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FERTILITY AND FEMALE STATUS:
BARBADOS, 1960 - 1970

by

Richard J. Day

A thesis submitted to the Faculty of Graduate Studies through the Department of Geography in partial fulfillment of the requirements for the degree of Master of Arts at the University of Windsor.

Department of Geography
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ABSTRACT

The fertility component of population growth in the developing world is of fundamental importance in the full appreciation of all development issues. In the Caribbean and Barbados the recent decline in fertility has too frequently been linked solely with the increase in contraception, often following the inauguration of a Family Planning programme. The objective of this study was to investigate whether changes in the socio-economic structure in Barbados were related to the fertility decline. In particular, whether female status, as illustrative of the socio-economic transformation, was related to fertility. Female status was exemplified by the educational attainment and occupational status of working women.


It was found that over this period there had been a significant decline in fertility and a significant improvement in female status. There was a significant positive correlation between attainment of primary education and fertility in 1960 and 1970 and a significant negative correlation between attainment of secondary education and fertility in 1960 and 1970. There was also a significant
positive correlation between the proportion of women employed in agriculture and fertility, and a significant negative correlation between the proportion employed in clerical and service categories and fertility in both 1960 and 1970. On a regional level there were differences between the more urban and rural parishes. The study established, within the limitations of the data, that there is a relationship between female status and fertility but that in 1970 this was not as strong as in 1960.

The main recommendation is for a fuller investigation of the regional nature of fertility based on field interviews, and probing the socio-economic changes that often occur simultaneously with fertility decline.
CONTENTS

Chapter I: INTRODUCTION..................... 1
Chapter II: DEMOGRAPHIC BACKGROUND........ 27
Chapter III: METHODOLOGY.................. 98
Chapter IV: CONCLUSION..................... 122

Appendix 1. Classification of Intermediate Variables Affecting Fertility 129

2. Factors Related to Fertility Directly or Indirectly........ 130
3. Results of Analysis............... 131

Bibliography: .................................. 145
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Regional Age Characteristics</td>
<td>36</td>
</tr>
<tr>
<td>3.</td>
<td>Sex Ratios</td>
<td>38</td>
</tr>
<tr>
<td>4.</td>
<td>Crude Birth, Death &amp; Natural Increase Rates</td>
<td>42</td>
</tr>
<tr>
<td>5.</td>
<td>Region Crude Birth &amp; Death Rates</td>
<td>43</td>
</tr>
<tr>
<td>6.</td>
<td>Child - Woman Ratio</td>
<td>45</td>
</tr>
<tr>
<td>7.</td>
<td>Infant Mortality</td>
<td>48</td>
</tr>
<tr>
<td>8.</td>
<td>Population Growth Rate</td>
<td>51</td>
</tr>
<tr>
<td>9.</td>
<td>Population Totals by Parish</td>
<td>53</td>
</tr>
<tr>
<td>10.</td>
<td>Commercial Contraceptive Importation</td>
<td>58</td>
</tr>
<tr>
<td>11.</td>
<td>No. Males per 1,000 Females aged 15-44 yrs</td>
<td>61</td>
</tr>
<tr>
<td>12.</td>
<td>Proportion of Women Legally Married</td>
<td>67</td>
</tr>
<tr>
<td>13.</td>
<td>Fertility &amp; Number of Partnerships</td>
<td>68</td>
</tr>
<tr>
<td>14.</td>
<td>Distribution of Employed by Major Industrial Group</td>
<td>75</td>
</tr>
<tr>
<td>15.</td>
<td>Occupations of Female Employed Populations</td>
<td>77</td>
</tr>
<tr>
<td>16.</td>
<td>Occupational Status of Female Working Population</td>
<td>79</td>
</tr>
<tr>
<td>17.</td>
<td>Lorenz Index of Concentration of Female Occupations</td>
<td>84</td>
</tr>
<tr>
<td>18.</td>
<td>Proportion of Working Women in Total Female Population</td>
<td>87</td>
</tr>
<tr>
<td>19.</td>
<td>Enrollment by Type of School 1970</td>
<td>88</td>
</tr>
<tr>
<td>20.</td>
<td>Education &amp; Contraception</td>
<td>89</td>
</tr>
</tbody>
</table>
LIST OF TABLES (CONT'D.)

22. No. of Children Ever Born to 1,000 Women 
    1,000 Working Women aged 16 - 50 ............ 104
<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Factors Determining Fertility Levels</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Barbados - Parishes</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Barbados - Physical Geography</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Barbados - Economic Geography</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Age - Sex Pyramids</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>Crude Birth &amp; Death Rates</td>
<td>41</td>
</tr>
<tr>
<td>7</td>
<td>Population Growth</td>
<td>52</td>
</tr>
<tr>
<td>8</td>
<td>Population Distribution</td>
<td>54</td>
</tr>
<tr>
<td>9</td>
<td>B.F.P.A. Clinics</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>Parish Age - Sex Pyramids 1960</td>
<td>63</td>
</tr>
<tr>
<td>11</td>
<td>&quot; &quot; &quot;                                           1970</td>
<td>64</td>
</tr>
<tr>
<td>12</td>
<td>Female Occupation by Parish 1960</td>
<td>80</td>
</tr>
<tr>
<td>13</td>
<td>&quot; &quot; &quot;                                           1970</td>
<td>81</td>
</tr>
<tr>
<td>14</td>
<td>Lorenz Curves Comparing the Distribution of Female Employment by Occupations</td>
<td>83</td>
</tr>
<tr>
<td>15</td>
<td>Educational Attainment of Female Working Population</td>
<td>94</td>
</tr>
<tr>
<td>16</td>
<td>Educational Attainment of Female Working Population</td>
<td>95</td>
</tr>
<tr>
<td>17.</td>
<td></td>
<td>113</td>
</tr>
<tr>
<td>18.</td>
<td>Fertility and Female Status</td>
<td>114</td>
</tr>
<tr>
<td>19.</td>
<td>Spearman's Rank Order Correlation</td>
<td>115</td>
</tr>
<tr>
<td>20.</td>
<td></td>
<td>116</td>
</tr>
</tbody>
</table>
Chapter I

INTRODUCTION

Population growth, the most fundamental event of our times, has within the last few decades become such a matter of world concern that 1974 has been designated World Population Year by the United Nations. In the developing world high rates of population growth can retard the development process. However, within the developing world the Caribbean island of Barbados has stabilised its population growth rate in the region of 0.9% since 1960. This rate is more characteristic of a high, than a low, income country. In 1960 the natural increase rate was high but out-migration limited the rate of population growth. During the 1960's the declining birth rate coupled with the fairly constant low death rate reduced the natural increase rate, which, despite a lower out-migration rate, kept population growth low.

The Barbadian success in reducing the birth rate has been an example to other islands and a topic of considerable interest to demographers. To a large extent the decline has been attributed to the development of the Barbados Family Planning Association. There can be no doubt that the decrease in fertility is related to an increase in contraception, either directly or indirectly motivated by the Association. However, the period of the declining birth rate has coincided
with a period of considerable social and economic trans-
formation. The economy has diversified away from the
traditional agricultural sector with the development of
tourism and ancillary services, manufacturing and
Government services. Barbados has attained political
independence and there has been widespread development of
social services and infrastructure. In the long term this
has resulted in the reduction of colour and class barriers
on the island.

One outcome of these changes is reflected in the
status of women. From the time of slavery women have
participated in the traditional agricultural life of the
island, but with the improving standards of education their
contribution is increasingly seen in the newer sectors of
the developing economy. The objective of this study is to
establish whether there is a relationship between changing
female status and declining fertility in Barbados over the

The importance of this study is seen in contributing
towards a fuller understanding of the factors influencing
fertility and, therefore, affecting the problem of
population growth seen by Clarke (1971:1) as "the most
notable demographic process in the world today". The
twentieth century began with a little over 1.5 billion people
and will end with between 6 and 7 billion. The United
Nations (1971:2) viewed the momentum in the present population
growth as having "alarming prospects for the immediate future". The bulk of the world population growth is taking place in the developing world, where 2.5 billion of the world's 3.6 billion people live. Durand calculated that the world annual rate of increase between 1900 and 1950 was 0.8% and that this would be 1.8% for the last half of the century. For the developing world these rates were 0.9% and 2.1%, and for the developed world they were 0.8% and 0.9%. For the second half of the century the population of the developing countries will double every 33 years, whereas the population of the developed countries will double every 83 years (Clarke, 1971:18).

An important aspect of the growth of population in the developing world is the high rate of natural increase, which results from fluctuations in fertility and mortality levels. The main cause of rapid population growth in many developing countries has been the abrupt decline in mortality, especially infant mortality, coupled with a high fertility rate. It is reasonable to suppose that most developing countries will experience improved mortality conditions over the next few decades, largely because of their youthful age structures and improved health facilities. In the developing world fertility rates have not decreased in line with the

---

1 The developing world is broadly defined as Latin America (including the Caribbean), Africa and Asia (excluding Japan and USSR) and the developed countries as Europe, North America, Japan and USSR. (Durand, 1967:137).
reduction in mortality. This is evidenced in the second stage in the population cycle. Much of the developing world is found in this stage, known as the early expanding or youthful demographic regime, where mortality declines but fertility remains high.

As the population cycle evolves mortality rates attain a fairly constant low figure so that population growth becomes a reflection of fertility rates and net migration changes. On a global scale the migration factor is balanced out. One must thus concur with Hill (1968:226) and Freedman (1965:36) that the problematic factor in population growth today in both the developed and developing world is the fertility component. It has also been found that fertility\(^2\) divides the developed from the developing world more consistently and more completely than any other single available indicator (U.N. 1963:137).

To comprehend fertility requires the application of varied related disciplines. The social and economic environment is a major determining force in human reproductive behaviour. As development has occurred fertility has evolved from a primarily biological phenomenon into a socio-economic-biological phenomenon (El-Badry, 1966:50-51). The disciplines that study this complex phenomenon include sociology, anthropology, religion, bio-medicine, history, psychology,

\(^2\) Fertility is defined as "reproductive performance" (U.N. 1958:38).
and geography. In the history of geographic thought human geographers have made valuable contributions to the study of population distributions. Trewartha (1953:81) proposed a three-fold organisation of geography in which man, the physical earth and the works of man are the triads of elemental groupings. Trewartha viewed population as the pivotal element in geography and geographic science would be seriously injured if it were neglected. Population geography is distinct from demography. The emphasis of population geography is upon space while demography is "the science of population viewed as a single topic" (Clarke, 1965:2). Chapter II of this study gives a regional demographic background to Barbados stressing areal differentiation in fertility and female status.

Informed laymen and professional geographers have become "increasingly convinced that poor but densely settled countries must achieve a successful demographic revolution and a rapid one" (Blake, 1965:1181). This revolution should be aimed at reducing population growth. Blake (1965:1199) noted that policy aimed towards that end has become bipolarized. One view is that a decrease in family size will occur only as an end product of advanced economic and social development, which will lead to a desire for fewer children. The other view is inclined to bypass the institutional setting of reproduction entirely and assume that education and communication regarding birth control will eventually reduce births to a level consonant with low mortality. It can be generally
expected that economic and social progress and higher levels of living in developing countries will ultimately bring about a decline in fertility and slow down population growth, as was the case in the industrialised world in the last century.

The historical decline in fertility in the developed countries is generally attributed to a complex of factors related to the process of modernisation, economic development and industrialisation. It has been difficult to precisely identify the factors, as they are frequently overlapping and heterogeneous. The relative importance of the factors and their mode of interaction is also difficult to assess. Sauvy (1954:226) was aware of the link between economic development and family size but he considered it too difficult to determine the predominant factor as they were too closely connected.

The whole complex of factors determining fertility levels can be illustrated by Fig. 1, a model which applies to both the developed and developing nations. The intermediate variables have been classified by Davis and Blake (1956:212) as the intercourse, conception and gestation variables.\(^3\) The available evidence suggests that the dramatic shift from high to low fertility that has taken place in the economically and socially developed countries has mainly been the result of increases in the incidence of

\(^3\) See Appendix 1.
Fig. 1
Factors Determining Fertility Levels

contraception, although in some areas abortion is thought to have played a significant role.

With the development and official sanction of family planning in developing countries, it is unlikely that the conception variables will play an increasingly important part in the reduction of fertility levels in developing countries. In an investigation of the declining birth rate in Barbados since 1960, Nobbe, Ebanks and George (1973) have shown that the conception variables, in particular the use or non-use of contraceptives, have been important contributing factors. It is however unlikely that the availability of family planning services will automatically cause people to adopt those devices without further motivation.

From Fig. 1 the intermediate variables can be directly or indirectly related to the social and economic structure. Some of these socio-economic determinants of fertility are mortality decline; improvement in health conditions; urbanisation; school attendance and levels of education, especially as they affect women; improvements in mass media communications; rising levels of living; greater numbers of women in employment outside the home; increased cost of children's upbringing; weakening of religious

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4 "Some 30 developing countries have established population policies and are committed to reducing fertility and lowering the rate of population growth through family planning and related methods". (U.N. 1971:5).
influences: desire and opportunities for social mobility; more complex technology and changes in the structure and function of the family.\(^5\)

Of these socio-economic factors that affect desire for children this study is concerned with education and occupation of woman as illustrative of female status. From knowledge, attitudes and practices (KAP) studies of family planning and from information collected from family planning programmes it has become evident that the status of women may influence fertility in a variety of cultural contexts. As stated in the U.N. publication *Human Fertility and National Development* (1971:56) "High status of women, as evidenced by their higher education and employment outside the home, appears often to be competitive with uncontrolled fertility and is probably also incompatible with it."

In any given situation the relative importance of all the factors influencing fertility decisions varies. Not all developing countries exhibit the same high fertility rates and the fertility rates within each country vary according to the ethnic, cultural, social and economic groups within that country. Clarke (1971:38) wrote that "the geography of developing countries, especially the population geography, is one of increasing disequilibrium." The introduction of a

\(^5\) See Appendix 2 for diagramatic representation of Factors Related to Fertility.
geographically localized modern sector of the economy in developing countries contrasts with the traditional occupations. In Barbados the development of tourism and light manufacturing as opposed to the traditional agricultural sector illustrates this. In the modern sector there is regular employment and stable, fairly high incomes, the level of education is high and the people value upward social mobility. This contrasts with the traditional sector of the economy. It would be expected that the different groups would exhibit different demographic characteristics.

The rapid growth of population in developing areas has adverse social and economic effects so that a reduction in human fertility is an important component of social and economic development. At the start of the second United Nations Development Decade high fertility and rapid population growth were seen as the main obstacles to economic and social progress in the developing world.

Repercussions of rapid population growth are generally seen in many sectors, a few of which are mentioned here. In the economic sector rapid population increase slows down growth of per capita income and tends to perpetuate inequalities in income distribution and limits the rate of growth of Gross National Product. There are employment problems associated with rapid population growth and a growing problem of food supply. The social effects include rapid urbanisation and internal migration; a stress on social
services and the impeding of social mobility by continuing widespread poverty. The increasing divergence of the modern and traditional sectors in a developing society is illustrative of growing social disparity. Other important effects of population growth are on health, education, housing, welfare services and occasionally on political stability and civil order. The quality of life and the well-being of the individual are also affected by population growth, although these terms can not be easily quantified.

Barbados has successfully limited its rate of population growth since the early 1960's largely through a declining birth rate. Nevertheless with a total population of 250,000 and an area of 166 square miles Barbados still has the highest density of population in the Caribbean. The problem of population growth assumes larger proportions when one considers the narrow resource base of the island. The only major assets are its soil and water resources and its natural advantages for tourism. Population growth has historically been a major problem for Barbados, and of the components of population growth it would seem that the burden for reducing or stabilising the growth rate lies with fertility, since mortality levels are now low and there is limited possibility for out migration.

It is therefore essential to have a full appreciation of the intermediate variables and the socio-economic structure that lie behind recent movements in fertility in Barbados.
This could be of assistance to other less developed islands and point the way to further reductions in fertility and population growth. It is here that the geographical approach is valid in analysing areal differentiation in fertility.

In this study the objective is to investigate whether there is an areal relationship between fertility and female status in Barbados, where female status is illustrated by the educational attainment and occupational status of the female working population.
Literature Review

The review of literature will examine studies that have broadly concentrated on social, economic and political determinants of fertility, including studies that have investigated the relationship between economic development and fertility. Specifically the review will examine studies on education and employment of women and fertility. Because of the intermediate development position of Barbados this will be attempted for developed and developing societies. Research on fertility in the Caribbean and Barbados will be reviewed finally.

A substantial interest in the quantitative study of the determinants of fertility is revealed in a review of the literature over the last twenty years. Friedlander and Silver (1967) studied economic, social and political variables influencing fertility in eighty-five developed and underdeveloped countries. The regressions for all countries combined establish positive and statistically significant relationships between the birth rate and the illiteracy rate; child mortality; the extent of the agricultural population; the extent of the non-farm self-employed population and overcrowded housing conditions. Adelman and Morris (1966) applied factor analytic techniques to crude fertility rates and indices of social and political structure in fifty-five less developed countries over the period 1957-1962. Although the method has been criticised by Hawthorn (1970:77)
the general conclusion of the study was that there was a systematic tendency for birth rates to decline with those social changes which characteristically accompany industrialisation. Heer (1966) studied economic development and fertility using data for forty-one nations for the 1950 decade. He set out to test the hypothesis that the direct effect of a rise in per capita income on fertility was positive, and found a small positive relationship. Other aspects of economic development Heer found to depress fertility, especially infant mortality decline and improved education. Comprehensive bibliographies for studies of these general determinants of fertility decline are found in Freedman (1961-62) and Hawthorn (1970).

Literature on developed countries shows that fertility levels are related to practices of contraception and induced abortion (Freedman, 1966). Although it would seem that fertility decline has been associated with various aspects of development there have been no valid generalisations as to the relative importance of such factors as urbanisation, higher living standards, better health and education and employment of women outside the home. Stykos (1962-63) and Heer (1964-65) both noted a positive relationship between fertility and economic development in parts of Latin America, although Hawthorn (1970) is critical of their methodology. Weintraub (1962) and Freedman (1963) found a positive relationship between income measures and fertility from a large sample of nations.
In the transition from a developing to a developed society, Jaffe (1959) showed that economic growth does not automatically lead to an immediate decline in fertility. A "threshold" hypothesis was suggested by the United Nations (1963:43). According to this hypothesis, in a developing country where fertility is initially high, improving economic and social conditions are likely to have little, if any, effect on fertility until a certain economic and social level is reached; but once that level is achieved, fertility is likely to enter a decided decline and to continue downwards until it is again stabilised on a much lower plane.

Studies have found a negative relationship between education and fertility in developed and developing countries. Friedlander and Silver (1967) found that the relation only existed when education had extended over a period of some years. In the developing world, studies by Miro and Mertens (1968) based upon Latin American urban and rural areas showed no other socio-economic variable with as definite a negative relationship with fertility. Stycos (1966) supported this view and with Miro and Mertens added weight to the idea of an educational "threshold" at the end of the primary level of education, after which level there were large decreases in fertility. Roberts (1968) and Goldstein (1972) also noted negative relationships between education and fertility for Jamaica and Thailand respectively.

In the industrialised societies a negative correlation
has also been found between female employment and fertility. Freedman, Whelpton and Campbell (1959) found that in the United States working wives are more likely to use effective contraceptive methods and consequently to have fewer children. The lower fertility of working women in the U.S.S.R. is established by Davtyan (1967) and Sadvokasova (1967). However, in the developing world opinions vary concerning the existence of a relationship between employment and fertility, the direction of the assumed relation and its explanation. Weller (1968:507) wrote, "The existence of a negative relationship between female employment and fertility in less developed countries is not convincing." Goldstein (1972) also remarked on the lack of a clear pattern. Gendell (1967), Miro and Mertens (1968), Colver and Langlois (1962), Heer (1964) and Goldstein (1972) found a negative relationship between the proportion of females in the labour force and fertility. Heer and Turner (1964) established a similar relationship in fourteen out of eighteen Latin American countries.

In contrast with the general trend of these studies Stykos and Weller (1967) using data for Turkey in 1963 found fertility differences between employed and non-employed women to be slight and not statistically significant. Studies in Lima (Stykos, 1965), and Mexico (Zarate, 1967) support this conclusion.

Many studies in the developed and developing world
have noted differential urban/rural fertility rates. Robinson (1961:218) stated the "well-established and widely accepted fact that rural fertility typically is higher than urban fertility" in Western, Asian, Latin American and African populations. However, Robinson's conclusions on re-examining the urban/rural fertility differentials in India is at variance with this rule.

Urban/rural differentials in fertility and educational levels have been noted. For Jamaica, Roberts (1968:274) found that the extent of the decline in fertility for several parishes is closely correlated with the general educational status of the parishes. The parishes closest to the capital constituted a region of relatively low fertility and high educational status. Goldstein (1972) drew similar conclusions from his Thailand study.

Goldstein (1972:436) also noted the influence of the urban factor in the relationship between employment and fertility, "The analysis suggests that the lower fertility characterising the metropolitan centre probably reflects the combined effects of higher educational levels and higher rates of female labour force participation". Gendell, Maraviglia and Kreitner (1970) also showed that there was lower fertility among the economically active women in large urban places in Latin America.

Further refinements are seen in the work of Federici (1968) who found that in Italy increased female participation
in agriculture paralleled increased fertility, whereas there was a clear inverse relation in industry and service industries. This could be connected with the idea of Stycos and Weller (1967) that where female work and maternal roles are compatible there will be no reduction in fertility. Jaffe and Azumi (1960) deduced, on the experience of Puerto Rico and Japan, that fertility of women employed within the home is very similar to that of non-working women, but that women working outside the home have a markedly lower fertility. The idea of role incompatibility is also found in studies by Weller (1968) and Goldstein (1972). Goldstein's analysis pointed to a differential relation between labour force participation and fertility in rural agricultural places and in the urban centre of Bangkok.

Fertility research in the Caribbean falls under two broad classes: demographic research and family planning research. Some work has been concentrated on the region as a whole and analysis of fertility trends and the influence of family on fertility. Examples of these types of demographic research include work by Abbott (1963), Dale (1963), Braithwaite (1957), Roberts (1951, 1955, 1956), and Roberts and Braithwaite (1961). Articles on Caribbean family planning research by M.G. Smith (1958), Tietz and Alleyne (1959) and Harewood (1968) have dealt generally with the development of family planning services in the West Indies.

Major works on particular Caribbean countries have
been mainly restricted to Puerto Rico and Jamaica. The Puerto Rican fertility studies have been associated with J. Mayone Stykos. His studies (1952, 1954, 1955, & 1968) are mainly concerned with trends and patterns in fertility levels associated with the lower income group. Also on Puerto Rico Jaffe (1959) found that higher education, urbanisation and participation of women outside the home in the labour force were the main factors contributing towards a lower birth rate.

The earliest work on Jamaican fertility by Blake (1955) was of a similar nature to the early Puerto Rican studies. For Jamaica Stykos and Back (1964) suggested a strong relationship between employment status and fertility and Roberts (1968) noted a strong negative correlation between levels of education and fertility. Roberts (1968) and Eyre (1972) both noted considerable regional variations in fertility in Jamaica. The work of K.A. Smith (1968) is an example of the KAP type of family planning research in Jamaica.

The quantity of demographic research on Barbados has intensified over the last twenty years. Work by Roberts (1955) dealt with migration, an important factor in population growth at that time. The migration experience prompted an early, detailed overview of the population of Barbados by Lowenthal (1957). This descriptive, historical work noted the relatively stable birth rate of the early
1950's. This source is the only one that introduced regional differentiation into the demographic patterns described. Of the general observations it was pointed out that birth rates increased away from Bridgetown and that in urban Christ Church and St. Michael they were below the national average.

The growth of the Barbados Family Planning Association and the decline in birth rate since 1961 prompted a series of articles of the family planning research type. This is exemplified in the work of Cummins, Lovell and Standard (1965) and Roberts, Cummins, Byrne and Alleyne (1967). This latter study was based on interviews conducted in 1964 and investigated the knowledge and use of birth control among different types of family union. Byrne (1966) wrote concerning administrative arrangements of the survey. The results of the survey supported the educational "threshold" idea and found that five years of education was a critical level for the spread of contraceptive knowledge. Functional literacy, over four years of formal schooling, was necessary for a detailed knowledge and use of contraceptive devices.

Nag (1971) examined the influence of conjugal behaviour, migration and contraception on Barbadian birth rates. His survey, based on field investigation, concluded that the rapid decline in birth rate could be explained by increased use of contraceptives. The pre-1961 pattern was more related to instability of union, the pattern of
emigration and some induced abortion. Most recent studies by Nobbe, Ebanks and George (1973) have confirmed that the use of contraceptives and migration are major contributing factors to the recent decline in birth rate. Many reports have come from the last named authors who are based at the University of Western Ontario. Their research project has been primarily aimed at assessing the extent of the effectiveness of the Barbados Family Planning Association. Balakrishnan (1973), who was associated with this project, published a cost benefit analysis of the Association. The research project has also concluded that there is a positive relationship between the number of partnerships and the average number of live births, which contradicts the previously held relationship that the more stable the sex union the higher the fertility.

Barbados is at an intermediate stage of development, and is acknowledged to be one of the more developed countries in the Caribbean area. Much attention has been focused on the apparent success of the family planning programme in Barbados, but as yet no in-depth studies have been undertaken of any of the socio-economic determinants of fertility levels, either on a national or regional scale. Of the socio-economic variables it is the major objective of this study to see whether there is a relationship between female status and fertility.
Relationship of the Study to the Literature.

The literature review revealed that in the developing world there is no firmly established relationship between female status and fertility although the United Nations (1971:56) considered that the two were connected. The main objective of this study is to establish whether there is a relationship between female status and fertility in Barbados, with reference to the time period 1960-1970.

Special attention has been paid to those studies that have sought a relationship between levels of female education and occupational status of women and fertility and on whether these relationships vary between characteristically urban and rural areas. One purpose of this study is to see whether there is a relationship between educational attainment of working women in Barbados and fertility, and whether there is any regional pattern in this relationship.

Quantitative studies have also been detailed that sought a relationship between female occupational status and fertility. No firm consensus of opinion has been arrived at as to the strength and direction of this relationship in developing societies, although a negative relationship has generally been found in developed societies. This study proposes to establish whether there is a relationship between occupational status of Barbadian women and fertility, and whether there are any regional differences in the relation-
ship, noting especially contrasts between the more urbanised parishes and the rural areas.

The literature review leads one to suspect that there will be regional fertility differences in a developing society associated with different levels of socio-economic development. One would expect that regional differences in socio-economic development would be reflected in differing attitudes on desired family size, the knowledge and use of contraception and hence on fertility rates.

For Barbados and the Caribbean there has been considerable stress on the socio-demographic factors that affect fertility but there have been only brief references to the connection between fertility and socio-economic development. This study will then examine female status, an aspect of socio-economic development, and fertility in Barbados to see whether a relationship can be established for the time period 1960-1970.

**Derivation of Hypotheses**

The hypotheses set out in this section have been derived to establish whether there is a relationship between fertility of women and female status, as illustrated by educational attainment and occupational status of working women.
The literature has shown that opinion is divided as to whether the fertility of women differs from that of working women. On the one hand, Heer and Turner (1964:282) after analysing census areal data for the provinces of eighteen countries in Latin America concluded that "the single variable showing the highest relation with the child-woman ratio is the proportion of women in the labour force... in 14 out of 18 nations the multiple regression coefficient for this variable was also negative." In contrast the United Nations (1953:78) found that studies "showing the total proportion of women recorded in censuses as gainfully employed......have not established the fact that increased employment of women is a major factor in the decline of family size." The following hypothesis was formulated to investigate the difference between the means of the fertility of women and working women in Barbados in 1971:

Hypothesis 1: There was a difference between the means of the fertility of women and working women in Barbados in 1971.

Though a variety of methods of measuring fertility decline are used in this study they all show that there has been an appreciable decline in the birth rate in Barbados between 1960 and 1970. Using the crude birth rate figure this decline is over 10 points. Before examining the factors associated with this decline it is necessary to test the hypothesis that the decline has been significant.
Hypothesis 2: There has been a significant decline in fertility in Barbados between 1960 and 1970.

It has also been asserted that there has been a change in female status during the 1960 decade in Barbados. This assumption was made from a study of recent economic and social developments in Barbados and from a preliminary analysis of the Census data for 1960 and 1970. The literature review has also noted changes in female status in the developing world that followed the introduction of a modern sector into the economy. In reply to a United Nations questionnaire on the Participation of Women in the Economic and Social Development of their Countries in 1967 Barbados noted that there is a more general trend for more active participation of women in the economic and social life of the island. This has led to the formation of Hypothesis 3:

Hypothesis 3: There has been a significant improvement in female status in Barbados between 1960 and 1970.

Friedlander and Silver (1967), Miro and Mertens (1968), Roberts (1968) and Goldstein (1972) have noted a negative relationship between women's educational attainment and fertility for countries in the developing world. Studies by Gendell (1967), Miro and Mertens (1968), Collver and Langlois (1962), Heer (1964) and Goldstein (1972) have
also found a negative relationship between the proportion of women in the labour force and fertility. Heer and Turner (1964) developed the idea of role incompatibility where there should be a relationship between fertility and employment where the role of mother and worker are incompatible. In the traditional sectors of the Barbadian economy, with traditional social values, the role of mother and worker are more compatible than they are in the modern sectors of the economy. Using educational levels and occupational status of working women in Barbados it is then necessary to examine whether fertility and female status are related, and whether this relationship is maintained in view of the changes in fertility and female status during the 1960's.

Hypothesis 4: There is a relationship between fertility and female status in Barbados in

i) 1960

ii) 1970.
Chapter II

DEMOGRAPHIC BACKGROUND

Before testing the validity of the hypotheses a brief review of the demographic background to Barbados from the mid twentieth century is provided to set the study in context. The overview will give a more detailed account of the study variables, specifically fertility and female status, and of the relevant socio-economic-demographic background that underlies the fertility pattern.

Barbados is the smallest independent island in the British West Indies, with the exception of newly independent Grenada. Historically Barbados has remained British from its original settlement in 1627 until Independence in 1966. Its early history and population growth was inextricably bound up with the sugar industry, which dominated the economy from the 1640's until the 1960's.

The 166 square mile island is divided into eleven parishes (Fig. 2 ). To some extent there is a grouping of these parishes according to physical landscape and economic activity (Figs. 3 & 4 ). The Scotland District, making up most of St. Andrew and St. Joseph, could be considered as one of the poorest areas of the island, of hilly relief and
BARBADOS
PHYSICAL
GEOGRAPHY

1: PHYSICAL
- over 900 ft.
- 600 - 900
- 200 - 600
- under 200

2: RAINFALL
- over 70 ins.
- 60 - 70
- 50 - 60
- under 50

3: SOILS
- Scotland
- Red Earth
- Black Earth

Source: Barbados Industrial Development Corporation
subject to damaging soil erosion. Currently its sugar production is very limited and hopes to diversify the agriculture of the area have not born fruit. The central parishes of St. Thomas, St. George and St. John are traditionally fairly productive and fertile areas. At the northern and eastern extremities of the island St. Lucy and St. Philip are the driest areas with limited agricultural possibilities, although changes are taking place. Examples include irrigation, and tourist and residential developments in St. Philip. Over 80% of the total population live in Bridgetown/St. Michael, Christ Church, St. James and St. Peter. This concentration is associated with the sheltered Caribbean coast of the island, the development of tourism, the spread of light manufacturing and the growth of Bridgetown.

Although it is difficult to make broad generalisations at the parish level some parishes can be considered more urban than others. Ebanks and Gilkes (1973:6) thought it not very meaningful to talk about rural/urban distinctions in such a densely populated island. However Lowenthal (1957:471) noted that "Bridgetown and its suburbs in St. Michael, Christ Church and St. James together make up an 'urban' area which contrasts sharply with the 'country'." In spite of the good communications network Lowenthal (1957:469) found that many people in the rural parishes rarely venture more than a few miles from home.
St. Michael and the City of Bridgetown totalled 56.4% of the island population in 1970. According to Ebanks and Gilkes (1973:6) Bridgetown, the parish of St. Michael and Christ Church form the urban complex and the urban area stretches along the coast from Oistins in Christ Church to Speightstown in St. Peter. Speightstown is the second largest town and Oistins the third and the Physical Development Plan (1970:14) includes them as future regional centres in the hierarchy of settlements under metropolitan Bridgetown. The urban area includes the parishes of Christ Church, St. Michael, St. James and St. Peter, yet, with the exception of St. Michael, all of these parishes include characteristically rural areas. The most rural parishes are St. Lucy, St. Joseph, St. John, St. Philip, St. George, St. Thomas and St. Andrew, which includes the small town of Belleplaine.

Referring to Table 1 on Population Density it is clear that Bridgetown/St. Michael must be considered urban. Christ Church has above average population density and with St. James could be considered as partially urban. The remaining parishes could be classified as predominantly rural, but as exemplified by St. Peter, it should not be forgotten that they may contain urban centres.

With this urban/rural distinction in mind this overview will examine aspects of the demography of the island
<table>
<thead>
<tr>
<th>Location</th>
<th>Density Per Sq. Mi.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown/St. Michael</td>
<td>6530</td>
</tr>
<tr>
<td>Christ Church</td>
<td>1574</td>
</tr>
<tr>
<td>St. George</td>
<td>998</td>
</tr>
<tr>
<td>St. Philip</td>
<td>717</td>
</tr>
<tr>
<td>St. John</td>
<td>783</td>
</tr>
<tr>
<td>St. James</td>
<td>1097</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>793</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>835</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>522</td>
</tr>
<tr>
<td>St. Peter</td>
<td>817</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>642</td>
</tr>
<tr>
<td>Barbados</td>
<td>1414</td>
</tr>
</tbody>
</table>

before more specifically examining the demographic and socio-economic determinants of the Barbadian fertility pattern.

1) Age and Sex

The age and sex distribution for Barbados in 1946, 1960 and 1970 is shown in Fig 5. The most pronounced general features are the sexual imbalance in 1960 in the 26-60 male age group and the changing shape of the base of the pyramid. The former largely resulted from an out migration of males and the latter from high birth rates until 1960 followed by a decreasing rate, which caused the base of the pyramid to approach the classic bell shape in 1970. It was a desire to investigate the factors behind this that motivated the present study.

The main regional age characteristics are given in Table 2. This shows a high proportion of young people under 15 in Barbados, comprising 37.0% of the island's population in 1970. The proportion of young people is higher in the rural parishes, being over 40% in St. Thomas, St. Joseph and St. Andrew in 1970. In contrast more people in the over 45 age group are found in the more urban parishes. There has been a decrease in the proportion of people in the 15-44 age group in all parishes since 1946, reflecting changes in birth rate, longevity and migration.
AGE-SEX PYRAMIDS

1946

1960

1970

Source: 1946, 1960, 1970 Censuses
### Table 2

Regional Age Characteristics, 1946, 1960, 1970

<table>
<thead>
<tr>
<th></th>
<th>1946</th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-</td>
<td>15-</td>
<td>0-</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>44</td>
<td>45+</td>
</tr>
<tr>
<td>Bridgetown</td>
<td>29.0</td>
<td>48.3</td>
<td>22.7</td>
</tr>
<tr>
<td>St. Michael</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christ Ch.</td>
<td>32.7</td>
<td>46.1</td>
<td>21.2</td>
</tr>
<tr>
<td>St. George</td>
<td>36.4</td>
<td>44.3</td>
<td>19.3</td>
</tr>
<tr>
<td>St. Philip</td>
<td>36.6</td>
<td>43.7</td>
<td>19.7</td>
</tr>
<tr>
<td>St. John</td>
<td>37.4</td>
<td>44.8</td>
<td>17.8</td>
</tr>
<tr>
<td>St. James</td>
<td>34.4</td>
<td>45.9</td>
<td>19.7</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>36.1</td>
<td>44.4</td>
<td>19.5</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>38.4</td>
<td>44.4</td>
<td>17.2</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>41.3</td>
<td>42.2</td>
<td>16.5</td>
</tr>
<tr>
<td>St. Peter</td>
<td>36.3</td>
<td>45.4</td>
<td>18.3</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>36.4</td>
<td>44.1</td>
<td>19.5</td>
</tr>
<tr>
<td>Barbados</td>
<td>33.2</td>
<td>46.1</td>
<td>20.7</td>
</tr>
</tbody>
</table>

In Barbados in 1946 there were 800 men per 1000 women. By 1970 this had increased to 885 men. Regional sex ratios are given in Table 3. Mag (1971:115) wrote that the unbalanced sex ratio is primarily due to sex selective emigration from the island, which has been an important phenomenon since the middle of the last century. Table 3 shows that at no time in any parish has there been an excess of males over females and that the greatest disparity in all parishes was in 1946. In 1960 and 1970 the greatest disparity occurred in the more urban parishes of Bridgetown/St. Michael and Christ Church, which probably reflects internal migration movements. Roberts (1955:219) suggested that the absence of men caused a reduction in the chances of conception for many women, in which case, ceteris paribus, a more normal sex ratio would tend to raise the birth rate. However, as the sex ratio has tended to become more balanced since 1960 the birth rate has dropped.

ii) Race

Mack (1965:145) wrote that "despite the dwindling for three centuries of the white population, Barbados remained in 1940 a plantocracy, governed politically, economically and socially by whites". The whites made up 7.0% of the population in 1921 and 3.9% in 1970. Barbados still contains a higher proportion of whites than any other British West Indian territory. Lowenthal (1957:468) considered that Barbados was the most rigid of the islands
### Table 3

**Sex Ratios: Males per 1,000 females**

<table>
<thead>
<tr>
<th>Location</th>
<th>1946</th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown</td>
<td>740</td>
<td>765</td>
<td>836</td>
</tr>
<tr>
<td>St. Michael</td>
<td>753</td>
<td>796</td>
<td>847</td>
</tr>
<tr>
<td>Christ Church</td>
<td>790</td>
<td>826</td>
<td>881</td>
</tr>
<tr>
<td>St. George</td>
<td>839</td>
<td>863</td>
<td>915</td>
</tr>
<tr>
<td>St. Philip</td>
<td>852</td>
<td>878</td>
<td>933</td>
</tr>
<tr>
<td>St. John</td>
<td>866</td>
<td>892</td>
<td>934</td>
</tr>
<tr>
<td>St. James</td>
<td>827</td>
<td>827</td>
<td>871</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>839</td>
<td>892</td>
<td>951</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>854</td>
<td>913</td>
<td>938</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>926</td>
<td>933</td>
<td>976</td>
</tr>
<tr>
<td>St. Peter</td>
<td>817</td>
<td>859</td>
<td>929</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>820</td>
<td>830</td>
<td>915</td>
</tr>
<tr>
<td>Barbados</td>
<td>800</td>
<td>832</td>
<td>885</td>
</tr>
</tbody>
</table>

with respect to colour distinctions and found that social barriers were strong and enduring.

Whites are found throughout the island but the greatest concentration is in Christ Church where they comprised 10.5% of the population in 1970. Historically a group of whites has been located in St. John as is shown on Lowenthal's maps (1957:477). Because of their distribution and their relatively small numbers the whites are not important in the demography of Barbados, Lowenthal (1957:468) wrote that "the demographic significance of Barbados' whites is slight at best, since they have only one twentieth of the local population".

Census records for 'black' and 'mixed' racial groups in 1960 and 1970 reflect changes in racial self image and fashions in ethnicity and as such are not comparable. It is also not meaningful in the Caribbean context to distinguish between these groups for as Lowenthal (1971:376) noted, the West Indian experience has not been characterised by a black-white dichotomy. In the Caribbean race is expressed as a colour continuum, so that it is very difficult, and perhaps irrelevant, to precisely identify race.

There are other ethnic groups recorded in the Barbadian Censuses. These minority groups include Syrians and Lebanese, Portuguese, Chinese and East Indians and other
European and American races. Together these groups comprised less than 1% of the total population in 1970. Unlike Trinidad and Guyana, Barbados does not have a large group of East Indians and Barbados cannot be classed as a plural society although it does exhibit some colour and class stratification which still persists, although becoming less pronounced.

iii) Fertility

National and regional changes in fertility levels form the key dependent study variable. For introductory purposes crude birth rate figures, shown in Fig. 6 and Table 4, illustrate the national changes in fertility. In the 1940's and 1950's the birth rate was low for the Caribbean area. Reductions in the Barbadian birth rate since 1960 have made the rate comparable with many of the world's developed nations. This experience has been unique in the British West Indies and as such has been much studied.

The national decline in birth rate since 1960 is also seen at a regional level in Table 5. The largest declines over the decade occurred in St. Peter, St. Joseph, and St. Lucy and the smallest decline occurred in St. Andrew. In 1960 birth rates below the national average were recorded in Christ Church, St. Andrew, St. James and Bridgetown/St. Michael whereas in 1970 they were recorded in St. Joseph, Christ Church, St. Peter, Bridgetown/St. Michael. Birth
CRUDE BIRTH AND DEATH RATES

RATE PER 1000 POPULATION

BIRTH RATE

DEATH RATE

YEARS

Table 4

Crude Birth, Death & Natural Increase Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Births</th>
<th>Birth Rate</th>
<th>Number of Deaths</th>
<th>Death Rate</th>
<th>Natural Increase</th>
<th>N.I. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>6175</td>
<td>30.3</td>
<td>3289</td>
<td>17.0</td>
<td>2886</td>
<td>13.3</td>
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<tr>
<td>1947</td>
<td>6425</td>
<td>32.6</td>
<td>3204</td>
<td>16.3</td>
<td>3221</td>
<td>16.3</td>
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<td>1948</td>
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<td>3141</td>
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<td>3376</td>
<td>18.8</td>
</tr>
<tr>
<td>1949</td>
<td>6549</td>
<td>32.0</td>
<td>2979</td>
<td>14.6</td>
<td>3570</td>
<td>17.4</td>
</tr>
<tr>
<td>1950</td>
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<td>3744</td>
<td>17.9</td>
</tr>
<tr>
<td>1851</td>
<td>6793</td>
<td>32.0</td>
<td>3000</td>
<td>14.2</td>
<td>3793</td>
<td>17.8</td>
</tr>
<tr>
<td>1952</td>
<td>7291</td>
<td>33.7</td>
<td>3186</td>
<td>14.7</td>
<td>4105</td>
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<tr>
<td>1953</td>
<td>7304</td>
<td>33.1</td>
<td>2997</td>
<td>13.6</td>
<td>4307</td>
<td>19.5</td>
</tr>
<tr>
<td>1954</td>
<td>7576</td>
<td>33.7</td>
<td>2544</td>
<td>11.3</td>
<td>5032</td>
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<td>4706</td>
<td>20.6</td>
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<tr>
<td>1956</td>
<td>7082</td>
<td>31.0</td>
<td>2430</td>
<td>10.6</td>
<td>4652</td>
<td>20.4</td>
</tr>
<tr>
<td>1957</td>
<td>7314</td>
<td>32.4</td>
<td>2469</td>
<td>10.9</td>
<td>4845</td>
<td>21.5</td>
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<tr>
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<td>7115</td>
<td>31.2</td>
<td>2298</td>
<td>10.1</td>
<td>4817</td>
<td>21.1</td>
</tr>
<tr>
<td>1959</td>
<td>7110</td>
<td>30.7</td>
<td>2084</td>
<td>9.0</td>
<td>4026</td>
<td>21.7</td>
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<tr>
<td>1960</td>
<td>7833</td>
<td>33.6</td>
<td>2127</td>
<td>9.1</td>
<td>5706</td>
<td>24.5</td>
</tr>
<tr>
<td>1961</td>
<td>6754</td>
<td>29.0</td>
<td>2410</td>
<td>10.4</td>
<td>4344</td>
<td>18.6</td>
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<td>20.4</td>
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<td>1963</td>
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<td>2090</td>
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<td>4666</td>
<td>19.7</td>
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<td>1964</td>
<td>6506</td>
<td>27.0</td>
<td>2127</td>
<td>8.8</td>
<td>4379</td>
<td>18.2</td>
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<td>1965</td>
<td>6358</td>
<td>26.1</td>
<td>1905</td>
<td>7.8</td>
<td>4453</td>
<td>18.3</td>
</tr>
<tr>
<td>1966</td>
<td>6319</td>
<td>25.6</td>
<td>2012</td>
<td>8.2</td>
<td>4307</td>
<td>17.4</td>
</tr>
<tr>
<td>1967</td>
<td>5455</td>
<td>21.9</td>
<td>2047</td>
<td>8.2</td>
<td>3408</td>
<td>13.7</td>
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<tr>
<td>1968</td>
<td>5475</td>
<td>21.7</td>
<td>2045</td>
<td>8.1</td>
<td>3429</td>
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<tr>
<td>1969</td>
<td>5196</td>
<td>20.5</td>
<td>1987</td>
<td>7.8</td>
<td>3209</td>
<td>12.7</td>
</tr>
<tr>
<td>1970</td>
<td>4939</td>
<td>20.4</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Table 5

**Regional Crude Birth & Death Rates**

<table>
<thead>
<tr>
<th></th>
<th>Birth Rate</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown/St.Michael</td>
<td>33.4</td>
<td>19.4</td>
<td>9.8</td>
<td>14.4</td>
</tr>
<tr>
<td>Christ Church</td>
<td>29.0</td>
<td>18.7</td>
<td>8.1</td>
<td>2.3</td>
</tr>
<tr>
<td>St. George</td>
<td>34.8</td>
<td>23.1</td>
<td>8.9</td>
<td>6.4</td>
</tr>
<tr>
<td>St. Philip</td>
<td>34.1</td>
<td>22.1</td>
<td>8.9</td>
<td>6.2</td>
</tr>
<tr>
<td>St. John</td>
<td>38.7</td>
<td>25.3</td>
<td>8.7</td>
<td>4.0</td>
</tr>
<tr>
<td>St. James</td>
<td>31.3</td>
<td>23.8</td>
<td>8.4</td>
<td>4.6</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>39.5</td>
<td>25.1</td>
<td>10.3</td>
<td>3.4</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>36.5</td>
<td>17.9</td>
<td>10.5</td>
<td>3.4</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>30.1</td>
<td>26.2</td>
<td>7.9</td>
<td>3.4</td>
</tr>
<tr>
<td>St. Peter</td>
<td>39.1</td>
<td>19.2</td>
<td>9.1</td>
<td>13.0</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>36.8</td>
<td>20.6</td>
<td>7.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Barbados</td>
<td>33.7</td>
<td>20.8</td>
<td>9.2</td>
<td>8.8</td>
</tr>
</tbody>
</table>

rates are calculated from registration of births and recorded in *Reports on Vital Statistics and Registrations.* Because of possible under registration of births and different registration rates in different parishes a different indicator of fertility may be used based on Census enumeration.

This index of fertility is the child-woman ratio, which is the number of children aged between 0 and 4 years that have been born to women of 15-44 years. This index, on Table 6, shows that in all parishes the rate was lower in 1970 than in 1960 and that in both cases the rates are lowest for St. Michael, Christ Church and St. James. There was a much greater variance from the mean in 1960 than 1970. In 1960 the standard deviation from the mean of 742 was 91 and in 1970 it was 76 from a mean of 611. Under whatever index of fertility used there has been an appreciable decline in fertility since 1960.

iv) Mortality

Lowenthal (1957:459-60) remarked, "It is surprising that with almost the lowest birth rate, and in some ways the highest standard of living in the British Caribbean, Barbados' death rate is the highest save for the Windward Islands." However, figures in Table 4 show that there has been a decline in the absolute number of deaths since 1946 but considerable annual fluctuations, and a decline in the death
Table 6

Child Woman Ratio

<table>
<thead>
<tr>
<th></th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Michael</td>
<td>581</td>
<td>504</td>
</tr>
<tr>
<td>Christ Church</td>
<td>611</td>
<td>511</td>
</tr>
<tr>
<td>St. George</td>
<td>746</td>
<td>607</td>
</tr>
<tr>
<td>St. Philip</td>
<td>734</td>
<td>560</td>
</tr>
<tr>
<td>St. John</td>
<td>758</td>
<td>630</td>
</tr>
<tr>
<td>St. James</td>
<td>666</td>
<td>558</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>817</td>
<td>688</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>797</td>
<td>698</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>914</td>
<td>753</td>
</tr>
<tr>
<td>St. Peter</td>
<td>744</td>
<td>573</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>796</td>
<td>637</td>
</tr>
<tr>
<td>Barbados</td>
<td>742</td>
<td>611</td>
</tr>
</tbody>
</table>

rate from 17.0 per 1000 in 1946 to 7.8 in 1970. Emphasising the importance of the decline Harewood (1968:874) stressed that it occurred during a period of increase in total population. Regional death rates are shown in Table 5. On the parish level there seem to be considerable fluctuations in death rates between 1960 and 1970. Both Bridgetown/St. Michael and St. Peter recorded higher death rates in 1970 than 1960, possibly influenced by the larger number of aged people in the urban areas.

The high death rate recorded in Barbados in the 1940's and 1950's was linked with high infant mortality rates, which Harewood (1968:875) noted are often connected in developing countries. Nowhere in the Caribbean was there such a high infant mortality rate and nowhere has there been such an appreciable decline. There has been much discussion on the unexpected high infant mortality rate. Lowenthal (1957:464) placed the blame at the door of the archaic pattern of Barbadian medical services and the general attitude towards public health, noting, "By and large the parochial system, together with Barbadian pride and conservatism, prevents many from getting timely medical care". With the growth of centralised medical services and improvement in socio-economic conditions the death rate dropped.

The infant mortality rate fell from a level of 275 per 1000 live births in 1921 to 160 in 1946, 60 in 1960 and
by 1969 had reached 42 per 1000. Infant mortality has now reached such a low level that figures for regional differences, Table 7, have become less meaningful.

The improved mortality position has led to a doubling of life expectancy over a period of 45 years. J. Byrne (unpublished paper:6) calculated that for 1920-22 the life expectancy for males was 28.52 and 31.88 for females. By 1964-65 this had risen to 65.50 for males and 70.92 for females. This increase in life expectancy would affect the reproductive age span of the populace and fertility would be expected to increase, other things being equal.

v) Migration

Only movements in external migration will be documented in this section, internal movements being referred to under the population distribution section. Byrne (unpublished paper:9) noted that "Records of migration have traditionally been the weakest link in the chain of demographic records available for the region". Nineteenth and twentieth century movements are well documented in an article by Roberts published in 1955. He found that migration loss in the period 1861 - 1921 was 103,500. The net migration loss was reduced in 1921 because of restrictions imposed by the United States. Byrne (unpublished paper:10) estimated that 18,700 people emigrated between
Table 7

Infant Mortality

<table>
<thead>
<tr>
<th></th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stillbirths*</td>
<td>Infant** Deaths</td>
</tr>
<tr>
<td>Bridgetown/ St. Michael</td>
<td>69</td>
<td>181</td>
</tr>
<tr>
<td>Christ Church</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>St. George</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>St. Philip</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>St. John</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>St. James</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>St. Peter</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Barbados</td>
<td>163</td>
<td>472</td>
</tr>
</tbody>
</table>

* per 1,000 live births
+ under 1 year old

1946 and 1960, the movement being mainly to the United Kingdom; since 1960 there has been a tendency towards migration to North America.

Migration movements have been age and sex selective as has been pointed out with reference to the age sex pyramids. The 1950's emigration involved a sizable proportion of the skilled and semi-skilled male section of the working force. The 1960's movement was seen by Byrne (unpublished paper:11) as involving skilled and semi-skilled females. For the period since the 1940's there are no reliable available records for external migrations from the different parishes.

vi) Natural Increase and Population Growth

The natural increase rate shown in Table 4 is calculated from fertility and mortality rates. The natural increase rate rose steadily from 13.3 per 1000 in 1946 to 22.4 per 1000 in 1954. For the next eight years it tended to stabilise around a mean of 21.1 and then from 1962 decreased from 20.4 to a provisional 1972 figure of 12.0. The decrease in the natural increase rate is primarily the result of declining birth rate and stable death rate during the last decade.

Population growth rates for the 1960-70 decade are
given in Table 8. The period from 1921-61 showed rates of growth in excess of 1.0% per annum, a rate that had not been experienced since the mid nineteenth century. This growth rate reflected high fertility rates and substantial mortality decline. The reduction in the growth rate since 1960 principally reflects the declining fertility rate.

vii) Population Distribution

The net result of population movements, both external and internal, and changes in birth and death rates is shown on Fig. 7. Between 1960 and 1970 there was a loss of population in eight parishes, which was largely the result of the urbanisation process. During the 1960's the population in the parishes of St. Thomas and Christ Church increased as did that in St. Michael, although there was a decline in Bridgetown. (Ref. Table 9).

Fig. 8 shows the population distribution on the island, again stressing the dominance of urban Bridgetown/ St. Michael and the west and south coast areas. During the twentieth century these areas have gained at the expense of the parishes more distant from Bridgetown. Lowenthal (1957:477) found that migration rather than fertility and mortality differences explained the growth of the Bridgetown area and the decline in population in the more remote parishes. He did however also record that there was greater natural increase away from Bridgetown related to higher birth rates.
Table 8

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>0.6</td>
</tr>
<tr>
<td>1965</td>
<td>0.9</td>
</tr>
<tr>
<td>1966</td>
<td>1.3</td>
</tr>
<tr>
<td>1967</td>
<td>1.0</td>
</tr>
<tr>
<td>1968</td>
<td>0.9</td>
</tr>
<tr>
<td>1969</td>
<td>0.3</td>
</tr>
</tbody>
</table>

1970
1971  1.1
1972^p -1.0

P = Provisional

Note: Revised Estimates from 1970 based on 1970 Population Census.

POPDULATION GROWTH

Source: 1946, 1960, 1970 Censuses
Table 9

Population Totals by Parish

<table>
<thead>
<tr>
<th></th>
<th>1946</th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown</td>
<td>76437</td>
<td>11452</td>
<td>8868</td>
</tr>
<tr>
<td>St. Michael</td>
<td>82264</td>
<td></td>
<td>88697</td>
</tr>
<tr>
<td>Christ Church</td>
<td>24963</td>
<td>33425</td>
<td>35189</td>
</tr>
<tr>
<td>St. George</td>
<td>14876</td>
<td>17075</td>
<td>16810</td>
</tr>
<tr>
<td>St. Philip</td>
<td>14409</td>
<td>17255</td>
<td>16841</td>
</tr>
<tr>
<td>St. John</td>
<td>10096</td>
<td>10967</td>
<td>10524</td>
</tr>
<tr>
<td>St. James</td>
<td>11297</td>
<td>13611</td>
<td>13379</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>8486</td>
<td>10026</td>
<td>10539</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>7712</td>
<td>8582</td>
<td>7849</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>7581</td>
<td>7813</td>
<td>7163</td>
</tr>
<tr>
<td>St. Peter</td>
<td>9127</td>
<td>10860</td>
<td>10622</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>7816</td>
<td>8997</td>
<td>8748</td>
</tr>
<tr>
<td>Barbados</td>
<td>192800</td>
<td>232327</td>
<td>235229</td>
</tr>
</tbody>
</table>

and lower death rates.

After this brief demographic background provided to establish a setting for the study, a more detailed review of the factors affecting fertility in Barbados will be attempted concentrating on family planning, which has been shown to influence fertility on the island and then on the socio-demographic and socio-economic factors that affect fertility.

Family Planning in Barbados

Following concern for the problem of over-population a Report of the Joint Committee by the two Houses of the Legislature to Examine the Question of Over-Population in 1954 made a strong recommendation for family planning. As a result of this a voluntary family planning association was formed in May 1954. This was the first officially sanctioned organisation in the Western Hemisphere (Nag, 1971:118). One year later the first local clinic was opened. Nag (1971:106) noted that since the late 1960's the use of modern contraceptives has become relatively common. Evans and Gilkes (1973:25) stated that family planning is now fully accepted and has become a way of life.

The Barbados Family Planning Association is a voluntary organisation which receives an annual subvention from Government and an annual grant from I.P.P.F. The
The history of the Association is well documented in *The Barbados Family Planning Association Annual Reports* and *Barbados: A Demographic Profile* by Ebanks and Gilkes. Measures of the Association's growth can be seen through increases in staff, the number of clinics operated and the growth in the number of acceptors. The Association has grown to currently employ 28 paid staff. Until recently services have been provided in 13 clinics situated in different localities all over the country and shown on Fig 9. These clinics are situated in Government Health Centres "spread over the country at vantage points in relation to the population distribution" (Ebanks and Gilkes, 1973:17). These clinics had been in operation for 10 years and appeared adequate to meet the needs of the Barbadian inhabitants. However upon the recommendation of the I.P.P.F. and from a survey of attendance figures four clinics were closed in 1973. The remaining stations are located in Bridgetown at Bay Street, Enmore Health Centre, Nutrition Clinic, Queen Elizabeth Hospital and the Child Care Clinic. Other stations are at Oistins Health Centre, Speightstown and St. Philip Health Centres and Gall Hill.

According to Ebanks and Gilkes (1973:25) the Association recruits on the average 300 new acceptors monthly, with a total of 28,284 acceptors out of an average of 50,000 women in the 15-44 age group.¹ The B'dos. Family Planning Assn.

¹ Balakrishnan (1973:353) reported that in 1970 there were an estimated 10,000 clients of the B.F.P.A., about 20% of all women of reproductive age.
imports its own contraceptives but in addition there is an increasing amount of commercial contraceptive importation.

<table>
<thead>
<tr>
<th>Year</th>
<th>Commercial Contraceptives Imported</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>approx. 600 cycles of oral pill</td>
</tr>
<tr>
<td>1967</td>
<td>10,000</td>
</tr>
<tr>
<td>1970</td>
<td>17,000</td>
</tr>
<tr>
<td>1962</td>
<td>10,000 doz. condoms p.a.</td>
</tr>
<tr>
<td>1965</td>
<td>13,000</td>
</tr>
<tr>
<td>1970</td>
<td>22,000b</td>
</tr>
</tbody>
</table>

Source: Ebanks and Gilkes 1973:23

Ebanks and Gilkes (1973:23) found a substantial use of contraceptives outside the Association with approximately one-third of all contraceptive use on the island taking place among non-clients of the B.P.P.A. These users are the middle and upper socio-economic groups, whereas the Association, from its inception, has given priority to the lower socio-economic group. It is almost impossible to assess the impact of the Association on the knowledge, attitudes, and practices of the non-clients.

Family Planning and Fertility Levels

The desire for children influences the use or non-use
of family planning methods. Two surveys undertaken in Barbados show the changing attitudes on the acceptance and adoption of family planning methods. Nag (1971:120) found that women in his sample taken in 1968 were generally favourable to birth control. This attitude differed greatly from Greenfield's respondents (1966:109) in 1956-57 who believed that a woman failing to bear all the children she is capable of bearing would suffer from high blood pressure and other diseases. Roberts et al. (1967:598) found that 3/4 of a sample of 1512 women of reproductive age interviewed in 1964 were fully aware that fertility could be controlled. The problem was no longer that of furthering the spread of knowledge about family planning but rather of increasing the relatively low number of women (36%) who have made efforts to control the size of their families.

Recent studies have been conducted to investigate how effective the B.F.P.A. has been in the reduction of the birth rate since 1960. The role of contraception has been stressed by Nag (1973:122); "The rapid decline of birth rates in Barbados since 1962 can be explained by the increasing use of contraceptives." This is irrespective of whether increased use was directly or indirectly motivated by the Association. Nag noted that favourable attitudes toward contraception had increased a great deal since the inception of the B.F.P.A. and he surmised that attitudes toward timing and limiting children had also changed in the decade 1961-71.
Ebanks, Nobbe and George (1973b:5-6) found that the B.F.P.A. was one factor which contributed to the decline of fertility on the island based on substantial evidence of the reduction in fertility of the Association's clients. They also considered it reasonable to conclude that the B.F.P.A. can receive a portion of the credit for having communicated the importance of family planning to non-clients. Balakrishnan (1973:360) estimated that the number of births directly averted by the Association between 1961 and 1970 was 7913.

The research noted has established that contraception and the B.F.P.A. have contributed towards fertility decline in Barbados since 1960. It is now necessary to turn to other background factors that could influence fertility.

Factors Influencing Fertility in Barbados

Other socio-demographic and socio-economic factors that have been seen by different authorities as influencing birth rate in Barbados will be categorised below.

Socio-Demographic Factors

1) Number of childless women

Harewood drew the connection between fertility and the number of childless women in the Caribbean but Census material on Barbados does not provide the necessary data.
It is probable that the number of childless women plays a very minor role in fertility changes. It has been established that the child-woman ratio declined between 1960 and 1970 and this could be indicative of an increase in the number of childless women. The change in the gross reproduction rate from 1.90 in 1945-47 to 2.15 in 1961 and 0.70 in 1970 might also indicate a possible increase in the number of childless women since 1961. With the large number of young women entering employment in the more urban areas there is further reason to suppose that an increase in the number of childless women would be likely and hence fertility would be reduced.

ii) Sex Ratio

The parish sex ratios shown in Table 3 could influence the birth rate as has been indicated earlier. On the national level changes in the number of males per 1000 females in the 15-44 age group have shown a considerable increase in the past decade.

Table 11

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>845</td>
</tr>
<tr>
<td>1960</td>
<td>809</td>
</tr>
<tr>
<td>1970</td>
<td>903</td>
</tr>
</tbody>
</table>

It would however be expected that a more normal sex ratio would tend to increase fertility, but this has not been the experience of Barbados. The parish age-sex pyramids (Figs 10 & 11) show the relative lack of males in the 15-44 age group, especially pronounced in 1960. In spite of this relative shortage in 1960 the fertility rate was high as shown by the widening base of the pyramid. By 1970 the effect of reduced fertility is seen at the base of the pyramids.

iii) Infecundity and Abortions

Studies on infecundity, the limitation of reproductive capacity, have not been undertaken in Barbados. It is possible that such things as disease, alcoholism and rising stress levels may influence fertility but it is expected that the influence on crude birth rates would be negligible. Ebanks, George and Nobbe (1973b:7) wrote, "Our best guess would be that the incidence of infecundity has been understated and that its impact on fertility would be most apparent among women in older age groups."

Estimates of the incidence of abortion vary and in a very conservative society like Barbados it is difficult to be precise. Nag (1971:117) felt that until 1951 induced abortion was probably the main method of controlling birth. Lowenthal (1957:466) stated that despite a law of 1868 against administering drugs "or other noxious things" to
PARISH AGE-SEX PYRAMIDS 1960

Source: 1960 Census
PARISH AGE-SEX PYRAMIDS 1970

Source: 1970 Census
induce an abortion, on penalty of penal servitude from three years to life, abortions were known to be common. Greenfield (1966:109) also reported the occurrence of abortion. Ebanks and Gilkes (1973:11) considered that perhaps as many as one out of every three pregnancies is terminated voluntarily, although they cited the early 1970's as showing signs of a reduction in abortion, largely reflecting greater use and success in family planning. The activities of the B.F.P.A. have created a greater awareness in Barbados of the extent of illegal abortion and the Association has instigated moves to promote legalised abortion.

iv) Age of first union/pregnancy and age of first marriage

The age of first union is more important than the age of first marriage as a factor affecting fertility. In 1970 the most frequent age of marriage for men and women was 25-29. Ebanks and Gilkes (1973:1) noted that the average age of women at marriage was 26, whereas the age of first pregnancy was 17. In Barbados 68% of all babies are born to unwed mothers. As Roberts noted (1955:200) "Sociologically, marriage does not necessarily indicate the commencement of a family union; demographically it does not necessarily connote the commencement of the exposure to the risk of childbearing".
v) Union Type

Table 12 shows the proportion of women married in each parish has changed little between 1960 and 1970. Sociologists generally distinguish three union types in the Caribbean: visiting, common law and legally married. The visiting union is the least stable when the partners do not share a common residence. A common law union involves the two partners sharing the same residence and marriage entails a legal relationship voluntarily entered into by the partners and usually solemnized by a Church wedding.

Ebanks and Gilkes (1973:2) noted that 80-85% of the population in the lower socio-economic groups generally entered into a visiting union at about age 17.6 One or more pregnancies may occur before the couple move into a common residence, if they ever do, and if the union survived the first pregnancy. Only rarely would the consensual union become legalised later in life. In less than 10% of Nobbe, Ebanks and George's sample survey in 1971 did one relationship go through the sequence from visiting to legally married status.

Patterns of union formation in the West Indies change and Harewood (1968:879) considered that the shift towards the more stable union might contribute towards rising fertility. However, Ebanks, George and Nobbe (1973c:19) found that "the previously established relationship of the more stable the
Table 12

<table>
<thead>
<tr>
<th></th>
<th>1960 %</th>
<th>1970 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown</td>
<td>25.1</td>
<td>23.0</td>
</tr>
<tr>
<td>St. Michael</td>
<td>33.4</td>
<td>32.1</td>
</tr>
<tr>
<td>Christ Church</td>
<td>37.2</td>
<td>37.3</td>
</tr>
<tr>
<td>St. George</td>
<td>39.5</td>
<td>34.9</td>
</tr>
<tr>
<td>St. Philip</td>
<td>39.8</td>
<td>35.2</td>
</tr>
<tr>
<td>St. John</td>
<td>38.3</td>
<td>34.1</td>
</tr>
<tr>
<td>St. James</td>
<td>37.5</td>
<td>34.1</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>36.3</td>
<td>33.4</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>37.8</td>
<td>34.0</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>41.1</td>
<td>37.0</td>
</tr>
<tr>
<td>St. Peter</td>
<td>37.1</td>
<td>33.9</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>34.7</td>
<td>33.8</td>
</tr>
<tr>
<td>Barbados</td>
<td>35.5</td>
<td>33.5</td>
</tr>
</tbody>
</table>

sex union patterns the higher the fertility is not supported by their research in Barbados. If this relationship was true in the past they consider it would no longer appear to be so.

vi) Number of Partnerships.

Much sociological literature on the Caribbean has linked the number of partnerships with fertility. For Barbados the positive link is shown in Table 13.

<table>
<thead>
<tr>
<th>Number of Partnerships</th>
<th>Number of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.7</td>
</tr>
<tr>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>3</td>
<td>3.7</td>
</tr>
<tr>
<td>4</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Source: Ebanks, George and Nobbe (1973c:20)

Ebanks, George and Nobbe concluded that "based on our study of Barbados and Ebanks' (1973) study of family planners in Jamaica we must conclude that instability of partnerships and for that matter sex union types does not inhibit societal fertility but in fact promotes it".
vii) Migration

One important conclusion from the survey by Ebanks, George and Nobbe (1973b:7) was that "migration has contributed significantly to the decline in the crude birth rates on the island". Their estimates showed that had there been no significant migration and had the migrants contributed the births they had abroad to the births on the island, the birth rate on the island, in spite of reductions due to contraceptive use, would be just under 30 in 1970 rather than 20.4. Ebanks and Gilkes (1973:28) are emphatic that emigration together with contraception are the two factors directly responsible for fertility declines in Barbados. Whereas Nag and Nobbe, Ebanks and George have noted the contribution of emigration to the lower birth rates in the earlier decades of the century Nag (1971:117) saw the recent decline almost solely in terms of increased contraception. Nag noted that emigration in the 1960's was only on a moderate scale and the sex ratio did not change a great deal because of migration.

Of the socio-demographic variables that lie behind recent changes in fertility levels it would appear that the Barbadian experience has been closely connected with the use of contraceptives and with sex and age selective emigration. There is however also a socio-economic background to fertility which can influence the desire of families for children. It is in this area that Harewood's (1968:881) comment "a great deal of research will be necessary to
determine the factors that have influenced the downward trend in fertility in the many countries of the region since 1960 could be directed. Harewood (1968:892) noted that for the most part the impetus towards family planning seems to be the social and economic problems, at the national level, which have accompanied extremely rapid population growth through very high fertility during a period of rapidly declining mortality.

**Socio-Economic Factors**

In Barbados very little study has been undertaken of the socio-economic factors underlying fertility, although these factors have been recognised as being important. Fluctuations in the birth rate in the 1940's and 1950's were seen at least partially as responses of society to economic conditions (Nobbe, Ebanks and George 1973a:1). Three socio-economic factors leading to increased motivation for family planning methods were cited in the *Economic Plan 1969-72.* 2

The factors were: rising income levels which brought increases in consumption levels and voluntary limitation of family size in order to reap the benefits of higher income; rising levels of education and the gradual shift in female employment from low-productivity to high-productivity jobs.

---

2 Based on research done by the Economic Planning Unit by Roberts, Alleyne, Cummins and Byrne.
As recorded by Nobbe, Ebanks and George (1973a:13) Barbados has undergone substantial social change in the past twenty years. In particular they note the diversification of a mono-crop economy, rapid urbanisation, substantial improvements in educational attainment and in levels of health and the development of an effective family planning programme. It is unreasonable to attribute decline in birth rate solely to the socio-demographic factors in view of the changing socio-economic background.

Nobbe, Ebanks and George (1973a:2) considered the idea that family planning was a consequence of socio-economic development but felt that the link between fertility and economic development would only hold for the Barbadian upper and middle classes, who constitute at most 20% of the population. Moreover, these classes have always been practising birth control and any decline in the birth rate cannot be attributed to them since their family size remained relatively stable and since their proportion in the total population has not shown any marked increase.

Of the many indicators of socio-economic development this overview will focus on female status as exemplified by the educational attainment and the occupational status of working women.
i) Female Status

It is difficult to precisely catalogue changes in female status as little information is recorded in the statute books. Female status is inextricably bound up with development in the economic and social sectors. Changes in the economic, social and political structure of Barbados have been taking place quite rapidly since the 1940's. Women's roles have changed with this transformation. In 1944 the income qualification for voters was reduced from £50 to £20 p.a. and the franchise was given to women, who also became eligible for election as members. In 1950 the income qualification was abolished and adult suffrage was introduced. The drive towards self-government, which was attained in 1966, was fused with a drive for racial equality (Lowenthal, 1971:375) and it is expected that it would also be fused with a drive for sexual equality. However this cannot be too strongly asserted as the woman's role has been historically well defined in this matriarchal society.

The best assessment of female status in Barbados comes from the U.N. Report on the Participation of Women in the Economic and Social Development of their Countries (1970). Barbados declared that women were active in some areas, especially in the traditional feminine roles as shop assistants, typists, teachers, nurses and in home industries. However, women were increasingly participating in national life although they held comparatively low levels of
responsibility due in part to the younger age structure of
the female work force.

Barbados does not exhibit characteristics of
militant feminism but there are a number of women's
organisations, for example the National Organisation of
Women and the Business and Professional Women's Association.
These organisations do not really reach the working women
and tend to be middle class in orientation. Some professional
organisations have large female membership, for example nurses,
but they are more concerned with professional problems than
with female status.

For the working woman who is employed outside the
traditional agricultural and service categories life has
become more job oriented. This is contrary to the once very
home oriented way of life. Women are increasingly encouraged
to participate in the development effort and Barbados fits
well into the U.N. conclusion (1970:3) that there is a more
general trend to more active participation of women in social
and economic life but that the woman's role is still limited,
with scope for expansion.

ii) Occupation

The total work force, male and female, increased from
89,000 in 1955 to 93,000 in 1966. In 1955 this included
75,000 employed persons and 14,000 unemployed. In 1970 there
was a total working population of 83,981 and the unemployment level was in the region of 12%. Because of underemployment, disguised employment, regional differences and differential unemployment among the different age groups, unemployment figures in the West Indies should be viewed with some suspicion.

Since the time of the abolition of slavery there has been a decline in the number of women in the labour force. The female labour force fell from 55,000 in 1881 to 46,000 in 1966. In 1960 the total female working population was 34,877 and this decreased slightly to 32,924 in 1970. The tendency throughout the twentieth century has been for women to relinquish their jobs to become full-time housewives as the economy has become more diversified and as incomes have risen. However, with improved female education and the introduction of a modern sector into the economy increasing numbers of younger women are entering the labour force.

There have been considerable sectoral changes in the composition of the labour force on a national and regional scale, as shown in Table 14. From 1946 to 1966 the proportion of the total labour force in agriculture declined from 30% to 28%. Over the same period the proportion of workers in services rose from 22% to 26%. One of the major difficulties encountered in an analysis of occupations in Barbados is
Table 14

Distribution of Employed by Major Industrial Groups

<table>
<thead>
<tr>
<th>Industrial Group*</th>
<th>1946</th>
<th>1960</th>
<th>1966</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'000</td>
<td>%</td>
<td>'000</td>
</tr>
<tr>
<td>Agriculture &amp; Fishing</td>
<td>24.7</td>
<td>30.2</td>
<td>22.0</td>
</tr>
<tr>
<td>Mining &amp; Quarrying</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>17.3</td>
<td>20.2</td>
<td>12.2</td>
</tr>
<tr>
<td>Construction</td>
<td>7.3</td>
<td>8.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Public Utilities</td>
<td>0.4</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Distribution</td>
<td>11.9</td>
<td>14.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Transport &amp; Communications</td>
<td>2.9</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Services (Government &amp; Public)</td>
<td>19.5</td>
<td>22.5</td>
<td>18.8</td>
</tr>
<tr>
<td>Total</td>
<td>84.4</td>
<td>100.0</td>
<td>80.4</td>
</tr>
</tbody>
</table>

* Excludes a small number of workers shown as 'Other' in Censuses & Labour Force Survey.

Source: Censuses 1946 & 1960
shown in this table. Industrial groupings are so broad that they conceal important changes between traditional and modern sectors of the economy. This is exemplified in Table 15 showing the occupational groupings of the female working population. For instance, the 'Manufacturing' sector includes both the traditional female occupation of seamstress and the modern light industrial sector which employs much female labour. In 1946 there were 6,731 dressmakers and seamstresses in Barbados out of a total of 7,058 women employed in factory and workshop, which corresponds with the manufacturing sector. 95% of the women in the manufacturing sector were thus in this traditional occupation, whereas in 1960 the figure was 69%. Although figures for 1970 are not yet available they are expected to show a considerable rise in the modern sectors of manufacturing commensurate with the growth and development of modern industrial estates. As stated in a Directors' Seminar of the B.F.P.A. (1971) "Ten years ago, even as little as five years ago, time was when women could be found at home....Today we must interest, inform, educate, motivate, sustain motivation among some 10,000 young women in 200 factories." This is just one aspect of the changing nature of the economy.

Similar problems are seen in the distribution/sales sector, with the decline in the importance of the traditional hawker. Hawkers and peddlars made up 69% of the women
**Table 15**

**Occupations of Female Employed Populations**

<table>
<thead>
<tr>
<th></th>
<th>1946 %</th>
<th>1960 %</th>
<th>1970 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>11372</td>
<td>9164</td>
<td>4767</td>
</tr>
<tr>
<td>Prod. &amp; Rel.</td>
<td>7117</td>
<td>4218</td>
<td>4198</td>
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<tr>
<td>Prof/Tech., Admin.</td>
<td>1211</td>
<td>3144</td>
<td>3191</td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerical &amp; Rel.</td>
<td>642</td>
<td>1969</td>
<td>4429</td>
</tr>
<tr>
<td>Sales</td>
<td>6706</td>
<td>5767</td>
<td>4405</td>
</tr>
<tr>
<td>Services</td>
<td>13847</td>
<td>10564</td>
<td>10466</td>
</tr>
<tr>
<td>Other</td>
<td>698</td>
<td>51</td>
<td>1468</td>
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<tr>
<td></td>
<td>41593</td>
<td>34877</td>
<td>32924</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: 1946, 1960 Censuses
employed in trade and commercial occupations in 1946 and 56% in 1960 as against 24% employed as sales persons in shops in 1946 which increased to 43% in 1960. By 1970 a further decline in the traditional role would be expected as communications and internal mobility increased and as the large urban market is increasingly provided for by the supermarket instead of the hawker. Retail activity is also expected to increase with improved economic standards and the development of tourist facilities.

The traditional and modern sectors can also be seen in the service industry. The domestic servant is the traditional occupation and this type of worker probably enjoys similar status to maids in the tourist industry. In the service category the modern sector is represented by the growth in Government, public and professional services. 83% of the women employed in personal services in 1946 were domestic servants and this proportion decreased to 77% in 1960, representing an absolute decline from 11,461 to 8,174.

Bearing in mind this problem of the traditional and modern sectors, Table 16 and Figs. 12 & 13 show the proportion of women employed in the different occupational categories. From the table two points stand out that are not affected by the traditional/modern dichotomy. These are the decline in the proportion of working women employed in agriculture and the increase in the proportion employed
<table>
<thead>
<tr>
<th></th>
<th>Agric.</th>
<th>Prod.</th>
<th>Prof/Tech</th>
<th>Cler.</th>
<th>Sales</th>
<th>Serv.</th>
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<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
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<tr>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

FEMALE OCCUPATION BY PARISH
1960

Source: 1960 Census
FEMALE OCCUPATION BY PARISH
1970

Source: 1970 Preliminary Census Bulletin
in clerical and related occupations. This is also an absolute decline and increase respectively. The decline in the proportion of women employed in agriculture from 26.3% in 1960 to 14.5% in 1970 and the increase in the proportion employed in clerical occupations from 5.6% in 1960 to 13.5% in 1970 is indicative of the decline in the traditional sector and increase in the modern sector. It is believed that changes of similar magnitude have occurred within the production, sales and services sectors.

Disregarding this assumption, for which statistics are not available, it has been possible to construct Lorenz curves for the female working population in Barbados in 1946, 1960 and 1970 (Fig. 14). These curves compare the industrial structure of the island showing the extent to which the distribution differs from a hypothetical even distribution. The curves show that as the century has progressed female employment has become less concentrated; the concentration being initially in the traditional agricultural sector.

On a regional level Table 17 shows the level of concentration of occupation in each parish relative to the national concentration. This index is calculated as follows:

\[ I = \frac{A-R}{M-R} \]

where \( I \) is the index of concentration, \( A \) is the area
Lorenz Curves Comparing the Distribution of Female Employment by Occupations

[Diagram showing percentage employed against ranks of industrial categories by number employed for different years (1946, 1960, 1970).]

Sources: 1946 & 1960 Censuses
Preliminary Census Bulletin
Table 17

Lorenz Index of Concentration of Female Occupations

<table>
<thead>
<tr>
<th>Parish</th>
<th>1960</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown/St. Michael</td>
<td>.080</td>
<td>.148</td>
</tr>
<tr>
<td>Christ Church</td>
<td>.001</td>
<td>.060</td>
</tr>
<tr>
<td>St. George</td>
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<td>.079</td>
</tr>
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<td>.059</td>
</tr>
<tr>
<td>St. John</td>
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<td>.114</td>
</tr>
<tr>
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<td>.245</td>
</tr>
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<td>.164</td>
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<td>St. Joseph</td>
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<tr>
<td>St. Lucy</td>
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<td>.224</td>
</tr>
</tbody>
</table>

Source: 1960 Census
cumulative percent total, R is the regional cumulative percent total and M is the maximum cumulative percent total assuming 100% of the frequencies in Rank 1. It should be noted that an index of 1.0 represents an absolute concentration and an index approaching 0 shows a distribution of frequencies in a particular area similar to that for the whole region. From the table of indices it is clear that in 1960 Bridgetown/St. Michael, Christ Church and St. James conformed most closely to the national pattern whereas in St. Andrew, St. Thomas and St. Lucy there was the greatest concentration of female occupations. In these three parishes over 50% of the women were employed in agriculture. The 1970 figures do not show such a concentration with more parishes approaching the national pattern, the highest concentration being in St. James, where, with the increase in tourism, a large number of women (43.3%) were employed in services.

Again it should be emphasised that the occupational grouping figures disguise the changes that have been taking place in the modernising economy. The greatest diversity of occupation would be expected to occur in Bridgetown/St. Michael and along the tourist areas of the south and west coasts. The distribution of new industrial estates, shown on fig. 4, tends to reinforce this tendency.

During the decade under consideration there has been
a slight overall decline in the proportion of all women working, from 26.45% to 26.11%. Parish rates are given in Table 18 from which it can be seen that there was a slight increase in the southern and western parishes of St. Michael, Christ Church, St. Peter, St. James, and St. Philip. The differences are only of the order of 1% and could well be accounted for by changing age structures and internal migration to areas offering the best job opportunities. According to the Development Plan (1969:14) "As many new jobs may be destroyed in the traditional sectors as are created in the modern sector" but it is expected that the above five parishes are rapidly increasing their job opportunities in the modern sector and this would enable young women who were previously self-employed at home to enter commerce and service industries.

iii) Education

Considerable strides have been made in educational expansion and development since the 1950's. Free primary education has been extended to all and in 1962 the 10 Government-aided Secondary (Grammar) Schools became non-fee paying. The secondary school sector has been greatly expanded since the mid 1950's. In 1952 the first two Secondary Modern Schools, which had been erected in the suburbs of Bridgetown were opened. In 1955 two new Secondary Modern Schools were opened in St. Philip and St. Joseph. The process of extension and expansion has
Table 18

Proportion of Working Women in Total Female Population

<table>
<thead>
<tr>
<th></th>
<th>1960 %</th>
<th>1970 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown</td>
<td>28.34</td>
<td>29.37</td>
</tr>
<tr>
<td>St. Michael</td>
<td>24.25</td>
<td>25.87</td>
</tr>
<tr>
<td>Christ Church</td>
<td>28.46</td>
<td>29.42</td>
</tr>
<tr>
<td>St. George</td>
<td>24.93</td>
<td>24.11</td>
</tr>
<tr>
<td>St. Philip</td>
<td>23.92</td>
<td>25.90</td>
</tr>
<tr>
<td>St. John</td>
<td>26.29</td>
<td>24.00</td>
</tr>
<tr>
<td>St. James</td>
<td>25.67</td>
<td>26.78</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>30.54</td>
<td>28.49</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>26.97</td>
<td>23.80</td>
</tr>
<tr>
<td>St. Andrew</td>
<td>25.51</td>
<td>23.22</td>
</tr>
<tr>
<td>St. Peter</td>
<td>26.68</td>
<td>27.08</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>25.87</td>
<td>25.20</td>
</tr>
<tr>
<td>Barbados</td>
<td>26.45</td>
<td>26.11</td>
</tr>
</tbody>
</table>

continued and the most recent additions have been in St. Lucy and St. George. In 1962 these Secondary Modern Schools were renamed Comprehensives. The comprehensive schools are co-educational.

Entry into secondary schools is competitive. In 1970 10,816 children entered Part I of the Common Entrance Exam. 3394 proceeded to Part II and only 716 gained admission to one of the Grammar Schools. Others would go to the Comprehensives or to Independent Aided or Un-aided Secondary Schools. The remainder would form the "tops" in the primary schools. Enrollment at the different types of school is illustrated in Table 19.

Table 19

<table>
<thead>
<tr>
<th>No. of Schools</th>
<th>Type of School</th>
<th>No. enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>Primary &amp; All Age Schools</td>
<td>43,218</td>
</tr>
<tr>
<td>7</td>
<td>Comprehensive Schools</td>
<td>8,747</td>
</tr>
<tr>
<td>8</td>
<td>Grammar</td>
<td>5,308</td>
</tr>
<tr>
<td>10</td>
<td>Independent Aided Secondary</td>
<td>6,996</td>
</tr>
<tr>
<td></td>
<td>Un-aided Secondary</td>
<td>348</td>
</tr>
</tbody>
</table>


Barbados can boast that "Recent developments in education have served to improve on an already comprehensive system which in this relatively poor country has produced one of the most literate populations in the world"
(Development Plan, 1969:17). In fact the Government has admitted a need to improve facilities at girls' schools (U.N., 1970:17) and there still remains a need to increase the number of secondary grammar school places available to girls.

The development of education has many ramifications in Barbados. Roberts et al. (1967:580) showed that education up to fourth grade defined the critical level for the spread of knowledge of contraception throughout the island. A rising number of contraceptive methods was known with advancing levels of education. Table 20 shows the connection Roberts found between education and use and knowledge of contraception.

Table 20

<table>
<thead>
<tr>
<th>Years of Education</th>
<th>% Women Ever Users</th>
<th>% Women Knowledgeable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3</td>
<td>22.4</td>
<td>45.8</td>
</tr>
<tr>
<td>4</td>
<td>30.6</td>
<td>54.7</td>
</tr>
<tr>
<td>5</td>
<td>38.3</td>
<td>68.9</td>
</tr>
<tr>
<td>6</td>
<td>40.0</td>
<td>79.2</td>
</tr>
<tr>
<td>7</td>
<td>46.2</td>
<td>80.0</td>
</tr>
<tr>
<td>Sec. +</td>
<td>49.1</td>
<td>81.5</td>
</tr>
</tbody>
</table>

Source: Roberts et al. 1967.

Roberts et al. concluded their study (1967:600) "The educational status of the population appears to be
adequate to ensure the spread of contraception; but the attainment of functional literacy is necessary for the most knowledge and use of contraception.

A difficulty occurs in comparing the educational attainment of the female working population using the Census material of 1960 and 1970 because of the change in the educational system and the different Census categories used. In the 1960 Census four major categories were recognised: Primary, Secondary, University and Education in a Foreign Country. The primary level was subdivided into Kindergarten and Standards 1 to 7. Each increase in the standard number was equivalent roughly to an advance of one year's formal schooling. The initial age group which was taken as equivalent to Standard 1 was 7 and each additional year of schooling was assumed to carry the child to a standard one point higher. Census educational attainment divisions in 1960 are Standards 1-4 and Standards 5-7. In the 1970 Census categories were Primary 1-4 years and Primary 5 years and over. For the purposes of this thesis it is assumed that Standards 1-4 and Primary 1-4 years, and that Standards 5-7 and Primary 5 years and over, are the same. Since there is only limited entry to secondary schools after the common entrance examination at 11 years it is assumed that those failing the exam would continue in primary school until school-leaving
age, or enter a private secondary school.\textsuperscript{3}

In the 1960 Census two levels of secondary education were distinguished. If a person secured a school certificate, matriculation level, or a higher certificate this was recognised as a higher level of secondary school education and categorised "school certificate". Persons who had failed to obtain such qualifications or who had not yet attempted them were put under the category "No School Certificate". In 1970 the level of secondary educational was recorded as either

Secondary
School Leaving Certificate
G.C.E. 'O' Level 1-2 subjects

\textsuperscript{3} It should be noted, that the author's interpretation of primary categories differs from that of the Director of the Barbados Statistical Service (private communication dated 31 May 1974). The Director stated:

1. In the 1970 Census, pupils in Standard/Class 5 were considered to have had seven years of primary schooling, would have been approximately 11-12 years of age, and would be at the Secondary School Level. The group Standard 5-7 in the 1960 Population Census...would therefore be considered to account for pupils at the secondary school level.

2. The group in Standard 5-7 should therefore be added to the existing category 'No School Certificate' to comprise Secondary No School Certificate.

The reason for the author's interpretation is that, although agreeing with 1. above, the pupils were of secondary school age but had not in fact entered secondary school because of the limited places available. Their education would therefore continue at primary level.
G.C.E. 'O' Level 3-4 subjects
G.C.E. 'O' Level 5 subjects, School Certificate or
G.C.E. 'A' Level 1 subject
G.C.E. 'A' Level 2 or more subjects.

The School Leaving Certificate is not the equivalent of a School Certificate and hence the group "School Leaving Certificate" in 1970 has been joined with the "No School Certificate" group in the 1960 Census. All the categories under G.C.E. in 1970 have been combined to relate to the category "School Certificate" in 1960. ⁴

The third category of educational attainment in 1960 identified persons who had attained University standards or acknowledged professional qualifications. This is related to degree and diploma in the 1970 Census. As such a small percentage of the working women had attained this level they have not been considered in the analysis.

Using the classification outlined above the educational attainment of the female working population has shown important changes in the 1960 - 1970 decade, both nationally and regionally, as shown in Table 21, and Figs. 15 - 16. Working women have a higher educational level in 1970 as evidenced by the fact that the proportion of working women

⁴ These points on secondary education have been recommended by the Director of the Barbados Statistical Service (private communication dated 31 May 1974).
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>25.58%</td>
<td>51.12%</td>
<td>14.59%</td>
<td>6.24%</td>
<td>0.19%</td>
</tr>
<tr>
<td>1970</td>
<td>5.42</td>
<td>35.37</td>
<td>47.42</td>
<td>8.87</td>
<td>2.25</td>
</tr>
<tr>
<td>St. Michael</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>22.54</td>
<td>56.63</td>
<td>11.36</td>
<td>6.89</td>
<td>0.27</td>
</tr>
<tr>
<td>1970</td>
<td>5.49</td>
<td>12.84</td>
<td>64.85</td>
<td>11.94</td>
<td>1.80</td>
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<tr>
<td>Christ Ch.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>22.18</td>
<td>56.61</td>
<td>9.94</td>
<td>7.64</td>
<td>0.61</td>
</tr>
<tr>
<td>1970</td>
<td>4.97</td>
<td>11.44</td>
<td>64.08</td>
<td>13.37</td>
<td>2.50</td>
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<td>St. George</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>1960</td>
<td>42.98</td>
<td>45.95</td>
<td>3.39</td>
<td>4.08</td>
<td>0.12</td>
</tr>
<tr>
<td>1970</td>
<td>4.63</td>
<td>17.06</td>
<td>66.25</td>
<td>8.69</td>
<td>0.99</td>
</tr>
<tr>
<td>St. Philip</td>
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</tr>
<tr>
<td>1960</td>
<td>39.43</td>
<td>48.26</td>
<td>3.15</td>
<td>6.34</td>
<td>0.04</td>
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<tr>
<td>1970</td>
<td>10.05</td>
<td>11.25</td>
<td>50.55</td>
<td>11.25</td>
<td>0.88</td>
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<td>St. John</td>
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<td></td>
</tr>
<tr>
<td>1960</td>
<td>43.50</td>
<td>44.90</td>
<td>4.45</td>
<td>2.67</td>
<td>0.50</td>
</tr>
<tr>
<td>1970</td>
<td>15.54</td>
<td>14.08</td>
<td>57.35</td>
<td>7.81</td>
<td>1.07</td>
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<td>St. James</td>
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<td></td>
</tr>
<tr>
<td>1960</td>
<td>25.42</td>
<td>59.51</td>
<td>5.57</td>
<td>5.72</td>
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<td>1970</td>
<td>10.02</td>
<td>25.43</td>
<td>47.83</td>
<td>9.45</td>
<td>2.61</td>
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<tr>
<td>1960</td>
<td>44.62</td>
<td>44.09</td>
<td>2.55</td>
<td>2.37</td>
<td>0.00</td>
</tr>
<tr>
<td>1970</td>
<td>15.59</td>
<td>30.27</td>
<td>44.37</td>
<td>5.84</td>
<td>0.71</td>
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<td></td>
</tr>
<tr>
<td>1960</td>
<td>35.90</td>
<td>49.23</td>
<td>3.73</td>
<td>3.10</td>
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</tr>
<tr>
<td>1970</td>
<td>12.96</td>
<td>25.41</td>
<td>50.62</td>
<td>6.43</td>
<td>1.24</td>
</tr>
<tr>
<td>St. Andrew</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>43.13</td>
<td>47.99</td>
<td>1.40</td>
<td>1.68</td>
<td>0.00</td>
</tr>
<tr>
<td>1970</td>
<td>14.60</td>
<td>25.53</td>
<td>47.62</td>
<td>6.76</td>
<td>1.18</td>
</tr>
<tr>
<td>St. Peter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>37.79</td>
<td>49.67</td>
<td>3.55</td>
<td>3.40</td>
<td>0.11</td>
</tr>
<tr>
<td>1970</td>
<td>13.41</td>
<td>15.29</td>
<td>59.62</td>
<td>9.04</td>
<td>1.54</td>
</tr>
<tr>
<td>St. Lucy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>44.44</td>
<td>45.25</td>
<td>2.28</td>
<td>2.64</td>
<td>0.07</td>
</tr>
<tr>
<td>1970</td>
<td>13.55</td>
<td>16.24</td>
<td>59.25</td>
<td>6.86</td>
<td>0.69</td>
</tr>
<tr>
<td>Barbados</td>
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<td></td>
</tr>
<tr>
<td>1960</td>
<td>79.98</td>
<td>52.75</td>
<td>7.77</td>
<td>5.63</td>
<td>0.25</td>
</tr>
<tr>
<td>1970</td>
<td>17.89</td>
<td>16.26</td>
<td>60.34</td>
<td>10.50</td>
<td>1.70</td>
</tr>
</tbody>
</table>

EDUCATIONAL ATTAINMENT OF FEMALE WORKING POPULATION 1960

- Primary 1-4 yrs.
- 5 yrs. & over
- Secondary: No School Cert.
- School Cert.
- Other

Source: 1960 Census
EDUCATIONAL ATTAINMENT OF FEMALE WORKING POPULATION 1970

Source: 1970 Preliminary Census Bulletin
with 1-4 years of primary education dropped from 29.98% in 1960 to 7.89% in 1970 and those with 5-7 years of primary education decreased from 52.75% in 1960 to 16.26% in 1970. More women had received secondary education in 1970; the proportion increased from 7.77% in 1960 to 60.36% in 1970 for those at the lower secondary level and increased from 5.63% to 10.50% for those with a higher level of secondary education.

Similar trends were experienced in all parishes, although there were differences between the predominantly urban and rural parishes. For instance in the more urbanised parishes of Bridgetown/St. Michael, Christ Church and St. James the rate for the 1-4 years of primary education category fell from approximately 23% to 6%, whereas in the remaining more rural parishes the rate fell from 41% to 12%. This shows the continuing lower level of educational attainment of the rural parishes, but does mark a considerable improvement during the decade. In the parishes defined above as urban the proportion of working women with secondary educational attainment, 'No school certificate', rose from 11 to 62% and in the rural parishes from 3 to 56%. It can be seen that at all levels and in all parishes there has been a considerable improvement in the educational attainment of the female working population.
This chapter has provided a demographic background to Barbados identifying the factors that could account for the 1960-70 decline in fertility, with particular emphasis on the increase in contraception since the foundation of the Barbados Family Planning Association. It was suggested that decisions re the adoption of contraceptive devices may have been motivated in part by changing attitudes accompanying the socio-economic transformation on the island since the mid twentieth century. In this respect the changing occupational status and educational attainment of working women was described as illustrative of changing female status. It will be the objective of Chapter III to see whether there is a relationship between fertility and female status.
Chapter III

METHODOLOGY

The study area and period will be defined in this chapter and comments made upon the data sources for the study. The study variables, fertility and female status will be fully defined. The objective of the data analysis section is to test whether there have been significant changes in fertility and female status between 1960 and 1970 and whether there is a relationship between fertility and female status in these years.

The Data Sources

The study area is the 166 square mile island of Barbados, the most easterly of the Caribbean islands. The study regions are the eleven parishes which make up the island, the parish of St. Michael containing the capital city of Bridgetown. The general physical and economic geography of Barbados is shown on Figs. 3 & 4.

The study period is 1960 - 1970 and the study utilises data primarily from the 1960 and 1970 Censuses of Barbados. No inter-censal estimates of the variables used in this study are available for the regional level, which
is the author's main concern. The Census material for 1946 is not compatible with that of the two more recent Censuses.

To date only one volume of the 1970 Census has been published: Volume III Age Tabulations. Data for 1970 is taken principally from Preliminary Bulletins of the Commonwealth Caribbean Population Census 1970 issued by the Barbados Statistical Service. The Bulletins present only summary tabulations, which has prevented as in-depth a study as was originally planned. As more material becomes available it will be possible to update parts of the study.

The Census of Barbados in 1960 and 1970 was part of a wider census programme: in 1960 covering the Eastern Caribbean and in 1970 covering the Commonwealth Caribbean. Both Censuses were thoroughly administered. The material for the 1960 Census was prepared by the Population Census Division of the Central Statistical Office of the Government of Trinidad and Tobago. The 1970 Census was largely processed by the Census Research Programme of the University of the West Indies. Both Census results may be accepted with some confidence and no reports have appeared criticising either the collection or the processing of the data.

J. Byrne published a paper (1971) attempting to assess the reliability of the 1970 provisional head count using material from previous censuses and data obtained from the Visitation Records of the 1970 enumeration, and on a tentative basis she accepted the 1970 findings.
The study period 1960 - 1970 appears to show a considerable decrease in the birth rate and improvement in the status of women, the variables involved in this study. The national birth rate decreased from 33.6 to 20.4 per 1000 over the study period and in addition important changes in the educational attainment of working women and in their occupational status occurred, as has been detailed in Chapter II.

The fertility measure chosen in this study is the child-woman ratio, which is the number of children between 0 and 4 years born to 1000 women between the ages of 15 and 45. The choice of this index is largely determined by the availability of census statistics. This ratio has been used in a similar instance by Collver and Langlois (1962). There are some defects in the use of this generalised ratio; for example it disregards infant and child deaths and it has been seen that these rates were high in Barbados in the mid twentieth century with possibly different rates between the parishes. However, the high infant mortality rate in Barbados had been considerably reduced by the 1960's. The ratio also does not take migration into account. It does, however, deal with all fertile women thus removing any age disparities between the parishes and is a good fertility measure available from census material from which the female status measures are taken. Crude birth rate data obtained from
the Report on Vital Statistics and Registrations offered no particular advantage over the child-woman ratio.

Female status is measured by the educational attainment of the female working population and the occupational status of employed women. The educational attainment of the female working population is derived from Census categories as explained in Chapter II and illustrated in Table 21. The categories used in the analysis are:

a) Primary Education 1-4 years
b) Primary Education 5 years and over
c) All Primary Education
d) Secondary Education - No School Certificate
e) Secondary Education - School Certificate
f) All Secondary Education

It will be noted that there is no category for working women whose maximum educational attainment is kindergarten or for those who received no formal education. In 1960 this combined category accounted for only 679 out of 34,877 working women and in 1970 only 204 women out of a total female working population of 32,924. Table 21 also shows the relatively small proportion of women who have attained post secondary education and as a result this group was omitted.

The major occupational groups of the female working population are calculated from the Census divisions and
grouped as follows, the proportion of women in each group being shown in Table 16.

a) agriculture
b) production and related
c) professional and technical, managerial and administrative
d) clerical and related
e) sales
f) services;

A discussion of this classification is found in Chapter II, and although inadequacies in this classification have been pointed out for groups b, e, and f, which conceal modern developments in the economy, the limitations of the data do not permit any other grouping to be used. To facilitate a comparison between the Preliminary Census Report on Working Population I for 1970 and the 1960 Census a classification of occupations for the 1970 Census was provided by the Barbados Statistical Service. This was used to ensure that the more detailed occupational groupings derived from 1960 Census matched those of 1970.

The overall objective of the study is to see whether there is a relationship between fertility and female status in Barbados over the time span 1960-70. For the purposes of the analysis the child-woman ratio is used for the fertility measure and female status is illustrated by the
level of educational attainment and type of occupational grouping of working women. Data for these variables was obtained from the 1960 and 1970 Censuses.

Data Analysis

A major assumption has been that fertility of all women has been the same as that of working women and that female status of working women can be compared with fertility of all women. A measure of fertility of working women is desired which is not available from Census material or from secondary sources. However, a measure of fertility of all women and all working women in each parish was obtained from a survey conducted in 1971 by Nobbe, Ebanks, and George.¹

From this survey the number of children even born to 1,000 women and 1,000 working women aged 16 - 50 was recorded. The results are depicted in Table 22. From this

¹ Nobbe, Ebanks and George of the Department of Sociology, University of Western Ontario, received a grant for their research from the International Development Research Centre in Ottawa in 1971. The data for their study was based on a national sample of 4,199 lower socio-economic status women. The sampling frame for their study was the 352 enumeration districts and a one-in-six systematic sample was chosen in two different and independent waves which yielded 60 enumeration districts from which interviewing was eventually conducted in 54. Within these 54 districts an attempt was made to interview all women between 16 and 50 years of age with the exception of those who were currently enrolled at a primary or secondary school and had never been pregnant.
Table 22

No. of Children Ever Born to 1000 Women & 1000 Working Women aged 16 - 50

<table>
<thead>
<tr>
<th>Parish</th>
<th>Women</th>
<th>Working Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgetown/St. Michael</td>
<td>2673</td>
<td>2235</td>
</tr>
<tr>
<td>Christ Church</td>
<td>2736</td>
<td>2662</td>
</tr>
<tr>
<td>St. George</td>
<td>3141</td>
<td>2350</td>
</tr>
<tr>
<td>St. Philip</td>
<td>2959</td>
<td>3138</td>
</tr>
<tr>
<td>St. John</td>
<td>3111</td>
<td>3813</td>
</tr>
<tr>
<td>St. James</td>
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<td>2590</td>
</tr>
<tr>
<td>St. Thomas</td>
<td>3372</td>
<td>3846</td>
</tr>
<tr>
<td>St. Joseph</td>
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<td>4136</td>
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<td>4960</td>
</tr>
<tr>
<td>St. Peter</td>
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<td>3191</td>
</tr>
<tr>
<td>St. Lucy</td>
<td>1851</td>
<td>2333</td>
</tr>
<tr>
<td>Barbados</td>
<td>2815</td>
<td>2594</td>
</tr>
</tbody>
</table>

table it is seen that the fertility of working women in Barbados is slightly less than that of all women. On a parish basis this is the case for Bridgetown/St. Michael, Christ Church, St. George, St. James and St. Peter, generally the more urban and partially urban parishes. In the remaining parishes the fertility of working women is higher than that of non-working women.

To investigate the difference between the means of fertility of women and working women, the following hypothesis was formulated:

Hypothesis 1: There was a difference between the means of the fertility of women and working women in Barbados in 1971.

A t-test was used to test for significance of difference between the two sample means. The samples are the number of women and the number of working women taken from the survey by Nobbe, Ebanks and George, and the means of the fertility of these samples, shown in Table 22, are calculated from the parish means. The results of the t-test, shown in Table A.1, established that there is no significant difference between the means of fertility of a sample of all women and working women. On this basis

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the assumption is made that the same held for 1960 and 1970 and thus the analysis will investigate whether there is a relationship between fertility of women and educational and occupational status of working women.

The study has also assumed that the decline in birth rate between 1960 and 1970 has been significant. Several measures of fertility have been used in this study to express the decline but the index used for the statistical test is the child-woman ratio, as shown in Table 6. The hypothesis is formulated as follows:

"Hypothesis 2: There has been a significant decline in fertility in Barbados between 1960 and 1970."

The t-test is the statistical test used to test for the significance of difference between the 1960 and 1970 means of fertility as expressed in Table 6. The results shown in Table A.2 verify Hypothesis 2. It is the desire to explain this decline that resulted in the present study; in particular whether the socio-economic transformation in the island is related to the fertility decline.

Female status, an aspect of the socio-economic

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3 The normality of the data was established by constructing fractile diagrams.
transformation, is a variable that might be related to fertility. It is illustrated by the educational attainment of the female working population and their occupational status, both being categorised from census divisions as explained in Chapter II and illustrated in Tables 16 and 21. These tables show considerable changes between 1960 and 1970. The third hypothesis then states:

**Hypothesis 3:** There has been a significant improvement in female status in Barbados between 1960 and 1970.

To investigate this hypothesis six working hypotheses (see Table A.3) are constructed concerning the improvement in educational levels of the female working population. For each working hypothesis a t-test is used to test for the significance of difference between the 1960 and 1970 means of the proportion of working women in each parish at each educational level (see Table 21). T-tests show a significant decline between the 1960 and 1970 means of the female working population whose maximum educational attainments are:

a) 1-4 years of primary

b) 5 and over years of primary

c) primary

There is also a significant increase between the 1960 and
1970 means of the female working population whose maximum educational attainments are:

d) secondary, no school certificate

e) secondary, school certificate

f) secondary education

These findings reflect the success of the development and extension of secondary schooling in Barbados between 1960 and 1970 associated with the growth of the Secondary Modern (Comprehensive) Schools. It could be considered that there has been a significant improvement in educational attainment of working women, one aspect of the improvement in female status suggested in Hypothesis 3.

Female status is also illustrated by occupational status and six working hypotheses are devised in Table A.4 to examine the changes in female occupational status indicated by the six main occupational groupings in Table 16. The working hypotheses are tested by a t-test examining the significance of difference between the 1960 and 1970 means of the proportion of working women in each parish in each occupational group. Significant changes are shown in two cases (see Table A.4). There is a significant decline between the 1960 and 1970 means of the female working population employed in agriculture
and a significant increase between the means of the female working population employed in clerical and related occupations. Changes in the production, professional and technical, sales and services sectors are not significant. It has been stressed that the data does not reveal the full extent of the economic transformation on the island. In particular it conceals differences between the traditional and modern sectors within the production, sales and services categories. It is not altogether surprising that the changes in these sectors are not significant; however, as a fuller occupational breakdown becomes available when 1970 Census results are released, these sectors could be further examined. The significant decline in agriculture is illustrative of the decline in the traditional economic sector and the significant increase in clerical and related occupations of the development of the modern sector of the economy. It is from this basis that one may suppose there has been a significant improvement in female occupational status between 1960 and 1970, until further census material becomes available to more rigourously test the hypothesis. The improvement in female status hypothesised in Hypothesis 3, as measured by educational attainment and occupational status of working women, has been verified to the extent that the data permits.
Having established that there has been a significant decline in fertility and improvement in female status the following hypothesis is designed to test whether these variables are related:

Hypothesis 4: There is a relationship between fertility and female status in Barbados in
1) 1960
2) 1970.

Spearman's Rank Order Correlation is used to test for a relationship between fertility and female status. Parish fertility, measured by the child-woman ratio, is ranked from 1 to 11, 1 representing the highest fertility and 11 the lowest. Female status, as explained under Hypothesis 3, is measured by six educational and six occupational status categories for working women. Within these categories ranking is from 1 to 11, with 1 representing the parish with the highest proportion of working women in each category and 11 representing the parish with the lowest proportion in each category. The proportions of female working population in each parish at different educational levels and in different occupations are given in Tables 16 a 21.

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The six working hypotheses concerning the relationship between fertility and educational attainment are shown in Table A.5. This table also shows the results of the Spearman's Rank Order Correlation.

1960 yields the expected relationship between primary education attainment and fertility, in that the more working women whose highest educational attainment is primary education the higher is the fertility. Also, the more working women with a maximum educational attainment of secondary education the lower the fertility. The only unexpected result for 1960 is that the more working women with a maximum educational attainment of 5 and more years of primary education the lower the fertility, although the value of rho is only significant at the 0.05 level and not the 0.01 level. This finding might possibly lend support to the idea of a "threshold" level of education existing in 1960, requiring more than 4 years of primary education for a knowledge, awareness and for the use of family planning services. Overall a significant positive correlation is found to exist in 1960 between maximum attainment of primary education and fertility.

Some regional differences are apparent in the correlation between educational attainment and fertility as shown in Fig. 17. For example, in 1960 Bridgetown/St. Michael, Christ Church and St. James had a much lower
Fertility & Female Status:
Spearman's Rank Order Correlation
Key to Figs. 17, 18, 19, 20.

11 Bridgetown/St. Michael
10 Christ Church
  9 St. James
  8 St. Philip
  7 St. Peter
  6 St. George
  5 St. John
  4 St. Lucy
  3 St. Joseph
  2 St. Thomas
  1 St. Andrew
Fig. 18

1960

SECONDARY: NO SCH. CERT.

1970

SECONDARY: SCH. CERT.

Fertility Rank

Educational Attainment Rank

\[ r_s = 0.764 \]

\[ r_s = 0.577 \]

\[ r_s = 0.946 \]

\[ r_s = 0.918 \]

\[ r_s = 0.913 \]

\[ r_s = 0.688 \]
Fig. 20

1960

CLERICAL

1970

SALES

Fertility Rank

Occupational Status Rank

SERVICES

n = 845

n = 791

n = 155

n = 182

n = 927

n = 764
proportion of women with a maximum educational attainment of less than 4 years of primary education, and a higher proportion with 5 years and over, and these were the three parishes with the lowest fertility rates.

In 1970 there is not such a strong correlation between attainment of primary education and fertility, although at all levels of primary education there is a positive correlation between educational attainment and fertility at the 0.05 significance level.

With regard to secondary education a negative correlation is found to exist in 1960 and 1970 between levels of secondary education and fertility. The correlation was significant at the 0.01 level for all levels of secondary education in 1960, but only at Secondary School Certificate attainment level in 1970. At the 0.05 level of significance there was a significant correlation between fertility and attainment of secondary education. Fig. 18 shows the difference between Bridgetown/St. Michael and Christ Church at the one extreme, with a higher proportion of working women with secondary school levels of education and low fertility, and, at the other extreme, St. Andrew, St. Thomas and St. Joseph with lower secondary school educational attainment and higher fertility.

Concerning Hypothesis 4 it has been shown that
there is not such a marked correlation between secondary school educational attainment and fertility in 1970 as there is in 1960. Although there is a significant improvement in educational status during the 1960–1970 decade there is not such a strong correlation between these variables in 1970 as there is in 1960. This could indicate the importance of the Family Planning Service reaching out to the less well educated women, who during the decade became acceptors and users, and thus education would not have such a marked effect upon fertility.

When the working hypotheses concerning occupational status, as illustrative of female status, are correlated with fertility in 1960 and 1970 (Table A.6) no significant values of rho are found at the 0.01 level between the production and sales categories and fertility. At the 0.05 level there is a significant correlation between production and fertility in 1960. It is repeated that intra-sectoral changes in these groups are masked by the broad categorisation. In 1960 and 1970 there is a significant positive correlation at the 0.01 level between the proportion of the working women employed in agriculture and fertility. Agriculture predominates in the rural parishes where over 10% of the female working population have under 5 years of primary education, where family planning centres are not as common, and where traditional values might be more strongly entrenched. Table A.6 shows that the value of rho in 1970 was .936 and in 1960 it was .791. It is thought that the
better educated rural females have left the agricultural sector to work in the more populated parishes where the economy is more diversified. This would leave a relatively less well educated rural female working community with the resulting greater positive correlation with fertility.

The reverse of this situation is shown in the clerical and related occupations, in Table A.6, showing a significant negative correlation with fertility at the 0.01 level in 1960 and 1970. This sector, which has not changed its definition over the decade, has attracted more status-inclined and educated women, and fertility in this category is thus lower.

Table A.6 shows that in 1960 and 1970 there is a significant negative correlation at the 0.05 level between fertility and the proportion employed in the professional and technical category. This, however, is a relatively small group of women, whose behaviour might be atypical. With increasingly higher education levels, changing age structure, and improving income levels this group might experience increasing fertility as the decade advances, as has been the case for some of the developed nations.

There is also a significant negative correlation at the 0.01 level between fertility and the proportion of
working women employed in the services category, in both 1960 and 1970. Although both traditional and modern service occupations are found in Barbados it might be that a woman's decision on fertility is not influenced by the fact that she is a private domestic servant or a lower status domestic employee at an hotel. A high value of rho was recorded in 1960, .927, and by 1970 the association is less pronounced, which probably reflects the change in status within the service category. It is interesting to note that St. James, on the West coast, has the highest proportion of its female working population employed in services and yet one of the lowest fertility rates. This might support the idea of lower fertility among hotel employees in this largely tourist oriented parish.

Figures 19 & 20 show differences in the regional levels of association between occupational status and fertility. As with the figures related to educational attainment, the differences between Bridgetown/St. Michael, Christ Church and St. James is seen in the one hand and St. Andrew, St. Joseph, St. Thomas and St. Lucy on the other. In the former parishes economic diversification has led to a greater variety of job opportunity and the possibility of improved status for women, with the resulting lower levels of fertility. In the four latter parishes, where the index of concentration of occupation is greatest and where the traditional occupations still prevail, the fertility rate
Hypothesis 4 sought a relationship between fertility and female status in Barbados in 1960 and 1970. When educational attainment of the female working population was correlated with fertility a significant positive correlation was generally found between attainment of primary education and fertility and a significant negative correlation between attainment of secondary education and fertility. When occupational status was correlated with fertility a significant positive relationship was found between the proportion in agriculture and fertility and a significant negative correlation between employment in clerical and service categories and fertility. With the exception of agriculture all correlations showed a stronger association in 1960 than in 1970.

In summary it can be seen from the analysis that there has been a significant decrease in fertility in the decade 1960 - 1970 and a significant improvement in educational attainment of the female working population. It also seems reasonable to suggest, on the evidence available, that there has been an improvement in female occupational status since 1960. The association between fertility and female status appeared to be weaker in 1970 than 1960. The major conclusions and implications of the study will be reviewed in the concluding chapter.
Chapter IV

CONCLUSION

The twofold objective of this Chapter is to summarise the conclusions of the study and to consider some of the broader implications of the study, suggesting possible directions for future research.

Conclusions from Analysis.

The main observation underlying the study was that there appeared to be a considerable decrease in fertility in Barbados over the period 1960 - 1970 at a time when there was considerable socio-economic change. As an indicator of this socio-economic transformation female status was used as the independent study variable, and it was defined as the level of educational attainment and occupational status of working women.

It was established that there was a significant decline in fertility and a significant improvement in educational attainment of working women over the period 1960-1970. There was also a significant decline in the number of women working in agriculture and an increase in the number in clerical occupations, the only two occupational categories for which the data did not obscure differences
between the traditional and modern sectors of the economy. On this basis it can be tentatively suggested that there was a definite change in occupational status of working women.

Spearman's Rank Order Correlation was used to establish whether there was a relationship between fertility and female status in 1960 and 1970. Results are consistent with findings in the literature that there is a significant positive correlation between attainment of primary education and fertility and a significant negative correlation between attainment of secondary education and fertility in 1960 and 1970. There is generally a weaker association between levels of educational attainment and fertility in 1970 than in 1960. This is viewed in the light of the significant changes in the number of women with primary and secondary educational attainments. It would appear that in 1960 fertility was strongly associated with educational levels but that during the decade improving educational standards and probable changing attitudes permitted the exercise of choice in decisions on family size and spacing. This should be related to the growth of the Barbados Family Planning Association during the decade. The Association has done much to influence favourable public attitudes towards family planning and has made contraceptives readily available. The improving educational attainment of women in conjunction with the activities of the Association have led to declining fertility.
On the regional level it was shown that Bridgetown/St. Michael, Christ Church and St. James, the more urban parishes, have relatively higher educational standards and lower fertility. Lower educational standards and higher fertility are evident in St. Joseph, St. Thomas and St. Andrew; the remaining parishes holding an intermediate position.

There is not such a strong association between occupational status and fertility as between educational status and fertility with the exception of the agricultural sector, which shows a strong positive correlation with Bridgetown/St. Michael, Christ Church and St. John having the lowest proportion of working women in agriculture and the lowest fertility. In the more agricultural parishes, fertility is higher. Other occupational groups show negative correlations but again being less pronounced in 1970 than in 1960, but with the more urban parishes showing lower fertility and generally higher proportions of women in the more modern occupational groups. It is postulated that as women have become more educated and as occupational status has changed women have become more aware and more desirous of the possibilities and needs of limiting their fertility thus adopting family planning measures as they gained in popularity and acceptability.

The family planning service has developed in a decade
during which women's status has changed, one reinforcing the other with resulting lower fertility. Women are better educated and more able to make decisions in the control of family size in line with the aspirations of their new status. Educational attainment and occupational status are thus not so strongly associated with fertility in 1970 as in 1960 when it was the poorly educated and those in the traditional occupations whose fertility was the highest.

Implications of Study and Future Directions for Research.

The main implication of this study is that there are forces at work in a developing society which influence people's attitudes towards family size. One such force has been indicated as the level of education of working women, and there is strong reason to believe that as occupational status changes, from traditional to more modern lines, that fertility is affected. When this happens in conjunction with the development of family planning services a decrease in fertility will occur. From this it is implied that the socio-economic changes associated with development are an important aspect in the study of changing fertility, for as noted by the United Nations (1971:42) "Since the social and economic environment is such a compelling force in human reproductive behaviour, it is important to understand the complex inter-relationships between reproductive behaviour,
social institutions and economic development."

There are wide possibilities for future research into female status and fertility in Barbados and throughout the Caribbean, emphasising aspects of socio-economic change in a rapidly developing society and its influence on fertility. These areas have been widely neglected in Caribbean fertility research in favour of family planning studies that link fertility decline with increased contraception. This has neglected factors causing changing attitudes and increased motivation towards contraception.

More intensive study along the lines of the present study should concentrate on random sampling of working and non-working women to ascertain fertility history, educational attainment, and occupational status. This would give better raw data than is available from Census figures to more rigourously test the concept of role incompatibility and its effect on Caribbean fertility. This could very usefully be related to regional differences in attitudes and behavioural patterns in decision-making on issues of procreation and contraception. This is especially valuable on a regional, inter-regional and international basis within the Caribbean.

The present study has emphasised the regional level in accordance with the United Nations (1971:40) statement that "It is essential to launch new studies......in order to
pinpoint the factors that influence fertility on a worldwide, regional or national level. This is the challenge to the population geographer. In a small island like Barbados facing problems of over-population, the population problem must be tackled on all fronts. This involves research into regional fertility differentials. Research on fertility in Barbados is too concentrated on the national level on the assumption that there is little regional variation in fertility in such a small island. This study has shown that on the broad urban/rural division there are differences in fertility rates. In order to reduce national fertility even further it would be wise to operate on the regional level in areas where fertility is highest. In this case, the regional approach of the Barbados Family Planning Association should be stressed, especially in the agricultural areas, where it is apparent that there is either less knowledge of contraception or little motivation for the use of contraception.

With regard to family planning, educational attainment, and improving female status Barbados is a leader among the smaller Caribbean islands. The Barbadian experience, if fully researched, could be an invaluable lead to many of the other islands with more acute economic and social problems.

It has been the author's contention that too great a stress has been placed upon the development of family
planning services in the West Indies in accounting for the decline in fertility levels, and that it is valuable and necessary to examine the social and economic factors that underlie fertility decisions. To this end it has been postulated, and to a large extent verified, that there is an association between female status and fertility, which is manifested through increases in contraception.
Appendix 1

A Classification of the Intermediate Variables Affecting Fertility
(after Davis & Blake)

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I

Factors Affecting Exposure to Intercourse
("Intercourse Variables")

A. Those governing the formation and dissolution of unions in the reproductive period.

1. Age of entry into sexual unions.
2. Permanent celibacy: proportion of women never entering sexual unions.
3. Amount of reproductive period spent after or between unions
   a) When unions are broken by divorce, separation or desertion.
   b) When unions are broken by death of husband.

B. Those governing the exposure to intercourse within unions.

4. Voluntary abstinence.
5. Involuntary abstinence (from impotence, illness, unavoidable but temporary separations).
6. Coital frequency (excluding periods of abstinence).

II

Factors Affecting Exposure to Conception
("Conception Variables")

7. Fecundity or infecundity, as affected by involuntary causes.
8. Use or non-use of contraception
   a) by mechanical and chemical means
   b) by other means.
9. Fecundity or infecundity, as affected by voluntary causes (sterilization, subincision, medical treatment, etc.)

III

Factors Affecting Gestation and Successful Parturition
("Gestation Variables")

10. Foetal mortality from involuntary causes.
11. Foetal mortality from voluntary causes.

Appendix 2
Factors Related to Fertility Directly or Indirectly

Blood group
Heredity
Inbreeding
Hybridization
Sterilizing operation
Oral contraception
Reproductive span
Lactation
Psychological factors
Diet
Disease

Fertility

Fecundity

Probability of coitus
Abortion
Non-oral contraception
Miscarriage and stillbirth

Frequency of coitus (marital, regular)
- Voluntary abstinence
- Involuntary abstinence
- Age at marriage
- Polygamy
- Separation or divorce
- Post-widowhood celibacy
- Premarital relations
- Extramarital relations
- Deviations from heterosexual intercourse
- Attitude toward sexual relations
- Desire for children
- Kinship organization
- Religion
- Education
- Occupation
- Standard of living
- Means of subsistence
- Rules of inheritance
- Social disorganization
- Involvement in war
- Population density
- Mortality

Source: Nag. 1962:167
Appendix 3: Results of Analysis

Table A.1
Fertility of Women and Working Women Aged 16–50, Barbados 1971: t-test

H₀: There is no difference between the means of the fertility of women and working women in Barbados in 1971.

H₁: There is a significant difference between the means of the fertility of women and working women in Barbados in 1971.

Significance level: α = 0.05
degrees of freedom = 20

Critical value of t = 1.725 (tα)

\[ t = 0.485 \]

Since 0.485 < 1.725 (tα) accept H₀
Table A.2

Decline in Fertility in Barbados 1960-1970: t-test

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_0$:</td>
<td>There is no significant decline in fertility in Barbados between 1960 and 1970.</td>
</tr>
<tr>
<td>$H_1$:</td>
<td>There is a significant decline in fertility in Barbados between 1960 and 1970.</td>
</tr>
</tbody>
</table>

Significance level: $\alpha = 0.05$

degrees of freedom = 20

critical value of $t = 2.086$ ($t_{\alpha/2}$)

$t = 3.518$

Since $3.518 > 2.086$ ($t_{\alpha/2}$) reject $H_0$
Table A.3
Improvemement in Female Educational Status in Barbados
1960 - 1970: t-test

a) \( H_0 \): There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is 1-4 years of primary education.
\[ H_1: \] There is a significant decline between the 1960 and 1970 means of the female working population whose maximum educational attainment is 1-4 years of primary education.

Significance level: \( \alpha = 0.05 \)
degrees of freedom = 22

Critical value of \( t = 2.074 (t_{\alpha/2}) \)

\[ t = 8.633 \]

Since \( 8.633 \geq 2.074 (t_{\alpha/2}) \) reject \( H_0 \)

b) \( H_0 \): There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is 5 and over years of primary education.
\[ H_1: \] There is a significant decline between the 1960 and 1970 means of the female working population whose maximum educational attainment is 5 and over years of primary education.

Significance level: \( \alpha = 0.05 \)
degrees of freedom = 22

Critical value of \( t = 2.074 (t_{\alpha/2}) \)

\[ t = 10.882 \]

Since \( 10.882 \geq 2.074 (t_{\alpha/2}) \) reject \( H_0 \)
c) $H_0$: There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is primary education.

$H_1$: There is a significant decline between the 1960 and 1970 means of the female working population whose maximum educational attainment is primary education.

Significance level: $\alpha = 0.05$

degrees of freedom = 22

critical value of $t = 2.074 \ (t_{\alpha/2})$

$t = 17.616$

Since $17.616 > 2.074 \ (t_{\alpha/2})$ reject $H_0$

d) $H_0$: There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary, no school certificate, education.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary, no school certificate, education.

Significance level: $\alpha = 0.05$

degrees of freedom = 22

critical value of $t = 2.074 \ (t_{\alpha/2})$

$t = 19.367$

Since $19.367 > 2.074 \ (t_{\alpha/2})$ reject $H_0$
e) $H_0$: There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary school certificate, education.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary school certificate, education.

Significance level: $\alpha = 0.05$

degrees of freedom = 22

critical value of $t = 2.074 (t_{\alpha/2})$

$t = 4.736$

Since $4.736 \geq 2.074 (t_{\alpha/2})$ reject $H_0$

f) $H_0$: There is no difference between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary education.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population whose maximum educational attainment is secondary education.

Significance level: $\alpha = 0.05$

degrees of freedom = 22

critical value of $t = 2.074 (t_{\alpha/2})$

$t = 17.165$

Since $17.165 \geq 2.074 (t_{\alpha/2})$ reject $H_0$
Table A.4
Change in Female Occupation Status in Barbados
1960 - 1970: t-test

a) \( H_0 \): There is no difference between the 1960 and 1970 means of the female working population who are employed in agriculture.

\( H_1 \): There is a significant decline between the 1960 and 1970 means of the female working population who are employed in agriculture.

Significance level: \( \alpha = 0.05 \)
degrees of freedom = 20

critical value of \( t \) = 2.086 (\( t_{\alpha/2} \))

\[ t = 2.786 \]

Since 2.786 \( \geq \) 2.086 (\( t_{\alpha/2} \)) reject \( H_0 \)

b) \( H_0 \): There is no difference between the 1960 and 1970 means of the female working population who are employed in production and related occupations.

\( H_1 \): There is a significant increase between the 1960 and 1970 means of the female working population who are employed in production and related occupations.

Significance level: \( \alpha = 0.05 \)
degrees of freedom = 20

critical value of \( t \) = 2.086 (\( t_{\alpha/2} \))

\[ t = 0.682 \]

Since 0.682 \( \leq \) 2.086 (\( t_{\alpha/2} \)) accept \( H_0 \)
c) $H_0$: There is no difference between the 1960 and 1970 means of the female working population who are employed in professional, technical, administrative and managerial occupations.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population who are employed in professional, technical, administrative and managerial occupations.

Significance level: $\alpha = 0.05$

degrees of freedom = 20

critical value of $t = 2.086$ ($t_{\alpha/2}$)

$t = 1.608$

Since $1.608 < 2.086$ ($t_{\alpha/2}$) accept $H_0$

d) $H_0$: There is no difference between the 1960 and 1970 means of the female working population who are employed in clerical and related occupations.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population who are employed in clerical and related occupations.

Significance level: $\alpha = 0.05$

degrees of freedom = 20

critical value of $t = 2.086$ ($t_{\alpha/2}$)

$t = 5.309$

Since $5.309 > 2.086$ ($t_{\alpha/2}$) reject $H_0$
e) $H_0$: There is no difference between the 1960 and 1970 means of the female working population who are employed in sales occupations.

$H_1$: There is a significant decrease between the 1960 and 1970 means of the female working population who are employed in sales occupations.

Significance level: $\alpha = 0.05$

degrees of freedom = 20

critical value of $t = 2.086 \ (t_{\alpha/2})$

$t = 1.868$

Since $1.868 < 2.086 \ (t_{\alpha/2})$ accept $H_0$

f) $H_0$: There is no difference between the 1960 and 1970 means of the female working population who are employed in services.

$H_1$: There is a significant increase between the 1960 and 1970 means of the female working population who are employed in services.

Significance level: $\alpha = 0.05$

degrees of freedom = 20

critical value of $t = 2.086 \ (t_{\alpha/2})$

$t = 1.681$

Since $1.681 < 2.086 \ (t_{\alpha/2})$ accept $H_0$
Table A.5

Fertility and Educational Attainment of Working Women: Spearman's Rank Order Correlation

a) $H_0$: There is no relationship between fertility and the proportion of female working population in each parish with a maximum educational attainment of 1-4 years of primary education in
   i) 1960
   ii) 1970

$H_1$: There is a positive relationship between fertility and the proportion of female working population in each parish with a maximum educational attainment of 1-4 years of primary education in
   i) 1960
   ii) 1970

No. of observations = 11

   i) $\rho = 0.773^{**}$
   ii) $\rho = 0.691^*$

b) $H_0$: There is no relationship between fertility and the proportion of female working population in each parish with a maximum educational attainment of 5 and over years of primary education in
   i) 1960
   ii) 1970

$H_1$: There is a positive relationship between fertility and the proportion of female working population in each parish with a maximum educational attainment of 5 and over years of primary education in
   i) 1960
   ii) 1970

No. of observations = 11

   i) $\rho = -0.736^*$
   ii) $\rho = +0.673^*$

* = significant at the 0.05 level
** = significant at the 0.01 level
c) \( \text{H}_0 \): There is no relationship between fertility and the proportion of the female working population in each parish with a maximum educational attainment of primary education in
   i) 1960
   ii) 1970

\( \text{H}_1 \): There is a positive relationship between fertility and the proportion of the female working population in each parish with a maximum educational attainment of primary education in
   i) 1960
   ii) 1970

\textbf{No. of observations} = 11

   i) \( \rho = 0.782^{**} \)
   ii) \( \rho = 0.818^{**} \)

\[ \]

\[ \]

d) \( \text{H}_0 \): There is no relationship between fertility and the proportion of the female working population in each parish with a maximum educational attainment of secondary, no school certificate, education in
   i) 1960
   ii) 1970

\( \text{H}_1 \): There is a negative relationship between fertility and the proportion of the female working population in each parish with a maximum educational attainment of secondary, no school certificate, education in
   i) 1960
   ii) 1970

\textbf{No. of observations} = 11

   i) \( \rho = -0.764^{**} \)
   ii) \( \rho = -0.527 \)

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\[ * \] = Significant at the 0.05 level
\[ ** \] = Significant at the 0.01 level
e) \( H_0: \) There is no relationship between fertility and the proportion of the female working population in each parish whose maximum educational attainment is secondary, school certificate, education in
   i) 1960
   ii) 1970

\( H_1: \) There is a negative relationship between fertility and the proportion of the female working population in each parish whose maximum educational attainment is secondary, school certificate, education in
   i) 1960
   ii) 1970

No. of observations = 11

i) \( \rho = -0.946^{**} \)
ii) \( \rho = -0.918^{**} \)

f) \( H_0: \) There is no relationship between fertility and the proportion of the female working population in each parish whose maximum educational attainment is secondary education in
   i) 1960
   ii) 1970

\( H_1: \) There is a negative relationship between fertility and the proportion of the female working population in each parish whose maximum educational attainment is secondary education in
   i) 1960
   ii) 1970

No. of observations = 11

i) \( \rho = -0.913^{**} \)
ii) \( \rho = -0.668^{*} \)

* = Significant at the 0.05 level
** = Significant at the 0.01 level
Table A.6

Fertility & Occupational Status of Working Women:
Spearman's Rank Order Correlation

| a) H₀: | There is no relationship between fertility and the proportion of female working population in each parish engaged in agriculture in |
| i) 1960 | ii) 1970 |
| H₁: | There is a positive relationship between fertility and the proportion of female working population in each parish engaged in agriculture in |
| i) 1960 | ii) 1970 |
| No. of observations = 11 | |
| i) ρ₀ = 0.791** | ii) ρ₀ = 0.936** |

| b) H₀: | There is no relationship between fertility and the proportion of female working population in each parish engaged in productive and related occupations in |
| i) 1960 | ii) 1970 |
| H₁: | There is a negative relationship between fertility and the proportion of female working population in each parish engaged in productive and related occupations in |
| i) 1960 | ii) 1970 |
| No. of observations = 11 | |
| i) ρ₀ = -0.627* | ii) ρ₀ = -0.482 |

* = Significant at the 0.05 level
** = Significant at the 0.01 level
c) $H_0$: There is no relationship between fertility and the proportion of female working population in each parish engaged in professional, technical, administrative and managerial occupations in
   i) 1960
   ii) 1970

$H_1$: There is a negative relationship between fertility and the proportion of female working population in each parish engaged in professional, technical, administrative and managerial occupations in
   i) 1960
   ii) 1970.

No. of observations = 11

i) $\rho = -0.827^{**}$
ii) $\rho = -0.673^*$

d) $H_0$: There is no relationship between fertility and the proportion of female working population in each parish engaged in clerical and related occupations in
   i) 1960
   ii) 1970

$H_1$: There is a negative relationship between fertility and the proportion of female working population in each parish engaged in clerical and related occupations in
   i) 1960
   ii) 1970.

No. of observations = 11

i) $\rho = -0.845^{**}$
ii) $\rho = -0.791^{**}$

* = Significant at the 0.05 level
** = Significant at the 0.01 level
e) \( H_0 \): There is no relationship between fertility and the proportion of female working population in each parish engaged in sales occupation in
   i) 1960
   ii) 1970

\( H_1 \): There is a negative relationship between fertility and the proportion of female working population in each parish engaged in sales occupations in
   i) 1960
   ii) 1970

No. of observations = 11

i) \( \rho = -0.155 \)
ii) \( \rho = -0.182 \)

f) \( H_0 \): There is no relationship between fertility and the proportion of female working population in each parish engaged in service occupations in
   i) 1960
   ii) 1970

\( H_1 \): There is a negative relationship between fertility and the proportion of female working population in each parish engaged in service occupations in
   i) 1960
   ii) 1970

No. of observations = 11

i) \( \rho = -0.927^{**} \)
ii) \( \rho = -0.764^{**} \)

\* = Significant at the 0.05 level
\** = Significant at the 0.01 level
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