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SPATIAL ASPECTS OF REGIONAL INEQUALITIES
AND DEVELOPMENT IN GHANA

By

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ABSTRACT

SPATIAL ASPECTS OF REGIONAL INEQUALITIES
AND DEVELOPMENT IN GHANA

By

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One of the spatial development strategies in develop-
ing countries used in redressing regional inequalities has
been to concentrate development investment in large and
medium-sized towns assuming that benefits would gradually
trickle down to surrounding settlements. Presently, there
is little evidence for this strategy; only a few studies have
been undertaken and results are ambigious.

The research objective is to study Ghana's spatial
pattern of development and assess the nature and pattern of
regional inequalities and development in Ghana.

Data collected from documentary sources and mailed
questionnaires are analyzed using socio-economic indicators,
location quotient, gini coefficient and the maximal Guttman
scaling technique which was used to produce development con-
tour maps for 1960, 1970 and 1980. These maps illustrate
the spatial diffusion over time and changes in development
patterns and regional inequalities. Quantitative scores are
also used to draw graphs from which rates of change of de-
velopment attributes are calculated. Chi-square is used to

Kwasi Kwafo Adarkwa

test the independence between regional location and development scores. Further, correlation analysis is used to tentatively explain the recorded variations in development scores or inequality between settlements.

The study shows that spatial inequalities exist in Ghana as measured by various gini coefficients ranging from 14.28 percent to 64.11 percent. The causes of these inequalities were traced to the way in which natural resources were initially exploited, with development benefits concentrated where resources were richest. Analyses of the spatial distribution of development in 1960, 1970 and 1980 indicates that the pattern of development diffusion is hierarchical in nature with a settlement's degree of development being mostly influenced by its population size. Other factors are found to be insignificant in explaining developmental inequalities. This is the case, for instance, of proximity to a growth center. In addition, it is observed that there has been little change in patterns of development in Ghana during the study period. These findings are used to conclude that growth poles have had little effect in reducing inequalities.

The conclusions of the research are used to suggest an alternative development strategy for redressing spatial disparities. Finally, areas of further research are identified to support the suggested planning strategy.

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CHAPTER ONE

INTRODUCTION AND APPROACH TO THE STUDY

Introduction and Problem Statement

The internal spatial structures of most developing countries show regional inequalities in development. These inequalities are characterized by small pockets of very developed regions and vast areas of poverty and underdevelopment. Inter-regional inequalities are generally most pronounced in developing countries where development tends to be concentrated in one dominant metropolitan area or enclave with the hinterland lagging behind. This pattern of development has several implications for the economies of developing countries. One such implication is the attraction of migrants from the lagging regions to the developed regions; usually in search of better economic opportunities.

The concentration of populations in small areas or regions of developing countries has led to many urban problems such as housing shortages and lack of public services. Because of the concentration of people in these areas there is usually a surplus of labor and therefore severe problems of underemployment and unemployment, which in turn affect the level of productivity (Gugler, 1978; McGee, 1976). In an

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attempt to solve these problems, governments of many develop-
ing countries have concentrated their financial resources
and planning efforts on these areas of population concentra-
tion at the expense of the lagging regions. This has led to
a costly cycle of unbalanced development or regional inequality
between different regions of many Third World countries.

Attempts to redress the problems of regional inequality
in development in many developing countries are numerous and
varied. They range from the creation of new towns in lagging
regions to the concentration of economic opportunities, social
facilities and investments in large- and medium-sized towns.
Many countries including Ghana, Nigeria, Kenya and Uganda have
all applied some variation of the latter strategy. The basis
of such a strategy is the assertion that the concentration of
development in selected centers will gradually transmit the
benefits of development to other settlements within the do-
main of these selected centers and thereby reduce inequalities.

If the foregoing assertion is true, it may be applied
as a useful policy rationale in planning to redress regional
inequalities in developing countries. At present, however,
there is no clear, empirical evidence for the assertion. Only
a rew studies have so far been undertaken and the results are
ambiguous (Xiarchos, 1978). This dissertation studies the
spatial development and regional inequalities in Ghana and
intends to provide insights and evidence that could prove
useful in the location and distribution of development ef-
forts in other countries at a similar stage of development.

Apart from the academic and policy implications of this study, there are social and political reasons why a study of this nature needs to be undertaken. Regional disparities in development have been shown to be the root cause of social and political unrest in some countries, such as the Sudan (Roden, 1974). Hence there is a need to study regional inequalities in development so as to find ways and means of redressing these imbalances because even temporary inequalities can lead to political instability which will in turn slow down the level of private investment.

In terms of the study's theoretical importance, it may be regarded as a test of the trickle-down concept implied in the growth pole strategy that has influenced much of development thinking. With contributions from economics, regional science geography and other allied disciplines, planners are now better equipped with knowledge to allocate government development funds. The impact of their actions, however, is not clear. Where to spend government money and the spatial implications these decisions have on other communities still elude researchers and policy-makers. For example, if development is initially located in a particular region or town, how does it affect other regions or towns within the country? Will the other regions subsequently benefit from similar developments, or will such actions simply introduce and later exacebate the problem of regional inequality? Answers to these questions will help planners

introduce policies to achieve their associated development objectives. The present study is a modest contribution in this direction.

Several African countries, including Ghana, have felt the need at some stage in their development to formulate governmental policy to reduce regional disparities in development. The need has been felt since the inception of planning in these countries. What is lacking is the ability of some governments to explicitly address this goal in their development plans. For the few plans in which this goal has been addressed, there has been no subsequent assessment of the extent to which regional disparities have been reduced and therefore no knowledge exists on their effectiveness. In other cases this is even worse because inequality has been treated indirectly or simply ignored.

In Ghana, for example, the pattern of regional inequality is deeply rooted in history. During the colonial period development plans were designed to create and maintain a spatial arrangement which was efficient for the exploitation of natural resources. Development proceeded from coastal and resource exploitation areas. After this period the pattern of development established by the British did not change. Instead urban and regional growth and development were experienced by a few urban settlements within the coastal regions. Subsequent development plans attempted to de-emphasize these areas but simply resulted in reinforcing

the bias in favor of the south. The history of regional
inequalities in spatial development in Ghana, then, has
its roots deep in the colonial period.

The current pattern of development in Ghana reflects
a concentration of investments in the primate city and a few
settlements serving as satellites. These centers are seen
as points from which the benefits of development will spread
to the surrounding areas and hence help to reduce regional
inequalities. This line of reasoning has been fundamental
to the formulation of most of the nation's development plans
as it is explicitly stated in the Five-Year Development Plan
1975-1980. Despite several attempts to reduce the dispari-
ties in development, there has been no systematic means of
assessing the extent to which the various centers of develop-
ment have succeeded in transmitting development to surrounding
settlements, and hence reducing inequalities. For too long,
such systematic assessment has been as aspect of Ghanaian de-
velopment plans that has been overlooked. The present study
is an attempt to investigate this problem by studying spatial
patterns and regional inequalities in development.

Objective of the Study

This dissertation's primary objective is to study the
spatial pattern of development and to assess the extent and
nature of regional inequalities in Ghana.
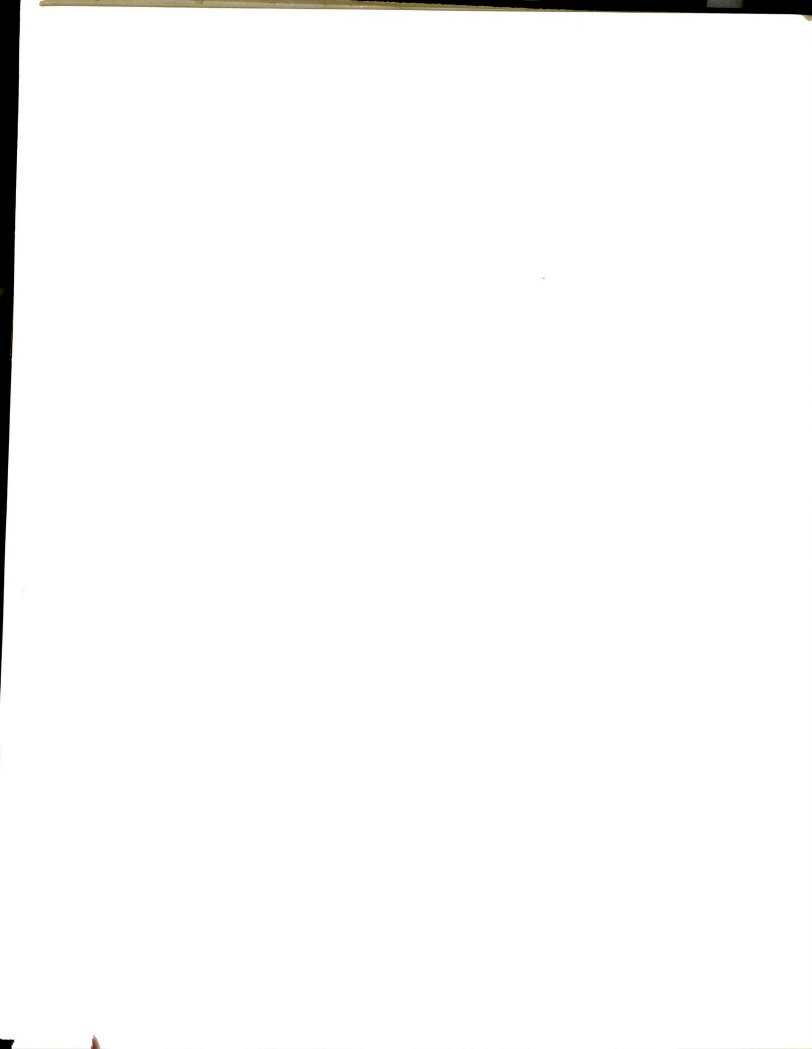
An achievement of this objective will help development planners gain empirical knowledge about patterns of spatial development and the extent of regional inequalities in Ghana, and perhaps then understand the processes behind a more desirable pattern of development.

This study will, therefore, examine the patterns of spatial development during pre-independence and the ways in which such patterns have or have not changed in subsequent periods. To achieve the primary objective of this research the present study undertakes the following:

     a. demonstrates that there have been regional inequalities in development in Ghana;

     b. describes the patterns of inequality in Ghana;

     c. explains how they came about;

     d. assesses how the patterns of inequalities are changing;

     e. accounts for observed variations in inequality between settlements and regions.

Methodology

To achieve the study's objective, two general approaches may be proposed following the usual guidelines of deductive and inductive reasoning. The deductive way of conducting research is perhaps the most rigorous and conclusive course of formal inquiry. The steps involved in this approach have been treated elsewhere. For the present study these steps may be summarized as was done by Fisher (1971):

a. statement of a hypothesis of a general and theoretical nature that is closely related to the research objective;

b. deduction and statement of testable (scientific) proposition implied by the analysis, which concerns the explanation and prediction of decisions or planning actions;

c. conducting test which have the capacity to disprove these propositions on the basis of particular evidence, thereby documenting their scientific validity or outright falsity.

The first two steps may be applied easily to the present research because the hypothesis and proposition to be tested can be obtained from development literature which is filled with theoretical propositions and effects on inequalities in regional development. However, the third step is difficult because to demonstrate that certain policies resulted in certain outcomes one would require historical information, or enough time to monitor all nine regions to provide such information, and also account for other factors. It may not be practical, therefore, to apply pure deductive techniques to the research design in this study.

The other research approach is based on inductive logic with the following steps (Fisher, 1971):

a. observation and recording of particular planning
    decisions as they have or are being made;

b. review of specific recorded observations for the
    purpose of identifying propositions which appear
    to describe or predict other planning decisions,
    and

c. hypothesis of a general planning decision which
    serves to describe or predict the decisions re-
    viewed.

It is evident from the foregoing that the inductive
approach is less demanding in terms of testing propositions
or hypothesis. It simply infers propositions from the ob-
servations of a large number of cases. This approach may be
easier to follow as it does not require rigorous testing to
reject hypothesis. However, if this course of inquiry is to
be followed, this researcher to generalize his findings would
need a large number of countries or cases for which good qual-
ity data exist. The present study has only one case, and it
is less than ideal to enable the researcher to follow a pure
inductive course of inquiry.

It is apparent, therefore, that neither simple de-
duction nor simple induction provide a suitable approach
for the design of this research. What appears most suitable
is either a modification of each of these two approaches or
a fusion of the two. A modification of the deductive ap-
proach appears to be a suitable approach to the research

design because of the severe data and time limitations. The
steps involved in the adaptation of the deductive approach
to this research can be summarized as follows:

    a. statement of a hypothesis of a general and theo-
       retical nature concerning the nature and pattern of
       regional inequalities in developing countries;

    b. collection and recording of observations (data)
       concerning the regional distribution of develop-
       ment benefits at different time periods in Ghana;

    c. testing of the hypothesis as it relates to Ghana;
       and

    d. drawing specific conclusions within the limits of
       the available data.

   More specifically, this research is undertaken through
the following steps:

    1. a literature review to identify what constitutes
       inequality and how development affects it. This
       will offer some insights into how development could
       have influenced inequalities in Ghana and how it
       is likely to affect them in the future;

    2. presentation of basic information about Ghana such
       as geography, history, economy and population and
       how they contribute to regional inequalities in
       development;

    3. a review of past development plans for Ghana to see
       how they have addressed the problem of regional

inequalities in development and the factors which
might have contributed to the present pattern of
regional inequalities;

4. description of the pattern of inequality and the
    distribution of development effects;

5. test hypothesis of the pattern and extent of re-
    gional inequalities in development in Ghana;

6. determining factors that could explain any varia-
    tions in inequality between settlements and regions;
    and

7. draw specific conclusions from the analysis about
    the pattern and extent of regional inequalities
    in development in Ghana. The unorthodox adaptation
    of the deductive approach implies that the applica-
    bility of the study's findings cannot be guaranteed
    to be valid for countries with development patterns
    that are different from Ghana's.

The main features of the above steps are the measure-
ment of inequality and the assessment of spatial patterns.
These are discussed next.

Measuring Inequality. Two techniques will be used to
describe the pattern of inequality in Ghana. First, the
measurement of levels of regional development using socio-
economic indicators that reflect inputs to the development
process. These indicators will be selected from lists of
standard indicators which reflect basic-needs concerns in de-
velopment and for which data are readily available. The

magnitude of an indicator will simply be associated to levels of development. Depending on the indicator being considered, the highest and lowest values for a region will be assumed to designate the most and least developed areas, respectively.

For example, when using percent of urban population or literacy per 1000 population, the highest and lowest values will be assumed to designate the most developed and least developed regions, respectively. All other regional values will then be standardized accordingly. On the other hand, when using an indicator such as dependency ratio, the lowest and highest regional values will refer to the most and least developed regions, respectively. This method of analysis has two major drawbacks. First, it assumes that development can be described simply by assigning isolated numerical values to various indicators. This is certainly not the case, and therefore, a composite index will also be used to present a consistent picture of regional levels of development. Second, such an analysis gives an overall picture of development at one point in time, and, strictly speaking, cannot be used in addressing the dynamic aspects of the policy issue the present study attempts to address. These dynamic aspects will be investigated using another technique.

To overcome the difficulties associated with relying solely on the foregoing indicators, the study will be supplemented using relevant literature on development planning in Ghana and other techniques to address the problem.

Apart from the use of socio-economic indicators to measure regional development, a location quotient approach will also be used to determine any patterns compatible with results of the earlier analysis. The location quotient, in this contest, is an index of relative locational concentration. It assumes a higher development value if a certain facility in a region is greater in relation to its population. Using this measurement it will be possible to assess a region's level of development relative to all other regions by standardizing the various regions' location quotients. The standardization will be done in such a way that the region with the largest disproportional concentration will be assumed to be the most developed region. This analysis will be carried out for the location and distribution of such social services as hospitals and schools on which data are available.

Assessment of Changing Patterns of Inequality. To assess how the concentration of development attributes or inequalities are changing over time, two techniques could be used: multivariate techniques, such as factor analysis, and maximal Guttman scaling or scalogram method. In using multivariate analysis to depict the spatial patterns of inequality a large number of variables relating to health, education, public services, communications and commercial activities could be measured. An isoline map of component scores synthesized from these data would indicate patterns of inequality. A number of these maps would be drawn for different

time periods and the changing patterns of inequality inferred
from them. Although this technique is very useful for de-
picting inequalities, its data requirements are so enormous
that in cases of data scarcity, such as the present study,
its use is inappropriate.

The maximal Guttman scaling technique, on the other
hand, does not require excessive amounts of data. It util-
izes dichotomous or binary data and converts these data to
quantitative scores if two conditions are satisfied. First,
data on which the scale is to be constructed must be unidi-
mensional in that its components should measure movement to-
ward or away from one baseline of a phenomenon. Second, the
data should be cumulative. The degree to which the data are
cumulative or unidimensional controls the extent to which re-
sponses or observations on one variable can be related to
responses or observations on other variables (Nie et al., 1975).

This technique is highly recommended for situations in
which quantitative data are not readily available and has been
successfully applied in a study of rural growth nodes in
Thailand (Voelkner, 1975). The present study will use Gutt-
man scaling with data on the presence or absence of social
services and facilities in 1960, 1970 and 1980, for two hun-
dred and fifty-five Ghanaian settlements. It has been shown
in Voelkner's study that by using binary data scalogram analy-
sis results obtained may be similar to those from other sophis-
ticated techniques such as factor analysis. The use of binary

data is therefore not likely to bias the results in any way. The presence or absence of these various services and facilities in the settlements will be used as indicators of development because they reflect development objectives in much the same way as improvement in health or levels of education.

Tests will be performed on the data to determine whether they satisfy the two basic conditions. Once these conditions are satisfied, the data will be converted into quantitative scores to be used as measures of the various settlements' levels of development. If these conditions are not met, the data will be adjusted until the conditions are met.

The quantitative scores will be used for two purposes. First, they will be used to draw development contours on base maps on Ghana for three periods in time--1960, 1970 and 1980. These maps will then be used to indicate the spatial distribution of development attributes, and hence regional inequalities in development over time. These maps will also be used for comparisons and will indicate any changes in the pattern of development, making it possible to detect a changing pattern of regional inequalities.

To further show the changes which have occurred in patterns of development, two techniques will be used. First, a graph will be drawn showing the relationship between the number of settlements and the number of development attributes they possessed during the three time periods. A comparison will indicate likely changes in the distribution of development

benefits and probably changes in the pattern of development. Second, a chi-square test will be used to examine the hypothesis of "change in the pattern of development" for each of the three time periods. In each test the independence between settlements' number of development attributes and their regional location will be explored. A regional bias in development will exist insofar as development attributes for settlements depend on their regional location for the three time periods. In this case it will be assumed that there has been very little, if any, change in the pattern of regional inequalities in development in Ghana.

Finally, to determine any variations in inequality or development scores between settlements a multiple regression analysis could be used. Variables such as population size, its rate of growth, proportion of population not employed in agriculture, distance from the coast and distance from a service center on which data are readily available could be used as independent variables. Instead, to avoid possible problems of multicollinearity between the independent variables a correlation analysis, which measures associations between development scores and each of the independent variables, will be used. These measures of association will then be individually used to explain variations in development scores and hence inequality.

Assumptions to be Tested

This study maintains that the colonization of Ghana by the British did not result in an efficient and equitable settlement pattern and distribution of development benefits. Settlement patterns were established to fulfill colonial objectives of resource exploitation. Development schemes and projects were also selected and located in ways which were likely to promote the exploitation of natural resources.

The rationale for this discrimination in the choice of schemes and their location and distribution which gave rise to the imbalances in development is historical. Howard (1978:157) offers an explanation as to why the Colonial Development Advisory Committee practices such discriminatory policies in the physical development of the country. She notes that:

> The policies of the Colonial Development
> Advisory Committee responsible after 1929
> for allocating funds for development pro-
> jects to the colonies under the Colonial
> Development Act, reflected this conservatism.
> Although the Committee had been urged to
> "Take risks. Take some initiative" in dis-
> tributing its resources, in practice it was
> limited to financing schemes likely to aid
> and develop agriculture and industry in the
> colonies, Protectorate and Mandated Territ-
> ories, and thereby (likely to) promote com-
> merce with, or industry in, the United Kingdom.

The spatial pattern of development inherent in this strategy was to concentrate all development in the resource exploitation areas most of which are located in the southern

part of the country. The resulting pattern of development,
once institutionalized, was followed and used as the basis
for post-colonial planning. Over the years this resulted in
a spatial concentration of poverty in most settlements and
regions and the concentration of social facilities and econ-
omic opportunities in only a few regions. The spatial im-
balance between areas of the country, particularly between
the north and the south, can thus be explained.

    The present study, therefore, hypothesizes that the
pattern of physical development has not changed during the
post-colonial period and that the general issue of regional
inequalities in development can be understood in its his-
torical perspective. Since a few plans have attempted to
redress the problem of spatial imbalance, some using the
growth pole strategy, it is plausible under the dictates of
deductive reasoning to assume that there is regional equality
in development or that there is a movement towards it. If
the foregoing is shown to be the case then it can be con-
cluded that there has been a change in the pre-independence
pattern of regional development and hence regional inequal-
ities.

Sources of Data

    Data for the present study are collected from documen-
tary sources and mailed questionnaires. The former will pro-
vide information on all the indicators used in the first part

of the analysis and the presence or absence of development attributes in Ghanaian settlements for 1960. Among the sources used are books, published and unpublished articles and official reports on aspects of development in Ghana by such agencies as the United Nations and the United States Agency for International Development. This method of data collection is very economical but automatically inherits all the limitations of the earlier studies in which such data were used.

Data obtained through the mailed questionnaires provided information on the presence or absence of facilities in Ghanaian settlements for 1970 and 1980. Such data were obtained from eight Regional Planning Offices and nine Regional Town Planning Offices in Ghana. There was no reliable way of checking the accuracy of information received from these offices. However, similar information inferred from the 1976 Ghana Telephone Directory was cross-checked with the information received from Ghana. This was useful in checking the 1980 information because it may be assumed that a listing for an agency performing certain functions in a settlement in 1976 is indicative of the presence of that agency in the settlement in 1980. While a service listed in the 1976 Ghana Telephone Directory could have been discontinued before 1980, it is plausible to assume that this would be the exception.

Using qualitative data on the presence or absence of development attributes helps improve on the accuracy of the

otherwise quantitative data which would have had to be collected from similar sources and which would have doubtful accuracy. Thus utilizing qualitative instead of quantitative data in this research helps improve reliability of the results.

Definition of Key Concepts

   Equality. This concept has different meanings for people of different ideologies and orientations. In this study, however, the concept is viewed from a perspective which falls between the two major political ideologies of capitalism and socialism. A certain amount of inter-regional inequality is accepted as the price of economic efficiency rendering equitable distribution of regional development not necessarily egalitarian. Inequality in development will therefore mean the uneven distribution of development relative to the proportional spatial distribution of the population. To facilitate measurement, equality is approximated to equity to enable the researcher to use some of the well-developed techniques such as gini coefficient.

   The foregoing definition implies that ideally development benefits should be distributed in a manner which is similar to the spatial distribution of the population. Any deviation from this ideal pattern is considered inequality, the magnitude of which is measured by a gini coefficient.

Development. There are numerous definitions of development in the literature but in this study it will mean a continuous process whereby Ghanaians learn how to use effectively the available human and material resources to attain what they perceive to be a better life. Being a process it presents numerous measurement problems but it will be operationally measured in terms of socio-economic indicators, such as a region's number of physicians and the variety of services and facilities a settlement possesses. In the latter instance the presence of these services and facilities in a settlement is seen as being indicative of the fact that these services will be used effectively to improve the residents' standard of living. The indicators are seen as mere pointers of development.

Spatial imbalance or regional inequality in development. This is used, in this study, to refer to differences in levels of development as measured by the various indicators or variety of services and facilities between one area or region and another. It refers to the lopsided nature of spatial development in Ghana. Throughout this study, the terms spatial imbalance and regional inequality in development are used interchangeably.

Region. In this study the concept of region takes two forms. First, it is used to denote an administrative area or division. It is also used to denote geographical areas which possess similar development or ecological attributes. The

Eastern, Western and Upper Regions are examples of the former type of region and the Coastal, Forest and Savannah are examples of the latter type. Figure 1 illustrates the administrative regions of Ghana.

Organization of the Study

A review of pertinent research is in Chapter Two. This help identify what constitutes inequality and how development affects it. It also identifies factors which influence regional inequality. The review offers useful insights into how development could have influenced inequalities in Ghana and how it is likely to do so in the future. This chapter therefore provides a good theoretical background for discussions in subsequent chapters.

A brief description of the geographical, historical, and contemporary context of Ghana is the subject matter of Chapter Three. This provides pertinent information to serve as general background material in the review of development plans in Chapter Four and analysis of regional inequality in Chapter Five.

Chapter Four is a review of past development plans in Ghana. The major concern is how the various development plans have tackled the problem of regional inequalities or spatial imbalance in Ghana. This Chapter also discusses how various development objectives have been articulated over the years
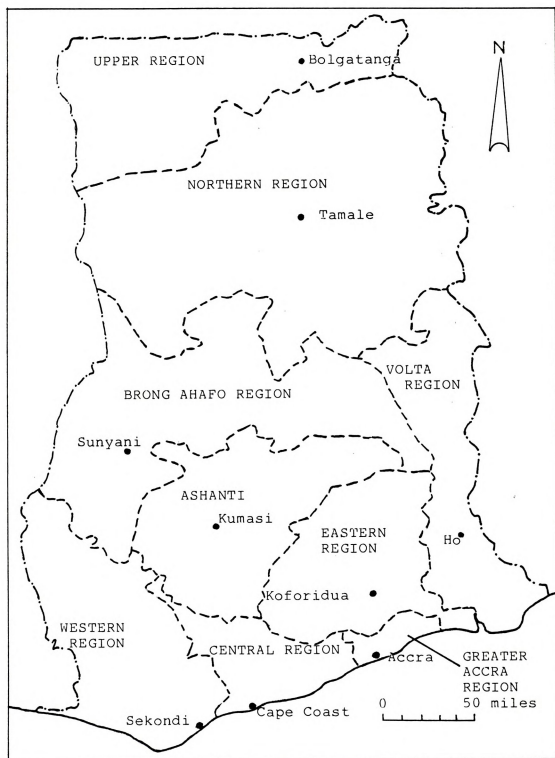
FIGURE 1: ADMINISTRATIVE REGIONS OF GHANA

to explicitly address the issue of spatial inequality. It, therefore, reveals factors which might have contributed to the present pattern of regional inequalities.

Chapter Five is an analysis of data concerning the distribution of development benefits in Ghana and presents a description of the pattern of regional inequality. It is divided into two sections. The first uses socio-economic indicators as surrogate measures of regional development from which inequalities are inferred. This help demonstrate that there have been regional inequalities in development in Ghana and also help describe the patterns of these inequalities. In the second section, the maximal Guttman scaling technique for three time periods is used to examine the dynamic aspects of regional inequalities in Ghana and also to test the study's hypotheses. Variations in development scores or inequality are also determined and factors which give rise to these variations are also discussed.

Chapter Six is devoted to a general summary and the discussion of the study's findings and recommendations.

CHAPTER TWO

REVIEW OF LITERATURE AND EMPIRICAL RESEARCH

Introduction

This chapter has three main objectives: to present a
concise and workable definition of inequality, to present an
overview of pertinent research on regional inequalities and
how development affects these, and to indicate where and how
the present study fits into the context of current literature
and its contribution to present knowledge on regional inequal-
ities in development and ways and means of reducing these.
This chapter will therefore help identify what constitutes
inequality and how development affects it. It will also
identify factors which give rise to regional inequalities
and also offer useful insights into how development could
have influenced inequalities in Ghana, how it is likely to
do so in the future.

Definitions and Dimensions of Inequality

Within the realm of social science, few concepts or
phenomena have been studied as much as equality in inequality.
This phenomenon falls within the scope of philosophy,

political science, statistics, demography, sociology, economics, geography, and urban and regional planning. One can therefore discuss inequality in terms of power (Beteille, 1973; Fallers, 1973), economic development (Alonso, 1968; Williamson, 1965; Ahluwalia, Carter and Chenery, 1979); income (Kuznets, 1955); spatial development (Soja, 1976); and regional development policy (Friedmann, 1966). For each of these aspects there are dimensions of spatial configuration: international, inter-regional, intra-regional, inter-urban, intra-urban and rural-urban. In this study, however, the main concern will be on <u>inter-regional inequality</u> within a country.

The definition of inter-regional inequality is viewed from two major political perspectives. An operational definition of inter-regional inequality for the purposes of this study, is best approached by defining equality in regional economic and spatial development.

Those on the right of the political spectrum believe in the economic justice of free-market competition in which differences in ability and resources result in greater rewards for the most productive people and regions. Inter-regional disparities in economic and spatial development can therefore be attributed to differences in regional productivity.

Those on the left of the political spectrum tend to believe in a "social justice" based on a broad principle of sameness in outcome, without regard to inputs. The definition of <u>inter-regional inequality</u> to be adopted in this study falls in between these extremes. A certain amount of inter-regional

inequality is accepted as the price of economic efficiency rendering equitable distribution of regional development not necessarily egalitarian. However, it should reflect a criteria of need, contribution to a common good, and merit. At the same time, equitable distribution of regional development should ensure that the prospects of the least developed regions are maximized.

Inter-regional inequalities in development will, therefore, mean the <u>uneven distribution of development relative to the proportional spatial distribution of the population.</u> For the purposes of describing, measuring and analyzing regional development, this research views it solely in terms of inputs to the development process, as reflected by the provision of social services and facilities. In order to measure equality, this definition approximates it to equity, making it possible to use a number of well-developed techniques to evaluate spatial distributions of development.

Review of Literature

Inequalities in development can be discussed in terms of a social (including economic) or a spatial categorization of people and activities. Much of the existing literature on the subject in relation to developed countries has been couched in non-spatial terms, however, a wealth of material on the spatial aspects of development in advanced and developing societies has recently become available in development literature.[1]

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[1]For examples, see Johnson (1970).

In the developing countries, social discussions of developmental inequality are undertaken, exclusively, with a total negligence of the spatial context. In the same light, any treatment of the spatial aspects of inequality will almost always neglect the social context. If the complex dynamics of inequalities in the development process are to be fully understood, it is essential that spatial and non-spatial dimensions be studied together. Soja (1976:1) puts this in a more succinct manner; "the social and spatial structures of inequality are sensitively and dialectically interactive to a degree which demands more consideration than hitherto given". Even though the present study is primarily focused on spatial inequality, it is considered pertinent to include the social (particularly economic) aspects. To introduce a discussion of these two aspects of inequality, the major determinants of regional or spatial inequalities are presented.

Determinants of Spatial Inequality

Spatial inequality can be explained from a number of different perspectives. No two regions are intrinsically equal in all respects and a factor that explains spatial inequality in one may be inappropriate for others. It should be pointed out that while each of these factors is presented separately, spatial imbalance will most frequently be attributed to the interplay of two or more of them. Indeed, it would be almost impossible to satisfactorily explain any spatial inequality by using a single factor.

<u>Historical Explanations of Spatial Inequality.</u> There is a school of thought that attributes international and even inter-regional inequalities in development to historical and social circumstances (Dos Santos, 1970; Wallerstein, 1976; Rodney, 1974). According to this framework, the development of a core region (or class) can be explained by a concentration of material wealth and power able to efficiently exploit resources from periphery regions.

This framework also stipulates that the social, economic, political and spatial systems in the periphery regions do not serve their own needs but the needs of the core regions. Organizations of space is thus designed to facilitate resource exploitation with a concentration of expensive infrastructural development in a single primate city and periphery settlements serving as satellites. The cumulative effect of such arrangements over time has been inter-national, intra-national, and rural-urban disparities in development; particularly in the less developed countries.

Quantitative attempts have been made to assess the validity of the foregoing framework as a plausible means of explaining regional or spatial inequality but, lacking convincing evidence, the issue is still heavily debated in professional journals.[2] One problem has been difficulty in obtaining reliable historical data.

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[2]See O'Brien's "A Critique of Latin American Theories of Dependency" in Oxaal, Barnett and Booth (1975); and Kaufman, Geller and Chernotsky (1975).

Other writers such as Omuta (1979) and Onokerhoraye (1978) have argued from a historical perspective that regional disparities in development in most African countries can be attributed to neglect of the spatial aspects of development planning. They attribute such neglect to a system of planning focused on non-spatial sectoral allocation of resources to specific project areas, such as education, transportation and health.

Ecological Bases of Spatial Inequality. According to an ecological perspective, spatial inequality can be explained by differential resource endowments. Certain regions are more heavily endowed than others and, by virtue of this fact, are likely to develop more than other regions, resulting in regional inequalities. The basis for this assertion holds that a region's physical environment is the prime determinant of its levels of productivity and wealth.[3]

Kamarck (1976) sees climate and the environment as some of the ruling constraints on economic development and, therefore, explains regional inequalities from this point of view. In Ghana for example, the disparities in development between the northern savannah regions and the southern coastal regions could be partially attributed to the differences in their environmental conditions.

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[3] For an example of this axiom see Kromm (1972) and Grergerson's (1973) subsequent rebuttal.

In a limited sense, environment and climate can be used to explain differences in development between regions. However, in this era of long-distance trade, permanent urban settlements and urban-based industrial development, resources and production are able to circulate faster, weakening the localized ecological bond. This is best illustrated by the case of Japan which has a poor resource base but compares favorably in industrialization with other countries that are heavily endowed with natural resources. Thus ecology may not be as strong a determinant of regional or spatial inequalities as it used to be, emphasizing the role that technology and infrastructure play in development.

Technological Advances. These are often divided into those which encourage concentration and those which encourage dispersion such as communication technologies. If, for example, one aim of development planning is to increase access to public facilities and services, then it could be argued that access may increase as technological advances are put in place. This is likely to result from technological innovations that increase economies of scale and require large threshold populations. Since large populations are usually associated with urban areas, the tendency will be for such innovations to encourage development concentration rather than dispersion and increase regional inequalities. This becomes even more critical in developing countries which are

endlessly seeking to "industrialize" and, at the same time,
make off of their populated regions equally accessible to
public services and facilities. The distribution of such
facilities is usually considered in terms of efficiency and
equality, leaving no doubt these considerations have become
germane to urban and regional land use decisions.

Favoring Efficiency Over Equality. National develop-
ment goals can also result in spatial inequality when effic-
iency is favored over equity considerations in development
planning. Such considerations can create inequalities by con-
centrating investment in the most productive regions. To
date there are no objective standards that can be used to
assess trade-offs between efficiency and equity. This issue
has long been recognized in welfare economics literature and
continues to be a bone of contention among various scholars.

Writers like McAllister (1976) argue that no objective
means exist to balance equity and efficiency considerations
in land use planning and that most decisions in this regard
are ultimately subjective. Goldman and Sussangkarn (1978)
support McAllister by arguing that equity and efficiency may
be incompatible. Others, like Gaile (1977), argue that
equity and efficiency are compatible and that they can be
resolved by trading one with the other. How much equity is
to be traded with efficiency is not quantitatively assessed.

To date the issue has not been resolved in any meaning-
ful manner but it appears as if efficiency considerations
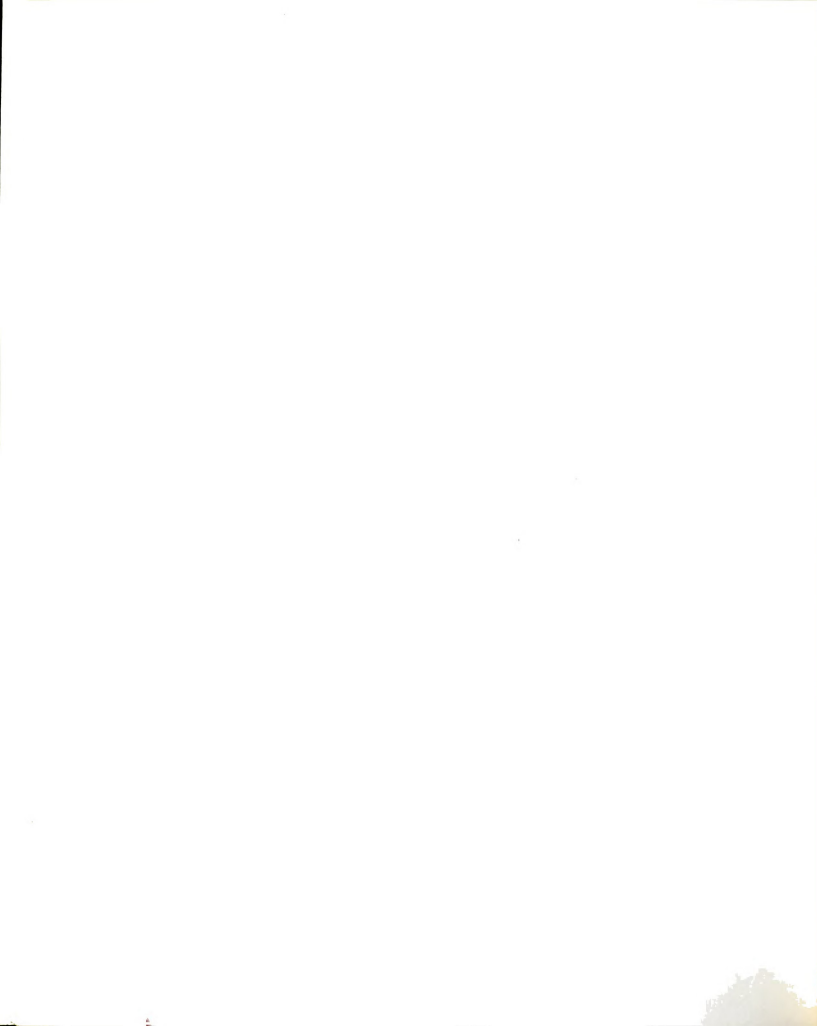
override equity in the location and distribution of public facilities. However, there are instances where equity has been given an unprecedented consideration over efficiency and this has resulted in spatial inequality.

Fuchs and Demko (1979) have observed that spatial inequality in development (in the U.S.S.R.) is the result of supporting efficiency through concentration at one time and equity through dispersion at another. In a final analysis, they hold that strategic considerations override equity and efficiency considerations and see this as another dimension to spatial inequality.

The controversy surrounding equity and efficiency considerations in development planning is reflected in the range of spatial investment or development strategies implemented by various African countries. They range from the dispersed, equality-oriented development strategy of Tanzania's Ujamaa to the primate city concentrated, efficiency-oriented strategy of the Ivory Coast. Most of the countries, however, espouse a "deconcentrated concentration" policy which is supposed to balance equity and efficiency considerations, but which almost invariably results in concentrated development in urban areas and increased regional inequality. Brown (1978) has shown this to be the case in Ghana.

Inequalities in Income Distribution. Since there is inequality among various occupational groups in any region, in addition to the fact that occupational groups tend to be
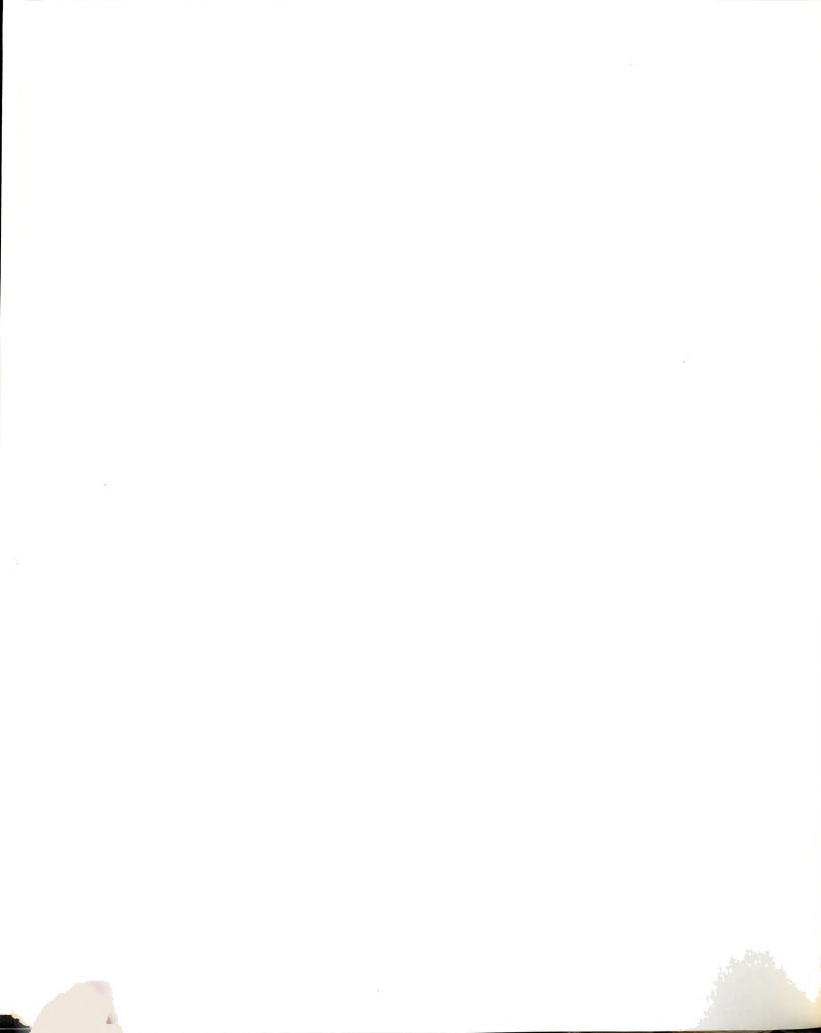
spatially clustered, it is plausible to argue that regional
income differences reflect differences in regional occupa-
tional structure. The spatial inequalities which exist be-
tween regions could then be considered to reflect regional
clustering of the occupational groups and their different
levels of income.

Tetteh (1971) in his study, The Spatial Structure of
the Labor Force in Ghana, identified urbanization, education
and long distance migration as the most important variables
influencing labor force quality in a particular area. These
same factors, in effect, influence regional income levels
and can be used to explain disparities in income between var-
ious regions and, hence, their spatial inequalities. Tetteh's
regionalization of Ghana, based on employment by industry,
consistently showed the Northern Region and the Brong Ahafo
local authority areas as different from the rest of the coun-
try. He attributed these disparities to the underdeveloped
economy (and low regional incomes) of the Northern Region
relative to other parts of the country.

Government Policies. Apart from the foregoing, there
are factors like politics, economics, government investment
and subsidy policies that can create regional imbalances in
development. Figure 2 illustrates these factors and the var-
ious linkages between them. They include external and inter-
nal forces which influence government policies in various ways.
These government policies influence migration and urbaniza-
tion, industrial location, job concentration and, finally,

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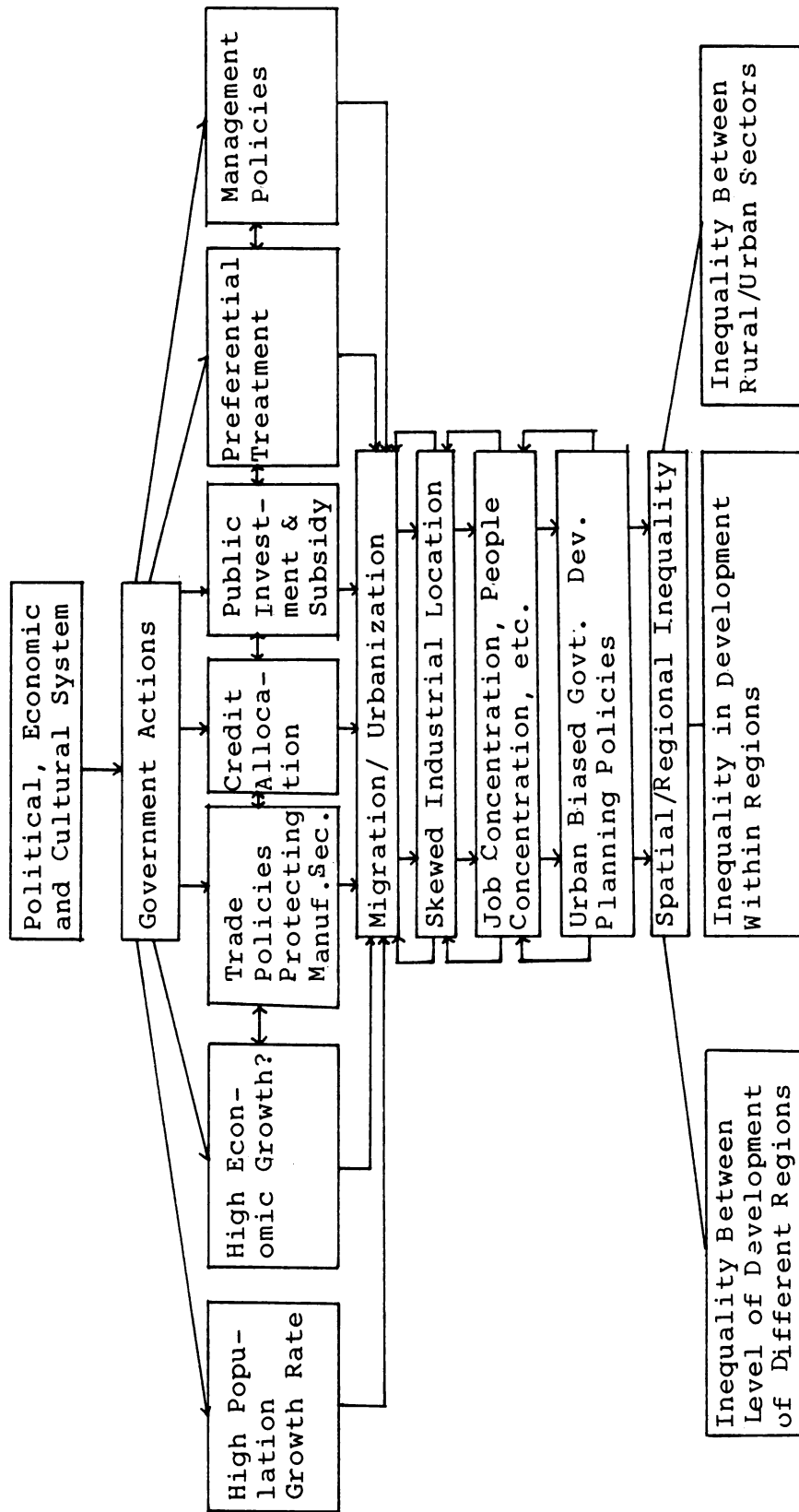
FIGURE 2: GOVERNMENT POLICIES INFLUENCING REGIONAL/SPATIAL INEQUALITY

what seems to be an urban-based development strategy. The
overall effect of this can be "place prosperity" develop-
ment which enhances a few, instead of all, settlements re-
sulting in spatial and regional imbalances.

The list of factors presented in this chapter is by
no means exhaustive, as it only highlights those factors
prevalent in the various sources searched.

These factors can be useful in attempts to assess
regional inequalities in Ghana, however, the importance of
each can only be evaluated after the various national de-
velopment plans have been reviewed.

In spite of the fact that the present study is con-
cerned solely with spatial inequality, it is necessary to
discuss the economic aspects of regional inequality because
the two are "sensitively and dialectically interrelated"
(Soja; 1976). In the next section, therefore, the effects
of development on regional income disparities and spatial
dimensions of inequalities are examined.

Effect of Development on Regional Inequalities in Income.

Some of the pioneering works in regional inequality
appeared in the development literature as early as the mid-
1950s. As will be shown in this review, between the 1950s
and 1960s, much of the literature on development was primar-
ily concerned with reducing inequality at international and
intra-national levels but remained generally optimistic about

the long-run effects of economic growth on inequality. It was not until the 1970s that the issues of internal inequality within developing countries were emphasized.

One of the pioneering works on inequality was by Kuznets (1955) who set out to examine whether economic development could lead to increase or decrease in income distribution within a country and, if so, what factors determine the trends in income inequalities. With very limited data, for a limited time periods, he studied income distribution in the U.S., England and Germany on one hand and Ceylon, Puerto Rico and India on the other. He concluded that the relative distribution of income (as measured by annual income in rather broad classes) in the developed countries was moving towards equality and in the developing countries was more unequal than in the developed countries. Critics of Kuznets raise questions about the methodology and indices he used and the relevance of his late 1940s findings to contemporary economic development situations. Other limitations include scanty data and errors in his data.

In spite of these limitations, Kuznets' conclusion prevailed through the 1950s and in 1960 was empirically supported by Kravis (1960:408-416). After comparing before-tax income in ten other countries with the United States, Kravis concluded that the greater equality of income found in the developed countries could be attributed to the social and economic conditions that distinguish them from the under-developed countries.

Table 1 is a summary of the five measures of inequality that Kravis used. Kravis' criterion for judging inequality was based on the Lorenz curve, which is itself based on an egalitarian pattern of distribution. However, an egalitarian distribution of income is not possible under most economic systems. This might explain why much of Oshima's (1962) criticism was centered on Kravis' five measures. It is interesting to note that, despite these criticisms, Oshima has implicitly concurred with Kuznet's and Kravis' findings:

> ...and with the completion of consumer asset formation, middle incomes may go increasingly into the ownership of securities, causing a decline in the concentration of stock and bond ownership, just as the spread of home ownership is now reducing the concentration of rental incomes. These fugure possibilities, together with present tendencies, may imply further declines in equality as the United States develops beyond the stage of consumer asset formation. (Oshima, 1962:444).

In spite of this, Oshima warns his readers that it may be risky to put much reliance on Kravis' conclusions that there is greater inequality in developing countries than in developed countries.

Until the mid-1960s the relationship between economic development and inequality of income had not been explored in any convincing manner and the prevailing thoughts on the subject were those expressed by Kuznets and Kravis. It will be observed that these studies and their conclusions relate to socieites at the extremes of the development continuum. In other words, the evolution of societies from one end of the spectrum to any other point was never stated explicitly even
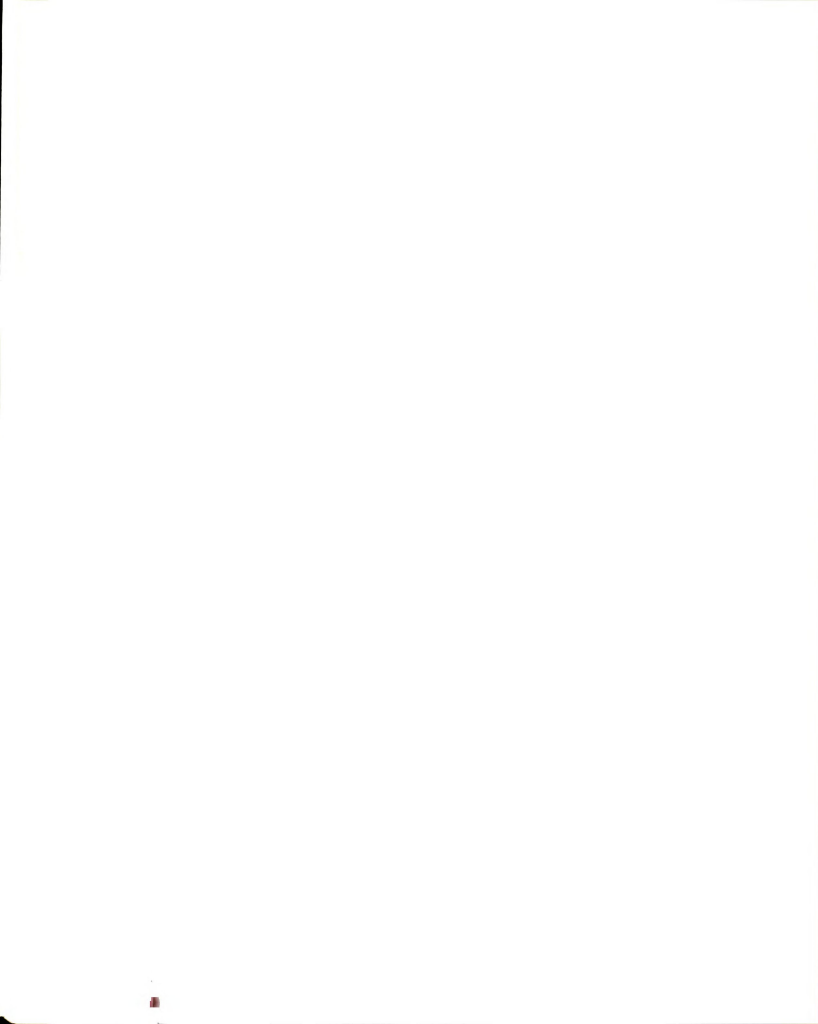
TABLE 1

INDEXES OF INCOME INEQUALITY, EARLY 1950'S (U.S. = 100)

	Share of		Coefficient of Variation (3)	Concentration Ratio (4)	σ of logs of income (5)
	Lowest Quintile (1)	Highest Quintile (2)			
A. Less inequality than U.S.					
Denmark	126	89	84	77	83
Netherlands[a]	151	100	na	86	65
Israel (Jewish pop. only)	68	96	78	88	96
B. About same inequality as U.S.					
Great Britain	102	100	128	100	91
Japan*	90	104	102	111	110
Canada	79	100	97	100	118
C. More inequality than U.S.					
Italy	110	114	143	108	79
Puerto Rico	104	121	160	120	110
Ceylon	106	121	247	115	91
El Salvador[a]	83	131	149	139	136

[a]Based on average of two comparisons. NOTE: All measures were computed from grouped data, and then expressed as relatives of the measures for the most nearly comparable American distribution. The concentration ratio is the area between Lorenz curve and the line of complete equality. The Lorenz curve traces out the proportions of total income (vertical axis) received by cumulative percentages of income receivers (horizontal axis), and the line of complete equality is the diagonal from the lower left to the upper right.

SOURCE: Kravis, Irving B. "International differences in the distribution of income," Review of Economics and Statistics, vol. 42, no. 4, November 1960, p.409.

though it could be argued that this dynamic aspect was implicit in their findings. Also underlying these studies was the assumption that inequalities in income, wages or per capita income are only temporal and can be alleviated through the free market mechanism and free movement of productive factors. Williamson (1965) was one of the first writers to state explicitly the effect of economic development on regional inequalities as an area evolves from an underdeveloped to a developed region.

Williamson investigated the nature of inequality within individual countries and saw regional barriers to the dispersion of growth stimulus as the primary cause of inequalities within nations. He argued that internal factor mobility would tend to eliminate interregional income per capita differentials and geographical dualism or spatial polarization. His major finding was a systematic relationship between national development levels and regional inequality or geographical dispersion. More specifically, he saw rising income disparities and increasing dualism as a characteristic of the early stages of economic development, while convergence, a disappearance of the dualism and a narrowing of regional income disparities were features of the later stages. This is best summarized in the classical inverted U-shaped development curve.

It needs to be pointed out that Williamson's conclusions are suspect since he used cross-sectional data and his examples of countries at the lower levels of development are

too few and hardly representative of African countries. Be-
sides it assumes a single development process that applies to
all countries which is quite questionable.

Commenting on the progression of society from one end
of the development spectrum to the other and its effect on in-
come inequality, in accordance with Williamson's findings,
Coates, Johnson and Knox (1977:3) note that "such a progression
accords quite well with Myrdal's ideas of cumulative causation
with 'backwash' effects being moderated by 'spread' effects
in later stages of economic development". Implicit in these
notions is that such disparities are highest at the middle
range of the developing continuum. Critics to this observa-
tion have questioned how long the poor will be willing to wait
for such disparities to subside.

Williamson's findings pervaded much of the development
literature until the 1970s when they were reinforced by two
other studies. Adelman and Morris (1972) compared inter-
country variations in income distribution in forty-four coun-
tries and concluded that economic development is associated
with increases for the bottom 20 percent only after relatively
high levels of socio-economic development have been achieved.
This study is regarded as an improvement on earlier studies
because it tackled the issue of distribution within the coun-
tries studied. In any case, it did not refute findings of
earlier studies, it added another dimension to the debate by

suggesting that it might be necessary to forego some growth to ensure more equitable distribution. This was made more explicit in their 1973 work in which they argued that the goals of development planning should be redefined to include the reduction of inequality. Their thesis, however, remained unchanged: if necessary, some growth should be sacrificed to achieve a better distribution of available output. The unresolved issue here is that redistribution cannot take place without growth because, without growth, sooner or later there will be little if anything at all to redistribute.

Even though it might seem that the foregoing is a departure from the "trickle down" idea, in actual fact it is not. It falls in line with earlier observations on the effect of economic development on income distribution but qualifies them by saying that it is only when a high level of socio-economic development has been achieved that the share of the bottom 20 percent of the population can be increased, reducing income inequalities (Adelman and Morris, 1973). This is also explicit in Williamson's model, which shows reductions in income inequalities after a high level of socio-economic development has been achieved.

A United Nations (1972) study compared income distribution in Latin America and the industrialized countries and concluded that inequality was substantially greater in the former countries than the latter. The implication here supports the assertion that economic development will more or

less automatically reduce income inequalities. However, this depends on the stage of economic development, as illustrated in Williamson's model.

So far, this crucial inequality-economic development debate has been one-sided, possibly from a lack of studies about income distribution patterns in the Third World. To what extent are these findings valid for developing countries? Will economic development in these countries lead to reductions in income inequalities? According to Kuznets, Kravis, Oshima and Williamson, such reduction in regional income inequalities is automatic.

Like most other development strategies, these assertions are built on two basic assumptions. First, they assume that certain sectors initiate modern economic development and that the benefits of such developments are later transmitted to the outlying areas. The implication is that if this process is encouraged, all backwardness will be eliminated. The assumption of "diffusion" on which this concept rests has been challenged. It is often argued that if the theory was valid, then income inequalities would not increase over time. So far the contrary has been the case in Africa and other parts of the Third World. Soja (1976) has argued that the theory is not reconcilable with the increasing inequality that occurs with development. To the extent that this methodological assumption has been shown to be faulty, to that same extent should the notion of economic development as a means of reducing regional inequalities be critically evaluated.

So far there have been few such critical studies but those which have been undertaken have given useful insights into the effects of economic development on income distribution. For example, Ewusi (1977a) conducted a study to investigate the income distribution pattern of cocoa farmers, self-employed persons, public and private sector employees, and rural and urban populations in Ghana from 1956 to 1970. His conclusions were that economic growth did not automatically reduce inequalities in income distribution. Similar studies have not been done in other developing areas, possibly because of data scarcity. To this extent the conclusions of Ewusi's study should be regarded as tentative until such time that similar studies refute or support his findings. In the meantime, Ewusi's study points to the fact that Kuznets', Oshima's and Williamson's earlier assertion may not be wholly valid for developing countries.

If economic development, itself, does not result in automatic reduction of regional disparities in income, then perhaps deliberate intervention by planners can help achieve that objective. Such intervention could be strategies which deliberately influence the manner in which a region is developed. For example, deliberate manipulation of space in determining where industries, social facilities and commercial activities are located within a region can help reduce income disparities that economic development has not ameliorated.

If urban and regional planning is seen as a mechanism that can effect change by influencing the location and distribution of development benefits; then perhaps it can be used to reduce regional inequalities in development. Certain strategies have already been implemented to reduce regional disparities. However, prior to the formulation and future policies those that have been implemented will have to be evaluated so as to provide bases for future policies. This study, among other things, evaluates the effectiveness of one such policy, the growth pole strategy, in reducing regional inequalities in Ghana.

Apart from the foregoing what are the other policies that can reduce such disparities? How effective are these policies and how valid are they theoretically? To evaluate the effectiveness and theoretical validity of deliberate spatial intervention policies in reducing regional disparities in development and income, a few such spatial strategies are presented.

Spatial Dimensions of Regional Inequality

Most of the spatial development strategies used as a means of reducing regional inequalities in development have capitalized upon one truism. That is, that economic development, industrialization, infrastructural development or any other human phenomenon is geographically uneven in incidence and intensity. Even in a hypothetical egalitarian

society made up of homogenous cultures which occupy a uni-
formly smooth region, an even location and distribution of
development benefits, even if desirable, would be impossible
to achieve. Certain regions will always be more endowed with
resources than others which will result in the concentration
of human actions and supportive materials at and around these
locations.

The foregoing has been used as a planning principle,
the advantage being that costs can be considerably reduced
by creating such social and material concentrations. The
most popular strategy emanating from this has been the growth
pole concept which has been implemented in various countries
including the developing countries. In almost all situations
where it is applied, it is seen as a means of reducing re-
gional disparities in development. Before the effectiveness
of the concept can be objectively evaluated, its theoretical
underpinnings must be presented.

The Growth Pole Concept. This concept owes its origin
to early French political economists, particularly Perroux.
In its original formulation, it was applied to abstract econ-
omic space. Perroux's definition of a growth pole evolved
out of this concept and he saw it as an "economic space con-
sisting of centers, poles or foci from which centrifugal forces
are attracted" (Darko, 1977:12). A growth pole owes its exis-
tence to the location of a major industry, whose growth attracts

other industries because of agglomeration economies created
in the region.

Perroux did not consider the spatial aspects of his
concept. While he agrees that economic growth occurs in space,
he dismisses this aspect by considering geographic space as
given. Hirschman, Myrdal, Boudeville and, most recently,
Friedmann have attempted to "ground" Perroux's concept of
abstract economic space. In Hirschman's and Mydral's formu-
lations, they argue that economic development does not appear
everywhere at the same time. One center of great economic
strength is needed in the economic development of a region.
According to Myrdal, once this is established and developments
set in, inequalities tend to widen through circular causation.
The latter being a situation in which the establishment of a
center of great economic strength and development, as defined
in Chapter One, are so "interlocked" that a change in any one
induces the other to change in such a way that these secondary
changes support the first with similar effects.

The creation of a center of great economic strenth
within a region attracts developments which strengthens the
center's potential to attract further developments, and so
on, thereby resulting in greater disparities within the region.
Hirschman's formulation of unbalanced growth does not make use
of Myrdal's concept of circular causation but says that polar-
ization or backwash effects are responsible for inducing re-
gional disparities and trickling down the effects.

Although Myrdal and Hirschman attempted to explain disparities in economic development within a "region", their formulations were strictly non-geographic. It was Boudeville who finally attempted to apply Perroux's concept geographically, arguing that economic space is strictly tied to geographic space, in an attempt to link conceptual and functional spatial poles of development. He defined a growth pole as "a set of propulsive industries (large scale industrial complexes) located in an urban area and capable of inducing increased development through the zones of influence" (Darko, 1977:12). To diffuse development to the areas surrounding it, Boudeville stressed the importance of <u>focality</u> and <u>interconnection</u>. It is argued that if growth poles can exist in geographic space, they can be induced and used as a development tool. They can be used to initiate and stimulate development in lagging and frontier regions and, thereby, reduce regional disparities in development. Alternatively, existing medium- and large-sized settlements could be selected as growth poles on the assumption that development would trickle-down to the surrounding areas.

There are, however, certain issues that the growth pole model does not address:

-It assumes that human activities would cluster together to generate internal and external economies of scale, but is silent on the heavy social costs of such clustering.

-It does not evolve criteria for identifying the location of probable settlements to be designated as growth poles.

The population necessary to sustain economic growth is also
not mentioned. For developed countries this has been put at
around 250,000 but a similar threshold for developing coun-
tries is lacking.

-It does not identify the type of investment or de-
velopment which would succeed in the various areas or settle-
ments designated as growth centers.

-There has been no empirical evidence to substantiate
the transition of a growth pole from economic space to geo-
graphical space. Perroux's main concern was to examine the
changing patterns of economic space in their abstract form.
He assumed geographical space to be constant. In this form-
ulation, the growth pole was the leading sector of an economy
whose impact on the other sectors could be traced through
input-output tables, allowing the various backward and for-
ward linkages to be traced. In short, the development pole
or growth pole in Perroux's formulation is not the same as
the concentration of geographical phenomenon. It is still
conceptual and whether it is applicable to geographical space
is questionable. This remains the major criticism of the
growth pole model.

-It is doubtful whether the spread effects from the
center to the periphery would raise incomes and employment
opportunities.

-The concept centers on public works projects and so
does not address itself to problems of the less privilaged like

poor health, low quality labor, and illiteracy in areas sur-
rounding the growth pole.

-It does not adapt itself to any but the developed
economies. In the developing economies, for example, it
ignores the informal and intermediate sectors. It is doubt-
ful whether if this concept, originally formulated for the
developed world, can be applied to developing economies.

Despite these drawbacks, the growth poles concept
has been applied extensively in many countries, first by
Friedmann (1966) in a study of Venezuela. Since then it has
also been applied in Great Britain, the U.S., U.S.S.R., Poland,
France, Italy, Greece, Canada, Brazil, Chile, Columbia, Argen-
tine, Japan, India, Pakistan, Algeria, Kenya, Tanzania and,
most recently, Ghana, Nigeria and the Gambia. Its wide use
suggests its popularity among development planners.

In spite of the foregoing, there have been few studies
to assess the effectiveness of growth centers strategy in re-
ducing regional disparities. Before planners can be fully
confident in applying this model there is great need for fur-
ther studies. Those done to date have not resolved the con-
troversy, but merit discussion.

Casetti, King and Odland (1971) developed a method to
test whether polarized growth has taken place in a given spatio-
temporal context. They used urban employment data for Los
Angeles and twelve peripheral points in the western United
States. Their conclusion was that the ratio of employment in

1967 to employment in the base year, 1950, tended to be polarized on Los Angeles; even when observations for the city were removed from the data. This meant that absolute employment in the peripheral areas did not increase as a result of diffusion from Los Angeles. A subsequent recommendation emphasized reconsideration of the growth pole strategy as a means of improving employment in peripheral areas and thereby reducing disparities in development.

A study of Kenya by Gaile (1974) also concluded that the growth pole concept does not work. Gaile developed models to describe government income and expenditure flows, private capital flows, trade, migration-commuting-employment expansion and diffusion of innovations due to spatial relationships with a core area. His criterion was movement in the absolute level of development. An increase indicated a spread impact; decrease a backwash effect.

The results of the modeling showed a clear distance-decay pattern of development. Gaile concluded that spatial investment strategies which use the growth pole concept hoping it will increase the development of the surrounding settlements should be reconsidered in light of the distance-decay function. He also concluded that urban-based spatial investment strategies will only exacerbate rural-urban and inter-regional disparities. He, therefore, emphasized the need to balance the efficiency of urban-based investment against the rural-urban development inequality it creates.

Despite these findings, several authors maintain that a modified growth pole strategy can be implemented successfully to reduce regional disparities in development. Examples are proposals for implementation of the strategy in India, Tanzania, Libya, Poland, Sweden and Canada.[4] It is apparent from the unresolved issues that the growth pole controversy will continue for some time to come.

With contributions from allied disciplines, planners and geographers are now better equipped in determining <u>how</u> to spend government development funds. <u>Where</u> to spend such funds and the implications for nearby environs is, however,unclear. This is demonstrated by the controversy surrounding the effectiveness of using the growth pole strategy in reducing regional disparities. Only by undertaking further studies can the falsity or validity of the growth pole strategy be resolved. The present study is an effort in this direction.

Summary

Review of the literature has indicated that regional disparities in development are features of the early stages of economic development and will be reduced as economic development proceeds. However, there are indications from the

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[4]For descriptions of these proposals, see Kuklinksi (1972).
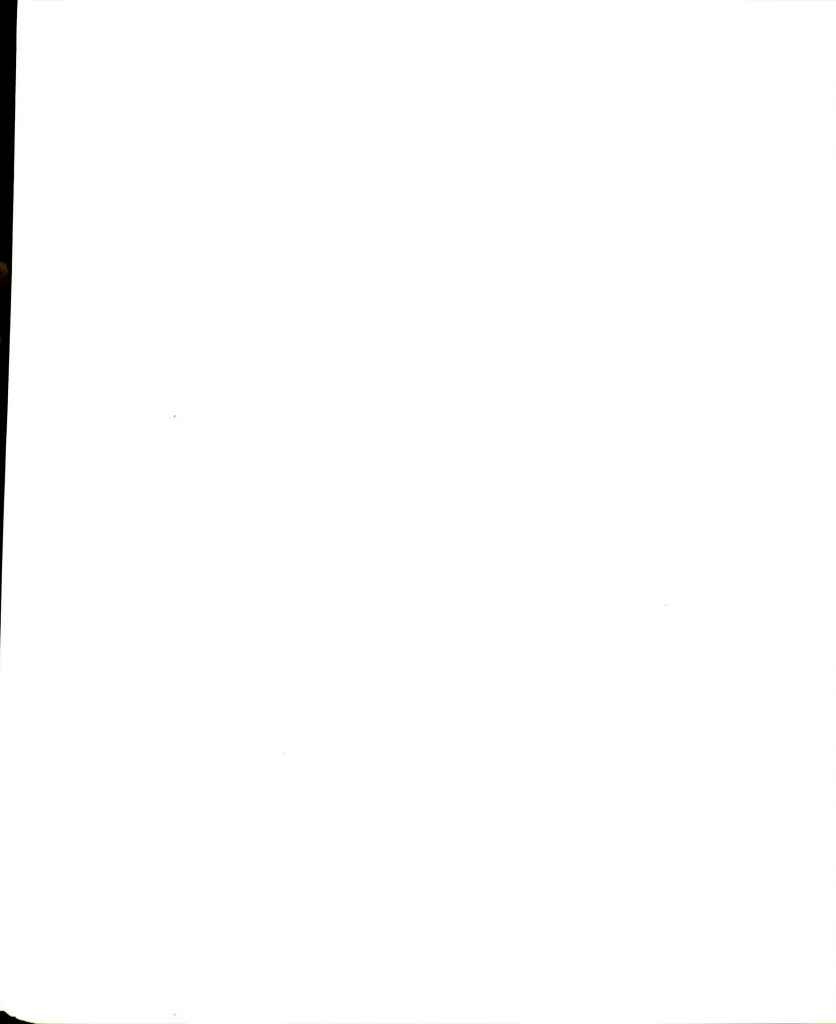
developing countries that these disparities do not automatically disappear or lessen with economic development. The growth pole concept has been identified as a spatial investment strategy that can be used to redress inter-regional disparities in development. To date the effectiveness of this strategy has not been studied extensively and the validity of the concept cannot be adequately assessed. The present study is undertaken with a view to resolving some of the controversy in the literature.
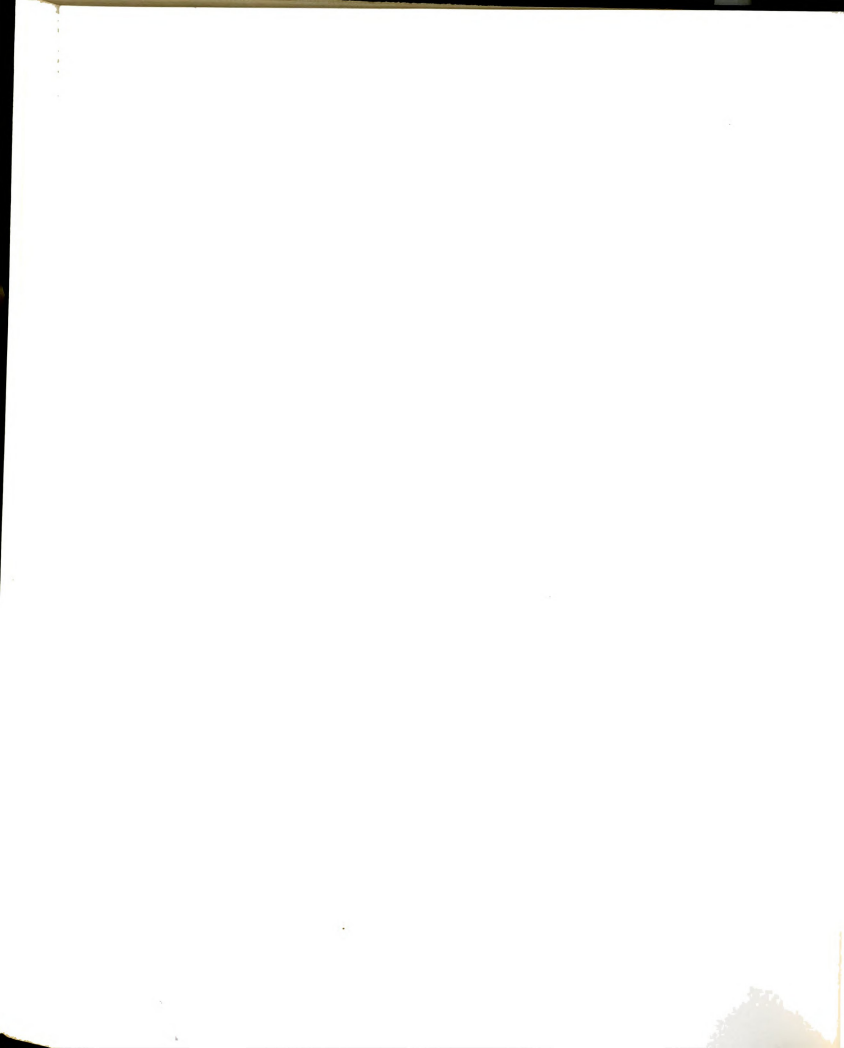
CHAPTER THREE

GHANA'S CONTEXTUAL SITUATION

Introduction

This chapter presents basic information about Ghana
including geography, history, government, economy, and popu-
lation characteristics. The purpose of such a presentation
is to provide pertinent information that will serve as general
background for the review of Ghana's development experience
in Chapter Four.

Geography

Ghana, the former Gold Coast colony, is situated on
the West Coast of Africa, north of the Gulf of Guinea. Her
neighbors are the Ivory Coast to the West, on the north-west
and north is the Upper Volta and on the east is the Republic
of Togo (See Figure 3). From south to north, it extends from
about latitude 4°2"N to about latitude 11°10'5N, a distance
of about 420 miles. From west to east, it extends from 3°15'3W
to 1°12'0E. The country has an area of approximately 92,100
square miles which is roughly equal in area to the United
Kingdom of Great Britain and Northern Ireland and about the
size of the State of Oregon.[1]

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[1]For a more detailed treatment of Ghana's geography,
see, for example, Dickson and Benneh (1970), Boateng (1959).

Upper Volta

Northern
Territories

British Mandated
Togoland

Republic of Togo

Ivory
Coast

Ashanti

Eastern
Province

GOLD   COAST   COLONY
Western Central
Province Province

Gulf of Guinea
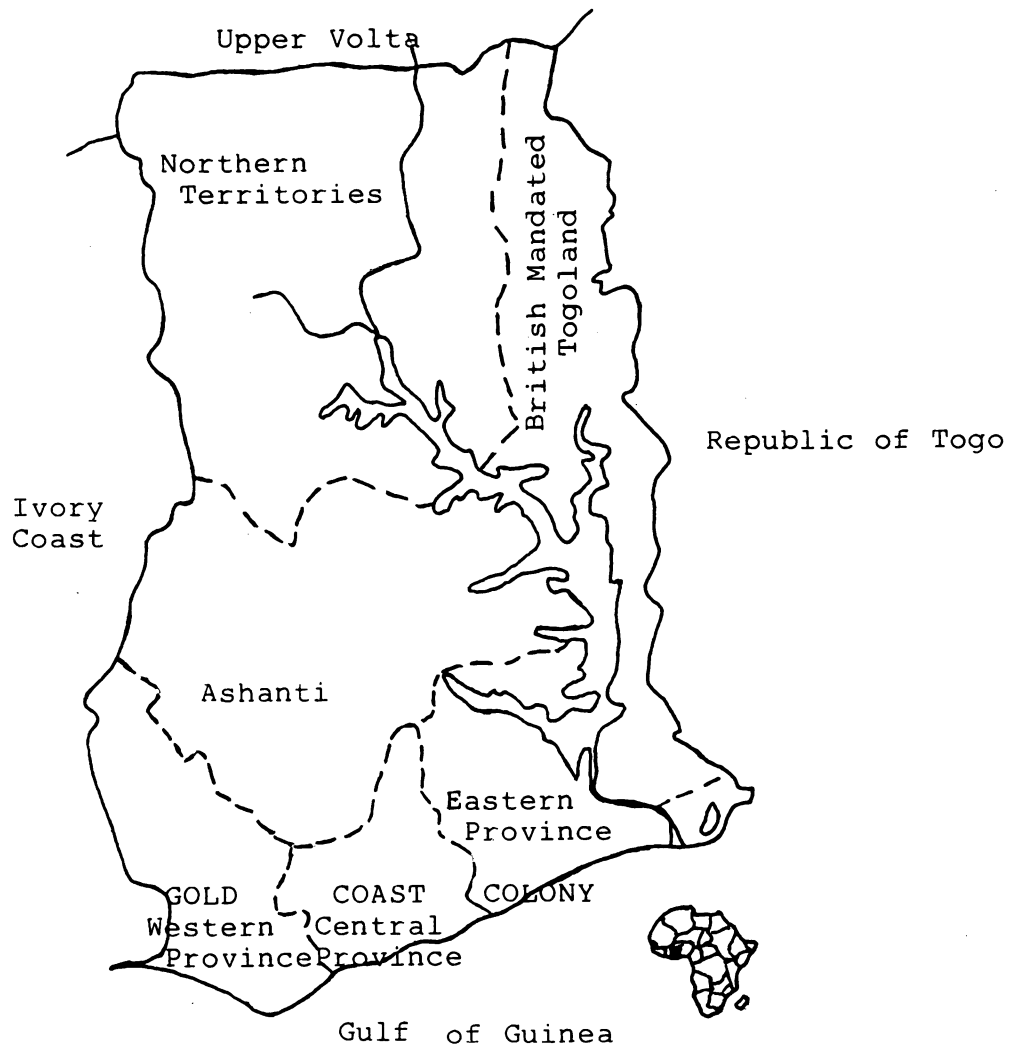
SOURCE: Ward, W.E.F.   A History of Ghana.   Revised 4th ed.
London, Allen and Unwin, 1967, p.22.

FIGURE 3:   LOCATION AND FORMER PROVINCES OF GHANA

Historical Background

Long before formal colonization by the British at the end of the nineteenth century, Ghana had substantial ties with the outside world. This contact was in the form of trade links with the Arabs and took place across the Sahara.

Ghana's initial contact with Europe was in the second part of the fifteenth century when Portuguese navigators visited the country in search of gold, ivory and spices.[2] The first English voyage to the then Gold Coast was made by Thomas Windham in 1553. The English were later followed by Danes, Dutch, Germans and Portuguese, each of whom controlled various parts of the country at various times.

The Gold Coast was made up of three distinct territories: the Colony, Ashanti and the Northern Territories (See Figure 3). Later these three territories were amalgamated and administered by the Colonial government which also administered Togoland. The latter had been held under a League of Nations Trusteeship from 1919 to 1946 when the Gold Coast government took over its administration.

On the 6th of March, 1957, the Gold Coast gained its independence and was renamed Ghana after an ancient Sudanese Empire which flourished between the fourth and tenth centuries and from which its people originated. At the time of independence

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[2] For an interesting discussion of Ghana's early history, see, for example Ward (1958) and Fage (1959).

the former British colony of the Gold Coast and the Trustee-
ship Territory of Togoland were retained under joint admin-
istration.

Ghana became a member of the United Nations on March
8, 1957 and joined the International Monetary Fund on September
20, 1957. On July 1, 1960, it declared itself a republic with-
in the Commonwealth of Nations. Currently Ghana is a member
of the International Development Association, the International
Finance Corporation, the Commonwealth, The African Development
Bank and numerous other international organizations.

Government Structure

Since Ghana attained its independence in 1957, it has
experienced a number of military coup d'etats and changes in
government. Within its relatively short history, it has had
eight changes in government. Presently, the country is ruled
by its fifth military regime headed by Flt. Lt. J.J. Rawlings.
Frequent changes in government have had profound effects on
development planning. As will be indicated in Chapter Four,
one effect has been a series of disjointed programmes imple-
mented by the different governments.

The country is divided into the nine administrative
regions (refer to Figure 1) and in each of these regions, there
are regional planning offices, regional development corpor-
ations, town and country planning offices and numerous other

agencies concerned with development. The regional planning
units are concerned with basic planning and resource allocation.
The regional development corporations engage in a wide variety
of commercial activities and use the profits to develop the
regions. The town and country planning units are concerned
with orderly development of individual settlements within the
regions. All these agencies come under the aegis of the Re-
gional Administrative Office which is the body representing
the central government in the regions. As part of the various
regional organizations, there are regional, district, and local
committees. These committees design, coordinate and implement
various development policies. They also act as a machinery
through which development benefits can be distributed.

Economy

Ghana's economy exhibits features of both central
planning and free market enterprise and is, therefore, a
mixed economy. For its size the country possesses substan-
tial amounts of human and natural resources. In recent years,
however, declining agricultural output, decreasing exports,
and mismanagement have resulted in large budget deficits,
increasing money supply and, ironically, a currency grossly
overvalued on both domestic and international markets. It
is not surprising that at the midpoint of the last decade,

Ghana had a high rate of inflation and a poor financial position. The factors that accounted for this included below-normal rainfall, inadequate agricultural producer prices, and a scarcity of fertilizer and agricultural machinery that substantially reduced both cocoa and domestic food production (Harris, 1980). At the same time, manufacturing had suffered an acute shortage of imported materials and spare parts. In recent months, however, under a new military regime, it is still doubtful if the country can regain its political and economic stability.

The foregoing is reflected in Table 2 which indicates that between 1974 and 1975 there was a decline of 12.5 percent in gross domestic product and a 3.7 percent decline between 1975 and 1976. After this period the economy started growing again, reflected by the fact that between 1976 and 1977, and 1977 and 1978, gross domestic product grew by 3.6 percent and 3.4 percent, respectively.

Cocoa is the main export and accounts for slightly more than half of all exports receipts and one-third of government revenues. Other exports are logs and sawn timber which account for 11 percent, gold 10 percent, diamonds 7 percent and manganese 5 percent of total exports. The following products are manufactured locally and account for about 11 percent of gross national product: textiles, food, and beverages,

TABLE   2

GROSS NATIONAL PRODUCT AT 1975 PRICES

Year	Gross National Product (Million Cedis*)	Rate of Growth (Percent)
1971	5581	
1972	5442	-2.5
1973	5597	2.9
1974	5982	6.9
1975	5241	-12.4
1976	5046	-3.7
1977	5227	3.6
1978	5404	3.4

* ¢2.75 = $1.00

SOURCE: Central Bureau of Statistics, Economic Survey 1977-
          1979. Accra-Tema, Ghana Publishing Corporation, 1980.
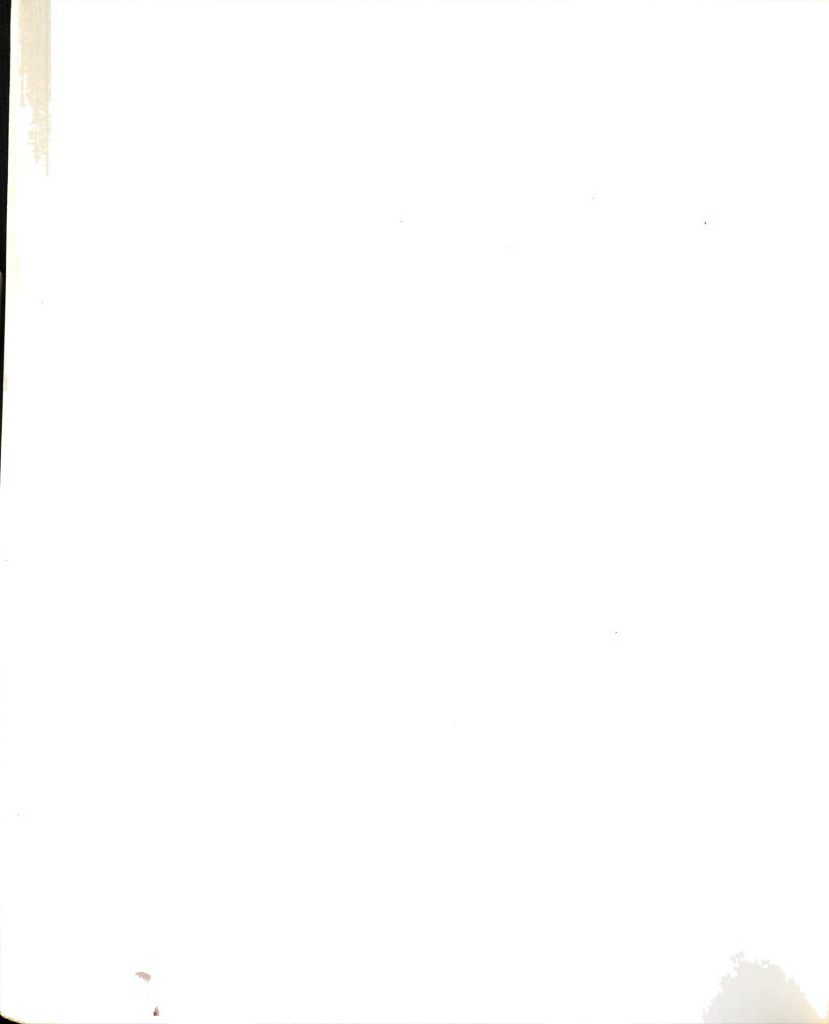
tobacco, pharmaceuticals, rubber products, etc.[3] Recent

mineral explorations have revealed new deposits of gold,

natural gas and oil.[4]

It is hoped that recovery of these minerals will im-

prove the country's balance of payments and help provide much

needed funds for development.

Regional Aspects of the Economy. Regional income or

employment figures are used as indicators of most economies.

In Ghana, however, these data are not readily available. Na-

tional labor statistics refer to only a proportion (65 per-

cent) of the actual labor force and thus do not reflect total

employment and hence regional incomes. Employment statistics

and other data on self-employed persons cover only incomes in

the agricultural and other monetized sectors. Data on self-

employed persons outside agriculture, particularly traders

is lacking. Data on interregional monetary transfers from

labor and capital investment are also not available. Re-

gional differences in value-added are therefore used, on the

assumption that they indicate regional income disparities and

reflect structural features of regional economies.

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[3]Other detailed aspects of the economy can be found
in Birmingham et al., (1967) and Singal (1973).

[4]For a documentation of Ghana's recent finds of gold
endowment see, for example, West Africa, no. 3312, 26 January
1981, pp. 149-152.
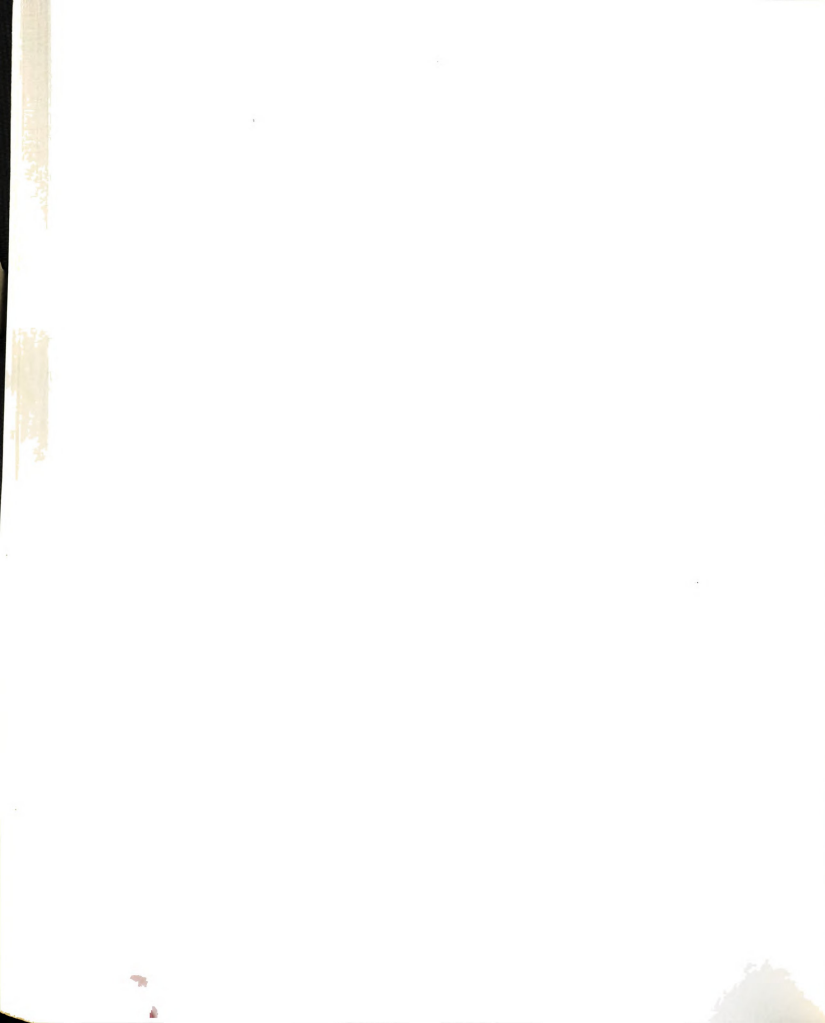
Table 3 shows the regional gross valued-added by sectors of origin for 1960. These data are outdated, but illustrate a basic structural feature of the economy, fluctuations are not likely to affect the basic pattern. Table 3 indicates a concentration of economic activity in the southern part of the country. The three forest zones (Ashanti, Eastern and Western Regions) and the Greater-Accra Region contribute 75 percent of the value-added in the economy while comprising only 34 percent of Ghana, and with 61 percent of its population. On the other hand, the Northern and Upper Regions comprise 41 percent of the country, but generate only nine percent of the gross value-added.

Intensity of economic activity also varies considerably. Greater-Accra Region which is made up of a distinct urban element, Accra and Tema, has the highest gross value-added per square mile. The difference between this figure and other regional figures is startling, it is at least ten times higher than all the other regional figures (See Table 3). Western and Central, Ashanti and Eastern Regions are similar in terms of their spatial intensities of economic activity. In fact, these regions have similar resource endowments and production structures. They cover the forest belt of Ghana, the area where most of the known agricultural and mineral resources are located.

The Northern and Upper Regions have the least intense economic activity and this is indicative of the production structure of these regions. Economic activity centers around traditional agriculture and livestock-rearing, the latter being severely handicapped by low rainfall.

TABLE 3

REGIONAL DIFFERENCES IN GROSS VALUE-ADDED, 1960*

Region**	% of Total Gross Value Added	g.v.a. per Capita, £G	g.v.a. per Sq. Mile, £G
Accra, C.D.	20.6	176	87,374
Western Region	22.2	68	7,110
Eastern Region	13.7	53	7,410
Ashanti Region	17.9	68	7,753
Volta Region	8.0	43	4,187
Brong-Ahafo Region	8.5	61	2,389
Northern Region	9.2	30	1,032
All Regions	100.0	63	4,566

SOURCE: Birmingham W. et al.,(eds.) A Study of Contemporary Ghana, vol. 1, Evanston, Northwestern University Press 1966, pp. 91-92.

* Figures refer to 1960 but no drastic changes have occurred in the proportional distribution over the regions since then.

**Until the middle of 1960 Ghana was administratively sub-divided into seven regions; the Northern Region consisted of the present Northern and Upper Regions, while the Western Region included the area which is now the Central Region.

Table 4 is a breakdown of regional economic activity which indicates that two of the seven regions rely on one economic sector. The Northern Region (Northern and Upper) derives 55 percent of its gross value-added from agriculture and the Greater Accra Region derives 59 percent of its gross value-added from services. The three forest regions: Western, Ashanti and Eastern have economies which are very similar. They derive about 30 percent of their gross value-added from three sectors: forestry, cocoa and mining. These three regions also have small agricultural sectors because traditional agriculture has declined in importance and most economic activities are centered around modern industrial activities. The Brong-Ahafo Region is predominantly agricultural, deriving 70 percent of its gross value-added from cocoa, forestry and agriculture. The Volta Region's economy is similar to that of the Brong-Ahafo Region but derives 43 percent, 10 percent and 32 percent of its gross value-added from agriculture, cocoa, and services, respectively.

The points made so far have indicated substantial differences among the structural features of the regions, particularly between the northern savannah and southern coastal regions. These differences can be partially attributed to differences in resource endowment among the various regions. Resource endowment also seems to have an impact on population and its distribution

TABLE 4

REGIONAL GROSS VALUE-ADDED, BY SECTORS OF ORIGIN, 1960

Region	Agriculture	Forestry	Cocoa	Mining & Quarrying	Manufacturing	Electricity	Construction	Fuel	Public Utilities	Services	Public Consumption	All Sectors
Accra CD	1.3	0.0	--	--	3.9	0.3	22.5	1.5	1.6	58.7	9.9	100.0
Western	12.3	8.6	9.8	11.4	2.6	0.4	7.0	1.0	5.5	36.9	4.6	100.0
Eastern	24.9	4.3	13.7	14.6	0.7	0.2	5.9	0.3	0.5	31.1	3.7	100.0
Volta	42.7	3.3	9.9	--	--	--	6.3	0.3	0.3	31.9	5.4	100.0
Ashanti	17.2	5.2	21.1	4.5	2.5	0.1	7.4	0.8	0.8	35.6	4.7	100.0
Brong-Ahafo	34.6	8.7	26.7	--	0.3	--	4.2	0.5	0.3	22.2	3.1	100.0
Northern	54.9	4.4	--	--	0.3	--	10.1	0.5	0.5	22.9	6.4	100.0
All Regions	20.8	4.8	10.9	5.3	2.0	0.3	10.1	0.8	1.9	37.4	5.7	100.0

SOURCE: Birmingham, W. et al., (eds.) A Study of Contemporary Ghana. vol. 1, Evanston, Northwestern University Press, 1966, p.93.

Population

Population is the basic parameter used at various stages of planning. Any discussion of Ghana's contemporary situation demands a presentation of the structural character-istics of its population pertinent to the problem of regional imbalances in development. Such characteristics include pop-ulation estimates, profile and spatial distribution.

Population Estimates. Only nine census counts have been done in Ghana. The first was undertaken in 1891 and covered only the then Gold Coast Colony. The second in 1901 covered the Colony, Ashanti and the Northern territories. Not until 1921 did the census include Togoland and, therefore, the entire country. Another census was undertaken in 1931. The outbreak of war prevented another until 1948. Subsequent enumerations were undertaken in 1960 and 1970. A 1980 census was not done because of administrative and operational limitations and has been rescheduled for 1982.[5]

Table 5 presents estimates of the population for each census year. The rate of population growth, on an annual basis, has varied from a low of 0.82 percent for the period 1891-1901 to a high of 3.2 percent for the periods 1931-1948 and 1970-1975. Given the unreliability and inaccuracies of the data set, certain adjustments can be made in these figures but even then the growth

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[5]For further details, see Daily Graphic (Accra), September 17, 1980, p.1, columns 1 and 2.

TABLE 5

POPULATION OF GHANA, 1891-1980

Census Year	Population Estimate (000s)	Average Annual Population Growth Rates
1891	1,750	---
1901	1,894	.82
1911	2,104	1.1
1921	2,298	2.1
1931	3,164	2.4
1948	4,118	3.2
1960	6,727	3.1
1970	8,559	2.7
1975	10,000	3.2
1980	11,550	2.9

SOURCES: 1. 1891-1960 figures obtained from: Kay, G.B. The Political Economy of Colonization in Ghana A Collection of Documents and Statistics 1900-1960. Cambridge, the University Press, 1972, p.310.

2. 1970 figures obtained from: Republic of Ghana, Central Bureau of Statistics. Statistical Handbook 1970. Accra, Public Relations Department. Central Sales Division, n.d., p.13

3. 1975 figure obtained from: United States, General Accounting Office. Impact of Population Assistance to an African Country. Washington, Department of State, Agency for International Development Report to Congress, 1977.

4. 1980 population estimate obtained from: Harris, Donald S., Country Labor Profile Ghana. Washington, U.S. Department of Labor, Bureau of International Labor Affairs, Office of Foreign Labor Affairs, 1980, p.1.

rates will not be significantly different from those in Table

5.   Caldwell (1967:10) contends that

> Even after adjustments are made to the 1948
> census population, the average annual rate
> of natural increase between that census and
> the 1960 one can hardly have been less than
> 2.9 percent. By the latter year it had al-
> most certainly passed the 3 percent mark and
> by the time of writing is probably around 3¼
> percent.

In support of this assertion, Gaisie (1969) has estimated the

rate of population growth in Ghana to be about 2.7 percent per

annum and Killick (1978) puts the figure somewhere between 2.5

percent and 3.5 percent annually.

In 1979, the U.S. Department of State estimated Ghana's

rate of growth at 3.2 percent. This is high compared with 2.7

percent for neighboring Togo and 2.2 percent for Upper Volta

but low compared with 4.2 percent in the Ivory Coast and 4.0

percent for Kenya. The implications of this growth rate are

far reaching.

As is to be expected, various administrative regions

have different growth rates. Table 6 is a summary of 1960

and 1970 regional populations and their respective growth rates.

With the exception of the Northern and Brong Ahafo Regions,

all the fast growing regions are located in the southern half

of the country.

The components of this population growth are the rate

of natural increase and the rate of immigration. Of the two,

the former is the most important. Traditionally, immigration

TABLE 6

REGIONAL GROWTH RATES 1960-1970

Region (1)	1960 Population (2)	1970 Population (3)	% Increase 1960-1970 (4)	Average Growth Rate (5)
All Regions	6,726,315	8,545,561	27.04	2.4
Western	626,155	768,312	22.70	2.1
Central	751,392	892,593	18.79	1.7
Greater Accra	491,317	348,325	72.59	5.6
Eastern	1,094,196	1,262,885	15.42	1.5
Volta	777,285	947,012	21.84	2.0
Ashanti	1,109,133	1,477,397	33.20	2.9
Brong-Ahafo	587,920	762,673	29.72	2.7
Northern	531,573	728,572	37.06	3.2
Upper	757,344	857,295	13.20	1.3

Source: Republic of Ghana, Central Bureau of Statistics
Statistical Handbook, 1970. Accra, Public Rela-
tions Department, Central Sales Division, n.d.
p.7.

has not played a significant role in population composition and change in Ghana. In 1960, for example, only 12.3 percent of the total population were immigrants and out of this, only 8.3 percent were born in a foreign country. By the early part of 1970, the proportion of immigrants in the country had been reduced to 6.6 percent because of implementation of the Aliens Compliance Order promulgated in 1969.

Population Profile. One way of describing the population profile of Ghana is to examine the population that makes up the various age cohorts and, where possible, relate this to comparable statistics from other countries (See Table 7).

As in most other developing countries, there is a significant proportion of children in the population. About 45 percent of the population is less than 15 years old and it has even been established that at least half the population is under 18 years. In addition to this, if the percentage of people over working age is added, the proportion of people not actively engaged in renumerative employment stands at about 53 percent. These figures indicate a rather high dependency ratio, estimated at about 101.6 percent, which is rather high compared to a figure of 67.3 percent for the United States.

In comparison with its broad base, the middle section of the population pyramid is small. In other words, the population is not evenly distributed among the age cohorts as compared with a similar profile for the same year for the United States. The

TABLE 7

COMPARISON OF AGE PROFILES IN GHANA AND
THE UNITED STATES (1970 FIGURES)

Age Cohort	Ghana	United States
Under 5	19.3%	11.3%
5-14	25.2	19.8
15-24	16.8	13.4
25-34	16.0	12.8
35-44	10.2	13.5
45-64	9.4	20.2
65+	3.1	9.2
Total	100.0%	100.0%

SOURCE: Shryock, Henry S. Jr., Jacob S. Siegel and Associates
The Methods and Materials of Demography. (Condensed
Edition by Edward G. Stockwell) New York, Academic
Press, 1976, p.130

broad base generally tapers off toward the top of the pyramid, but the tapering is less abrupt in the U.S. profile. These population features seem to be characteristic of developing countries but are hardly desirable because of the profound effects they have on the labor force, revenue for development and the provision of social amenities. In Ghana, the age dependency ratio of 101.6 percent simply means that about 102 people will have to be supported by every member of the working force population. When this is compared to the figure of 67.3 percent for the United States, the enormous strain on the Ghanaian labor force can be appreciated.

The root cause of regional disparity and other population related problems is the rapid growth which gives rise to mis-allocation of resources to particular sectors of the economy and particular regions. Examples are the substantially larger expenditures allocated to say education as opposed to agriculture or the Greater Accra Region as compared to the Upper Region.[6]

Population Distribution. In discussing how the population of Ghana is spatially distributed, it ought to be pointed out that geographically the country possesses no particularly uninhabitable arid lands, deserts or rugged ranges. In spite of this, large sections of the country remain sparsely populated.

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[6] For the expenditure by each of the sectors in the development plans prior to 1975, see for example Kay (1972: 322).
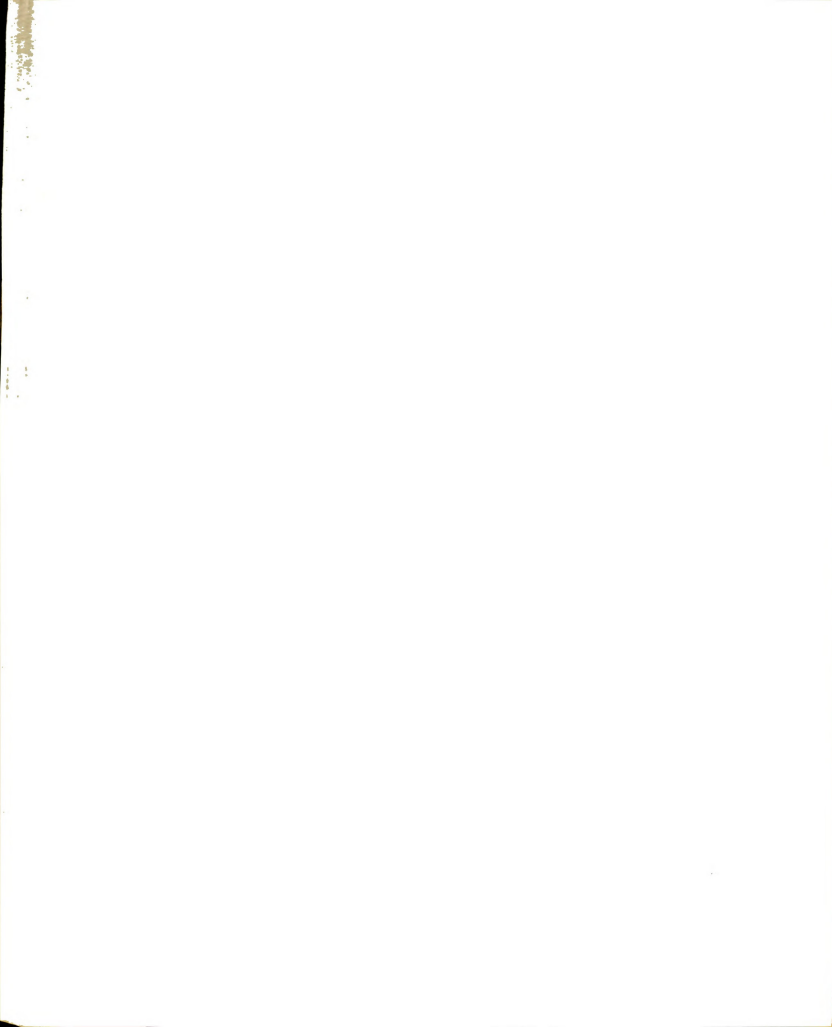
In 1979 the population density of 115 persons per square mile was higher than most African countries. The Ivory Coast,for example, had only 58 persons per square mile in 1979 and Kenya's figure was 70.

Table 8   shows Ghana's population density and urbanization rates by region in 1970.   The uneven distribution of population is evident.   The Greater Accra Region is the most densely settled, followed by the Central, Eastern and Ashanti Regions, in that order.   Much of Ghana's agriculture and its mineral resources are located in these regions indicating that the pattern of population distribution is consistent with the areas of raw material exploitation and economic opportunity.

Within each of the nine regions there is also an uneven distribution of the population, which is usually concentrated in the urban areas.   This has had the profound effect of concentrating development resources in the urban areas. In addition to the natural tendency of planners to concentrate their efforts where they will affect the most people, the explanation of this pattern is partly historical.   As early as in the 1920's, it was reported that the government's policy was to concentrate its resources on large towns where rapidly growing populations caused grave dangers of epidemics of infectious diseases (Kay, 1972:59).

These intra- and inter-regional density disparities tend to have other implications for the delivery of services. For example, in the Northern Region with a 1970 density of only 26.8 people per square mile, the delivery of services can only

TABLE   8

POPULATION DENSITY AND LEVEL OF
URBANIZATION BY REGION IN 1970

Region (1)	Area (Sq.Miles) (2)	Population 1970 (3)	Population Density Per Sq.Mile(4)	Percent Urbaniza- tion (5)
Western	9,236	768,312	81.2	27.0
Central	3,815	892,593	233.4	28.5
Greater Accra	995	848,825	851.1	85.5
Eastern	7,698	1,262,885	164.1	24.5
Volta	7,943	947.012	119.2	16.0
Ashanti	9,417	1,477,397	156.9	30.0
Brong-Ahafo	15,273	762,673	49.9	22.0
Northern	27,175	728,572	26.8	20.5
Upper	10,548	857,292	81.3	7.0
All Regions	92,100	8,545,561	92.8	23.0

SOURCES: [2]Calculated from column 4 of TABLE 3 in Hunter, J.M.
"Regional Patterns of Population Growth in Ghana,
1948-1960" in Whitton, J.R. and Wood, P.D. eds.,
Essays in Geography for Austin Miller. Reading,
University of Reading, 1965, p.277.

[3]Obtained from: Republic of Ghana, Central Bureau of
Statistics. Statistical Handbook 1970. Accra Public
Relations Department, Central Sales Division, n.d.
p.7.

[5]Ewusi, Kodwo. Social and Economic Indicators for
Planning and Monitoring Integrated Rural Development·
in Ghana. Legon, Ghana. University of Ghana, 1977,
p.81

1960 Population Densities in Parenthesis.

be undertaken at high (per capita) cost. All else being equal, development strategies should be concerned with attracting more people to these areas to reduce the per capita cost of public service delivery and ease urban overcrowding.

Summary

This overview of Ghana's contextual situation has revealed problems pertinent to national development planning as well as patterns useful in analyses of regional inequality in Ghana. The problems include: rapid population growth, imbalance between the percentage of people in various age groups and huge inter-regional population density disparities.

The overview has also indicated a distinct pattern of regional development in Ghana, a relatively developed southern half and a northern half with few modern economic activities. The latter comprises the northern sections of Brong Ahafo and Volta Regions and the entire Northern and Upper Regions. Knowledge of these disparities, then, provides a basis for the review of Ghana's development planning experience to follow in Chapter Four and the analysis of regional inequality in Chapter Five.

CHAPTER FOUR

DEVELOPMENT PLANNING IN GHANA

Introduction

        This chapter has two main objectives. First, it will
review past development plans to see how they tackled the prob-
lem of regional inequalities or spatial imbalance in Ghana.
Second, it will discuss how various development objectives have
been articulated over the years to address the issue of spatial
inequality. These two objectives will reveal factors which might
have contributed to, or reinforced, the present pattern of re-
gional inequalities.

        Ghana is faced with many problems and its development
plans have not addressed some of these problems. Regional in-
equality in development is one such problem which has impli-
cations for social-economic development, as were discussed in
Chapter One. The persistence of regional inequalities in de-
velopment by no means suggests that the government officials
were not sensitive to this problem but, as Gilvert (1976:3)
puts it, it "swam in a sea of important issues demanding the
attention of planners and politicians".

        A few attempts have been made to redress the problem of
regional inequalities through development planning. In fact,
planning is not a recent activity in Ghana but, one of
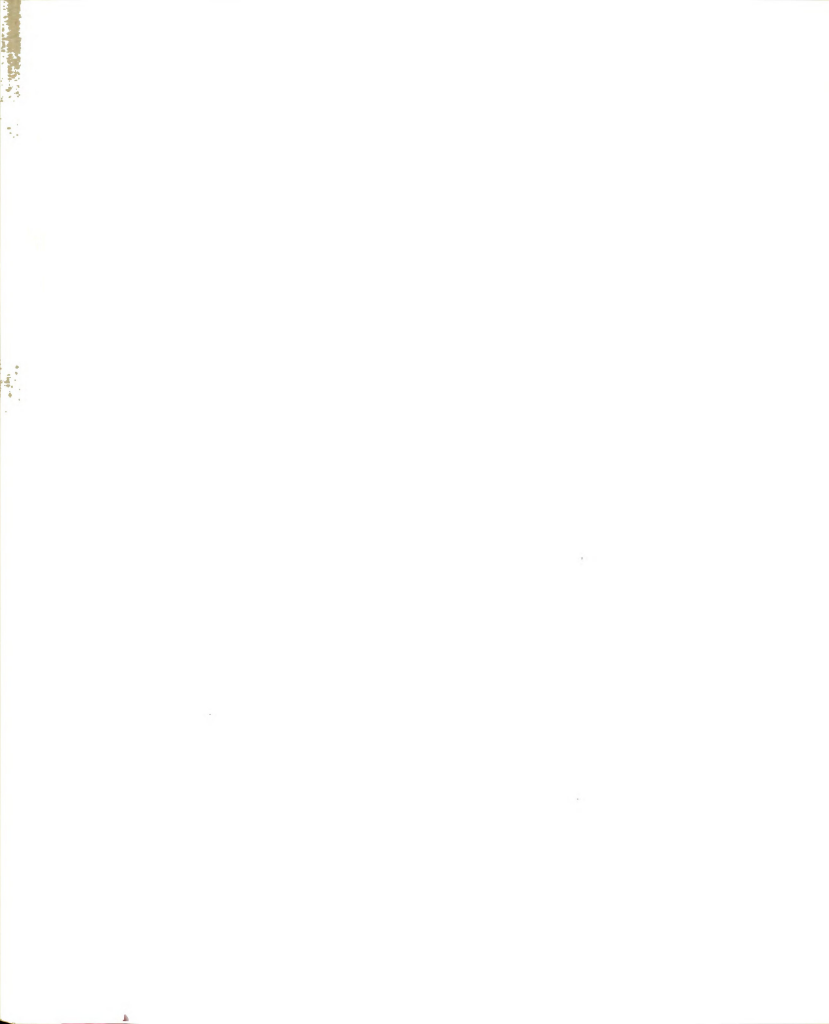
the legacies inherited from the colonial powers. Niculescu (1958:5) has observed that:

> The major administrative contribution made
> by the Metropolitan Governments after the
> Second World War to the solution of these
> underlying problems has been the introduction
> of development planning, and this is one of
> the devices which the colonies have been
> taking over into their new-found state of
> emancipation and will certainly continue to
> employ.

This is not a wholly accurate description of when planning was first introduced into Ghana. There are indications that development planning began before the end of the Second World War and, therefore, long before independence (Niculescu, 1958; Ewusi, 1973; Ward, 1967). When the British assumed full control of the Gold Coast and its hinterlands in 1901, they devoted the post-1901 period to social, economic and political development. However, it needs to be pointed out that the policy was probably a reaction to events in Britain. A series of events which occurred at that time led to the evolution of long-range, comprehensive, and integrated development planning.[1]

Since Ghana is an ex-British colony, its growth and development has in many ways been influenced by various British institutions and events in the United Kingdom. Most of its institutions were inherited from the British and used to guide and manage the growth and development of independent Ghana.

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[1]For a succinct review of these events, see for example Niculescu (1958) and Ewusi (1973).

Planning is one such institution, the existence and develop-
ment of which was heavily influenced by actions in the United
Kingdom. Any attempts to understand the history of planning
in Ghana will have to recognize these factors. To the extent
that these factors affect the institutional framework within
which development takes place, to that same extent do they
influence the establishment and expansion of development plan-
ning activities. Within this context a brief history of plan-
ning in Ghana is discussed in the following section.

History of Planning in Ghana

In Ghana, the idea of planned economic development
was introduced by Sir Gordon Guggisberg in 1919. A surveyor
by profession and later a Governor of the Gold Coast, it can
be assumed that he had full knowledge of the peculiar social
and economic problems confronting the country, as well as
the technical problems connected with surveys and public works.
Guggisberg advanced Ghana's planning efforts and as Niculescu
(1958) observes, "Guggisberg, as Governor of the Gold Coast,
seems to have been not only the first in the British colonial
empire but also the first in the modern world to put forward
in outline in 1919 an integrated ten-year development plan."
This initial plan was subsequently followed by a number of
other plans, each of which had different development emphases
at different points in time. Table 9 is a summary of all the
plans which have been drawn up since 1919. As a prelude to

TABLE 9

GHANA'S DEVELOPMENT PLANS

Plan #	Title of Plan	Period Scheduled for Implementation	Period Implemented
I	The Guggisberg Ten-Year D-Plan	1920-1930	1920-1927
II	A Ten-Year Plan of Development And Welfare for the Gold Coast	1946-1956	1946
III	Ten-Year Plan for the Economic and Social Development of the Gold Coast	1951-1961	1951
IV	The First Five-Year Development Plan	1951-1956	1951-1957
V	The Consolidation Plan	1958-1959	1958-1959
VI	The Second Five-Year Development Plan	1959-1964	1959-1961
VII	National Physical Development Plan	1962	-
VIII	The Seven-Year Development Plan	1964-1970	1962-1966
IX	The Two-Year Development Plan	1968-1970	1968
X	One Year Development Plan	1970-1971	1970
XI	Five-Year Development Plan	1975-1980	1975

Sources:
Ewusi, Kodwo. Economic Development Planning in Ghana. New York, Exposition Press, 1973.

Ghana, Government Of. 1975-1980 Development Plan. Accra, Government Press, 1977.

any comparisons between the various plans and their major emphasis, caution should be taken in assuming the comparability of the different plans.

Comparability of Development Plans

In reviewing the various plans, one is tempted to compare one plan with another. Such a comparison would be possible if the plans covered similar items, in similar terms, and over the same time period. To some extent they do. However, it would still be inaccurate to compare them because certain extraneous factors not documented in the plans, such as the departure of a Governor from the country, could have powerful implications for the various policies outlined in the plans.

Since the various plans did not cover precisely the same items and used different terms even when they did overlap, it will be impossible to compare them. Such one-to-one comparison is not the intent of this review. Its focus is on policies which contributed to, or reinforced, the pattern of inequality. Thus the main views expressed in the various plans are outlined and the extent to which they address the problem under investigation is assessed. In a strict sense, the summaries depicting aspects of the various plans should be regarded as a collection of heterogenous pieces of data which will allow only the vaguest possible comparison and which will be used as grounds for subsequent discussions.
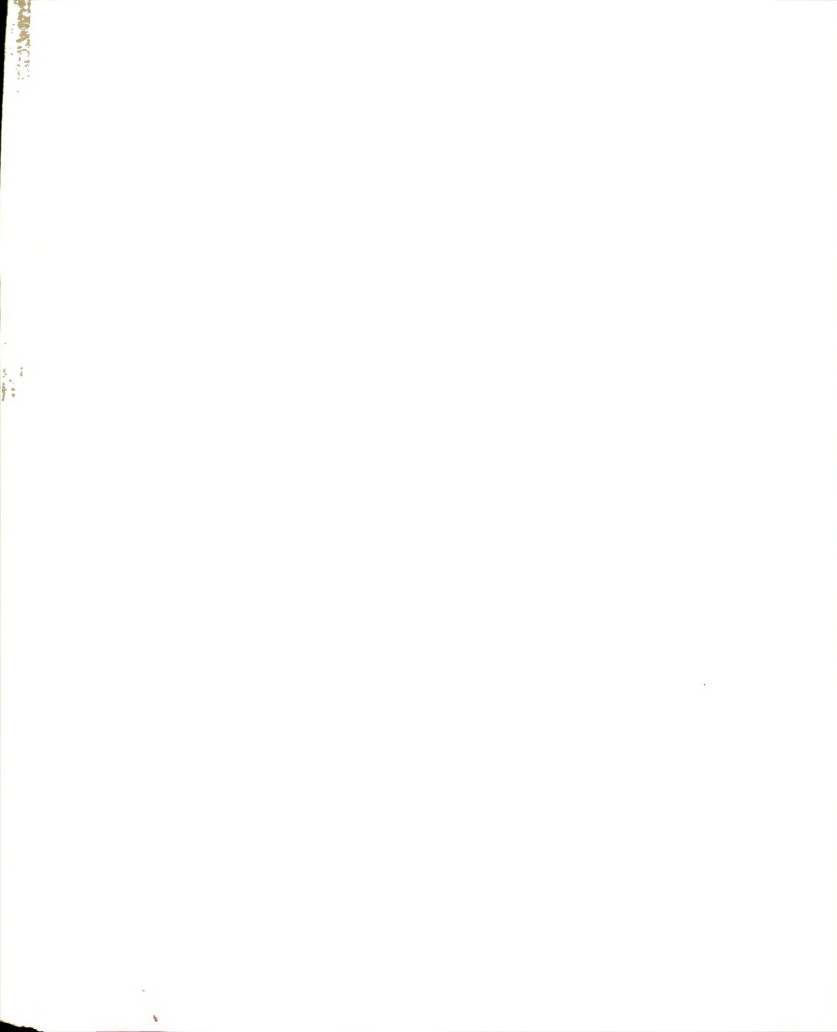
Review of Development Plans - Content Summary

Guggisberg Ten-Year Plan 1920-1930. Table 9 is a
summary of the various plans designed and implemented since
the era of Ghana's first Governor, Guggisberg. The first,
the Guggisberg Plan, was designed to lay out the country's
basic infrastructure for subsequent development. During
this period railway and road construction were undertaken,
largely in the cocoa growing areas of the Central and Eastern
Regions and the mineral production areas in the Western Re-
gion. The Takoradi harbour and the railway terminal were
built at Sekondi-Takoradi because it was perceived that these
twin-cities would eventually become the import-export center
of the Gold Coast. This explains why the first railway line
was built in Ghana from Sekondi to Tarkwa, the latter being
the heart of the gold production region. Later the Accra-
Kumasi line was built through the cocoa production area. The
roads built during this period also run in a north-south di-
rection, reflecting the emphasis, in this era, on export trade.

Apart from extending the basic transportation system,
other areas of emphasis during the Guggisberg era were town
improvement, surface drainage and posts and telecommunication.
Table 10 indicates expenditures by sector under each of the
plans and clearly demonstrates that social services was second
to infrastructure in proposed expenditures under this plan.
The entire plan was estimated at about £12 million and init-
ially financed through loans provided under the Colonial De-
velopment Act.

TABLE **10**

EXPENDITURE BY SECTOR UNDER GHANA'S DEVELOPMENT PLANS 1920-1970 (000's)

Sector	Ten Year* 1920-7	TenYear+ 1946-56	1st Develop-* ment 1951-7	Consolida-* tion 1957-9	2nd Develop-* ment 1959-63	Seven Year* 1963-70
Productive	151	--	7,933	5,682	38,071	177,300
Industry & mining	--	--	3,091	3,456	27,454	109,300
Agriculture forestry & fishing	151	671	4,842	2,226	10,617	68,000
Social Services	1,977	50	28,494	9,982	47,686	150,300
Education	--	2,086	12,331	4,131	16,545	64,000
Health & sanitation	--	1,579	4,644	681	9,497	31,100
Other social services	--	--	579	--	1,050	10,500
Housing	--	--	5,182	1,447	11,647	20,000
Public administration	--	--	3,033	2,861	3,840	19,000
Public buildings	1,512	--	--	--	--	--
Police & prisons	--	--	1,981	686	2,729	5,700
Broadcasting	--	100	744	176	2,378	--
Town Improvement & surface drainage	465	--	--	--	--	--
Infrastructure	10,143	5,682	43,910	22,055	48,584	89,200
Roads	1,223	--	14,822	3,456	--	26,400
Railways & inland waterways	5,621	--	8,006	3,641	--	8,700
Ports & harbours	2,264	--	--	--	--	5,500
Tema Harbour	--	--	8,200	7,894	40,027	--
Airports & airplanes	--	--	153	521	--	1,500
Shipping	--	--	--	--	--	--
Other Transport	--	--	183	13	--	--
Posts & telecommunications	276	445	1,643	596	--	9,600
Electricity	188	766	2,123	1,173	4,448	11,100
Water & sewerage	204	--	5,359	1,520	4,109	24,400
Takoradi township	189	--	--	3,241	--	--
Tema township	--	--	3,421	--	--	--
Maps & Sureys	178	--	--	--	--	--
Other						
Volta	--	--	1,558	373	20,453	33,700
Defence	--	--	2,689	498	16,479	--
Miscellaneous contingencies	156	--	9,099	4,147	14,134	25,000
Total	12,427	11,379	93,683	42,737	185,407	475,500

Sources: *Kay, G.B. op. cit. p.322
          +Ewusi, K. op. cit., p.23

In retrospect, what can be said of this plan is that, once the basic infrastructure for trade had been developed, it did very little for the economy of Ghana. Guggisberg's strategy reflected the requirements of the economy at one early stage of development but the basic patterns established became the backbone of subsequent transportation developments that were not as appropriate for later periods. Guggisberg's Plan, therefore, clearly demonstrates the extent to which initial development of the transportation system was determined by the location of exploitable resources and this set in motion a discriminatory but efficient pattern of physical development in Ghana. This pattern concentrated development in the Western, Central and Eastern Regions. However, the plan's spatial aspects were never mentioned explicitly.

Ten-Year Plan 6f Development for the Gold Coast 1946-1956. Much of what was envisioned in the first plan was not implemented because Guggisberg left the country in 1927. For nineteen years afterward no other plan was prepared partly because of the onset of the World depression. After this era, however, development planning proceeded in accordance with the guidelines outlined in acts and instruments designed by the Imperial Government to guide development in the colonies. Serious efforts were made to revise and modify Guggisberg's plan but the 1946 plan essentially followed the 1921 pattern. The major difference was that it was less ambitious and more

realistic, given the country's resources and the drop in world
cocoa price.

During the 1946-56 period infrastructure was again,
given the highest priority, reflected by the fact that this
sector received the highest budgetary expenditure. This was
followed by education and health, in that order (See Table 10).
It needs to be mentioned that developments in health, education
and infrastructure occurred during the period between the first
two plans, because this period particularly 1939-1945, saw
substantial developments in Ghana and West Africa in general
because of the position of the region as a source of vital
raw materials. This period therefore brought large railway
construction programs, airport construction at Accra and land-
ing facilities at Tamale and a number of other developments.

In terms of spatial development, the 1946 Ten-Year
plan basically followed the policies outlined in the Guggisberg
Plan. However, it extended Guggisberg's policies to include
building air landing facilities in Kumasi (Ashanti Region) and
Tamale in the Northern Region. These towns were important
administrative, commercial and cultural centers. In building
these landing sites the plan demonstrated its urban, as op-
posed to rural, orientation.

Ten-Year Plan for the Economic and Social Development
of the Gold Coast 1951-1961. The next major plan was a ten-
year plan (1951-1961), later abridged to five years. This

plan followed the earlier path to development because planners realized that the country needed to be put on a firm economic footing. Therefore, agriculture was given priority in the "widest" sense. This meant that communications and other services regarded as crucial to the improvement of agriculture were promptly developed, even though agriculture itself was not allocated large expenditures under the plan. It was argued that developments in agriculture would propel other agro-based industries and even provide inputs for future industries.

Transportation and social services were highly ranked during this period. Apart from opening up the interior, the development of roads, waterways and related facilities was seen as crucial to the administration of the colonies. Administrative centers were therefore linked up with roads. The development of these facilities, especially the transportation links, was in no way related to demand. They simply traversed the country in a north-south direction from the hinterlands to the coast. Although excessive for their time, these social and economic facilities became useful for subsequent development.

No explicit mention was made of the plan's spatial aspects. However, it can be inferred that because one intention was to link up the various administrative centers; it did moderate the urban bias exhibited by two earlier plans. By linking the administrative centers with roads, the accessibility

of rural settlements near the roads would have been improved
and could have led to other development in the rural areas.
Thus it is plausible to conjecture that the policies resulted
in a rural bias even though this was not an explicit objective.

First Five-Year Development Plan 1951-1956. In 1951,
when the majority of African governments came to power, there
was a shortage of indigenous planners and data so that an
appropriate new plan could not be designed. The 1951-1961
Ten-Year Plan was, therefore, adopted in principle but later
modified to increase projected expenditures, in particular
the education expenditures. These increases in expenditure
were prompted by a boom in the world producer prices of most
primary products and the income accruing from these. Until
this time, the role of space had not been explicitly consid-
ered in the location and distribution of the benefits of de-
velopment.

In terms of spatial emphasis this plan was very little
different from the 1951-1961 plan, except that increased edu-
cation expenditures meant an initial urban emphasis. This
is supported by the fact that most educational institutions
established during this period, like the University College
of the Gold Coast, were located in urban areas like Accra.

The plan also called for breaking an overdependence
on agriculture to establish some industries, such as food
processing. Perhaps this was one of the reasons why W. Arthur
Lewis, a renowed Harvard economist, was invited to study the

country's industrial capabilities in 1953. The urge to industrialize was strengthened by the fact of legal independence and a desire to follow Britain's development path to industrialization.

Even though spatial aspects of the plan were not documented it may be inferred that the plan's policies resulted in an urban bias. This is borne out by the fact that, apart from the tomato factory at Pwalugu (Upper Region), all the industries recommended during this period are located in urban areas. Most are located in the Accra-Tema (Eastern Region), Kumasi (Ashanti) and Takoradi (Western Region).

It was also alleged that, during this period, in order for Prime Minister Nkrumah to satisfy opposing ethnic or regional groupings, or even to favor those supporting him, industries and other services were located according to a political criteria. Gitelson (1972) has observed that this strategy has been practiced by other African leaders, such as Uganda's Obote.

Consolidation Plan 1958-1959. The Consolidation Plan drawn during this period overlapped both five-year periods into which the 1951-1961 Ten-Year Plan had been broken. Its design was to provide a review of the first five-year plan and additional funding for those projects which could not be completed during the first five years. Despite conscious efforts to diversify; the emphasis on social overhead remained obvious--the Department of Communication and Works together

were allocated nearly one half (49 percent) of the planned expenditure. Unlike the other plans, expenditures in this plan were broken down by departments and not sectors of the economy.

In 1958 just after independence W. Arthur Lewis was invited to draft the Consolidated Plan after studying the industrial possibilities in Ghana earlier on in 1953. His conclusion was that no major industrialization program was justifiable at that time, but he did put forward a number of proposals which would set in motion the prerequisites necessary for industrialization.[2] Most of his proposals were implemented and it was evident that the Nkrumah government made every effort to diversify the economy by setting in motion the necessary underpinnings for industrialization. Accordingly, about one-half of the planned expenditures were allocated to building roads, inland waterways, electricity and the Tema and Takoradi seaport Townships. (See Table 10). The Plan's policies therefore resulted in a clear urban bias. In terms of a spatial bias, most of these developments were to take place in the Western, Central and Eastern Coastal Regions.

Second Five-Year Development Plan 1959-1964. This Development Plan was a follow-up to the First Five-Year Development Plan and the Consolidated Plan. The Second Five-Year

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[2] For a detailed discussion of these recommendations, see, for example Kay (1972:88-89).

Development Plan recognized the importance of the agricultural

sector as well as the need for industrial development. Its

objective was not different from the First Five-Year Plan

and it stressed the provision of physical and economic in-

frastructure. One pitfall was its focus on individual projects

(See Table 11), foregoing coherence and coordination among the

projects planned for the period. Likewise, no consideration

was given to the spatial aspects of the many projects planned.

A glaring example of this is the inequitable distribution of

secondary schools developed under the Ghana Educational Trust

scheme. One result of the uneven location of these schools,

relative to the distribution of population, is that students

have to travel long distances to attend a secondary school.

Other priorities of the plan included developing es-

sential services like power and water (See Table 11), still

to encourage a strong basis for further industrialization.

As part of this strategy, provisions were made for the de-

velopment of both agriculture and industrial complexes. The

Second Five-Year Development Plan was operational for only

three years. It was halted for a number of reasons, though

primarily because it lacked the form and precision of a na-

tional physical plan and had no physical planning staff work-

ing out a continuing program (Nez, 1962:19).

In response to this a national physical development

plan was produced with technical help from the United Nations

in 1962. Unlike the Consolidated Plan, policies of the Second

TABLE 11

SUMMARY OF PLANS AND THEIR PRIORITIES

Plans	PRIORITIES			
	First	Second	Third	Fourth
1. Guggisberg Ten-Year Development Plan	Railways & Inland Waterways	Ports & Harbours	Public buildings	Roads
2. Ten-Year Plan of Development for the Gold Coast 1946-1956	Infrastructure	Education	Health & Sanitation	Electricity
3. Ten-Year Plan for the Social Development of the Gold Coast 1951-1961	Communications	Social Services	Economic & Production services	Common services
4. First Five-Year Development Plan 1951-1956	Roads	Education	Tema Harbor	Railway & Inland Waterways
5. Consolidation Plan 1958-1959	Tema Harbour	Education	Roads	Takoradi Township
6. Second Five-Year Development Plan 1959-1964	Tema Harbour	Industry & Mining	Volta Lake Project	Defense
7. National Physical Development Plan 1962	(Bridge the gap in development between areas)			
8. Seven-Year Development Plan 1964-1970	Industry & Mining	Agriculture forestry & fishing	Education	Roads
9. Two-Year Development Plan 1968-1970	Utilities— Public Works	Transport and Communication	Education	Agriculture
10. One-Year Development Plan 1970-1971	Utilities— Public Works	Administration	Agriculture	Banking, Trade etc.
11. Five-Year Development Plan 1975-1980	Agriculture	Transport & Communication	Utilities— Public Works	Education

Source : Compiled by author

Five-Year Plan resulted in a rural bias because it sought to de-emphasize the concentration of employment and economic facilities in the coastal regions.

National Physical Development Plan 1962. The National Physical Development Plan was a one-year plan and its main principle according to Nez (1962:30) was to "bridge the gap between the first form of cash economy which benefits only a few places, and the poor subsistence economy which prevails everywhere else." This was to be achieved through combined economic, social and physical planning. More precisely, through a dispersal of human activities, industrial and agricultural instruments, planned utilities and housing, in a balanced framework. It was claimed such a dispersal would ensure the benefits of development to the majority of the population. Thus, for the first time in Ghana's history of development planning, there was explicit consideration of its spatial aspects. This consideration was designed to bridge the gap between quantity and level of services in various areas of the country through careful location of human activities. This plan was never fully implemented because it was superceded in 1964 by the Seven-Year Development Plan.

Seven-Year Development Plan 1964-1970. In many respects, the Seven-Year Development Plan (1964-1970) was regarded as superior to the earlier plans and the most comprehensive of the plans drawn thus far. It was comprehensive in that it

provided programs for both private and public (government)
sectors. The emphasis was on the modernization of agriculture
and the promotion of industrial activity, relying heavily on
import substitution. In its initial stages the country's in-
dustrial activity had relied on imported raw materials with
serious implications for Ghana's foreign exchange services.
It was hoped that by the end of the period, firm foundations
would have been laid to transform the country into a self-
reliant industrial giant in Africa. As part of this trans-
formation, Ghana was to have been turned into a socialist
society, as Nkrumah explicitly states in the forward to the
Seven-Year Development Plan.[3]

The importation of raw materials to feed the various
industries in the country had taken substantial proportions
of foreign exchange reserves and limited the capability of
the country to import other important items not locally avail-
able. For example, the country could no longer import basic
food items like milk, sugar and flour, in large quantities
and these items became scarce. The country had become so
dependent on these imported items that people began to ques-
tion how the economy was being handled. Scarcity of these
items and low industrial output resulted in inflation and the
government's attempts to import goods in large quantities re-
sulted in balance of payment problems. These events and the

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[3]For a discussion of socialist development in Ghana
during the period, see Folson (1977).

threat of socialism prompted some military officers, with outside help, to stage a military take-over in 1966. On assumption of office, the military, as the National Liberation Council, abandoned the Seven-Year Development Plan and in 1968 introduced the Two-Year Development Plan, 1968-1970. Between 1966 and 1968, the economy was managed without the guidance of a formal development plan (Ghana, 1968:1A).

The Seven-Year Development Plan had as its main objective the modernization of agriculture and therefore its policies reflected an emphasis on the rural areas.

Two-Year Development Plan, 1968-1970. This plan was in preparation for a future comprehensive plan. Its main purpose was to stimulate economic, social and cultural progress to improve the general standard of living. This was to be achieved, "in a manner compatible with human dignity based on equity and full employment" (Ghana, Ibid). Other aims of the plan included national income growth through a sustained high rate of development. Thus, public works, transport and communication, education and agriculture were all priorities during the two-year plan period. Expenditures for each of these activities are summarized in Table 12.

The plan also aimed for a more equitable distribution of income between regions, rural development and a diversification of the monocultural economy. Despite these grand aspirations, problems of unemployment, foreign debt, run-away inflation, and low agricultural productivity lingered as real

TABLE 12

EXPENDITURES BY SECTOR UNDER GHANA'S DEVELOPMENT PLANS 1970-
1980 (¢000's)*

Sector	Two-Year Developmetn Plan 1968-1970		One-Year Development Plan 1970-1971		Five-Year Development Plan 1975-1980	
Agriculture	7,977	(11.8)	12,300	(10.8)	999,066	(25.5)
Transport & Communication	14,138	(20.9)	6,000[a]	(5.3)	345,950	(21.6)
Manufacturing Industry	3,934	(5.8)	6,900	(6.0)	166,648	(4.3)
Mining	7,200	(10.7)	4,200	(3.7)	355,020	(8.5)
Forestry	196	(0.3)	700	(0.5)	59,800	(8.5)
Game & Wildlife	---	(----)	---	(----)	19,081	(0.5)
Education	10,421	(15.4)	10,200	(8.9)	496,257	(12.6)
Manpower & Employment	---	(----)	---	(----)	33,421	(0.8)
Health	1,604	(2.4)	4,200	(3.7)	119,339	(3.0)
Housing	6,536	(9.7)	5,900	(5.2)	290,541	(7.4)
Social Welfare	700	(1.0)	9,300[b]	(3.1)	17,963	(0.5)
Utilities	14,804[c]	(21.9)	23,900[d]	(20.9)	541,663	(13.8)
Economic Sector[e]	---	(----)	12,000	(10.5)		
Administrative Sector	---	(----)	18,600[f]	(16.3)		
Grand Total	67,510	(100.0%)	114,200	(100%)	3,924,749	(100.0%)

*$1 = ¢2.75

[a]Communication

[b]Culture and Sports, Water and Sewerage, Youth and Rural Develop-
ment.

[c]Water and Sewage

[d]Public Works Department

[e]Includes Banking, Trade, Electricity, Volta River Authority,etc.

[f]Includes Ministry of Works, and Housing, Information, Justice,
Office of Prime Minister, Defense, Etc.

Sources: Ghana, Republic of. Two-Year Development Plan From
Stabilization to Development. Accra-Tema, State
Publishing Corporation, July 1968, pp.105-107.
                              . One-Year Development Plan.
July 1970 to June 1971. Accra-Tema, State Publishing
Corporation, September 1970, p.24-25.
                              . Five-Year Developmetn Plan 1975/76-
1979/80. Accra, Ministry of Economic Planning, January,
1977, p.iii

threats to economic stabilization which is a pre-requisite to development.

There were subtle indications of the spatial aspects of these proposals in the 1968-1970 Plan but they were never explicitly stated. The Plan's emphasis on rural development was explicitly stated and was seen as a way of bridging the rural-urban disparities in development.

Until this time, only one of the nine plans had made any reference to the distribution of the country's development and its spatial dimensions. Even that plan became a bookshelf document and was never implemented. Thus far, the country's strategies of development (See Table 11) had reflected the requirements of the economy at different points in time. The results of these strategies are the various physical artifacts of development which are predominantly visible in the southern section of the country. No major developments took place in the country outside these areas, where there were no exploitable resources in large quantities. In a way, the history of regional or spatial inequality in development has its origin in this pattern of development.

One-Year Development Plan 1970-1971. When the Busia government took over from the National Liberation Council in 1969 the One-Year Development Plan 1970-1971 was launched as a continuation of the previous 1968-1970 Two-Year Development Plan. This is one of the few instances of a new government continuing the policies of an earlier regime. The One-Year

Plan called for, "using the resources at its (the country's) disposal for stimulating and promoting sustained growth of the economy in order to increase the productive capacity of the economy and the job opportunities for our citizens." (Ghana, 1970:iii). One reason for accelerating the nation's economic growth and social development was to ensure that the benefits of such developments "accrue in an equitable fashion to all sections of the population and to all regions." (Ghana, 1970:v). One of the plan's major emphases was rural development because the government had become sensitive to inequities in the distribution of income and employment opportunities, not to mention access to various services. Planners argued that since 60 to 77 percent of the people live in rural areas, any developmental strategy which fails to include these would be unsuccessful. Among the problems hindering rural development was an absence of functionaly viable small and medium-sized towns in rural areas where farmers could have access to markets, resources and services they needed.

World inflation, high energy costs, rising prices of manufactured imports and other factors weakened the national currency and it was subsequently devalued. Among the consequences were inflation, shortages of basic items and a lack of development funds. Finally, the army once again took over in 1972, under the name of the Supreme Military Council. In 1975, the Council launched the Five-Year Development Plan for 1975-1980.

Five-Year Development Plan 1975-1980. Under this plan,
the Supreme Military Council emphasized self-reliance and
increases in food and agricultural production, industry and
trade. Agricultural programs such as "Operation Feed Your-
self" and "Operation Feed Your Industry" emerged during this
period. In addition, the plan argued that if such increases
were to be distributed to all Ghanaians, the plan needed to
be "supported by effective support services and a wide spread
of social services." (Ghana, 1977:vi). It was hoped that the
latter would ensure that the benefits of development would be
equitably distributed to improve the quality of life of all
the people. These proclamations were followed in 1975 with
a set of guidelines which specified how the goals of the plan
were to be achieved. These guidelines are well discussed in
Ghana (1975).

For the first time in the country's development plan-
ning history the plan's goals were translated into spatial
terms. The government saw regional planning as a means through
which it could ensure that it's policies of social justice
and equitable distribution of the benefits of development are
achieved. Its spatial policy objectives, among others, were
expressed as follows:

> To progressively reduce the present disparities
> in the levels of development and standards of
> living existing between the regional centers
> and urban areas, also gradually between regions,
> and within regions of Ghana;
>
> To evolve a rational system and criteria for a
> fair distribution of social services and facil-
> ities based on the criteria of social justice
> and economic efficiency. (Ghana, 1975:46).

These were also seen as ways of developing the non-urban areas, increasing their accessibility to social services and reducing the primacy of the urban settlements, particularly Accra. This was to be made possible by developing "growth foci" across the country, from which growth could be transmitted to the nearby environs. The growth foci were a four-tier hierarchy of development centers as follows:

1. Growth Poles at the national level--for example, Accra, Kumasi and Sekondi-Takoradi. These were selected for their population concentration, infrastructure and economic activities.

2. Growth Centers at the regional level--Tamale was the only settlement proposed as a regional level growth center. The idea was that existing infrastructure and services would be upgraded to make Tamale the center of industrial and commercial activities for the northern part of the country.

3. Growth Points at the district level--A number of these were proposed for all areas of the country as strategic points in the development of agriculture and agriculture-related industries. These points were central places from which farmers could have access to services critical to increased agricultural production.

4. Development Service Centers at the local and village levels--These were to be located in areas of intensive agriculture to complement the district growth points. Equivalent to rural service centers,they are points from which various developmental impulses will "trickle down" to the remote parts of the country. This approach to development recognizes the spatial pattern that has been created and attempts to bring about more balanced spatial development.

After the National Redemption Council, subsequent changes in government--from the Supreme Military Council to the Armed Forces Revolutionary Council and lastly President Limann's civilian government--did not change the proposals in the 1975-80 Five-Year Development Plan. The foregoing governments ruled for relatively short periods of time and were unable to formulate new development Plans. The present government, National Defence Council, has also ruled for too short a time to develop a plan document. It can, therefore, be assumed that the Five-Year Development Plan of 1975-1980 still guides national development.

Summary

The foregoing overview of Ghana's development planning has shown that between 1920 and 1975, eleven plans were formulated. Each of these plans emphasized different priorities (See Table 11), which reflected the requirements of the national economy at different points in time. In emphasizing the different sectoral objectives, the spatial aspects of these plans were neglected. One result of this was to worsen a pattern of development in favor of the coastal regions. The pattern concentrated most industries, economic opportunities, and social facilities in the coastal regions. Thus the concentration of population and the relatively well developed infrastructure in the coastal regions were simply reinforced by most of the plans after the Guggisberg Plan. In most respects,

the inequities in subsequent development can be understood from the foregoing framework.

Attempts to redress the problems of regional inequalities in development have been interrupted by the frequency with which the administration of the country changes hands, on the average once every three years (See Table 13), and a lack of continuity from one plan to another.

To what extent has the 1975-1980 Plan been able to reduce rural-urban imbalances or regional inequalities in development? In other words, to what extent has development been transmitted from the national growth poles through the regional growth center, district growth points and finally to the development of service centers? How effective has this strategy of growth centers been in reducing regional disparities in development? Chapter Five is devoted to an analysis of this question.

TABLE 13

POST-INDEPENDENCE ADMINISTRATIONS OF GHANA

Head of State	Period	Administration
Dr. Kwame Nkrumah	1957-1966	Convention Peoples' Party
Lt. Gen. J.A. Ankrah	1966-1969	National Liberation Council
Dr. K.A. Busia	1969-1972	Progress Party
Col. I.K. Acheampong	1972-1975	National Redemption Council
Col. I.K. Acheampong	1975-1978	Supreme Military Council
Lt. Gen. F.K. Akuffo	1978-1979	Supreme Military Council
Flt. Lt. J.J. Rawlings	1979-1979	Armed Forces Revolutionary Council
Dr. Hilla Limann	1979-1981	Peoples' Nationalist Party
Flt. Lt. J.J. Rawlings	1982-Present	National Defence Council

CHAPTER FIVE

ANALYSIS OF REGIONAL INEQUALITY IN GHANA

Introduction

This chapter is concerned with an analysis of data
on the distribution of development benefits, and has four
objectives. A description of the pattern of inequality in
Ghana constitutes the first objective, a description to be
undertaken by using socio-economic indicators and location
quotients. The second objective is to test the hypothesis
of "change in the pattern of development" by assessing the
extent to which regional inequalities have changed. This
second objective will be achieved by using the maximal scal-
ing technique, a graph of attributes and number of settle-
ment, and Chi-square tests. In a final section the third
objective of uncovering any causal relationships with in-
equality will be accomplished with the aid of correlation
analysis. In this section also, a final objective will be
to draw specific conclusions from the analysis about how de-
velopment benefits have been transmitted from national and
regional growth centers to surrounding settlements.

Measurement and Distribution of Inequality

Data for this section were collected from documentary sources which provided information on all the indicators used. Most of these sources were government documents or similar materials published by international agencies such as the United Nations and the U.S. Agency for International Development.

In measuring the level of development of one region relative to other regions, socio-economic indicators of development were used as surrogate measures as used by de Graft-Johnson (1975), Rao (1975) and Ewusi (1977b). No "ideal" set of indicators was recommended by any particular study. The choice of indicators was determined by, in most cases, availability of data. For any study area the choice of different sets of indicators may lead to differences in levels of regional development. In the present study, indicators for which data are readily available, and which are closely related to the goals of Ghana's development planning as expressed in the various plans, are used. Table 14 is a list of indicators used in this study.

In using these indicators to measure levels of regional development, and hence inequalities or disparities, the magnitude of an indicator or the concentration of facilities is simply correlated with a level of development. Depending on the indicator being considered, the highest or the lowest regional values are assumed to represent the areas of greatest

TABLE 14

DEVELOPMENT INDICATORS USED IN MEASURING REGIONAL INEQUALITY

Indicators	Operational Variables
Population	-Dependency Ratio -Percent of Urban Population -Inter-regional Migration with Region as Destination -Crude Death Rate
Education	-Literacy Rate Among Those 15 Years and Over
Health	-Population Per Hospital -Population Per Physician -Population Per Hospital Bed -Population Per Nurse
Housing and Environment	-Proportion of Population With Access to Potable Water Supply
Transport and Communication	-Accessibility Index -Vehicles Per 1,000 People

development. For example, in using percent of urban population or literacy rates per 1,000 population, the highest regional measurement is assumed to have a value of 100 percent. Alternatively, the lowest values of certain indicators such as dependency ratio would refer to the most developed region.

When considering the concentration of facilities, a location quotient is used to assess a region's level of development with respect to equality. Regional inequality in this instance is defined as the distribution of services or facilities in proportion to population distribution. A location quotient is, therefore, an index of locational concentration whose value is computed by applying the following relationships: the region's percent share of a variable magnitude, say hospitals, divided by the region's percent share of a base magnitude such as population.* In using this

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*Algebraically, the relationship is:

$$LQ_i = \frac{\dfrac{Vi}{\Sigma Vi}}{\dfrac{P_i}{\Sigma P_i}}$$

Where LQ_i = Location Quotient for region i.

Vi = Variable magnitude for region i.

Pi = Base magnitude for region i, its population.

relationship, the assumption is made that various facilities and social services, such as hospitals will be distributed according to the spatial distribution of population. For example, an index of unity simply means that a region's share of the nation's hospitals is proportional to its share of the population. An index of less than unity would mean a less than proportional share of hospitals and a value of more than unity would mean a disproportionately large concentration of hospitals. The indices will indicate the concentration of facilities in various regions from which regional disparities can be inferred.

A composite index of regional development is obtained by adding each region's score on each of twelve indicators. The results obtained are then standardized by transforming to a value of 100% the highest composite score. These standardized scores are then used to measure and describe the pattern of inequality. It should be pointed out that the twelve indicators were not weighted. They were simply used in the manner de Graft-Johnson (1975) and Ewusi (1977b) employed in measuring levels of regional development. Had other types of data been available different results would have been obtained.

Table 15 indicates the relative levels of regional development obtained by using the list of socio-economic indicators presented in Table 14. It may be seen from Table 15,

TABLE 15

LEVELS OF REGIONAL DEVELOPMENT IN GHANA

Region	Crude Death Rate Per 1,000 [1]		Urbanization Ratio [2]		Inter-regional migration with region as destination [3]		Dependency Ratio [4]		Proportion of Population who have never attended school [5]	
Western	15	(53.3)	27.0	(31.6)	27.4	(64.9)	57.0	(100.0)	46.7	(68.9)
Central	19	(42.1)	28.5	(33.3)	12.7	(30.1)	58.4	(97.6)	51.3	(62.8)
Greater Accra	8	(100.0)	85.5	(100.0)	42.2	(100.0)	57.0	(100.0)	32.2	(100.0)
Eastern	17	(47.1)	24.5	(28.7)	16.3	(38.6)	60.2	(94.7)	41.4	(77.8)
Volta	18	(44.4)	16.0	(18.7)	7.5	(17.8)	61.2	(93.1)	47.0	(68.5)
Ashanti	18	(44.4)	30.0	(35.1)	19.2	(45.5)	60.6	(94.1)	44.6	(72.2)
Brong Ahafo	19	(42.1)	22.0	(25.7)	23.9	(56.6)	59.0	(96.6)	56.6	(56.9)
Northern	24	(33.3)	20.5	(24.0)	9.5	(22.5)	68.9	(82.1)	86.8	(37.1)
Upper	26	(30.8)	7.0	(8.2)	4.4	(10.4)	69.9	(81.5)	83.3	(38.4)

Sources: Compiled from various sources, for details, see Appendix 2.

Figures in parenthesis refer to relative level of development in percent.

TABLE 15 (Cont.)

Region	Proportion of hospitals/proportion of population[1]	Population per physician[2]	Population per hospital bed[3]	Population per Nurse[4]	Percent Population with access to potable water supply[5]	Accessibility Index[6]	Vehicles for 1,000 people[7]
Western	0.96 (74.4)	13,052 (48.7)	1,000 (29.0)	2,258 (42.2)	49.80 (55.1)	11.9% (28.9%)	137 (17.6%)
Central	0.99 (76.7)	55,633 (11.4)	1,351 (21.5)	3,273 (29.1)	51.06 (56.5)	33.7 (81.8)	61 (7.8)
Greater Accra	1.04 (80.6)	6,355 (100.0)	290 (100.0)	925 (100.0)	90.35 (100.0)	41.2 (100.0)	779 (100.0)
Eastern	0.99 (76.3)	45,759 (14.1)	968 (30.0)	4,005 (23.8)	30.74 (41.8)	22.2 (53.9)	47 (6.0)
Volta	1.01 (78.3)	155,722 (4.1)	725 (40.0)	4,066 (23.4)	40.64 (45.0)	17.5 (42.5)	44 (5.6)
Ashanti	1.29 (100.0)	188,996 (3.4)	886 (32.7)	6,073 (15.7)	39.71 (44.0)	17.1 (41.5)	165 (21.2)
Brong-Ahafo	0.88 (68.2)	163,876 (3.9)	1,519 (19.1)	8,710 (10.9)	39.91 (44.2)	7.2 (17.5)	38 (4.9)
Northern	0.92 (71.3)	142,801 (4.5)	1,643 (17.1)	3,292 (28.9)	40.68 (45.0)	8.5 (20.6)	42 (5.4)
Upper	0.60 (46.5)	1,107,840 (0.6)	1,209 (24.0)	5,426 (17.5)	36.13 (40.0)	10.5 (25.5)	15 (1.9)

that with the exception of the "proportion of hospitals per

share of population," the Greater-Accra Region is the most

developed region when these indicators are used as surrogate

measures of development (Refer to Figure 1 for a map of the

regions). This exception may be explained by a rather high

number of private hospitals in Ashanti (See Appendix 1),

that demonstrate the private entrepreneurial abilities of

the Ashantis which have been documented by Niculescu (1956).

Table 15 also indicates that the Upper Region is the

least developed region on eight out of the twelve socio-

economic indicators used to measure regional development.

The level of development in the other seven regions shows

little consistency, varying when different indicators are

used. Thus, the only discernible patterns in Table 15 are

the trends exhibited by the Greater-Accra and Upper Regions,

which are consistently shown as the most developed and least

developed regions, respectively.

Table 16 is a composite index that summarizes the twelve

different development measures for each of the nine regions.

It may be seen that the most developed region, Greater-Accra,

has a level of development nearly twice that of the second

most developed region, the Western Region.

The spatial distribution of these levels of regional

development reveals that the two regions furthest from the

coast in the northern section of the country have low levels

TABLE 16

LEVELS OF REGIONAL DEVELOPMENT AS DETERMINED BY THE
COMPOSITE INDEX

Region	Composite Index	Level of Regional Development (%)
Western	614.6	12.1%
Central	550.7	10.8%
Greater Accra	1180.6	23.2%
Eastern	533.6	10.5%
Volta	481.4	9.47%
Ashanti	549.8	10.8%
Brong Ahafo	455.9	8.97%
Northern	391.8	7.71%
Upper	325.3	6.40%
TOTAL	---	100.0%

of development (See, Figure 4). The coastal regions appear
to be moderately and well developed. Any relationship be-
tween distance from the coast and level of development will
be fully investigated later in this Chapter. However, the
pattern of development benefits revealed in Figure 4 could
partially reflect spatially discriminatory policies adopted
in the country. Various developments initially introduced
in the southern part of the country, such as education, have
not been quickly diffused to the north.

Perhaps the largest difference between the composite
scores in Table 16 can be attributed to Accra's primacy. It
could also demonstrate that successive post-independence govern-
ments have not been able to significantly alter the basic de-
velopment pattern initiated by the colonial government. Re-
gions initially developed for administrative and commercial
purposes (i.e., the Greater-Accra Region), and those developed
in exploiting huge deposits of various minerals (i.e., the
Western Region), still receive a more than proportionate
share of national development benefits.

It may be argued that this method of determining level
of development is rather simplistic and too general. A bet-
ter measure takes distribution into consideration by assessing
the proportion of individual facilities to which a given pro-
portion of the population has access. Either a location quo-
tient or a gini coefficient can be used to facilitate such a
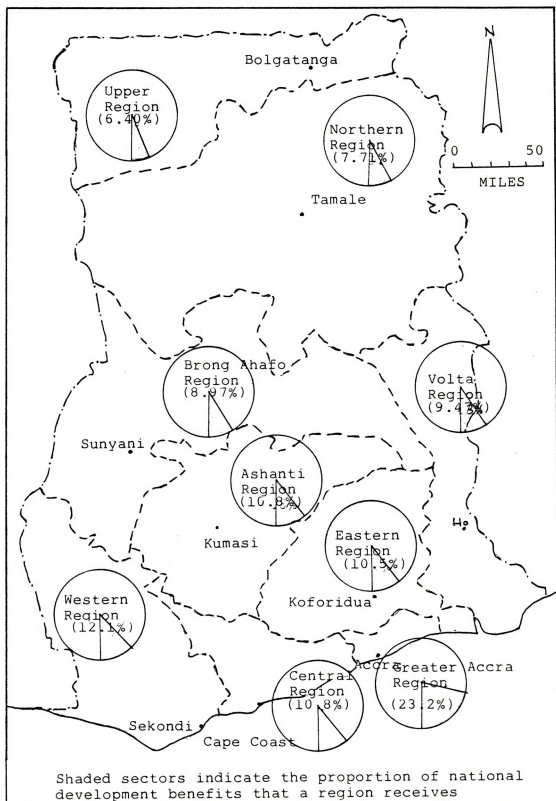
FIGURE 4:   SPATIAL DISTRIBUTION OF REGIONAL DEVELOPMENT
            BENEFITS

measurement in relation with an ideal distribution. An ideal distribution is perceived as one in which a given percentage of the population have access to, or possess, the same proportion of the facilities or services under consideration.

The value of a gini coefficient can vary between zero and unity (or one hundred percent). A value of zero would indicate a pattern of distribution in which segments of the population have equal access to all facilities. A value of unity, conversely, would indicate a situation of complete inequality in which only a small proportion of the population have access to, or possess, all facilities. The first may indicate a "perfectly uniform" distribution meaning proportionality with population distribution, and the latter, a "total clustering" of development and population.

Table 17 is a summary of the various development indicators and their respective gini coefficients and Figure 5 shows the variables defining the range of these coefficients. The Table shows the wide variation in the distribution of these indicators in Ghana. Their concentration ranges from a low of 14.28 percent to a high of 64.11 percent. It is also evident from Table 17, that, with the exception of physicians and vehicles per 10,000 people which are heavily skewed, all the indicators are fairly well distributed among the regions. Because of the varying sensitivity of these

TABLE 17

GINI COEFFICIENTS FOR SELECTED DEVELOPMENT INDICATORS

Indicator	Gini Coefficient (%)
Crude death rates	21.54
Urbanization rates	34.50
Internal migration rates	39.87
Dependency ratios	14.28
Illiteracy rates	26.01
Hospitals	18.46
Population per physician	64.11
Population per hospital bed	27.06
Population per nurse	27.89
Percent population with access to potable water supply	31.08
Vehicles per 10,000 people	61.32
Accessibility Index	29.86

NOTE: See Appendix 3 for an example of the calculation of the Gini coefficients.
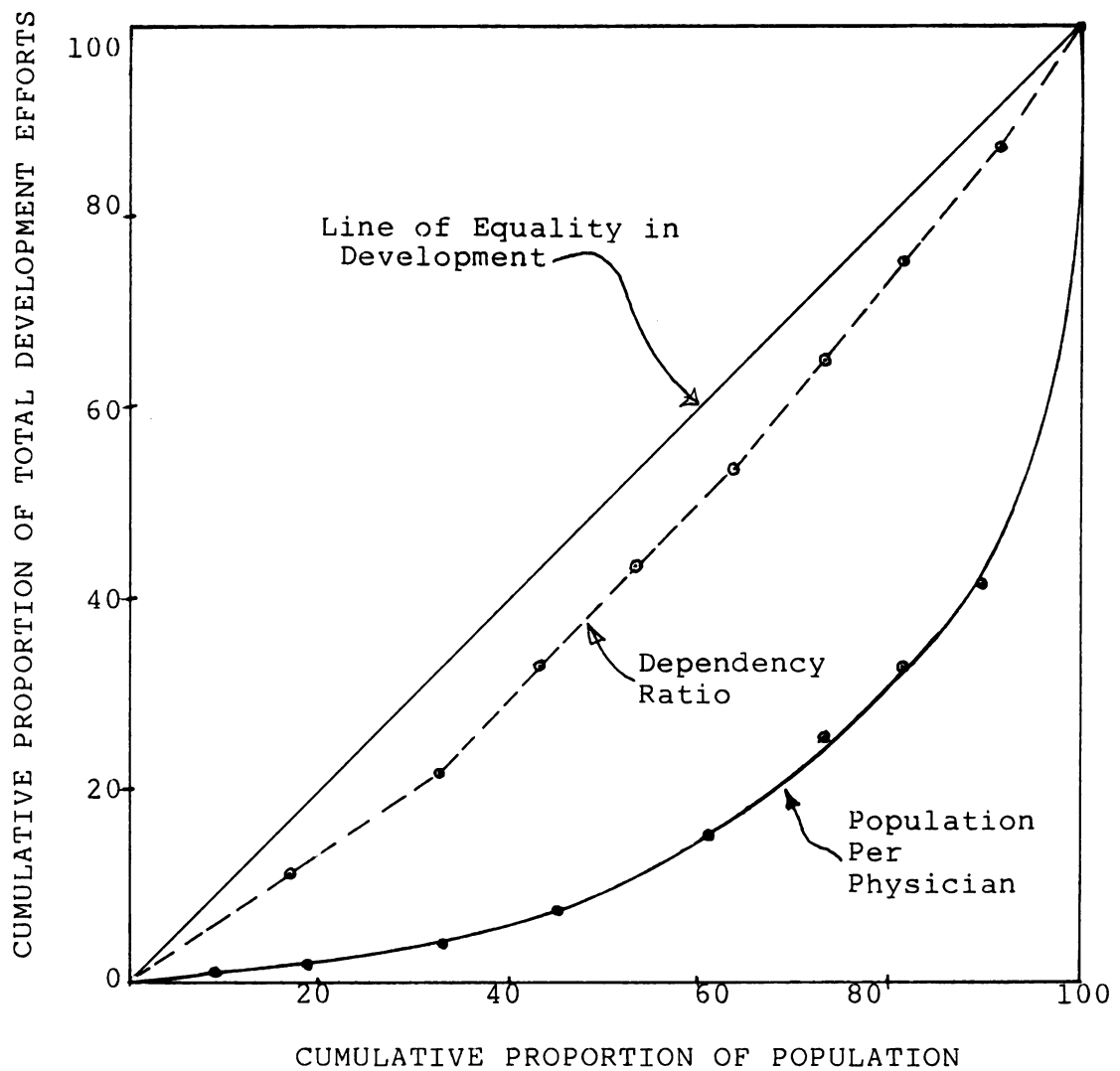
FIGURE 5: RANGE OF DISTRIBUTION OF REGIONAL DEVELOPMENT
INDICATORS IN GHANA

indicators to levels of development, it will be difficult to describe the overall distribution of these development indicators. One way of describing their overall distribution could have been to use descriptive statistics such as mean, mode, and median values of the gini coefficients in Table 17. However, this would have required some weighting which would be almost an arbitrary or subjective task.

Some measures of development are more sensitive as indicators of development than others. For example, population per physician is a more sensitive measure of development than say dependency ratio or crude death rate for that matter. The latter two can hardly be considered as measures of development, even on a national scale, because they are subject to a host of cultural, environmental and structural conditions of the area. Thus, the various gini coefficients in Table 17 should be interpreted independently.

It will be seen from Table 17 that sensitive indicators, such as population per physician, reflects the existence of wider disparities in regional development than less sensitive indicators such as dependency ratios. Despite the difficulty in obtaining a clear picture of inequalities in the distribution of development in Ghana, Table 17 establishes that there are extremes of regional inequalities depending on the development dimension being considered and shows that for most cases, although the distribution of development benefits is

not equitable it is less severe than it was expected (as
most gini coefficients are less than 40.0 percent).

Having described the basic patterns of inequality,
it will be fruitful to assess the extent to which these pat-
terns have changed since 1960. By assessing this change it
will also be possible to assess the extent to which growth
centers in Ghana have succeeded in transmitting development
benefits to nearby settlements.

Assessing the Changing Patterns of Inequality

If data were readily available, a simple way of assess-
ing changing patterns of inequality would be to replicate
the foregoing analysis for two or three time periods and
then use techniques such as multivariate and shift share
analysis. However, this is not possible because of their
data requirements. Instead, a maximal Guttman scaling tech-
nique which requires only binary data is used.

This study uses the presence or absence of certain
services and facilities at three points in time--1960, 1970
and 1980--to assess the changing nature of regional inequal-
ities in development and test the study's hypothesis. The
1960 data were obtained from Grove and Huzsar (1964) who
provided information on two hundred and fifty-five settle-
ments and twenty-six facilities and services. The settle-
ments were those which had at least one of the services or
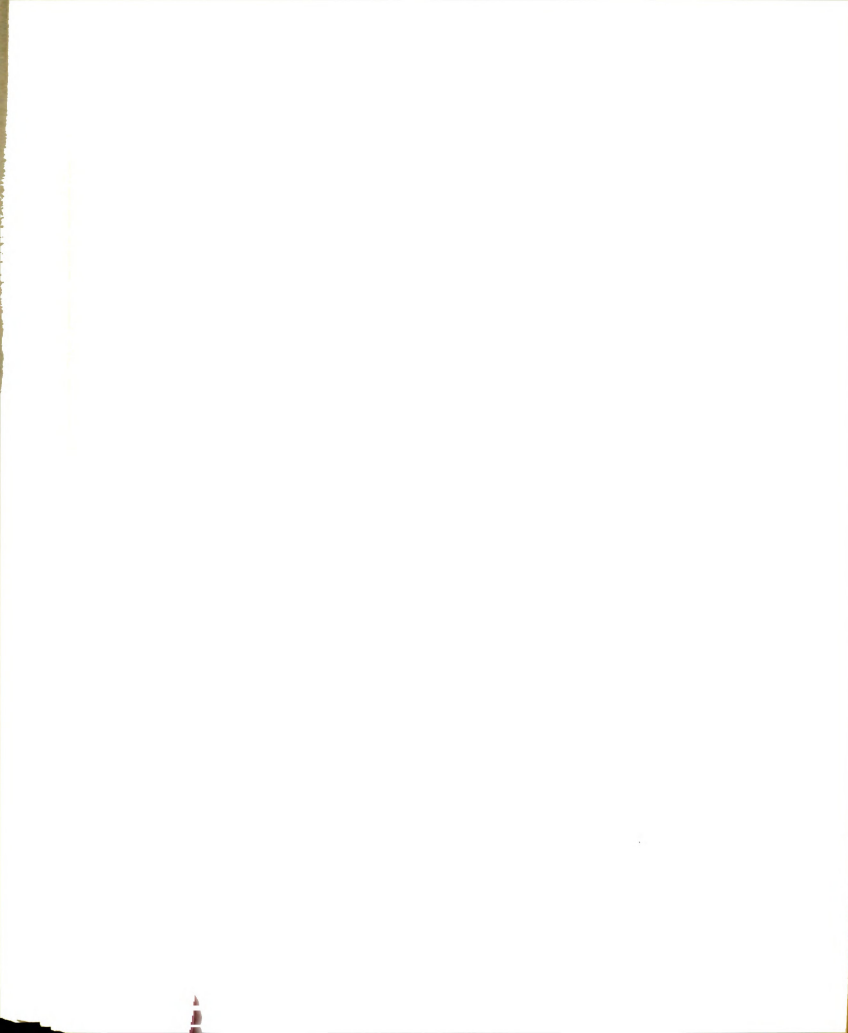
facilities listed in Table 18 in 1960. Figure 6 shows
the locations of some of these settlements. Similar data
for the same number of settlements, but a wider range of
thirty-nine services and facilities for 1970 and 1980 were
obtained from mailed questionnaires (See Tables 19 and 20).
These services and facilities were selected from Grove and
Huzsar's (1964) study in Ghana and a more comprehensive list
used by Voelkner (1974) in Thailand.

A packet containing a cover letter, which explained
the type of data being sought, together with an appropriate
response form, were mailed to each of the nine regional plan-
ning offices in Ghana. (See Appendix 4 through 6 for samples
of two letters and the form used in data collection). Simi-
lar packets were sent to each of the nine regional town plan-
ning offices, in case responses to the first set of letters
were too low. Two completed forms from each region for 1970
and 1980 were the minimum data required for the analysis to
proceed. Response rates of about 56% and 67% were obtained
from the regional planning and regional town planning offices,
respectively. These were combined to provide the minimum data
required for analysis.

Although there was no absolute certainty on the ac-
curacy of information received from the various offices,
the information on the returns was cross-checked against
similar information from the 1976 Ghana Telephone Directory.
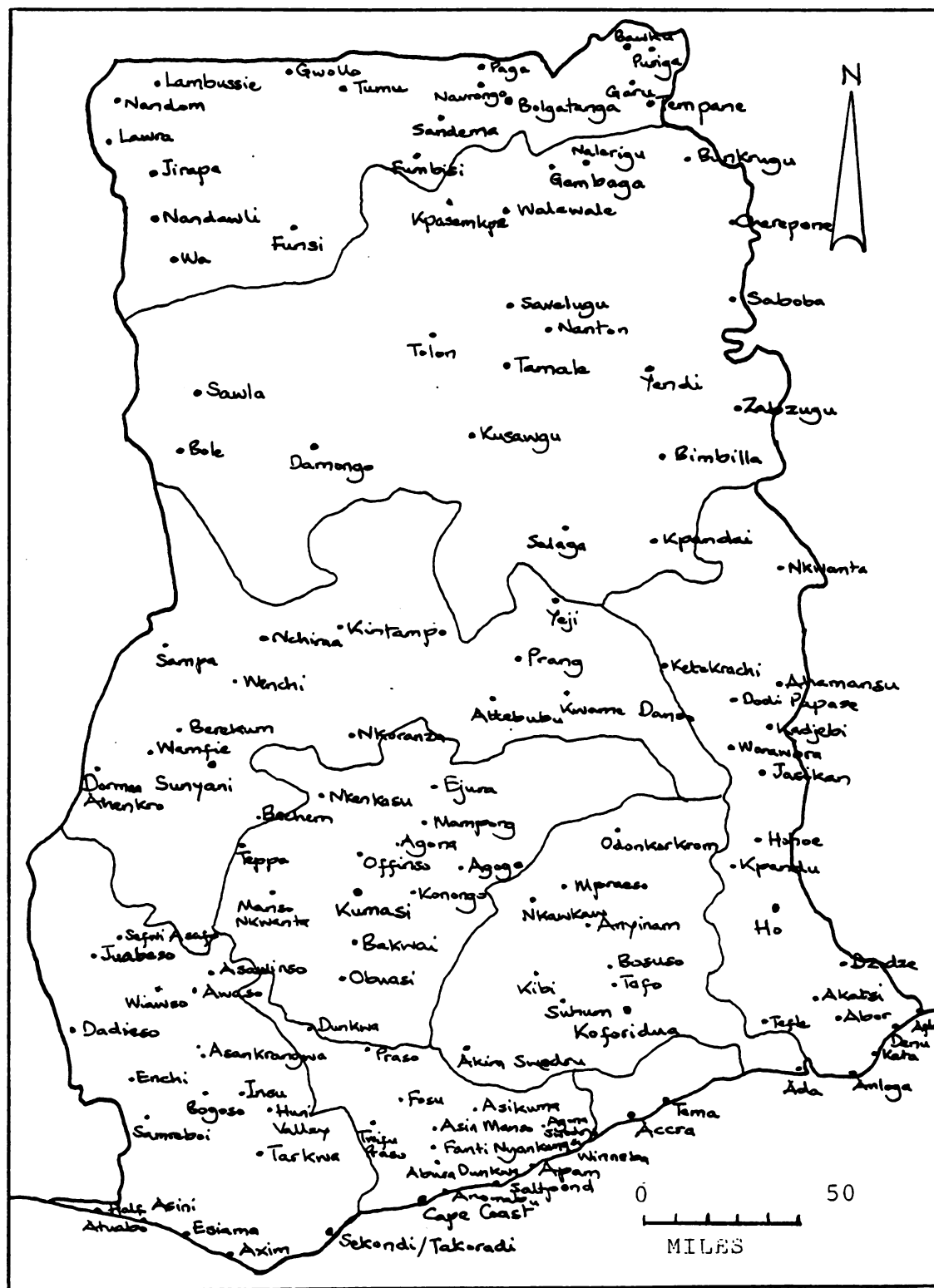
FIGURE 6: LOCATIONS OF SOME OF THE SAMPLED SETTLEMENTS

TABLE 18

LIST OF SERVICES ON WHICH 1960 DATA WERE COLLECTED

	Service or Facility	Proportion of Towns With Service
1	Postal Agency	83.1%
2	District Commissioner	59.6
3	Police Post	57.6
4	Police Station	53.3
5	Post Office	50.9
6	Rest House	48.6
7	Petrol Station	44.0
8	Local Court	41.5
9	U.A.C. Wholesale	39.0
10	Health Center	37.6
11	Main Road Junction	35.6
12	General Hospital	25.0
13	Secondary School/Training College	24.0
14	Barclays Bank	16.8
15	Government Treasury	15.6
16	Bank of West Africa	13.0
17	Electricity	12.9
18	Police District Headquarters	11.7
19	Railway Station	11.7
20	Commercial Bank	11.7
21	Service Station	9.0
22	U.A.C. District or Branch Office	8.6
23	Hotel or Catering Rest House	5.4
24	Telephone Exchange (24 Hours)	5.4
25	Public Library	5.4
26	Municipal Bus Service	5.0
27	Airstrip	3.5
28	Regional Commissioner	3.5
29	Specialist Hospital	2.3
30	Sea or River Port	1.5
31	Airport	1.5
32	University or University College	1.0

SOURCE: Survey Questionnaire

TABLE 19

LIST OF SERVICES ON WHICH 1970 DATA WERE COLLECTED

	Service or Facility	Proportion of Towns With Service
1	Police Post	90.2%
2	Local Market, Daily	86.6
3	Post Office	71.0
4	Police Station	70.5
5	Postal Agency	67.0
6	Local Market, Periodic	58.8
7	Rest House	54.5
8	Petrol Station	51.7
9	Piped Borne Water Supply	47.8
10	Local Produce Buying Center	45.8
11	Electricity for Domestic Use	45.7
12	G.N.T.C.,U.A.C. Wholesale Outlet	44.7
13	Health Center	44.3
14	Bank	39.6
15	Local Produce Storage Center	37.6
16	Secondary School	37.2
17	Main Road Junction	36.8
18	Health Post	34.9
19	Police District Headquarters	30.1
20	Local Court	29.4
21	Local Radio Relay Station	29.4
22	G.N.T.C., U.A.C. District/Branch Office	29.0
23	District Administrative Office	28.2
24	Hospital	25.0
25	Government Treasury	17.2
26	State Transport Station	15.6
27	Telephone Exchange (24 Hours)	14.9
28	Post-Sec., N.T.C., Polytechnic etc	12.1
29	Other Wholesale Outlet for Imported Goods	12.1
30	Service Station	10.9
31	Railway Station	10.5
32	Municipal Bus Service	7.8
33	Hotel	7.8
34	Public Library	7.0
35	Airstrip	3.5
36	Regional Administrative Office	3.5
37	Sea or River Port	2.0
38	Airport	2.0
39	University	1.2

SOURCE: Survey Questionnaire

TABLE 20

LIST OF SERVICES ON WHICH 1980 DATA WERE COLLECTED

	Service or Facility	Proportion of Towns With Service
1	Police Post	99.6%
2	Postal Agency	85.9
3	Police Station	81.6
4	Local Market, Daily	81.2
5	Local Market, Periodic	75.7
6	Post Office	74.9
7	Piped Borne Water Supply	63.9
8	Health Post	61.1
9	Electricity for Domestic Use	60.4
10	Rest House	54.9
11	Local Produce Buying Center	52.5
12	Petrol Station	51.4
13	Health Center	46.3
14	G.N.T.C.,U.A.C. Wholesale Outlet	46.3
15	Bank	45.1
16	Secondary School	40.8
17	Main Road Junction	38.4
18	Local Produce Storage Center	38.0
19	District Police Headquarters	37.6
20	G.N.T.C.,U.A.C. District or Branch Office	34.9
21	Local Court	34.9
22	State Transport Station	32.2
23	Local Radio Relay Station	31.4
24	District Administrative Office	30.6
25	Hospital	28.2
26	Government Treasury	18.0
27	Telephone Exchange (24 Hours)	16.1
28	Post-Sec.,N.T.C., Polytechnic etc	16.1
29	Public Library	13.3
30	Municipal Bus Service	12.9
31	Other Wholesale Outlet for Imported Goods	12.2
32	Service Station	11.8
33	Railway Station	11.0
34	Hotel	10.2
35	Regional Administrative Office	3.5
36	Airstrip	3.5
37	Airport	2.0
38	Sea or River Port	2.0
39	University	1.2

SOURCE: Survey Questionnaire

This was particularly useful in checking the 1980 information because it was assumed that listings for agencies performing certain functions in a settlement in 1976 were indicative of those agencies' presence in the settlement in 1980. While a service listed in the <u>1976 Ghana Telephone Directory</u> could have been terminated after 1976, such terminations of services are assumed to be the exception rather than the rule.

<u>Analysis of Data</u>. The 1960, 1970 and 1980 data on the presence or absence of certain services were analyzed to determine the interrelationships of these services and to see if the variables meet the special conditions or properties which determine a Guttman scale.

The data on the presence or absence of the various services in Tables 18 through 20 were summarized in three matrices (See Appendices 7, 8 and 9). These matrices consisted of settlements ordered according to the frequency of ones with the maximum at the top and services or facilities also ordered with the maximum at the extreme right. If the data were to form perfect scales then the materials which represent these data would be such that for each year there would be a distinct pattern of seperation between the ones and zeros. The ones indicate the presence of a service and a zero indicates the absence of a service. All services were treated equally, irrespective of scale of facility and range

of services offered, because the version of scalogram analysis used in this study does not enable any form of weighting. However, the scale line is useful to identify various clusters or hierarchies of settlements from which an idea of scale of various facilities can be inferred.

From Appendices 7, 8, and 9 it is apparent that none of the matrices form a perfect scale making it necessary to measure the extent to which they approximate the ideal pattern of separation between the ones and zeros. Every deviation from the ideal matrix or pattern is counted as an error and the accumulated errors help determine whether the data satisfy the conditions through the use of standard coefficients.

For the conditions of unidimensionality and cumulativeness to be met these coefficients which include the coefficients of reproducibility and scalability should have values of 0.9 and 0.6, respectively. Other coefficients which do not have any minimum standards include minimum marginal reproducibility and percent improvement.

By using these two minimum standards to evaluate the scale of development of the 255 settlements, it will be seen from Table 21 that conditions are met for each of the three time periods. The coefficients are well above the recommended minimum values. To assess the changing patterns of inequality and the extent to which development has been transmitted from the growth centers to other settlements, a Guttman scale

TABLE 21

SUMMARY OF STANDARD COEFFICIENTS FOR GHANA'S
STRUCTURAL ATTRIBUTES

Coefficients	1960	1970	1980
Coefficient of reproducibility	0.9263	0.0843	0.9922
Minimum Marginal reproducibility	0.7062	0.9049	0.9471
Percent Improvement	0.2201	0.0794	0.0451
Coefficient of Scalability	0.7492	0.8351	0.8519

was constructed using the three data matrices. The scale
line was constructed by drawing a continuous vertical and
horizontal line on each of the three matrices so that they
separate the ones and zeros as shown in Appendices 7, 8 and
9. These lines are called scale lines and the development
score for each settlement is the number of zeros and ones
behind these lines to the right.

The scale lines for 1960, 1970 and 1980 are made up
of fourteen, eighteen and fifteen steps, respectively. These
steps help identify clusters of settlements that are at the
same level of development. If these settlements and their
respective levels of development are classified and isoline
maps drawn from these scores it is possible to detect regional
inequalities in development in Ghana, their changing patterns
and, hence, the transmission of development.

Classification of settlements into development ranges.
Tables 22 through 24 are summaries of these classifications
which were determined by identifying clusters of settlements
along the scale lines. Where there are only small differ-
ences in development scores between two consecutive clusters
of settlements along the scale line, they are combined to
form a cluster which can easily be differentiated from other
clusters.

It will be seen from Table 22 that in 1960, 124 or 49
percent of the 225 towns had the lowest development level score
(0-7). Surprisingly, of the 124 settlements at the lowest

TABLE 22

FREQUENCY DISTRIBUTION OF SETTLEMENTS AND THEIR LEVEL OF
DEVELOPMENT FOR 1960

Development Score Range[1]	R E G I O N S[2]								Total
	01	02	03	04	05	06	07	08	
0-7	13	16	27	19	13	10	10	16	124
8-11	11	9	12	9	8	6	7	3	65
12-15	2	3	9	3	4	4	2	1	28
16-20	2	2	3	3	2	3	1	2	18
21-26	1	2	4	1	2	0	0	2	12
27-32	1	1	2	0	2	1	1	0	8
33-38	0	0	0	0	0	0	0	0	0
More than 38	0	0	0	0	0	0	0	0	0
TOTAL	30	33	57	35	31	24	21	24	255

NOTE:

1. This refers to the Guttman Scale Values

2. These codes refer to the following regions:

    01 - Western; 02- Central; 03- Eastern including Greater
    Accra; 04- Volta; 05- Ashanti; 06- Brong Ahafo; 07-
    Northern; and 08- Upper.

TABLE 23

FREQUENCY DISTRIBUTION OF SETTLEMENTS AND THEIR LEVEL OF
DEVELOPMENT FOR 1970

Development Score Range[1]	R E G I O N S[2]								
	01	02	03	04	05	06	07	08	Total
0-7	13	15	19	9	6	4	9	15	90
8-11	0	0	1	0	0	0	1	0	3
12-15	3	9	8	11	5	7	6	0	49
16-20	6	2	7	6	8	3	1	1	34
21-26	3	3	11	5	5	5	2	1	35
27-32	2	2	4	2	2	2	1	3	18
33-38	2	2	6	2	4	3	1	3	23
More than 38	1	0	1	0	1	0	0	0	3
TOTAL	30	33	57	35	31	24	21	24	255

NOTE:

1. This refers to the Guttman Scale Values

2. These codes refer to the following regions:

    01-Western; 02-Central; 03-Eastern including Greater Accra;
    04-Volta; 05-Ashanti; 06-Brong Ahafo; 07-Northern; and
    08-Upper.

TABLE 24

FREQUENCY DISTRIBUTION OF SETTLEMENTS AND THEIR LEVELS OF
DEVELOPMENT FOR 1980

Development Score Range[1]	REGIONS[2]								
	01	02	03	04	05	06	07	08	Total
0-7	9	5	4	6	4	3	9	14	54
8-11	5	7	17	6	5	6	2	5	55
12-15	3	8	5	5	2	4	4	0	31
16-20	4	5	6	6	8	1	0	0	30
21-26	6	3	14	7	5	7	4	2	48
27-32	1	2	6	3	2	2	1	3	20
33-38	1	1	4	2	4	1	1	0	14
More than 38	1	0	1	0	1	0	0	0	3
TOTAL	30	33	57	35	31	24	21	24	255

NOTE:

1. This refers to the Guttman Scale Values

2. These codes refer to the following regions:

   01-Western; 02-Central; 03-Eastern including Greater Accra;
   04-Volta; 05-Ashanti; 06-Brong Ahafo; 07-Northern; and
   08-Upper.

level of development, 60 percent of these were located in
regions which have coastlines--Western, Central, Eastern and
Volta Regions. Nineteen percent (19 percent) of the 124 set-
tlements were located in Ashanti and Brong Ahafo Regions and
the remaining 21 percent were located in the Northern and
Upper Regions. Also of interest is that about 50 percent of
all settlements in the lowest category of development are in
regions with rich agricultural and mineral resources: Ashanti,
Eastern, Western and Central Regions. This may seem to under-
mine the assumption that areas of rich mineral deposits and
intensive agriculture are also highly developed. It is a re-
flection of the pattern of settlement distribution in Ghana.
There are more settlements in the southern part of the coun-
try than in the northern parts and most of them included in
the 255 settlements are at a rudimentary stage of development.

It is also apparent from Table 22 that in each region
there are fewer settlements in the higher development score
ranges. In each of the development ranges, coastal regions
tend to have more settlements than either Ashanti and Brong
Ahafo together or the Northern and Upper Regions combined.
What is equally true is that, at each level of development,
there are more settlements in Ashanti and Brong Ahafo Regions
than in the Northern and Upper Regions. The foregoing obser-
vations may reflect the distribution of natural resources and,

perhaps, a bias inherent in the way development benefits are distributed.

To what extent is a settlement's level of development independent of the region in which it is located? In other words, does a settlement's regional location affect its level of development? If this is shown to be the case then one implication could be that there may be a bias in the distribution of development benefits. Such a bias could be regarded as a barrier to the transmission of development from the growth poles to nearby settlements. On the other hand, if a settlement's level of development is shown to be independent of its regional location than it could be said that there is no locational bias in the distribution of development benefits and no barriers to the transmission of such benefits. The foregoing is investigated using a chi-square (goodness-of-fit) test.

Testing independence between settlements' level of development and their regional locations. A chi-square test was performed to test independence between the development score or level of development of the various towns and their regional locations. Results of the test indicate that, in 1960, at a significance level of 0.05 the sample does not provide sufficient evidence to reject the hypothesis of independence, an indication that perhaps a settlement's level of development is independent of its regional location. Thus

it may be concluded that in 1960, just after independence, a town's range of services and facilities was not likely to have been influenced by its regional location. A town's level of development during this period could have been influenced by other factors such as its production capabilities and hence the nature of investment of foreign capital. The latter was involved in market-oriented activities and therefore favored large urban agglomerations such as Accra, Kumasi and Sekondi-Takoradi where there was a concentration of services. Apart from this, another factor that explains the pattern of development during this period, especially the concentration of services in these centers, was the attitude of the colonial administration. The latter focused on the provision of services for government personnel, administrative and mining centers and areas of colonial exploitation.

The distribution of the various settlements in each of the regions at the various stages of development in 1970 and 1980 follow the basic pattern exhibited by the 1960 data except that as the development range increases, the number of settlements in each class of a region does not necessarily decrease (See Tables 23 and 24). The highest number or proportion of settlements in the higher ranges of development scores are found in the coastal regions, Volta, Eastern, Central and Western, with the Ashanti and Brong Ahafo Regions a

distant second. In 1970 and 1980 the Northern and Upper
Regions had the fewest settlements in the higher ranges of
development scores. Surprisingly, these two regions do not
contain the greatest proportion of settlements in the lowest
range of development scores. The coastal regions still have
the highest proportion of settlements in this range, followed
by the Northern and Upper Regions and Ashanti and Brong Ahafo
Region. Again, this is a reflection of the pattern of settle-
ment distribution in Ghana.

Chi-square tests performed on the 1970 and 1980 data,
unlike 1960, indicate that a significance level of 0.05, the
sampled settlements provide sufficient evidence to reject the
hypothesis of independence between levels of development in
the respective settlements and their regional locations (See
Appendix 13). Since the hypothesis of independence has been
rejected for these latter time periods, it can be concluded
that currently a settlement's level of development is influ-
enced by its regional location. This could be an indication
of the existence of barriers to the transmission or diffusion
of development benefits and a possible bias in regional de-
velopment over the years.

The low level of transportation development in the
Northern and Upper Regions, as has been noted earlier, may
be one of such barriers to the diffusion of development bene-
fits. Other factors such as political patronage, environmental

constraints and accidents of history, which have resulted
in a skewed industrial location policy, may all be regarded
as barriers to the successful transmission of development
benefits. Given the existence of these factors it is plau-
sible to argue that the basic pattern of development in Ghana
has not changed during the post-independence periods. The
latter, which is also the study's hypothesis, is tested as
follows.

Testing the study's hypothesis. Table 25 is a summary
of the percentage of settlements in each of the three ecolo-
gical ranges and level of development regions. The latter
were defined by dividing the range of development scores for
each year into three equal classes so as to make comparisons
easier.

Figure 7 shows the number of settlements with a given
number of services or attributes. It can be seen that between
1960 and 1980, even though there were changes in proportions
of towns within each of the development categories, such
changes were rather small and did not exhibit any discernible
pattern. This is further demonstrated by comparing the slopes
or gradients of plots for 1960, 1970 and 1980 which were -5.01,
-2.53 and -3.21, respectively. With these slopes genereally
on the "increase", the curves can be said to be flattening
out. This means that, on the average, more settlements are
gradually increasing the number of development attributes or

TABLE 25

CHANGING PERCENTAGE OF SETTLEMENTS AT THE VARIOUS STAGES OF DEVELOPMENT IN THE REGIONS

Level of Development	Coastal			Forest			Savannah		
	1960	1970	1980	1960	1970	1980	1960	1970	1980
Depressed	61.0	61.3	58.6	19.0	16.8	15.5	20.0	21.9	25.9
Developing	62.0	66.7	63.0	24.0	27.3	28.0	14.0	6.0	9.0
Developed	58.0	56.7	61.1	26.0	29.9	22.2	16.0	13.4	16.7

NOTES:

1. The Coastal Region is made up of Western, Central, Eastern and Volta Regions.

2. Ashanti and Brong Ahafo Regions form the Forest Region.

3. Northern and Upper Regions make up the Savannah Region.

FIGURE 7: RELATIONSHIP BETWEEN NUMBER OF SETTLEMENTS AND NUMBER OF ATTRIBUTES
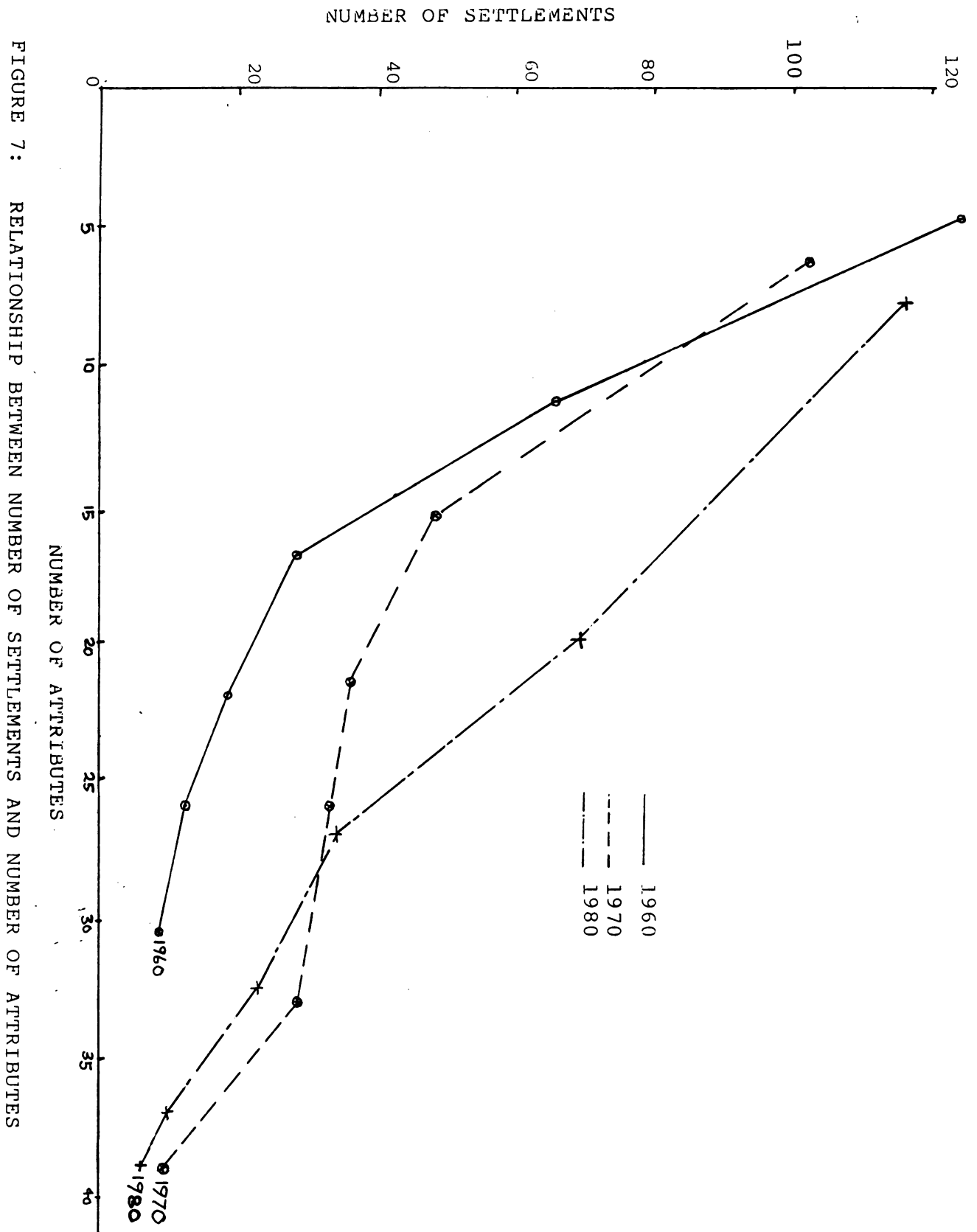
services they possess. In some ways this indicates a gradual spread of the benefits of development from the growth centers to the surrounding areas. In a way this supports Hager-strand's assertion (Haggett:1979) that an innovation tends to appear near the place where the innovation already exists, and that with increasing distance from this center the like-lihood of seeing the innovation decreases.

Table 26 sheds some light on Hagerstrand's thesis, but with some modification, showing that in the coastal re-gions where development was initially introduced, there is a high average rate of increase in development attributes. As one moves away from the coastal regions to Ashanti and Brong Ahafo Regions, the average rate of increase in development attributes increase slightly. This slight increase, instead of an expected decrease, can be attributed to the rich agri-cultural and mineral base of the Ashanti and Brong Ahafo Re-gions which indicates that perhaps regional development bene-fits are distributed according to each region's resource base or degree of economic activity. The Northern and Upper Re-gion, being further inland and with the least intense econ-omic activity, had the lowest average rate of increase in development attributes.

The foregoing discussion has established that, in gen-eral terms, as one moves from the coastal regions to the Northern and Upper Regions, the rate of increase in development

TABLE 26
RATE OF CHANGE OF REGIONAL STRUCTURAL ATTRIBUTES*

Region	1960	1970	1980	Average Rate of Change**
Western, Central Eastern and Volta	1457.5	2367	2709	1.32×10^{-5}
Ashanti and Brong Ahafo	573.5	1003.6	914	1.52×10^{-5}
Northern and Upper	384.5	590	534	0.94×10^{-5}

*Figures refer to regional development scores.

**Adjusted for population.

attributes decreases. Thus, in general, regions in the southern parts of the country are likely to receive the benefits of development more rapidly than the Northern and Upper Regions.

What this discussion on regional diffusion of development in Ghana does not address is the effectiveness of growth poles or centers of development in transmitting development to surrounding settlements over time. Does development in Ghana start from individual centers and spread outward or simply take place in a hierarchical manner? Answers to this question will help evaluate the effectiveness of growth poles in transmitting development, and thereby reducing regional inequalities.

Assessing the Effectiveness of Growth Poles

To evaluate the effectiveness of growth poles in transmitting development benefits, "development contours" were drawn for 1960, 1970 and 1980. The spatial diffusion of development was then inferred from these maps and used as a surrogate index of effectiveness.

The foregoing was accomplished in a series of steps. First, a base map of Ghana was obtained, its outline traced and defined by a set of 325 points. The sampled settlements were located on the outline map next and the X and Y coordinates of both sets of points were determined using a digitizer and the MSU 6500 computer. Finally, these coordinates

were used with development scores obtained from the scale
lines to run a SYMAP program, from which development con-
tour or surface maps were extracted using the program's
interpolation routine.

Figures 8, 9 and 10 represent the development sur-
faces or contours for 1960, 1970 and 1980, respectively.
From Figure 8 it is apparent the development surface is domi-
nated by about ten "peaks" most of which occur in the coastal
and forest areas. These centers include Accra-Tema, Sekondi-
Takoradi, Tarkwa-Prestea, Kumasi, Sunyani and Tamale. Secon-
dary peaks occur in areas like Wa, Yendi and Hohoe-Kpandu.
The Damongo-Wenchi strip, areas around Salaga, Yendi, Enchi
and Nkawkaw fall in the third category and may be considered
transitional zones between the "developed" and "developing"
areas. Large areas to the northwest and northeast of Tamale
present the largest concentration of least developed areas.
In general terms, it appears that the "developed" areas coin-
cide with areas of mineral exploitation and commercial or
early administrative towns.

Again, what is clear from this analysis is that while
the largest concentrations of least developed areas are mostly
located in the Northern and Upper Regions, there is an absence
of these concentrations along the coast. In fact the only
large concentration of least developed land occurs in an area
in the north-eastern section of the Western Region. It will
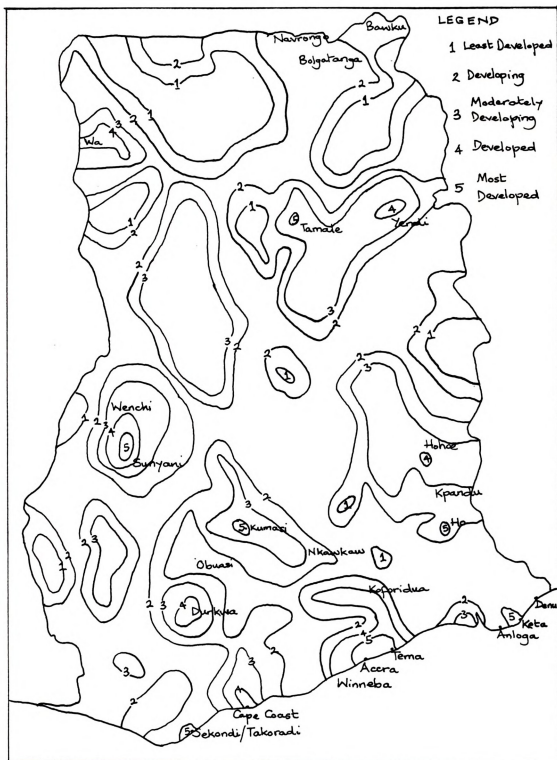
FIGURE 8: DEVELOPMENT SURFACE FOR 1960
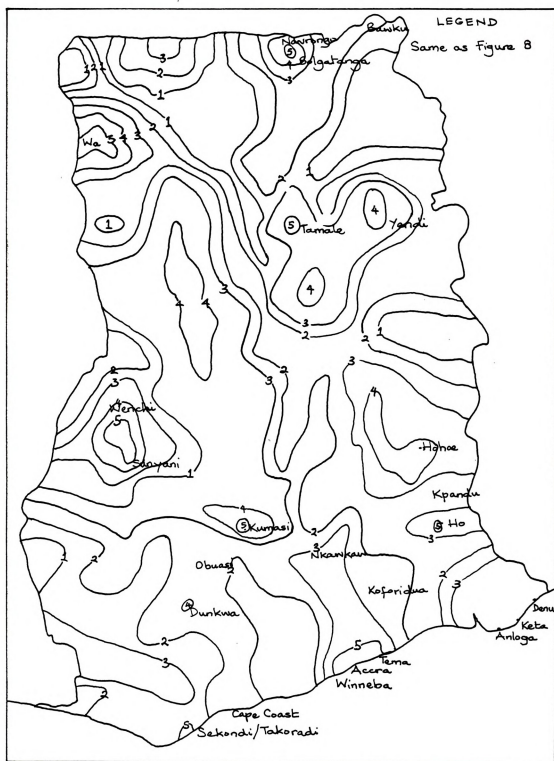
FIGURE 9: DEVELOPMENT SURFACE FOR 1970
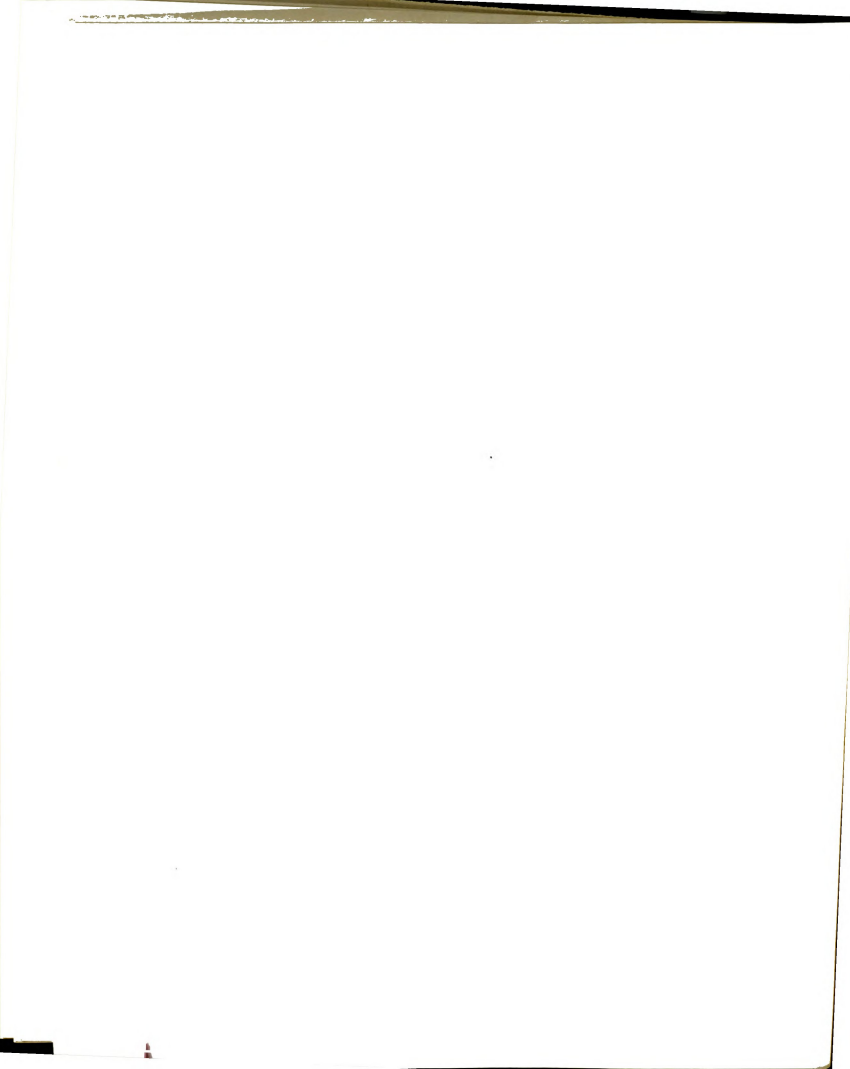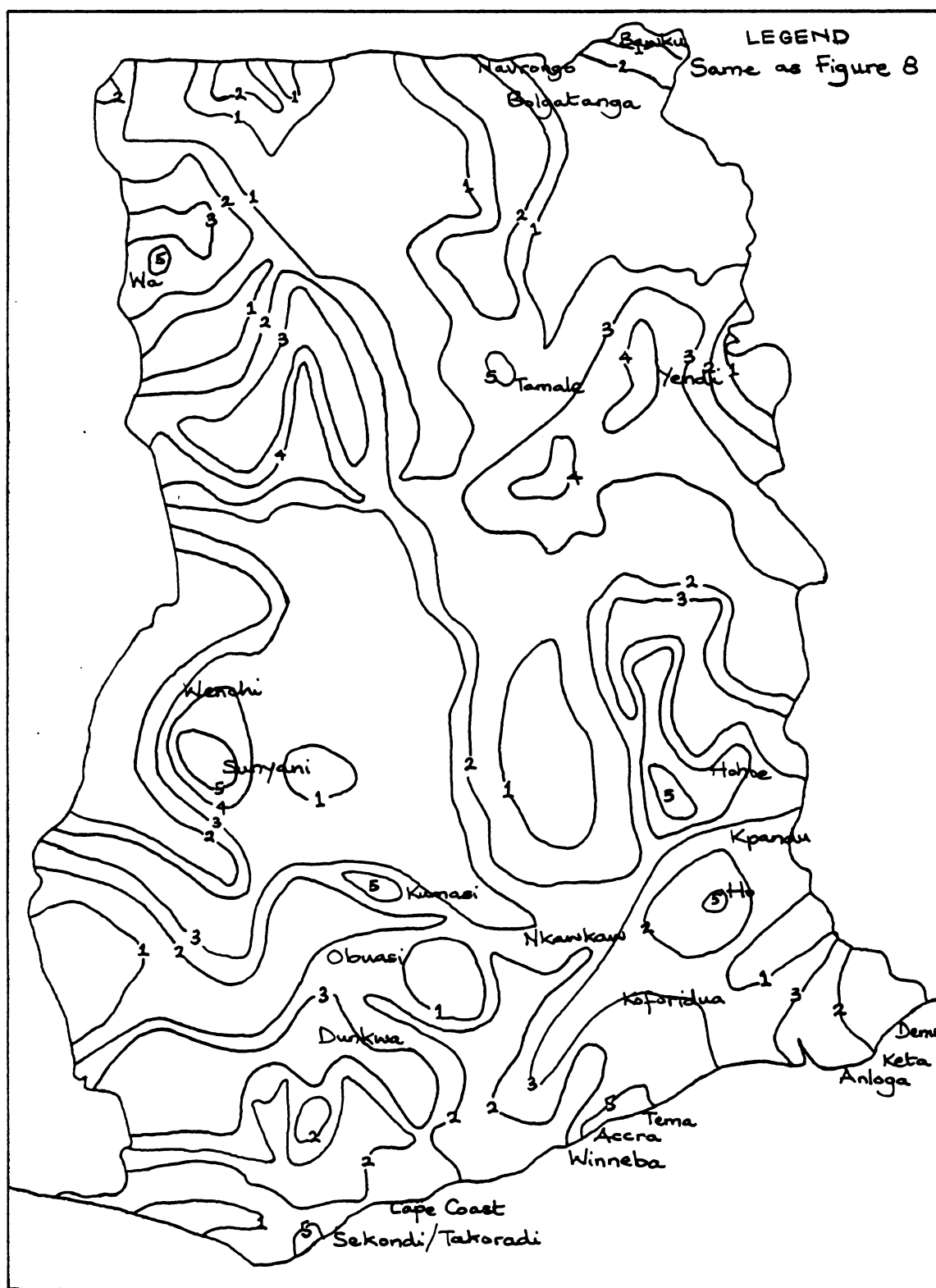
FIGURE 10:   DEVELOPMENT SURFACE FOR 1980

be seen that this pattern of development is fairly consis-
tent with results of earlier analyses of regional develop-
ment using socio-economic indicators and the classification
of settlements into the various categories of development.

The 1970 development surface (Figure 9) reflects
changes which occurred between 1960 and 1970. In addition
to the 1960 peaks identified earlier, Oda-Kade, an area
around Wa, Salaga, Hohoe-Kpandu-Jasikan, Mampong, Dunkwa and
an area around Sunyani appeared as secondary peaks (See
Figures 8 and 9) which can be associated with the emergence
of sub-regional centers in the various regions. Large sec-
tions of the Eastern and Western Regions, previously de-
scribed as being "least developed", moved into the third cate-
gory of development. Other large areas of "least develop-
ment" in the Northern and Upper Regions in 1960 saw no major
changes by 1970. The area from the Volta River to the border
town of Aflao along the east coast registered noticeable
changes. This latter development may be traced to abrupt
governmental enthusiasm for Volta River development whenever
this region threatens seccession to join the Republic of Togo.

Also evident from the development surfaces for 1960,
and to a limited extent for 1970, is that there are no large
areas of the country which can be defined as "developed".
The developed areas appear as isolated spots on the develop-
ment surface in places like Accra-Tema, Sekondi-Takoradki,

Kumasi, Sunyani and Koforidua. In 1970, Kumasi, Sunyani, Wa and their immedaite environs appeared to be peaks of the highest category of development (See Figure 9). However, it appears that as one moves away from these centers (generally in any direction) the probability of the existence of various development attributes decreases, confirming Hagerstrand's observation, that with increasing distance from the center of an existing innovation, the probability of the appearance of an innovation decreases.

A comparison of the 1970 and 1980 surfaces clearly illustrates that changes in development have occurred, especially in the coastal and forest regions. Many areas in these two regions have progressed to higher levels of development, indicating that diffusion of development has taken place. What is peculiar about all the three surfaces is that the areas lying north of Tamale and in the Upper and Northern Regions have remained almost unchanged with three exceptions. These exceptions are the Tamale-Yendi-Salaga section, the Wa environs and the area around Gollu. The large unchanged areas indicate that development is diffusing very slowly from the service centers in the Northern and Upper Regions. This may be attributed to a lack of well developed transportation networks within these regions, demonstrated by the fact that these two regions have low accessibility indexes compared to other regions (See Table 15). Lack of transportation and
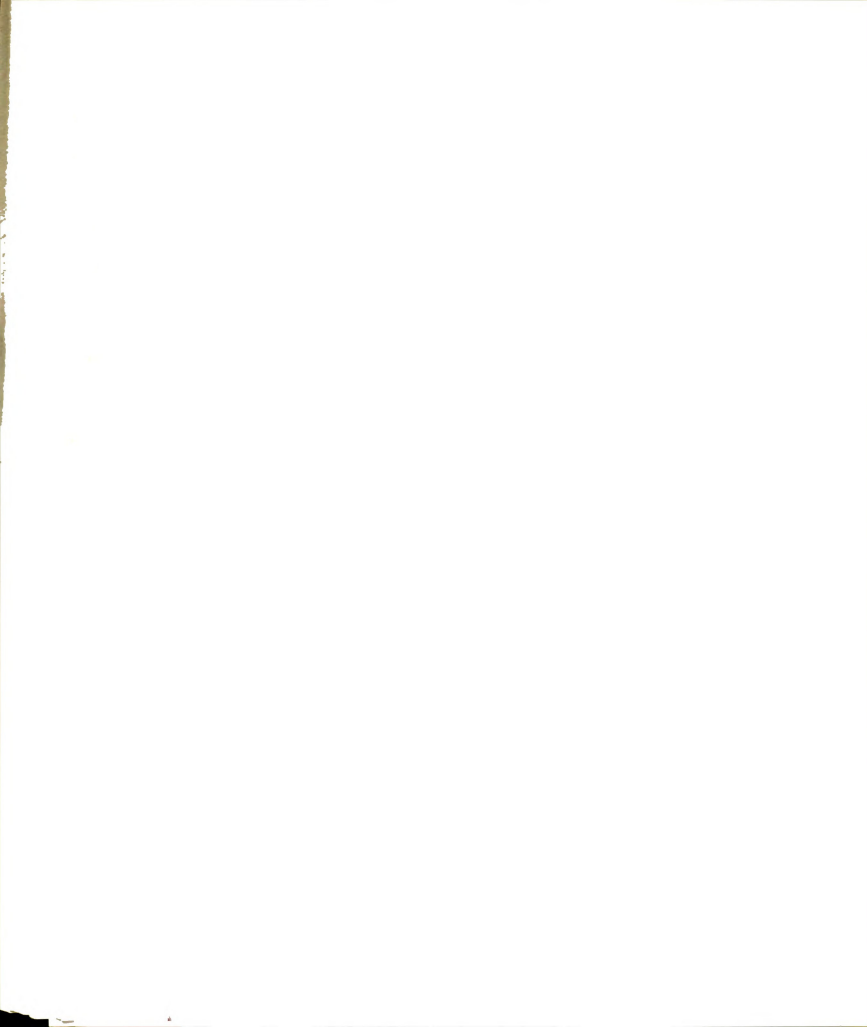
communication, therefore, appear to create barriers to the
rapid diffusion of development benefits in the Northern and
Upper Regions. This is not to suggest that in regions with
well developed transportation networks the growth centers
were effective in transmitting development benefits to sur-
rounding settlements. Apart from transportation development,
other factors such as politics, regional productivity, en-
vironmental constraints and accidents of history as discussed
earlier may also be viewed as obstacles to development in
the Northern and Upper Regions.

On a smaller scale the pattern of development illus-
trated by the three surfaces indicates a contagious form of
spatial diffusion of development. Sub-regional centers and
most settlements within their environs increased their num-
bers of development attributes during the study period. The
present study will assess whether these occurred as a result
of their proximity to various growth centers. Apart from
proximity there are equally important factors which can in-
fluence the number of development attributes a settlement
receives. It would, therefore, be erroneous to use the con-
tagious pattern of development evident from Figures 8, 9 and
10 to conclude that the growth poles were effective in trans-
mitting the benefits of development to nearby settlements.

The claim that the growth centers have succeeded in
transmitting development benefits to surrounding areas is
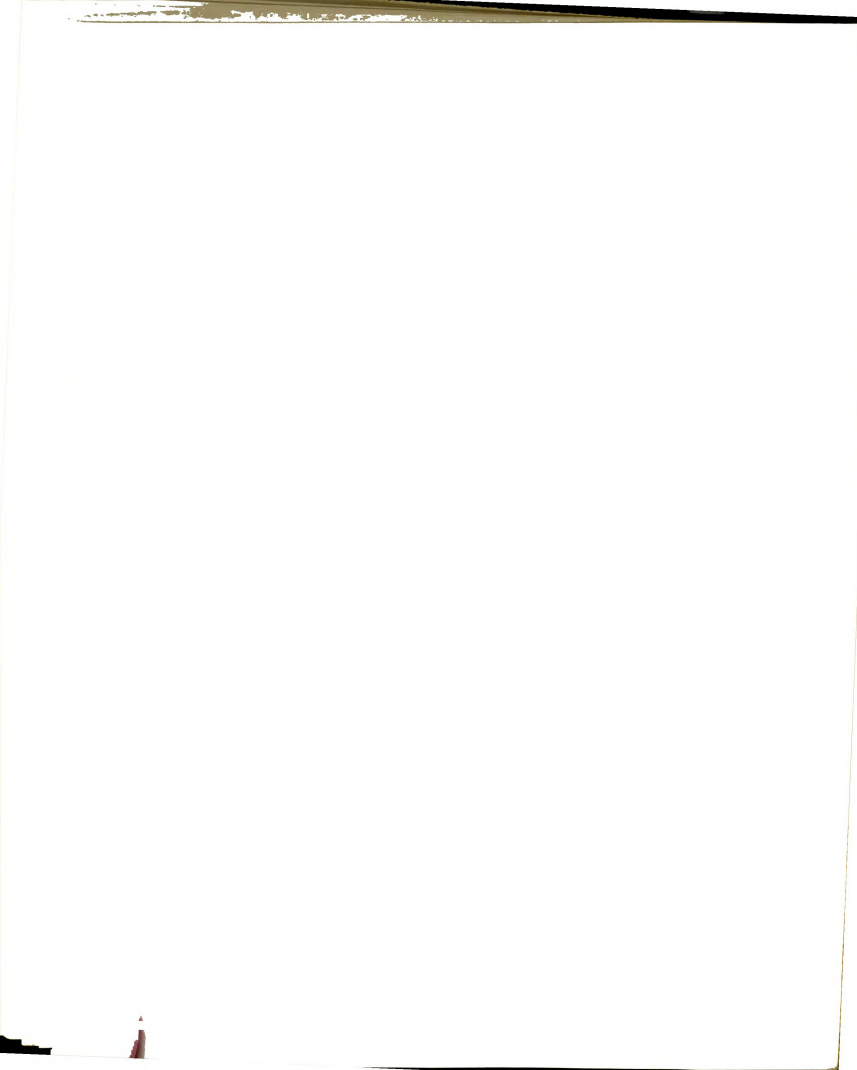
weakened by a national pattern of spatial distribution of these benefits that follows a hierarchical pattern, indicating the importance of other factors than proximity. Factors such as a settlement's population, its rate of population growth, and proportion of people in non-agricultural activities could conceivably influence a settlement's development score, the diffusion of development attributes and the effectiveness of the growth centers in transmitting development. If "proximity to nearest growth center" is shown to co-vary with settlement's "development score" an association can be inferred and, perhaps, it can be tentatively concluded that the growth center has been effective in transmitting development benefits. An investigation of this is presented.

Variations In Inequality or Development Scores

To determine and account for variations in development scores, which give an idea of inequality between settlements, a correlation analysis is used. This analysis will help explain variations in development scores of individual settlements and hence regional developmental inequality. The results of this anlaysis will also help determine if the growth centers were effective in transmitting development benefits.

Since population is a basic parameter on which most planning activities depend, it is plausible to expect that

a settlement's development score will vary with its population, with larger settlements being better developed than smaller settlements. A settlement's rate of population growth can also influence its level of development. In fast-growing settlements one would expect that efforts to cater to their expanding populations may result in the eventual development of these settlements. Another aspect of population which may influence a settlement's level of development is the percentage of the work force that are engaged in non-agricultural pursuits, a pointer to the the industrial composition of the settlement. Since industrial towns are known to be more developed than non-industrial towns, it is reasonable to expect that the larger the non-agricultural labor force, the more developed a settlement will be.

Hagerstrand's findings, in his study of central Sweden, seem to indicate the importance of distance in the spread of innovations. In a similar manner distance can also become important in the spread of development benefits with the probability of such benefits decreasing with increasing distance from existing growth centers and the coast where development started. Thus it can be expected that distance from a growth pole and also from the coast are two variables which can influence settlement's development scores and hence regional inequality.

The foregoing factors which can account for variations in development scores of settlements and on which data are
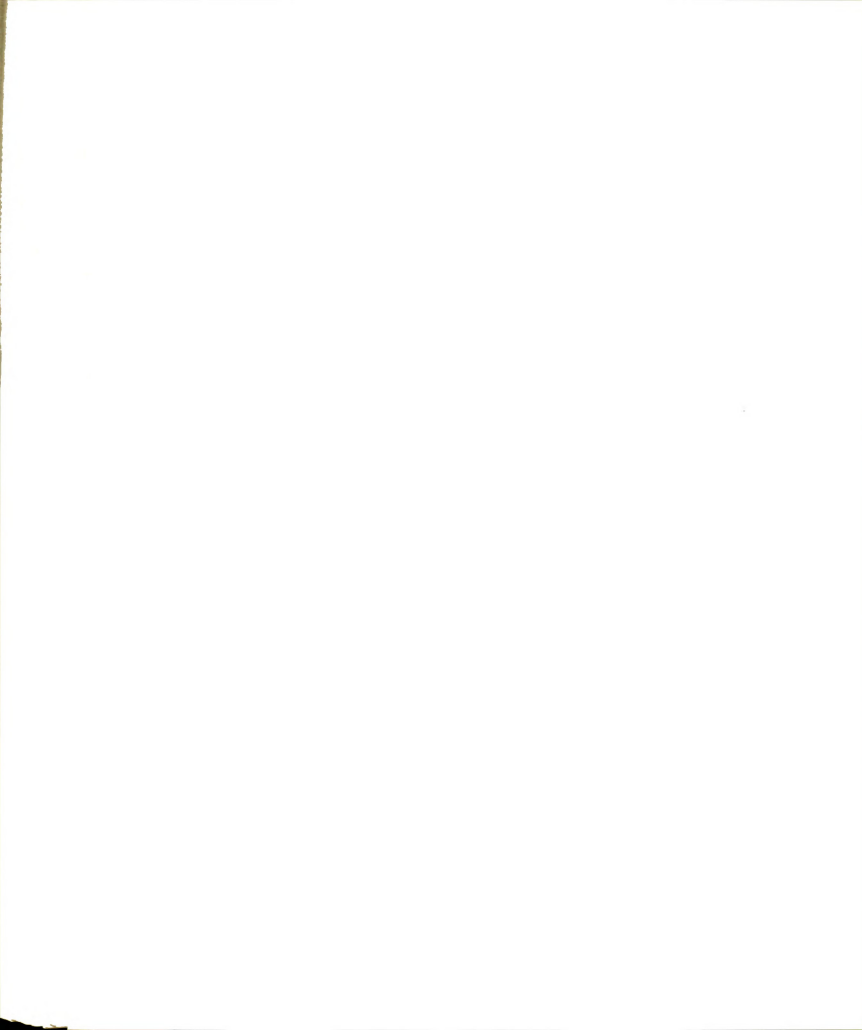
readily available were individually correlated with the set-
tlement's development scores, using the latter as the de-
pendent variable. Simple correlation coefficients were used
to measure the degree to which variations in development
scores can be attributed to each of these factors. These
measures also provided a means by which the strength of the
various associations were measured. The extent to which these
correlation coefficients could have been influenced by samp-
ling error, assuming that the true correlation coefficient
is zero, are also assessed by using significance tests.

Table 27 is a summary of the various simple correla-
tion coefficients and their levels of significance. It will
be seen from Table 27 that of all the factors, postulated to
have some association with development scores, population has
the strongest relationship. The correlation coefficient of
.7551 is highly significant indicating it could not have oc-
curred by chance alone, the sample is identical to the list
of settlements which possess any of the structural attributes
shown in Tables 18 through 20. About 57 percent of the vari-
ations in development scores or inequality can be attributed
to variations in population. It may also be argued that var-
iations in population could be explained by variations in
development scores, however, this is not the framework adopted
in this study.

TABLE 27

SUMMARY OF MEASURES OBTAINED IN THE CORRELATION ANALYSIS

Variable	Correlation Coefficient, r	Coefficient of Determination, r^2	Level of Significance
Population of Settlements	.7551	.5702	.001
Rate of Settlements' Population Growth	.1977	.0390	.001
Percent of Non-Agricultural Workforce	.5940	.3528	.001
Shortest Distance From The Coast	.0204	.0004	.373
Shortest Distance to a Growth Center	.3204	.1027	.279

The percentage of a settlement's labor force engaged in non-agricultural pursuits is also correlated with developmen scores. The correlation coefficient of .5940 is highly significant (See Table 27) indicating that it could not have occurred by chance. About 35 percent of the variations in development scores may be attributed to variations in the percent of non-agricultural employment. This may also indicate that the structural composition of a settlement's economy can have an impact on its development.

Surprisingly, "shortest distance to a growth center" is not strongly correlated with development scores. The strength of this relationship is .3204, with a probability of .279 that it could have occurred through sampling error. Only ten percent of the variation in development scores or inequality can be attributed to variations in "distance from growth centers", indicating a weak relationship. If the growth centers had been successful in transmitting development to nearby settlements this relationship would have been stronger.

Even though most developments in Ghana were initiated from the coast, an analysis of settlements' distances from the coast and their level of development indicates that there is very little association between these two variables. This seems to support that apart from a settlement's distance from the coast, other factors determine its level of development, A settlement's rate of population growth also has a rather weak association with inequality or development scores.

Summary of Findings

This analysis has shown regional inequalities in development in Ghana established through the use of socioeconomic indicators of development. The magnitude of these inequalities varied from a low of .1428 or 14.28% for dependency ratios to a high of .6411 or 64.11% for population per physician, indicating the varying degrees of regional inequalities in Ghana.

Results of the chi-square indicated that the hypothesis of independence between the level of development and regional location of settlements can be rejected for each of the last two time periods studied. This implies that there has been little change in the pattern of development and that the level of development of the sampled settlements may depend on their respective regional locations. A rejection of the study's basic hypothesis of equality in regional development may also indicate that certain regions are likely to be developed faster than others, as explained earlier. Settlements within the faster growing regions are likely to possess more of the structural attributes of development than those in the slow growing regions.

The diffusion of development in Ghana inferred from the spatial distribution of structural attributes for 1960, 1970 and 1980 resembles a hierarchical pattern rather than a contagious patten of diffusion. At the national level, settlements with larger populations tend to have more development
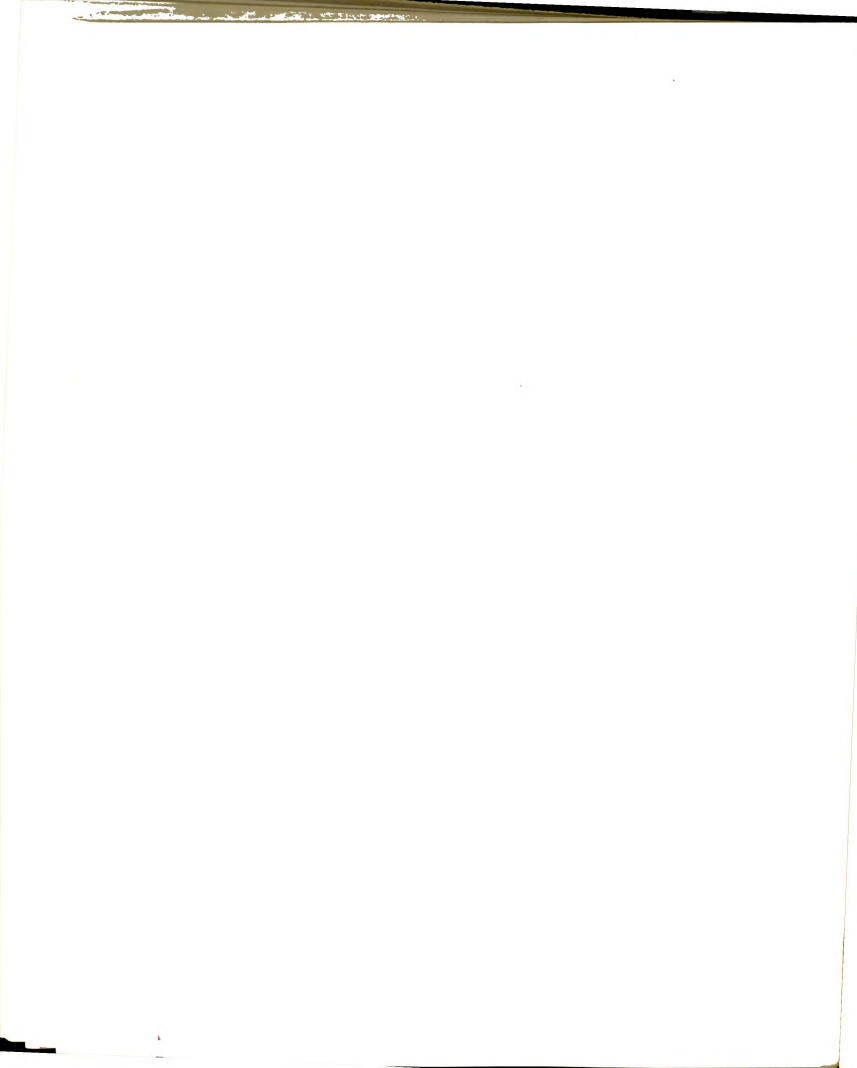
attributes. Settlements of smaller populations possess fewer attributes.

At the level of individual settlements and growth centers there is only a slight resemblance to the contagious pattern of development diffusion. More specifically, at the local level, proximity of a settlement to a growth center does not indicate that the settlement possesses more development attributes. Results of the correlation analysis show that proximity to a growth center is only slightly associated with development scores or inequality. In fact, of the five variables used in the analysis, "population of a settlement" is the only variable that shows significant association with development scores.

The foregoing indicates that the growth centers have had limited success in transmitting development benefits to surrounding settlements. Had they been very successful, proximity to a growth center would have shown a stronger association with development scores. It may, therefore, be concluded that in spite of the fact that economic growth occurred during the study period, inequalities did not decline and the process of convergence as argued by Williamson (1965) has been unable to redress spatial as well as social disparities. Meanwhile it is hoped that sometime in the future inequalities will decline, but it is difficult to tell the time or income threshold. From data currently available it may also be said that the growth poles have had limited success in redressing spatial inequalities.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this dissertation was to study the spatial pattern of development in Ghana and to assess the extent of regional inequalities in Ghana. This concluding chapter discusses the extent to which the research objective was accomplished and makes appropriate recommendations about areas of development planning research.

To assess the extent to which the research has accomplished its primary objective this chapter combines the findings of Chapter Five with the review of Development Plans in Chapter Three and the discussion of relevant and empirical research in Chapter Two.

Conclusions

This research has shown that there have been regional inequalities in development in Ghana. Quantitatively these inequalities vary substantially, depending on the indicator considered. They range from a low of 14.28 percent for dependency ratios to a high of 64.11 percent for regional distribution of physicians. It was impossible to aggregate

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quantitatively in an overall index the pattern of distribution because the indicators were heterogeneous and had different magnitudes and directions of change with development.

The foregoing findings compares favorably with findings of other studies except that the gini coefficient for population per physician is higher than those reported for other developing countries. For example, Coates, Johnson and Knox (1977) quote a gini coefficient of 28.7 percent for the distribution of population per hospital bed by province in Sierra Leone in 1964; and in this study the comparable figure for Ghana in 1970 was 27.06 percent (See Table 17).

On the other hand, a gini coefficient of 64.11 percent obtained for the distribution of population per physician in Ghana in 1970 is rather high compared to similar figures that are readily available and accessible. Coates, Johnston and Knox (1977)· arrived at a gini coefficient of 34.6 percent for the world distribution of physicians by country in 1970. The relatively higher coefficient for Ghana may be seen as a manifestation of the growing phenomenon of international out-migration by physicians. In Ghana this has been hastened by the slow and gradual deterioration of the economy and consequent political instability; both in combination have led these physicians to out-migrate to work in other African countries such as Nigeria, Zambia and Liberia.

A review of various determinants of regional inequality revealed a few which would be pertinent in understanding the origins and dynamics of regional inequalities in Ghana. These include historical, political and economic factors, amongst others. The history of development planning in Ghana suggests that there was heavy emphasis on sectoral allocation of developmental resources and in the process the spatial aspects of these allocations were neglected. Efficiency dictated an initial emphasis on mining and mineral exploitation. The Western, Ashanti and Eastern Regions were heavily endowed with natural resources, and with the early exploitation of these resources came the development of basic infrastructure and other supportive services in these regions.

It is also argued that once the foregoing pattern had become established, it became even more efficient and attractive for investments and physical developments to flow to these regions, rather than to other areas of the country. This set in motion a pattern of development which was efficient, and was highly correlated with population and areas of rich resource endowment, though spatially inequitable.

Omuta (1979) has documented a similar approach to development planning in Nigeria. He contends that spatial inequality in development in Nigeria is a result of the sectoral emphasis in planning that neglected its spatial aspects. In a way the planners and politicians are not to be blamed for

their negligence because at the time there were a number of
other problems which demanded their attention. It is probably
unreasonable for planners and researchers to expect a country,
such as Ghana, to develop its economy and at the same time
avoid all the major spatial inequalities associated with econ-
omic growth.

Analyses of the spatial distribution of development
attributes indicates that, at the national level, the pattern
of distribution and diffusion of development attributes fol-
lows a hierarchical pattern more closely than a contagious or
cascade pattern. In addition, there is evidence that there
had been little change, if any, in the pattern of development
over the study period. In other words, development did not
trickle down from growth centers to surrounding settlements
between 1960 and 1980. It is, therefore, inferred that growth
pole strategies have had limited success in reducing dispar-
ities.

This particular finding may be regarded as a further
clarification of Xiarchos' (1978) assertion that results of
growth pole studies are ambiguous. The finding is also in
line with Casetti, King and Odland's (1971) earlier claim
that growth poles are ineffective as a means of improving em-
ployment in peripheral areas which in turn helps reduce dis-
parities in development. It also accords well with Gaile's
(1974) assertion that the growth pole concept does not work.

Thus, even though these two studies were conducted in countries at different levels of development, a concensus is beginning to emerge. However, the only way to be more certain will be to conduct further research.

Differences in levels of development between settlements can be attributed to a number of quantitative and qualitative variables. Quantitative variables such as a settlement's popualtion, degree of urbanization, percent of labor force employed in non-agricultural activities, distances from the coast and the nearest growth center, account for variations in levels of development. Of these, variations in settlement's level of development can best be attributed to differences in settlements' population.

Qualitative factors such as politics, government policies, environmental and economic constraints and events of history can all help in explaining variations in levels of development between settlements as well as between regions. In Ghana it appears that party politics and government policies could have greater effect in shaping regional inequalities than, say, environmental constraints. This has also been documented by Gitelson (1972), and shown to be the case in Uganda during Obote's regime.

Having indicated that growth pole strategies are not the best answer for Ghana, what strategies, then, are likely to reduce regional inequalities in development?

Recommendations

There are a number of approaches to development which can be adopted to help achieve a more equitable distribution of development benefits through the improvement in the living conditions of areas where majority of the population live instead of relying on the central government to shower development benefits. Over the years some of these approaches, which include the community development approach, social amenity approach, accelerated project implementation approach and the increased agricultural production approach, have been implemented in Ghana.

Each of these approaches has had limited success in Ghana because of two reasons. First, they all relied on the national government to shower development benefits on settlements. Second, they all tackled development in a piecemeal manner. For example, the community development approach visualized a direct correlation between absence of certain facilities, such as community centers, and the economic, social, and cultural paralysis of the rural areas. Such a correlation does not necessarily exist; and the building of, say, a community center in a rural area does not automatically solve all its problems, although it might help in a number of ways.

The bases of future development policies should hinge on a smaller role for the national government with emphasis
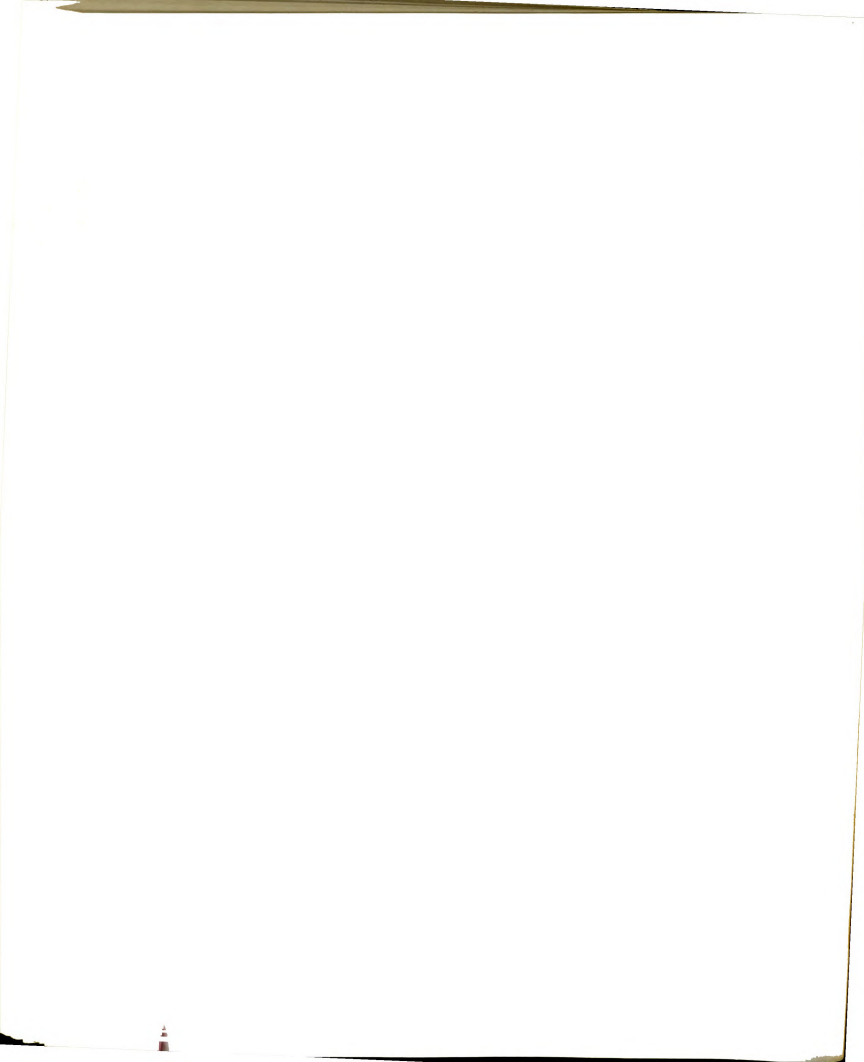
put on developing the country in an integrated manner. One
such future development strategy is presented.

It has been shown in this study that a planning strat-
egy that concentrates development attributes in selected
Ghanaian centers, hoping that they will trickle down to sur-
rounding settlements, has not been effective. Any further
use of such growth center concepts as policy rationale in
Ghana's planning thus calls for a rethinking of the growth
center strategies that have influenced much of our past de-
velopment planning.

Rethinking these strategies does not in anyway imply
a rejection of the use of growth poles concept. While plan-
ning should be done from "below" for effective development
administration, at the same time the opportunities and econ-
omies of scale provided by nodal points, or growth centers
should not be ignored.

Such a strategy should seek to improve the economic
base and living conditions of rural people by helping them to
build strength and increase agricultural production within
their local communities rather than allocating "benefits"
to them from above. This will necessitate meeting the local
people at their own level, helping them to deal with the re-
alities that exist in their villages now and planning with
them (rather than for them) to meet their needs as they de-
fine them and the goals they desire.

The national government, using such a strategy, would have to give up some of its decision-making power and control of development in rural settlements and see itself as "facilitating" rather than "controlling" regional development. For example, it may have been an accepted practice in the past for the national government to provide a school facility when a settlement's population reached a certain size. In tackling developmental inequalities from "below", the national government would no longer make such arbitrary decisions but would learn to respond to the needs expressed by the local people. The community might determine that a farm cooperative to improve agricultural production is what they really need, and that formal schooling can be put off until the community can feed all its members.

The key ingredients in such a strategy are properly trained facilitators supplied with the necessary authority, access to government funds, and services to help mobilize local peoples to define their own needs and goals, work cooperatively as a community and start to make community decisions through which they will gain strength as a political and social unit. These facilities can only be supplied on an effective scale by the national government—but must go into local settlements without a "nationally prepared agenda" to assist the people to plan for their own growth and development, according to their own needs, with the national government standing by to lend expertise and funds if and when required.

Like most other suggestions for development the fore-
going has inherent problems but they are more than offset by
its potentialities. Research should therefore be conducted
to help planners and development practitioners better under-
stand these problems and how to deal with them. Such a re-
search should primarily focus on resolving the difficulties
or obstacles associated with planning from "below".

Recommendations for Further Research

Even though there has been a shift in emphasis from
centralized planning to planning from "below" in recent years
there are still a number of unresolved issues. Planning
theory remains ambigious about some of these issues and prac-
titioners do not have any clear knowledge as to how to han-
dle them. If the planning profession is to be effective at
the local level these obstacles must be studied and under-
stood. It is only then that appropriate ways can be found
to deal with them. These issues have been extensively dealt
with elsewhere by such writers as Whyte (1981) and Friedmann
(1979); those that are of immediate relevance to the present
study will be highlighted in this section.

If planning is to be done from "below" and an organ-
ization or department is to be established to implement this,
it is questionable if such an agency will fit into the pres-
ent bureaucratic government structure. Will such an agency

be able to provide facilitators with the necessary training and expertise, or would such an agency be made part of the Ministries of Rural Development, Social Welfare and Cooperatives or the Town and Country Planning Department?

Alternatively instead of establishing such an agency can these existing ministries coordinate such an activity? These are pertinent issues which must be well understood if the strategy is to be effective; otherwise it could create problems of jurisdictional rights. Others may even view the establishment of such an agency to implement the strategy of planning as a misguided proposition in so far as it leads to further bureaucratization.

Another issue that needs to be well considered relates to the distribution of power in various settlements. Will the existing power centers in these settlements have enough support to mobilize people towards the satisfaction of mutually felt needs? If the power bases are fragmented what could be done to mobilize active communities towards the satisfaction of needs? How would conflicts of interest in a community be resolved?

As was noted in Chapter Four the lack of political and administrative continuity is one major obstacle to development in Ghana. If there is a change of government how would it affect the idea of planning from "below"? How can this be made an on-going activity? When a government is in power there
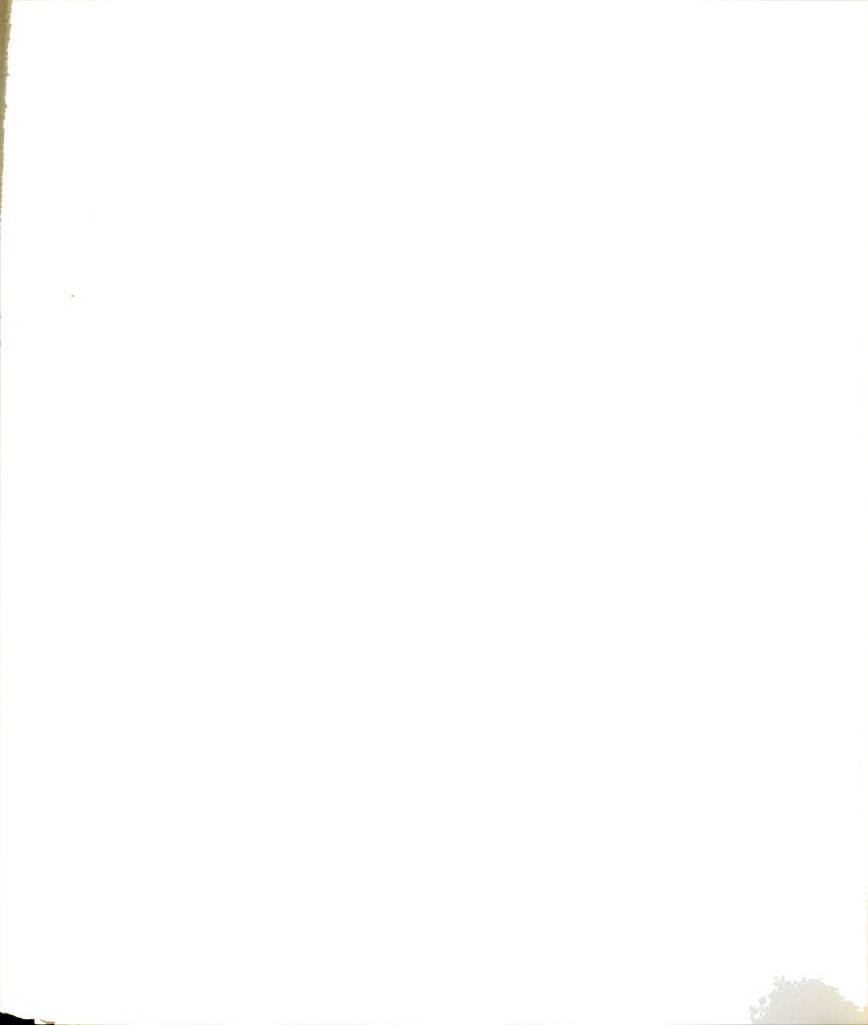
might also be the opposition or ambivalence among high rank-
ing officials who may fear that organizing people to develop
their communities might provide a political base for chal-
lenging their leadership. More specifically, will such a
strategy work under Rawlings' regime and in a situation as
fluid as present day Ghana?

Apart from these inherent obstacles to the idea of
planning from "below" the findings of this study have pointed
to other interesting areas in development planning research
where scholarship needs to be directed to.

Research is needed to assess how future development
plans can best respond to established regional inequalities
in development. It is also recommended that in future de-
velopment plans, planners consider explicitly spatial as well
as economic sectors of the economy. This way, future regional
disparities could be avoided and current ones redressed.

If planning research on regional inequality in Ghana
is to be an on-going activity, it will be necessary to up-
date information on development attributes extant in the
settlements.

Also important in this regard will be the compilation
of data on private sector attributes, such as doctors, ma-
ternity homes, cinemas and retail activities not usually cover-
ed by government censuses and sample surveys. To ensure uni-
formity and coverage of all settlements, information collection

and up-dating should be done on a regional basis. Small
units within the Regional Planning Offices and the Town and
Country Planning Department should be made responsible for
such data gathering and up-dating. Once this is done it will
be easier to pull all the data together so that inter-regional
and intra-regional comparisons can be made.

Regional inequality has been a persistent feature of
the Ghanaian landscape but was not viewed as priority prob-
lem by planners and politicians until 1975; a fact which ex-
plains why existing plans have not addressed this issue di-
rectly. Most of these plans attempted to diversify the na-
tional economy but, because they neglected spatial aspects,
they simply reinforced the initial inequalities established
by the colonial government. Development is still concentra-
ted in urban areas particularly Accra, Tema, Kumasi, Sekondi
and Takoradi but the hinterland is also gradually changing.
The pattern of distribution of development benefits in Ghana
bears resemblance to the pattern of population distribution;
proximity to a growth center does not seem to be influential.

Planning in Ghana has had to cope with problems such
as inadequate data and research, a shortage of skilled man-
power and a lack of coordination between the various agencies
involved in development. The economy has also had to grapple
with political instability and unanticipated movements in
world commodity prices and trade balances. If political

stability is achieved in the near future, and if as a re-
sult the economy improves, there will be greater hope for
future integrated economic, social and political develop-
ment. When this takes place, the process of achieving a
more equitable distribution of development benefits will be
hastened.

The present study is a modest contribution to what
has to be known and done before the process of regional
distribution of development benefits can be brought to
fruition in Ghana.

APPENDICES

APPENDIX 1

REGIONAL DISTRIBUTION OF GOVERNMENT,
QUASI-GOVERNMENT AND PRIVATE HOSPITALS

APPENDIX 1: REGIONAL DISTRIBUTION OF GOVERNMENT, QUASI-
             GOVERNMENT AND PRIVATE HOSPITALS

Region	Government Hospitals*	Quasi-Government Hospitals	Private Hospitals
Western	5	-	11
Central	6	1	4
Greater Accra	5	4	2
Eastern	9	1	7
Volta	5	1	7
Ashanti	3	2	18
Brong Ahafo	1	1	-
Northern	5	1	1
Upper	4	-	4
Total	43	11	54

*Excluding military hospitals

SOURCE: <u>1967-68 Statistical Year Book</u>. Accra, Central
         Bureau of Statistics, 1970, p. 71.

APPENDIX 2

NOTES AND SOURCES OF DATA FOR DEVELOPMENT
INDICATORS IN TABLE 15

APPENDIX 2:   NOTES AND SOURCES OF DATA FOR DEVELOPMENT
              INDICATORS IN TABLE 15

1. These refer to the lower limits of the range of figures

    given as the probably range of crude death rate per

    1,000 in: Ewusi, Kodwo. Social and Economic Indicators

    for Monitoring Rural Development in Ghana. Legon,

    Institute of Statistical, Social and Economic Research,

    1977, p.74.

2. United States, General Accounting Office. Impact of

    Population Assistance to an African Country. Department

    of State, Agency of International Development Report to

    Congress, Washington, D.C., General Accounting Office,1977.

3. Interpreted as proportion of the population born in

    another region. The rates were computed from 1970 Census

    of Ghana Special Report "D". Statistics of Localities

    and Enumeration Areas, Volume 2, p.xxvi.

4. The dependency ratio R, is defined as $R=100 -r*$, where

    $r*$ is the crude labour force participation rate. Source:

    de Graft-Johnson, K.T. "Some Economic and Social In-

    dicators to Measure Development in West Africa". Inter-

    national Social Science Journal, vol. 27, no. 1, 1975.

    p. 83.

5. The average number of persons 6-14 years, 15-24 years

    and 25 years and over who have never attended school.

    These figures were computed from 1970 Census of Ghana

    Special Report "D". Statistics of Localities and Enumer-

    ation Areas, Volume 2, p.xxvii.

APPENDIX   3

CALCULATION OF GINI COEFFICIENT
FOR THE REGIONAL DISTRIBUTION OF HOSPITALS

APPENDIX 3:   CALCULATION OF GINI COEFFICIENT FOR THE REGIONAL
               DISTRIBUTION OF HOSPITALS

Region	Hospitals	PROPORTIONS Hospitals(Y)	Population(X)	Location Quotient
Western	17	.156	.090	1.733
Central	11	.101	.104	.971
Greater Accra	11	.101	.099	1.020
Eastern	17	.156	.148	1.054
Volta	13	.119	.111	1.072
Ashanti	23	.211	.173	1.220
Brong Ahafo	2	.018	.089	.202
Northern	7	.064	.085	.753
Upper	8	.073	.100	.730
Total	109			

Rank-Location Quotient		Proportions Y	X	Cumulatiive Y	X	XiY(i+1)	X(i+1)Yi
Brong Ahafo	.202	.018	.089	.018	.089	.008099	.003402
Upper	.730	.073	.100	.091	.189	.029295	.024934
Northern	.753	.064	.085	.155	.274	.06987	.05859
Central	.971	.101	.104	.255	.378	.134946	.121635
Greater Accra	1.020	.101	.099	.357	.477	.244701	.223125
Eastern	1.054	.156	.143	.513	.625	.395000	.377568
Volta	1.072	.119	.111	.632	.736	.620448	.574488
Ashanti	1.220	.211	.173	.843	.909	.908091	.842157
Western	1.733	.156	.090	.999	.999	---	---
Total	---	---	---	---	---	2.41045	2.25899

Gini Coefficient = 2.41045 - 2.25899 = .184551

         = .1846 or 18.46%

APPENDIX 4

COVER LETTER FROM FOREIGN STUDENTS' OFFICE

MICHIGAN STATE UNIVERSITY

OFFICE OF THE DEAN OF INTERNATIONAL STUDIES AND PROGRAMS   EAST LANSING · MICHIGAN · 48824

March 24, 1981
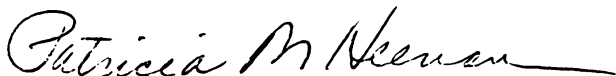
To Whom It May Concern:

Mr. Kwasi K. Adarkwa is a graduate student at Michigan State University, pursuing a Ph.D. degree in Urban Planning.

Mr. Adarkwa is now in the process of writing a doctoral dissertation and is conducting research toward that purpose. The subject of his dissertation is "Regional Inequalities in Development in Ghana." He is sending survey materials by mail and expects responses by mail.

Any courtesies you can extend to Mr. Adarkwa as he conducts a survey and prepares his dissertation will be greatly appreciated.

Signed

Patricia M. Heenan,
Foreign Student Counselor

lc

APPENDIX 5

SAMPLE OF LETTER SENT TO PLANNING OFFICES IN GHANA

1644 G. Spartan Village,
Michigan State University
East Lansing, MI 48823

March 22, 1981

Regional Planning Officer,
Western Regional Planning Office,
GHANA, West Africa

Dear Sir:

I am a doctoral candidate in urban and regional plan-
ning at Michigan State University and I am conducting re-
search on "Regional Inequalities in Development in Ghana".
As part of the research I need to take stock of the various
types of services in each of the nine regions in the country.

Ideally, I should have returned home to collected the
data. However, because of severe financial constraints my
sponsors were unable to support me in this endeavor. I will
therefore appreciate it if you could fill in the attached
matrices of services and promptly return them to me. For
each of the settlements use "X" to indicate the presence of
a service on the first matrix for 1970, and the same mark
in the appropriate cell in the 1980 matrix to indicate the
same information for 1980. For your convenience I have in-
cluded a matrix of similar information collected by David
Grove and Lazlo Huszar in 1960 for their Towns of Ghana:
the role of service centers in regional planning published
by Ghana Universities Press in 1964. In order to save you
some time, you can simply upgrade this basic 1960 informa-
tion for 1970 and 1980 respectively. If you have any other
information that you consider pertinent to the research,
please do not hesitate to send it to me. In much the same
way, you may also forward any questions you have in this
regard.

While I look forward to hearing from you at your earliest
convenience, I wish to render my sincere thanks for your
cooperation.

Yours faithfully,

Kwasi Kwafo Adarkwa

APPENDIX 6

SAMPLE OF FORMS USED FOR DATA COLLECTION

APPENDIX 6: SAMPLE OF FORMS USED FOR DATA COLLECTION

Year: **1980**

Column groups (columns 1–40):

ADMINISTRATION
1. REGIONAL ADMINISTRATIVE OFFICE
2. DISTRICT ADMINISTRATIVE OFFICE
3. LOCAL COURT
4. GOVERNMENT TREASURY
5. POLICE DISTRICT HEADQUARTERS

COMMUNICATION
6. TELEPHONE EXCHANGE (24)
7. LOCAL RADIO RELAY STATION
8. POST OFFICE
9. POSTAL AGENCY
10. SERVICE STATION
11. PETROL STATION
12. MUNICIPAL BUS SERVICE
13. STATE TRANSPORT STATION
14. MAIN ROAD JUNCTION
15. AIRPORT
16. AIRSTRIP
17. HOTEL
18. REST HOUSE

COMMERCE
19. G.N.T.C. U.A.C etc DISTRICT or BRANCH OFFICE
20. G.N.T.C. U.A.C etc WHOLESALE OUTLET (RETAIL OUTLET)
21. OTHER WHOLESALE OUTLETS FOR IMPORTED GOODS.
22. BANK
23. LOCAL MARKET, DAILY
24. LOCAL MARKET, PERIODIC
25. LOCAL PRODUCE BUYING CENTER
26. LOCAL PRODUCE STORAGE CENTER

SOCIAL SERVICES
27. HOSPITAL
28. HEALTH CENTER
29. HEALTH POST
30. POST-SEC. POLYTECHNIC, NURSING TRAINING
31. SECONDARY SCHOOL
32. UNIVERSITY
33. PUBLIC LIBRARY

OTHERS
34. PIPE BORNE WATER SUPPLY
35. ELECTRICITY FOR DOMESTIC USE
36. RAILWAY STATION
37. SEA OR RIVER PORT
38.
39.
40.

SETTLEMENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
CAPE COAST	X	X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X				X	X		X	X	X	X	X	X	X	X			
DUNKWA	X	X	X	X		X	X		X	X							X	X	X	X	X	X	X				X	X	X		X			X	X	X				
AGONA SWEDRU	X	X				X	X	X	X	X	X	X	X						X	X	X	X	X				X	X			X			X	X					
WINNEBA	X	X	X		X		X	X		X	X								X	X	X	X	X				X	X			X			X	X					
SALT POND	X	X	X		X			X		X									X	X	X	X	X				X				X			X	X					
ELMINA	X	X					X			X									X				X				X				X			X	X					
NYAKROM	X	X					X			X									X				X				X				X									
FOSO	X	X	X	X		X	X	X		X									X	X	X	X	X	X			X	X			X	X		X	X					
APAM	X	X					X			X								X					X				X				X									
TWIFU PRASO	X	X					X			X								X					X								X					X				
KOMENDA	X		X					X		X													X				X				X									
AJUMAKO	X	X					X			X	X	X							X				X				X				X									
KWANYAKO	X		X					X		X													X								X									
NSABA	X	X					X			X	X	X							X				X				X													
ESIAM	X	X					X				X	X							X				X				X													
SENYA BREKU	X	X	X				X			X									X				X				X				X									
ABURA DUNKWA	X	X	X				X			X									X				X				X				X				X					
ESSAKYIR	X	X					X			X													X								X				X					
FANTI NYANKUMASI	X	X					X			X													X	X							X									
ASIKUMA	X	X	X				X			X									X				X				X	X			X				X					
BAWJIASE	X	X					X			X													X				X	X			X				X					
DUAKWA	X	X					X			X													X																	
PRASO	X	X	X				X			X									X				X	X	X	X	X				X				X					
AFRANSE	X	X						X		X													X																	
ANUMABU	X	X					X			X										X			X				X				X									
ASIN MANSO	X	X					X			X													X	X	X	X	X				X									
MANKRONG JUNCTION	X	X					X			X													X																	
MOREE	X	X					X			X													X				X													
ODOBEN	X	X					X			X													X	X	X	X	X													
BESEASE	X	X	X				X			X													X	X	X		X													
DAWURAMPONG	X	X					X			X													X	X			X													
NKWANTANUM	X	X			X			X		X	X	X											X				X													
DIASO	X						X			X																														

APPENDIX 7

RAW DATA AND SCALE LINE FOR 1960

APPENDIX 7: RAW DATA AND SCALE LINE FOR 1960.

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1960 05 156 11011111111111111111111111111111 31
1960 01 001 01111111111111111111111111111111 31
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1960 05 160 00000001011011011111111111111111 18
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1960 03 107 000000000000000010000 1010001        04
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APPENDIX 7: Continued

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1960  02  058   000000000000000000000001101   03
1960  03  113   000000000000000000000001101   03
1960  06  207   000000000000001000000000001   02
1960  08  248   000000000000000010000000010   02
1960  07  230   000000000000000010000000010   02
1960  02  060   000000000000000000100000001   02
1960  01  029   000000000000000000010000000010   02
```

APPENDIX 7: Continued

```
1960 05 179 000000000000000000000000001C000010          02
1960 05 181 000000000000000000000000001C000001          02
1960 05 183 000C0000000000000000000000010000001         02
1960 05 177 000000000000000000000000000100001           02
1960 07 228 000000000000000000000000000C100010          02
1960 07 225 000000000000000000000000000C100010          02
1960 08 247 000000000000000000000000000C100010          02
1960 04 155 00000000000000000000000000010001            02
1960 02 061 00000000000000000000000000010001            02
1960 06 209 00000000000000000000000000001100            02
1960 05 185 00000000000000000000000000001100            02
1960 05 186 00000000000000000000000000001100            02
1960 01 030 000000000000000000000000000100001           02
1960 01 026 00000000000000000000000000001110            02
1960 02 059 00000000000000000000000000000C11            02
1960 02 057 00000000000000000000000000000C11            02
1960 02 055 00000000000000000000000000000C11            02
1960 08 246 00000000000000000000000000000C11            02
1960 04 153 00000000000000000000000000000C11            02
1960 03 114 00000000000000000000000000000C11            02
1960 05 180 00000000000000000000000000000C11            02
1960 05 182 00000000000000000000000000000C11            02
1960 07 229 00000000000000000000000100000000C00          01
1960 01 025 000000000000000000000000100000000C00         01
1960 03 120 000000000000000000000000100000000C00         01
1960 02 062 000000000000000000000000100000000C00         01
1960 07 226 00000000000000000000000000000000010          01
1960 03 115 00000000000000000000000000000000010          01
1960 07 251 00000000000000000000000000000000010          01
1960 07 252 00000000000000000000000000000000010          01
1960 07 253 00000000000000000000000000000000010          01
1960 07 254 00000000000000000000000000000000010          01
1960 07 255 00000000000000000000000000000000010          01
1960 05 184 00000000000000000000000000000000010          01
1960 07 231 00000000000000000000000000000000010          01
1960 07 249 00000000000000000000000000000000010          01
1960 07 250 00000000000000000000000000000000010          01
1960 02 063 00000000000000000000000000000000010          01
1960 06 210 00000000000000000000000000000000000          00
```

APPENDIX 8

RAW DATA AND SCALE LINE FOR 1970

APPENDIX 8:   RAW DATA AND SCALE LINE FOR 1970.

```
1970 01 001 011111111111111111111111111111111111111111  38
1970 03 064 110111111111111111111111111111111111111111  38
1970 05 156 110111111111111111111111111111111111111111  38
1970 07 211 011111111110111111111111110111111111111111  36
1970 06 187 010111011011111111111111111011111111111111  35
1970 03 065 000011101111111111111111111111111111111111  34
1970 02 031 100011111010111111111111101111111011111111  32
1970 03 067 001001111111111111111110111111111111111111  34
1970 04 121 000011011011101111111111111111111111111111  32
1970 01 002 000000110101111111111111111111111111111111  31
1970 05 159 000001011011111111111111111111111111111111  31
1970 03 066 000000111101111111111011111111111111111111  31
1970 08 232 000011110011111111111111011110111111111111  31
1970 03 070 000000001101111111111111111111111111111111  30
1970 04 122 000001011011101111111110111111111111111111  30
1970 04 123 000001001011101111111111111111111111111111  30
1970 03 068 000000011101011111111111111111111111111111  30
1970 08 233 000100111001111111111111011110111111111111  30
1970 05 158 000011101101111110111011110111111111111111  30
1970 05 160 000000001001111111111111111111111111111111  29
1970 05 157 000000101101111111111011110111111111111111  29
1970 03 069 000000100011001111111111111111111111111111  28
1970 04 124 000001001001101111111110111111111111111111  28
1970 06 188 000000000111111011111111111111111111111111  27
1970 08 235 000101100010011111111011010111111101  26
1970 06 189 000000001010100011111111111111110111111  26
1970 02 033 000000101000101011111111111111110111111  26
1970 01 003 000000000000101110111111111111111111111  25
1970 02 032 000000100000011111111110111111111110111111  25
1970 04 125 000001001000010111111011111111111111111  25
1970 08 234 000000000000111111111110111101111111111  25
1970 07 212 000100000000011110111111101111011111111  23
1970 05 164 000000100100010001011111101111111111111  23
1970 01 005 000000000000100110011111111111111111111  23
1970 06 191 000000000010000011111001111111111111111  22
1970 04 128 000000000001000111010111110111111111111  22
1970 04 126 000100000000011011010110101111111111111  22
1970 02 034 000000100000001110101101011111111011111  22
1970 03 072 000000001010100011110001111111110101111  21
1970 03 076 000000001001100011101001101111111101111  21
1970 01 007 000000100000110010011111011010111111111  21
1970 03 073 000000001000100111110001011110111101111  20
1970 03 078 001000000011000111100001111011011101111  20
1970 06 190 000000000000000110011110111011111111111  20
1970 06 192 000000000000000011011010111111111111111  20
1970 06 194 000000000000000010111101111111111111111  20
1970 08 236 000000000000011110111111001100111111101  20
1970 02 038 000000000011011010111100101111011001111  20
1970 03 080 000000000010100101111000111111111001111  20
1970 03 071 000000000101101111101000001110011111111  20
1970 02 035 000000000000011110011101011110111111111  20
1970 03 075 000000001001000011001111110111110101111  20
1970 04 130 000000000001000010100111111110111111111  19
1970 01 010 000000001000101100111001011111110110111  19
1970 03 082 000000000000100111110000111101111011111  19
1970 05 161 000000001000100010110111010111111101111  19
1970 05 162 000000000000000100000111111111111111111  19
1970 05 163 000000000000000100010101111111111111111  19
1970 05 165 000001000000001100101101101111101111111  19
1970 03 079 000000000011000100100011111111110001111  18
1970 04 127 000000000000000011100011111111101111111  18
1970 03 074 000000001000101001000001111111110101111  18
1970 01 006 000000000000000110010111101101011111111  18
1970 06 195 000000000010000010011010111001111111111  18
1970 07 213 000000000000011001111100110011111111101  18
1970 07 214 000000000000011110011101010110011111101  18
1970 05 167 000000000001000110010101100111111111111  18
1970 03 081 000000001000000001100011110111110101111  17
```

APPENDIX 8: Continued

```
1970 04 136 000000000001000001000101111111010111111 17
1970 05 179 000000000000000000011111101111111100111 17
1970 06 193 000000000000000001000100111111011111101111011 17
1970 08 237 000000000000000001011111100110011111111101 17
1970 06 197 000000000000000000001001111101111111111111 17
1970 02 036 000000010000010000000101011110111011111 16
1970 03 077 000000000001100110100001011010111001111 16
1970 03 087 000000100100000111010001010110110001111 16
1970 04 129 000010000010000001000001011110101111111 16
1970 05 166 000000000100010000000001110111111111111 16
1970 03 083 000000000100000000100010111111110001111 16
1970 05 170 000000001000000000011101001111111110111 16
1970 01 008 000000000000000010011101101101011011011 15
1970 01 013 000000000000000001010110101011011111011 15
1970 04 131 000000000000000101000011001110011111111 15
1970 05 177 000000000000000000010110111111111110111 15
1970 03 088 000000000100000011000000111111011011111 15
1970 03 015 000000000100010010000100101110110110011 15
1970 04 133 000000000000000001000110110001111111111 15
1970 01 004 000000000000000111000110101101010001110 14
1970 01 009 000000000000000010011101101101010011011 14
1970 01 014 000000000000000010011001011110011011111 14
1970 02 037 000000000000000000000111001011111111111 14
1970 04 132 000000000001000010001100101100101111111 14
1970 04 140 000000000010000001000011100011010111111 14
1970 05 178 000000000000000000011100101101111010111 14
1970 07 215 000000000000000010010110001100111111101 14
1970 04 143 000000000000000101001110010010100111111 14
1970 05 172 000000000000000100001001111011111111111 14
1970 01 012 000000010000000100111011001010001011111 13
1970 05 168 000000000000000000011001000011111111111 13
1970 03 084 000000000000000100100111000100110101111 13
1970 06 198 000000000000000100100001011010100111111 13
1970 03 085 000000010000000001100001010010111001111 13
1970 05 175 000000000000000000001000001011111111111 13
1970 01 016 000000000000000001000001101010110111111 12
1970 02 043 000000000000000000000001001111101111111 12
1970 03 090 000000001000000000001001000010111111111 12
1970 04 134 000000000000001000000001010110011111111 12
1970 04 135 000000000000000000011000010111111111 12
1970 05 169 000000000000001100100000010111111 11 12
1970 06 196 000000000000010000000110011101111111 12
1970 07 217 000000000000000100111000011001011111001 12
1970 04 138 000000000010000010000010000101101111111 12
1970 03 111 000000000010000001100001011010100011111 12
1970 01 011 000000000100000010000010100100101011111 11
1970 02 039 000000000000010000000010001101010101111 11
1970 02 040 000000000000100000000010011100101111111 11
1970 04 139 000000000010000000001000101010110111 11
1970 05 176 000000000000000000010000010111110101111 11
1970 06 207 000000000000000000001010011100011111 11
1970 07 218 000000000000010100110000000010111111101 11
1970 02 041 000000000100100000000000110100001111 10
1970 03 091 000000010000000000000000101011011111 10
1970 03 097 000000000000000010000100110101100001111 10
1970 03 106 000000000000000010001010000110010111 10
1970 04 146 000000000000000010001001000010001111 10
1970 04 147 000000000010000000000000110011111111 10
1970 05 180 000000000000000000010010010101101110011 10
1970 05 186 000000000000010011001001100101101 10
1970 04 174 000000000000000010001000100010001111 10
1970 06 199 000000000000000000010000011111101111 10
1970 07 216 000000000000000100001100010001011111001 10
1970 02 047 000000000000000000000000010101101111 09
1970 02 050 000000000000100000000100101010101011 09
1970 02 051 000000000001010001000000110011010111 09
1970 02 052 000000000000000000010010101010111011 09
1970 02 055 000001000000100000000001000000101111 09
1970 03 092 000000000000000000001000101010101111 09
1970 03 093 000000000000000000000000001101111111 09
1970 04 137 000000000000000000000001000110010110111 09
```

```
1970  04  144  000000000000000100000010001010100110011  09
1970  04  145  000000000001000000000000000000110111111  09
1970  04  148  000000000000000000000000000111111101011  09
1970  05  181  000000000000000000000100100100010111011  09
1970  06  200  000000000000000000000010000101111111  09
1970  06  204  000000000000000000000000101100011111111  09
1970  06  206  000000000000000000000000111001000111011  09
1970  06  210  000000000000000000000001010011100110011  09
1970  03  089  000000000000000000000001000001101011111  09
1970  03  096  000000001000000000000000011001001011111  09
1970  07  222  000000000000000000001100010001011111001  09
1970  01  017  000000000000000000000010110001011111  09
1970  01  018  000000000010000100000001001000101010101  08
1970  01  019  000000000000000100000000101100010101  08
1970  01  021  000000000000000100000010011000000010111  08
1970  01  022  000000000000000001000000011000010010111  08
1970  02  042  000000000000000000000000000101111111011  08
1970  02  044  000000000000000000000000010000010111111  08
1970  03  086  000000000000000000100101100000010111  08
1970  03  101  000000000000000100001000100001000001111  08
1970  03  102  000000000000001000000000000011011111  08
1970  03  104  000000010000000101000010000100000000111  08
1970  03  108  000000000000000001000001000010001011111  08
1970  06  201  000000000000000000001000011001000011011  08
1970  06  205  000000000000000001000100000101101011  08
1970  08  238  000000000000001000011000100000111001  08
1970  08  239  000000000000000000101001100011101001  08
1970  03  103  000000000000000011000100000000111101  08
1970  08  244  000000000000001000001010010000011101001  08
1970  07  227  000000000000001000001010010001011100001  08
1970  03  118  000000001000000000001000100000011111  08
1970  03  116  000000000000000100000100000111111  08
1970  02  046  000000000000000000010000100010010111  08
1970  02  056  000000000010000000000010101011111  08
1970  01  027  000000001000000000000010000000011111  07
1970  01  029  000000000000000000010010000000011111  07
1970  02  053  000000000000000000000001010000011111  07
1970  03  094  000000000000000000000000001110111  07
1970  03  095  000000000000000100100000000011111  07
1970  03  098  000000000000000010010100000010000111  07
1970  03  105  000000010000000000000100010101011  07
1970  03  109  000000000000000000000000010011111  07
1970  03  117  000000000000000000000001011101111  07
1970  05  171  000000000000000001000000010011100011  07
1970  05  173  000000000000000000010000010101011  07
1970  06  202  000000000000000001000000000111111  07
1970  06  209  000000000000000001000100011101111  07
1970  08  242  000000010000000010000000011111001  07
1970  07  219  000000000000000011000000010111001  07
1970  07  220  000000000000000011000000010111001  07
1970  03  107  000000100000000000000010001011  06
1970  01  023  000000000000000010000001011011  06
1970  01  028  000001000000000001000010010101  06
1970  02  045  000000000000000110000000001010011  06
1970  02  048  000000000000000000000000001011111  06
1970  02  058  000000000000000000010001000011011  06
1970  02  060  000000000000000000010000111011  06
1970  02  061  000000000000000000001000110111  06
1970  03  099  000000000000000000010011000111  06
1970  03  100  000000000000001000000000001011111  06
1970  03  110  000000000000000000000000101001111  06
1970  03  112  000000000001000000001000100000111  06
1970  03  113  000000000000000000010001000011111  06
1970  04  142  000000000000000010000001011011  06
1970  05  182  000000000000000010010000010111  06
1970  04  150  000000000000000010000000101111  06
1970  03  203  000000000000000010000010110011  06
1970  08  240  000000000000100000010000001110001  06
```

APPENDIX 8: Continued

```
1970 08 241 000000010000010000000010000000001100001 06
1970 03 119 000000000000000000000000000001D011011 05
1970 01 030 00000000000000000000000000000000111110 05
1970 04 151 00000000000000000000100000010000011001 05
1970 04 152 00000000000000000000001100001000010001 05
1970 08 243 00000000000000000000000001000001110001 05
1970 08 245 000000000000000010000000000001110001 05
1970 01 020 00000000000000000001000001000000010001 04
1970 01 024 00000000000000000000000010000000010101 04
1970 02 057 00000000000000000000000000010000010011 04
1970 03 114 00000000000000000000000000010000000111 04
1970 03 120 00000000000000000000000010100000000101 04
1970 04 149 00000000000000000000010000000000010011 04
1970 04 155 00000000000000000000000000000000011101 04
1970 05 184 00000000000000000010000000000000010101 04
1970 07 221 00000000000000000000000000000001101001 04
1970 07 224 00000000000000000000000000000001110001 04
1970 04 141 00000000000000000000000000000000110011 04
1970 02 049 00000000000000000000000000000000010111 04
1970 01 025 00000000000000010000001000000000000001 03
1970 02 059 00000000000000000000000000000000010011 03
1970 03 115 00000000000000000000000000000000000111 03
1970 05 183 00000000000000010000000000000000010001 03
1970 08 246 00000000000000000000000000000000110001 03
1970 08 247 00000000000000000000000000000001100001 03
1970 08 248 00000000000000010000000000000000010001 03
1970 07 223 00000000000000000000000000000001100001 03
1970 07 225 00000000000000000000000000000001100001 03
1970 07 228 00000000000000000000000000000001100001 03
1970 07 229 00000000000000000000000000000001100001 03
1970 07 230 00000000000000000000000000000001100001 03
1970 04 154 00000000000000000000000000000001001001 03
1970 05 185 00000000000000000000000000000000000011 02
1970 02 062 00000000000000000000000000000000000011 02
1970 02 063 00000000000000000000000000000000000011 02
1970 04 153 00000000000000000000000000000000010001 02
1970 08 249 00000000000000000000000000000000100001 02
1970 08 250 00000000000000000000000000000000100001 02
1970 08 251 00000000000000000000000000000000100001 02
1970 08 252 00000000000000000000000000000000100001 02
1970 08 253 00000000000000000000000000000000100001 02
1970 08 254 00000000000000000000000000000000100001 02
1970 08 255 00000000000000000000000000000000100001 02
1970 07 226 00000000000000000000000000000000100001 02
1970 07 231 00000000000000000000000000000000100001 02
1970 01 026 00000000000000000000000001000000000001 02
```

APPENDIX 9

RAW DATA AND SCALE LINE FOR 1980

APPENDIX 9:   RAW DATA AND SCALE LINE FOR 1980

```
1980 01 001 011111111111111111111111111111111111111111 38
1980 03 064 101111111111111111111111111111111111111111 38
1980 05 156 101111111111111111111111111111111111111111 38
1980 07 211 111110111111111111111111111111111111111111 37
1980 06 187 001111011011111111111111111111111111111111 35
1980 03 065 000011111011111111111111111111111111111111 34
1980 04 121 000011011111111111111111111111111111111111 34
1980 03 067 010001111111111111110111111111111111111111 34
1980 05 159 000000111101111111111111111111111111111111 32
1980 04 122 000001011111111111111101111111111111111111 32
1980 03 066 000001111110111111111101111111111111111111 32
1980 01 002 000001101110111111111111111111111111111111 32
1980 02 031 100011010111111111111011111101111101111011 31
1980 03 068 000001111011001111111111111111111111111111 31
1980 03 070 000000111100111111111111111111111111111111 31
1980 04 123 000000011011111111111111111111111111111111 31
1980 08 232 000011001111111111110111111011111111111111 31
1980 08 233 000001001111111111110111111101111111111111 30
1980 05 158 000000111101111111111111110111101111111111 30
1980 04 124 010000011001111111111101111111111111111111 30
1980 03 069 000001101001011111111111111111111111111111 30
1980 05 160 000000011000111111111111111111111111111111 29
1980 05 157 000001011001111111111111101111011111111111 28
1980 02 033 000000010100110111111111111111111101111111 27
1980 06 188 000000001000111111111101111111111111111111 27
1980 06 189 000000010001101111111101111111101111111111 27
1980 07 212 000100000000011111111110111111111111111111 27
1980 08 235 000100000101111111111011101101111111111111 27
1980 08 234 000000000011111111110101111110111111111111 26
1980 04 125 000000010010010111111101111111111111111111 26
1980 03 076 000000010010100111111101111111111111111111 26
1980 02 032 000000000110011111111101111111111111101111 26
1980 01 003 000000010010111110101111111111111111111111 26
1980 03 072 000000010001100111111111101111111111111111 25
1980 03 078 010000000001001110111011111111111111111111 25
1980 03 082 000101000010101111011001111101111111111111 25
1980 04 128 000000001000010101111111111111111111111111 25
1980 05 154 000000100100000010101111111111111111111111 25
1980 02 038 000000111000011101111101110111101111101101 25
1980 07 213 000000000100111111111111111111101111101110111 25
1980 07 215 000000000000011111111111111101111101110111 24
1980 04 126 010100000000010100111011111111111111111111 24
1980 03 073 000000000001011111110111111101111111111111 24
1980 03 071 010000010001111101110001110111111111111 23
1980 01 005 000011000100011011001011111111111111111111 24
1980 02 004 000000000110011111100100111111111110101111 23
1980 03 080 000000000011110111010011111111111111101111 23
1980 04 130 000001000100100001110111111111011111111 23
1980 06 191 000000000010001001111111111111111111111 23
1980 07 214 000000000000011111111101111111101111110111 23
1980 08 236 000000000001111111010110110111111110111 22
1980 07 217 000000000010101111111111110010111110111 22
1980 06 192 000000000001001011111101111111110111111 22
1980 03 075 000001000001001101011111110111111111 22
1980 01 007 000000001001001011011110111110101111 21
1980 03 079 000000011110011100010011110111101111 21
1980 05 152 000000000000011000011111111111111111 21
1980 03 081 000000010000000110110111111101111111 21
1980 02 035 000010111000111001110011101011011011 21
1980 06 194 000000000000000100111111111111111111 21
1980 06 190 000000000001001011011011111111111 20
1980 06 195 000000000010001001011110111101111111 20
1980 06 161 000000100000000011111100111101111111 20
1980 03 153 000000000001001001001011111111111111 20
1980 03 074 000001000000001011000100111111111111 20
1980 03 077 000000000011101110001011110011110111 20
1980 01 006 000000000000001001001101111111111 20
1980 05 179 000000000000000100101111011111111111 20
```

APPENDIX 9: Continued

```
1980 01 010 00000010000001101101100111111111001111 20
1980 04 127 00000000000000101101011111101111111111 19
1980 04 129 00000000011100010100011110011110111111 19
1980 05 165 00000000100001000101110110110111111111 19
1980 05 167 00000000010000010001110110011111111111 19
1980 06 193 00000000000010100010011101111111111111 19
1980 06 197 00000000000001000101011101111111111111 19
1980 08 237 00000000000100011101011011101011110111 19
1980 03 088 00000000000100001101000111101111111111 19
1980 01 008 00000010000100110100100111111101011111 19
1980 03 083 00000010000000011010101101110111101111 19
1980 03 087 00000100000100011101100110100101101111 18
1980 04 131 00000000010000100001001111101110111111 18
1980 04 136 00000000101100000001001101101101011111 18
1980 01 009 00000000000001101101011111110010001111 17
1980 02 036 00000100011100000010000111101101101111 17
1980 03 084 00000000100010011001011001100111111111 17
1980 04 132 00000000102100001010011110011011111111 17
1980 05 166 00000010000000000100010110011111111111 17
1980 04 143 00000000001001000011010101000111111111 16
1980 03 085 00001000000000001101000110010110111111 16
1980 02 037 00000000011000000000010101011110111111 16
1980 01 013 00000000000000011110001111110011111111 16
1980 02 043 00000000010000001011010000110110111111 16
1980 05 177 00000000000000000000010101111111111111 16
1980 03 111 00000000000010001100110010110101011111 16
1980 01 012 00000001000000010011010100100101011111 15
1980 01 014 00000000000000001110011101110101011111 15
1980 03 090 00000010000000010000110010101011111111 15
1980 04 133 00000000000000000110011101110111111111 15
1980 04 154 00000000000010010010011001100111111111 15
1980 05 170 00000000000000000111001011111111111111 15
1980 05 172 00000000000000010001011011111111111111 15
1980 05 168 00000001000010000100100110011111111 14
1980 05 199 00000000000001000110000011011111111 14
1980 05 175 00000000000000100001000000111111111111 14
1980 05 178 00000000000000010110011111101110111111 14
1980 06 198 00000000000010100000110100011111111111 14
1980 04 140 00000000000100000010110010100101011111 14
1980 01 004 00000000000111000010001010001110011111 14
1980 02 057 00000000000000011111100010110011111 14
1980 02 054 00000000000000000110000111000011111 14
1980 04 122 00000000011000010110100100101111111 14
1980 04 134 00000000000100000010011101101111111 13
1980 04 135 00000000000001000100101101111111 13
1980 05 175 00000000000000010000010111111111111 13
1980 04 139 00000000010010000001001011111111111 13
1980 03 097 00000000000000101001010100111101111 13
1980 01 011 00000010000000001010000101011111111 13
1980 03 092 00000000000000010000101011010111111 13
1980 02 056 00001000100000011000010000110111101 13
```

APPENDIX 9: Continued
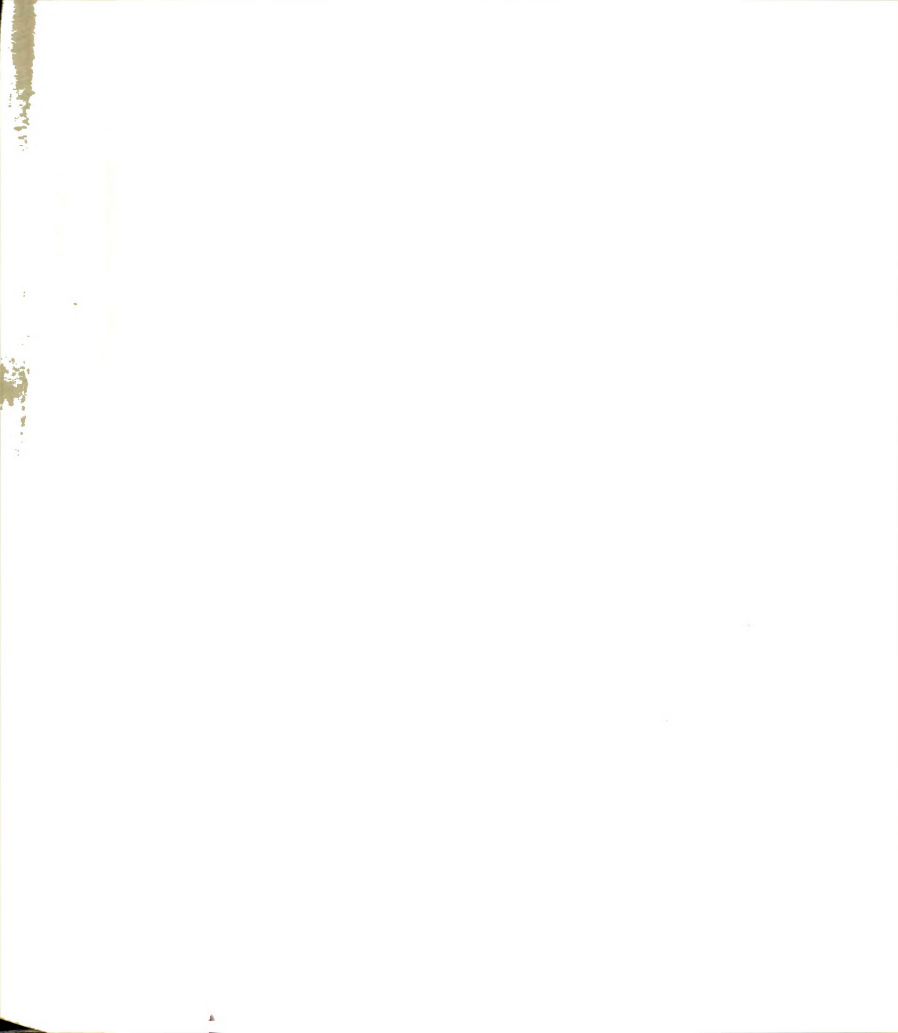
```
1980 06 196 0000000000000010000000001011101101111111 13
1980 06 200 0000000000000000001000000 1011010111111111 13
1980 06 207 0000000000000000000000001 1010101111111111 13
1980 07 216 0000000000000000000000010 1010110111111111 13
1980 07 218 0000000000000010110101000 000001111010111 13
1980 07 222 0000000000000000000010100 001111011110111 13
1980 06 204 0000000000000000000100000 1010001111111111 12
1980 05 174 0000000010000000001000 1001011101111111 12
1980 04 155 0000000000000000000100011010011101011112 12
1980 02 061 0000000000000000011100 000001101011111 12
1980 02 052 0000000001000000010100 010100110011111 12
1980 02 047 0000000000000000000000 0101111101111 12
1980 02 043 0000000000000000000001000101101011111111 12
1980 02 040 0000000000000000000010000100111011111111 12
1980 03 091 0000001000000001000000010111101010111 12
1980 03 096 0000000000000010000000011000111111111 12
1980 03 106 0000000000000010000110000010101111111 12
1980 01 015 0000000000000100100000010111001111101 12
1980 01 027 0000000000010000000001010010010111111 11
1980 02 039 0000000000000000100000101000110110111 11
1980 02 041 0000000000100000100000110000101101111 11
1980 03 095 0000000000000001000011000001111011111 11
1980 03 098 0000000000000010000001000100111101111 11
1980 03 101 0000000000000100010000000011111111 11
1980 03 104 0000010000000011000010000010101001111 11
1980 03 108 0000000000000001000010000010101111111 11
1980 04 148 0000000000000001000010000110101011111 11
1980 06 201 0000000000000000000000101101101111111 11
1980 06 206 0000000000000000001001010010101111111 11
1980 02 062 0000000000000001010001000110111111 11
1980 02 051 0000000000010100010000010001111111 11
1980 02 042 0000000000100000000000111101011111 11
1980 08 239 0000000000001000000010110011100101011 10
1980 07 219 0000000000000000000101000110110011011 10
1980 06 199 0000000000000000000101000010001111101 10
1980 06 205 0000000000000010000010010011111101 10
1980 05 180 0000000000000001000101100100110111 10
1980 05 181 0000000000000000010001010001011111 10
1980 05 186 0000000000000011100000110010100111 10
1980 04 144 0000000000010000001000100011110110111 10
1980 04 145 0000000000000001000000010100001111111 10
1980 04 146 0000000000000000010000001101011111111 10
1980 04 147 0000010000000000001000001001001111111 10
1980 03 086 0000000000100001011000101101011 10
1980 03 089 0000000000000100000010000110011011111 10
1980 03 093 0000000000000010000000001111001111111 10
1980 03 102 0000000000101010000000100101111111 10
1980 03 103 0000000000001010001000000101111111 10
1980 03 118 0000001000100100000100000101101111111 10
1980 03 116 0000000000001100010000000101111111 10
1980 03 105 0000010000000010000010001111101011 10
1980 03 094 0000001000000010000000010100101111110 10
1980 03 117 0000000010001000001000000101101111 10
1980 02 044 0000000000000000010100011010010111 10
1980 02 050 0000000000000001001000001100100111 10
1980 02 060 0000000000000001000001101111101011 10
1980 01 019 0000000000001010100100001001001 10
1980 03 107 0000001000001000000100001001101011 09
1980 01 017 0000000000000000000011000100110111 09
1980 01 021 0000000000001000001010100010101011 09
1980 01 029 0000000000000000000010010100111111 09
1980 02 059 0000000010000001100000001010011111 09
1980 02 055 0000000010000001001100001001000111 09
1980 03 109 0000000000010000000000010101111111 09
1980 03 112 0000000000010000000001000111101011 09
1980 03 113 0000000000000000100000101101011111 09
1980 04 137 0000000000000000001010100100111011 09
1980 05 171 0000000000000000000000001101011111 09
```

APPENDIX 9: Continued

```
1980 06 208 0000000000000000000000100000011000111111 09
1980 06 210 0000000000000000000010101000010101011011 09
1980 07 227 0000000000001000001000100100101111100011 09
1980 08 244 0000000000000001000000001001001110010101 09
1980 02 046 0000000000000001000000010010011010001111 09
1980 08 238 0000000000000001000000100010010010100011 08
1980 05 173 0000000000000000000000110010111011 08
1980 03 099 0000000000000000000001101001100110100111 08
1980 03 100 0000000000000011000000010010011111111 08
1980 03 110 0000000000000000000000000011011011111 08
1980 01 028 0000000000000000000001011110011001 08
1980 01 016 0000000000000010000010110000101101 08
1980 04 141 0000000000010000000001000010111011 08
1980 01 018 0000000000001000000010001100101111 08
1980 02 045 0000000000000000010101000010101111 08
1980 01 024 0000000001000000000000010100101011001 07
1980 01 025 0000000000000010000110010110011001 07
1980 01 026 00000000000000000000101110011001 07
1980 02 048 0000000000000000010001001000101111 07
1980 02 053 0000000000000010010000000101101101 07
1980 03 119 0000000000000000000010001101101111 07
1980 04 142 0001000010000000001001010000001011 07
1980 04 151 0000000000000000000010011001001111 07
1980 04 152 00000000010000000010000001011011 07
1980 06 203 0000000000000000000011001010101011 07
1980 06 209 0000000000000000001000001000001011 07
1980 06 202 0000000000000000000000010111111011 07
1980 07 220 0000000000000000000100100100010111 07
1980 07 221 0000000000000000000100001001010111 07
1980 05 182 0000000000000000000001011000011111 07
1980 03 120 0000000000000000000001000010011111 07
1980 08 242 00000010000100000010000010001111 07
1980 08 240 00000000001000000100000010010011 06
1980 08 241 0000010000000000100001000010001001 06
1980 08 243 00000000000000000000010011000010011 06
1980 07 229 0000000000000000100001001011111 06
1980 07 150 0000000000000000100000000011111 06
1980 03 114 0000000000000000010000010011111 06
1980 03 115 0000000000000001000000101101111 06
1980 02 058 0000000000001000000000001111 06
1980 01 022 0000000000000000010010000111101 06
1980 01 023 00000000000000010010000011101 06
1980 01 020 00000000000001000010000101100001 06
1980 05 184 000000000000010000000000010001111 05
1980 07 225 0000000000000000000011001010101 05
1980 02 049 0000000000000000000000010011111 05
1980 01 030 00000000000000000010000010001101 05
1980 08 245 00000001000000000010001010011 05
1980 07 224 00000000000000100000010011001101011 05
1980 05 183 000000000000100000000000101101 05
1980 07 226 00000000000001000010100101 04
1980 07 228 0000000000000100000101010101 04
1980 07 230 0000000000000000010010100101 04
1980 04 153 000000000000000000000001011011 04
1980 04 149 0000000000100000000001001101 04
1980 07 223 000000000000000000100010010011 04
1980 07 231 0000000000000000100010001 03
1980 08 246 000000000000000000001000100001 03
1980 08 247 000000000000000000100010001 03
1980 08 248 00000000000010000010010001 03
1980 08 185 00000000000000000001011 03
1980 08 249 0000000000000000000010001 02
1980 08 250 00000000000000000001001 02
1980 08 251 000000000000000000010001 02
1980 08 252 00000000000000000010001 02
1980 08 253 0000000000000000010001 02
1980 08 254 0000000000000000010001 02
1980 08 255 0000000000000000010001 02
```

APPENDIX 10

REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED NUMBER
OF SETTLEMENTS AT EACH LEVEL OF DEVELOPMENT IN 1960.

APPENDIX 10: REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED
NUMBER OF SETTLEMENTS AT EACH LEVEL OF DEVELOP-
MENT IN 1960

Development Score Range*	REGIONS			
	Coastal[1]	Forest[2]	Savannah[3]	Totals
0 - 7 (Depressed)	(75) 75	(27) 23	(22) 26	124
8 -15 (Developing)	(57) 58	(20) 22	(16) 13	93
16 -32 (Developed)	(23) 22	(8) 10	(7) 6	38
Totals	155	55	45	255

Expected Values in Parenthesis

1. The "Coastal Region" consists of the Western, Central,
    Eastern and Volta Regions.

2. The "Forest Region" consist of Ashanti and Brong Ahafo
    Regions.

3. The "Savannah Region" consists of the Northern and Upper
    Regions.

*These scores refer to the Guttman Scale Values.

APPENDIX 11

REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED NUMBER
OF SETTLEMENTS AT EACH LEVEL OF DEVELOPMENT IN 1970.

APPENDIX 11:   REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED
NUMBER OF SETTLEMENTS AT EACH LEVEL OF DEVELOP-
MENT IN 1970

Development Score Range*	Coastal[1]	Forest[2]	Savannah[3]	Total
0-16 (Depressed)	(94) 95	(34) 26	(27) 34	155
17-22 (Developing)	(20) 22	(7) 9	(6) 2	33
33-39 (Developed)	(41) 38	(14) 20	(12) 9	67
Totals	155	55	45	255

For Explanation of Table, see notes on Appendix 10

*These scores refer to the Guttman Scale Values

APPENDIX 12

REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED NUMBER
OF SETTLEMENTS AT EACH LEVEL OF DEVELOPMENT IN 1980.

APPENDIX 12: REGIONAL DISTRIBUTION OF OBSERVED AND EXPECTED
NUMBER OF SETTLEMENTS AT EACH LEVEL OF DEVELOP-
MENT IN 1980

Development Score Range*	REGIONS			Totals
	Coastal (01-04)	Forest (05-06)	Savannah (07-08)	
0-11 (Depressed)	(71) 68	(25) 18	(20) 30	116
12-26 (Developing)	(63) 65	(22) 29	(18) 9	103
27-39 (Developed)	(22) 22	(8) 8	(6) 6	36
Totals	155	55	45	255

For explanation of Table, See notes on Appendix 10.

*These scores refer to the Guttman Scale Values

APPENDIX 13

CHI-SQUARE TEST OF INDEPENDENCE BETWEEN A
TOWN'S LEVEL OF DEVEOPMENT AND ITS REGIONAL LOCATION

APPENDIX 13: CHI-SQUARE TEST OF INDEPENDENCE BETWEEN A TOWN'S LEVEL OF DEVELOPMENT AND ITS REGIONAL LOCATION

H_o: That Y (or the development score) is independent of X (or the region). In other words, the development score or level of development of a settlement is independent of the region in which it is located.

$\hat{X}^2_{1960}$ 0/75 + 16/27 + 16/27 + 1/57 + 4/20 + 9/16 + 1/23 + 4/8 + 1/7

= 0+0.5925+0.7273+0.01754+0.2+2.5625+0.04348+0.5+0.1429

= 2.78632

X^{*2}_{1960} 9.48

At (r-1)(c-1) d.f. = (3-1)(3-1) = 4 d.f. and 0.050 significance level $\hat{X}^2_{1960}$ $<$ X^{*2}_{1960} , therefore cannot reject H_o.

$\hat{X}^2_{1970}$ = 1/94+64/34+49/27+4/20+4/7+16/6+9/41+36/14+9/12

= 0.010638+1.8824+1.8148+0.2+0.57143+2.66667+0.2195_2.57143

+0.75

= 10.686878

X^{*2}_{1970} = 9.48

At 4 d.f. and 0.050 significance level, $\hat{X}^2_{1970}$ $>$ X^{*2}_{1970}, therefore, reject H_o.

$\hat{X}^2_{1980}$ = 9/71+49/25+100/20+4/63+49/22+81/18+0/22+0/8+0/6

=0.9859+1.97+5.0+0.063492+2.22723+4.5+0.0+0.0+0.0

=13.849355

X^{*2}_{1980} = 9.48

At 4 d.f. and 0.050 significance level,

$\hat{X}^2_{1980}$ $>$ X^{*2}_{1980}, therefore reject H_o.

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