POPULATION CHANGE IN CENTRAL SOUTH-MAMPRUSI, NORTHERN GHANA

Thesis for the Degree of M. A.

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ABSTRACT

POPULATION CHANGE IN CENTRAL SOUTH-MAMPRUSI, NORTHERN GHANA

by John S. Nabila

Population change is a dynamic equilibrium between forces of increment and forces of decrement. Thus, change in the population of any country or place can only happen in two possible ways; through reproductive change (natural increase) and/or net migration.

One of the most important demographic facts about a population is its rate of change. How the population of a locality, a region or a state changed to be what it is today in comparison with those of other areas and how its population may be at some future date is one of the major concerns of geographic analysis.

The present study focuses its attention on population change in Central South-Mamprusi, Northern Ghana, during the twentieth century. The analysis centers on the components of population change with emphasis on the mechanisms by which the change took place.

For the early period population change was accounted for at the local council aggregate level, that is, considering Central South-Mamprusi together. For the period between 1948 and 1960 the enumeration areas of the 1960 Ghana census were utilized in an attempt to account for differential population growth patterns. Simple and multiple regression analyses were the basic statistical techniques employed in estimating the relationships between population growth and thirteen selected independent variables which

are directly or indirectly related to population change.

Central South-Mamprusi forms part of the Voltaic family and linquistically belongs to the Mole-Dagbani association which covers a major part of Northern Ghana and Upper Volta. The study area is known to have been settled for a very long time, perhaps before the neolithic period.

One of the major aspects of the area's human geography is its peopling by small groups from further North, beginning about the 15th century. These immigrants from the North developed a system of traditional authority and today there is a hierarchy of chiefdoms. This system of authority has been of paramount importance in considerations of the general development of the area, including trends in population growth and distribution.

Though earlier censuses were not very accurate, they do indicate that population has been increasing in South-Mamprusi since 1900. At the turn of this century both birth rates and death rates were very high. The occurrences of epidemics, such as the influenza epidemic in 1918, cerebro spinal menengitis in 1921 and sleeping sickness in the 1930s, raised death rates. However, the establishment of health centers coupled with the control and eradication of the epidemics has helped in considerably reducing mortality rates, especially infant mortality.

There has been a general desire for children to help in the subsistence economy, hence until quite recently children were regarded as an economic asset. This factor, for a very long time, tended to raise fertility levels. Indeed, the customs and religion of the people do favor high fertility. Thus, though the death rates were high, the population continued to increase considerably. Between 1911 and 1921 it increased by 54.3 per cent while between 1931 and 1948 it increased by 34 per cent. The reduced

growth rate in this latter period was caused by the sleeping sickness epidemic. Between 1948 and 1960 there was an increase in population of about 54 per cent, thus giving an intercensal growth rate of about 3 per cent per year.

In an attempt to understand the factors that account for population change, it was hypothesized that traditional authority, density of population, education and urbanization, have direct relationships with population change while distance from main roads and urban centers have inverse relationships with population change. The results of the multiple regression model supported the hypotheses formulated at the beginning of the study. Cultural considerations, namely traditional authority and related subjects are the most important factors directly associated with population change. Density of population, urbanization, internal migration, and immigration from neighboring African countries were also found to be important factors affecting population growth. Long distance emigration from South-Mamprusi was found to be insignificant.

It was, however, difficult to explain from the results of the multiple regression model or the data available to the author, the specific contributions of the major components of population change, namely, reproductive change and net migration. This was largely due to lack of any relevant data on the vital statistics of South-Mamprusi.

POPULATION CHANGE IN CENTRAL SOUTH-MAMPRUSI, NORTHERN GHANA

By

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PREFACE

The author takes this opportunity to express his gratitude to the Paramount Chief, Divisional Chiefs -- his father being one of them -- and people of Central South-Mamprusi for their cooperation during his field work.

Appreciation is also expressed to Dr. K. B. Dickson, Dr. George Benneh and Mr. S. K. Gaisie, all of the University of Ghana for the initial help they gave in directing the author's field research.

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CHAPTER I

INTRODUCTION: THE PROBLEM AND STUDY AREA

Definition of Population Change

Population change is a dynamic equilibrium between forces of increment and forces of decrement. Thus, change in the population of any country or place can only happen in two possible ways: through reproductive change (often called natural increase)[1] and net migration. Reproductive change is the balance between births and deaths while net migration is the balance between in-migration and out-migration.

According to Bogue, if we know the population count as of a particular date and keep track of the number of occurrences of each of these four components of growth, we can calculate the population of any later date. By using the demographic book-keeping equation, this can easily be worked out, for example:

$$Pt = Po + (B-D) - (Mi-Mo)$$

Where Pt is the later population count, Po is the earlier population count; B= births during interval between Pt and Po; D - deaths

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[1]Reproductive change is not a more "natural" source of change in comparison with births and deaths. Besides the net effect of fertility and mortality is not always to increase population. Hence, the term, "natural increase," is a complete misnomer: Bogue, Donald J., Components of Population Change, 1940-50; Estimates of Net Migrations and Natural Increase for Each Standard Metropolitan Area and State Economic Area. Scripps Foundation, 1957, p. 1.

deaths between the two periods; Mi and Mo = in-migration and out-migration respectively, for the interval between Pt and Po.[2]

Theories of Population Growth

Theories of population have been suggested by many people in an attempt to explain the main influences, especially with respect to fertility, of population growth. Coontz has classified these theories into three categories: biological, cultural and economic.[3]

Biological theories stress that the law regulating human population growth is basically the same as that regulating the growth of plants and animals. This view which relates fertility to nutrition and density has found different exponents in the last two centuries. De Castro, for instance, hypothesized that there is an inverse relationship between protein intake and human fertility. In his analysis, he associated low productivity and high productivity to hunger, especially specific hunger of proteins, minerals or vitamins.[4]

Cultural theories of population growth emphasize the role of man's character and culture in influencing his fertility. Declining fertilities in advanced countries is said to be due to the influence of desires for higher social and economic status and for more luxuries and pleasures in life. More often than not, many people have suggested increased education

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[2]Bogue, Donald J., Principles of Demography. John Wiley and Sons, 1969.

[3]Coontz, S. E., Population Theories and their Economic Interpretation, Routledge and Paul, London 1957.

[4]de Castro, Josu, Geografia da fome, (Geography of Hunger). Livraria - Editora da Casa do Estudiante to Brazil, Rio de Janeiro, 1953.

and urbanization as determinants of fertility decline in some parts of the world, especially in the advanced nations.

Economic theories of population growth emphasize the significance of economic relations in social change. It has often been suggested that there is an inverse relationship between social status and fertility. Conditions of fertility, migration and geographical distribution of population are regarded as being essentially responses to economic conditions. Stressing the role of economic factors, Zelinsky suggests that the economic characteristics of an area exert a much more direct effect upon its population than do its physical characteristics.[5]

Content of Population Geography

Population geography has been described as the empirical, spatial and mathematical study of human populations. It focuses its attention areally on three readily observable human phenomena: (1) change in population size (growth or decline) (2) the composition of the population and (3) the distribution of population in space. It is interested in how the size, composition and distribution of population vary throughout space, whether at present or through time. Thus, population geography is concerned with demonstrating how spatial variations in change, composition and distribution of populations are related to spatial variations in the nature of places. A place in this context, may be a territory of any extent from a minute area to the entire surface of the earth.[6]

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[5]Zelinsky, Wilbur, A Prologue to Population Geography, Prentice-Hall, Inc., New Jersey (1966), p. 34.

[6]Thomas, Robert N., Seminar notes on population geography, Geo. 804.

Therefore, the study of population change is a legitimate field for geographers. How the population of a locality, a region, a state, or even a continent, changed to be what it is today in comparison with those of other areas, and how its population may be at some future date, is one of the major concerns of geographic analysis. Trewartha has remarked that,

> "....any comprehensive geographical analysis of a region should take into consideration, factors of differential population growth rates, both as it applies to areas beyond, and outside the region in question, and likewise, to the several localities which comprise the region. Both inter-regional and intra-regional contrasts in differential rates of growth carry in their train economic and political and social consequences which the student of social and cultural phenomena may not ignore."[7]

Purpose and Scope

This is a study of the change of population in Central South-Mamprusi, Northern Ghana. The study focuses on the changing patterns of population growth, especially in the 20th Century. An attempt is made to account for the factors which affect population change (growth or decline) in South-Mamprusi. In this way, the author gives an account of differential growth rates in the various Census Enumeration Areas which constitute the study area.

In the analysis, the study will try to answer the following questions:

1. What are the major components which are responsible for population change?

2. Which are the areas with high population growth rates and why?

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[7]Trewartha, Glen T., "A Case for Population Geography," Annals of the Association of American Geographers, Vol. 43, No. 2, 1953, pp. 71-79.

3. Which are the areas with declining population change rates and why?

4. What is the role of the traditional system of authority in population change?

5. What relationship exists between population changes in the various enumeration areas and the major economic activities carried out by the people?

6. What have been the conditions in population change during the post-1960 population census period?

The Study Area

Central South-Mamprusi has an area of 1,692 square miles and is 56 per cent of the whole of South-Mamprusi, which has an area of 2,996 square miles (Figure 1). Central South-Maprusi lies approximately between 10^{o} North and 10^{o} 40' North. Its boundaries are clearly defined by the White Volta-River Morago, River Nasia and the former Anglo-German boundary.

For the most part, the area lies between 400 ft. and 1,000 ft. above sea level, but rises to about 1,500 ft. in the eastern part of the area. Indeed, it is the dip slope of the Gambaga escarpment (Figures 2 and 3). Apart from a small area around Kpasenkpe, which overlies granite, the whole district lies on the Voltaian geological systems consisting of sandstones and shales. Light sandy soils are common and there are some silts and clay in the valleys.

The climate is Sudanese-type with a pronounced dry season, i.e., when there are no rains, during the period from November to March and a wet season which begins in March-April, and continues to October with a peak in August-September. In the dry season, from November to February, the "Harmattan" - a dry desiccating wind - blows more or less continuously from the north-east. The mean annual rainfall for the area is 45 inches. The natural vegetation is tree-savannah i.e., with tall grass and rather

LOCATION CENTRAL SOUTH MAMPRUSI (SHADED)

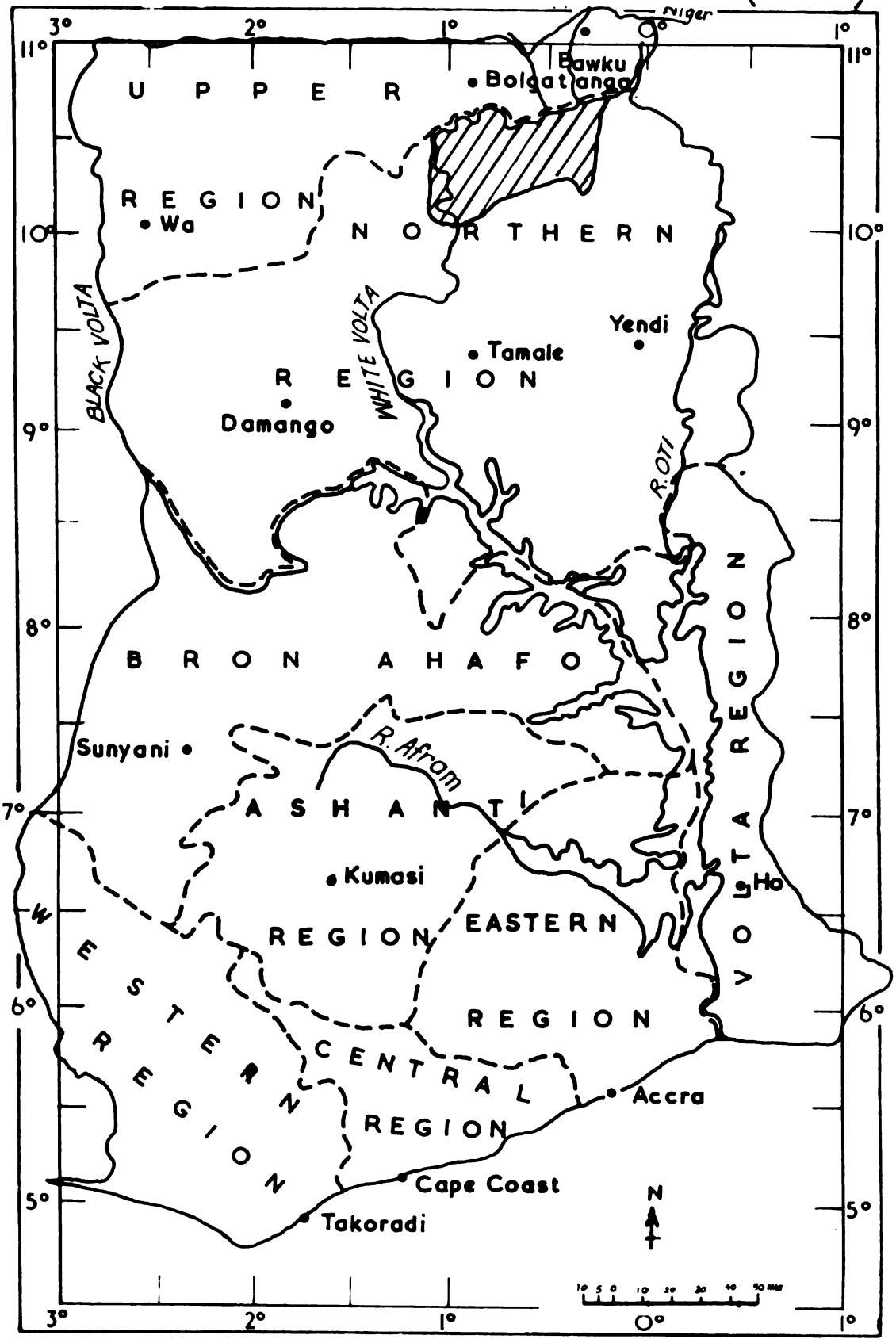

Figure 1

CENTRAL SOUTH MAMPRUSI
RELIEF AND DRAINAGE

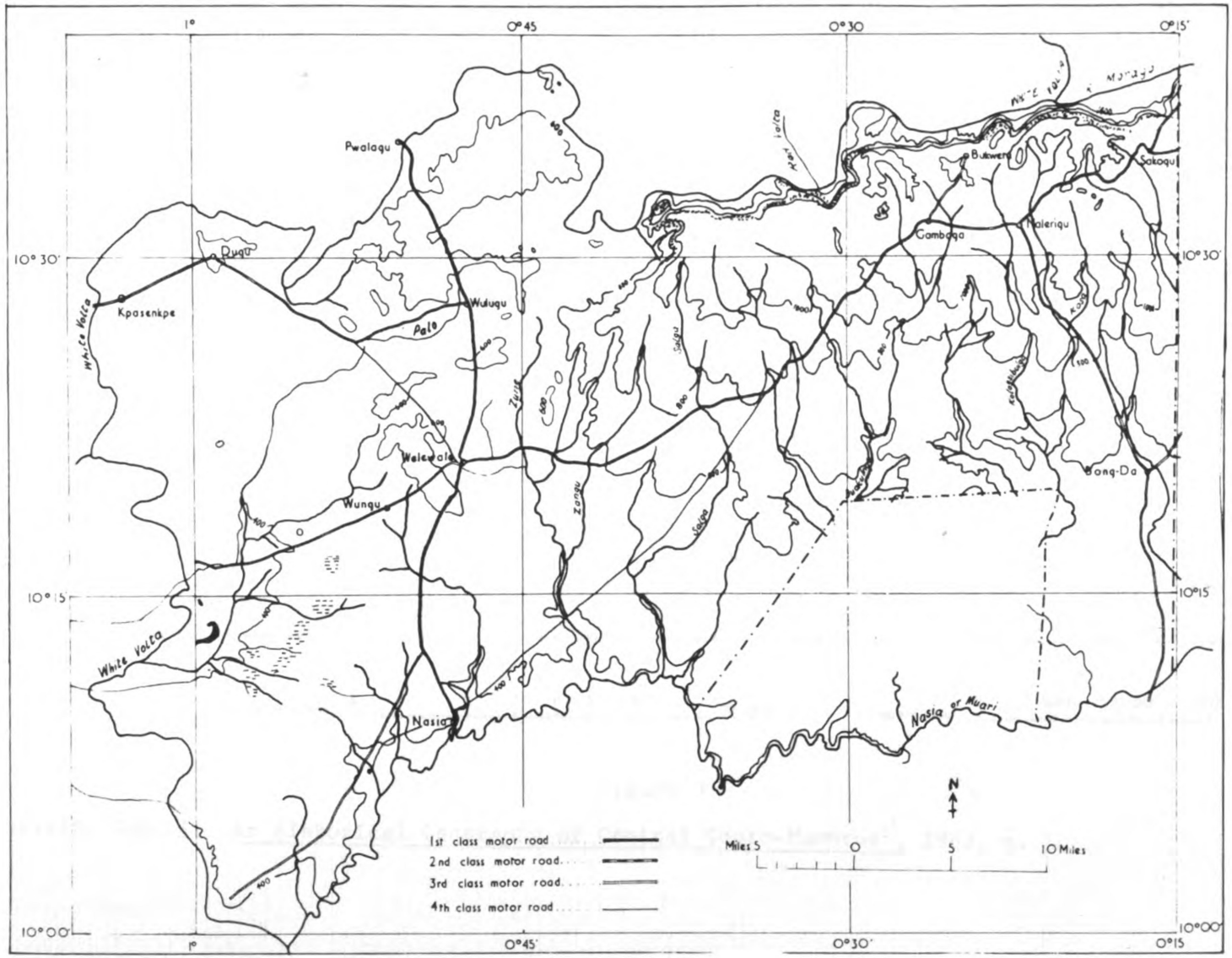

Figure 2

After Nabila, John S. An Historical Geography of Central South-Mamprusi, Legon, 1968, p. 1.

A CROSS SECTION OF THE GAMBAGA ESCARPMENT (ALONG 0° 17' W.)

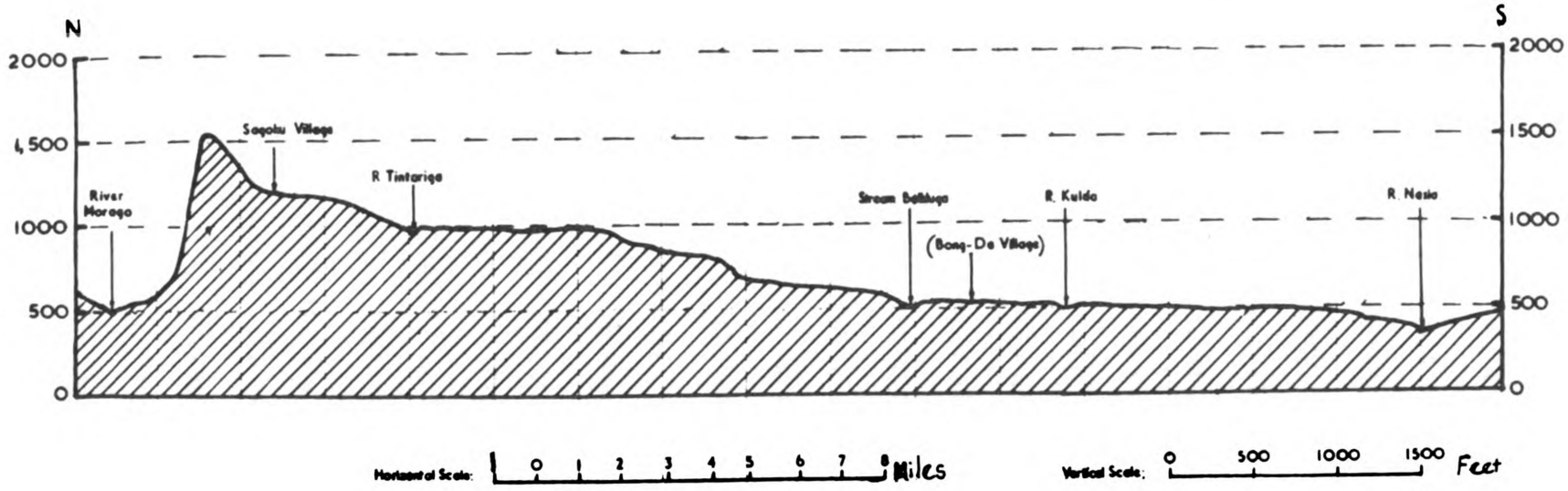

Figure 3

After Nabila, John S. An Historical Geography of Central South-Mamprusi, 1968, p. 1.

low trees. However, the vegetation has changed as a result of the activities of man, for example, farming and annual burning of the bush in the dry season. In fact, in almost all places, except along rivers, it is now a biotic climax vegetation of low grass and scattered trees.

Quite possibly the area was settled for a very long time, perhaps before the neolithic times. Starting from about the 15th Century it has experienced in-migration, especially from the north. Before the turn of this century the people acquired their wealth from entrepôt trade between the Western Sudanese states and Southern Ghana. This was supported by subsistence agriculture. When the trade dwindled at the beginning of the twentieth Century, especially after Bawku and Bolgatanga supplanted Gambaga and Walewale as commercial centers, the economy changed to one almost solely based on subsistence agriculture. Today, many agricultural innovations are being introduced, such as irrigation, the use of fertilizers, the use of farm machinery and the cultivation of cash crops like rice, tobacco, groundnuts and cotton.

The social and economic development of South-Mamprusi, just as other parts of Northern Ghana has lagged behind that of other areas in Southern Ghana. Hence, today there are not any significant urban centers. Indeed, the largest settlement, Walewale, had 4,493 in 1960; thus, it failed to qualify as an urban center according to the definition of the 1960 Population Census.[8] Within South-Mamprusi itself, or even considering its space relations with its immediate neighbors, the few rural-urban centers do render important commercial, medical, educational and other

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[8]The Ghana 1960 Census Reports defines an urban center as any settlement with a population of 5,000 people.

economic and social functions to the rural areas.

There were two major considerations in the choice of this study. In the first place, very little has been written on this area. The only writings on it are general works on Ghana as a whole, literature on only Northern Ghana and a few diaries of the former Colonial District Commissioners which primarily describe the routine activities of the officers. The author wrote a B.A. thesis on the historical geography of the area and the present study is a follow-up. It is hoped, by focusing on the human populace, especially how they have increased, that the two studies will, by and large, help in future related studies of the area. Secondly, the author comes from the area, a factor which made his field research relatively manageable within the resources and time available to him.

Content of the Study

Chapter II has been devoted to a review of literature on population change and related subjects. It is hoped that this will help to bring to light some of the factors that may account for population change in South-Mamprusi. In addition it should help in directing the major analysis of this study in terms of the hypotheses to be formulated as well as variables to be used for the study. Chapter III gives an account of the sources of data and methods used for the analysis. Chapter IV focuses attention on population change from 1900 to 1948, with an introduction on the peopling of the area; Chapter V gives an account of population change to the present. Finally, Chapter VI contains the summary and conclusions (findings and implications) of the study. A glossary has been provided at the end of the analysis to help the reader understand a few Mamprusi words used in the main text.

CHAPTER II

A REVIEW OF LITERATURE

A. General Concepts of Population Growth

One of the most important single demographic facts of a population is its rate of growth. For the rate at which a population grows affects not only its size and numerical increase but also its composition. Population growth is both cause and consequence of social and economic conditions in any society and is, therefore, a subject worthy of study that cannot be ignored. For a very long time the concept of population growth has received attention from many disciplines. Some of the known demographic theories developed in respect of this single factor about human populations have already been mentioned in Chapter I. Here a consideration is given to the important general ideas pertaining to population growth.

A few of the general concepts about the rate of population growth are discussed below. (a) The Malthusian theory postulates that population increases in a geometric ratio while subsistence increases in an arithmetic ratio. History has shown that Malthusian theory lacks the quality of universality and his critiques have often noted the factor of technology

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[1]Malthus, Thomas, Essays on the Principle of Population. 1789. London.

in food production.[2] However, his supporters point to the fact that food production could have a limit and the rapid growth of population could be a threat to the very existence of man. (b) The theory of logistic curve of population growth, formulated by Verhult in the first half of the nineteenth century but now usually associated with R. Pearl and G. V. Tule (1871) or R. Pear, and L. J. Reed (1920), states that growth is a function of the size and density of population itself. That is, with an increase in the size and density of a given population living in a constant environment, the birth rate will decrease and the death rate will increase, hence the rate of growth decreases. In addition, population size is limited by cultural conditions and technology of production.[3] This theory, just as the Malthusian theory, is under constant attack because of its deterministic flavor. Indeed, it fails to take into consideration possible changes in the technology in food production, level and changes of aspirations of mankind and changes in human reproductive patterns. (c) Ibn Khaldun and E. F. Wagemann feel that population growth is cyclical. To Khaldun, population change is a consequence of economic, political and socio-psychological conditions. He held that besides the actual situation expectation of men about productivity in the future played an important role in changing size of population. To Wagemann, improvements in technology of production would

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[2]Wrong, Denis, Population and Society. New York, Random House, 1962;

Bogue, Donald J., Principles of Demography. John Wiley & Sons, 1969.

[3]Spengler, Joseph J., and Otis Dudley Ducan (eds.), Population Theory and Policy. Illinois, The Free Press, Glencoe, 1956, pp. 30-32; Pearl and Yule: "The Growth of Population and the Factors Which Control It." The Journal of the Royal Statistical Society, LXXXVIII (1925), p. 38.

help the society to overcome the law of diminishing returns and thus enable population to grow larger. They all hold that at a certain point the advanced socio-economic conditions so created will result in de-population, which will in due course be replaced by overpopulation.[4]

(d) All the world's countries, as they develop and become modernized, pass through a series of changes in birth and death rates and, accordingly, in population growth rates.[5] This is the basic concept underlying the popular Demographic Transition Theory. It has a notion of a demographic development correlated with stages, from Pre-Industrial (Stage 1) to Pre-Western (Stage II) and finally to Modern Western (Stage III). Stage I is represented by the stability of population size caused by the balance of high, though fluctuating, death rates with high birth rates. During Stage II, population begins to experience the effect of industrialization and modernization. Improvement in nutrition and health standards helps bring the mortality rate down, while fertility rates remain high. The gap between mortality and fertility is widened, resulting in the rapid growth of population. Most of the emerging countries of Asia, Africa and Latin America are experiencing this imbalance at present. At the last stage, associated with advanced industrialization, preference for small families increases and consequently the fertility rate declines. Thus, a balance between fertility and mortality is again approached and the growth of population slows. Only the advanced industrialized countries have

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[4]Spengler and Duncan, op. cit., p. 8.

[5]Trewartha, Glenn T., "A geography of population Characteristics," in Geography of Population, Paul F. Griffin (ed.), Fedron Publisher, 1970, pp. 39-64.

reached this stage.[6] The three stages are sometimes labeled, with respect to the change in population size only, as High Growth Potential, Transitional Growth and Incipient Decline.

Many people have questioned the universality of this transition theory, especially whether it is applicable in the developing countries since it was developed after the pattern of population growth in Europe. The assumption was made that the contemporary developing world will follow the pattern which occurred in Europe in their process towards modernization. Past trends of population growth in many places do not conform to the theory, while those which conform to the model show variations in the timing and duration of successive stages of evolution. Also, the demographic and socio-economic conditions as postulated by the theory during Stage I were much different in the Asian and African countries in comparison with those in Europe.

Despite these shortcomings, the transition theory is an "ideal model" for scientific studies in various fields. The core of the model, despite the variations in real phenomena, is the change from balancing high mortality rate with high fertility to balancing low mortality with low fertility. This concept will be utilized for this study.

B. Population Growth in Ghana

Population growth in Ghana has been rapid, even by the standards of most of the developing countries. Between 1921 and 1960, Ghana as a

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[6] Wrong, Dennis, op. cit., 1962;
Bogue, Donald J., op. cit., 1969;
Coale, Ansley J., "How a population ages or grows younger," in Ronald Freedman, (ed.), Population: The Vital Revolution, New York, Doubleday and Co., Inc., 1964.

whole trebeled its population and between 1948 and 1960 the national growth was 63 per cent, that is, an intercensal growth rate of about 4.2 per cent per year.[7]

Thus, between 1948 and 1960, of the 69 Local Councils of Ghana (1960) there were 21 councils with vigorous population growth rates of 80 per cent increase and over, e.g., Sunyani, 115%; Tema, 1,400%; Accra, 166%; Kumasi, 166% of the rest, 25 councils had an average growth of 50-79 per cent increase while 23 councils had slack growth or absolute decline of 49 per cent increase and below.[8] Another striking feature is the growth in size and number of urban centers. During the intercensal period the urban rate of growth was more than double the rural rate -- 116 per cent and 52 per cent or 6.6 per cent and 3.6 per cent per annum respectively -- while the proportion of urban to total population rose from 17 per cent to 23 per cent.

Central South-Mamprusi falls within the third national category of population growth, that is, slack growth, with an intercensal growth rate of 52 per cent between 1948 and 1960. An analysis of differential growth rates in Mamprusi reveals that there are a few areas which fall within the first category. For example, Walewale, Langbinsi, Nagbo, and Burugu have growth rates of 139%, 127%, 124%, and 109% respectively;

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[7]Caldwell, John C., "Population Change," in Walter Birmingham, I. Heustadt and E. N. Omaboe (eds.), A Study of Contemporary Ghana, Vol. II. Some Aspects of the Social Structure, London, 1967, p. 78.

[8]Hunter, John M., "Regional patterns of population growth in Ghana 1948-69," in Essays in Geography for Austin Miller, J. B. Whittow and P. D. Wood (eds.), 1965, pp. 272-90.

while Zangu, Fio and Soo Daboya have growth rates of -4%, -7%, and -14% respectively.

C. Components of Change

An analysis of population change often involves an examination of the immediate components of change, namely, births, deaths and in- and out-migration. Each of the components is usually measured as a rate and the commonest are the "crude" rates: crude birth, death and migration rates. A crude rate is simply the number of events of a given type that occur in a year divided by the mid-year population. Usually this ratio is multiplied by 1000 to show the number of events per 1000 people. In algebraic terms, the crude birth and death rates are:

$$CBR = \frac{\text{total births}}{\text{midyear population}} \times 1000$$

$$CDR = \frac{\text{total deaths}}{\text{midyear population}} \times 1000$$

The crude rate of reproductive change is the balance between the crude birth rate and the crude death rate. In like manner, net migration can be obtained through the same process, thereby enabling us to arrive at the growth rate, that is, reproductive change plus net migration.[9]

The crude rates, though the simplest and commonest for population change analysis, are not adequate measures of change since they are calculated, especially in respect of births and deaths, without regard to sex and age composition of the population. The factor of sex and age composition

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[9] Bogue, Donald J., op. cit., 1969;
Kuczyski, Robert, The Measurement of Population Growth. New York, 1936;
Baclay, George, Techniques of Population Analysis. London and New York, 1958.

of the population. The factor of sex and age composition is eliminated by relating births and deaths to specific female and age groups. In this way, various fertility rates, for instance, are now in constant use for demographic analysis. A few of these are general fertility rate, age-standardized fertility rates, age-specific fertility rates, gross reproductive and net reproductive rates.[10]

From the above, it is quite evident that the availability of data on the components of change is of paramount importance for a sound analysis of population change. Such data can be obtained from vital statistics -- registers of births, deaths and migration, ---- and Census reports. Detailed demography of Ghana is not yet known. There is no information on fertility or mortality representative of the various sections of the country. Birth and death statistics are published regularly for a few of the major cities and towns, but they can hardly be held representative of vital rates in the country. Registration of births and deaths in many parts of Ghana, Mamprusi inclusive, is nonexistent. Indeed, most of the studies on the demography of Ghana have been based on either general reports of a few

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[10]Bogue, D. J. and Palmore, James, "Some empirical and analytical relations among demographic fertility measures with regression models for fertility estimation," Demography, Vol. 1, 1964, pp. 316-338;
Bogue, D. J. (1969), op. cit.;
Kyczynski, op. cit., 1936;
Ryder, Normal B., "Fertility," in Philip M. Hansen and O. D. Duncan (eds.) The Study of Population: An Inventory and Appraisal, University of Chicago Press, 1959.

sample surveys.[11]

The first population count to be carried out in Ghana took place in 1891. However, this was restricted to the southern part of Ghana. After that count, there were subsequent censuses every ten years (except in 1941 due to the 2nd World War). A count was taken in 1948 and then in 1960; and the latest was made in March-April, 1970. Apart from the 1960 census, the accuracy of the first censuses is greatly in doubt. Even with the 1960 census there are no direct data on births, deaths and migration for specific periods. According to Caldwell, since Ghana is not covered by a birth and death registration system, an estimate of the rate of population growth cannot be made from the results of a single census combined with the known vital rates of the time. It must depend on two censuses or an examination of the age structure depicted by the most recent census.[12]

A population change is said to be explained when it has been subdivided into its major components and subcomponents. Therefore, this study involves the analysis of the components with emphasis on the mechanisms by which the change took place. These mechanisms will involve an examination of variables that are directly or indirectly related to population change.

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[11] Caldwell, J. C., 1967, op. cit.;
_____, "Fertility differentials as evidence of incipient fertility decline in a developing country - the case of Ghana," Population Studies, Vol. XXI, No. 1, July, 1957;
_____, "Fertility attitudes in three economically contrasting rural regions of Ghana," Economic Development and Cultural Change, Vol. XV, pp. 217-38;
Gaisie, S. K., Dynamics of Population Growth in Ghana. Legon, 1969;
Pool, D. T., "The Ghana Fertility Survey," paper presented to the first African Population Conference," Ibadan, January, 1966.

[12] Caldwell, 1967, op. cit., p. 78.

D. A Consideration of Variables

1. Fertility Ratio

One crude measure of fertility is the fertility ratio (child/woman ratio). This is computed by dividing the number of persons under 5 years old in the population by the number of women 15-49 years of age. This is often regarded as the effective fertility or the fertility remaining after the bulk of infant mortality has occurred.[13] However, Bogue and Palmore have indicated that the ratio underestimates fertility, for although the deaths of women in the child bearing years tend to compensate for deaths to children, the net result is that the ratio is biased.[14] In any case, with the absence of vital statistics, this is quite a sound measure of fertility. In Ghana many women get married by 20. Even though early marriages may adversely affect the woman's health, it is a factor which considerably increases fertility, both because it prolongs the actual child-bearing period and because it is the young female age-group that has the highest fertility. In Ghana, the 1960 Census Report gives data for the age group 15-44 years. Besides, as Caldwell has indicated, this is the most effective fertile age group.[15]

2. Density of Population

Density of population was suggested by Bogue and Harris as being potentially important in explaining differences in growth between metropolitan areas in the United State of America. To them, dense settlement and

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[13]Gabil, Wilson N. and Cho, Lee Jay: "Methodology for the measurement of current fertility from population data on young children," Demography, Vol. II, 1965, pp. 50-68.

[14]Bogue and Palmore, 1965, op. cit.

[15]Caldwell, 1967, op. cit., pp. 87 and 102.

intensive use of land may facilitate growth in a Standard Metropolitan Area by providing favorable cost and market conditions for new and expanded industry, i.e., making room for more people.[16] In like manner, Thomas considered density as one of the factors areally associated with population growth. In Chicago, he found a negative association between density and population growth and suggests that cities with "large population increases would be those with lower densities," since many people will move into these noncongested cities.[17] In Studies in Demography of Pakistan, 1967, edited by Warren C. Robinson, density of population was found to have significant statistical correlation with fertility and population change.

In answering the question, "At what stage, and to what extent will pressure on the land act as a determinant of population growth?", Hunter found out that density gives a poor correlation with growth of population in Ghana.[18] On the other hand, Caldwell indicates that the densely populated Southern Ghana has higher growth rates than sparsely populated Northern Ghana.[19]

3. Migration and Sex Ratio

It is predominantly the young adult who usually migrates. In Ghana, contrary to Ravenstein's theory, men are more migratory than

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[16]Bogue, Donald J. and Dorothy L. Harris, Comparative Population and Urban Research Via Multiple Regression and Co-variance Analysis. Scripps Foundation, 1954.

[17]Thomas, Edwin H., "Areal associations between population growth and selected factors in the Chicago urbanized area," Economic Geography, Vol. 36, 1960, pp. 158-170.

[18]Hunter, 1965, op. cit., pp. 272-90.

[19]Caldwell, 1967, op. cit., pp. 107-109.

women.[20] From the age and sex factors, it has been found that many pull areas have high sex ratios within the 15-44 years age group, while push areas have low sex ratios. Hunter found significant correlation between sex ratio and growth of population: r=0.686; and r=0.789 between immigration and sex ratio.

4. Place of Birth

During the 1960 Census, persons were classified by place of birth, according to whether they were born in (1) the locality of enumeration (2) another locality in the same administrative region (3) another administrative region or (4) abroad, including Africa. A classification of the population of a given area by place of birth makes possible a crude measure of the volume and sources of migration into the area during an indefinite number of years. An analysis of migration based on this is very crude because such data does not take into consideration migrants who have died between the time of migration and the date of the census; of those having returned to their places of birth or moved on to other areas, after migrating to the area in question, or of previous migrations between the time of birth and the time of entering the given area. However, it is possible to obtain meaningful general patterns of migration from the type of classification used in Ghana. Numerous studies on the demography of Ghana have used this variables for analyzing both migration and population growth.[21]

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[20] Ravenstein, E. G., "The laws of migration," Journal of the Royal Statistical Society, Vol. 48, (1885), pp. 167-235; Vol. 52 (1889), pp. 241-305.

[21] Caldwell, 1967, op.cit., pp. 111-146;
Hunter, 1965, op. cit., pp. 272-90.

5. Education

A survey in Ghana revealed that of males and females who have never been to school, 27% and 16% respectively migrated at some time to an urban area; but 67% and 61% of those with high school or university education had done so.[22] It has been found that changes in the traditional family system, introduction of Western innovations and the like are more prevalent among the educated and Urban elite than it is with the rural and the uneducated population.[23]

6. Traditional Authority

In addition to modern forms of administration, many places in Ghana have a system of chieftaincies. These have been in existence for a very long time, a few of them from time immemorial. Centers of chieftaincies have often served as points for the grouping of people together and dense populations were associated with stable chieftaincies.[24]

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[22]Caldwell, John C., "The Determinants of Rural-Urban Migration in Ghana." Population Studies, Vol. XXII No. 3, pp. 361-77.

[23]Caldwell, John C., Population Growth and Family Change in Africa. The New Urban Elite in Ghana. Canberra, 1968;
Jahoda, Gustav, The Social Background of a West African Student Population (Part I and II) British Journal of Sociology, Vol. V, pp. 355-69, and Vol. VI, pp. 71-9;
Omari, T. Peter, "Changing Attitudes of Students in West African Society Towards Marriage and Family Relationships," British Journal of Sociology, Vol. XI, pp. 197-210 (1960);
Busia, K. A., "Some Aspects of the Relation of Social Conditions to Human Fertility in the Gold Coast, in Larimer, Culture and Human Fertility, Paris (1954), pp. 341-50.

[24]Dickson, K. B., A Historical Geography of Ghana. Cambridge, 1969, p. 49.

In a study of South-Mamprusi, this latter factor was found to be of paramount importance in the consideration of peopling and the density of population.[25] Most of these chieftaincies in South-Mamprusi are very rural and show some of the typical population characteristics of rural Ghana, for example, extended and large families (polygamy).

Musham has shown that fertility of women living in polygamous marriages is about twice that observed in monogamous marriages of the same social and cultural milieu. The total number of children born in a polygamous family (by all wives together) exceeds the total number of children born in monogamous families. This is probably the main demographic raison d'être of polygamy: to ensure a greater number of offspring to a man.[26]

7. Urbanization and the Distance Factor

Urban centers as receiving points of population from rural areas is an established phenomena in most of the countries of the developing world. Apart from having concentrations of population, urban centers are known to be destinations of innovations introduced in the developing world. The role of the urban elite in Ghana in terms of growth of population, family system, education, and the like, has been discussed by Caldwell in his book, Population Growth and Family Change in Africa: The New Urban Elite in Ghana.[27] Caldwell found rural-urban differentials in fertility

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[25]Nabila, John S., An Historical Geography of Central South-Mamprusi Thesis presented for the B.A. Degree. University of Ghana, Legon-Accra. (Unpublished).

[26]Musham, W. V., "Fertility of Polygamous Marriages," Population Studies, Vol. 10, Part 1, July 1956, pp. 2-16.

[27]Caldwell, J. C., 1968, op. cit.

and population growth in Ghana. Other studies, too numerous to mention here, in other parts of the world have proven this factor of rural-urban differentils in fertility, rate of population growth and other related phenomena.

From these urban centers, innovations spread to rural areas and therefore towns near them are at a better advantage than settlements that are farther away. A major employment characteristic of an urban center is the existence of people engaged in secondary, even tertiary, activities. A few of these are usually carried out by migrants. The classification of the employed population into (a) Employed in Agriculture and (b) Other (in the 1960 Census) makes it possible for the "other" to be designated as the population engaged in secondary or tertiary activities.

8. The Dependency Ratio

The Dependency Ratio is the ratio between the total population under 20 years, plus 65 years and over (the dependent population) on one hand, and the total population aged 20 to 64 years. The ratio purports to measure how many dependents each 100 persons in the productive years must support. Bogue has pointed out that the ratio is directly a function of the components of population growth.[28] The minimum dependency load in the long run is that obtained when the population is barely replacing itself at the lowest possible combination of mortality and fertility. Population growth always implies a higher dependency load than do stationary numbers. This variable will, therefore, be used with the hope that with the absence of vital statistics it could serve as a useful indicator of

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[28]Bogue, Donald J., 1969, op. cit., pp. 155-156.

population growth differentials in the enumeration areas.

E. Basic Assumptions about the Study: Hypotheses

For the purpose of analyzing population growth in Central South-Mamprusi, the following assumptions have been made with reference to the major components of population change.

1. Reproductive change (natural increase) is the major source of population change in the area under study.

2. There is a close relationship between traditional authority and growth of population.

3. Men migrate for long distances more than women, consequently the sex-ratio of the age group (15-44 years) is a good measure of migration patterns. For it is mostly this age-group which engages in long distance migration.

4. There is a direct relationship between density of population and growth of population.

5. There is an inverse relationship between density of population and distance from main roads. Thus, there is also an inverse relationship between population growth and roads.

6. The urban centers are areas of rapid population growth. By the very nature of their functions there is an inverse relationship between population growth and distance from urban centers.

7. There is a close relationship between education and the tendency to migrate. There should therefore be a direct relationship between education and population growth.

In order to understand the mechanisms for population change in the area, the following factors related to the components of change either directly or indirectly were used as variables for the analysis. Multiple and simple regression are the basic statistical techniques employed in estimating the relationships between population growth and the selected factors. Population growth between 1948 and 1960 is the dependent variable for the study, while the observations (unit areas) are based on the Enumeration Areas (1960), and the authors field work in 1969.

F. Dependent Variable: Population Change (1948-60) - Variables.

Independent Variables:

1. Sex Ratio
2. Density of Population
3. Per cent born in locality of enumeration
4. Per cent born in another locality
5. Per cent born in another ration
6. Per cent born outside Ghana
7. Population 15 years and over with Present and Past Education.
8. Dependency Ratio
9. Fertility Ratio
10. Tradition Authority
11. Distance from nearest Urban Center
12. Level of Urbanization
13. Distance from Main Roads

Blalock has pointed out that the use of many variables, especially where their implications are very obvious, is likely to obscure the results of a regression analysis.[29] There is a further problem in this study in the use of variables pertaining to birth place. They are percentages and, therefore, the use of all of them is likely to introduce multi-collinearity since they add up to one hundred. Even though these shortcomings do exist, in the absence of any reasonable data on components of growth, such as birth rates, death rates and migration data, the inclusion of such variables will help indicate some significant associations about the mechanisms of population change. Indeed if there is a distortion in the total variation explained (R^2) the simple correlation matrix will be of an immense help in the study (personal discussion with Dr. Brunn).

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[29] Blalock, Hubert M., Social Statistics, McGraw-Hill Book Company, New York, 1960, p. 360.

CHAPTER III

DATA AND METHODOLOGY

A. Sources of Data

For the purpose of analyzing population change in the study area, the following sources were used for the acquisition of data.

1. National Censuses: It has already been pointed out that the availability of vital statistics on births, deaths and migration would have been of great help to the author for the study. However, the absence of such data was not completely a handicap since Ghana had population counts starting from 1891. Census Reports are therefore available for 1891 (Southern Ghana alone), 1901, 1921, 1931, 1948 and 1960 (the country has just finished with the 1970 Population Census and the data is being processed).

Though these reports are available their accuracy, especially the counts carried out during the Colonial period, is in doubt. The early counts were carried out by very few personnel and at a very little cost. With the first three, the traditional method of counting people through village chiefs was adopted and it was only in 1931 that the population was enumerated individually.

The Chief Census Officer of the Ghana 1960 Census, remarked that the 1948 census had about 10 per cent under-estimation.[1] This gives an idea of

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[1] Gil, B. Z., West Africa, No. 2381, January, 1963, p. 68.

the extent of underestimation that might have taken place during the earlier counts.

The year 1960 marks a milestone in Ghana demography for in that year in March, a well organized population count was carried out. All collected information was recorded separately for each individual of the country. As a follow up, two months after the Census, a Post Enumeration Sample Survey was carried out on about a 5% of the total population. The objectives of the survey were (1) to measure "coverage and content errors" and (2) to inquire into additional topics which could not be covered in the main census such as household size and structure, internal and external migration, religion, literacy, secondary occupation, marital status and form of marriage, number of wives, fertility and mortality etc.

Data from this intensive and extensive 1960 Census was used in conjunction with previous Census figures for the population change analysis.

2. National Archives: There is an office of The Ghana National Archives in each regional capital therefore the Tamale and Accra National Archives Offices were used for collecting relevant data. The author was able to obtain material from some of the Departmental Reports and records on the Colonial and independent periods; e.g., data on the peopling of the area, the occurrences of the major diseases, population characteristics, and general social and economic development of the area.

3. Sample Survey: A Sample Survey was carried out by the author during the months of January, March, April, May and July, 1969 in the study area. He had the privilege of discussing his field research with Professor John M. Hunter who was in Ghana from January to March, 1969.

Central South-Mamprusi has forty-six Enumeration Areas according to the 1960 Census and these were used as the basic units for the research.

FIGURE 4: Central South-Mamprusi 1960 Census Enumeration Areas

Enumeration Areas Numbered on the Map

1. Kpasenkpe
2. Du
3. Arigu
4. Wulugu
5. Zangu
6. Zangum
7. Gbimsi
8. Nayoku
9. Walewale
10. Wungu
11. Logri No. 2
12. Janga
13. Langbinsi
14. Gambaga
15. Kpakpirigbangu
16. Nalerigu
17. Sakogu
18. Namasim
19. Nagbo

(Figure 4) A systematic random sample was taken with the result that twenty-three enumeration areas were visited. In each of these, interviews were carried out according to households.[2] Considering the money available, only twenty households in each enumeration area were covered. Thus, in all, four hundred and sixty households were interviewed, this representing about 3 per cent of the total population.

The main objectives of the survey were (a) to obtain data which could be used as supplementary material to the 1960 population census Reports. (b) obtain data on population characteristics for the post-censal period, that is 1960-69. To achieve these objectives questionnaires were prepared with the help of Mr. S. K. Gaisie of the Demographic Research Center, University of Ghana. (The questionnaires are attached as appendixes.) With these, data was obtained on (a) fertility and mortality (b) in and out migration with origins and destinations of both aspects noted (c) composition of household (d) occupational structure (e) marital status and (f), number of wives and number of children.

B. Methods for Analysis of Problem

1. 1900-1948: The short comings of the early Census Reports have already been mentioned. Though in 1931 and 1948 Census enumerators were appointed to work in Enumeration districts no base maps were used. As Monkhouse and Wilkinson have pointed out, "a properly conducted census must be based on clearly defined enumeration areas."[3] The lack of clearly

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[2]A household refers to a number of people who obtain their food from the same source. Since the extended family system encourages common bondage, a household turned out to be a complete compound (house) of many individual families.

[3]Monkhouse, F. J. and Wilkinson, H. R., Maps and Diagrams, University Paper backs. London (1951), p. 260.

demarcated units makes it difficult to account for population change according to the various sections of the study area. Thus for this period the analysis is given at the local council aggregative level, that is, considering Central South-Mamprusi together.

2. 1948-1960: The 1960 Census had two main aspects of operation namely, the geographical preparations and the actual population count. The enumeration areas, then serve as basic units for any population analysis at the distributive level.

Though Central South-Mamprusi has forty-six enumeration areas, it was thought helpful from the authors field research, to re-demarcate the area into thirty three units with boundaries coinciding in most cases with the 1960 Census Enumeration Areas.[4] In 1960, villages with a population of one thousand and over were demarcated as enumeration areas, hence, I incorporated these into larger units to facilitate meaningful areal analysis. (Figures 5 and 6)

The census material provide insufficient evidence to allow an adequate distinction to be made between reproductive change (natural increase) and gain from immigration. The Multiple Regression Analytic model was used in order that the total variation of population change can be accounted for in terms of other variables derived from the Census Reports of 1948 and 1960, mostly the latter, and the authors field research.

3. The Multiple Regression Analytic Method: It is a method which consists of the measurement of the linear relationship or association between a dependent variable (Y) and two or more independent variables (X_1, X_2, X_3, etc.) With this method it is possible to obtain multiple correlation

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[4]Boundaries of Enumeration Areas coincide with Traditional cum Administrative Boundaries.

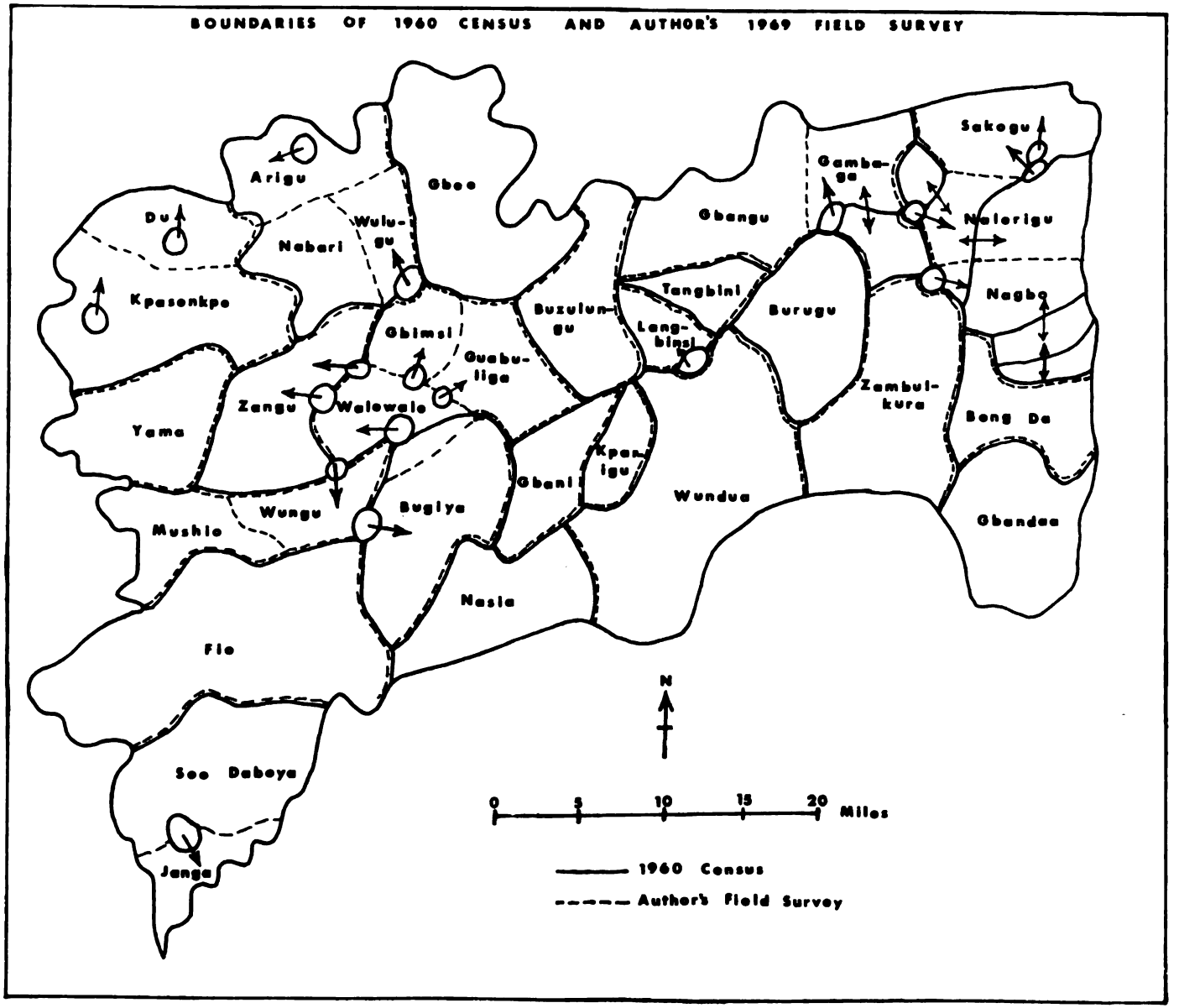

Figure 5

Source: Ghana 1960 Census and Author's Field Survey.

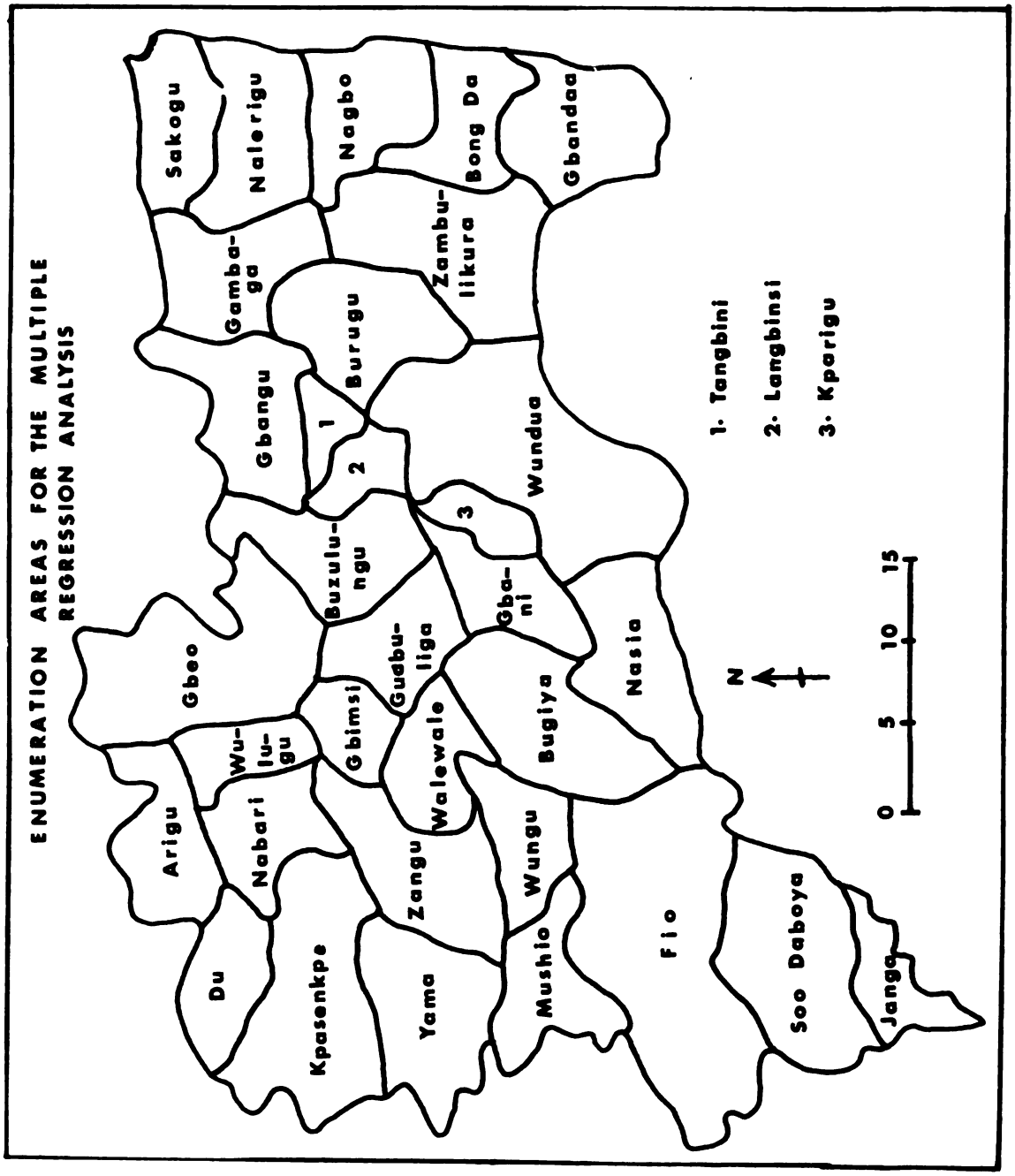
ENUMERATION AREAS FOR THE MULTIPLE REGRESSION ANALYSIS
Sakogu
Nalerigu
Nagbo
Bong Da
Gbandaa
Gamba-ga
Zambu-likura
Gbangu
Burugu
1
2
3
Wundua
Buzulu-ngu
Gba-ni
Gbeo
Gbimsi
Gubu-liga
Wu-lu-gu
Nasia
Arigu
Nabari
Walewale
Bugiya
Zangu
Wungu
Du
Kpasenkpe
Yama
Mushio
Fio
Soo Daboya
Jang
1. Tangbini
2. Langbinsi
3. Kparigu
N
0
5
10
15

Figure 6

coefficients (R) which measure the estimated and observed value for Y by the individual independent variables. In this way the research is in a position to show the kind of relationship existing within the framework of an established hypothesis or hypotheses i.e., the relationship between Y and X_1, X_2, X_3 etc. respectively.

It is usually assumed that a correlation which is greater than $\pm$ 0.50 is significant and anything greater than $\pm$ 0.70 is considered to be high. However, this depends on the sample size. These limits are arbitrary, and merely provide a convenient guide to making use of the coefficients as descriptive statistics. In general terms coefficients between -0.50 and -1.00 (perfect negative relationship) and between +0.50 and +1.00 (perfect positive) are fairly significant; while of the values lying between -0.50 and +0.50, little significant correlation is to be expected. If a value of zero is obtained, this indicates that the two sets of data fluctuate completely independently of each other and no correlation exists at all.

In measuring up the relationship between the independent variables and population change, the object is to explain why some enumeration areas had higher population growth rates than others between 1948 and 1960. An advantage of the regression model is that apart from indicating the type of relationship existing between the dependent and independent variables it can help the research know how much of the variance in the problem being studied (in this case population change) through the use of the multiple coefficient of determination (R^2) has been explained, and how much remains unexplained.

The multiple regression model is often expressed algebraically as:

$Y = a+b_1 X_1+b_2 X_2 + b_3X_3 + b_4X_4$ etc.

where Y is the dependent variable (population change)
X_1 " independent variable No. 1
X_2 " " " No. 2
X_3 " " " No. 3
X_4 " " " No. 4

a and b_1, b_2 etc. are constants.

4. Residuals from the Regression Model: The kinds of measures of associations given above are only summary values: they apply to the entire area under study and they cannot be used for mapping internal variation of the degree of association. Their role is merely to describe the degree of spatial correspondence among the areal variations of the variables as measures of the validity of the hypotheses for the area as a whole.

The multiple regression model has an additional advantage of providing residuals. A residual from regression for a particular observation is the difference in magnitude between the observed value whose numerical value is determined by factors included and omitted from the investigation, and an estimated value, determined only by variables included in the study.[5] In this study a residual will be that part of the magnitude which population change reaches in an enumeration area which is independent of the areal association between population change and other independent variables considered.

The map has been described as the fundamental instrument of geographic research.[6] It is possible to map residuals in an attempt to answer the

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[5]Thomas, Edwin H., Maps of Residuals from Regression in Brian, J. L. Berry and Duane F. Marble (eds). Spatial Analysis A Reader In Statisitcal Geography. Prentice-Hall, New Jersey, 1968, p. 330.

[6]James, P. E. and C. F. Jones, American Geography: Inventory and Prospect, Syracuse University Press, 1954, p. 9.

following questions:

1. Where are the large residuals found?

2. Where are the areas in which the regression equation performs with reasonable accuracy?

3. Is there any recognizable pattern in the distribution of the residuals that might suggest the effect of other possibly unknown variables? (Hopefully, the locational arrangement of the residual values will suggest other variables which might be important in accounting for the remaining variation in the dependent variable, i.e., the formulation of new hypotheses.)

Residuals have either a negative sign (in cases where the equation over-estimates the value of Y) or a positive sign (in cases where the equiation underestimates the value of Y). Thus a residual map will show areas of over-estimation and areas of under-estimation and thereby depict graphically the spatial variations in the performance of the equation in accounting for differential population change.

CHAPTER IV

POPULATION GROWTH 1900-1948

A. Peopling of the Area

For a better understanding of the pattern in population change, both at the aggregative and the distributive levels it has been considered necessary to devote this section to giving an annount of the peopling of the area before the turn of this century. The greatest event to take place in the area was the peopling of it by groups of people from different cultural reas. This factor of differential cultural background has throughout the years affected many aspects of the human geography of Central South-Mamprusi.

The area forms part of the Voltaic family and linquistically belongs to the Mole-Dagbani association which covers a major part of Northern Ghana and Upper Volta. It is known to have been settled for a very long time perhaps before the neolithic period. The social organization of the people was the same and leadership was vested in the divine representatives of the Earth God (Tendana)*. Oral tradition does not help in telling us how populous the region was but it can be inferred from the widespread notion of the "tendana" that there was no vast areas unoccupied by man. Descendants of these original people in South-Mamprusi are called "Dagbansabilisi."*

Upon these autochthonus people migrated small bands of people from further north who were better armed, familiar with the idea of territorial acquisition, and, in some cases, familiar with the rudiments of Mohammedianism.

The first group of 'invaders' to arrive were the Moshi-Dagomba who claim to have migrated from Zanfara.[1] The exact date of the arrival of this group who later established the Moshi-Dagomba group of states comprising Moshi, Mamprusi, Dagomba and Nanumba, has not yet been fixed, but many suggestions have been made. It is most likely that they arrived in the 15th century.[2]

According to oral tradition the leader of this group of migrants from the North was Gbewa who after settling in Pusiga near Bawku encouraged the movement of more men from further North. Due to succession disputes after the death of Gbewa, Tohogu one of his sons, moved with some of his followers including Gruma to Mamprugu[3] which later gave the group its name. Gambaga was later on established as the traditional headquarters of the Mamprusi. There is no evidence that the invaders received any serious opposition from the original people apart from the Komkomba who opposed them and that explains why there are no real Mamprusi in Komkomba.

Mercenaires and merchants have played a major role in the peopling of the area. The oral tradition of the area has it that the first group of mercenary-immigrants were some Mande-Dyulas who were invited by the

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[1]The Mamprusi, Moshi and Dagomba all claim to have come originally from Zanfara, one of the Hausa Bakoi States. Tribal marks of the Zanfara people who remained behind are similar to Mamprusi, Moshi and Dagomba tribal marks. The Moshi-Dagomba group recognize the Zanfara people as their "abokin wasa" (Hausa) meaning play mates.

[2]Nabila, John S., An Historical Geography of Central South-Mamprusi. B.A. thesis submitted to the University of Ghana, Legon, March, 1968.

[3]Mamprugu, now in ruins, was a village east of present Bunkprugu i.e. North East of Nalerigu. The 1901 Census Report shows that it had only 78 people. Mamprugu refers also to the Kingdom. (See the Glossary)

10th ruler of the Mamprusi Kingdom, Na Zibrim, in order to strengthen his power. They were horsemen armed with spears and today their decendants are to found in the royal towns of Nalerigu and Gambaga where they still play the role of spear bearers to the chiefs.

Na Atabia (1692-1752) went to Kong in the Ivory Coast by way of Walewale, Daboya, Bole and Mango-Taro; and returned with a number of mercenaries in 1751. These later on settled at a place they named Sansane-Mango but some of them remained in Central South-Mamprusi and gave birth to the Kanbonsi warriors of the chiefs. Their decendants are the chakosi who speak a tongue understood by the Akans in the South.

The Tampolensi are Sisalas who arrived in Central South-Mamprusi in the 1750's. Being mainly farmers they chose a fertile section north-east of Walewale and established their own villages -- (1) Langbinsi, (2) Singbini, (3) Ka-sape, (4) Boyene, (5) Zangua, (6) Nabilboka, (7) Tang-bini, (8) Pinaba, and (9) Boku. (Figure 7)

The Mande merchants are known to have operated in the Gold Coast for a long time, for the Portuguese met them at the coast in the 15th Century. Their kinsmen, the spear bearers, invited them into Central South-Mamprusi and they founded the following settlements: Nabari, Bulbia, Guabuliga, Mushio and Zangu. A few of them settled in already existing villages and built their own sections (Zongo), such as those in Gambaga, Nalerigu and Wungu.

The Jihad of Uthman Dan Fodio coupled with the wars of the Fulani against the Hausa in Northern Nigeria in the early part of the 19th Century forced many Hausa to migrate Southwards. Some of them settled in Central South-Mamprusi and Binger saw them in Walewale and Gambaga.[4]

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[4]Binger, L. G., Du Niger au Golf de Guinee, Vol. 2, Paris, 1892, p. 37.

EVOLUTION AND DISTRIBUTION OF SETTLEMENTS

(TRANSPORT SYSTEM 1960 SHOWN)

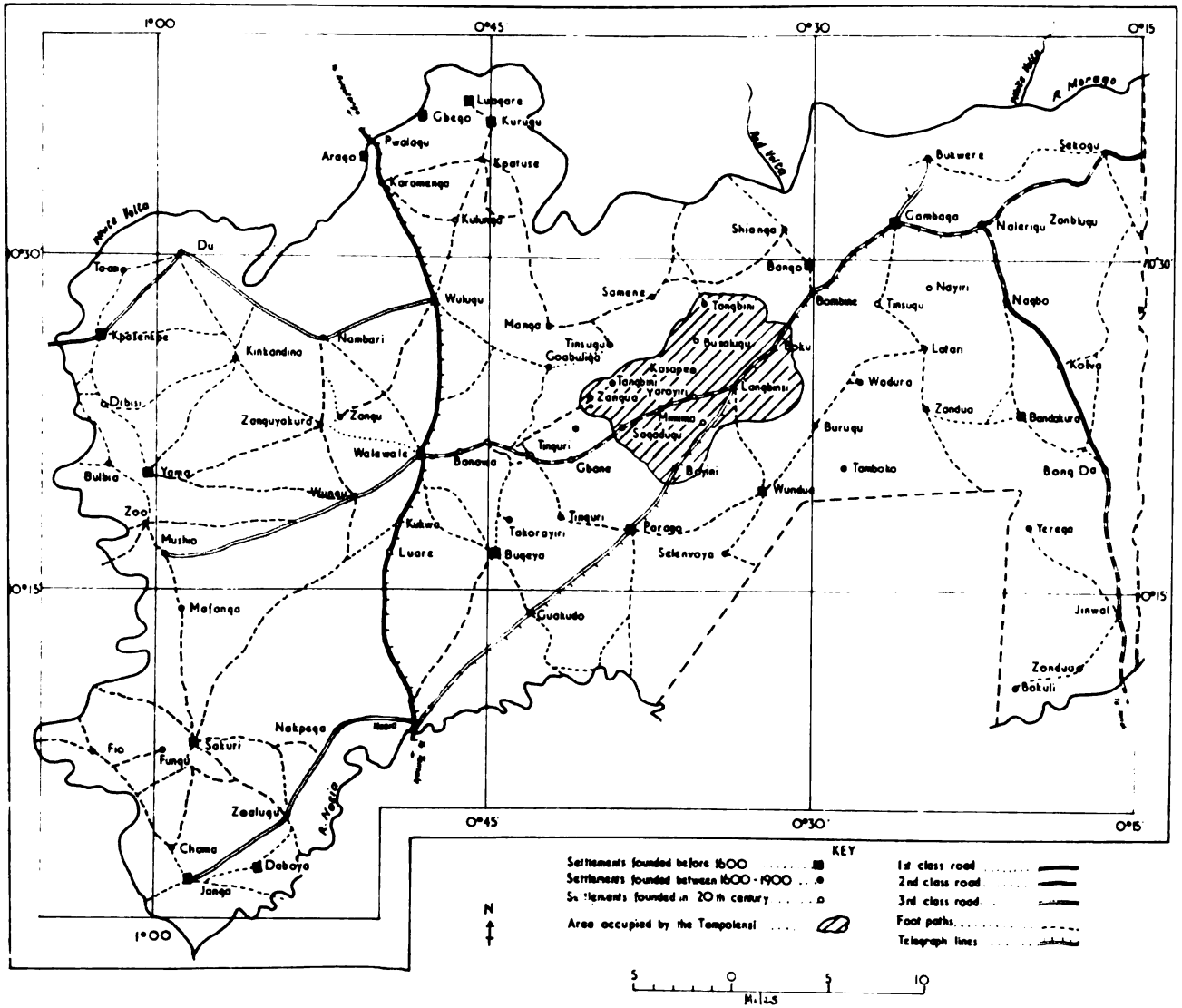

Figure 7

After Nabila, John S., op. cit., 1968, p. 11.

Through gradual acquisition of land, either by conquest or settlement, mostly the latter, the Mamprusi Kingdom by the 19th Century extended from present Chakosi in the East to about 1 40' Longitude West. It had common boundaries with Sisala (Tumu) and Moshi in the North; Gonja and Dagomba in the South; and Wa in the West.[5]

Political status accounted for the growth of the population of certain settlements which became the seats of important chieftaincies. A hierarchy of chieftaincies was developed with Nalerigu as the seat of the Paramount Chief, and Kpasenkpe, Wungu, Janga and Kurugu[6] were divisional headquarters. These became centers of attraction for social, political and religious reasons for the people. (Table 1)

Before the turn of the century some Moshi men migrated from Upper Volta in South-Mamprusi, most of whom were cloth dyers and weavers and therefore settled in existing villages with markets such as Walewale, Nalerigu, Gambaga, Langbinsi and Wungu. A few Moshi farmers are also known to have migrated into the area at that time. Thus before 1900 the population was made up of people from different places as shown in the table below. (Table 2)

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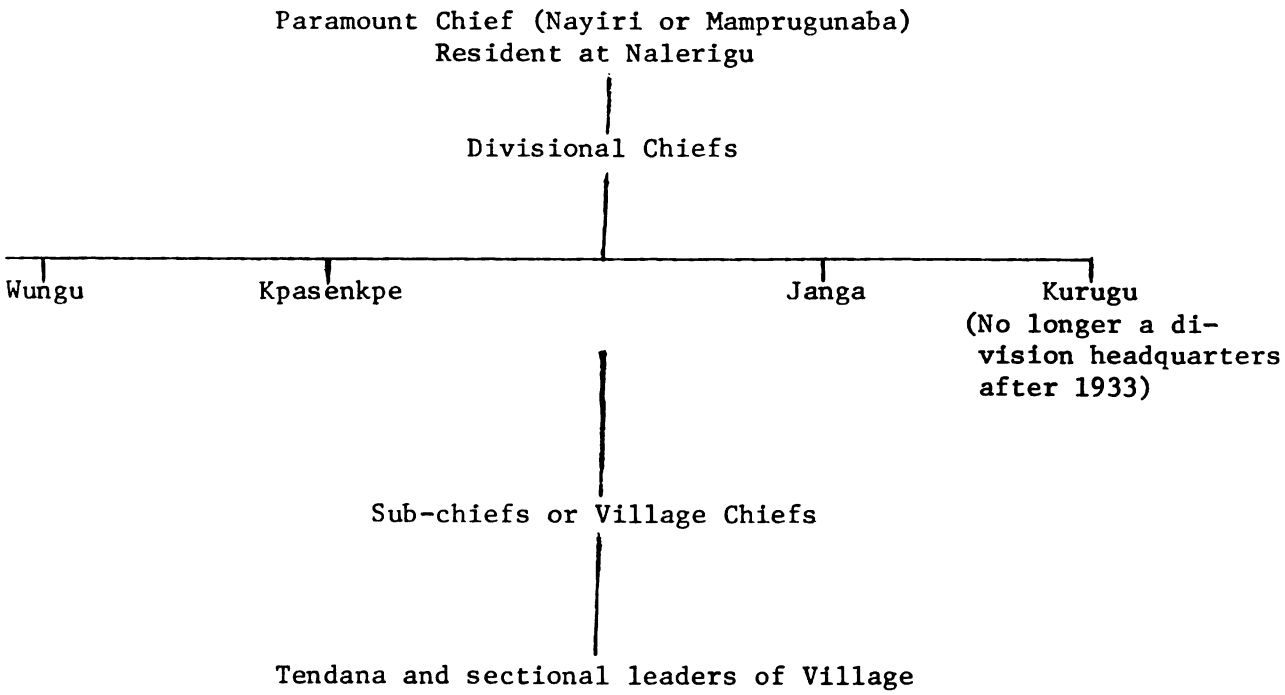
[5]Binger, op. cit. In 1888 he said that "Mamprugu controlled Sesanimango and all the Grumshi up to the Red Volta," p. 38.

[6]Kurugu was the divisional headquarters of the Talensi and Bolatanga area. The 1931 Census shows a population of 1,427 for the settlement. In 1933 Tongo and Bolgatanga were made separate divisional capitals. As a result Kurugu lost its political function hence its population reduced considerably. In 1948 for instance, the population was only 70 and in 1960, 55; indeed by then it has completely declined.

TABLE 1

HIERARCHY OF TRADITIONAL AUTHORITY



B. Population Growth 1900-1948

Between 1887 and 1901, the British, Germans and French engaged in political manoeuvre in Northern Ghana. On 24th December 1896, the British flag was hoisted in Gambaga and in 1901 the Northern Territories Protectorate was created directly under the British Crown with Gambaga as headquarters -- Gamabaga lost this position to Tamale in 1907.[7]

With the establishment of 'Pax Britannica' the Slave trading activities of Samori and Bakatu in Northern Ghana ceased. In like manner

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[7]Metcalfe, G. E., Great Britain and Ghana, Documents of Ghana History 1806-1957, Thomas Nelson 1964, pp. 452-468 and 487-508.

TABLE 2

COMPOSITION OF POPULATION BY END OF
19th CENTURY - A RECAPITULATION

Group	Remarks
1. Autochthonus people	The indigenous people and main stock of population today.
2. Those of Mande Origin	These included Traouri, Diabakhate and Kamara. Some of them formed the chieftaincy group while others were either merchants or spear bearers.
3. Hausa Immigrants	Came to area after the Wars of Uthman Dan Fodio.
4. Chakosi	The Warrior group.
5. Tampolensi	Settled in North-east of Walewale.
6. Moshi Immigrants	Settled in area as traders and farmers.

intervillage or inter-stage conflicts were stopped and all these gave an impetus to free movement of people. Indeed there was a redistribution of population in many parts of the North and adjoining Upper Volta.

1. Population Growth 1900-1921:

The methods used for counting people in the 1901, 1911 and 1921 censuses were very inaccurate, owing particularly to lack of qualified personnel. As a result many villages were not enumerated and even in villages where counting took place the response from the people was poor. Even with the 1948 Census which was better organized than the previous

ones, the Chief Census Officer suggested that there was about 10% underestimation of that particular census.[8] Even though one cannot rely wholly on these figures they do serve as an approximation and as a guide to what the trend was in population growth between 1900-1921. As the table below shows, there was a steady increase in population.

TABLE 3

POPULATION GROWTH 1900-1921

	1901	1911	Population Change	1921	Population Change
Male	5,064	7,250	43.2%	10,200	40.7%
Female	3,920	6,609	68.6%	9,454	43.0%
Total	8,984	13,895	54.3%	19,654	41.8%

(After Census Reports)

Conditions of population growth during this period are not very clear from the Census Reports. There was a population growth of 54.3 per cent between 1901 and 1911 while there was a change of 41,8 per cent between 1911 and 1921. Though it is difficult to distinguish reproductive change from net migration rate, it was the former which accounted for much of the growth. This was during the early stages of the districts contact with innovations introduced by Europeans and consequently birth rates were quite high, thus conforming to the demographic transition theory. In view of the population increases during the period, though this was a time health

[8] Gil, B. Z., 1963, op. cit., p. 68

conditions were very poor, it can be inferred that the fertility rate might have been much higher than present rates. The family system to a very large extent was based on the extended family system. Commenting on the marriage in Northern Ghana as a whole, the 1911 Census Report has this to say:

> "All females after they arrive at puberty may be looked upon as married, and males from an early age until they are old take upon themselves as many wives as they can afford."[9]

Mortality rates were equally high in the society especially within the young and old age group. Infant mortality was very high owing to very poor health conditions and diseases like malaria, convulsions and small pox took many lives from this young age group. Among the adult population deaths were also common and it is known that the Influenza Epidemic of 1918 raised the mortality rate especially within the age group 16 to 30 years. Cerebro Spinal Menengitis also caused many deaths especially among females and the 1921 Census Report attributes the high sex ratio to the deaths of many females as a result of this disease.[10] The living conditions at the time made many diseases endemic as well as highly epidemic in a few places.

There was a general desire for many children especially males to help on the farm, to tender livestock and to take part in other activities associated with the subsistence economy. The people were mostly farmers and in many places the wealth and prestige of a family was measured in terms of the number of cattle, the extent of acreage under cultivation, and above all, the size of the family. According to Caldwell, tropical African customs

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[9]Gold Coast (Ghana) Census Report, 1911.

[10]Gold Coast (Ghana) Census Report, 1921.

and religions have always favored high fertility.[11] The creation of Gambaga as the first headquarters of the Northern Territories Protectorate enhanced the position of Central South-Mamprusi. Even though this was short-lived, an inertia in terms of attracting migrants into the area was created.

When the British first took over the Northern Territories, they found that whatever trade did exist was almost entirely in the hands of the Hausa from Nigeria. The indigenous people were mostly farmers and not interested in trade. More often than not these traders took cattle to Southern Ghana in caravans and on the return trip brought back kola nuts from the forest to the North. This helped markets in a few places, like Walewale, Nabari and Gambaga, to increase in importance and consequently they attracted immigrants. Even Walewale and Gambaga were important centers for the trade traffic before the turn of the century. Commenting on the importantce of Walewale in 1888 Binger said "Walewale is a sort of entrepôt for Central Moshi, Sensanimango and North-Mamprusi."[12] Thus the creation of Gambaga as the headquarters along with the efforts of the British administration to encourage trade resulted in the migration of some more Hausa, Moshi and Mande traders into Central South-Mamprusi. The administrative role of Gambaga also brought a few people from Southern Ghana into the area. Table 4 shows the composition of the population of Gambaga by ethnic groups in 1921. This table gives us an idea about the origin of most of the migrants in South-Mamprusi. The density of population of South-Mamprusi was 11 persons per square mile in 1921 (Figure 8). As this map shows there

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[11] Caldwell, C., op. cit., 1967, pp. 39-40.

[12] Binger, L. G., op. cit., p. 52.

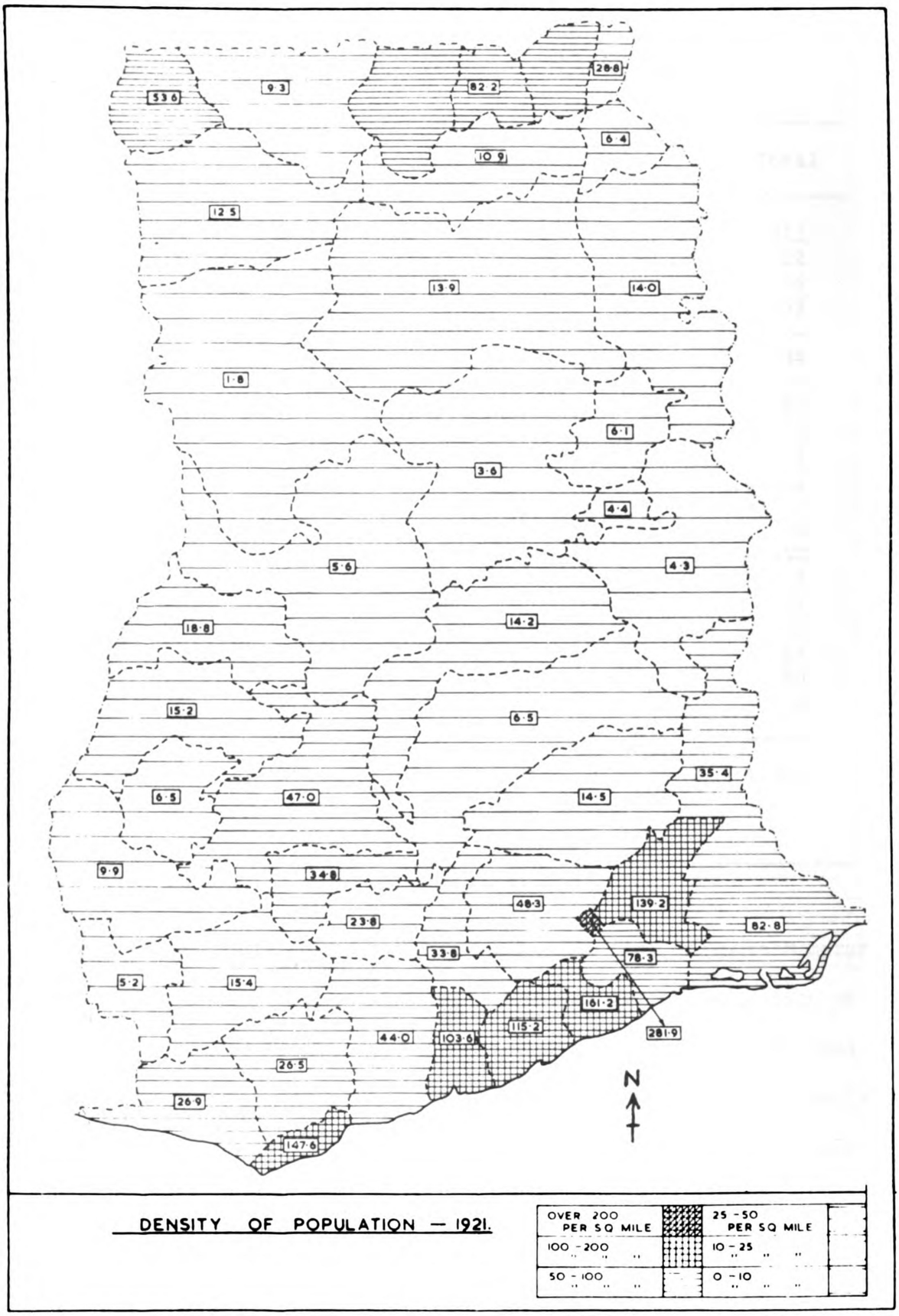

Figure 8

After Hilton, T. E.: Ghana Population Atlas. Thomas Nelson and Sons Ltd. London. k960, p. 12.

TABLE 4

ETHNIC COMPOSITION OF POPULATION IN GAMBAGA, 1921

Ethnic Group	Male	Female	Total
Mamprusi	375	438	813
Dagomba	7	15	22
Frafra	10	6	16
Grunshi	79	73	152
Builsa	6	8	14
Konkomba	5	29	34
Ashanti	9	0	9
Fante	12	3	15
Kusasi	3	4	7
Krobo	1	0	1
Kwitta	1	0	1
Dagarti	1	0	1
Bazaberimi	2	4	6
Hausa	64	86	150
Fulani	7	0	7
Lobi	1	0	1
Kotokoli	1	0	1
Yoruba	7	7	14
Moshis	32	28	60
Wangara	1	1	2
Total	617	702	1,319

(After 1921 Census Report)

was relatively a dense population in North-Mamprusi. The fact of South-Mamprusi being adjacent to a populous region was one of the causes for the migration of some Grunshi, Frafra, Builsa, Kusasi and Busansi into South-Mamprusi. Besides this, there was the fact that South and North-Mamprusi formed one Administrative Unit - the North Eastern Province - and the British officers encouraged people from these areas to migrate into South-Mamprusi where land was abundant. Even as late as 1950 John R. Raeburn estimated that in South-Mamprusi "only about

8 per cent of the total surface is cropped in any one year."[13] Even though this was the policy of the administrators only a few did move because of the high attachment of farmers to their "fathers' land". By 1920 there were already Yoruba from Nigeria in the area and were definitely engaged in commercial activities. In Gambaga for instance there were 14 Yoruba in 1921. (Table 4)

The above has been a consideration of conditions from 1901 to 1921 and the rest of this section will be devoted to analyzing conditions of population growth from 1921 to 1948. It is hoped that the above analysis will serve as the basis for the understanding of conditions in the relatively contemporary period.

2. Population Change Between 1921 and 1948

This period is of paramount importance in the analysis of the human geography of Northern Ghana as a whole and, indeed, in many other parts of Ghana. Education was well established in the country and South-Mamprusi boasted of a major Primary Boarding School in Gambaga (opened in 1912) and Primary Day Schools in Kpasenkpe, Janga and Wungu (all were opened in 1947; the author was one of the pioneer students of the Kpasenkpe School). Health conditions were improving with the building of dispensaries in Gambaga, Walewale, Janga, Kpasenkpe and Wungu to cater for the schools as well as the local population. There existed roads which served as arteries for the important settlements,[14] and there was even a proposal

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[13] Raeburn, John R., Report on a Preliminary Economic Survey of the Northern Territories of the Gold Coast, Colonial office, 1950, p. 18.

[14] Nabila, John S., op. cit., pp. 41-42.

to build a railway line to the North.[15] With the existence of motor transport, movements became very common and this was an impetus for the attraction of more migrants into sparsely populated South-Mamprusi. Of more importance still during the period was the spatial relationships of South-Mamprusi, firstly with other parts of Northern Ghana and secondly with Southern Ghana. Whereas it gained immigrants from the former, it lost quite a few young men who migrated to the latter to seek employment. On the whole, living conditions were improving at quite a satisfactory rate.[16] All these developments during the period under consideration had far reaching repercussions on population growth.

Between 1921 and 1931 there was a population change of 55.3 per cent while a change of 34 per cent took place between 1931 and 1948. Both Caldwell[17] and Gaisie[18] have indicated that birth rates have been very high throughout the regions of Ghana for a very long time now. They have suggested that fertility rates in Ghana have not changed very much from what they were years ago. From this generalization, it is assumed for this study that fertility rates in the various sub-divisions of Mamprusi by 1948 were almost the same as they were between 1911 and 1921. The inadequacy of the Census Reports has made it difficult for any definite calculations on fertility to be worked out. According to Caldwell, given reasonably

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[15] Sessional Papers XXIV, Papers Relating to the Construction of a Railway to the North from Kumasi, 1928-1929. The plan initiated by Governor Guggisburg was scrapped by his successor because of the uncertainty that the line could be operated at a profit.

[16] Census Reports - 1931 and 1948 and Report on the Northern Territories of the Gold Coast, 1937, Colonial Office, London (1937).

[17] Caldwell, John C., op. cit., 1967, p. 24.

[18] Gaisie, S. K., op. cit., p. 39.

TABLE 5

POPULATION GROWTH 1921-1948

	1921	1931	Per Cent Population Change		Per Cent Population Change
Male	10,200	16,520	+62.0%	21,877	+32%
Female	9,454	14,003	48.0	19,104	36
Total	19,654	30,523	55.3	40,981	34

(After Census Reports)

good information on the age structure of a population and the distribution of births by age of mother, it is possible to estimate the level of fertility. Unfortunately, such information is not available on Central South-Mamprusi for any estimations on fertility to be made.

By the 1930s the health conditions of the people had improved. The building of dispensaries coupled with the existence of a relatively satisfactory transport system made it possible for the rural areas to receive medical care from Urban Centers. Though this was a factor that helped in reducing the number of deaths in villages, the period between 1921 and 1939 was a very difficult time for the people because of the occurrence of sleeping sickness.

Sleeping sickness, a protozoal disease, is caused by the genus trypanosomiasis. African trypanosomiasis is a specific febrile infection often characterized by weakness, wasting, and a protracted lethargy - a condition which has given the disease its name, sleeping sickness. Unless

treated, the disease usually ends fatally.[19]

The prevalence of the disease depends on three major factors, namely (1) the parasite or trypanosomes (2) the tsetse fly vector to transport the trypanosomes and (3) a host (susceptible human or animal population). Though the disease is known to be endemic in West Africa it was never a serious disease until the 1920s and 30s. It is known that the first outbreak of sleeping sickness took place around Ouadougou in Upper Volta but it was restricted to this area until the Colonial period when it spread to other places.[20] Lack of movement among the people during the pre-colonial period was a major factor in curtailing the disease. Studies have shown that the appearance of some epidemics followed directly the need among the people for trade, employment or the occupation of new land. By the 1930s Southern Ghana had already become a receiving area of labor migrants from Northern Ghana, Upper Volta and other neighboring countries. The influx of migrants from the North to the South did not only introduce the disease in Ghana but also raised the incidence rate of sleeping sickness. Checks at the Yeji ferry revealed that most of the migrants to Southern Ghana were infected with sleeping sickness.[21]

As Figure 9 shows, South-Mamprusi was one of the areas which suffered from sleeping sickness in Ghana. The development of the focus was largely due to the permanent settlement of Moshi in South-Mamprusi and of

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[19]Strong, Richard, Diagnosis, Prevention and Treatment of Tropical Diseases, New York, 1945, p. 164.

[20]Morris, R. S., "The Ecology of Epidemic Sleeping Sickness, The Significance of Location." Part I and II Bulletin of Entomological Research, Vol. 43, 1951.

[21]Scott, David, "The Epidemiology of Sleeping Sickness in Ashanti (in three parts) Journal of Tropical Medicine and Hygiene. Vol. 60, 1957.

INCIDENCE OF SLEEPING SICKNESS IN GHANA 1919-1939

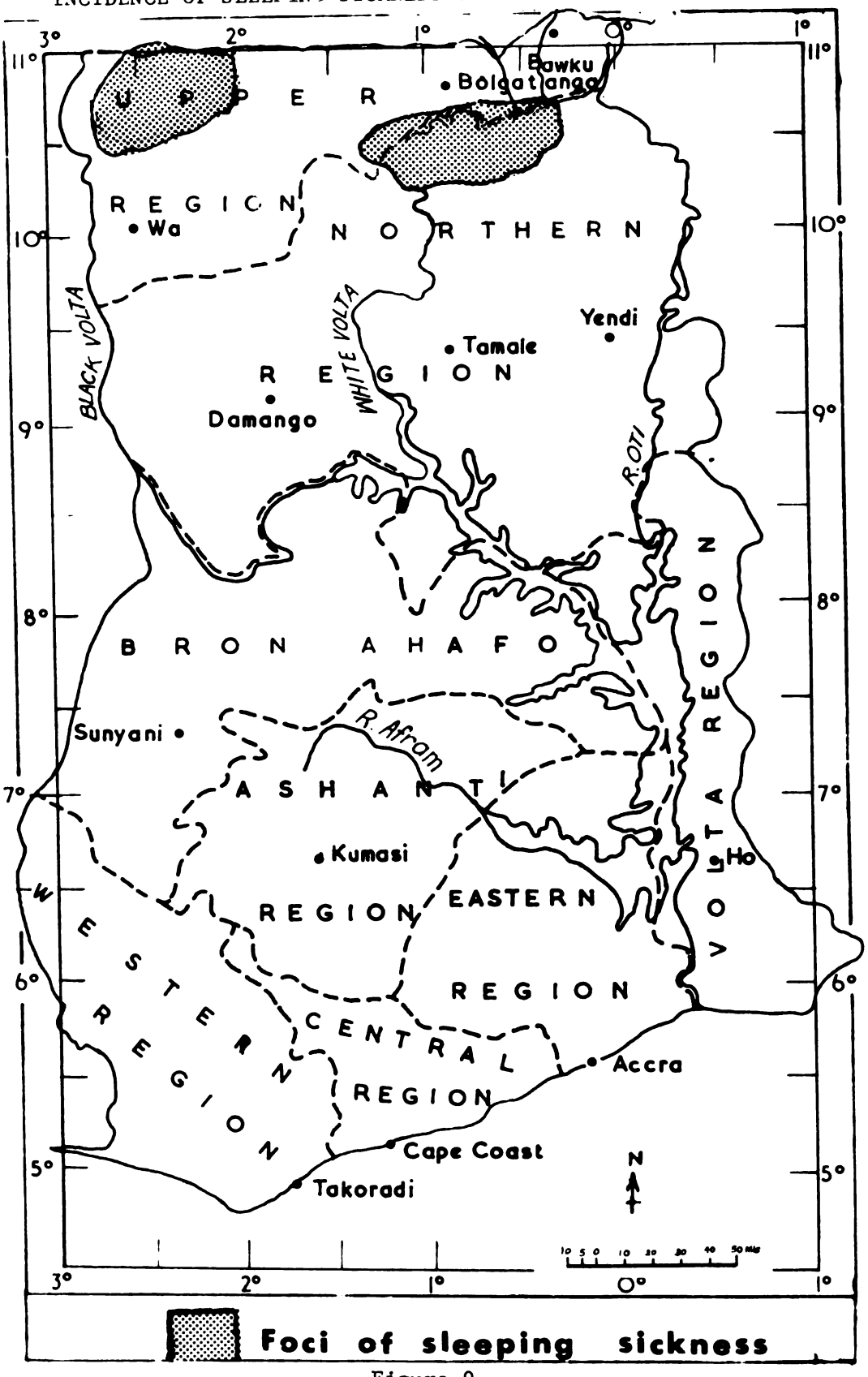

Figure 9

After David Scott; "The Epidemiology of Sleeping Sickness in Ashanti" (in three parts) Journal of Tropical Medicine and Hygiene, Vol. 60, 1957.

course, a favorable environment for the development of the disease; the existence of the Tsetse fly vector and a susceptible human population. What was absent was the parasite, trypanosome which the Moshi immigrants supplied. Since the 16th century the Moshi, Mamprusi, Dagomba and Namumba regarded themselves as sister kingdoms. With the development of free movement of people, coupled with the existence of abundant land in South-Mamprusi, the Moshi felt well accommodated to settle in the area. At times they established their own villages, for example, Sayo, Nagbo, Banawa, Manga and Guabuliga. Indeed, the authors field work has revealed that there are Moshi immigrants in almost all the settlements in Central-South Mamprusi. Records in Gambaga and Tamale reveal that the disease was unknown until many Moshi made the area their home. Though it is difficult to tell the exact number of people who died from this disease, Table 6 clearly shows South-Mamprusi with the highest incidence rate in Ghana as a whole between 1932 and 1939. Through the efforts of the Colonial Administration the disease was eradicated and today the Rural Health Department, with a head office in Gambaga, has the duty of making sure that the people are free from the disease.

Apart from the incidence of Sleeping Sickness during this period, the area faced periods of famine owing to the invasions of locusts. The first invasion took place in 1929-30 and it has been recorded that 545 farms were destroyed by the locusts.[22] There was a second invasion of the locusts in 1933/34 and a final one in 1939. During the author's field work, the people gave vivid accounts of the hard times they experienced due to these

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[22] District Daily Diaries, Gambaga Administrative Office, Gambaga.

TABLE 6

INCIDENCE OF SLEEPING SICKNESS
(Trypanosomiasis) in Ghana 1932-1939

Year	All Ghana	Kumasi Hospital	Sunyani	Mamprusi	/Tumu
1932/33	685	93	*	*	*
1933/34	1.179	363	73	250	1
1934/35	1,973	252	96	1,012	150
1935/36	3,885	249	95	1,683	1,161
1936/37	4,820	411	119	2,323	944
1937/38	5,594	306	155	2,148	1,242
1938/39	5,611	258	36	1,415	1,107
1939/40	6,826	*	*	*	*

South Mamprusi and Lawra/Tumu were endemic areas with incidence rates of 6% and 3.5% respectively.

*Figures unrecorded.

After David Scott, "The Epidemiology of Sleeping Sickness in Ashanti," (in three parts) Journal Tropical Medicine and Hygiene, Vol. 60, 1957.

invasions and, of course, the sleeping sickness epidemic. With the foregoing, it is quite evident that death rates between 1921 and 1948 might have been higher than they were in the previous years.

After 1921, immigration mainly accounted for the increase in population in northeastern and northwestern areas of Northern Ghana. These immigrants who were seeking land for cultivation or were desirous of escaping the stringent political and administrative (tax) systems in their

respective countries were mainly from Upper Volta, northern Togo, Mali and the Ivory Coast. About 50 per cent of them settled in north Mamprusi, therefore, by the 1930s there was already a problem of over-population.[23] There was a steady influx of immigrants from North-Mamprusi into South-Mamprusi. These immigrants were mainly agricultural settlers. In addition to the immigrants from the north, there were some Fulani who are noted for rearing cattle very well in some West African countries, e.g., Nigeria, Senegal and Guinea. The British administration, at the time also in charge of Nigerian affairs, encouraged the Fulani to migrate to Northern Ghana to help farmers keep their cattle. This, they hoped, would produce better cattle as well as allow Northern Ghanaian farmers to concentrate on food production.

In 1945, the Gold Coast (Ghana) Department of Agriculture held a survey in South-Mamprusi and as a corollary to the survey, four villages were visited where immigrants were interviewed. The results of the interviews, as shown in Table 7, indicate quite clearly the role which inter-regional immigration from North-Mamprusi played in the population growth of the area.

Fishing in rivers, streams and ponds has been well established in the area. However, the Mamprusi usually engaged in fishing during only the dry season when the water was low, especially between the months of September and May. Kpasenkpe, Arigu, Janga, Mushio, Bukpere and Nasia have long been associated with fishing, but in none of these areas, was it a serious profession. In 1929-30 some Battor immigrant fishermen from Tongu villages on the lower Volta, where they faced problems of over-population

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[23] Dickson, K. B., op. cit., p. 280.

TABLE 7

IMMIGRANTS FROM NORTH-MAMPRUSI
AND UPPER VOLTA, 1945

Village	Frafra	Moshi	Grunshi	Busanga	Total	Average No. Yrs. Settled
Langbinsi	9	17	20	2	48	12
Sameni	12	1	7	-	20	15
Nayoko	4	9	11	6	30	8
Gbimsi	13	26	25	-	64	10
Total	38	53	63	8	162	-

*The number of years settled varied from 2 to 25 but for the most part corresponded nearly to the average figures given above. Grunshi, here, refers to Builsa and Kasena. Moshi and Busanga were mostly from Upper Volta.

After Smith, R., Agriculture in South Mamprusi, Agriculture Department (1945), p. 9.

and increasing proverty in the home area, arrived. They settled in almost all the fishing villages mentioned above and in one instance they found their own settlement -- Mafanga. Since then, the fishermen continue to immigrate into South-Mamprusi and they carry out fishing on commercial basis along the White Volta.

The increasing importance of commercial activities in the district brought more Yoruba, Hausa and quite a few traders from Southern Ghana. Some Dagomba traders and farmers also immigrated to settle in the district. Another source of immigrants was the eastern section of the district where live the Bimoba and Komkomba. A few of these immigrated to some of the settle-

TABLE 8

NUMBER OF PEOPLE ENUMERATED FROM NORTHERN TERRITORIES IN THE COLONY AND ASHANTI, 1948

Kusasi	2	Sisala	4
Nankani	1	Dagarti	11
Mamprusi	2	Lobi	7
Bimoba	0	Wala	14
Kassena	2	Gonja	3
Builsa	3	Dagomba	7
		Konkomba	2

(After 1948 Census Report)

ments in eastern Mamprusi for example Gambage, Nalerigu, Sakogu and Langbinsi.

Data from the Census Reports for the major ethnic divisions from Northern Ghana but enumerated in Southern Ghana in 1948, gives some indication of the long distance mobility of the various groups.

Though it is most likely that there was some under-estimation of the actual number of people, the figures do suggest that there was a small movement of labor to the South from Mamprusi. In like manner out-migration from the area to other parts of the North was very insignificant. The only out-movement of any sort to other parts of the North was through a few marriages of Mamprusi women outside the district.

CHAPTER V

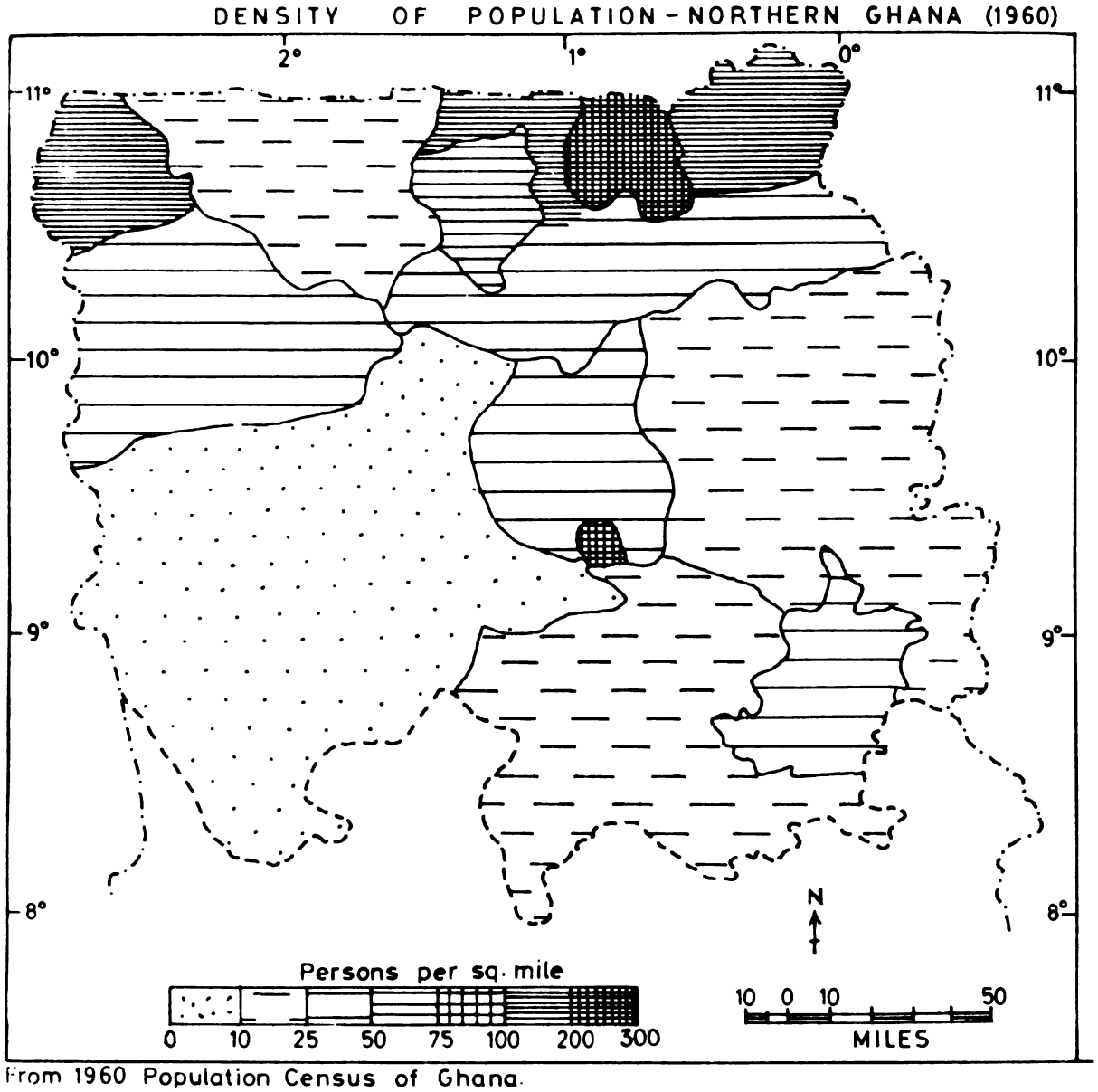
POPULATION CHANGE - 1948-1969

A. Population Change - 1948-1960

The 1948 and 1960 census figures are more reliable than those of earlier periods. In 1960 the total population was 61,372 giving an overall population increase of about 54 per cent, i.e. between 1948 and 1960. This gives an intercensal growth rate of about 3 per cent per year. Table 9 gives the population for the four traditional-administrative divisions. In it, the per cent change in population and population densities for each division has been given as a basis for comparative analysis at the divisional aggregate level.

Birth rates continued to be the same while the death rate was reduced very considerably with the opening of a modern hospital at Nalerigu in 1957 by the American Baptist Mission. Immigrants continued to settle in Central South-Mamprusi so that by 1960 almost all the major ethnic groups of Ghana were represented (Table 10). As Figure 10 shows, in 1960, South-Mamprusi was one of the intermediate zones lying between the sparsely populated middle belt and densely populated north-east and north-west.

The analysis of population change between 1948 and 1960 is based on the thirty-three population unit areas (Enumeration Areas) which were derived from the Ghana 1960 Census and the author's field research. (Figure 6)



From 1960 Population Census of Ghana.

Figure 10

TABLE 9

POPULATION BY SUB-DIVISIONS 1948 AND 1960

Sub-Division	Area sq. miles	1948 M	1948 F	1948 Total	1960 M	1960 F	1960 Total	1960 Density (sq. mi.)	Population Change M	Population Change F
Nalerigu	1,152	11,916	10,264	22,180	17,300	16,050	33,350	33.1	45%	56%
Wungu	216	5,334	4,800	10,134	8,100	7,024	15,124	70*	51	46
Kpasenkpe	180	3,017	2,940	5,957	4,930	3,903	8,833	49	63	32
Janga	144	1,610	1,100	2,710	2,930	1,135	4,065	28	81	3
Total	1,692	21,877	19,104	40,981	33,465	29,907	61,372	36.2(Avg)	52	56

*Population figures for Walewale (4,493) and Wungu (1,790) have invariably affected this density figure. Parts of the Wungu, Janga and Kpasenkpe Divisions are in the West. (After Census Reports)

TABLE 10

COMPOSITION OF POPULATION IN CENTRAL SOUTH-MAMPRUSI
(by Ethnic Groups

Mamprusi	32,500	Mole-Dagbani (including Mamprusi)	8,471
Akan	520	Grunshi	1,060
Ga-Adangbe	97	Mande	1,090
Ewe	210	Songhai	50
Central Togolese	11	Fulani	1,043
Guan	530	Gruma	14,210
Yoruba	600	Other Africans	250
Hausa	520	Not classified by ethnic groups	210

After 1960 Population Census, Special Report E., 1964, Accra

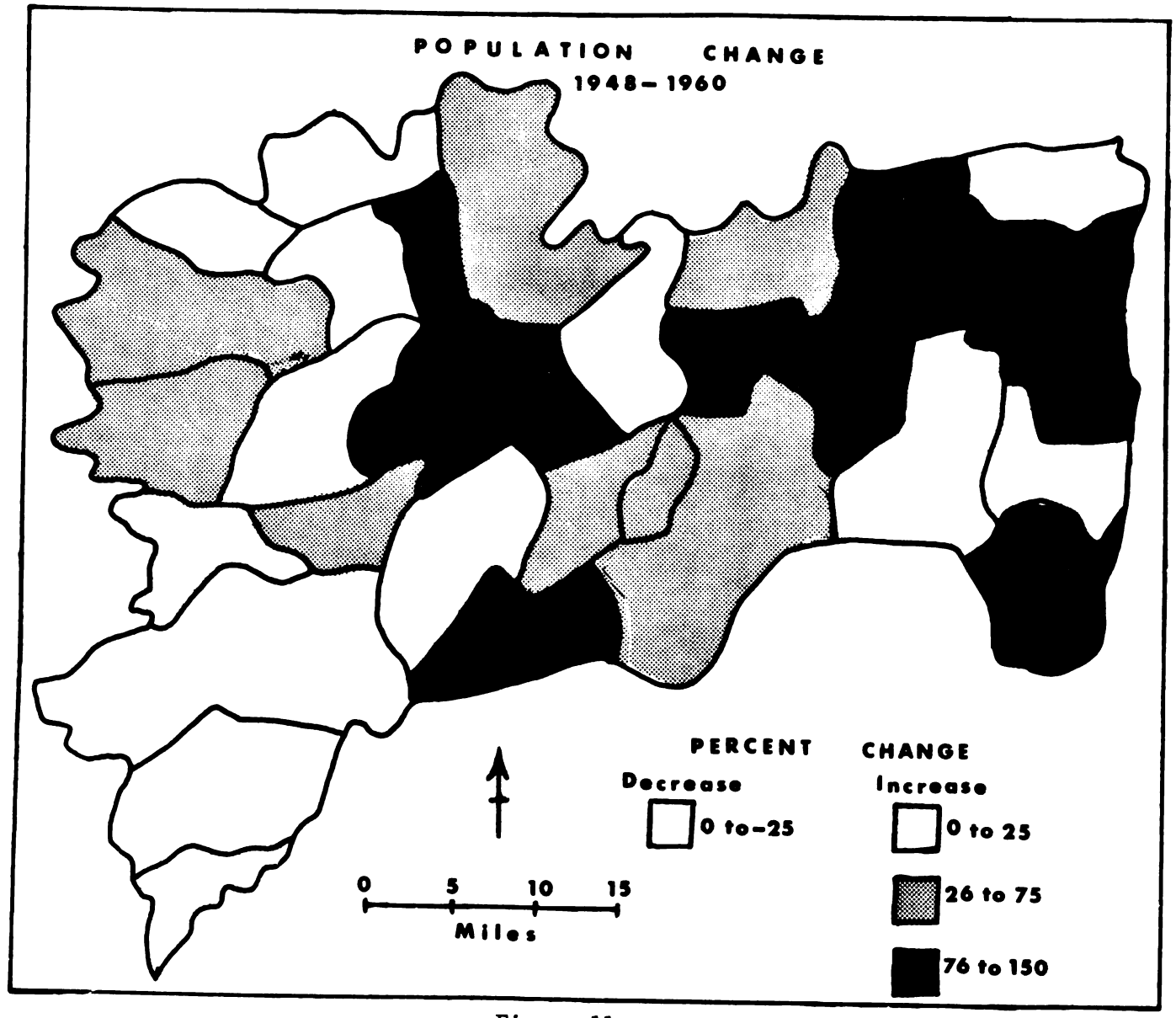


Figure 11

(Ghana 1948 and 1960 Census Reports.)

Figure 11 gives the population change in the different areas between 1948 and 1960. As Appendix B shows, of the 33 areas, 12 had high growth rates, 8 had moderate growth rates, 6 had low growth rates while 7 had a decrease in population change. An attempt is made to account for the differential growth rates in these areas in the rest of this section.

1. Results of the Multiple Regression Analysis

(i) Preliminary Considerations: The variables for the analysis have already been given in Chapter 2. For the purpose of the analysis, the author designated ranking values of 1,2,3, and 4 for village chief, sub-divisional chief, divisional chief and paramount chief respectively, i.e. values for traditional authority. A settlement with a population of 1,000 was considered as an urban center and was awarded 1 point. For example, Walewale with 4,493 people, got 4.5 points, which was the highest value for these urban centers. For the other twelve variables the author utilized the Census Reports to obtain values for them.

The data used for the regression model was in nominal, ordinal and ratio scales. Apart from this, there were great variations in the values for the various variables considered in the study.[1] It was therefore thought necessary to carry out a log transformation. Blalock has pointed out that where the independent variables take on a wide range of values such that a certain value is reached further increases produce less and less effect on the dependent variable. This could even result in a non-linear relationship.[2] The logging of the figures will have the effect

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[1]There were a number of extreme cases where some Enumeration Areas scored zeros for per cent born in another region and foreign born.

[2]Blalock, H. M., op. cit., (1960), pp. 312-313.

of bunching together the extremely large scores and lessening the bend effect of the large scores. One major prerequisite of a correlation and regression model is that there should be some measure of a linear relationship between the variates, i.e. a normal distribution. Indeed, a preliminary treatment of the raw data without any transformations resulted only in an R^2 of 15% for all variables. A transformation of logarithms (X_1=log. 10X) were thus derived for the analysis, and this transformation was performed on all variables.

(i) Factors Accounting for Population Growth

An examination of the simple correlation matrix (Appendix 1) and Table 11 reveals that only three of the independent variables have no significant correlations with population change namely, per cent born in another region, sex ratio and dependency ratio. The table gives correlations between the independent variables and population change, and their levels of significance, plus the standard partial regression coefficients which are the 'b' values. Each 'b' value gives the rate of change in the dependent variable for a unit change in the particular independent variable while remaining independent variables are held statistically constant.[3] Thomas, for instance, has said that these figures do indicate the individual contributions of the variables towards explaining the variation in the dependent variable.[4]

From Table 11, in order of importance, the regression coefficients of traditional authority, urbanization, education, another locality, and

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[3]King, Leslie J., Statistical Analysis in Geography. Prentice-Hall, Inc., New Jersey (1969), p. 140.

[4]Thomas, E. N., op. cit., 1960, pp. 158-170.

TABLE 11

ANALYSIS OF VARIANCE TEST FOR SIGNIFICANCE OF THE SIMPLE CORRELATIONS AND
(b) THE STANDARD PARTIAL REGRESSION COEFFICIENTS

Formula for Test $F_{1, N-2} = \frac{r^2}{1 - r^2} (N - 2)$ (After Blatock H.M., op. cit., p. 304)

Where F is the degree of freedom and N is the number of observations, in this case 33 Enumeration Areas.
(1) Critical F. value for significance at the .05 level = 4.05
(2) " " " " " " " .01 level = 7.39
(3) " " " " " " " .001 level = 13.01

Variable	Correlation With Pop. Change	Significance Value	Level of Significance	Standard Partial Regression Coefficients
1. Density	.72	33.29	.001	.27
2. Fertility Ratio	.36	4.59	.05	.03
3. % Born - this locality	-.32	3.50	.05	.10
4. % Born - another locality	.33	3.48	.05	.36
5. % Born - another region	-.18	1.02	*	-.02
6. % Foreign Born	.52	11.44	.01	.28
7. Sex Ratio	.23	1.67	*	.18
8. Traditional Authority	.82	63.49	.001	.74
9. Distance from roads	-.60	17.42	.001	.06
10. Distance from Urban.	-.51	11.43	.01	.12
11. Urbanization	.67	25.14	.001	.52
12. Dependency Ratio	.18	1.02	*	.06
13. Education	.46	8.28	.01	.48

*Not significant.

TABLE 12

SUMMARY TABLE FOR THE STEPWISE REGRESSION MODEL (LSADD AND LSDEL)

Position	Variable	R	R^2	Increase or Contribution
1	Traditional Authority	.8207*	.6736	.6736
2	Urbanization	.8628*	.7445	.0709
3	Education	.9055*	.8199	.0754
4	another Locality	.9184*	.8436	.0237
5	Density	.9261*	.8577	.0141
6	Foreign Born	.9306*	.8661	.0084
7	Sex Ratio	.9340	.8723	.0062
8	Distance from Roads	.9361	.8764	.0041
9	Born in this locality	.9389	.8816	.0052
10	Dependency Ratio	.9397	.8830	.0014
11	Distance - Urban	.9400	.8836	.0006
12	Fertility Ratio	.9403	.8841	.0005
13	Born Another Region	.9403	.8842	.0001

*Significant at the .05 level.

foreign born contributed more toward explaining the total variation than the other variables. As an aid to understanding the individual contributions of the variables both step-wise deletion and addition ("Least Squares Deltion" and "Least Squares Addition") programmes were carried out with the logrithmically transformed data. The results have been combined and shown in Table 12 in order of importance. In Chapter II, it was envisaged that the simple

correlation matrix should help in bringing out meaningful demographic patterns in South-Mamprusi. Indeed, there are more higher inter-correlations than those between the independent variables and the dependent variable, and these will be utilized for the analysis. With the foregoing, a consideration of the independent variables individually will be given in order of their magnitude in an attempt to account for population change as well as test the hypotheses formulated at the beginning of the study.

(a) Traditional Authority: This has a simple correlation coefficient (r) of .82 with population change and is significant at the .001 level. It is the most important variable related to population change. It has an R of .8207 and R^2 .6736. Thus, it "explains: by itself 67% of population change, and points to the importance of cultural considerations on population growth. The hierarchy of traditional authority has already been noted and the role of chieftaincies in attacting local and outside immigrants has also been noted earlier. It was hypothesized that there should be a direct relationship between traditional authority and population change, and the results support this assumption.

In considering fertility levels in Ghana as a whole, Caldwell has pointed out that Ashanti has the highest fertility rates because of the traditional system, apparently derived from the former Ashanti Kingdom.[5] Both Gaisie and Caldwell attribute the low levels of fertility among the ethnic groups in Northern Ghana to sex imbalance and seasonal and long term migrations which tend to separate couples for short and/or long periods.[6]

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[5]Caldwell, op. cit., January 1967, p. 222.

[6]Ibid., p. 222;
Gaisie, S. K., op. cit., 1969, p. 47.

(Table 13) Though this is the case at national level, there is evidence to show that the Mamprusi engage in very little long-distance migration. (Table 14) Though there are no sociological, ethnographic and demographic studies on the major Ghanaian ethnic groups, there are some basic considerations which the author found during his research within the traditional system to be of relevance to population change.

The Mamprusi just as the Dagomba, Nanumba, and Gonja and Wala in Northern Ghana has a centralized political system with rotational succession to political offices. In contrast, the other ethnic groups in the north have long standing of acephalous societies. It has been pointed out in Chapter IV that the "royals" are descendants of immigrant conquerors, while commoners are the autochthones. In Mamprusi, the royals constitute about one-third of the total population. Socially and economically, the people are differentiated into groups of royals, warriors, Muslims, musicians, craftsmen, and commoners. Fortes noted that these centralized societies have "centralized authority, administrative machinery, and judicial institutions, and in which cleavages in wealth, privileges and status correspond to the distribution of power and authority.[7]

Status in the traditional society implies, more often than not, the acquisition of many wives and children. On the whole, polygamy is widespread in South-Mamprisi, and children are regarded as an economic asset. The perpetuation of the line of descent is of paramount importance to any family. Among the Talensi, Fortes said "there is something wrong by custom

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[7]Fortes, M. and Evans-Pritchard, E. E., African Political Systems, London, Oxford University Press, 1940, p. 7.

TABLE 13

GHANA, TOTAL FERTILITY BY ETHNIC GROUP AND URBAN/RURAL

Ethnic Group	Total Fertility**	Urban	Rural
1. Akan	6.6	5.5	7.1
2. Asante and Ahafo	7.3	5.5	7.7
3. Fante	6.5	5.3	7.3
4. Nzema	5.2	5.2	5.2
5. Akyem	5.9	6.2	5.7
6. Akauapem	5.2	3.7	5.8
7. Kwahu	7.3	7.2	7.5
8. Wasa	5.3	---*	5.5
9. Boron (including Buda)	7.2	5.8	7.4
10. Ga-Adangbe	5.8	5.5	7.4
11. Ga	5.6	5.7	4.7
12. Adangbe	5.8	4.2	6.1
13. Guan	6.3	5.4	6.9
14. Ewe	6.6	5.4	6.8
15. Gurma	5.6	---*	5.4
16. Konkomba	4.4	---*	4.7
17. Lobi	6.2	---*	6.2
18. Grusi	5.0	---*	5.0
19. Central Togolese	6.4	---*	5.4
20. Mole-Dagbani	5.3	5.2	5.4
21. Dagomba	4.8	5.0	5.0
22. Mamprusi	6.3	---*	6.2
23. Dagarti	6.6	7.6	7.2
24. Builsa	5.1	---*	5.1
25. Frafra	4.0	3.0	4.1
26. Kusasi	5.2	---*	4.8
27. Moshi	5.9	6.5	4.9
28. Yoruba	6.1	4.9	6.4

Source: Gaisie, S. K., Dynamics of Population Growth in Ghana, University of Ghana, Legon. 1969, pp. 39 and 43.

*Insufficient information for the computation of total fertility rates.

**Total fertility is the estimate of the number of children a cohort of 1,000 women would bear if they all went through their reproductive years.

TABLE 14

SHORT AND LONG RANGE MOBILITY BY ETHNIC GROUP AND SEX, NORTHERN GHANA: COMPARATIVE ANALYSIS

Ethnic Group	Per cent of people Enumerated					
	In Another Locality, Same Region		In Another Region of Ghana		Abroad	
	M	F	M	F	M	F
Group A: Centralized States						
Mamprusi*	12.9	24.7	8.0	3.0	0.3	0.1
Gonja	17.8	22.0	7.3	8.3	0.1	0.1
Dagomba & Nanumba	20.8	31.7	11.5	9.3	0.1	0.1
Wala	12.3	26.5	14.1	10.6	1.0	0.8
Group B: Acephalous Societies						
Komkomba	26.0	31.7	12.8	12.4	4.8	4.9
Dagati	11.1	37.3	20.4	8.6	5.5	5.0
Builsa	4.2	29.5	15.8	7.3	0.2	0.1
Grunshi	3.6	43.2	0.5	0.1	0.1	2.2
Frafra	9.0	38.5	26.3	10.8	0.8	2.0
Talensi	4.8	37.3	1.7	0.6	0.1	0.1
Kusasi	7.2	16.0	15.6	6.8	1.3	1.1
Sisala	8.3	47.6	15.0	7.5	9.0	1.6
Kasena	5.6	47.2	2.2	0.9	1.6	7.5
Moshi and Vagala	11.4	20.4	37.7	23.7	19.3	14.8
Lobi	4.7	8.5	2.8	2.1	44.4	40.4

*The figures include the Eastern and Western South-Mamprusi.
(Source: 1960 Population Census of Ghana Special Report E., 1964, Accra. Table 4, pp. 25-26.

with men and women who never marry, and they are few."[8] This is very true of the Mamprusi, especially among the royals who are made up of chiefs and their sons, elders, courtiers, and others associated with authority. These are noted for the possession of very large families.

Moslem populations usually depict higher fertility rates than other major religions. Kirk has attributed this to characteristics of Muslim institutions which favor high fertility.[9] At the time of their migration into Northern Ghana from further north, the royals already knew some rudiments of Mohammedanism. Since about the 16th century, the centers of chieftaincies and commercial centers have often attracted Muslim immigrants. Since Muslims are an integral part of a chief's court in Mamprusi, the traditional authority capitals must show a high level of fertility--higher, say, than the villages with or without Muslims.

An examination of Table 14 reveals that there are some differences in the mobility of the people between the groups based on traditional authority--centralized and acephalous. The movement of males intra-regionally is significantly greater than that of males in the acephalous societies; the average per cent of males enumerated in a locality other than their natal one is double that of group B societies. The men in the centralized societies migrate more locally than they do outside the region. In contrast, men in group B move very little locally and when they move they do so outside the region (inter-regional migration).

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[8]Fortes, M., The Web of Kinship Among the Tallensi, London, 1949, p. 83.

[9]Kirk, D., "Factors Affecting Moslem Natality," in Bernard Berelson (ed) Family Planning and Population Programs, Chicago, 1966, pp. 561 ff.

Regarding female local mobility, census figures show that in every locality more women than men are living in localities of the region other than their birth place. On the whole, in the acepalous societies, lineage and clan exogamy and virilocal marriage are the rule. In contrast, in the centralized states there are no prohibitions about wives to be chosen from distance places. The states are characterized by a complexity of many ethnic groups and do not therefore cater for exagamous socieities.

From the above, the role of traditional authority in controlling the movement of people is quite obvious. The hierarchy of chieftaincies do generally generate intra-local migration. The successor to the paramountcy is usually chosen from among the chiefs of the "skin-villages" in Mamprusi. At the lower level, in the traditional system, smaller chieftaincies are stepping-stones to higher political office. Others, like the divisional chiefs of Kpasenkpe, Wungu, and Janga are termini at which the chief reaches the limit of his ascent in traditional authority.[10]

Customarily sons cannot reach higher positions in traditional authority than fathers. In pursuit of a higher chieftaincy, an ambitious chief's son goes from office to office of increasing rank until he reaches the limit of his line. The ascent of this ladder of political office often involves frequent movement from village to village over considerable distances. Such a movement does not affect the chief and his immediate family alone, but also many others, including patri- and matri-kin, personal members of the court, clients, specialists like musicians or craft-specialists. Nalerigu, the seat of the paramountcy, is noted for having people from

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[10]The Mamprusi have a saying that "The Prince has no home village," indicating the high incidence of mobility among the royals.

more than one-third of the villages in the east. There is a case of Na Wafu of the Mamprusi State who is said to have moved six times, i.e. to six different villages, before becoming the paramount chief in Nalerigu.

The traditional political system serves as a check on the migration of people to other regions. With such a system, many men are bound to be involved in the whole set-up. Besides, there is the fact that the system calls for very close kinship ties, such that only a few people can really get away from home for long distances, especially with the purpose of settling there permanently. Perhaps this partially explains why the Mamprusi engage very little in long-distance migration.

(b) Urbanization: At the national level, urbanization is unimportant in Central South-Mamprusi. However, within the area itself some settlements like Walewale, Langbinsi, Gambaga, Nalerigu, Wungu, and Sakogu do have quite sizeable populations. It was hypothesized that urban centers are areas of rapid population growth. Urbanization has a simple correlation value of r=.67 with population change thus showing that it is significant at the .001 level for the study. It contributes about 7% of the total variation in the step-wise regression model.

A few studies in Ghana and elsewhere have revealed that there are fertility differentials between the rural and urban populations. Fertility is usually found to be higher among rural residents than among the residents of towns. The rural fertility exceeds the urban fertility by 15% in Ghana.[11] From Table 13, the role of urban centers in reducing fertility among Ghanaian societies is clearly shown. However, the table also reveals the low level

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[11]Gaisie, S. K., op. cit., 1969, p. 29.

of the degree of urbanization in Northern Ghana. Caldwell found that Northern Ghana, Volta Region, and Brong Ahafo are the least urbanized regions in Ghana.[12] A further consideration of Table 13 still indicates the absence of this phenomenon in many Local Councils, South-Mamprusi being one of them. What is happening is that Urbanization is still developing in the few villages mentioned above. As a result, urbanization is rather playing a reverse role here, i.e. instead of reducing fertility, it is raising it. A few of the urban centers are also traditional authority capitals eg. Nalerigu, Wungu, and Gambaga. There is a simple correlation value of r=.55 between Urbanization and traditional authority, and what has been said about the latter is very true of the former in terms of the roles they play in increasing the population.

The few urban centers have either medical facilities (a hospital in Nalerigu, a health center in Walewale and dispensaries in the others) or easy access to hospitals outside Mamprusi. This has been a contributory factor towards the lowering of mortality rates, especially infant mortality. On the whole, living conditions in the urban centers are far better than what it is in rural areas and they continue to serve as attractive centers for the local populace or immigrans from other regions.

(c) Education: It has been noted that a survey in Ghana revealed that, of the males and females who had never been to school, 27% and 16% respectively migrated at some time to an urban area; but 67% and 61% of those who had high school or university education had done so. This being the case, education should be a significant factor for population growth. Most of the

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[12]Caldwell, "Population Change," op. cit., 1967, p. 132.

immigrants from other regions and are engaged in administration, commerce, education (teaching in schools and a college) working in the hospital and the like have all received some sort of education. Urban dwellers have a higher proportion of literates than what exists in rural areas. The variable, number of people with present or past education, has a correlation of .46 (r) with population change and this is significant at the .01 level.

A few of the urban centers and traditional authority capitals have schools and educated people, therefore, it is not surprising that there are correlations of .72 and .62 between education and traditional authority respectively, and both correlations are significant.

Later age marriages in the urban areas and the use of contraceptives to a greater degree by women in the large towns are some of the factors for urban-rural differentials in fertility in Ghana. The use of contraceptives has been found to be more prevalent among the educated and urban dwellers. The use of contraceptives is not a common phenomenon in South-Mamprusi. As one of the medical doctors in Nalerigu pointed out, it is even not an accepted practice to the people who see no need for it. The only people who have ever tried or used contraceptives are those who have received an education. Extended formal education is also one reason for postponement of marriage by some women in Ghana. In South-Mamprusi, education has not yet made any marked impact on fertility in terms of reducing it. For instance, the 1960 census shows that only 1% and 2% of the population has past education and present education respectively.

(d) Another Locality: Among the migration variables only this one is of any importance. It has already been noted that local mobility is more important than inter-regional migration. Apart from traditional authority

as explained from Table 4, being an initiator of local mobility there are other considerations such as a few families in search of new land and migration of families to areas where relatives do live. The extended family system has some measure of "social security" for members of the society, such that it is not uncommon for young men or girls to be sent by parents to relatives to live with them. A relative at any place and facing economic or social hardships can migrate locally to any relative who is likely to provide him with some sort of support. There are weak correlations between the variable born in another locality and the other variables, the highest being with foreign-born (r=.30). A few of the foreigners, especially the Moshi, Busanga, Yoruba, Fulani, and Songhai, engage in step-internal migration. Most of these groups are very mobile in any region or between regions of Ghana. In South-Mamprusi they do indulge in both intra and inter-local migration. What does not stand out clearly and which is difficult to explain is the weak association between the variables traditional authority and per cent born in another locality. An examination of the raw data shows that apart from Nasia, a bridge town which has 58.8 per cent born in another locality, some of the high figures for the variable percent born in another locality are to be found found at the traditional authority capitals--eg. Nalerigu 41.9%, Gambaga 26.2%, Nagbo 34.7%, and Kpasenkpe 33.3%. What might have happened here was the existence of a threshold since both traditional and non-traditional capitals have high figures. This suggests, as mentioned above, that traditional authority alone cannot account for local population mobility. Part of the explanation lies with other factors, such as the building of roads, the search for new land, and the establishment of urban centers.

Even though the raw data shows urban centers with high figures for the variable, per cent born in another locality, there is a weak correlation between urbanization and born in another locality. The development of a possible threshold is suggested again, for this result since some rural areas also have high figures.

(e) Density of Population: It was assumed that there is a close relationship between density of population and growth of population. The rationale behind this assumption was that where the people are many the higher rates of population increase take place there. Even though density of population has a simple correlation coefficient of .72 and is significant at the .001 level, with population change it only explains about 1% of the total variation in the stepwise regression model. As has always been the short-coming of density analysis, the pockets of high population concentrations, which in a few cases happen to be the urban centers, might have distorted the importance of this variable. Perhaps its relative unimportant role can be explained by its close association with the other important variables, namely traditional authority, urbanization, Education, with which it has inter-correlations of .64, .79 and .54 respectively—they are all significant at the .01 level.

(f) Foreign Born: This is the last of the most significant variables. Although it explains about 1% of the total variation it has .52 simple correlation with population change. For a long time now there are quite a few foreigners in South-Mamprusi as revealed by Table 10; namely, Yoruba, Moshi, Mande, Songhai, Fulani, Hausa, other Africans and people from outside Africa. These,of,course have contributed towards population growth

in South-Mamprusi, especially if one takes into consideration the long standing relationship between the area and other groups outside Ghana. Most of the foreigners stay in the commercial and traditional authority centers. Hence, between foreign born, and traditional authority and urbanization there are correlation coefficients of .34 and .49 respectively, which are significant at the .05 level.

(g) Sex Ratio: This has turned out to be one of the insignificant variables and has a simple correlation r=.23 with population change. This variable was included with the hope that it will serve as an indicator of migration patterns, a component of population change. Sex ratio for the population aged 15-44 years has a maximum value of 176 men per 100 women (Nalerigu) and a minimum value of 99 (Zangu). It has often been argued that since men are more migratory for long distances than women a low sex ratio of the 15-44 years age group is indicative of out-migration and a high one is indicative of in-migration. With these high sex ratio figures, South Mamprusi is unlikely to fall into any of these categories for as discussed previously little out-migration is carried out and therefore men stay at home. In like manner, the area has no significant economic attractions for only male immigrants. The only exception is Nalerigu, with the highest sex ratio, which had construction workers putting up the hospital in 1960. The existence of a hospital, in addition to the fact that it is the capital of the paramountcy, encourages young men to migrate to it. The areas with low sex ratios, e.g., Zangu, which had -4% decrease of population between 1948 and 1960 suffered greatly from the sleeping sickness which had a high incidence among men. Other enumeration areas with low sex ratios are Fio, Soo Saboya, Du, Nabari, and Buzulungu, the

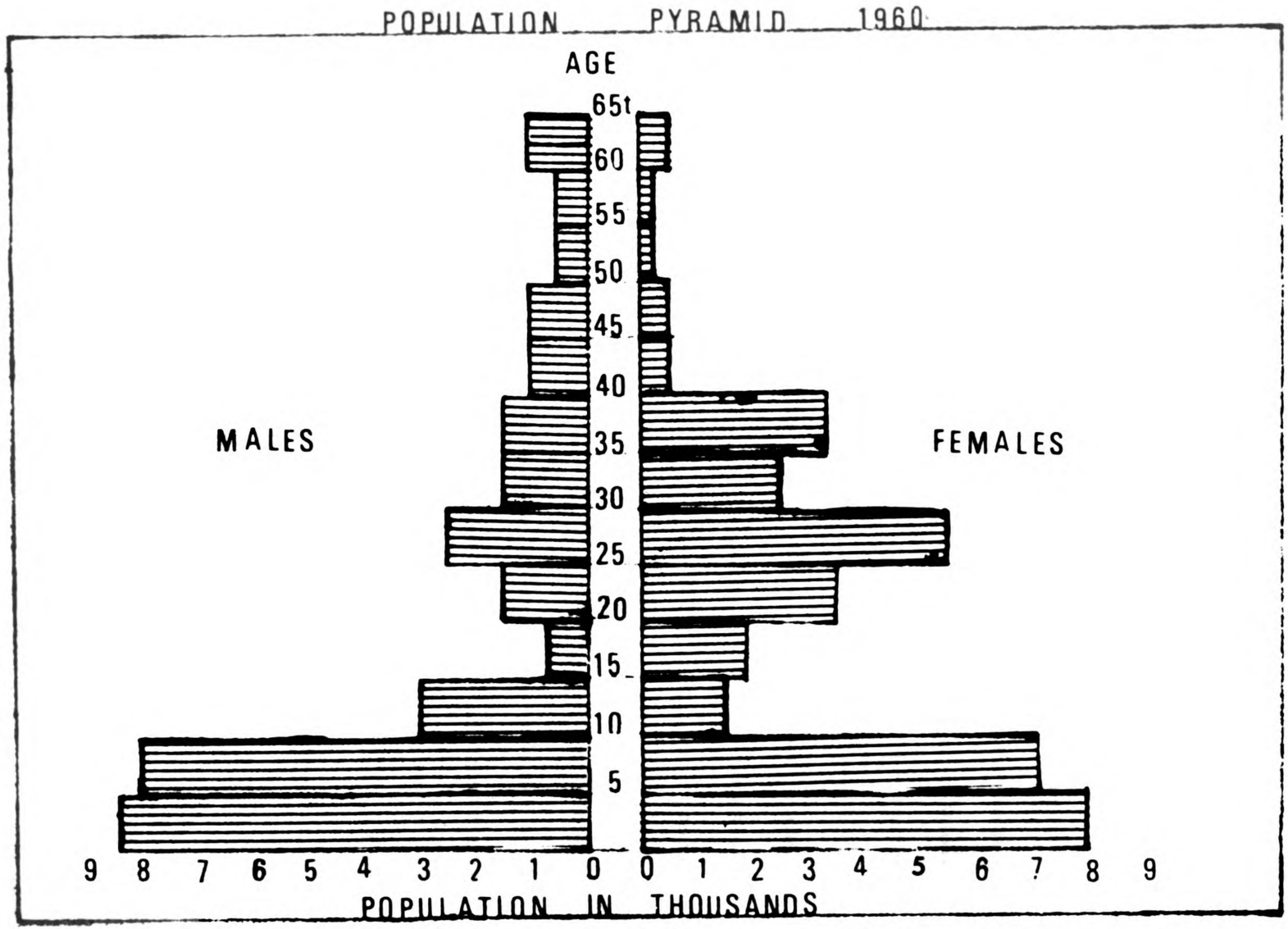

Figure 12

Source: Ghana 1960 Census Report

only places which decreased in population between 1948 and 1960 (-7, -14, -25, -5, and -2 respectively). Indeed, records indicate that all these places were camp centers for the eradication of sleeping sickness.

A population pyramid showing the composition of the population by age and sex do conform broadly with what has taken place in an area regarding fertility, mortality, and growth rates. Therefore Figure 12 is a summary of what has been said about population growth in South-Mamprusi from the previous years to 1960. Considering South-Mamprusi as a whole, the sex ratio is very high with ages 0-10 years, and this is the largest portion of the population. The large proportion of the young population can be attributed to the lowering of infant mortality by medical care. Caldwell has suggested that this could also be due to misstatements of ages among ages 10-20 years, which has resulted in the 10-20 year age group being relatively small.[13] The ages between 20 and 40 years show a higher number of females, and as mentioned previously, this can be explained by the fact many males died owing to the sleeping sickness. The high sex ratio of ages 40-60 is probably due to the occurrence of Cerebro Spinal Menengitis in the 1920s which killed more women than men. The pyramid shows a few aged people and this is a reflection on the low rate of life expectancy in South-Mamprusi.

(h) The Distance Variables: It was hypothesized that there should be inverse relationships between population growth and distance from main roads and distance from the nearest urban centers. There are correlations of r=·-60 and r=·-51 between population change and distance from main roads

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[13]Caldwell, John C., op. cit., 1967, pp. 30-35.

and urban centers respectively and both are significant at the .01 level. This supports the hypotheses formulated. The role of urban centers has already been discussed and since it was thought that facilities in urban centers do encourage population growth, then the resultant correlation is of significance in terms of urban-rural differentials. The building of roads in South-Mamprusi attracted many people to settle along them. The radial pattern of the distribution of population, especially along the Walewale and Nalerigu road is clearly shown on the maps for the distribution of population in 1948 and 1960. (Figures 13 and 14) These maps show the growth in population during the period, especially at the urban centers. Generally, the areas around Walewale in the West, and Nalerigu in the east have dense populations.

There is an inter-correlation value of r=.85 between the distance variables and the author has questioned whether one variable might not serve the purpose. A problem in using only one is that not all the settlements along the main roads are urban centers. Besides, the role of road in attracting settlements along them and thereby raising densities and consequently population growth rates, have radial spatial characteristics while urban centers tend to result in a few clusters.

(i) Born in this Locality: This has a negative correlation value of r=·-32 with population change and is significant at the .05 level. Its role is very doubtful since it considers the main section of the population. There are a few places which had high percentages born in this locality, for example, Janga, 94.4%; Gbandaa, 86%; Bugiya, 85%; Du, 88%. One explanation is that the per cent born in this locality does not, by itself, tell the researcher the number of people that were added to the population.

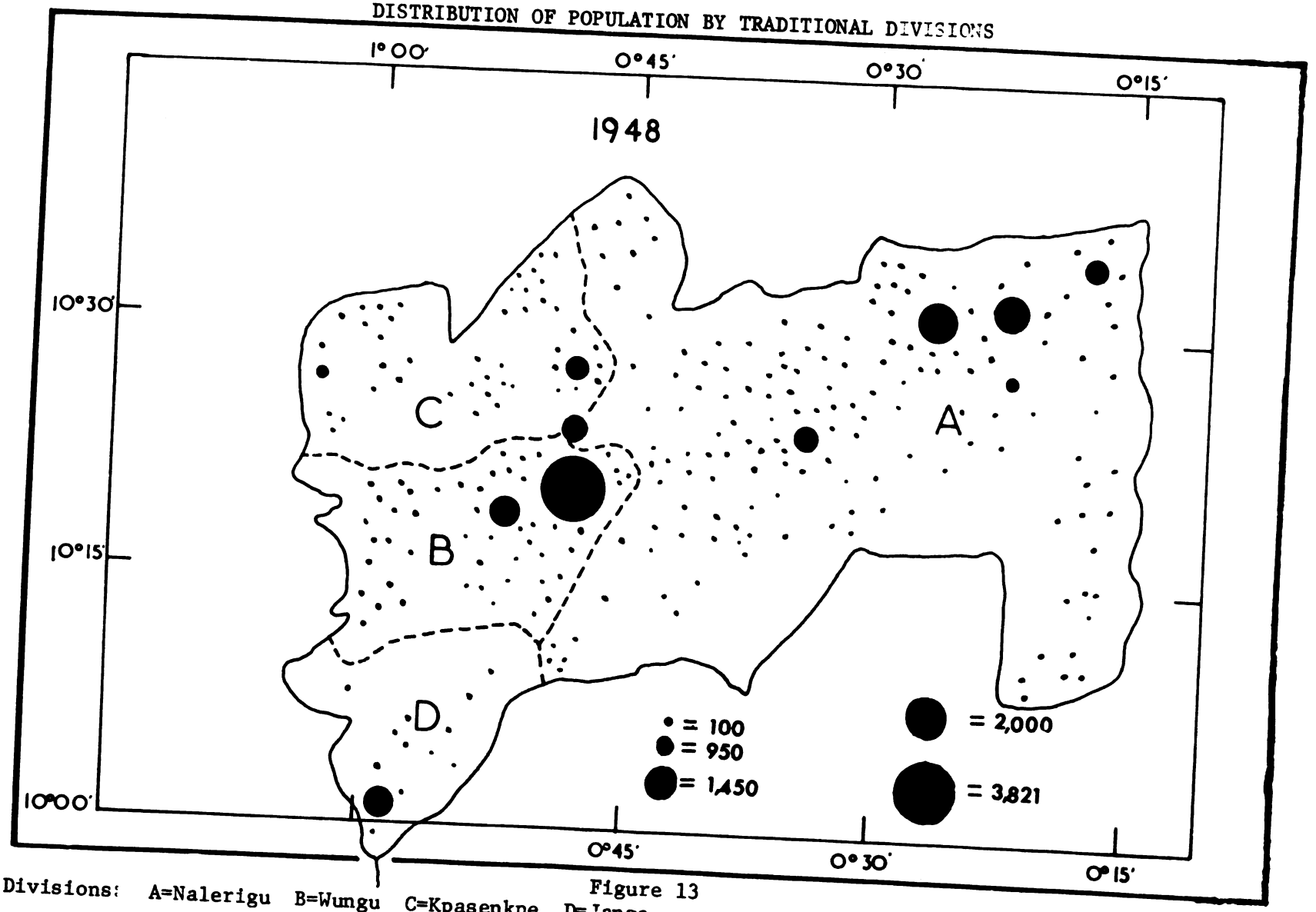

Figure 13

Divisions: A=Nalerigu B=Wungu C=Kpasenkpe D=Janga

(Ghana 1948 Census Report.)

DISTRIBUTION OF POPULATION BY TRADITIONAL DIVISIONS

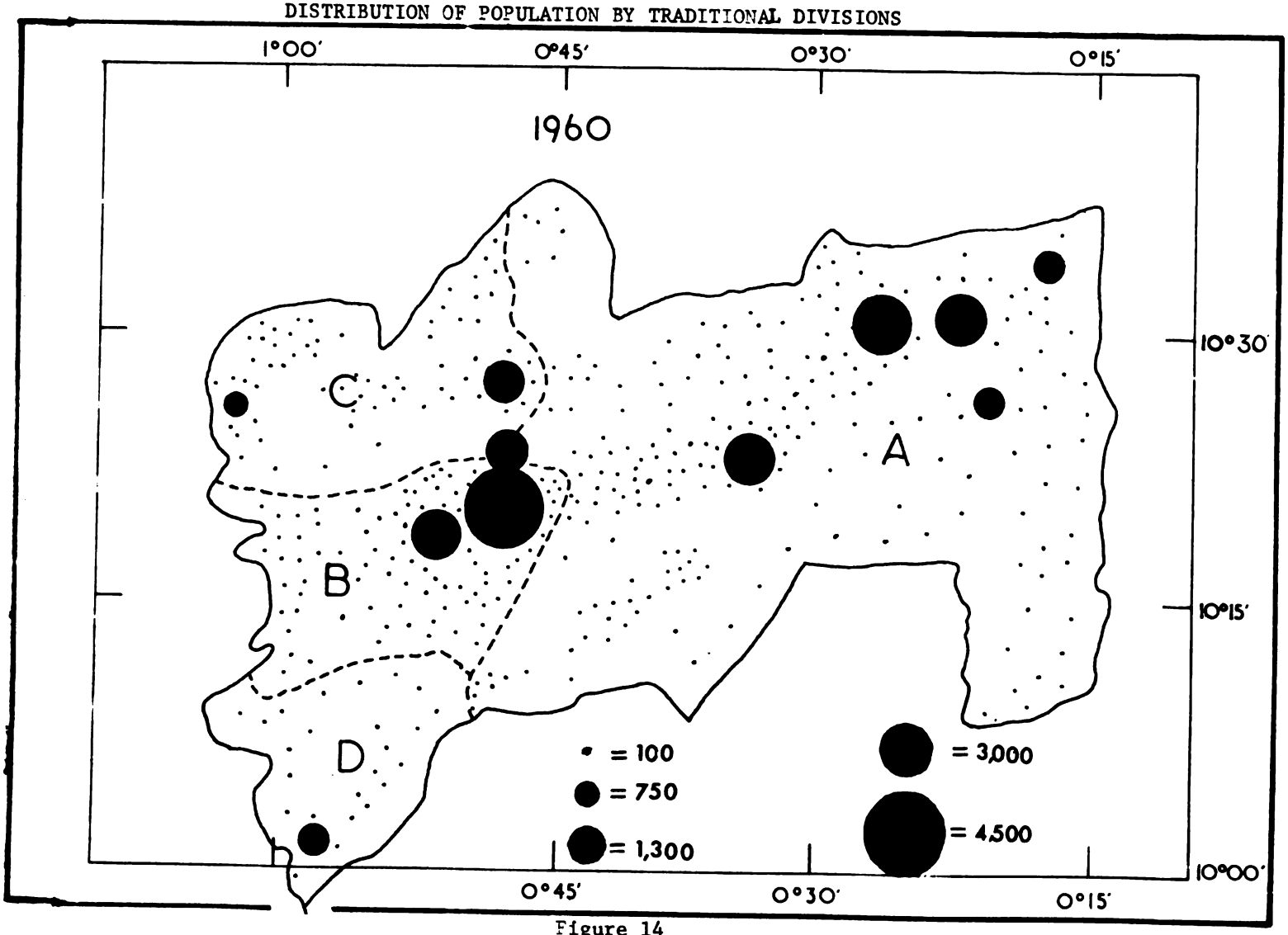

Figure 14

Divisions: A=Nalerigu B=Wungu C=Kpasenkpe D=Janga

(Ghana 1960 Census Report)

The author has a feeling that this variable ought not to have been added to the variables for the study. In view of its insignificant role in the step-wise deletion programme one may be right to assume that it has not distorted very much the results of the regression model. An interesting significant inter-correlation, however, exists between foreign-born and this variable (-.44). This explains the point that the foreigners do not usually stay in rural areas; therefore, where there is a high proportion of people born in a locality, there are a few or at times no foreign residents. Earlier in the study, the contention was made that very few foreigners settle in Mamprusi as subsistence farmers and this correlation supports the contention. The per cent born in this locality has a very insignificant correlation with education, r=.028, and shows the low level of education in the very rural areas.

(j) Dependency and Fertility Ratios: These variables were used with the hope that they will serve as fertility indicators, especially fertility ratio. They have, however, turned out to have insignificant correlations with population change (dependency, r=.18 and fertility, r=.36). Individually, they contribute very little to the total variation in the multiple regression model. It was noted in Chapter II that Bogue and Palmore feel that the fertility ratio underestimates fertility because the net result of the ratio is biased. This could be a reason for the weak role of the fertility ratio. In any case, it has inter-correlations of r=.43 and r=.44 with traditional authority and urbanization respectively which are significant at the .05 level. This supports the assumption that fertility is higher at the urban centers and at the traditional authority capitals. Though the dependency ratio is directly a function of the components of population change in the sense that increase in population always implies

a higher dependency load than do stationary populations, its role here might be due to the distribution of the ratio among the enumeration areas. One reason might be that there was a development of a threshold in the distribution of values of this variables between areas with high population increases and areas with population decreases. On the whole, fertility ratio with the correlation of r=.36 and significant at .05 with population change, is more important than the dependency ratio.

(k) Born in Another Region: The minor role of this variable in accounting for population change can be explained in terms of the under-developed nature of Mamprusi at the national level. As Ravenstein pointed out, usually "migrants proceeding long distances generally go by preference to one of the great centers of commerce and industry."[14] Thus, a few migrants from far away places within Ghana do come to Mamprusi. The few long distance migrants in the area are in these occupations: business, administration, rural-commerce, education, and fishing.

A Consideration of the Residuals:

From the regression analysis about 88 per cent of the total variation of population change was accounted for by the thirteen independent variables. (Table 12.) Both the delete and addition programmes yielded the following variables as the most important - traditional authority, urbanization, education, another locality, density, and foreign born; together they account for about 87 per cent of the total variation of population change. For the analysis of the residuals in view of the relative insignificant roles of the other variables, only the above variables have been used, i.e. residuals

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[14] Ravenstein, E. G., op. cit. (1885), p. 199.

from the step-wise deletion programme.

The enumeration areas have been divided into four categories of population change namely, high growth, moderate growth, low growth and decrease (Appendix B). Figure 15 gives the negative and positive residuals according to one standard deviation units. It has already been noted that negative residuals indicate over-estimation of the per cent of population change while positive residuals mean an under-estimation of the per cent of population change. The pattern on Map 15 indicates that there were not any striking deviations from the explained estimated variation, the highest being only 2 standard deviation.

An examination of Figures 11 and 15 reveals the following: (a) All the areas which had population decrease are in the negative one standard deviation category, indicating an over estimation. (b) About half of the areas with high population change (Langbinsi, Nagbo, Nalerigu and Gambaga) have negative value of one standard deviation, while the remaining half are in positive one standard deviation category. (c) In like manner, half of the areas with moderate and low growths have negative one standard deviation values while the rest are in the positive one standard deviation category. (d) There is one extreme case that has a positive value of two standard deviation; this is Gbeo with moderate population growth.

It is not surprising that the residuals indicate an over-estimation for all the areas with decrease growth. The variables considered above are insignificant in these places. The level of traditional authority is at the village level, and apart from Du and Arigu which were considered as urban centers at the lower level, the rest are rural areas. Education is also not important in these places and densities are quite low. It was noted in Chapter IV that these are the areas which did have high death rates in the

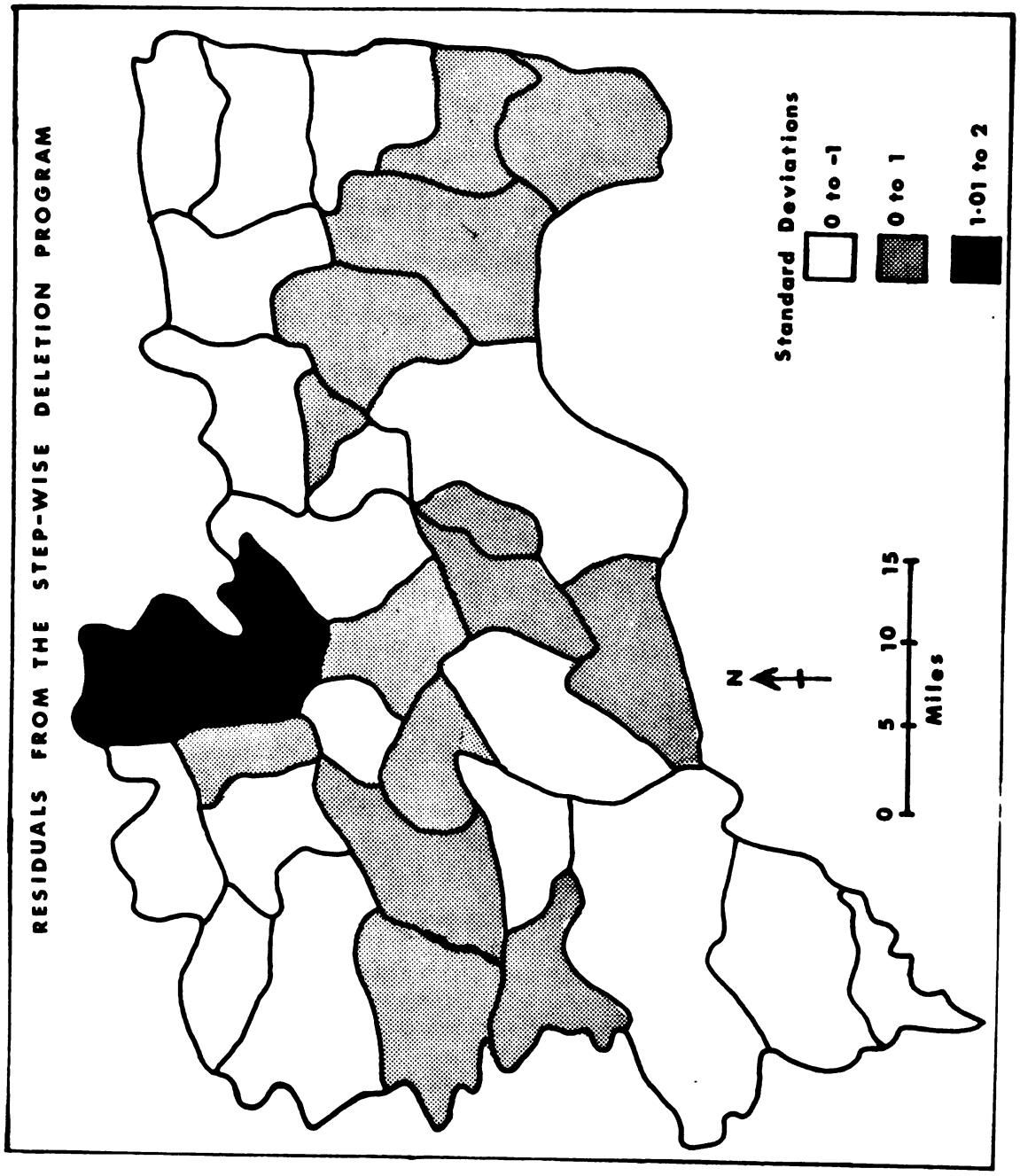
RESIDUALS FROM THE STEP-WISE DELETION PROGRAM
Standard Deviations
0 to -1
0 to 1
1.01 to 2
N
0
5
10
15
Miles

Figure 15

past. Thus independent variables on the vital statistics of the area -- births, deaths and migration -- would have helped, however these are not available.

The position of Langbinsi, Nalerigu, Nagbo, Gambaga and Gbimsi in possessing negative residuals though they have high growths is not very clear. All these places have some level of traditional authority, urbanization, education and quite a number of foreigners. Being traditional and urban centers they will also have immigrants from other parts of South-Mamprusi. If this is the case and yet the residuals suggest an over-estimation, perhaps too much importance was attached either to a few or all the variables. One shortcoming of traditional authority is that there are only a few places with Paramount chief (Nalerigu) and Divisional chiefs. This limited spatial distribution might have had some distortion on the effectiveness of the other variables. There is also the point that with the establishment of the Indirect Rule by the British administration during the colonial period the importance of traditional authority capitals was reinforced. They became administrative, health, commercial educational and transport centers. Thus they do possess all the qualities of the most important independent variables.

Nasia, Gambaga, Gbandaa, Burugu, Tangbini, Wulugu, Walewale and Guabuliga are all high growth areas and yet the residuals indicate that there was a little under-estimation of the per cent change of population. Gambaga, Walewale and Wulugu are urban centers but the others are rural areas. Almost all these places are near main roads. If the values have been under-estimated one could infer that the areas might have benefited from the use of other variables. What has been said about the need for vital statistics is very true for these places. The fact that they are

near main roads do suggest continued receipt of immigrants therefore a net-migration variable would have been useful, but such information is not available.

The areas with moderate and low growth rates can broadly be divided into under-estimated and over-estimated areas. (Appendix 2) Most of these are rural areas but a few like Sakogu, Kpasenkpe, Wungu, Bong-Da, Janga, Kparigu are both traditional centers with some measure of education and urbanization. Wungu, Kpasenkpe and Janga have divisional chiefs and yet they all indicate an over-estimation of the per cent change. This again suggests that though cultural considerations are important for population growth (in view of the minor deviations) there are also other factors which should be given, some attention. It could also be a pointer to the already mentioned uneven distribution of the major traditional capitals, for in the West only Janga, Kpasenkpe and Wungu are divisional capitals.

The extreme case of an under-estimation in Gbeo with a +2 standard deviation value, can be explained in terms of the density variable. Though the area has moderate growth it has a far lower density of population than other areas with moderate growth, owing to the extensive area it occupies. Kurugu was mentioned in Chapter IV as a former divisional capital but which lost its position in the 1930s. This resulted in an exodus of quite a few people from the area hence the low density of population today. Other variables based on vital statistics might have helped in explaing the variation here.

A major striking feature of Figure 15 is the extensive belt of under-estimated values (+1 Standard deviation values) almost in the middle

of the area, from east to west. Indeed, there would have been a contiguous belt if Wungu, Gbimsi, Langbinsi and Bugiya had the same values. In an attempt to explain the pattern the author realized that there are the following factors about this middle belt of underestimated per cent population change. (a) It contains most of the oldest settlements in South-Mamprusi. (b) It has some of the most important food producing villages in Mamprusi. (c) The eastern part of the belt is along the Walewale - Nalerigu main road. (d) A superimposition of the residuals on a relief map (Figure 2) indicates that a majority of the settlements in this belt are situated along the headwaters of the streams of the White Volta and River Nasia. A consideration of all these factors led the author to believe that there ought to have been an "agriculture land value" or "agricultural production" variable for the regression analysis.

In choosing the sites for the earliest settlements the availability of water and fertile land were of paramount importance to the people.[15] The choice of the area east of Walewale by the Tampolensi because of its fertile soil has already been noted. All these villages lie within this belt and Langbinsi with a high population growth is not only a food market for South-Mamprusi, but also for North-Mamprusi and some parts of Dagomba. Another consideration is the spatial distribution of immigrants from North-Mamprusi. It was noted earlier on that most of them are agricultural settlers and are therefore to be found within this underestimated per cent change belt. In view of this, the author wonders if a variable on net migration might not have reduced the striking feature of underestimation in the belt. Lack of any data on agriculture land value, agriculture production or rural incomes

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[15] Nabila, John S., op. cit. (1968), p. 9.

and net-migration made the inclusion of such variables not feasible.

B. Post-Censal Period - 1960-1969

Basically the main objective of the sample survey was to collect data on the settlement and population geography of South-Mamprusi. Thus in addition to providing answers for the questionnaires the author collected data on other related conditions. In the course of processing the data collected in the field it was considered necessary to focus the thesis on only population change in Central South-Mamprusi. Thus the following analysis will be based on the major components of population change.

1. Fertility and Mortality: Total fertility rates were computed for the enumeration areas. This rate is the estimate of the number of children a cohort of 1000 women would bear if they all went through their reproductive years. It is computed by summing the age-specific fertility rates for all ages and multiplying by the interval into the ages grouped. The age-specific fertility rate is the ratio of births by age of mother to women in each age interval.

According to Bogue, the total fertility rate is the best single cross-sectional measure of fertility because it is rather closely restricted to the child bearing population and is not influenced by differences in the age composition between child-bearing populations. It is also independent of mortality since it assumes that all women survive from birth to the end of child-bearing period.[16] To Caldwell, one measure of fertility which has the advantage of summarizing a considerable amount of information in the

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[16]Bogue, Donald J., op. cit., 1969, p. 659.

form of a simple index is the total fertility rate. He also indicates that fertility levels in Ghana have not changed much, therefore the total fertility can be equated with the average size of completed family sizes.[17]

Information on current fertility, i.e. births occurring during the twelve months preceding the survey was obtained from the field. In addition, the total number of children ever born to women and the number of children alive were also recorded. This information was used for the computation of the total fertility rates. More often than not, the births occurring to women aged 50 years and above are regarded as the total fertility. It was not possible to compute the crude birth rate since the mid-year population was not known.

The table below gives the mean number of children ever born to women by age group in South-Mamprusi. The completed fertility rate is

TABLE 15

MEAN NUMBER OF CHILDREN EVER BORN TO WOMEN BY AGE GROUP

Age Group	Mean No. of Children
1. 15 - 20	1.0
2. 21 - 25	2.0
3. 26 - 30	3.2
4. 31 - 35	4.3
5. 36 - 40	5.1
6. 41 - 45	5.8
7. 46 - 50	6.0
8. 51 - 55	6.5
9. 56 - 60	7.0
10. 61 - 65	7.0
11. Over 65	7.0

[17] Caldwell, op. cit., 1967, p. 88.

TABLE 16

TOTAL FERTILITY AND THE NUMBER OF DEATHS FOR THE PAST TWO YEARS

Enumeration Areas Visited	Total Fertility	No. of deaths for the past two years
1. Soo Daboya	5.9	26
2. Nasia	6.0	15
*3. Kparigu	6.5	20
4. Zambulikura	6.8	25
*5. Bong-Da	6.1	15
6. Kpikparibobgu	5.9	22
7. Burugu	7.2	35
8. Samene	6.3	26
9. Guabuliga	6.4	19
10. Zangum	5.9	22
11. Logri No. 2	6.3	16
12. Sayo	7.0	20
*13. Kpasenkpe	6.9	17
14. Kinkadina	5.8	28
15. Gbeo	6.0	30
16. Kpakpiri gbangu	5.9	16
17. Namasim	6.1	17
*18. Sakogu	6.5	18
*19. Janga	6.2	20
*20. Nalerigu	7.1	10
*21. Wulugu	6.8	15
*22. Walewale	7.3	15
*23. Gambaga	6.2	17

*Traditional and Urban Centers.

seven. Though this is the average, there were a few completed family sizes which were about ten. This was largely due to past infant mortality rates which lessened the spacing period between births. Considering South-Mamprusi as a whole, the average length of the interval between births is 2 years but this was noticed to be shorter whenever a child died before the weaning period. It is most likely that these figures are lower than what exists because many people are reluctant to discuss their dead children.

Table 16 gives the total fertility rates and the number of deaths for the past two years preceding the sample survey. The fertility rates indicate that South-Mamprusi has a minimum total fertility rate of 5.8 and a maximum of 7.3 for Walewale, an urban center. This is not very different from what Gaisie found out for the area and this shows that fertility rates have not changed very much.[18] The slight increase might be due to increased medical care, and on the whole better living conditions. The total fertility figures are quite high in a few of the traditional authority capitals and urban centers. This still suggests that fertility is higher in these areas than in the typical rural areas. There is no doubt that as urbanization and education continue to develop in South-Mamprusi, these fertility rates in urban centers will drop. Though most of the respondents felt that there was nothing wrong in having large families, they expressed concern about the changing cost of living which makes it increasingly difficult for large families to be catered for.

The crude death rates could not be computed for the enumeration areas because there was no idea about the mid-year population. The number of deaths for the past two years, however, helped in giving an idea about mortality levels in these enumeration areas. From Table 16 it is quite obvious that deaths do occur often in the rural areas than in the urban centers. On the average, the people reported that deaths in recent years have been less than what they were years ago. This is definitely due to the availability of medical facilities especially in areas near the main roads, urban and traditional authority capitals. Besides, since the eradication of the sleeping sickness epidemic in the 1930s no epidemic

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[18] Gaisie, S. K., op. cit., 1969, p. 39.

has taken place in South-Mamprusi. The major causes of deaths among the young population were malaria and measles. These are somewhat periodic diseases every year, however they are being controlled and deaths from them now are lower than what the situation was years ago.

2. Internal Migration: This seems to have become very pronounced during the period 1960-1969. The search for better agriculture lands by a few people in the rural areas continues and this often results in the movement of single families or complete villages. Along the Gambaga - Walewale road new settlements are continually being established by people who move to that area from other parts of Mamprusi, especially, the section around Gambaga. Namiyala, Yaroyiri and Tianoba are all new settlements on the road and were established between 1960 and 1969. Namiyala, for example, was established by people from a whole village near present Zagiri in the South-east. These villages along the road have the advantage of utilizing some of the fertile areas in Mamprusi. Besides, with the road it is quite easy to send food to be sold in markets in Walewale, Langbinsi, Gambaga and Nalerigu. A few settlements are also being established along the other main raods, for example between Wulugu and Nabari or between Nalerigu and Sakogu. Bogue has pointed out that internal migration is the single factor accounting for population growth differentials in many places in the world. At the rate that families are increasingly becoming mobile in South-Mamprusi it will be internal migration which will account for population growth differentials in the future. At present it is only one of the factors accounting for population growth differentials.

3. Immigration: This continued to be important in South-Mamprusi as it was in the previous years. Immigrants continued to migrate into the area from

North-Mamprusi and Central Moshi.

In the rural areas immigration was found to be unimportant. Of the households visited in the rural areas only 15 families were immigrants who had moved into South-Mamprusi between 1960 and 1969. Apart from some immigrant fishermen in Kpasenkpe and Janga, the immigrants were agricultural settlers. The fishermen were either Battor from Central Togo or Hausa, but the agricultural setters were from Frafra, Kusasi and Moshi. None of these regarded South-Mamprusi as their home, their real homes were back on their father's land in the various places they migrated from. The Frafra and Kusasi made periodic visits home to take part in the major annual festivals.

The urban and traditional centers received a majority of the immigrants. Walewale is a commercial center for many places in the West and therefore received most of the immigrants to the West. These were some Yoruba, Hausa, Moshi, Dagomba and people from Southern Ghana, who moved into South Mamprusi in order to engage in trade. Another source of immigrants was through administrative functions. Walewale, with a health center, Workers Brigade Camp, Post Office, Agriculture Extension Station and a Middle School received quite a substantial number of both educated and uneducated workers. Other places in the West which received immigrants were Wulugu, Gbimsi, Wungu, Nasia, and Logri No. 2. At the time of the survey the author estimated that the population of Walewale was well above 5,000, perhaps about 6,000 people.

Nalerigu has become an important destination for more than half of the immigrants to the east. Indeed, the major component of population growth here between 1960-69 should be immigration, both from outside Mamprusi and from other localities. In addition to its role as the seat of the

paramountcy, it is the administrative headquarters of the Nalerigu Local Council and a medical center. The growing importance of the hospital in Nalerigu has brought new functions to the town such as construction, commerce, building of houses for renting out to visitors and workers and a food-market.

The role of traditional authority continues to make Nalerigu the termini of some chiefs and their families. Nalerigu exhibits some features of stream and counter-stream in local migration. For as chiefs attain higher ranks and qualify to stay in Nalerigu, young princes become lower chiefs and move out to other villages. At the time of the survey there was a new paramount chief -- Na Bongu -- who had been installed in 1968 to replace a previous one who died in 1967. Na Bongu was the chief of Kparigu and therefore had to move to Nalerigu with all members of his family, his patri- and matri-kins, his close elders in the court and other members of his extended family. Since he bacame a chief about three princes have moved out of Nalerigu to be chiefs in other places.

The Nalerigu Hospital itself has established a village for the treatment of tuberculosis patients. These patients are from different places in Mamprusi and outside the district. They stay here until they are out of the danger zone or completely healed. At the time of the survey the author enumerated fifteen T. B. patients with their families. The average number of years spent in the village was two years, and while they are in Nalerigu they are given land to farm in order to support their families. Apart from this village, the hospital has many employees including American and British medical officers and their families. Further, the hospital also draws quite a high number of patients every day from other places in Northern Ghana and a few patients from the South. Nalerigu should

have more than 5,000 people now.

In the east, Sakogu, Gambaga, Nagbo and Langbinsi, were some of the places which received migrants from outside Mamprusi. Immigrants from Bimoba and Komkomba areas in the east are among the people who move into the east to settle. They are usually agricultural settlers rather than people engaged in commerce.

4. Out-migration: This is becoming very important, as Table 17 indicates in South-Mamprusi than the situation was years ago. The table shows that quite a few people engaged in long distance migration. All these were mostly men who went to Southern Ghana in search of better income or in order to have the experience of staying in the relatively better developed southern part of the country. Ashanti and Bong-Ahafo regions are the usual destinations for these migrants who were mostly in the 14-33 years age group. Few of them stay in urban centers in the South while a majority of them work on cocoa farms on contract basis, for two or three years. When the contract expires, a migrant can renew it or return home.

Among the out-migrants enumerated were some females but these usually went with their husbands or joined them later on. However, the common practice is for a long-distance migrant male to leave the wife and children at home to be taken care of by other members of the extended family.

Education was found to be one of the factors encouraging out-migration. Many students from South-Mamprusi are in other parts of Ghana receiving education in secondary schools, colleges and universities. Young men and girls with past education who could not make it to the end, especially the young men, engage very much in out-migration to Southern Ghana.

TABLE 17

LONG DISTANCE MIGRATION
IN SOUTH-MAMPRUSI

Enumeration Area	No. of long distance emigrants	Average number of years away
1. Soo Daboya	6	2
2. Nasia	6	3
*3. Kparigu	15	4
4. Zambulikura	5	3
*5. Bong-Da	4	1
6. Kpikparibobgu	20	5
7. Burugu	10	2
8. Samene	18	4
9. Guabuliga	23	3
10. Zangum	30	3
11. Logri No. 2	15	2
12. Sayo	40	6
*13. Kpasenkpe	20	3
14. Kinkadina	15	3
15. Gbeo	25	8
16. Kpakpiri gbangu	30	6
17. Namasim	14	2
*18. Sakogu	50	8
*19. Janga	25	5
*20. Nalerigu	50	4
*21. Wulugu	100	8
*22. Walewale	60	3
*23. Gambaga	40	5

*Traditional Authority and Urban Centers.

The number of out-migrants reflects the structure of the population of the various enumeration areas as well as the economic opportunities available in them.

The number of out-migrants from rural areas is lower than that from urban centers. This suggests that there is still an attachment to the "family system" in rural areas than the case is in urban areas.

A closer examination of Table 17 shows that some rural areas have many out-migrants. These are the enumeration areas with immigrants from North-Mamprusi and Moshi who usually engage in step-migration to the South, with Mamprusi as one of the intervening destinations. Sayo, Gbeo, Kpakpiribangu and Sakogu have all got high numbers because of these immigrants who tend to be very mobile. Wulugu has the highest number - 100 - because of its location. It is on the main Bolgatanga - Kumasi road and it is now an aspired after goal by the youths to migrate to the South to stay for a few years before returning home. Indeed, there is no house in Wulugu without some young men, either alone or with their spouses, living in Southern Ghana.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This has been a consideration of population change in Central South Mamprusi. An attempt has been made to find out the factors accounting for population change in the area as a whole.

For the purpose of the study, the following assumptions (hypotheses) were made:

(1) Reproductive change (natural increase) is the major source of population change in the area under study. The assumption here was that, since South-Mamprusi receives a few immigrants it should be reproductive change rather than migration that is accounting for population growth.

(2) There is a close relationship between traditional authority and growth of population. For a very long time now a hierarchy of chiefdoms has been developed such that the growth of some settlements is due to the existence of the chieftaincies. It was hoped that, since these centers serve as capitals for the other villages they should show higher growth rates.

(3) Men migrate for long distances more than women and therefore the sex-ratio of the age group 15-44 years is a good measure of migration. More often than not, in the developing countries, men migrate for long distances to the "pull" areas (economic cells). This creates a high sex ratio in the "pull" areas while there is a low sex ratio in the "push" areas. Thus this variable was to find out the level of in and out migration

in South-Mamprusi.

(4) There is a direct relationship between density of population and growth of population.

(5) There is an inverse relationship between density of population and distance from main roads. Thus, there is also an inverse relationship between population growth and distance from main roads. The assumption here was that settlements along the roads should grow faster than those which are far away.

(6) The urban centers are areas of rapid population growth, thus there should be a direct relationship betwen population growth and urbanization. By the very nature of their functions there is an inverse relationship between population growth and distance from urban centers.

(7) There is a close relationship between education and the tendency to migrate. There should therefore be a direct relationship between education and population growth.

The changing patterns of the increase in numbers of population in the twentieth century was considered in the study. For the early period, population change was accounted for at the local council aggregate level, that is, considering Central South-Mamprusi together. For the period between 1948 and 1960 the study was based on the enumeration areas of the 1960 census and the author's field work. Data for the analysis as a whole was derived from National Census Reports, records in the National Archives and data from the author's field work. Since the 1948 and 1960 census reports are more reliable than the previous censuses, it was considered quite helpful to consider population change in the enumeration areas at the distributive level.

In order to understand the mechanisms for population change in South-Mamprusi, fourteen variables were used for carrying out a multiple

regression analysis. Population change was the dependent variable while the other thirteen, derived from the above hypotheses were the independent variables. (Refer to Chapter 2)

The study area forms part of the Voltaic family and linguistically belongs to the Mole-Dagbani association, which covers a major part of Northern Ghana and Upper Volta. It is known to have been settled for a very long time, perhaps before the neolithic period. One of the major aspects of the human geography of the area is the peopling of it by small groups of people who immigrated into it to settle, beginning in about the 15th century.

Through these immigrants from the north, a system of traditional authority was developed and today there is a hierarchy of chiefdoms. The small groups of people who moved in and introduced the idea of chieftaincy and territorial acquisition form the royals today. This factor has been of paramount importance in considerations of the general development of the area as well as the patterns of population distribution.

Though the earlier censuses were not very accurate, they do indicate that population has been increasing in South-Mamprusi since 1900. At the turn of this century, fertility rates were supposed to be very high. In like manner, death rates were also quite high, in veiw of the poor living conditions at the time. The occurrences of the influencza epidemic in 1918 and cerebro spinal menengitis in 1921 raised the death rates. It has been recorded that the high sex ratio in the 1920's was largely due to the death of many females as a result of these diseases.

There has been a general desire for children to help in the subsistence economy and this has consequently raised the fertility level. Indeed, the customs and religion of the people do favor high fertility.

The creation of Gambaga as the first headquarters of the Northern Territories encouraged a few people to migrate into the area. When the capital was removed to Tamale the area continued to receive immigrants from further north, especially from North-Mamprusi and Central Moshi. South-Mamprusi is very fortunate to have abundant land, about eight per cent is cropped in any one year. The relative nearness of the area to the populous North-Mamprusi, where by the 1930s there was a problem of over population, has been a factor in attracting immigrants from these hard-pressed areas, though not in considerable numbers as the administration anticipated. In rural Ghana as a whole, many farmers find it difficult to leave their "father's land" and this explains why many people from North-Mamprusi have not moved into South-Mamprusi.

By 1948, health conditions of the people had improved and the mortality rates would have been lower than those of previous years if it had not been due to the occurrence of sleeping sickness in some villages. The disease claimed the lives of quite a few people and the situation was made worse by the invasions of locusts in the same period, which resulted in periodic famines. During this time South-Mamprusi continued to receive immigrants from North-Mamprusi, Central Moshi, Nigeria and Southern Ghana.

Birth rates continued to be the same as they were years ago. Death rates, since the eradication of some of the major diseases coupled with the building of a hospital in Nalerigu and a health center in Walewale, have been on a steady decline. Infant mortality rates which were quite high during the past years have been considerably reduced. Between 1948 and 1960 the whole population increased by 54 per cent, this representing an intercensal growth rate of about 3 per cent per year. Even though there were no major urban centers by 1960, there were quite a few settlements which were considered

as more important than the rural villages. These continued to grow at the expense of the other villages and by virtue of the facilities available in these urban centers they rendered some services to the rural areas.

During the post-censal period population continued to increase until the departure of most of the foreigners.[1] At present, it is not known exactly the effect this mass departure of foreigners has on population numbers in the various enumeration areas. A sample survey revealed that fertility levels were still the same and the family system was still geared towards the possession of large families. The only exception being the few educated people who have started possessing small families. Out-migration is increasingly becoming important in South-Mamprusi and it is mostly the young men who emigrate to Southern Ghana to stay for short periods.

Hypotheses Accepted: Through the multiple regression analysis the author was able to find out some of the major factors which influence population growth in the study area:

(1) Traditional authority was found to be of importance for population growth. The hypothesis that it should have a direct relationship with population growth was supported by the results of the regression model.

Before the establishment of the British Administration, the system of chieftaincy was already in existence. The introduction of Indirect Rule whereby the Colonial Administration did almost everthing through the chiefs reinforced the importance of traditional authority. The traditional

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[1] In November 1969, the Government of Ghana passed a new immigration law requiring that aliens of Ghana should be in possession of valid resident documents. This resulted in the departure of about three quarters of the aliens, especially those from nearby countries.

authority capitals, therefore, became administrative, commerical educational, health, transport and religious centers. A few of them developed from rural to urban status such that they have continued to receive immigrants from other parts of Mamprusi and from outside the area. Indeed, almost all of them are attracting areas for foreigners. The immigration of Muslims into South-Mamprusi and consequently the establishment of that religion in the area has helped in raising fertility rates. At the beginning of the study it was felt that a religious variable should be used, but this was dropped due to lack of sufficient data.

(2) Density of population was found to have a direct relationship with population growth, thus the hypothesis was supported at the .001 level.

(3) It was hypothesized that there should be inverse relationships between population growth and distances from main roads and urban centers. The roads continue to attract people to settle along them such that during the field work relatively new settlements were found along these roads. This hypothesis was supported by the results of the analysis.

(4) The hypothesis that urban centers grow faster in population than rural areas was accepted. In many other places in Ghana urban-rural differentials in fertility rates show that urban centers have low fertility rates. However, in South-Mamprusi it was found that, owing to the fact that urbanization on the same scale as is found in Southern Ghana is still taking place, fertility was rather high in urban centers. The many facilities in urban centers do tend to favor the prevalence of higher growth rates of population.

(5) Education as a positive factor of population growth was accepted. The acquisition of education does encourage people in Ghana to be more mobile than the people who are uneducated. Since all the elementary schools are

day schools which cater for the local population, only people aged more than 15 years with present or past education were considered. People with past education were those who were in the area and engaged in administration and other occupations. People with present education were students from the local area attending school in other places, but were currently at home, for the 1960 census was carried out during vacation. The only exception will be localities with middle schools, in which case the students were attending school in the same locality.

Hypotheses Rejected: (1) The assumption that reproductive change is the major contributor of population growth was not accepted. A pitfall of this hypothesis is that there was no specific independent variable in the study based on reproductive change. The most appropriate variables for it would have been those based on vital statistics.

(2) The contention that the sex ratio should be a good indicator of the nature of migration was rejected. This variable has been found to be significant at the national level as an indicator of migration patterns. In South-Mamprusi long distance migration was not important hence its insignificant role in the regression model.

On the whole, the variables used for the regression analysis, especially those of traditional authority, urbanization, education, born in another locality, density of population, and foreign born, were significant for the study. Population change was accounted for by 88 per cent by all the independent variables and this indicates the significant relationship between these variables and population change.

Though this is the case, the availability of vital statistics would have saved the author from a great deal of trouble from using other variables.

Indeed, such data would have helped in focusing the attention of this study on the major components of population change. Though, the results are quite good it is difficult to give the specific contributions of the major components of population change, namely fertility, death and migration rates.

The use of the variables pertaining to place of birth has a short coming of not giving the researcher the opportunity of knowing exactly the contribution of immigration. The variables do not take into consideration the period being studied, such as distinguishing between old and new immigrants. It was envisaged that the results of the multiple regression model should serve as a reflection of the whole trend of population change in South-Mamprusi. Hence, though the birth place variables did not give an idea of conditions between 1948 and 1960, they gave an idea of trends of population growth, regarding the contribution of migration, for the whole period considered in the study.

GLOSSARY

1. Dagbansabilisi: Literally this means inferior Dagomba. Binger was told that traders and all other people of Mande origin were called Dagomba. From the name coupled with Binger's work it could be inferred that the invaders and their kinsmen gave the original people this name. The original people are at times called Tindanbisi, meaning descendants of the Tendana.

2. Tendana: Before the 16th Century, i.e. before the chieftaincy system was introduced, every village was an autonomous unit and the head was the Tendana -- the owner of the land. He was the representative of the 'Earth-God' and was consulted in matters related to farming, hunting and spiritual affairs. After the establishment of the chieftaincy system, the Tendana continued to play that role but subordinate to a village chief.

3. Mamprugu: The following words have been coined from this name:

   (a) Mamprugu - the kingdom

   (b) Mamprusi - the ethnic group or the people

   (c) Mampruli - the dialect spoken by Mamprusi

   (d) Mamprugunaba - the Paramount Chief of the Mamprusi.

APPENDIX A(1): DEPENDENT AND INDEPENDENT VARIABLES

Variables	Type	Symbol
Population Change	Dependent	X_1
Density of Population	Independent	X_2
Fertility Ratio	Independent	X_3
% Born in this locality	Independent	X_4
% Born in another locality	Independent	X_5
% Born in another region	Independent	X_6
% Foreign Born	Independent	X_7
Sex Ratio	Independent	X_8
Traditional Authority	Independent	X_9
Distance from urban centers	Independent	X_{10}
Distance from main roads	Independent	X_{11}
Urbanization	Independent	X_{12}
Dependency Ratio	Independent	X_{13}
Population with past or present education	Independent	X_{14}

(Also refer to page 26 for list of variables).

APPENDIX A(2)

MATRIX OF SIMPLE CORRELATIONS

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}
X_1	1.00													
X_2	.72	1.00												
X_3	.36	.19	1.00											
X_4	-.32	.07	-.12	1.00										
X_5	.33	-.03	-.04	-.83	1.00									
X_6	-.18	-.11	-.20	.01	.01	1.00								
X_7	.52	.46	.04	-.44	.30	.10	1.00							
X_8	.23	.29	-.08	.21	-.16	.03	.08	1.00						
X_9	.82	.64	.43	-.14	.10	-.15	.34	.21	1.00					
X_{10}	-.60	-.70	-.28	.15	-.01	-.11	-.53	-.35	.52	1.00				
X_{11}	-.51	-.69	-.27	.07	.07	-.06	-.58	-.36	-.43	-.85	1.00			
X_{12}	.67	.69	.44	-.20	.05	.04	.49	.25	.54	-.83	-.77	1.00		
X_{13}	.18	.12	-.18	-.11	.17	-.32	-.01	.06	.16	-.11	-.09	.01	1.00	
X_{14}	.46	.54	.32	.03	-.12	.19	.33	.29	.62	-.62	-.55	.72	.04	1.00

APPENDIX B

ENUMERATION AREAS WITH PER CENT POPULATION CHANGE AND RESIDUALS

Enumeration Area	Per Cent Population Change	Per Cent Residuals	One Std. Deviation	Category
1. Walewale	139	27.13	1	
2. Langbinsi	127	-11.66	-1	
3. Nagbo	124	- 1.05	-1	
4. Nalerigu	112	- 9.63	-1	
5. Burugu	109	15.55	1	
6. Tangbini	100	7.49	1	HIGH
7. Guabuliga	99	9.97	1	GROWTH
8. Nasia	89	8.76	1	
9. Gambaga	89	-20.91	-1	
10. Gbandaa	88	21.40	1	
11. Wulugu	83	18.33	1	
12. Gbimsi	80	- 4.01	-1	
13. Yama	72	28.58	1	
14. Gbeo	61	54.05	2	
15. Wundua	56	-13.56	-1	
16. Kparigu	44	10.32	1	MODERATE
17. Gbani	37	10.07	1	GROWTH
18. Kpasenkpe	35	-14.11	-1	
19. Wungu	32	- 9.73	-1	
20. Gbango	31	26.70	-1	
21. Sakogu	20	16.54	-1	
22. Bugiya	17	-14.24	-1	
23. Bong-Da	15	17.54	1	LOW
24. Mushio	11	2.26	1	GROWTH
25. Zambulkura	10	6.47	1	
26. Janga	3	22.68	-1	
27. Buzulungu	- 2	31.45	-1	
28. Zangu	- 4	5.73	1	
29. Nabari	- 5	-14.47	-1	
30. Fio	- 7	- 0.66	-1	DECREASE
31. Arigu	-12	- 9.42	-1	
32. Soo Daboya	-14	-10.70	-1	
33. Duu	-25	-12.03	-1	

APPENDIX C

QUESTIONNAIRES

FORM A: (By Household)

Name (Household owner first	Sex	Age	Married	No. of Wives	No. of Children	Reason for Status	Occupation	Education (Highest Class) attained	Physical Condition	Remarks

Etc.

FORM B: MIGRATION

Name	Age	Sex	Where To Village & Region	What is he/she doing?	Reason for going?	How Long There?	Marital Status	Remittance What & When?	When Expected Back	When was he at home?	Where were you last 12 months?	Purpose	Do you Hope to Travel? Where?	Remarks (Attitude, etc.)

Etc.

APPENDIX C

QUESTIONNAIRES

FORM C: FERTILITY

Name of Female 12 Year(s)	Children				Birth Last 12 Months	Average Interval	Name(s) of Father	Relation-ship to Female	Age of Father	Education		Occupation		Re-marks
	M	F	Total	Still Birth						Father	Mother	Father	Mother	

Etc.

FORM D: MORTALITY (No. of Deaths Last 2 Years By Household)

Name	Age	Sex	When did he die?	Where did he die?	Cause of Death	Where Deceased Spent Greater Part of Life/ Remarks

Etc.

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