retain their inhabitants, particularly the males.

In addition, classical economic demographers argued that economic system could increase or retard population growth depending on how the economic system revolutionized individual incomes, controlled demand and supply of labour, and made capital available. In the Kano-Sugar-belt, regional inequalities in economic activities and provision of infrastructure partly determined regional

imbalances in population spatial mobility. The Sugar-belt according to Table 40 had about 98% of her adults regarded as in-migrants. The Kano locations according to Table 39 had approximately 52% of her adults regarded as sedentees. These inequalities in migration balance partly reflected the influence of regional differentials in economic activities which provided incomes to the people. It was further found that the role of economic activities in the area hinged on government's policy for regional development. The inauguration of Ahero Pilot Scheme (1967) and initiation of re-settlement schemes in the Sugar-belt influenced significantly population mobility in the region. It should be realized as well that economic systems could directly or indirectly modify cultural values of a society as values of a society as tastes and perceptions of the environment change due to economic pressure. In a nutshell, population changes in the area surveyed reflect pre-eminently the influence of migrations particularly in the Sugar-belt, where they virtually accounted for the entire population growth in the intercensal period. In Kano locations, changes in population density, sex-ratios, and regional migration trends were attributed mostly to regional variations in population spatial mobility which reflected greatly the impact of

Socio-economic and cultural factors. However, actualities intercensal population increase in the entire Kano locations could be attributed to the influence of fertility rates and mortality rates. The future pattern of population growth will reflect the existing pattern of demographic features unless environmental problems prevalent in the region are reduced. Particularly in areas of greater population instability as Nyansa Province, Western Province, and the Recommendations could possibly furnish regional planners with data necessary for guiding provision of rural infrastructural facilities. The author feels that the study of intercensal population change should be extended to major existing rural towns because these rural nodes offer good strategies for rural development programmes. Furthermore, the research could be expanded to cover the entire Kisumu District which is an important area of out-migrant labour force. A wider area could give better data for identifying the role of migrational factors or fertility-mortality low factors in overall population growth especially if factor analysis method is used in identifying important factors influencing population change. tend to experience high fertility rate. Another aspect of migration study which is overdue for research is rural-to-rural migration. Planners in developing countries are apparently overwhelmed with

problems of rural-to-urban migration, hence, most studies on human spatial mobility have concentrated on this aspect of spatial mobility, not realizing that the direction and magnitude of rural-to-rural population mobility exceed significantly rural-to-urban migration.

The analysis of determinants of rural-to-rural migration particularly in areas of greater population instability as Nyanza Province, Western Province, and the Rift Valley could possibly furnish regional planners with data necessary for guiding provision of rural infrastructural facilities and ^{APPENDIX I} spreading innovative processes. In connection to this study research into factors influencing migrants to return to their home areas and the role they play in modernizing their regions after they return ought to be analysed because return migrants could become effective instruments in the spread of innovative processes.

Research should also be carried out to establish factors responsible for high mortality rates and low fertility rates in East Kano in view of the fact that West Kano, which is in the same region and has experienced similar natural catastrophies, tend to experience high fertility rates. Moreover, the decline in herds of livestock is becoming evident in Kano locations particularly in West Kano, and effects of this should be investigated.

TABLE 1

POPULATION DENSITY RANK

Location	Sub-Location	Population Density	Density Rank
West Kano	Nyanware	333	1
West Kano	Kashara	331	2
East Kano	Mohar	283	3
East Kano	Kochogo	279	4
West Kano	APPENDIX I	236	5
West Kano	*Kochieng'	214	6
East Kano	Kakola	212	7
East Kano	Hangaya I	202	8
East Kano	Sidho-East	161	9
East Kano	Kanagaga	157	10
Muhoroni	Muhoroni	128	11
Muhoroni	Tama	127	12
Chemelil	God-Abuoro	127	13
East Kano	Hawidhi A	115	14
West Kano	Isanda	114	15
West Kano	Kachiambo	113	16
East Kano	Sidho-West	113	17
East Kano	Kandar	96	18
Koru-Norterman	Koru	91	19
Songhior	Songhior	89	20

cont...

TABLE 1

Location	Sub-Location	Population Density	Density Rank
Chemelil	Chemelil	83	21
East Kano	POPULATION DENSITY RANK	83	22
East Kano	Wawidhi B	82	23
Miwani-Kibos	Miwani	66	24
Forternan	*Fort-Fernan	81	25
Source:	Kenya Population Census 1969 Volume 3, Statistics Division, Ministry of Finance and Economic Planning, Nairobi, 1970.		
West Kano	Nyamware	333	1
West Kano	Kombura	331	2
East Kano	Kabar	283	3
East Kano	Kochogo	279	4
West Kano	Kawino	236	5
West Kano	*Kochieng'	214	6
East Kano	Kakola	212	7
East Kano	Wangaya I.	202	8
East Kano	Sidho-East	161	9
East Kano	Kamagaga	157	10
Muhoroni	Muhoroni	128	11
Muhoroni	Tamu	127	12
Chemelil	God-Aburo	127	13
East Kano	Wawidhi A	115	14
West Kano	Bwanda	114	15
West Kano	Kadhiambo	113	16
East Kano	Sidho-West	113	17
East Kano	Border	96	18
Koru-Forternan	Koru	91	19
Songhnor	Songhnor	89	20

cont...

TABLE 2			
Chemelil	Chemelil	83	21
East Kano	*Wangaya II	83	22
East Kano	Wawidhi B.	82	23
Miwani-Kibos	Miwani	66	24
Forternan	*Fort-Ternan	51	25

Source:	Kenya Population Census 1969 Volume I, Statistics Division, Ministry of Finance and Economic Planning, November, 1970.		% of Total Population in the area
Sub-Location	(=)	(y)	
Note *			
Kochieng	206	25	11.9
Kochieng	206	25	11.9
Byomano	206	20	13.7
Kawino	206	20	13.7
Kabar	206	27	15.5
Sidho-East	206	28	18.2
Sidho-West	206	28	18.2
Wangaya II	437	22	10.1
Kabola	307	35	8.5
	4739	236	789
			100.0

E = 25.22
 SD = 2.75
 z = 10.44

F = 57.67
 SD = 18.73

- 236 -
- 235 -

TABLE 2

SAMPLE SIZE OF SETTLEMENT
CLUSTERS IN KANO LOCATION

Sub-Location	Number of Total No. of Villages	Size of Sample No. of Villages (x)	Population Enumerated (y)	% of Total Population in the area
Bwanda I	579	129	77	13.3
Kochieng'	496	25	94	18.9
Nyamware	598	30	108	18.0
Kawino	438	22	66	15.1
Kabar	542	27	122	22.5
Sidho-East	558	28	102	18.3
Sidho-West	564	28	71	12.6
Wangaya II	437	22	82	18.8
Kakola	507	25	67	13.2
	4719	236	789	100.0

\bar{x} = 26.22
SD = 2.75
r = +0.44

\bar{y} = 87.67
SD = 18.73

TABLE 3

SAMPLE SIZE OF SETTLEMENT
THE SAMPLE SIZE OF SETTLEMENT UNITS
UNITS IN THE SUGAR-BELT

Sub-Location	Total Number of Housing-Units	Sample Size of Housing-Units	Population Enumerated	% of Total Population
God-Aburo	341	17	29	7.2
Chemelil	2660	133	156	38.7
Koru	495	25	81	20.1
Muhoroni	1220	61	137	34.0
	4716	236	403	100.0

Sub-Location	$\bar{x} = 1179$	$\bar{x} = 5916$	$\bar{x} = 100.75$
77	122	SD = 45.83	SD = 49.76
94	102	r = +0.86	
103	71	61	
66	62	137	
--	67	--	
345	444	403	

TABLE 5

THE SAMPLE SIZE OF SETTLEMENT UNITS

WEST KANO DATA

West Kano		East Kano	Sugar-Belt	
A	29	27	17	
B	25	28	25	+ 0.66
C	30	28	61	
D	22	22	133	+ 0.56
E	-	25	-	
CD	106	130	236	+ 0.88

TABLE 6

THE SAMPLE SIZE OF ENUMERATED POPULATION

West Kano		East Kano	Sugar-Belt	
GH	77	122	156	
GH	94	102	29	+ 0.86
I	108	71	81	
	66	82	137	
	-	67	-	
	345	444	403	

TABLE 8

INTER-CORRELATION ANALYSIS

<u>WEST KANO DATA</u>			
<u>(SUGAR BEETS)</u>			
<u>Group</u>	<u>S</u>	<u>Sub-Location</u>	<u>Correlation</u>
A		Bwanda	+ 0.66
B		Kochieng'	
C		Nyamware	
D		Kawino	
AB		Bwanda + Kochieng'	+ 0.88
CD		Nyamware + Kawino	
K		Muhoroni	+ 0.89
JK		Koma + Muhoroni	
<u>EAST KANO DATA</u>			
E		Kabar	+ 0.77
F		Sidho-East	+ 0.72
G		Sidho-West	
H		Wangaya II	+ 0.90
EF		Kabar + Sidho-East	
GH		Sidho-West + Wangaya II	+ 0.86
GI		Sidho-West + Wangaya II	
I		Kakola	

TABLE 9

THE MEAN AGE INTER-CORRELATION: SUGAR-BELT

Sub-Location	Mean Age	Variation from Mean
Ikwanda	(SUGAR-BELT)	+ 0.36
Kochieng'	31.04	- 1.20 West Kano
<u>Groups</u>	<u>Sub-Location</u>	<u>+ 0.5 Correlation Data</u>
Ka: I	Chemelil 28	+ 0.24
L	God-Abuoro	+ 0.76
Grand Average	36.04	
J	Koru	+ 0.73
K	Muhoroni	
Ka: II	Chemelil 32 God-Abuoro	+ 0.43
SiJK-East	Koru + Muhoroni	+ 0.89 East Kano
Sidho-West	34.26	-1.99
Mangaya II	35.67	- 0.58
Makola	37.87	+ 1.62
Grand Average	36.25	

NOTE: These are data for adult population only aged 15-75+ years.

TABLE 10

THE MEAN AGES OF ADULTS IN KANO SUB-LOCATIONS

THE MEAN AGES OF ADULTS IN

Sub-Location	Mean Age	Deviation from Mean
Bwanda	36.40	+ 0.36
Kochieng'	34.84	- 1.20 West Kano
Nyamware	36.60	+ 0.56
Kawinon	36.28	+ 0.24
Uda-Abdono	36.37	+ 0.51
Grand Average	36.04	
Shamali	36.04	+ 0.22
Koru	27.01	- 4.80
Kabaroni	35.82	+ 0.43
Sidho-East	37.54	+ 1.29 East Kano
Grand Average	31.81	
Sidho-West	34.26	-1.99
Wangaya II	35.67	- 0.58
Kakola	37.87	+ 1.62
Grand Average	36.25	

NOTE:

These are data for adult population only aged 15-75+ years.

TABLE 11

GRAND MEAN AGES OF ADULTS ONLY

THE MEAN AGES OF ADULTS IN

THE SUGAR-BELT SUB-LOCATIONS

Locations	Mean Age	Standard Deviation
West Kano	<u>ADULT POPULATION ONLY</u>	
Sub-Location	Mean Age	Deviation
God-Abuoro	32.37	+ 0.51
Chemelil	34.04	+ 2.23 Sugar-Belt
Koru	27.01	- 4.80
Muhoroni	33.85	+ 2.04
Grand Average	31.81	AGE OF ADULTS

IN THE SUGAR-BELT

Location	Mean Age	Standard Deviation
Sugar Belt	32.45	10.35

TABLE 12

GRAND MEAN AGES OF ADULTS ONLY

IN KANO LOCATIONS

Whipple Index

Locations	Mean Age	Standard Deviation	
West Kano	36.04	14.23	Enumerated Population in age-groups of 5
East Kano	36.25	15.29	
23	24	25	23
24	25	30	19
25-29	24	35	14
30-34	50	40	13
35-39	24	22	13
40-44	22	50	11
45-49	24	55	10
50-54	22	50	7
55-59	24	50	-
60	7	-	-
61	6	-	-
62	8	-	-
TOTAL	585	TOTAL	105

TABLE 13
THE GRAND MEAN AGE OF ADULTS
IN THE SUGAR-BELT

Location	Mean Age	Standard Deviation
Sugar Belt	32.45	10.55

Whipple Index = $\frac{100 \times 105}{585} = 18.12\%$

TABLE 14

KANO LOCATIONS

Whipples Index

Age-groups	Population Enumerated	Age-groups of 5	Enumerated Population at age-groups of 5
23	24	25	23
24	23	30	15
25-29	97	35	14
30-34	69	40	13
35-39	69	45	13
40-44	62	50	11
45-49	64	55	10
50-54	52	60	7
55-59	44	-	-
60	7	-	-
61	6	-	-
62	8	-	-
TOTAL	525	TOTAL	106

Whipples Index = $\frac{5 \times 106 \times 100}{525 \times 1} = 100.95\%$

TABLE 15

AGE AND SEX DATA THE SUGAR-BELT

Whipples Index

Age-group in (years)	Male Males		Age-specific		Enumerated Population at age- groups of 5	Total
	Males	Females	Males	Females		
0-1 Age-groups 1-4	Population Enumerated 21	31	Age-groups of 5 1,201			
2-3	17	31	1,278	1,278	119	
4-5	17	35	2503	2,737	16	166
6-7	17	33	3011	2,971	14	51
8-9	25	33	1,389	1,668		76
10-11	76	28	35	2,982	13	68
12-13	68	24	4027	2,980	8	59
14-15	52	21	4567	1,305	6	67
16-17	12	14	1,091	2,848		26
18-19	37	12	50	2,980	4	67
20-21	27	11	15500	2,917	2	82
22-23	15	12	6633	1,200	1	33
24-25	6	9	857	1,200		67
26-27	7	3	2,000	2,545		333
28-29	1	2	6727	2,200		200
30-31	1	2	--	--		50
All 62 groups	349	369	--	--		93
TOTAL	319		(TOTAL 5-5)		64	

Sex-ratio
Whipples Index = $\frac{5 \times 64}{319} \times \frac{100}{1} = 100.3\%$
where 1 = 100

TABLE 16.

AGE AND SEX DISTRIBUTION FOR WEST KANO LOCATION:

Age-group in (years)	West Kano		Age-Ratio		Sex- Ratio
	Males	Females	Males	Females	
0-1	17	7	-	-	243
1-4	57	61	1.281	1.768	93
5-9	72	62	1.252	1.292	116
10-14	58	35	1.303	0.737	166
15-19	17	33	0.411	0.971	51
20-24	25	33	1.389	1.081	76
25-29	19	28	1.027	0.982	68
30-34	12	24	0.727	0.980	50
35-39	14	21	1.167	1.105	67
40-44	12	14	1.091	0.848	86
45-49	8	12	0.762	0.960	67
50-54	9	11	1.500	0.917	82
55-59	4	12	0.533	1.200	33
60-64	6	9	0.857	1.200	67
65-59	10	3	2.000	0.545	333
70-74	4	2	0.727	0.800	200
75+	1	2	-	-	50
All groups	345	369	-	-	93

$$\text{Formula for Age 1-4} = \frac{(1-4)}{\frac{1}{2}(0-1 + 5-9)}$$

$$\text{Sex-ratio} = \frac{M \times k}{F}$$

where K = 100

TABLE 17

AGE AND SEX DISTRIBUTION FOR EAST KANO LOCATION

Age-group in (years)	East Kano		Age-Ratio		Sex- Ratio
	Males	Females	Males	Females	
0-1	13	14	1.077	1.025	93
1-4	34	43	1.079	1.686	79
5-9	50	37	1.389	0.860	135
10-14	38	43	0.874	1.103	88
15-19	37	41	1.014	1.012	90
20-24	35	38	1.045	1.246	92
25-29	30	20	1.250	0.690	150
30-34	13	20	0.553	1.111	65
35-39	17	16	1.214	0.780	106
40-44	15	21	0.811	1.050	71
45-49	20	24	1.111	1.500	83
50-54	21	11	1.105	0.647	191
55-59	18	10	1.125	1.333	180
60-64	11	44	0.880	0.500	275
65-69	7	6	1.000	2.400	116
70-74	3	1	0.500	0.333	300
75+	5	0	-	-	∞
TOTAL	367	349	-	-	105
TOTAL	313	310	-	-	100

TABLE 18

AGE AND SEX DISTRIBUTION FOR THE SUGAR-BELT

Age-groups Sub-interval (years)	Sugar-Belt		Age-Ratio		Sex- Ratio
	Respondents		Male/Female		
	Males	Females	Males	Females	
0-1	5	2	-	-	250
1-4	34	31	1.889	1.722	110
5-9	31	34	1.107	1.172	91
10-14	22	27	0.978	0.931	81
15-19	14	23	10.483	0.667	61
20-24	36	42	1.075	1.826	86
25-29	53	23	1.140	0.868	230
30-34	57	11	1.200	0.667	518
35-39	42	10	0.954	1.176	420
40-44	31	6	0.984	0.750	517
45-49	21	6	0.954	1.333	350
50-54	12	3	0.857	1.000	400
55-59	7	0	0.778	-	-
60-64	6	0	1.714	-	-
65-69	0	0	-	-	-
70-74	0	0	-	-	-
75+	0	0	-	-	-
TOTAL Kano	59,371	29,218	2.33	2.31	17022
West Kano	45.95	49.62	7.99	15.01	6847

Source: Oshida, S.H. - Ph.D. Thesis, 1963.

TABLE 19

LAND USE DATA - WEST KANO

Sub-Location	Area 1969	Population Density	% of Uncultivable Land	% of Arable Land	Land for Settlement and Grazing
	Sq. Km.	per Sq. Km.			
Bwanda	47	114	25	25	50%
Kochieng'	29	214	0	25	75%
Nyamware	21	333	50	25	25%
Kawino	15	236	33	33	34%
Source: District Agricultural Office, Kisumu.					
Kabar	31	74	9	10	
Sidho-East	TABLE 20	70	7	7	
Sidho-West	21	73	7	11	
Mangaya II	A GENERAL LAND USE DATA		6	13	
Makola	19	79	6	13	

Location	% of Total Area Under Crops	% of Unimproved Pasture Area	% of Scrub-land	% of Fresh Water Swamps	Total Acreage
East Kano	59.16	29.16	9.33	2.31	113912
West Kano	45.95	40.62	7.90	13.41	66847

Source: Ominde, S.H. - Ph.D. Thesis, 1963.

TABLE 21

TABLE 22

MARITAL STATUS - KANO LOCATIONS

MARITAL STATUS - KANO LOCATIONS

Sub-Location	% of Total Population Sampled in Each Sub-Location			% of Total Males who are Polygynous
	Single	Married	Others	
Bwanda	4	91	5	37
Kochieng'	22	74	4	10
Nyamware:oro	23	69	8	2
Kawino:li?	8	76	16	9
Kabar:	21	74	5	10
Sidho-East	23	70	7	7
Sidho-West	21	72	7	11
Wangaya II	18	76	6	15
Kakola	15	79	6	13

WINGE 23

TABLE 22

EDUCATIONAL STANDARDS IN KANO LOCATIONS

MARITAL STATUS - SUGAR-BELT SUB-LOCATIONS

Sub-Location	Illiterate	Primary Education	Secondary Education	Post-Secondary	% of Total Males who are Polygynous
	Number %	Number %	Number %	Number %	
Brandu	% of Total Population Sampled in Each Sub-Location				% of Total Males who are Polygynous
Evungare	Single	Married	Others		
God-Abuoro	4024 61	276 39	- 0	0 10	
Chemelil	7612 62	475 34	134 3	0 16	
Koruo-East	5339 52	458 40	34 5	2 40	
Muhoronisi	4212 61	272 38	160 0	0 40	
Kokels	29 43	33 48	4 5	1 1	
Others	- Widowers/Widows + Divorcees				

TABLE 23

EDUCATIONAL STATUS IN KANO LOCATIONS

Sub-Location	Illiterate		Primary Education		Secondary Education		Post-Secondary	
	Number	%	Number	%	Number	%	Number	%
Bwanda	44	57	29	38	2	2	2	2
Kochieng'	43	46	42	45	7	7	2	2
Nyanwareion	60	56	39	36	8	7	0	0
Kawino	40	61	26	39	0	0	0	0
Kabar	76	62	42	34	4	3	0	0
God-Muware	3	20	20	62	2	7	1	3
Sidho-East	53	52	41	40	6	5	2	2
Chemelal	52	33	72	46	7	3	25	26
Sidho-West	43	61	28	39	0	0	0	0
Kork	46	57	31	38	4	4	0	0
Wangaya II	46	56	34	41	0	0	2	2
Muhorani	61	47	64	47	3	5	1	2
Kakola	29	43	33	48	4	5	1	1

TABLE 25

TABLE 24

OCCUPATIONAL STATUS -- KAKO LOCATIONS

EDUCATIONAL STATUS IN THE SUGAR-BELT

Sub-Location	Unskilled		Skilled		No Monthly Income (Salary)			
	Number	%	Number	%	Number	%		
	Illiterate		Primary Education		Secondary Education		Post-Secondary Education	
Kochieng'	Number	%	Number	%	Number	%	Number	%
Nyanura	106	93	2	2	2	2	1	1
God-Abuoro	8	28	28	62	2	7	1	3
Chemelil	52	33	72	46	7	3	25	26
Koru	46	57	31	38	4	4	0	0
Muhoroni	64	47	64	47	8	6	1	1
Mangaya II	50	98	2	2	2	70	93	
Kakola	67	100	0	0	62	92		

TABLE 25

KANO STATE

OCCUPATIONAL STATUS - KANO LOCATIONS

OCCUPATIONAL STATUS - KANO LOCATIONS

Sub-Location	Unskilled		Skilled		No Monthly Income (Salary)	
	Number	%	Number	%	Number	%
Bwanda	77	100	0	0	75	97
Kochieng'	91	97	3	3	86	91
Nyamware	106	98	2	2	102	94
Kawinoro	62	94	4	6	56	85
Kabar	114	99	1	1	115	94
Sidho-East	98	106	4	4	90	88
Sidho-West	71	100	10	10	69	97
Wangaya II	80	98	2	2	78	95
Kakola	67	100	0	0	62	92

TABLE 26

OCCUPATIONAL STATUS - THE SUGAR-BELT

YEAR	TOTAL	Mestizo		Wasa		Total	%	M	F
		N	%	N	%				
1910-1909	39	17	43	17	43	1	1	0	0
1910-1919	79	13	16	20	26	17	21	0	0
1920-1929	113	19	17	42	37	41	35	3	3
1930-1939	147	31	21	30	20	62	42	15	15
1940-1949	255	63	25	76	30	149	58	45	45
1950-1959	501	119	24	127	25	247	49	92	92
1960-1969	485	155	32	103	21	258	53	60	60
1970-1973	195	162	83	39	20	191	98	42	42

Sub-Location	Mestizo	Wasa	Total	%	No Monthly Income (Salary)	
					Number	%
God-Abuoro	27	5	32	93	23	79
Chemelil	130	83	213	83	12	8
Koru	81	42	123	86	70	86
Muhoroni	121	43	164	65	89	65

TABLE 27

RETROSPECTIVE DATA ON BIRTHS

YEAR	TOTAL	West Kano		East Kano			% of Total		Sugar-Belt			
		M	F	Total	M	F	Total	West Kano	East Kano	Total	M	F
1900-1909	39	17	8	25	9	5	14	(64.10)	35.9	1	1	0
1910-1919	79	13	20	33	26	20	46	41.8	58.2	17	17	0
1920-1929	118	19	24	43	42	33	75	36.4	63.6	41	33	8
1930-1939	147	31	44	75	36	36	72	51.0	49.0	62	46	16
1940-1949	255	65	72	137	76	42	118	53.7	46.3	140	94	46
1950-1959	501	119	145	264	127	110	237	52.7	47.3	167	75	92
1960-1969	485	156	119	275	103	107	210	56.7	43.3	124	64	60
1970-1973	195	161	54	115	38	42	80	59.0	41.0	50	27	40

736

711

676

600

655

654

676

665

618

606

CHILDREN
BORN PER
1000 WOMEN

STATISTICS OF THE GOVERNMENT OF NIGERIA

TABLE 28

CHILD-WOMAN RATIO FOR KANO LOCATIONS

TABLE 29

CHILD-WOMAN RATIO Sub-Location	Total Number of Women Aged 15-49	Total Number of Children Aged 0-4	Child-Woman Ratio per 1000 Women
Bwanda	36	37	1028
Kochieng' Nyamware Sub-Location Kawino	43 Total No. 44 of No. 36 Aged 15-49	35 Total No. 35 of Child. 35 Aged 0-4	814 795 972
Kabar	55	25	454
Sidho-East	30	13	1433
Sidho-West	30	21	1070
Wangaya II	37	25	676
Kakola	28	20	5714
ALL	1339	246	6726

TABLE 29

CHILD-WOMAN RATIO DATA FOR THE SUGAR-BELT AREAS

Sub-Location	Total Number of Women Aged 15-49		Total Number of Children Aged 0-4		Child-Woman Ratio per 1000 Women
	East	West	East	West	
God-Abuoro	11	0	18	0	1636
Chemelil	24	0	24	0	1000
Koru	33	0	9	0	272
Muhoroni	50	0	28	0	560
ALL	118	0	79	0	669

Year	Total
1907-1909	0
1910-1919	4
1920-1929	2
1930-1939	31
1940-1949	69
1950-1959	109
1960-1969	181
1970-1973	82

Age-Group	0-1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
Female	21	53	55	63	71	74	80	86	90	95	100	105	110	114	118	122	126
<u>RETROSPECTIVE DATA ON MORTALITY</u>																	
Male	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

YEAR	TOTAL	West Kano			East Kano			% of Total		Sugar-Belt		
		M	F	Total	M	F	Total	West Kano	East Kano	Total	M	F
1900-1909	0	0	0	0	0	0	0	0.0	0.0	0	0	0
1910-1919	4	0	2	2	1	1	2	50.0	50.0	0	0	0
1920-1929	2	1	1	2	0	0	0	100.0	0.0	0	0	0
1930-1939	31	5	0	5	21	5	26	16.1	83.9	1	0	1
1940-1949	69	10	19	29	22	18	40	42.0	58.0	3	1	2
1950-1959	109	32	16	48	31	30	61	44.0	56.0	15	3	12
1960-1969	181	40	36	76	61	44	105	42.0	58.0	41	11	30
1970-1973	83	21	25	46	20	17	37	55.4	44.6	40	8	32

1900-1909	0	0	0	0	0	0	0	0.0	0.0	0	0	0
1910-1919	4	0	2	2	1	1	2	50.0	50.0	0	0	0
1920-1929	2	1	1	2	0	0	0	100.0	0.0	0	0	0
1930-1939	31	5	0	5	21	5	26	16.1	83.9	1	0	1
1940-1949	69	10	19	29	22	18	40	42.0	58.0	3	1	2
1950-1959	109	32	16	48	31	30	61	44.0	56.0	15	3	12
1960-1969	181	40	36	76	61	44	105	42.0	58.0	41	11	30
1970-1973	83	21	25	46	20	17	37	55.4	44.6	40	8	32

TABLE 31

RETROSPECTIVE DATA ON DEATHS -- MALES ONLY

Age-Group	Total Deaths	West Kano		East Kano		Sugar-belt	
		Number	%	Number	%	Number	%
0-1	91	36	39.56	51	56.04	4	4.40
1-4	83	45	54.22	31	37.35	7	8.43
5-9	15	8	53.33	4	26.67	3	20.00
10-14	8	7	87.50	0	-	1	12.50
15-19	1	1	100.00	0	-	0	-
20-24	4	4	100.00	0	-	0	-
25-29	4	2	50.00	0	-	2	50.00
30-34	6	4	66.67	0	-	2	33.33
35-39	10	0	-	8	80.00	2	20.00
40-44	6	5	83.33	1	16.67	0	-
45-49	0	0	-	0	-	0	-
50-54	5	2	40.00	3	60.00	0	-
55-59	4	2	50.00	2	50.00	0	-
60-64	6	5	83.33	1	16.67	0	-
65-69	0	0	-	0	-	0	-
70-74	2	1	50.00	1	50.00	0	-
75+	0	0	-	0	-	0	-

TABLE 32

RETROSPECTIVE DATA ON DEATHS - FEMALES ONLY

Age-Group	Total Deaths	West Kano		East Kano		Sugar-belt	
		Number	%	Number	%	Number	%
0-1	81	32	39.51	47	58.02	2	2.47
1-4	103	37	35.92	44	42.72	22	21.36
5-9	15	7	46.67	3	20.0	5	33.33
10-14	3	2	66.67	0	-	1	33.37
15-19	15	4	26.67	0	-	11	73.33
20-24	40	4	10.00	3	7.50	33	82.50
25-29	15	5	33.33	0	-	10	66.67
30-34	14	3	21.43	3	21.43	8	57.14
35-39	2	0	-	2	100.00	0	-
40-44	4	2	50.0	1	25.0	1	25.0
45-49	0	0	-	0	-	0	-
50-54	1	1	100.0	0	-	0	-
55-59	2	2	100.0	0	-	0	-
60-64	0	0	-	0	-	0	-
65-69	0	0	-	0	-	0	-
70-74	0	0	-	0	-	0	-
75+	0	0	-	0	-	0	-

A = Weather
 B = Agricultural Output
 C = Food Supply
 D = Purchases of Goods
 E = Health Facilities

TABLE 33

ENVIRONMENTAL PERCEPTION DATA (I)

WEST-KANO

Items	Bwanda	Kochieng'	Nyamware	Kawino
A	+35	+4	+78	-97
B	+53	+13	+63	+100
C	+61	+52	+2	-100
D	+87	+76	-39	-100
E	+74	-	-11	+100

EAST KANO

Items	Kabar	Sidho-East	Sidho-West	Wangaya II	Kakola
A	-28	+53	-34	+56	-4
B	-72	-23	-74	-73	-40
C	-74	-43	-100	-83	-49
D	-80	-22	-100	-85	-61
E	-80	-25	-58	-83	+16

SUGAR-BELT

Items	God-Abuoro	Chemelil	Koru	Muhoroni
A	+90	+100	+31	+12
B	+10	+36	+33	+32
C	-13	-28	+11	-1
D	-24	-40	+26	-26
E	-3	-3	-1	-61

NB: A = Weather
 B = Agricultural Output
 C = Food Supply
 D = Purchases of Goods
 E = Health Facilities

TABLE 34

ENVIRONMENTAL PERCEPTION DATA (II)

KANO LOCALITIES

WEST KANO

Items	Bwanda	Kochieng'	Nyamware	Kawino
A	-95	-94	-89	-100
B	-95	-83	+44	-18
C	-95	-94	-58	-100
D	-95	+7	+2	+100
E	-92	-81	-70	-100

Kochieng'	<u>EAST KANO</u>	146	90.60	11	7.01
Nyamware	131	131	100.0	-	-

Items	Kabar	Sidho-East	Sidho-West	Wangaya II	Kakola
A	-100	-71	-58	-88	-94
B	+20	-8	-83	+5	-70
C	-88	-	-21	-68	+1
D	-84	-23	-89	-68	+1
E	-84	-33	-100	-64	-70

Sidho-West	<u>SUGAR-BELT</u>	71	100.0	-	-
Wangaya II	71	70	98.60	-	-

Items	God-Abuoro	Chemelil	Koru	Muhoroni
A	-38	-69	-75	-43
B	+93	-32	+93	+80
C	+17	+69	+100	+100
D	+38	-100	-16	-2
E	-38	-86	-9	+13

NB: A - Diseases and Illness D - Lack of
 B - Floods Education Facilities
 C - Drought E - Lack of Job Opportunities
 information on the period of residence in the
 area after birth.

TABLE 35

CHILDREN PLACE-OF-BIRTH

KANO LOCATIONS

CHILDREN PLACE-OF-BIRTH

Sub-Location	Total Number of Children	Born in Home Area		Born Elsewhere	
		Number	%	Number	%
Bwanda	164	147	89.63	17	10.37
Kochieng	157	146	92.99	11	7.01
Nyamware	131	131	100.0	-	-
Kawino	126	126	100.0	-	-
Mad-Aluora	52	14	26.92	38	73.05
WEST KANO	578	550	95.16	28	4.84
Koru	56	11	19.64	45	80.36
Kabar	162	162	100.0	-	-
Sidho-East	65	51	78.46	14	21.54
Sidho-West	71	71	100.0	-	-
Wangaya II	71	70	98.60	1	1.40
Kakola	71	64	90.14	7	9.86
EAST KANO	440	418	95.00	22	5.00
KANO LOCATIONS	1018	965	94.80	50	5.2

NB: a) The retrospective data on births given by women are for the period of residence in the area of birth of the children aged only (15-49) and covers only children who are still alive.

b) Place-of-birth information is reinforced by information on the period of residence in the area after birth.

TABLE 37

TABLE 36
MIGRANT CHILDREN BY BIRTH LOCATIONS

CHILDREN PLACE-OF-BIRTH					
Sub-Location	Total Number of Children Still Alive	Total Number of out-Migrant Children		% of out-Migrant Children	
Kenia	264	21		8.0	
Kocheng'	157	20		12.7	
Wamango	22	15		68.2	
Sub-Location Nanyo	106	40		37.7	
		Number	%	Number	%
TOTAL (WORLD BANK)	278	66	23.7	212	76.3
God-Abuoro	52	14	26.92	38	73.05
Chemelil	38	15	39.47	23	60.53
Nanyo	162	35	21.6	127	78.4
Koru	56	11	19.64	45	80.36
Muhoroni	148	14	9.46	134	90.54
SUGAR-BELT	294	54	18.37	240	81.63
TOTAL (WORLD BANK)	440	66	15.0	374	85.0

NOTE: a) The retrospective data on births given by women aged only (15-49) and covers only children who are still alive.

b) Place-of-birth information is reinforced by information on the period of residence in the area after birth.

TABLE 37

MIGRANT CHILDREN IN KANO LOCATIONS

Sub-Location	Total Number of Children Still Alive	Total Number of out-Migrant Children	% of out-Migrant Children
Bwanda	164	33	20.1
Kochieng'	157	20	12.7
Nyamware Sub-Location	131 Number of Children Still Alive	Total Number of 16	12.2
Kawino	126	19	15.1
TOTAL (West Kano) Gad-abnoro	578 52	88	15.2 7.7
Chemall	38	2	5.3
Kabar	162	36	22.2
Koru	56	10	19.6
Sidho-East	65	10	15.4
Sidho-East	71	13	18.3
Wangaya II	71	13	18.3
Kakola	74	6	8.4
TOTAL (East Kano)	440	68	15.45
KANO LOCATIONS	1018	156	15.3

TABLE 38
MIGRANT CHILDREN IN SUGAR-BELT

Sub-Location	Total Number of Children Still Alive		Total Number of Out-Migrant Children		% of Out-Migrant Children
	Male	Female	Number	%	
God-Abuoro	52	28	25	39.4	7.7
Chemelil	38	2	39	41.4	5.3
Koru	56	11	58	46.1	19.6
Muhoroni	148	11	19	28.7	7.4
TOTAL	294	28	135	39.1	9.5

cont...

Kaber	122	59	48.36	8	6.56	TABLE 39	54.92	3	2.45	52	42.53			
Sidho-East	102	45	44.12	15	14.71	60	58.82	14	13.69	23	27.49			
Sidho-West	71	36	50.70	8	11.26	44	61.97	1	1.41	26	36.63			
Wangaya II	62	39	47.58	8	9.75	47	57.31	4	4.86	31	37.81			
Kakola	67	26	38.81	ADULT POPULATION - KANO LOCATIONS								7.40	30	44.73

East Kano	444	205	46.2	45	10.0	250	56.3	27	6.1	167	37.6
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KANO LOCATIONS	700 Adult Population Enumerated	340 Adult Population Born at Home 9.2				415 Total Adults Born at Home 2.3		33 Adult Population Born Elsewhere 3.5			
		Males		Females		at Home		Males		Females	
		Number	%	Number	%	Number	%	Number	%	Number	%
Bwanda	77	25	32.47	3	3.90	28	36.36	2	2.6	47	61.4
Kochieng'	94	39	41.49	6	6.38	45	47.87	2	2.13	47	49.98
Nyamware	108	52	48.15	13	12.04	65	60.19	0	-	43	39.81
Kawino	66	19	28.79	6	9.09	25	37.98	2	3.02	39	59.08
West Kano	345	135	39.10	28	8.10	163	47.20	6	1.70	176	51.0

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cont...

Kabar	122	59	48.36	8	6.56	67	54.92	3	2.46	52	42.63
Sidho-East	102	45	44.12	15	14.71	60	58.82	14	13.68	28	27.49
Sidho-West	71	36	50.70	8	11.26	44	61.97	1	1.41	26	36.63
Wangaya II	82	39	47.58	8	9.75	47	57.31	1	4.86	31	37.81
Kakola	67	26	38.81	6	8.95	32	47.76	5	7.46	30	44.78
East Kano	444	205	46.2	45	10.0	250	56.3	27	6.1	167	37.6
KANO LOCATIONS	789	340	43.1	73	9.2	413	52.3	33	4.2	343	43.5
Location	Number	Males		Females		Total		Males		Females	
		Number	%	Number	%	Number	%	Number	%	Number	%
God-Amyere	29	0	0	0	0	0	0.0	18	62.07	11	37.93
Chenali	155	1	0.64	1	0.64	2	1.28	131	83.97	23	14.72
Kore	81	2	2.47	3	3.70	5	6.17	16	19.75	30	36.99
Hakwara	137	-	-	-	-	-	-	32	23.36	55	39.71
SUGAR-BEAT	403	3	0.74	4	0.99	7	1.70	277	68.70	119	29.3

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TABLE 40

ADULT POPULATION - SUGAR-BELT

(KANO LOCATIONS ONLY)

Sub-Location	Adult Population Enumerated	Adult Population Born at Home				Total Adults Born at Home		Adult Population Born Elsewhere			
		Males		Females		Males		Females			
		Number	%	Number	%	Number	%	Number	%		
God-Abuoro	29	0	0	0	0	12	0.40	18	62.09	31	37.95
Chemelion	156	1	0.64	21	13.46	15	9.62	131	83.97	23	14.72
Koru	81	2	2.47	3	3.70	5	6.17	46	56.75	30	36.99
Muhoroni	137	-	-	1	0.73	10	7.30	82	59.85	55	40.15
SUGAR-BELT	403	3	0.74	34	8.44	47	11.66	277	68.70	119	29.5

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TABLE 41

Fabar	62	60	0	-	21	35.0	3	4.8	31	51.7
Sidho-East	59	43	6	10.2	13	30.2	8	13.6	15	34.9
Sidho-West	37	34	1	<u>PLACE-OF-BIRTH DATA</u>			-	-	8	23.5
Wangaya II	43	39	2	4.7	16	41.0	2	4.6	15	38.7
Kakola	31	35	0	<u>(KANO LOCATIONS: ONLY)</u>			5	16.1	14	38.8
Kano	252	212	9	3.9	84	39.6	18	7.7	63	39.2
	Born in other Sub-Locations of Kano Locations						Born Outside Kano Locations			
Sampled Sub- Locations	Adult Males Enumer- ated	Adult Females Enume- rated	Males		Females		Males		Females	
			Number	%	Number	%	Number	%	Number	%
Bwanda	27	50	0	-	12	24.0	2	7.4	38	76.0
Kochieng'	41	53	2	4.9	15	28.3	-	-	32	60.4
Nyamware	52	56	0	0.0	6	10.7	-	-	37	66.1
Kawino	21	45	1	4.8	10	22.2	1	4.8	29	64.4
West Kano	141	204	3	2.1	43	21.1	3	2.1	136	66.7

cont...

Kabar	62	60	0	-	21	35.0	3	4.8	31	51.7
Sidho-East	59	43	6	10.2	13	30.2	8	13.6	15	34.9
Sidho-West	37	34	1	2.7	18	52.9	-	-	8	23.5
Wangaya II	43	39	2	4.7	16	41.0	22	4.6	15	38.7
Kakola	31	36	0	-	16	44.4	5	16.1	14	38.8
East Kano	232	212	9	3.9	84	39.6	18	7.7	83	39.2

Sampled Sub-locations	within the Sugar-belt									
	Adult Males Number-rated	Adult Females Number-rated	Males		Females		Males		Females	
			Number	%	Number	%	Number	%	Number	%
Gadabuwo	10	11	0	-	0	-	10	100.0	11	100.0
Chacchil	132	24	2	1.5	7	-	130	98.5	24	100.0
Fara	45	33	1	2.2	1	3.0	45	92.7	29	87.9
Makunt	22	55	1	4.5	1	1.8	21	95.5	54	98.2
MSU-SUMT	280	123	4	1.4	2	1.6	274	97.8	118	95.9

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TABLE 42

PREVIOUS PLACE-OF-RESIDENCE
PLACE-OF-BIRTH DATA

(KANO (SUGAR-BELT))

Sampled Sub-Locations	Previous Place-of-Residence Born in other Sub-Locations within the Sugar-belt						Previous Place of Residence Outside Kano			
	Adult Males Enumerated	Adult Females Enumerated	Males		Females		Males		Females	
			Number	%	Number	%	Number	%	Number	%
God-Abuoro	18	11	0	0.0	0	0.0	18	100.0	11	100.0
Chemelil	132	24	2	1.5	0	0.0	130	98.5	24	100.0
Koru	48	33	1	2.1	1	3.0	45	93.7	29	87.9
Muhoroni	82	55	1	1.2	1	1.8	81	98.9	54	98.2
SUGAR-BELT	280	123	4	1.4	2	1.6	274	97.8	118	95.9

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TABLE 43

		PREVIOUS PLACE-OF-RESIDENCE									
		(KANOLLOCATIONS)					Other Sub-Locations				
		of Kano Location					of Residence Outside Kano				
Sampled Sub-Locations	Total	Adult Males Enumerated		Adult Females Enumerated		Males		Females		Total	
		Number	%	Number	%	Number	%	Number	%	Number	%
	62	60	-	-	19	31.7	2	4.8	33	53.0	
Higho-West	59	43	6	13.9	15	25.4	4	6.8	19	31.9	
Higho-East	37	34	2	5.9	15	24.9	-	-	7	20.6	
Higho-N	43	30	1	2.9	20	33.7	1	2.3	11	23.0	
Total	201	147	3	6.5	49	33.3	7	9.7	70	34.8	
West Kano	232	212	5	3.5	46	21.7	11	3.5	124	57.8	
Bwanda	27	50	1	3.7	12	24.0	-	-	32	64.0	
Kochieng	41	53	2	4.8	14	26.4	2	4.8	26	49.1	
Nyamware	52	56	11	1.9	9	16.1	-	-	35	62.5	
Kawino	21	45	1	4.8	11	24.4	3	14.3	31	68.9	
West Kano	141	204	5	3.5	46	22.5	5	3.5	124	60.8	

cont...

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TABLE 44

		PRIV	COOP	PL	SE-UP-	RESIDE	AGE				
Kabar	62	60	-	-	19	31.7	3	4.8	33	55.0	
Sidho-East	59	43	6	10.2	15	34.9	4	6.8	15	34.9	
Sidho-West	37	34	1	2.7	18	52.9	-	-	7	20.6	
Wangaya II	43	39	1	2.3	20	51.3	1	2.3	11	28.20	
Kakola	31	36	2	6.5	19	52.8	3	9.7	11	30.6	
East Kano	232	212	10	4.3	91	42.9	11	4.7	77	36.3	

Sub- Locations	AGRIC		Males		Females		Males		Females	
	Enumerated	Enumerated	Number	%	Number	%	Number	%	Number	%
God-Buoro	13	11	0	0	11	100.0	11	100.0	11	100.0
Ghemil	132	24	3	6.1	-	-	124	93.9	24	100.0
Karu	48	33	1	2.1	1	3.0	47	97.9	32	96.9
Mahanzai	102	55	1	2.4	1	1.9	80	97.6	54	98.2
	380	123	11	2.9	13	10.6	269	96.1	122	98.4

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TABLE 45

TABLE 44

PREVIOUS PLACE-OF-SETTLEMENT DATA FOR KANG LOCATIONS

PREVIOUS PLACE-OF-RESIDENCE DATA												
		(SUGAR-BELT)				Period of Settlement Elsewhere						
Sub-Location		Number of Persons in other Sub-Locations of the Sugar-belt				Less than 10 Years		Previous Place-of-Residence Outside the Sugar-belt				
Sampled Sub-Locations	Enumerated	Adult Males	Adult Females	Males		Females		Males		Females		
		Enumerated	Enumerated	Number	%	Number	%	Number	%	Number	%	
God-Aburo	18	66	11	0	0	11	100.0	18	100.0	6	11	100.0
Chemelil	32	24		8	6.1	-	-	124	93.9	24		100.0
Koru	48	345	33	1	2.1	1	3.0	47	97.9	6	32	96.9
Muhoroni	82		55	2	2.4	1	1.8	80	97.6	54		98.2
	280	123		11	3.9	13	10.6	269	96.1	121		98.4

cont...

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TABLE 45

PREVIOUS PLACE-OF-SETTLEMENT DATA FOR KANO LOCATIONS

Sub-Location	Number of Persons Interviewed	Number of Persons Previously Residents Elsewhere	Less than 10 Years		Over 10 Years	
			Number	%	Number	%
Kabar	122	55	5	4.1	50	40.9
Sidho-West	71	26	-	-	26	36.7
Mangaya II	82	32	-	-	26	26.6
Makola	102	40	-	-	25	24.3
Total	387	153	5	1.3	127	32.6
Kano Locations	789	369			171	41.2
Ewanda	77	43	-	-	43	55.8
Kochieng'	97	44	2	2.1	42	43.3
Nyamware	108	45	1	0.9	44	40.7
Kawino	66	46	4	6.1	42	63.6
WEST KANO	345	178	7	2.02	171	49.6

cont...

TABLE 46

Kabar	122	55	5	4.1	50	40.9
Sidho-East	71	26	-	-	26	36.6
Sidho-West	82	35	-	-	35	42.3
Wangaya II	67	35	-	-	35	52.2
Kakola						
EAST KANO	444	191	8	1.8	183	41.2
Kano Locations	789	369	15	1.9	354	44.9
	Interviewed	Residents Elsewhere	Less than 10 Years		Over 10 Years	
			Number	%	Number	%
God-Aworo	29	29	19	65.5	10	34.5
Gecheli	156	156	116	74.4	40	25.6
Koro	81	81	7	8.6	74	91.4
Makroni	137	137	9	6.6	128	93.4
EUCAR-BNLT	403	403	151	37.5	252	63.5

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TABLE 46

PREVIOUS PLACE-OF-SETTLEMENT DATA FOR SUGAR-BELT LOCATIONS

Sub- Locations	Total Number of Persons Interviewed	Number of Adult Persons Previously Residents Elsewhere	Period of Settlement Elsewhere			
			Less than 10 Years		Over 10 Years	
			Number	%	Number	%
God-Aburo	293	29	19	65.5	10	34.5
Chemelil	156	156	116	74.4	40	25.6
Koru	81	81	7	8.6	74	91.4
Muhoroni	137	137	9	6.6	128	93.4
SUGAR-BELT	403	403	151	37.5	252	63.5

TABLE 47

Sub-Location	PERIOD OF SETTLEMENT - KANO LOCATIONS				108	88.5
	102	60	12	11.0		
Sidho-East	71	44	10	14.1	61	85.9
Sidho-West	82	47	15	18.3	67	81.7
Wangaya II	67	32	11	16.4	56	83.6
Kakola						
EAST KANO	444	250	62	14.2	188	86.0
Sub-Location	Total Number of Persons Interviewed	Number of Adult Persons Born At Home	Period of Settlement			
			Less than 10 Years		More than 10 Years	
			Number	%	Number	%
Bwanda	77	28	16	20.8	61	79.2
Kochieng'	97	45	18	18.6	76	78.3
Nyamware	108	65	14	13.0	94	87.0
Kawino	66	25	15	22.7	50	75.8
WEST KANO	345	163	63	18.3	281	81.4

TABLE 46

Kabar	122	67	14	11.5	108	88.5
Sidho-East	102	60	12	11.8	90	88.2
Sidho-West	71	44	10	14.1	61	85.9
Wangaya II	82	47	15	18.3	67	81.7
Kakola	67	32	11	16.4	56	83.6
EAST KANO	444	250	62	14.0	382	86.0
Sub-Kano Locations	Number of Fex 789ms	Adult Persons 100%	125ms 10 Y	15.8	663ms 10 Y	84.0
			Number	%	Number	%
Mad-Abuoro	29	0	29	96.6	1	3.4
Chemelil	156	2	118	75.6	36	24.4
Koru	81	5	69	85.2	12	14.8
Muhoroni	137	0	108	78.8	29	21.2
SUGAR-BELF	403	7	323	80.1	80	19.8

TABLE 48
PERIOD OF SETTLEMENT FOR THE SUGAR-BELT

Sub-Location	Total Number of Persons Interviewed	Number of Adult Persons Born at Home		Period of Settlement			
				Less than 10 Years		Over 10 Years	
		Number	%	Number	%	Number	%
God-Abuoro	29	0	0.0	28	96.6	1	3.4
Chemelil	156	2	1.3	118	75.6	38	24.4
Koru	81	5	6.2	69	85.2	12	14.8
Muhoroni	137	0	0.0	108	78.8	29	21.2
SUGAR-BELT	403	7	1.7	323	80.1	80	19.8

SUGAR-BELT SETTLEMENT FOR THE SUGAR-BELT

TABLE 48

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TABLE 49

SOURCES OF IN-MIGRANTS TO THE SUGAR-BELT

District	Total Population	Percentage of total Population
Kisumu	221	57.40
Siaya	49	12.73
S. Nyanza	38	9.87
Kakamega	13	3.38
Kisii	12	3.11
Kericho	4	1.04
Bungoma	3	0.78
Busia	3	0.78
Others	42	10.91
TOTAL	221	100.00
TOTAL	385	100.00

TABLE 50

SOURCES OF IN-MIGRANTS TO THE SUGAR-BELT

KANO LOCATIONS

Location		Total Population		Percentage of total Population		Absolute	%
Sub-Location	Population 1962	Population 1969	Absolute Change	Population 1962	Population 1969	Population Change	Population Change
East Kano	137	62	-75	28.05	13.7	-123	-89.5
Kisumu Town	87	35	-52	15.84	8.7	-79	-90.8
Wanda	87	114	+27	31.0	132	+45	15.8
West Kano	137	214	+77	15.38	262	+125	22.4
North Nyakach	165	333	+168	110.86	410	+245	23.1
Masingo Kolua	165	236	+71	43.0	272	+107	15.3
South Nyakach		12		5.43			
Kajulu	202	283	+81	40.7.69	333	+131	17.7
Siho-East	149	161	+12	8.0	183	+34	13.7
Kisumu West	149	16	-133	7.24		-133	-91.3
Siho-West	100	113	+13	13.0	127	+27	12.4
Wagaya II	78	83	+5	6.4	297	+219	29.4
T O T A L		221	+5	100.00			
Karola	200	212	+12	6.0	242	+42	14.1

TABLE 51

INTERCENSAL POPULATION DENSITY CHANGE

KANO LOCATIONS

Sub-Location	Population Density 1962	Population Density 1969	Absolute Population Change	% Population Change	Population Density 1973	Absolute Population Change	% Population Change
Bwanda	87	114	+27	31.0	132	+18	15.8
Kochieng'	137	214	+77	56.2	262	+48	22.4
Nyamware	284	333	+49	17.2	410	+77	23.1
Kawino	165	236	+71	43.0	272	+36	15.3
Muhoroni	124	128	+4	+3.2	131	+3	2.3
Kabar	202	283	+81	40.1	333	+50	17.7
Sidho-East	149	161	+12	8.0	183	+22	13.7
Sidho-West	100	113	+13	13.0	127	+14	12.4
Wangaya II	78	83	+5	6.4	207	+124	149.0
Kakola	200	212	+12	6.0	242	+30	14.1

TABLE 52

INTERCENSAL POPULATION DENSITY CHANGE

FOR KANO LOCATIONS
SUGAR-BELT

Sub-Location	Population Density 1962	Population Density 1969	Absolute Population Change	% Population Change	Population Density 1973	Absolute Population Change	% Population Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
God-Abuoro	114	127	+13	+11.4	154	+27	21.2
Buranda	109	94	-15	-13.8	79	-15	-6.0
Chemelil	82	83	+1	+1.2	89	+6	7.2
Kochere	109	94	-15	-13.8	108	+14	+4.9
Korumbi	187	1091	+4	+4.6	10294	+2+3	+3.3
Muhoroni	124	128	+4	+3.2	131	+4+3	+4.2.3
Kabar	107	105	-2	-1.90	93	-7	-6.7
Sidho-East	106	117	+11	+10.40	128	+11	+9.4
Sidho-West	101	101	-	-	92	-9	-8.9
Wangaya II	117	90	-27	-23.10	112	+22	+24.4
Kakola	112	95	-17	-15.12	102	+7	+7.4

Note: a) data for Column (1) extracted from the work of S.H. Omiade and P.F. Ojany.
 b) data for Column (2) computed from 1969 census report.
 c) data for Column (5) computed from sample survey information.

TABLE 53

INTERCENSAL SEX-RATIO CHANGE

FOR KANO-LOCATIONS

Sub-Location	Sex-Ratio for (1962) (1)	Sex-Ratio for (1969) (2)	Absolute Change (3)	% Change (4)	Sex-Ratio for (1973) (5)	Absolute Change (6)	% Change (7)
Bwanda	109	94	-15	-13.8	79	-15	-16.0
God-Abura	109	94	-15	-13.8	108	+14	+14.9
Kochieng'	102 ²	101	-1 ²	-0.98	102	+1	+0.99
Nyanware	103	100	-3	-2.91	86	-14	-14.05
Kawino		105	-	-	105	-	-
Kabar	107	105	-2	-1.90	98	-7	-6.7
Sidho-East	106	117	+11	+10.40	128	+11	+9.4
Sidho-West	101	101	-	-	92	-9	-8.9
Wangaya II	117	90	-27	-23.10	112	+22	+24.4
Kakola a)	112	95	-17	-15.12	102	-10	-9.8

S.H. Ominde and F.F. Ojany.

Note: a) data for Column (1) extracted from the work of S.H. Ominde and F.F. Ojany report.
 b) data for Column (2) computed from 1969 census report.
 c) data for Column (5) computed from sample survey information.

TABLE 54

**INTERCENSAL SEX-RATIO CHANGE FOR THE
(NATURAL LIGHT SUGAR-BELT LOCATIONS)**

Sub-Location	Sex-Ratio for (1962)	Sex-Ratio for (1969)	Absolute Change 1969	Percentage Change 1969-1962	Sex-Ratio for (1973)	Absolute Change	Percentage Change	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
God-Abuoro	*	157.5	-	5.1	164	+6.7	+4.5	
Chemelilwo	42	164.2	+122	+290.5	336	+172	+104.9	
KoruKowino	*	133.4	-	3.4	123	-10	-7.5	
Muhoroni	*	153.2	-	3.8	113	-40	-26.1	
Sidho-East		1.1		3.2		+2.2		
Sidho-West		2.2		3.0		+0.8		
Wangaya		* Information not available.					+1.2	

Note Kuka) data for Column (1) extracted from the work of S.H. Ominde and F.F. Ojany.

- b) data for Column (2) computed from 1969 census report.
- c) data for Column (5) computed from sample survey information.

TABLE 55

TABLE 56

INTERCENSAL POPULATION CHANGE

(NATURAL INCREASE) FOR KANO LOCATIONS

(NATURAL INCREASE) FOR THE SUGAR-BELT

Area	Percentage of Natural Increase 1962-1969	Percentage of Natural Increase 1969-1973	Difference
Bwanda	3.9	3.6	-0.3
Kochieng'wo	5.1	5.1	0.0
Nyanware	3.8	5.1	+1.3
Kawino	4.3	3.4	-0.9
Kabaroni	2.8	3.8	+1.0
Sidho-East	1.1	3.2	+2.1
Sidho-West	2.2	3.0	+0.8
Wangaya II	1.5	2.7	+1.2
Kakola	2.8	3.1	+0.3

TABLE 56

INTERCENSAL POPULATION CHANGE
 (NET INCREASE) FOR KANGI LOCATIONS
INTERCENSAL POPULATION CHANGE
 (NATURAL INCREASE) FOR THE SUGAR-BELT

Sub-Location	Net Increase 1962-69 Percentage of Natural Increase 1962-1969	Net Increase 1969-73 Percentage of Natural Increase 1969-1973	Absolute Difference
God-Abuoro Nyamuro	1.5	4.9	+3.4
Chemelil Kisiro	0.3	1.6	+1.3
Koru Kabar	0.7	1.3	+0.6
Muhoroni Sidha-East	0.3	0.9	0.3
Sidha-West	+ 4	+ 3	+ 1
Wangaya II	+ 2	- 2	0
Kahola	-12	- 1	-11

TABLE 57.

INTERCENSAL POPULATION CHANGE
(NET MIGRATION) FOR KANO LOCATIONS.

Sub-Location	Net Migrants 1962-69	Net Migrants 1969-73	Absolute Difference
Bwandauro	-93	+61	-2
Kochieng'	-33	-10	-7
Nyanware	+80	-6	-6
Kawinoni	-15	-0	-15
Kabar	+6	-1	+5
Sidho-East	+5	-4	+1
Sidho-West	+4	+3	+1
Wangaya II	+2	-2	0
Kakola	-12	-1	-11

TABLE 58

INTERCENSAL POPULATION CHANGE

(NET MIGRATION) FOR THE SUGAR-BELT

Sub-Location	Kano Locations		Sugar-Belt	
	Population 1962-69	Net Migrants 1962-69	Net Migrants 1969-73	Absolute Difference
God-Aburo	8733	+97128	0.0081	-11949
Chemelil	0.0711	-0.2799	0.2768	-0.8582
		+3	0	+3
	-0.5349	-0.7552	0.8835	-0.0065
Koru	0.4757	+23913	0.7637	-0.6054
Muhoroni	0.2609	+32561	0.4088	-0.9121
r12.4	0.9995	0.8198	0.3394	-0.1229
r12.3	0.9568	0.9278	0.8125	0.9997
r13.2	-0.8033	-0.8595	-0.7627	-1.0000
r13.4	0.1320	0.3100	0.0448	-0.2553
r14.2	-0.6539	-0.6347	0.8613	-0.0019
r14.3	-0.5431	-0.7613	0.8735	-0.4803
r23.4	0.5144	0.6890	0.9546	0.5638
r24.3	-0.3330	-0.6484	0.4099	-0.4661
r12.34	0.9782	0.8797	0.9986	0.9997
r13.24	-0.8826	-0.6140	-0.9982	-1.0000
r14.23	-0.8030	-0.5627	1.0000	-0.9355

TABLE 59

PARTIAL CORRELATION COEFFICIENTS

Sub-Loc	Kano Locations		Sugar-belt		Levels
	Periods 1973		Periods		
	1962-69	1969-73	1962-69	1969-73	
r12	0.8733	0.7128	0.4981	-0.1017	
r13	0.0711	-0.2759	0.2760	-0.8529	
r14	-0.5349	-0.7552	0.8835	-0.0066	
r23	0.4757	0.3913	0.9537	0.6061	
r24	-0.2609	-0.2561	0.3988	-0.5186	
r34	0.0749	0.5838	0.2896	-0.2750	
r12.4	0.8995	0.8198	0.3394	-0.1229	
r12.3	0.9568	0.9278	0.8125	0.9997	
r13.2	-0.8033	-0.8596	-0.7627	-1.0000	
r13.4	0.1320	0.3100	0.0448	-0.8889	
r14.2	-0.6530	-0.8447	0.8613	-0.0819	
r14.3	-0.5431	-0.7613	0.8736	-0.4803	
r23.4	0.5144	0.6890	0.9548	0.5638	
r24.3	-0.3380	-0.6484	0.4258	-0.4601	
r12.34	0.9782	0.8797	0.9986	0.9997	
r13.24	-0.8826	-0.6140	-0.9982	-1.0000	
r14.23	-0.8030	-0.5627	1.0000	-0.9355	

TABLE 60

POPULATION ESTIMATES

Sub-Locations Sub-Location	Estimated Population as at 1973	Annual Growth Rate Levels		
		4%	3.3%	3.0%
Ewanda	6,190	8,191	7,799	7,637
Kochieng'	7,605	10,064	9,582	9,382
Kawino	4,070	5,386	5,128	5,021
Nyamware	8,603	11,384	10,840	10,613
WEST KANO	26,468	35,025	33,349	32,653
Kabar-East	8,004	10,592	10,085	9,875
Kakola West	7,983	10,564	10,059	9,849
Sidho-East	4,945	6,544	6,231	6,101
Wangaya II	6,331	8,378	7,977	7,811
Wangaya II	3,485	4,612	4,391	4,299
EAST KANO	30,748	40,690	38,743	37,936
God-Abuoro		3,14	2.5%	2%
Muhoroni	7,625	9,407	9,082	8,770
Koru	4,896	6,040	5,832	5,631
God-Abuoro	3,543	4,371	4,220	4,075
SUGAR-BELT	22,017	27,162	26,225	25,323

TABLE 61

**ESTIMATED YEARS TAKEN FOR
POPULATION TO DOUBLE (1960)**

Sub-Location	1960	1965	Years	1970
Bwanda	49.9	49.3	19	50.0
Bwanda Kochieng'	51.0	50.0	14	50.0
Kochieng' Nyamware'	51.1	50.0	14	50.4
Nyamware Kawino	48.4	48.6	21	49.5
Kawino Kabar	52.0	50.3	18	50.0
Sidho-East	51.0	50.0	22	50.0
Sidho-West			23	
Kakola Wangaya II	46.0	46.0	26	46.0
Sidho-East Kakola	42.0	42.0	23	42.0
Sidho-West ALL SUB-LOCATIONS IN KANO	44.1	44.3	19	44.2
God-Abuoro	50.6	50.6	14	51.1
Chemelli			44	
EAST KANO Koru	45.6	47.3	54	48.0
God-Abuoro	41.6	56.1		49.0
Koru	41.6	31.4		35.0
Chemelli	37.0	19.2		28.1
Kakoroza	37.4	35.3		37.0
SUGAR-BELT	40.1	35.0		35.0

TABLE-62

**ESTIMATED PERCENTAGE OF CHILDREN
POPULATION (THOSE UNDER 15 YEARS)
UNDER DIFFERENT LEVELS OF
NATURAL POPULATION GROWTH**

Sub-Location	% in 1969	% in 1973	% in 1980
Bwanda	53.0	59.0	56.0
Sub-Location Kochieng'	51.1	50.0	51.4
Nyamware	48.4	42.6	45.5
Kawino	52.0	56.3	54.0
WEST KANO	51.0	52.0	54.0
Kabar	46.0	44.0	45.0
Sub-Location Sidho-East	43.0	23.0	33.0
Sidho-West	44.1	40.3	42.2
Wangaya II	44.5	40.0	42.1
Kakola	50.6	39.6	45.1
EAST KANO	45.6	37.3	41.4
God-Abuoro	41.6	56.1	49.0
Sub-Location Koru	44.6	31.4	38.0
Chemelil	37.0	19.2	28.1
Muhoroni	37.4	36.3	37.0
SUGAR-BELT	40.1	36.0	38.0

TABLE 63

ESTIMATED NUMBER OF CHILDREN AND
(THOSE AGED BELOW 15 YEARS)
UNDER DIFFERENT LEVELS OF
NATURAL POPULATION GROWTH

Sub-Location	Absolute Natural		Total Number of		Absolute Natural		Total	
	per 1000 1982-1985	1985	Interest 4% Birth Level-21 per annum	1985	3.3% Level per annum	1985	3.0% Level per annum	1985
Bwanda	51	4572	58	4353	51	4263	4	
Kochieng'	34	5073	48	4830	51	4729	4	
Nyamware	41	2448	54	2331	34	2283	3	
Kawino	26	6147	56	5854	33	5731	3	
SUGAR-BELT		18010	19	17148	34	16790	4	
Sidho-West	31		39		50		2	
Kabar		4750	25	4523	27	4429	2	
Wangaya II	1							
Sidho-East	2	3467	30	3301	31	3232	2	
Kakola		2763		2631		2576		
Wangaya II	27	3529	379	3360	330	3290	29	
TOTAL		2082		1982		1941		
EAST KANO	30	16858	42	16051	36	15716	44	
			3%		2.5%		2.0%	
God-Abuoro		4592		4434		4281		
Koru		2295		2216		2139		
Chemelil		1228		1185		1145		
Muhoroni		2705		2612		2522		
SUGAR-BELT		10303		99947		9605		

TABLE 64

INTERCENSAL POPULATION CHANGE AND

BIRTHS IN KANO LOCATIONS

Sub-Locations	Absolute Natural Change per 1000 1962-1969	Total Number of Intercensal Births 1962-1969	Absolute Natural Change per 1000 1969-1973	Total Intercensal Births 1969-1973
Bwanda MONO	39.5	59	36.9	44
Kochieng'	51.3	58	51.6	41
Nyamware	38	48	51	42
Kawino	43.7	54	34.1	35
Kabaroni	28.3	56	38.9	39
Sidho-East	11	19	32	16
Sidho-West	22.8	30	30.7	23
Wangaya II	15	25	27	25
Kakola	28.7	30.75	31.15	27.15
TOTAL	275	379	330	292
	$\bar{x}=30.56$	$\bar{x}=42.11$	$\bar{x}=36.67$	$\bar{x}=32.44$

TABLE 65

INTERCENSAL POPULATION CHANGE AND
BIRTHS IN THE SUGAR-BELT

Sub-Location	Absolute Natural Change per 1000 1962-1969	Total Number of Intercensal Births 1962-1969	Absolute Natural Change per 1000 1969-1973	Total Intercensal Births 1969-1973
K. God-Aburo	3015	208	349	12
K. Chemelil	51 3	94	516	18
K. Hyamwate	30	11	51	7
K. Koru	43 7	187	13	9
K. Muhoroni	20 3	218	309	130
TOTAL	3328	627	387	520
Kakola	$\bar{x} = 7.0$	$\bar{x} = 6.75$	$\bar{x} = 21.75$	$\bar{x} = 13$
TOTAL				
	$\bar{x} = 30.55$	$\bar{x} = 14.56$	$\bar{x} = 36.67$	$\bar{x} = 10.11$

TABLE 66

INTERCENSAL POPULATION CHANGE AND
DEATHS IN KANO LOCATIONS

Sub-Location	Absolute Natural Intercensal Change 1962-1969	Total Number of Intercensal Deaths 1962-1969	Absolute Natural Intercensal Change 1969-1973	Total Number of Intercensal Deaths
Bwanda	39	20 ³	36 ³	19 ³
Kochieng'	51	9 ⁰	51 ⁶	6 ¹
Nyamware	38	11 ²	51 ¹³	7 ³
Koru	43	18	34	16
Kawino	43	18	34	16
Kabar	28	23 ⁴	38 ⁵	8 ⁵
Sidho-East	11	10	32	0
Sidho-West	22	16 ⁹	30 ⁷	10 ⁴
Wangaya II	15	13	27	11
Kakola	$\bar{x} = 28$	$\bar{x} = 11.25$	$\bar{x} = 31.75$	$\bar{x} = 14.5$
TOTAL	275	131	330	91
	$\bar{x} = 30.56$	$\bar{x} = 14.56$	$\bar{x} = 36.67$	$\bar{x} = 10.11$

TABLE 67

INTERCENSAL POPULATION CHANGE AND
DEATHS IN THE SUGAR-BELT

Sub-Location	Absolute Natural Intercensal Change 1962-1969	Total Number of Intercensal Deaths 1962-1969	Absolute Natural Intercensal Change 1969-1973	Total Number of Intercensal Deaths
God-Aburo	151	- 3	51 49	0
Chemelil	30	0	51 16	6
Kawino	43	-15	34	
Koru	7	+ 2	30 13	3
Muhoroni East	31	+ 4	32 9	5
T O T A L	285	+ 9	21 87	14
TOTAL	$\bar{x} = 7.0$	$\bar{x} = 12.25$	$\bar{x} = 21.75$	$-\bar{x} = 3.50$
	$\bar{x} = 30.56$		$\bar{x} = 36.67$	

TABLE 68

INTERCENSAL POPULATION CHANGE AND NET

MIGRATION IN KANO LOCATIONS

Sub-Location	Absolute Natural Change 1962-1969	Net Migrants 1962-1969	Absolute Natural Change 1969-1973	Net Migrants 1969-1973
Bwanda	39 ₅	- 3	36	+ 1
Kochieng ^a	51	- 3	51	-10
Ghemelii	38 ₃	0 ₃	51	- 6
Nyamware				
Kawino	437	-152	34	60
Kabar ^b	28 ₃	+ 6 ₃	38	- 1
Sidho-East	11	+ 5	32	- 4
Sidho-West	22 ₆	+ 4 ₇	30	+ 3
Wangaya II	15	+ 2	27	- 2
Kakola	28	-12	31	- 1
TOTAL	275	-16	330	-20
	$\bar{x}=30.56$		$\bar{x}=36.67$	

TABLE 69

INTERCENSAL POPULATION CHANGE AND NET
MIGRATION IN THE SUGAR-BELT

Sub-Location	Absolute Natural Change: 1962-1969	Net Migrants 1962-1969	Absolute Natural Change 1969-1973	Net Migrants 1969-1973
God-Abuoro	15	+9	49	0
Chemelil	3	+3	16	0
Koru	7	+2	13	+6
Muhoroni	3	+3	9	-4
TOTAL	28	17	87	+2
	$\bar{x} = 7$		$\bar{x} = 21.75$	

Sub-location	Estimated Population (1962)	Area in Sq. Km. (1962)
Esende	4100	47
Kochileng	4176	32
Mudwene	5405	19
Ysuliro	2647	16

TABLE 70

Sub-Location	Estimated Population (1962)	Area in Sq.Km. (1962)	POPULATION GROWTH - KANO LOCATIONS				Estimated Population (1973)	Area in Sq.Km. (1973)	Population Density (1973)
			1962	1969	1969	1969			
Kabar	5667	28	149	4351	27	161	4945	27	183
Sidho-East	4031	27	100	5704	50	113	6331	50	127
Sidho-West	4897	49	78	3128	38	83	7983	38	207
Mangaya II	2818	36	200	4053	20	61	5083	20	254
Bwanda	4100	47	87	5359	47	114	6190	47	132
Kochieng'	4378	32	137	6206	29	214	7605	29	262
Nyamware	5405	19	284	7016	21	333	8603	21	410
Kawino	2647	16	165	3556	15	236	4074	15	272

....cont....

TABLE 7A

	POPULATION	AREA	POPULATION DENSITY	POPULATION	AREA	POPULATION DENSITY	POPULATION	AREA	POPULATION DENSITY
	(1962)	(1962)	(1962)	(1969)	(1969)	(1969)	(1973)	(1973)	(1973)
Kabar	5667	28	202	6875	24	283	8004	24	333
Sidho-East	4031	27	149	4351	27	161	4945	27	183
Sidho-West	4897	49	100	5704	50	113	6331	50	127
Wangaya II	2818	36	778	3128	38	83	7983	38	207
Kakola	5812	29	200	7052	33	212	7983	33	242
Sub-Location	Estimated Population (1962)	Area in Sq.Km. (1962)	Population Density (1962)	Population Census (1969)	Area in Sq.Km. (1969)	Population Density (1969)	Estimated Population (1973)	Area in Sq.Km. (1973)	Population Density (1973)
Casabuero	2524	23	114	2912	23	127	3543	23	154
Chambali	5466	67	82	5584	67	83	5953	67	89
Kona	4426	51	87	4643	51	91	4816	51	94
Bakawani	7203	58	124	7357	58	126	7625	58	131

TABLE 71

POPULATION GROWTH - SUGAR-BELT

IN HANOI PROVINCE

Sub-Location	Estimated Population (1962)	Area in Sq. Km. (1962)	Population Density (1962)	Official Population Census (1969)	Area in Sq. Km. (1969)	Population Density (1969)	Estimated Population (1973)	Area in Sq. Km. (1973)	Population Density (1973)
God-Aburo	2624	23	114	2912	23	127	3543	23	154
Chemelil	5466	67	82	5584	67	83	5953	67	89
Koralong	4426	51	87	4648	51	91	4816	51	94
Muhoroni	7203	58	124	7357	58	128	7625	58	13
Kasey	149		100	439	34	23	33		-10
Sidho-East	106		120	+14	17	10	7		+ 5
Sidho-West	85		103	+18	10	16	14		+ 4
Nangaya II	110		124	+14	10	13	18		+ 2
Kakela	92		99	+ 7	10	11	19		-12

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TABLE 72

INTERCENSAL POPULATION CHANGE 1962-1969

IN KANO LOCATIONS

Area	Estimated Sample Population 1962	Estimated Sample Population 1969	Absolute Change	Inter-censal Total Births	Inter-censal Total Deaths	Absolute Difference	Estimated Net Migrants
Bwanda Woro	126	162	+36	59	20	39	-3
Kochieng'	116	162	+46	58	9	49	-3
Nyanware	122	159	+37	48	11	37	0
Kawinoni	111	132	+21	54	18	36	-15
Kabar	149	188	+39	56	23	33	+6
Sidho-East	106	120	+14	19	10	9	+5
Sidho-West	85	103	+18	30	16	14	+4
Wangaya II	110	124	+14	25	13	12	+2
Kakola	92	99	+7	30	11	19	-12

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TABLE 73

INTERCENSAL POPULATION CHANGES 1962-1969 (NET MIGRANTS)

IN THE SUGAR-BELT

Sub-Areaion	Estimated Sample Population 1962	Estimated Sample Population 1969	Absolute Change	Inter-censal Total Births	Inter-censal Total Deaths	Absolute Difference	Estimated Net Migrants
God-Abuoro	140	548	+14	48	13	+35	+19
Chemelil	174	1817	+27	44	0	+44	-13
Koruara	199	1063	+27	47	2	+45	+2
Muheroni	204	2111	+27	38	14	+44	+3
Sidhe-West	120	132	+12	16	0	+16	-1
Sidhe-West	103	119	+16	23	10	+13	+3
Kangaya II	124	136	+12	25	11	+14	-2
Kakola	99	111	+12	27	14	+13	-1

TABLE 74

INTERCENSAL POPULATION CHANGE 1969-1973 (NET MIGRANTS)

IN-KANO LOCATIONS

<u>Sub-Location</u>	<u>Estimated Sample Population 1969</u>	<u>Estimated Sample Population 1973</u>	<u>Absolute Change</u>	<u>Inter- censal Total Births</u>	<u>Inter- censal Total Deaths</u>	<u>Absolute Difference</u>	<u>Estimated Net Migrants</u>
Bwanda	162	188	+26	44	19	+25	+1
Kochieng ¹⁰	162	187	+25	41	6	+35	-10
Nyamware	159	188	+29	42	7	+35	-6
Kawino	132	151	+19	35	16	+19	0
Kabaroni	188	218	+30	39	8	+31	-1
Sidho-East	120	132	+12	16	0	+16	-4
Sidho-West	103	119	+16	23	10	+13	+3
Wangaya II	124	136	+12	25	11	+14	-2
Kakola	99	111	+12	27	14	+13	-1

TABLE 75

AGE DISTRIBUTION OF POPULATION

Age Group	1969		1973		Estimated Net Migrants
	Population	%	Population	%	
0-4	18	10	22	13	0
5-9	23	12	24	14	0
10-14	19	10	14	9	+6
15-19	2	1	2	1	-4
20-24	4	2	1	1	0
25-29	3	2	3	2	0
30-34	3	2	3	2	0
35-39	3	2	3	2	0
40-44	3	2	4	3	0
45-49	3	2	1	1	0
50-54	3	2	1	1	0
55-59	1	1	1	1	0
60-64	0	0	1	1	0
65-69	2	1	1	1	0
70-74	1	1	0	0	0
75+	0	0	0	0	0
TOTAL	23	105	70	32	

Sub-Location	Estimated Sample Population 1969	Estimated Sample Population 1973	Inter-censal Absolute Change	Inter-censal Total Births	Inter-censal Total Deaths	Estimated Net Migrants
God-Aburo	54	66	+12	12	0	0
Chemolil	181	193	+12	18	6	0
Koru	106	118	+12	9	3	+6
Muhoroni	211	215	+4	13	5	-4

TABLE 77
TABLE-76

AGE DISTRIBUTION OF POPULATION

AGE DISTRIBUTION OF POPULATION
IN WEST KANO LOCATION

IN EAST KANO LOCATION

Age-Group	Bwanda		Kochieng'		Kawino		Nyamware		Kaduna	
	M	F	M	F	M	F	M	F	M	F
0-4	18	19	20	15	14	21	22	13		
5-9	19	23	21	14	18	11	14	14	12	9
10-14	19	21	15	8	11	5	13	59	5	6
15-19	2	5	7	12	6	8	52	38	5	4
20-24	4	9	7	6	13	12	51	26		6
25-29	3	7	8	7	6	8	22	25		
30-34	3	10	3	4	3	3	63	47		
35-39	2	7	2	7	6	4	14	36		
40-44	3	7	2	5	3	3	44	33		
45-49	3	0	2	2	2	2	31	12		
50-54	3	1	4	3	1	2	51	32		
55-59	1	1	3	4	2	3	61	12		2
60-64	0	1	0	1	3	4	61	12		2
65-69	2	1	1	4	3	0	11	01		2
70-74	1	2	1	3	2	1	10	00		2
75+	0	0	0	0	1	1	10	01		0
TOTAL	83	105	97	90	95	93	70	81		55

TABLE 77

1978

AGE DISTRIBUTION OF POPULATION
AGE DISTRIBUTION OF POPULATION IN
IN EAST KANO LOCATION
THE SOKO-FULF

Age-group	Kabar		Sidho-East		Sidho-West		Wangaya II		Kakola	
	M	F	M	F	M	F	M	F	M	F
0-4	9	16	6	7	6	15	15	10	11	9
5-9	17	12	6	5	10	8	8	6	9	6
10-14	20	22	3	3	4	5	6	9	5	4
15-19	14	9	8	7	6	5	5	14	4	6
20-24	9	7	12	10	7	6	2	9	5	6
25-29	9	4	7	1	3	6	6	4	5	5
30-34	3	7	5	2	3	6	1	3	1	2
35-39	2	7	3	1	6	2	4	3	2	3
40-44	5	10	3	3	3	4	3	1	1	3
45-49	3	11	7	6	3	1	5	3	2	3
50-54	6	1	4	6	2	1	6	1	3	2
55-59	7	1	1	5	1	1	6	1	3	2
60-64	2	1	4	1	3	0	1	0	3	2
65-69	2	0	3	1	1	1	1	0	0	2
70-74	0	0	1	0	0	1	1	0	1	0
75+	0	0	1	0	1	0	2	0	1	0
TOTAL	108	110	74	58	57	62	72	64	56	55

TABLE 78

AGE DISTRIBUTION OF POPULATION IN

THE SUGAR-BELT

Age-Group	God-Abuoro		Chemelil		Koru		Muhoroni	
	M	F	M	F	M	F	M	F
0-4	11	7	14	10	5	9	10	112
5-9	7	4	5	6	8	15	12	13
10-14	5	3	1	1	7	13	10	15
15-19	3	2	1	4	6	12	4	5
20-24	2	3	12	16	15	8	7	15
25-29	1	2	27	1	10	7	15	13
30-34	4	1	31	2	6	3	16	5
35-39	3	1	22	1	4	2	13	6
40-44	1	1	17	0	2	1	11	4
45-49	1	1	9	0	4	0	7	5
50-54	2	0	6	0	10	0	4	2
55-59	1	0	3	0	0	0	3	-
60-64	0	0	4	0	0	0	2	-
65-69	0	0	0	0	0	0	0	-
70-74	0	0	0	0	0	0	0	-
75+	0	0	0	0	0	0	0	-
TOTAL	41	25	152	41	65	53	114	101

YEAR

1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973

TABLE 79

RETROSPECTIVE DATA OF BIRTHS AND DEATHS IN WEST KANO

YEAR	Kobor		Bwanda		Kochieng'		Nyanware		Kawino		Total
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	
1962	8	3	7	2	5	1	11	1			
1963	33	3	35	0	25	11	03	2			2
1964	37	3	40	2	05	4	20	1			1
1965	19	4	16	1	16	2	14	2			0
1966	18	3	25	0	27	2	18	2			2
1967	37	3	05	2	47	0	03	2			1
1968	69	2	10	1	25	11	34	2			0
1969	18	2	10	1	38	2	11	6			
1970	38	4	17	2	10	2	36	4			
1971	10	7	26	0	27	2	27	3			
1972	19	4	19	11	39	1	05	2			
1973	29	2	19	2	28	0	46	1			

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TABLE 80

RETROSPECTIVE DATA OF BIRTHS AND DEATHS IN EAST KANO STATE

YEAR	Kabar		G. d-A Sidho-East				Ch Sidho-West				Wangaya II		Kakola				
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths			
1962	6	3	-	2	3	-	4	-	2	-	1	-	0	-	4	-	2
1963	12	5	1	2	1	0	1	0	1	1	4	2	1	4	1	1	
1964	9	1	1	3	1	0	1	3	1	1	4	1	1	4	0	0	
1965	3	1	1	2	1	0	1	5	2	1	2	1	2	2	2	2	
1966	5	3	1	3	1	0	1	3	4	1	2	1	4	3	4	1	
1967	6	6	1	1	1	0	1	3	2	4	1	3	3	3	3	0	
1968	7	1	2	3	2	0	1	6	3	1	5	3	3	3	3	1	
1969	8	3	2	3	2	0	2	6	2	2	6	3	6	6	6	1	
1970	10	2	2	2	2	0	1	3	2	1	3	3	2	2	2	1	
1971	6	1	2	3	2	0	2	1	3	2	3	1	6	6	6	2	
1972	7	2	3	5	3	0	2	8	2	2	8	1	7	7	7	3	
1973	8	0	3	3	3	0	6	5	1	3	5	0	6	6	6	3	

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TABLE 81

RETROSPECTIVE DATA OF BIRTHS AND DEATHS IN THE SUGAR-BELT

YEAR	God-Aburo		Chemelil		Koru		Muhoroni	
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths
1962	1	1	1	1	1	1	1	1
1963	1	1	1	1	1	1	1	1
1964	1	1	1	1	1	1	1	1
1965	1	1	1	1	1	1	1	1
1966	1	0	1	0	1	0	1	0
1967	1	1	1	1	4	1	3	1
1968	2	0	1	0	1	0	1	0
1969	2	0	2	0	2	1	2	2
1970	2	0	1	0	1	0	3	1
1971	2	0	4	2	1	1	2	1
1972	3	0	5	1	2	2	4	0
1973	3	0	6	3	3	0	2	1

* Others * Other locations outside the study-region

Note: * Sugar-Belt

* Muhoroni

* Chemelil

* Koru

TABLE 82 cont... TABLE 82

<u>INTER-LOCATIONAL MIGRATION DATA</u>			
<u>Sub-Location</u>	<u>Location</u>	<u>Number</u>	<u>Percentage</u>
Kaduna	West Kano	4	9.0
	East Kano	8	17.0
	<u>Sources of Migrants</u>		
	*Sugar-Belt	0	0.0
	*Others Belt	34	71.0
	<u>TOTAL</u>	<u>43</u>	<u>100.0</u>
	<u>TOTAL</u>	<u>137</u>	<u>100.0</u>
Bwanda Kabar	West Kano	2	5.0
	East Kano	9	21.0
	*Sugar-Belt	0	0.0
	*Others Belt	32	74.0
	Others	0	0.0
	<u>TOTAL</u>	<u>43</u>	<u>100.0</u>
	<u>TOTAL</u>	<u>137</u>	<u>100.0</u>
Kochieng' Sidho-East	West Kano	10	23.0
	East Kano	6	14.0
	Sugar-Belt	10	23.0
	*Others Belt	28	63.0
	Others	0	0.0
	<u>TOTAL</u>	<u>44</u>	<u>100.0</u>
	<u>TOTAL</u>	<u>137</u>	<u>100.0</u>
Nyamware Sidho-West	West Kano	4	9.0
	East Kano	6	13.0
	Sugar-Belt	10	22.0
	*Others Belt	35	78.0
	Others	0	0.0
	<u>TOTAL</u>	<u>45</u>	<u>100.0</u>
	<u>TOTAL</u>	<u>137</u>	<u>100.0</u>

Note: * Sugar-Belt = Contains two sub-locations namely Chemelil and Muhoroni.

* Others = Other locations outside the study-region.

TABLE 82 cont...

<u>Sub-Location</u>	<u>Location</u>	<u>Number</u>	<u>Percentage</u>
Kawinon II	West Kano	4	9.0
	East Kano	18	17.0
	Sugar-Belt	0	0.0
	Others	34	74.0
	TOTAL	46	100.0
Kabara	West Kano	10	18.0
	East Kano	19	16.0
	Sugar-Belt	0	0.0
	Others	36	66.0
	TOTAL	55	100.0
Sidho-East	West Kano	7	18.0
	East Kano	10	25.0
	Sugar-Belt	33	7.0
	Others	20	50.0
	TOTAL	40	100.0
Sidho-West	West Kano	8	3.0
	East Kano	11	42.0
	Sugar-Belt	0	0.0
	Others	13	27.0
	TOTAL	126	100.0

TABLE 82 cont...

<u>Sub-Location</u>	<u>Location</u>	<u>Number</u>	<u>Percentage</u>
Wangaya II	West Kano	4	12.0
	East Kano	12	35.0
	Sugar-Belt	2	6.0
	Others	16	47.0
	TOTAL	134	100.0
Kakola	West Kano	6	17.0
	East Kano	14	40.0
	Sugar-Belt	1	3.0
	Others	14	40.0
	TOTAL	35	100.0
God-Abuoro	West Kano	4	14.0
	East Kano	2	7.0
	Sugar-Belt	0	0.0
	Others	23	79.0
	TOTAL	29	100.0
Chemelil	West Kano	7	5.0
	East Kano	5	3.0
	Sugar-Belt	8	5.0
	Others	136	87.0
	TOTAL	156	100.0

TABLE 82 cont... TABLE 82

<u>Sub-Location</u>		<u>Location</u>		<u>Number</u>	<u>Percentage</u>	
Muhoroni		West Kano		9	7.0	
		East Kano		36	26.0	
		Sugar-Belt		3	2.0	
		Others		89	65.0	
TOTAL				137	100.0	
Age-groups		Number	Percentage	Number	Percentage	
Koru	0-4	West Kano	19	19	23.0	10.0
	5-9	East Kano	8		10.0	
		Sugar-Belt	2	23	3.0	12.0
		Others	52		64.0	
	10-14		10.0	11	7.0	
	15-19	TOTAL	1.0	81	100.0	3.0
	20-24	4	2.0	5	5.0	
	25-29	3	2.0	2	4.0	
	30-34	5	2.0	15	5.0	
	35-39	2	1.0	4	2.0	
	40-44	3	2.0	3	2.0	
	45-49	3	2.0	2	1.0	
	50-54	3	2.0	4	2.0	
	55-59	1	0.0	2	2.0	
	60-64	0	-	0	-	
	65-69	2	1.0	1	0.5	
70-74	1	-	1	0.5		
75+	-	-	-	-		
TOTAL		33	44.0	105	56.0	

TABLE 83

DATA FOR AGE AND SEX PYRAMID FOR BWANDA

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	18	9.0.0	19	10.00
5-9	19	10.0.0	23	12.0.0
10-14	19	10.0.0	13	7.0.0
15-19	2	1.0.0	5	3.0.0
20-24	4	2.0.0	9	5.0.0
25-29	3	2.0.0	8	4.0.0
30-34	3	2.0.0	10	5.0.0
35-39	2	1.0.0	4	2.0.0
40-44	3	2.0.0	3	2.0.0
45-49	3	2.0.0	2	1.0.0
50-54	3	2.0.0	4	2.0.0
55-59	1	0.0.0	3	2.0.0
60-64	0	-	0	-
TOTAL	79	44.0	91	51.0
65-69	2	1.0	1	0.5
70-74	1	-	1	0.5
75+	-	-	-	-
TOTAL	83	44.0	105	56.0

TABLE 84

DATA FOR AGE AND SEX PYRAMID FOR KAWINO

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	22	14.0	13	7.9
5-9	14	8.9	14	8.9
10-14	13	8.2	29	18.6
15-19	22	14.0	8	5.0
20-24	1	0.6	6	3.8
25-29	2	1.3	5	3.1
30-34	3	1.9	7	4.4
35-39	4	2.5	6	3.8
40-44	4	2.5	13	8.2
45-49	1	0.6	12	7.5
50-54	1	0.6	2	1.3
55-59	1	0.6	2	1.3
60-64	1	0.6	2	1.3
65-69	1	0.6	1	0.6
70-74	-	--	0	--
75+	-	--	1	0.6
TOTAL	70	48.0	81	53.0

TABLE 85

DATA FOR AGE AND SEX PYRAMID FOR KABAR

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	19	14.0	16	7.0
5-9	17	8.0	12	5.0
10-14	20	9.0	22	10.0
15-19	14	6.0	19	4.0
20-24	9	4.0	7	3.0
25-29	9	4.0	4	2.0
30-34	3	1.0	7	3.0
35-39	2	1.0	7	3.0
40-44	5	2.0	10	5.0
45-49	3	1.0	11	5.0
50-54	6	3.0	1	1.0
55-59	7	3.0	1	1.0
60-64	2	1.0	1	1.0
65-69	2	1.0	2	1.0
70-74	1	1.0	2	-
75+	2	1.0	2	-
TOTAL	108	48.0	110	51.0

TABLE 86

DATA FORAGE AND SEX PYRAMID FOR WANGAYA II

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	15	11.0	10	7.0
5-9	10	7.0	16	4.0
10-14	16	4.0	19	7.0
15-19	5	4.0	14	10.0
20-24	2	1.0	19	7.0
25-29	16	4.0	14	3.0
30-34	11	1.0	3	2.0
35-39	14	3.0	3	2.0
40-44	13	2.0	1	1.0
45-49	5	4.0	3	2.0
50-54	6	4.0	1	1.0
55-59	6	4.0	1	1.0
60-64	1	1.0	0	-
65-69	1	1.0	0	-
70-74	1	1.0	0	-
75+	2	1.0	0	-
TOTAL	174	53.0	162	47.0

TABLE 87

DATA FOR AGE AND SEX PYRAMID FOR MUHORONI

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	10	5.0	18	8.0
5-9	12	6.0	13	6.0
10-14	10	5.0	15	7.0
15-19	4	2.0	5	2.0
20-24	7	3.0	15	7.0
25-29	15	7.0	13	6.0
30-34	16	7.0	5	2.0
35-39	13	6.0	6	3.0
40-44	11	5.0	4	2.0
45-49	7	3.0	5	2.0
50-54	4	2.0	2	1.0
55-59	3	1.0	-	-
60-64	2	1.0	-	-
65-69	-	-	-	-
70-74	-	-	-	-
75+	-	-	-	-
TOTAL	114	53.0	101	47.0

TABLE-88

DATA FOR AGE AND SEX PYRAMID FOR CHEMELIL

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	14	17.0	24	11.0
5-9	5	2.0	11	5.0
10-14	1	0.5	2	1.0
15-19	1	0.5	4	2.0
20-24	12	6.0	16	8.0
25-29	27	13.0	1	0.5
30-34	31	14.0	2	1.0
35-39	22	10.0	1	0.5
40-44	17	8.0	1	1.5
45-49	9	4.0	1	1.5
50-54	6	3.0	=	=
55-59	3	1.0	=	=
60-64	4	2.0	=	=
65-69	=	=	=	=
70-74	=	=	=	=
75+	=	=	=	=
TOTAL	152	71.0	61	29.0

TABLE 89

DATA FOR AGE AND SEX PYRAMID FOR GOD-ABUORO

Age-group	Males		Females	
	Number	Percentage	Number	Percentage
0-4	11	17.0	7	11.0
5-9	7	11.0	4	6.0
10-14	5	8.0	3	4.0
15-19	3	4.0	2	3.0
20-24	2	3.0	3	4.0
25-29	1	1.5	2	3.0
30-34	4	6.0	1	1.5
35-39	3	4.0	1	1.5
40-44	1	1.5	1	1.5
45-49	1	1.5	1	1.5
50-54	2	3.0	-	-
55-59	1	1.5	-	-
60-64	-	-	-	-
65-69	-	-	-	-
70-74	-	-	-	-
75+	-	-	-	-
TOTAL	41	62.0	25	37.0

POPULATION GROWTH PROBLEMS

The country population growth rate for Kenya is approximately 3.3% per annum. But, it is evident that micro-regional differentials in demographic growth rates are substantial because regions vary in their degree of interaction within the framework of the ecosystem. The different intensity of interaction could then produce diverse effects on demographic growth rates. Therefore, two major problems which underlined the research were:-

APPENDIX VIII - Method of life table population

- a) estimation of initial population in each area of observation from the
- b) estimation of initial population in each area of observation from the

Construction of a life table for each region from which survival ratios could be computed was deemed unwise as population data were scattered and distribution of population was relatively low and much distorted by migrational influences. Furthermore, calculated infant mortality ratios gave extremely unrealistic life expectancy at birth (e.g. 30) and such information could not give a realistic guide in choosing a model life table for the region.

POPULATION ESTIMATE PROCEDURE and data

extracted from the sample survey. However, a reasonable picture of the mean population growth rate for Kenya is approximately 3.3% per annum. But, it is evident that micro-regional differentials in demographic growth rates are substantial because regions vary in their degree of interaction within the framework of the ecosystem. The different intensity of interaction could thus produce or adverse effects on demographic growth rates. Therefore, two major problems which confronted the research were:-

(a) estimation of intercensal population

$$\frac{\text{growth rate (per 1000)}}{\text{Mid-Population}} = \frac{1000}{1}$$

(b) estimation of total population in each area of enumeration from the

It was an unsample population rate for the
Construction of a life table for each significantly
region from which survival ratios could be computed
was deemed useless as population data for each
distribution of population was relatively few and much
distorted by migrational influence. Furthermore,
calculated infant mortality ratios gave extremely unrea-
listic life expectancy at birth (e.g. = 20) and such
information could not give a realistic guide in choosing
a model life table for the region.

Retrospective data on births and deaths extracted from the sample survey however gave a reasonable picture of annual pattern of deaths and births within the sampled regions between 1962-1973, and these were employed to estimate crude intercensal population growth rate for each region between 1962-1969 and 1969-1973 and following the procedure below:-

1st - A crude natural growth rate for the 1st quarter of 1973 was calculated for each sub-region. The

formula used was:

And population population estimate for 1973 =
C.N.G. Rate = CBR-CDR

$$= \left(\frac{\text{Total births}}{\text{Mid-Population}} \times \frac{1000}{1} \right) - \left(\frac{\text{Total}}{\text{Mid-Population}} \times \frac{1000}{1} \right)$$

On the other hand, forward extrapolation would be as follows:

$$\left(\frac{\text{Total deaths}}{\text{Mid-Population}} \times \frac{1000}{1} \right)$$

NB: It was assumed that the growth rate for the remaining part of 1973 would not deviate significantly from the computed values.

2nd To estimate past and future population for each

enumeration area on an annual basis, geometric

extrapolation was employed i.e. forward and

backward projection technique was carried. For

forward projection the formula $\bar{p} = P_1 e^{rn}$ was used.

Note \bar{p} = estimated population.

P_1 = total number of population at initial period.

r = annual rate of increase.

n = exact number of years between P_1 and P_2 .

For backward projection the formula given above

was used but in a reverse way; for example, if area x had a population size of 193 in 1973 and it had a growth rate of 1.5% per annum then the estimated population size in 1972 could be

$\frac{193}{1.0150} = 190$ procedure was carried out for the period 1969-1968 with minor adjustments

And population estimate for 1971 - especially in areas where natural growth rates for 1973

or 1969 were down $\frac{190}{1.0150} = 187$ low. In such cases, the adjustments

made involved back extrapolation would be as follows: following the year in question,

if population size for 1973 = 193

then population size for 1974 = 193×1.0150

= 196

etc.

The technique made it possible to estimate annual population size for each sampled region between 1969-1973. Then summing up all births between

Net migration = $(P_{1973}) - P_1 - (B-D)$

1969-1973 and all deaths during the same period, and

* Source: United Nations Manual VI, Methods of using mid-intercensal population as the base popu-

lation it was possible to estimate intercensal crude birth rates and crude death rates. The difference between the two measures gave a crude intercensal natural growth rate. during the

Note The effect of migration was neglected in the computation as it was extremely difficult to estimate annual net migration for each enumeration area.

Estimating Net Migration In summary, the same procedure was carried out for the period 1962-1969 with minor adjustments especially in areas where natural growth rates for 1973 or 1969 were deemed too slow. In such cases the adjustments made involved combining crude growth rates for the years preceeding and following the year in question, and

which constituted 2.8% of the entire population

Estimation of Net Migration in an enumeration area. Therefore,

if 2.8% = (x) population size for an area,

to estimate net migration for each enumeration

area, a simple formula (given by United Nations

Manual VI) was used.

obtained for \bar{p} which are the total estimated
$$\text{Net migration} = (P_{t+n}) - P_t - (B-D)$$

population figures were very close to the

* Source: United Nations Manual VI, Methods of measuring international migration. The Sugar-

Periods where N = net migration. Formula

Pt = population at the later census.

B = number of births that occurred to residents of the area during the same, i.e. if natural intercensal period. (s) = 3.0% per annum, then D = The number of deaths in the area during the same period. for that population to double.

Estimating Total Population

Formula for Estimating Total Population

To estimate total population size for each enumeration area using 1973 sample surveys population size, a simple formula was used.

if r12.34 is the coefficient of partial correlation between X1 and X2 keeping X3 and X4 constant, then

size, a simple formula was used.

Example

It was found that the sample survey population size constituted 2.8% of the entire population for each enumeration area. Therefore, if 2.8% = (x) population size for an area, then total population size for the same area = (100 x (x)) / 2.8 = p̄. The results obtained for p̄ which are the total estimated population figures were very close to the census figures of 1969. In fact, the largest deviation was -3% for a region in the Sugar-belt.

Note: Source: B.S. J. ... and Problems of ... National Book Co. p. 372.

Periods Taken by Population Sizes to Double

To estimate this, a period of 70 years is divided by the natural growth rate of the population size, i.e. if natural growth rate of area (x) is 3.0% per annum, then it would take about $\frac{70}{3.0} = 23.3$ years for that population to double.

Partial Correlation Analysis

ARTICLE III

The formula used is given below:

if $r_{12.34}$ is the coefficient of partial correlation between X_1 and X_2 keeping X_3 and X_4 constant, then

$$r_{12.34} = \frac{r_{12.4} - r_{13.4}r_{23.4}}{\sqrt{(1-r_{13.4}^2)(1-r_{23.4}^2)}}$$

$$= \frac{r_{12.3} - r_{14.3}r_{24.3}}{\sqrt{(1-r_{14.3}^2)(1-r_{24.3}^2)}}$$

where $r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{(1-r_{13}^2)(1-r_{23}^2)}}$

where $r_{12.4} = \frac{r_{12} - r_{14}r_{24}}{\sqrt{(1-r_{14}^2)(1-r_{24}^2)}}$

etc.

Note: Source: M.R. Spiegel; Theory and Problems of Statistics. Schaum's outline series McGraw-Hill Book Co. p. 272.

DEMOGRAPHIC SURVEY 1973

WAO PLAINS AND THE SUGAR BELT

1. Area-Identify

1. Area-Identify

1. Name of Location

Sub-location

Enumeration Unit

Settlement or Village

or Plot No.

APPENDIX III

2. Sex

Code

1. Male M

2. Female F

3. Ethnic Origin

Code Code

1. Are you:

a Luo A Kisii F

b Luhya B Kikuyu KE

c Kalenjin C Horn H

d Kipsigis D Asian E

e Kandi E European J

2. If not, please name your tribe

4. Area DEMOGRAPHIC SURVEY 1973

1. KANO FLAINS AND THE SUGAR BELT

2. When were you born? (Year)

1. Area Identity enumerator should estimate the

1. Name of Location residents is ignorant

Sub-Location

5. Marital Status
Enumeration Unit Code

1. Settlement or Village Single 1

or Plot No. Married 2

2. Sex

6. Migration Data Code

1. Male M

2. Female F

3. Ethnic Origin

Province Code

Code

1. Are you:

7. Place of Residence A Kisii F

a Luhya B Kikuyu Y

a Kalenjin C Meru H N

1. Da Kipsigis her D Asian I

2. Fa Nandi her E European J

2. If not, Please name your tribe

3. Where were you living before

coming here?

4. Age Structure

Group of
Rural Areas

1. What was your age at the last birthday? _____

2. When were you born? (Year) _____

N.B. The Enumerator should estimate the

age if the respondent is ignorant

5. Marital Status

(wed. in any other place) Code _____

1. Are you Single 1 _____

2. Education Married 2 _____

Widow/Widower 3 " Y _____

6. Migration Data

1. Where were you born? Groups in your level of education

Sub-Location	Code	_____
I - IV	1	_____
District		_____
V - VIII	2	_____
Province		_____

7. Place of Residence

I - II Code Yes = Y

III - IV 4 No = N

1. Do you live here? 5 _____

2. For how many years have you lived here? _____

3. Where were you living before coming here? _____

9. Occupation Area _____ Length of Stay in Years _____

4. Sub-location _____

15. Location employed? _____

26. District of present occupation? _____

27. Province you work daily _____

28. Have you lived, in any other Places? _____

8. Education

a fisherman Code YES - Y

a businessman NO - N

1. Have you ever attended school? _____

2. In which of these groups is your level of education? _____

<u>Primary</u>		<u>Std</u>	<u>Code</u>
10. <u>Income</u>	I - IV		1
1. <u>In which of these groups is your income?</u>	V - VIII		2
	<u>Shillings per month</u>		<u>Code</u>
	<u>Secondary</u>		
	0 - 299		1
	<u>Form</u>		
	300 - 599		2
	I - II		3
	600 - 899		3
	III - IV		4
	900 - 1199		4
	IV - VI		5
	1200 - 1499		5
	<u>Post-Secondary</u>		
	1500 and above		6
	<u>Technical</u>		
	<u>Education</u>		6
	<u>University</u>		
	<u>Education</u>		7

9. Occupational Perception

Code YES = Y

NO = N

1. Are you employed? Area with respect to: _____

2. What is your present occupation? _____

3. Where do you work daily? _____

4. If not employed, are you _____

(a) Purchaser of goods Code _____

(b) a farmer on facilities 1 _____

(c) a fisherman on facilities 2 _____

(d) a businessman of Group 3 3 _____

5. What a house-servant face you 4 here? _____

1. a tailor and ill-used 5 _____

Ex. Ethnic _____

10. Income

5. Drought _____

1. In which of these groups is your income? _____

Shillings per month Code _____

0 - 299 1
5. Lack of health facilities _____

300 - 599 2
6. Poor communication _____

600 - 899 3
7. Lack of job opportunities _____

900 - 1199 4
8. Few trading centres _____

1200 - 1499 5
9. Lack of family planning _____

1500 and above 6
Facilities _____

10. Other: (name) _____

11. Environmental Perception

1. When did your husband die Code YES = Y
 2. At what age did he die? NO = N

1. Do you like this area with respect to:

13. Hort: (a) ~~by~~ Weather (Non) _____
 1. (b) Agricultural Output? _____
 2. (c) Food Supply lives died? _____
 3. (d) Purchase of goods _____
 (e) Education facilities _____
 (f) Health facilities _____
 1st (g) Availability of Occupation _____
 2. What major problems face you here?
 3rd 1. Diseases and Illness _____
 4th 2. Floods _____
 5th 3. Drought _____
 6th 4. Lack of Educational _____
 7th 5. facilities _____

5. Lack of health facilities _____

14. Hort: 6. ~~by~~ Poor communication 15 years and less than _____

7. Lack of job opportunities _____
 8. Few trading centres Code YES = Y
 9. Lack of family planning NO = N
 1. Do you facilities _____
 2. 10. Others, (name) _____

12. Mortality Data (Women)

1. When did your husband die? _____
2. At what age did he die? _____

13. Mortality Data (Men)

1. How many wives do you have? _____
2. Has any of your wives died? _____
3. When did she die? _____

8. Are the children living? _____

Order Year of death Approximate age at death

Classify because of any of _____

- 1st wife _____ Code _____
- 2nd wife Getting Education 1 _____
- 3rd wife Working 2 _____
- 4th wife Migrated from _____
- 5th wife here to settle 3 _____
- 6th wife Getting medical _____
- 7th wife treatment 4 _____

14. Fertility Data (Women above 15 years and less than

- (#) Have been married _____
9. Where and when were your _____ Code YES = Y
- NO = N
1. Do you have children? _____
2. Are they all alive? _____

		<u>Location</u>	<u>District</u>
3.	How many are daughters?	_____	_____
4.	How many are sons?	_____	_____
5.	Are all your children living and with you here?	_____	_____
6.	How many sons are living elsewhere?	_____	_____
7.	How many daughters are living elsewhere?	_____	_____
8.	Are the children living elsewhere because of any of these reasons?	_____	_____
10th	born _____	<u>Code</u>	_____
11th	(a) Getting Education	1	_____
12th	(b) Working	2	_____
13th	(c) Migrated from _____	_____	_____
15.	Mortality here to settle only	3	_____
	(d) Getting medical treatment	Code	YES <input type="checkbox"/> Y NO <input type="checkbox"/> N
1.	(e) Visiting friends or children are or relatives	4	_____
2.	(f) Have been married 1 or 6?	5	_____
9.	Where and when were your children born?	6	_____
4.	When did they die?		_____

<u>Order</u>	<u>Sex</u>	<u>Year</u>	<u>Sub-location</u>	<u>Location</u>	<u>District</u>
1st born			Birth	Age at death	
2nd born					
1st born					
3rd born					
2nd born					
4th born					
3rd born					
5th born					
4th born					
6th born					
5th born					
7th born					
6th born					
8th born					
7th born					
9th born					
8th born					
10th born					
9th born					
11th born					
10th born					
12th born					
20 th born					

15. Mortality Data (Children only)

1. V. good Code YES = Y
2. Good No = N
1. Did you say some of your children
4. No response are dead? _____
2. How many boys have you lost? _____
3. How many girls have you lost? _____
4. When did they die? _____

<u>Order</u>	<u>Historical Cal</u>	<u>Year of</u>	<u>Approximate</u>
<u>Order</u>	<u>Sex</u>	<u>Death</u>	<u>Age at death</u>
1st born	_____	_____	_____
Year	<u>Luo Name</u>	_____	<u>Historical Cal</u>
2nd born	_____	_____	_____
1880 3rd born	Cengang'ao	_____	Verdun _____ for
_____ 4th born	Orduca	_____	out York _____
1880-1900 5th born	Buana Clong'	_____	epidemic _____
_____ 6th born	_____	_____	The work of _____
1901 7th born	Opande	_____	_____ (the Bi).
1906 8th born	_____	_____	_____
1910 9th born	_____	_____	_____
_____ 10th born	Hagadi Soda	_____	_____
1913 11th born	Ahika (Miwani)	_____	_____
1913-14 12th born	Buana Inoo	_____	_____
1914 13th born	_____	_____	_____
1914 14th born	Simo	_____	Telephone.
16.4 Interviewers assessment of response			
1. V. good	_____	_____	_____
1917-18 2. Good	Cngoro	_____	_____
1919 3. Fair	Ekaka	_____	Influenced.
1920 4. No response	Cruko	_____	A reference to a
1921 5. _____	_____	_____	former SS (Mr. Cox).
1921 6. _____	_____	_____	let respondents seen.
1922 7. _____	_____	_____	_____
1922 8. _____	_____	_____	Ahara Bridge built.
1926 9. _____	_____	_____	Ahara Court built.
1924-25 10. _____	Sirug	_____	_____

<u>Year</u>	<u>HISTORICAL CALENDER</u>	<u>Meaning in English</u>
19 FOR KANO PLAINS DEMOGRAPHIC SURVEY 1973		
	Oridi	Chiefs reign.
	Oluwama	
	Asina	
<u>Year</u>	<u>Local Name</u>	<u>Meaning in English</u>
1880	Ongong'a	Various names for one form of cattle epidemics.
1930-31	Ndinya	
1931	Onduse (Oluwama)	
1933-35	Apano	
1880-1900	Bwana Olong'	The work of a Dutch missionary (Hobil).
	Fanyuko	
1947	Ahero Police Station started.	
1901	Cariglo	First train to Kisumu.
1906	Opande	Famine local party.
1910-55	Athiany	Fish.
1955	Jometho	
1961	Mumboni	Anthrax.
1961-62	Bilek	
1962	Akoko's death	
1913	Magadio	
1913	Akirai (Miwani)	Miwani factory started.
1913-14	Bwana Innes	
1914	Nundu	Small-pox.
1914	Simeak Mayor of Kisumu	Telephone.
1914-18	Bitai's death	1st World War.
1969	Keani's death	
1969	Nundu	2nd Small-pox.
1917-18	Ongere	Famine.
1919	Mbeka	Influenza.
1920	Oruko	A reference to a former DC (Mr. Cox).
1921	Ndege	1st aeroplane seen.
1921	Kipande	
1922	Olalo	Ahero Bridge built.
1928	Ahero Court built.	
1924-25	Siling	

<u>Year</u>	<u>Luo Name</u>	<u>Meaning in English</u>
1929-1930	Kitoto) Owiti) Okwana) Amino) Matete) Onunga) Aguko-Origa)	Chiefs reign.
1930-31	Bonyo	Locust outbreak.
1931	Nyangweso (Otuoma)	Famine.
1933-35	Ajana	
1939-45	Bitu) Panyako)	2nd World War.
1947	Ahero	Police Station started.
1947	Otonglo	Famine.
1952	Kau	A political party.
1952-55	Mau-Mau	
1955	KADU started	
1961	KANU started	
1961-62	Ataro	Flood.
1962	Akoko's death Ongeche) Karanda) Onjiko)	Chiefs reign.
1965	Ondiek Mayor of Kisumu	
1969	Tom Mboya's death	
1969	Argwings' Kodhek's death	
1969	Nundu.	2nd Small-pox.

BIBLIOGRAPHY

- Adams, W.O. - Water Resources of the Kibale Forest Reserve, Uganda. The Uganda Forestry Department, Kampala, 1953.
- Alexander Gibb and Partners Africa Ltd. - Kampala Hills Basin Water Resources Survey, 1951-1956. February, 1957.
- Anderson, J. et al - Energy and Agricultural Production in Kenya. John Wiley and Sons Australasia Pty Ltd., Sydney, 1970.
- Arriaga, L.S. - "The Impact of Population Changes on Education Costs." In Demography, Vol. 9, No. 2, May, 1972, pp. 273-284.
- Barbour, K.H. - "Population Shifts and Changes in the Sudan since 1950." In African Population Studies, II, No. 2, 1966, pp. 98-122.
- Barclays, George W. - Techniques of Population Analysis. Wiley, New York, 1958.
- Beale Calvin, L. - "Natural Decreases of Population - The Current and Prospective Status of an Emergent American Phenomenon."

BIBLIOGRAPHY

- Abler et al - Spatial Organization - The Geographers View of the World. Prentice-Hall
Englewood Cliffs, New Jersey, 1971.
- Blacker, J.G.C. - Population Movements in West Africa.
Addo, N.O. - Kenya Nile Basin Water Resource Survey 1954-1956, February, 1957.
- Alexander Gibb and Partners - Population Growth and Differential Fertility in Kenya: A Thematic Study. Thesis and Assignment Writing, John Wiley and Sons Australasia, Pty Ltd., Sydney, 1970.
- Blacker, J.G.C. Africa Ltd. - "The Impact of Population Changes on Education Cost." In Demography, Growth and Change, Vol. 9, No. 2, May, 1972, pp. 275-294.
- Arriaga, E.E. - "Population Shifts and Changes in the Sudan since 1898." In Middle Eastern Studies II, No. 2, 1966, pp. 98-122.
- Barbour, K.M. - "Strata in Population Analysis: Techniques of Population Analysis." Wiley, New York, 1958.
- Blacker, J.G.C. Barclays, George W. - "Natural Decrease of Population - The Current and Perspective Status of an Emergent American Phenomenon."
- Beale Calvin, L.

- Blackler, J.G.C. - In: Demography, Vol. 6, No. 2, May, 1969, pp. 91-100.
- Benjamin Benard - Demographic Analysis, New York, Fredrick Praeger, 1969.
- Blackler, J.G.C. - Population Growth in Kenya, In: Inter-African Labour Institute Bulletin, "XII, 2, May, 1965, pp. 246-255. Edited by ...
- Blackler, J.G.C. - "Population Growth and Differential Fertility in Zanzibar Protectorate." In: Population Studies Vol. XV, No. 3, 1962.
- Blackler, J.G.C. - "Population Growth in East Africa." In: African Economic Problem of Growth and Change - Basic Determinants.
- Hogue Donald J. - A series of undergraduate lectures edited by K.H. Bell and P.W. Bell. Vol. 3, Kampala: Makerere University College, 1965.
- Blackler, J.G.C. - "Stages in Population Growth." In: The Eugenics Review, Vol. 39, 1947, pp. 87-102.
- Harris, W.B. - "Problems of Developing Countries." In: E/CN/Al. World Population Conference:

- Blacker, J.G.C. - "Population Growth and Urbanization in Kenya." In L.N. Bloomer and C. Abrams Report of United Nations Mission to Kenya on Housing. Government Printers, Nairobi, 1965.
- Boateng, E.A. - "Agriculture and Population Growth in Ghana." In Population Growth and Economic Development edited by S.H. Ominde and C.N. Ejiogu, pp. 11-22. Heinemann Educational Books, 1972. 2.
- Bogue Donald J. - "A Technique for making Extensive Population Estimates." Monthly Journal of the American Statistical Association Vol. 45, No. 250, June, 1950, pp. 149-163. In Vol. 45, No. 2
- Bogue Donald J. - "Internal Migration." In The Study of Population: An Inventory and Appraisal edited by Phillip M. Hauser and O.D. Duncan, University of Chicago Press, 1969.
- Borrie, W.D. - "International Migration as Related to Economic and Demographic Problems of Developing Countries." In UNEP/CONF/41. World Population Conference:

- Proceedings Vol. IV, United Nations,
New York, 1965.
- Bowen Ian - "Classification of Factors Affecting"
Gosla, A.C. - Population Change. In Population.
Digswell Place, James Nisbet and
Co. Ltd., Cambridge University
Press, 1960.
- Brass William - "The Graduation of Fertility Rates
from Data for Primitive Communities."
In Population Studies Vol. 14, No. 2,
November, 1960.
- Brass William - "The Derivation of Fertility and
Reproduction Rates from Restricted
Data on Reproductive Histories."
In Population Studies Vol. 17, No. 2
November, 1953.
- Caldwell, J.C. and
Ganic, S.K. - "The Use of Existing Data." In
The Population of Tropical Africa
edited by J.C. Caldwell and
C. Okonjo, Longmans, Green and Co.
Ltd. 1968.
- Brass William - "Population Data Needs for Develop-
ment Planning." In Population
Growth and Economic Development,
pp. 477-490.

- Caldwell, J.C. .. edited by S.H. Ominde and C.N. Ejiogu,
Heinemann Educational Books, 1972.
- Brass William and - "Methods of Analysis and Estimation."
Goale, A.J.C. .. In The Demography of Tropical
Africa, Princeton, N.J. Princeton
University Press, 1968.
- Brentano, L.S. = "The Doctrine of Malthus and
Increase of Population during the
Last Decades." In Economic
Journal, September, 1970.
- Brown Lawrence and - The Intra-Urban Migration Process:
Moore, E.G. An Actor-Orientated Model. Department
of Geography, Ohio State University,
Mimeo, 1968. 1969.
- Caldwell, J.C. and = "Methods of Population and Family
Gaisie, S.K. Planning Research Problems in their
Application in Africa." In Rural
Africana, No. 14, edited by
David Radel. A publication of
African Studies Centre, Michigan
State University, 1971.
- Caldwell, J.C. - "A Study of Age Misstatement among
Young Children in Ghana." In
Demography, Vol. III, No. 20, 1966,
pp. 477-490.

- Caldwell, J.C. - "The Control of Family Size in
Tropical Africa." In Demography
Vol. V, No. 2, 1968, pp. 598-619.
- Caldwell, J.C. - "Urbanization and Fertility Control
in Tropical Africa." In African
Urban Notes, 1970. J.C. Caldwell
- Caldwell, J.C. - African Rural-Urban Migration: and
The Movement to Ghana Towns,
- Coale, A.J. - Columbia University Press, New York
York, 1969.
- Caldwell, J.C. and C. Okonjo - The Population of Tropical Africa
printed in Great Britain by Lowe
and Brydone Printers Ltd., London,
3rd edition, 1969.
- Chambers, R.J.A. and Hoover, B.M. - Notes on Proposed Kano Plains and
Tana River Irrigation Schemes,
Unpublished, E.A. Staff College,
Nairobi, 1965.
- Coale, A.J. and Clark, Colin - Population Growth and Land Use,
London, McMillan, 1967.
- Clark, Colin. - "Urban Population Densities." In
H.N.S.O. Journal of the Royal Statistical
Society series A, Vol. 114, 1951
pp. 490. in Hungry between 1959-65.

- Clarke, J.I. - "Sex Ratios in England and Wales."
In Tijdschrift Voor economische en
Sociale Geografie 51, 1960, p. 32.
- Clarke John I. - "Population Distribution in Sierra
Leone." In The Population of
Tropical Africa edited by J.C. Caldwell
and C. Okonjo, Longmans, Green and
Co. Ltd., 1968.
- Cougill, D.O. - "Estimates of Fertility and Mortality
in Tropical Africa." In The
Population of Tropical Africa.
edited by J.C. Caldwell and
C. Okonjo, Longmans, Green and Co.
Ltd., London, 1968.
- Coale, A.J. - Population Growth and Economic
Development in Low Income Countries.
Princeton University Press, 1958.
- Coale, Ansley J. and Hoover, E.M. - New Estimates of Fertility and
Population in U.S.A. Princeton
University Press, 1963.
- Coale, A.J. and Melvin Zelnik - Land and Population in East Africa.
1952.
- Colonial No. C 290ick - Land and Population in East Africa.
1952.
- H.M.S.O. - Internal Migration and Population
Change in Hungary between 1959-65.

- In Transaction of Institute of
British Geographers No. 47,
 September, 1969, pp. 111-129.
- Dakynne, R.S. -
- Coontz Sydney, H. - Population Theories and the Economic
Interpretation, London, Routledge
 and Kegan Paul Ltd., 1961.
- Davin, J.F. -
- Cowgill, D.O. - "Theory of Population Growth Cycles."
 In Population Theory and Policy
 edited by J.J. Spengler and
 C.D. Duncan, The Free Press of
 Glencoe, 1956.
- DeLorenzo and
 Palmer, P.S.S. -
- Cox R. Peter- - "The Analysis of Mortality."
 In Demography, Cambridge University
 Press, 1959.
- Donjain, V.R. - "Estimating the Age and Sex
 Structure of Net Migration for a
 Sub-region: A Case Study; North
 and South Humberside 1951-1961."
 In Regional Studies Vol. 4,
 Pergamon Press, Great Britain, 1970.
- Etienne Van De Walle -
- Culwick and Culwick - "The Study of Population." In
Continuity and Change in African
Cultures, edited by W.R. Bascon
 and Melville, J. Herkovits,

- Etienne Van De Walle- "The Relationship Between Population
University of Chicago Press, 1959.
- Dakeyne, R.B. - "The Pattern of Settlement in
Tropical Africa." In The Population
Central Nyanza. In Australian
of Tropical Africa edited by
Geography, Vol. II, No. 4, March, 1962.
J.G. Caldwell and C. Chorojo.
- Davis, J.F. - "The Changing World. United States
Languages, Green and Co. Ltd.,
Population Changes 1960-1970." In
London, 1968.
Geography Vol. 57, part 2, April,
- Eugene B. Brody - "Migration and Adaptation." In
1972, pp. 140-143.
- De-Roberts and - "A Demographic Study in an Area of
Low Fertility in North-East
Tanganyika." In Population Studies
Politics since 1945. In Regional
Vol. XIII, No. 1, July, 1959,
Studies Vol. 5, Progress Paper,
pp. 61-80.
Great Britain, 1970.
- Dorjahn, V.R. - "Incidence and Intensity of Polygny."
Fearn, H. - "Population as a Factor in Land
In Continuity and Change in African
Usage in Nyanza Province of Kenya
Cultures edited by W.R. Bascon and
Galony." In East Africa Agricultural
Melville, J. Herskovits, University
Journal, Vol. 20, January, 1955.
of Chicago Press, 1959.
- Federici, H. - "Migration and Ethnographic
Etienne Van De Walle- "Characteristics of African Demographic
Trends in Under-Developed Regions
Data." In The Demography of
in Italy. In Studies on Mortality
Tropical Africa editors W.I. Brass
and Social Mobility, Proceedings of
et al, Princeton University Press,
International Symposium, Hungarian
1968.
Academy of Science, Budapest.
edited by Egon Zentgraf et al,

- Etienne Van De Walle- "The Relationship Between Population
Change and Economic Development in
Tropical Africa." In The Population
of Tropical Africa edited by
J.C. Caldwell and C. Okonjo,
Longmans, Green and Co. Ltd.,
London, 1968.
- Eugene B. Brody - "Migration and Adaptation." In
American Behavioral Scientist Vol. 3,
No. 1, September.
- Eversley, D.E.C. - "Population Changes and Regional
Policies since War." In Regional
Studies Vol. 5, Pergamon Press,
Great Britain, 1970.
- Fearn, H. - "Population as a Factor in Land
Usage in Nyanza Province of Kenya
Colony." In East Africa Agriculture
Journal, Vol. 20, January, 1955.
- Federici, N. - "Migration and Its Demographic
Impact in Under-developed Regions
in Italy." In Studies on Fertility
and Social Mobility, Proceedings of
International Symposium, Hungarian
Academy of Science, Budapest.
edited by Egon szabady et al,

- Gaisie, S.K. - November 20-30, 1962. Population Growth
- Freedman Ronald - "Norms for Family Size in Under-
developed Areas". In, Readings on
Population edited by D.M. Heer,
Prentice-Hall in/Englewood Cliffs,
New Jersey, 1968.
- Gaisie, S.K. - "The Sociology of Human Fertility."
Freedman Ronald - In: Social Demography, edited by
Thomas R. Ford and G.S. de Jong,
Prentice-Hall, Englewood Cliffs, N.J.
1970.
- Friedlander, D. - "Estimating Fertility Levels in Ghana."
Gilmour, H.G. - In: The Population of Tropical
Africa edited by J.C. Caldwell and
C. Okonjo, Longmans, Green and Co.
Ltd., 1968.
- Friedlander, D. - "Demographic Responses and Population
Gambonik, H. - Change." In: Demography, Vol. 6, No. 4,
November, 1969.
- Friedlander, D. and Roshier, R.J. - "A Study of Internal Migration in
England and Wales." In Population
Studies Vol. 19, 1965-66, pp. 239-252.

- Gaisie, S.K. - "Dynamics of Population Growth in Ghana." In Ghana Population Studies No. 1, Legon, Demographic Units, Department of Sociology, University of Ghana, 1969.
- Gaisie, S.K. - Demographic Prospects for Tropical Africa for the next 30 years.
- Gulzar Jamal
- Ghansah, D.K. - "Population Policies in Africa South of Sahara." In Rural Africana No. 14, edited by David Radcliff, African Studies Centre, Michigan State University, 1971.
- Hance William
- Gilmour, M.G. - Some Aspects of Residential Mobility in Urban Social Space (M.A. Thesis) in Department of Geography, McGill University, 1969.
- Hanjral John
- Glass, D.V. and Grenbenik, E. - "The Trend and Pattern of Fertility in Great Britain." part I H.M.S.O. 1954, London, pp. 271-283.
- Golberg David M. - "The Effects of Fertility of Two Generation Urbanites." In Population Studies, No. 17, pp. 214-222. Princeton Population Studies, No. 8, Oxford, Ohio, 1954.

- Göttlieb Mannelson - "The Theory of Optimum Population
for a closed Economy." In and Cliffs,
Population Theory and Policy
Heenan, L.D.B. -- edited by J.J. Spengler and
O.D. Duncan, The Free Press of
Glencoe, 1956.
- Gulzar Jamal - "An Analysis of Social Facility
Provision in Uganda." In East
Heen, E.H. -- African Geographical Review, No. 10,
April, 1972.
- Hance William - Population Migration and Urbanization
in Africa, New York, Columbia
Heen, E.H. -- University Press, 1970.
- Hanjnal John - "The Prospects of Population
Forecast." In Journal of the
American Statistical Association,
1955, pp. 309-322.
- Harris, C.W. - Problems of Measuring Change,
Madison, Wisconsin, 1963.
- Harris Dorothy L. - "Comparative Population and Urban
Research via Multiple Regression
and Covariance Analysis." In Social
Cripps Foundation Studies, No. 8
Oxford, Ohio, 1954.

- Hartley S. Foster - Population Quantity versus Quality.
Prentice-Hall inc. Englewood Cliffs,
New Jersey, 1972.
- Heenan, L.D.B. - "Rural-Urban Distribution of
Fertility in South Island, New
Zealand." In Annals of Association
of American Geographers Vol. 57,
No. 4, December, 1967. Planning.
- Heer, D.M. - "Abortion, Contraception and
Population Policy in the Soviet
Union." In Demography 2, 1965,
pp. 531-539.
- Heer, D.M. - Demographic Determinants of
European Population Growth In
Readings on Population. Alex
Inkoles editor, Prentice-Hall,
Englewood Cliffs, N.J. 1968.
- Heisel, D.F. - "Attitudes and Practice of
Contraception in Kenya." In
Demography Vol. 5, No. 2, 1968,
pp. 632-641.
- Heisel, D.F. - "Rapid Population Growth, Some Social
and Political Implications" - A
Seminar organized by Family Planning,
Heinemann Educational Books, 1972.

- Moed Christopher - Association of Tanzania, Dar-es-Salaam, 1968.
- Heisel, D.F. - "Measuring Current Population Changes." In Institute for Development Studies, University of Nairobi, 1966.
- Heisel, D.F. - "The Rate of Population Change as a variable in Development Planning." A seminar Paper at Institute for Development Studies, University of Nairobi, 1966.
- Homer, C. H. - "Second Thoughts on Sudan's Population Census." In The Population of Tropical Africa edited by J.C. Caldwell and G. Okonjo, Longmans, Green and Co. Ltd., 1968.
- Johnston, R.G. - "A Culture Theory of Population Trends." In Journal of Political Economy, October, 1930.
- Hirst, M.A. - "Population Growth in Mainland Tanzania 1948-1957." In Population Growth and Economic Development edited by S.H. Ominde and C.N. Ejiogu, Heinemann Educational Books, 1972.

- Hood, Christopher - "Gathering Vital Statistics in Africa; A preliminary Report on the Recording of Births and Deaths in Tanzania." In Rural Africana No. 14, edited by David Radel, African Studies Centre, Michigan State University, 1971.
- Johnston, R.J. - "The Role of Migration in Population Change among the Aged." In American Sociological Review, Vol. 19, April, 1954, p. 194.
- Homer, C. Hitt
Johnston, R.J. - "Fertility, Social Mobility and Urban Migration in Brazil." In Population Studies No. 14, 1961, pp. 182-189.
- Hutchison, B. - "Central Places and the Settlement Pattern and some Aspect of Social Geography in Nidderdale." (M.A. Thesis) University of Manchester, 1964, unpublished.
- Johnston, R.C.
Kent, P.H. - "A Reconnaissance Study of Population Change in Nidderdale 1951-1961." In Transaction of Institute of British Geographers, 1967, pp. 113-123.
- Keyfitz Nathan

- Johnston, R.J. - "Components and Correlates of Increasing Victorian Population Change: Vital 1954-1961." In: Australian Geographical Studies; Vol. 15, May 1967, pp. 165-181.; pp. 149-165.
- Johnston, R.J. - "Components of Rural Population Change." In: Town Planning Review 36, 1966, pp. 279-293. and Response
- Kingsley Davis - "Rural Population Changes." In: Australian Geographical Studies, 1963. Vol. 9. and the Theory of Population."
- Johnston, R.J. - "Estimating Population Size and Growth from Inadequate Data." In International Science Journal Vol. XVII, No. 2, 1965, Population
- Kingsley Davis - Studies, p. 296. The Demography of
- Kent, P.E. - "The Country around Kayirondo Gulf of Nyansa." In: Geographical Journal 1942, pp. 22-31.
- Kingsley Davis - "Changes of Birth and Death Rates and their Demographic Effects." In Rapid Population Growth Consequences and Policy Implications Vol. II, An Research Papers." In Economic
- Keyfitz Nathan
- Kingsley Davis and Blake, J.

- Keyfitz Nathan - Population Trends in Newly Developing Countries in Population. The Vital Revolution. edited by R. Freedman; Garden City, New York, Doubleday Anchor Books, 1964; pp. 149-165.
- Langlands, M.H.
- King Leslie J. - Statistical Analysis in Geography,
- Lars Bondesen - Englewood Cliffs, N.J., 1969. In
- Kingsley Davis - "The Theory of Change and Response in Modern Demographic History." In Population Index No. 74, October, 1963.
- Kingsley Davis - "Malthus and the Theory of Population." In Language of Social Research edited by P.F. Lazarsfeld and
- Logan, W.P.D. - Morris Rosenberg, The Free Press of Glencoe, 1955. Public
- Kingsley Davis - The Human Society. The, McMillan Co. New York, 1949; pp. 557-561.
- Kingsley Davis - "A Crowding Hemisphere Population Change in the Americas." In Annals of American Academy of Political and Social Sciences Vol. 316,
- Martin, C.J. - March, 1958. Discussing Fertility in
- Kingsley Davis and - "Social Structure and Fertility: An
- Blake, J. Analytical Frameworks" In Economic

Development and Cultural Change,

April, 1956, p. 211.

- Langlands, B.W. - "The Population Mapping of Uganda."
In East African Geography and Economic Development edited by S.H. Ominde.
- Lars Bondestam - "Population Growth in Kenya." In "Research Report No. 12. The Scandinavian Institute of African Studies, Uppsala, 1972.
- Hodgson, J.D. et al. - "Population Change in Northern New England." In "A.A.A.G. Vol. 62 No. 2, June, 1972."
- Lewis K. George - "Social Class Variations in Mortality." In Public Health Report Vol. LXIX No. 12, December, 1954, pp. 127-132.
- Logan, W.P.D. - "Population Changes and Functioning Regions." In "Journal of the Town Planning Institute, 50, 1964, pp. 21-31.
- Moulding, B.F. - "A Method of Measuring Fertility in Under-developed Countries where Birth Registration is non-existent"
- Lomas, G.M.
- Millan, R.H.
- Martin, C.J.

- Mitchel, J.C. - or defective. In Proceedings of the World Population Conference, Rome, 1954, Vol. IV, p. 384.
- Martin, C.J. - "Some Estimates of the General Age Distribution, Fertility and Rates of Natural Increase of African Population of British East Africa." In Population Studies VII, G. Caldwell pp. 181-199, 1953.
- Masisco, J.J. et al - "The Effects of Labour Force and Participation and the Relation between Migration Status and Fertility in San Juan Puerto Rico." In Milbank Memorial Fund Quarterly, 48. Social Change in the Kano Plains."
- Maulding, W.P. - "Estimating Rates of Population Growth" - A paper presented at the International Conference on Family Planning Programmes, Geneva, 1965.
- Notstein Frank W. - Settlement Change and Challenge on Kano Plains. In Department of Geography, University College, Nairobi, 1967. (The American Anthropologist) Oxford University Press, 1966.

- Mitchel, J.C. - "An Estimate of Fertility in Some Yao Hamlets of Liwonde District of Southern Nyasaland." In Africa, XIX, October, 1949, No. 2.
- Morgan, R.W. - Fertility Level and Fertility Change in Nigeria In Population Growth and Socio-Economic Change in West Africa edited by J.C. Caldwell et al, 1971. Nairobi.
- Morgan, W.T.W. - Population of Kenya Density and Distribution, Oxford University Press, 1966.
- Ogot, E.A. - Report on the Human Environment Kenya, Nairobi, 1971.
- Ogugo, Benedict P. - "Problems of Rural Development in Kenya - A Sociological Case Study of Social Change in the Kano Plains." In Republic of Kenya, National Report on the Human Environment Kenya, Nairobi, 1971.
- Ogugo, S.H. - Some Economic Aspects of Population Change in Developing Countries: In Population Dilemma for Latin America, edited by J. Mayone Stycos and Jorge Arias, The American Assembly Columbia University Press, 1966.

- Ojany, F.F. - "The Physique of Kenya - A Contribution in Landscape Analysis."
In Annals of the Association of American Geographers Vol. 56, No. 2, June, 1966, pp. 183-196.
- Ogendo, R.B. - "Notes on Ecological Regions of Kenya." - Unpublished lecture notes, in the Department of Geography, University of Nairobi, 1970.
- Ogot, B.A. - The History of the Southern Luos.
- Ogungo, Benedict P. - Migrant Labour in Miwani Sugar Estate and its Effect on Neighbouring Locations. Unpublished (B.A.) dissertation, Department of Geography, University of Nairobi, 1971.
- Ominde, S.H. - "Some Aspects of Land and Population Problems in the Lake District of Western Kenya." In East African Academy Symposium, 1963, Mimeo.
- Ominde, S.H. - "Land and the Population in Western District of Nyansa Province." Ph.D. Thesis. (London), April, 1963, In University of Nairobi Library.

- Ominde, S.H. - "Notes on the Scope and Limitations of Population Census Data in Kenya."
- Peacock, A.T. - In Department of Geography, University of Nairobi, 1973.
- Ominde, S.H. and C.N. Ejiogullian - Population Growth and Economic Development in Africa, Heinemann Publishers, London, 1972.
- Ominde, S.H. and Ojany, F.F. - "The Kano Plains - A Geographical Challenge." In African Scientist edited by T.R. Odhiambo, East African Publishing House, Nairobi, 1969, pp. 52-55.
- Osborne, R.H. - "A General View of Population Change in the Middle Trent Countries 1801-1861." In The East Midland Geographers, Vol. 5, part I and 2, R.H. No. 33, 34, June-December, 1970.
- Paris, J.D., R.G. - "Regional/Structural Analysis of Population Changes." In Regional Studies, Vol. 4, Pergamon Press, Great Britain, 1970.
- Republic of Kenya - "Theory of Population and Modern Economic Analysis." In Population Theory and Policy edited by

- J.J. Spengler and O.D. Duncan,
The Free Press of Glencoe, 1956.
- Penrose, E.F. - Population Theories and their Application, Stanford University, 1934.
- Petersen William - Population, The McMillan Co., New York, 1961.
- Petersen William - "Internal Migration and Economic Development, in North America." In Annals of the American Academy of Political Science, Vol. CCXVI, March, 1958, pp. 52-59.
- Prothero, R.M. - "Continuity and Change in African Population Mobility." In Geographers and the Tropics: Liverpool Essays, edited by Steel, R.W. and Prothero, R.M. 1964., University of Nairobi.
- Ravenstein, E.G. - "The Laws of Migration." In Journal of the Royal Statistical Society, XLVIII, pp. 169-235.
- Republic of Kenya - Kenya National Report to the United Nations on Human Environment, Co. Government Printers, Nairobi, 1973, pp. 1-8.

- Richards, A.T. and Reining, P. - "Report of Fertility Surveys in Buganda and Buhaya, 1952." In Culture and Human Fertility UNESCO, 1954. edited by F. Lorimer, p. 403.
- Ritchney, P. Neal et al - "Residence Background and Migration and Fertility." In Demography, Vol. 19, No. 2, May, 1972, pp. 217-230.
- Roderick Von Ungern Sternberg - "The Causes of the Decline in the Birth Rate within European Spheres of Civilization, Cold Spring Harbour, New York, August, 1931.
- Schmitt Robert C. Roger Van Zwanenberg - "A History of Population Growth in Kenya and Ugand." Working Paper No. 91 In Institute for Development Studies, University of Nairobi, March, 1973.
- Scott Christopher Romaniuk, A. - "Infertility in Tropical Africa." In The Population of Tropical Africa edited by J.C. Caldwell and C. Okonjo, Longman, Green and Co. Ltd., 1968.

- Royal Commission on Population - "The Economic Consequences of the Present Trend of Population." In Royal Commission on Population, 1950 Vol. III, Report of Economic Committee (London) H. M. S. Office, 1950. pp. 53-107.
- Saggerson, E.P. - The Geology of the Kisumu District Report No. 21, Government Printer, Nairobi. Nairobi Geographical Review,
- Sauvy Alfred - A General Theory of Population printed in Great Britain by Trinity Press, Worcester and London, 1969. Notes 1952-1954. In
- Schmitt Robert C. - "Short-cut Methods of Estimating Country Population." In Journal of the American Statistical Association, June, 1952, pp. 232-238.
- Shyrock, H.S.J. and Laurance - "Vital Rate Surveys in Tropical Africa. Some New Data Relevant to Sample Design." In The Population of Tropical Africa, edited by J.C. Caldwell and C. Okonjo, Longmans, Green and Co. Ltd., 1968. In Demography Vol. 6, No. 2, May, 1969, pp. 101-116.

- Scott, C. and Sabah, G. - "The Historical Calendar as a Method of Estimating Age; The Experience of Moroccan Multipurpose Sample Survey of 1961-1963." Demography Population Studies XXIV, March, 1970, pp. 93-107.
- Seigel Jacob et al Soja, D.W. - "Accuracy of Post Censal Estimates of Population for States and Cities." In American Sociological Review, Vol. 9, No. 4, August, 1954, pp. 440-441.
- Sheppard, J.A. - "Rural Population Changes in New South Wales, 1921-1954." In Australian Geographer Vol. IX, No. 13, March, 1964, p. 156.
- Shyrock, H.S.J. and Lawrance - "The Cultural Status of State and Local Population Estimates in Census Bureau." In Journal of the American Statistical Association 44 (2461) June, 1949, pp. 151-173.
- Southall, A.W. - "Some Aspects of the Use of Birth Expectations Data from Sample Survey for Population Projection." In Demography Vol. 6, No. 2, May, 1969, pp. 101-116.

- Southall, A.W.
Sigurdur
- Thorarinsson
- Smith, T.L. and
Zopf, P.E.
- Soja, E.W.
- Spongler, J.F.
- Som, R.K.
Georgel W. Murray
- Stebbins, G.W.
- Southall, A.W.
- Speck, J.M. and
George Arino
- "Population Changes in Iceland." In The Geographical Review, Vol. Ll, 1961, pp. 519-533.
- "The Numbers and Geographic Distribution of Population." In Demography: Principles and Methods. Davis Co. Ltd., Philadelphia, 1970.
- The Geography of Modernization in Kenya - A Spatial Analysis of Social, Economic, and Political Change. Syracuse Geographical Series No. 2, Syracuse University Press, 1968.
- "Some Demographic Indicators for Africa." In The Population of Tropical Africa edited by J.C. Caldwell and C. Okonjo, Longmans, Green and Co. Ltd., 1968.
- "Population Movements in East Africa." In Essays in African Population edited by K.M. Barbour and R.M. Prothero, London, Routledge and Kegan Paul Publishers, 1961, pp. 157-197.

- Southal, S.A. - "The Demographic and Social Effects of Emigration on the Population of East Africa." In World Population Conference Proceedings Vol. IV, United Nations, New York, 1965.
- Spengler, J.J. - "Values and Fertility Analysis." In Readings on Population edited by David M. Heer, Prentice-Hall inc/Englewood Cliffs, New Jersey.
- Spengler, J.J. - "Malthus Total Population Theory; A Restatement and Appraisal." In Canadian Journal of Economics and Political Science XI, 1945, pp. 83-110.
- Spiegel R. Murray - "Theory and Problems of Statistics:" Schaum's Outline series, McGraw-Hill Book Co. 1961.
- Stolnitz, G.J. - "Mortality Declines and Age Distribution." In Milbank Memorial Fund Quarterly XXXIV, 1956, pp. 178-215.
- Stycoos, J.M. and Jorge Arias - "Population Dilemma in Latin America" Washington D.C. Potemac Books, inc. Publishers. 1966. pp. 59-64.

- Sytek William
United Nations S.
and ...
E.A.I.S.R. Conference, 1965.
Thomas Dorothy S.
- "Internal Migration in Sweden;
A Note in their Extensiveness as
compared with Net Migration Gain
or Loss." In American Journal
of Sociology XL II pp. 345-357,
1936.
Thomas I.D.
United Nations
- The Relevance of Population Density
Paper No. 530 Kampala, Makerere
Institute of Social Research, 1960.
Thomlinson Ralph
United Nations
- "The Determination of a Base
Population for Computing Migration
Rates." In Milbank Memorial Fund
Quarterly Vol. XL No. 3, July,
1962, pp. 356-366.
Thomlinson Ralph
United Nations
- Population Dynamics Causes and
Consequences of World Demographic
Change, Random House, New York, 1965.
Thomlinson Ralph
United Nations
- "Methodological Needs in Migration
Research." In Population Review
Vol. VI No. I, January, 1962,
pp. 59-64.

- Thompson Warren S. - Population Problems. McGraw-Hill Book
and Lewis, D.T. Company, 5th edition, 1970.
- Trewartha Glenn T. - A Geography of Population, World
Patterns, John Wiley and Sons,
inc. 1959.
- Trewartha, G.T. and - "Population Distribution and Change
Zelinsky, W. in Korea 1925-1949." In
Geographical Review Vol. 45,
January, 1955 No. I pp. 1-26.
- United Nations - The Future of World's Population
In ST/SOA/SER/28 Sales No. 58:
XIII:2, New York.
- United Nations - Manual III, Methods for Population
Projection by Sex and Age; ST/SOA/
SER A/ Population Studies No. 25,
United Nations, New York, 1956.
- United Nations - Manual IV, Methods of Estimating
Basic Demographic Measures from
Incomplete Data In ST/SOA/SER/42;
New York.
- United Nations - "History of Population Theories."
In Population Theory and Policy,
edited by J.J. Spengler and
O.D. Duncan, The Free Press of

- Glencoe, 3rd edition, 1963.
- United Nations - "The Ageing of Populations." In Population Studies No. 26, Population ST/SGA/NER A/26, New York, 1956.
- United Nations - "Progress in Reduction of Mortality." In Population Bulletin No. 6, 1962, Sales No. 62.XIII:2, New York.
- Umoh, O.E. - "Demographic Statistics in Nigeria." In Population Growth and Economic Development in Africa (edited by S.H. Ominde and C.N. Ejiogu), Heinemann publishers, 1972.
- Von Nort Leighton - "Demographic Transition Re-examined." In American Sociological Review XX, 1956, pp. 523-27.
- Waller, P.P. et al - Basic Features of Regional Planning in the Region of Kisumu, Kenya; Deutsches Institut für Entwicklungs politik, Berlin, 1968.
- Webb, J.W. - "The Natural and Migrational Components of Population Changes in England and Wales 1921-1931." In Economic Geography Vol. 39, 1963, pp. 130-148.

- Westoff, C.F. - "The Changing Focus of Differential Fertility Research: The Social Mobility Hypothesis." In Population Theory and Policy, edited by J.J. Spengler and O.D. Duncan, The Free Press of Glencoe, 3rd edition, 1963.
- Whisson Michael - Change and Challenge: Luos Societal and Economic Structure Printed by Acme Press, Ltd., Nairobi.
- Wilks Yorick - "Family Planning or Tribal Planning." In Cambridge Review Vol. XCII, No. 2198, October, 1970.
- Willats, E.C. and Newson, M.G.C. - "The Geographical Pattern of Population Changes in England and Wales 1921-1951." In Geographical Journal Vol. 119, December, 1953, pp. 431-454.
- Wilson, M.G.A. - "Differential Fertility." In Population Geography, Nelson Publishers, Australia, Ltd., 1968, or Times Printers, Singapore.
- Wilson, M.G.A. - "Patterns of Population Distribution and Density." In Population

Geography: Nelson Publishers,
Australia Ltd., 1968.

- Withington, W.A. - "Migration and Economic Development
- Some Recent Spatial Changes in
the Population of Rural Sumatra
Indonesia." In Tijdschrift
Voor Economische en Sociale
Geografie Vol. 58, 1967, pp. 153-163.
- Yates, F. - Sampling Methods for Censuses
and Surveys: 3rd edition, Charles
Griffin and Co. Ltd., Publishers,
London, 1960.
- Zacharia, K.C. et al- "Basic Demographic Measures of
Algeria." In Demographic Measures and
Population Growth in Arab Countries
Research Monograph Series No. 1.
Cairo Demographic Centre, 1970,
S.O.P. Press, Cairo.
- Zelinsky Wilbur - "Changes in the Geographic Patterns
of Rural Population in the U.S.A.
1790-1960." In Geographical
Review, Vol. 52, 1962, pp. 492-524.