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Infant and Child Mortality and Fertility: Trinidad and Tobago, Guyana and Jamaica

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The WFS is being undertaken, with the collaboration of the United Nations, by the International Statistical Institute in cooperation with the International Union for the Scientific Study of Population. Financial support is provided principally by the United Nations Fund for Population Activities and the United States Agency for International Development.
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Preface

The policy of WFS is to encourage and to support, where possible, further detailed analysis of the survey data following the publication of the First Country Report. The national meetings, as in the case of other participating countries, held in the three English-speaking Caribbean countries – Guyana, Jamaica and Trinidad and Tobago – and the two regional seminars provided the forum for identifying the topics and for preparing project proposals for such analyses. After a careful review of the proposals, the countries approved the choice of five topics: contraception, infant and child mortality, union patterns and fertility, fertility preferences and socio-economic differentials in fertility. It was also decided that work on the first three topics would be undertaken by experienced researchers in the region while the last two would be done by the two Caribbean nationals working with WFS. The programme was supported by WFS through the funds made available for second-stage analysis.

With the emphasis on country-specific analysis, the Caribbean programme was expected to produce an analytical report on each of the five topics for each of the three countries, which would have resulted in fifteen national reports. However, in view of the similarity of the questionnaires used in the three countries, it was decided to organize the research in such a way that each researcher would carry out the analysis on all three countries, using similar or the same methodology and to publish one single report on each topic. This approach also had the advantage of allowing comparisons within a single report, for a given topic, and indeed the authors were requested to prepare a short comparative chapter in addition to the main chapters on individual countries.

All the papers have gone through two stages of review and revision. The first stage was a regional seminar, held at the University of the West Indies, St Augustine, Trinidad, in September 1982, where representatives from each country were invited, and the papers were presented. External reviewers commented on each paper: contraception (Halvor Gille), union patterns (Yves Charbit and Basia Beckles), infant and child mortality (Richard Lobdell), fertility preferences (Michael Vlassoff) and socio-economic differentials in fertility (Barbara Boland). The papers were revised following these reviewers' suggestions, and the second stage was to have a further evaluation of the revised draft reports, mainly done by assigned WFS staff members, but in two cases by external reviewers. A final version, in all cases involving substantial rewriting and condensation, then followed.

This report is one of the five reports and has been prepared by Edward Ebanks who worked for a period at the WFS Professional Headquarters in London. I am very grateful to him for undertaking this task, and I would like to associate myself wholeheartedly with his expression of appreciation (page 8) for assistance and contributions from various sources. Comments by participants at the regional seminar were also taken into consideration.

We hope that this report, along with the other four, will provide valuable insights, leading to better understanding of the demographic situation in the three countries and that it will be of use to the national policy-makers. In conclusion, I wish to thank the national survey directors and their staff for their continued support and most valuable collaboration.

HALVOR GILLE
Project Director

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The assistance and encouragement of V.C. Chidambaram and Jack Harewood are very much appreciated. I thank Susheela Singh, Gigi Santow, Richard Lobdell, John Hobcraft and Shea Rutstein for their comments on earlier drafts of the report. Many thanks also to Bill Marshall, Lokky Wai and Hazel Ashurst for their assistance.

To the secretarial staff at University of Western Ontario and WFS I owe so much. My sincere thanks go to them all.

1 Introduction

This report deals with infant mortality, child mortality and fertility in the three Caribbean countries of Trinidad and Tobago, Guyana and Jamaica and has two main goals. The first focus is upon the interrelationship between infant and child mortality on the one hand, and fertility on the other. The second aim is an examination of correlates of infant and child mortality. Intervening variables between infant and child mortality and fertility are included in the analysis. The data of the study are taken from the Trinidad and Tobago Fertility Survey 1977, the Guyana Fertility Survey 1975, and the Jamaica Fertility Survey 1975–6; all conducted under the World Fertility Survey (WFS) Programme. The analysis of the data involves a variety of techniques and measures.

This first section of the report presents a general discussion of the interrelationships under examination as well as a description of the data. The methodology used in deriving measures of some variables will also be given.

Sections 2, 3 and 4 of the report are similar in structure but each deals with one of the countries. These sections can stand on their own but the reader is encouraged to read the entire report. This division was undertaken in order to facilitate the reader who is only interested in a specific country. The interrelationships presented in section 1 are looked at with data in sections 2–4. Section 5 compares the findings of the country-specific sections, and draws some conclusions.

1.1 OVERVIEW AND DISCUSSION

A brief overview and discussion of the interrelationship between infant and child mortality and fertility will now be presented as a background to this study. In recent years a great deal of attention has been given to this topic and many scholars have discussed it since the 1960s. They have dealt with it at both the macro (group) and micro (individual) levels. The findings have not always been consistent. This should be expected since fertility and mortality (infant and child) are influenced by socio-cultural factors, which are themselves different from society to society. In this paper the analysis is at the micro level but some macro data and discussion will be presented as a background to the study.

At the macro level, infant mortality, child mortality and fertility have been of great concern, especially during the post-World War II period, and specifically within the context of the developing societies. Among the economically poor countries fertility was generally observed to be high and so too was infant and child mortality. Among the economically rich countries low fertility, generally was observed to coincide with low infant and child mortality. Studies using countries as units of analysis reveal a positive correlation between levels of infant and child mortality and fertility. Social scientists have postulated that a reduction in infant mortality is necessary for fertility decline. The argument is made that there is an internalized desired family size. This desired family size is based on economic and cultural considerations. The infant mortality level must be taken into account if one is to achieve one's ideal number of surviving children. When infant mortality is high, it follows that fertility will be high since the number of live births (fertility) minus the number of infant and child deaths should approximate the ideal or desired family size. A reduction in infant mortality will allow for a reduction in the number of live births necessary to achieve the desired family size.

Most of the evidence to date points in the direction of societal fertility decline following declines in infant and child mortality with a time lag. This time lag, the argument runs, occurs because the parents of children will not be aware immediately of the society's increasing rate of survivorship. It takes time for people to become aware of the fact that a higher proportion of the live births are surviving. Once this phenomenon of declining infant and child mortality is generally known and reasonably expected to persist in the future then fertility is likely to decline (Bouvier and Van der Tak 1976; Preston 1975 a, b, 1976, 1977; Palloni 1981; Stolnitz 1955, 1956, 1965; Schultz 1976, 1978; Dyson 1977; Shin 1977; Chaudhry 1977).

This societal level interrelationship manifests itself at the micro level. The 'insurance hypothesis' argument has been briefly sketched above. Couples, in order to ensure a set number of surviving children, have or aspire to have a set number of live births based on their perception of the probability of surviving. The high desired and actual family sizes in developing countries in part can be explained by this motivation and related behaviour. Another hypothesis, the replacement hypothesis, is also advanced with regard to infant and child mortality and fertility. It posits that couples in trying to attain their desired number of surviving children will replace, wherever possible, those children that die. Couples are assumed to have ideal numbers of surviving children and their fertility behaviour is aimed at achieving these goals. Therefore, if infant and child mortality intervene they then will increase their fertility in order to replace the lost children. Both hypotheses lead to the same results – a positive correlation between infant and child mortality and fertility (Balakrishnan 1978; Adlakha 1973; Preston 1975 a, 1977, 1980; Hashimoto and Hongladarom 1981; Ben Porath 1976; Harrington 1971). High fertility levels in the Third World societies have been partly attributed to these two motivations.

It is not possible to examine the insurance hypothesis with the available data but a discussion of it was deemed

necessary since it has relevance for our micro analyses. Infant mortality is relatively high at present in the three countries and it was much higher in the not too distant past. The manifested fertility behaviour of the women in this study may have been influenced by the perceived levels of infant and child mortality.

The replacement hypothesis will be given some attention within sections 2–4. However, the available data place constraints on a direct and full examination of it.

The other main relationships considered in the country-specific parts are discussed below. This is done in order to set the stage for the country-specific treatments and to avoid duplication of these concerns in those discussions.

Within each of the three sections focussing on the specific countries a number of relationships will be examined. These relationships have been examined in some studies with respect to other countries using data obtained from a variety of sources.

1 Fertility and infant and child mortality are associated with the age of the mother. Fertility in particular is related to current age and the amount of exposure up to that age. The probability of succumbing to mortality early in life has been shown to be associated with the age of the mother at the birth of the child (Balakrishnan 1978; McKenzie *et al* 1967; Edmonston 1982; Bouvier and Van der Tak 1976; Rutstein 1983; Nortman 1974; Cochrane and Zachariah 1983.) Birth order, which is related to the age of the mother, also has an association with infant and child mortality. In general we expect infant mortality to be higher among first order births than second order ones, and births of order 2 to some number such as 5 to have lower probabilities of dying in early childhood than those of high parity (about 6 and higher). This relationship is usually studied in conjunction with the age of the mother at the birth of the respective children.

2 The spacing of births is generally believed to be associated with infant and child mortality as well as fertility. The proper spacing of births allows more time for child care, is likely to make more material resources available for the care of each child, and also allows for healthier mothers. Therefore, it is expected that a short interval in between any two births will decrease the probability of surviving of both of the relevant children (Goldberg and Adlakha 1969; Hobcraft *et al* 1983; Edmonston 1982; Wray 1971; Wolfers and Scrimshaw 1975). Breastfeeding is undoubtedly a contributing factor in the length of the birth interval and its relationship to infant and child mortality, but it will not be examined in this study. The availability of breastfeeding information in this set of WFS data does not lend itself to a full analysis of its impact and for that reason it is omitted. Cochrane and Zachariah (1983) have examined it using WFS data.

3 High levels of infant and child mortality should be expected to work against contraceptive use. Women who have lost some of their offspring are not as likely to use contraception as those who have not suffered child loss since they may be trying to replace the lost child. The level of fertility and that of child mortality should, along with the desired family size, have a strong bearing on contraceptive use (Arora 1980; Butz *et al* 1981; Cochrane and Zachariah 1983). Contraceptive use is another variable influencing the length of the birth interval. However, a full analysis of that relationship is beyond the scope of this paper. It is only touched on briefly here.

4 The relationship between sex union patterns and fertility in the English-speaking Caribbean is well documented (Lightbourne and Singh 1982; Harewood 1984; Roberts 1955; Ebanks 1973; Ebanks *et al* 1974; Blake 1961; Stycos and Back 1964; Roberts and Braithwaite 1960; Nobbe *et al* 1976; Leridon and Charbit 1981). These sex union patterns are very complex. Some aspects of these patterns will be examined in relation to infant and child mortality. The nature of the relationship between infant and child mortality and sex union patterns is not known. We do expect, however, that there will be a pattern in which the unstable sex unions experience higher infant and child mortality levels than the more stable ones.

5 Fertility desires in relation to the present level of fertility and the infant and child mortality experience to date should shed some light on the efficacy of the replacement hypothesis and may even have some oblique reference for the insurance hypothesis. We will examine this area and in so doing take into consideration current contraceptive behaviour. We expect women with the same current levels of surviving children to desire different numbers of additional births based on their infant or child mortality experiences. Those with infant or child losses are expected to desire more additional births than those whose children are all alive even when we control for number of living children. Controlling for the number of living children, those women who have lost one or more infants or children are less likely to be currently using contraception than those with all their children surviving.

6 Education has been shown to be a major explanatory variable in fertility analyses. There is evidence that it has a similar influence on the levels of infant and child mortality (Caldwell 1979; Caldwell and McDonald 1982; Simmons and Bernstein 1982; Sloan 1971; Smucher 1975; Cochrane 1980; Trussell and Preston 1982; Trussell and Hamerslough 1983; Meegama 1980; Hobcraft *et al* 1984; Frenzen and Hogan 1982). The better educated mothers experience less infant and child mortality. The higher is the educational level, the more likely is it that the quality of life, maternal care and child care will be higher and the infant loss lower. We speculate that socio-economic improvements are likely to be a necessary condition for reduction in infant mortality to low levels.

7 Other socio-cultural variables in so far as they are related to fertility are expected to be associated with infant and child mortality. Urban dwellers are likely to experience less infant loss since they are more likely than rural women to have access to maternal and child care facilities, and they are more likely to enjoy on average a better standard of living (Behm *et al* 1976–9; Haines and Avery 1982). Ethnicity in Trinidad and Tobago, and Guyana is considered as a variable of importance in social and economic differentials and may therefore be associated with infant and child mortality. For this reason it is introduced as a control variable in some of the analyses. The occupation of the women before the

birth of the first child is also examined for its implication for infant and child mortality.

1.2 MEASURES AND DATA CONSIDERATIONS

The infant mortality and the child mortality data as well as the fertility information are obtained from the pregnancy history of the individual questionnaire. For each pregnancy the following were ascertained: month and year of termination, outcome of pregnancy, sex, whether or not the child was still living, month and year of death (if applicable), and duration of the pregnancy (if not a live birth). The number of live births was also obtained and this constitutes the measure of fertility. All variables used are from the information obtained at the individual level (women, 15–49).

The infant mortality rate is obtained by counting the number of reported infant deaths in a time period and expressing it per 1000 live births in the same period. An infant death is one that occurs in the first one year after birth. The child mortality rate is similarly obtained, except that it applies to the first five years of life. The infant mortality rate is therefore a subset of the child mortality rate.

Some tables in this report give probabilities of dying for synthetic cohorts and others represent real cohorts. The synthetic cohort probabilities are taken from Rutstein (1983). The real cohort probabilities were calculated for this paper. Rutstein's methodology is described in his report. In calculating the real cohort probabilities of dying in infancy (the first one year after birth), and in the first five years after birth, we have avoided truncation effects by excluding the first year or first five years before the survey in presenting infant and child mortality rates, respectively, for time periods before the survey. Rutstein's tables (except for part of one) reproduced in this paper are for synthetic birth cohorts and can be identified by the fact that the time periods before the survey always begin with (0–4) years. The real birth cohorts of this paper can be identified by (1–4) years and (5–9) years as the first periods before the survey for infant and child mortality, respectively.

Information on sex union patterns are obtained from the union history. In the Caribbean sex union formation patterns are complex and therefore it is not possible to give a comprehensive treatment in this report. However, this information cannot be ignored because of its relationship to fertility and possibly to infant and child mortality. We will look at the number of sex partners and the number of sexual relationships entered into; taking them as indications of sex union patterns stability (or instability). We also present data with respect to the present union status (or the last one for women not in a union at the time of the survey).

An examination of the additional number of children desired in relation to the current level of fertility and the infant and child mortality experience is also undertaken within the context of the three countries. This is one way of looking at the replacement hypothesis.

Current contraceptive use, fertility and infant and child mortality are looked at, in all three country sections. There are many aspects to contraceptive use but its association with infant and child mortality is not clear and a full treatment is beyond the scope of this paper.

It should be remembered that the women who were interviewed in the study were 15–49 years old at the time of the survey. Therefore the oldest five-year age cohort (45–49) was 15–19 years old 30 years before the survey. They began their childbearing 30 years ago. The women interviewed from these older cohorts are the survivors of larger cohorts. They are also being asked to recall births and deaths that occurred a long time ago. Caution is warranted in interpreting this kind of data. When looking at secular trends we concentrate for the most part on the period 24 years and less before the surveys.

The time periods before the survey have been grouped in five-year intervals (except the first one in the case of infant mortality for real cohorts) in order to increase subsample sizes. The period is also terminated 24 years before the survey because of small numbers of cases beyond that point.

In the examination of parity progression the analysis is confined to the first five parities only, and only women 35 years and over are included. This is done in order to ensure that the women have made the progression to the next parity or they are not likely to do so. Women 35 years and over have been through most of their childbearing and even if they have not, they are likely to be beyond their fifth child in any case, taking into consideration the early initiation of childbearing and the length of the birth intervals.

Union status at present includes the status of the last union for women not in a union at the time of the survey. Three union statuses are recognized – married, common law and visiting. Those who are not familiar with these classifications should consult Harewood (1983) and Lightbourne and Singh (1982). Married unions are seen to be the most stable, and visiting the least. The number of partners is the number of different men that the respondent reported as being intimately sexually involved with in a 'steady' relationship, up to the time of the survey. The number of sexual relationships (the number of relationships) is the number of different union types (union statuses) that a woman has been involved in up to the time of the survey. A woman could be in as many as three relationships with the same partner (visiting, common law, married). As another example, a woman may be in four relationships with two partners – visiting and common law with one, and visiting and married with the second.

The data are based on a probability sample of 4359 women aged 15–49 for Trinidad and Tobago, 3096 in the case of Jamaica and 4642 for Guyana. Women in this age range who were still in school were not interviewed. The central statistical office in each country was the agency responsible for all phases of the data collection.

Evaluation of the quality of the data will be given at the beginning of each country-specific part. In general the data are of good quality for all three countries and, except where the numbers are small, warrant some confidence.

1.3 THE COUNTRIES

The three societies included in this study are the only three English-speaking Caribbean countries that partici-

pated in the World Fertility Survey (WFS). Guyana is the largest in terms of land area and the smallest in population. Trinidad and Tobago is intermediate in population and surface area. All three are former British colonies and hence have certain similarities culturally, socially and historically. Jamaica and Trinidad and Tobago are islands in the Caribbean sea. Guyana lies on the South American mainland but has a Caribbean coast and has always been closely identified with the English-speaking Caribbean islands. Both in land area and population they are the three largest English-speaking Caribbean nations (excluding Belize). They are all members of the Caribbean Common Market. Trinidad has the highest per capita income and Guyana the lowest. All three countries have some natural resources and potential for economic growth.

2 Trinidad and Tobago: Infant and Child Mortality and Fertility

2.1 INTRODUCTION

Trinidad and Tobago, the two-island Caribbean nation, had in 1982 an estimated population of 1.2 million, a crude birth rate of 25, and a crude death rate of 6. Its infant mortality was given as 26.4 and life expectancy at birth of 70 years (Population Reference Bureau 1983). Even if one questions the accuracy of these figures it is still the case that the society has been undergoing demographic changes and currently is moving towards the third stage in the demographic transition.

The Trinidad and Tobago Fertility Survey 1977 (TTFS) collected data on a probability sample of 4359 women between the ages of 15 and 49 years. Of these 4359, 877 had never been in a sexual union, and the remaining 3482 had been in one or more sexual unions. Since fertility and infant and child mortality are our concerns the analysis is confined to those women who have had at least one live birth. This specification resulted in a working sample of 2826 women, ever in a union, with one or more live births. The data collection was carried out in Trinidad and Tobago in 1977 by the Central Statistical Office under the auspices of the World Fertility Survey (WFS).

Women who were 45–49 in the year of the survey (1977) were 15–19 years of age in 1947. These women were 18–22 in 1950. An attempt is made to sketch very briefly the societal demographic picture from about 1950 up to the time of the survey. Retrospective data obtained in the survey are also presented as part of this exercise. It is in most cases possible to obtain data for the period 1960 to the present. Before 1960 the data are not always available and when they are, they are suspect.

Life expectancy at birth in Trinidad and Tobago in 1950 may be estimated to have been about 60 years; by 1960 it was about 65; by 1970 it was about 68; and currently (1982) it is 70. The infant mortality rate in 1950 was about 80; in 1960, 45; in 1970, 35; and in 1982, 26. The crude death rate in 1950 was about 9; in 1960 about 8; in 1970 about 7.5; in 1975 about 6.5; and in 1982 about 6 (UN Demographic Yearbooks; Population Index; Harewood 1975; Vital Statistics). These three demographic measures are interrelated. They point clearly in the direction of substantial demographic changes since 1950.

The TTFS provides relatively good data on fertility and infant and child mortality as well as the other variables used in this study. An evaluation of the quality of this data is available in Hunte (1983). It is unnecessary to report on this evaluation here in great detail. However, it is appropriate to point out some of the relevant findings. Hunte's conclusions are that the fertility data are of a high quality. Infant and child mortality data are also of a high quality with the observed 'fluctuation due mainly to sampling error'. Some digit preferences are observed for ages ending in 0 and 5. 'Age shifting' occurs between age groups 20–24 and 25–29. There is perhaps some small amount of under-reporting of age. Overall, the variables used in this study, are measured with a great deal of reliability and validity.

2.2 INFANT AND CHILD MORTALITY AND FERTILITY – AN OVERVIEW

It is perhaps necessary to present some recent historical data on fertility and infant mortality before proceeding to the analysis based on the WFS data. Child mortality figures are available only from the WFS data.

The crude birth rate (table 1) in 1960 was under 40. It is likely that it was declining before that year. Between 1960 and 1969 it declined from 39.1 to 24.4. Since 1970 there has been very little change. It has mostly stayed between 24 and 25. The 1982 figure is given as 25 (Population Reference Bureau 1983). The decline is associated with economic growth, improvements in the quality of life, outmigration in large numbers, and increasing contraceptive use. The slow-down in the decline of the crude birth rate is perhaps related to the

Table 1 Trinidad and Tobago: Crude birth rates, total fertility rates – vital statistics and Trinidad and Tobago Fertility Survey data – 1960–76

Year	Crude birth rates[a]	Total fertility rates (vital statistics)[b]	Total fertility rates (TTFS)[b]
1960	39.06	5.58	6.49
1961	37.90	5.24	6.04
1962	37.88	5.19	5.86
1963	35.59	4.91	5.58
1964	34.65	4.76	5.41
1965	32.81	4.49	5.31
1966	30.24	4.10	4.93
1967	28.18	3.84	4.20
1968	27.54	3.78	4.54
1969	24.45	3.32	3.71
1970	24.50	3.39	3.96
1971	25.29	3.57	3.10
1972	26.84	3.73	3.86
1973	24.80	3.38	3.54
1974	24.50	3.30	3.44
1975	23.74	3.12	3.02
1976	24.72	3.15	3.23

[a]Population and Vital Statistics 1977 Report. Trinidad and Tobago.
[b]Hunte (1983).

dynamics of the age structure, a dramatic halt to emigration and a slow-down in improvements in the quality of life. It is likely that had it not been for the national family planning programme (established in 1969) and continued improvements in the level of education, the crude birth rate would be on the rise mainly because of the current age structure. In fact it may still increase above its present level.

Total fertility rates obtained from vital statistics and from the TTFS are shown in table 1. Overall, the TTFS-derived rates are higher than the vital statistics rates. This is perhaps due to a combination of reasons, two of which are poor population estimates and under-registration of births. It is not likely that women interviewed in the TTFS have over-reported births. Both sets of total fertility rates show declining levels of fertility in Trinidad and Tobago. They show, however, a slowing-down of the rate of decline. Figures for the period since the survey are not available.

In summary, fertility has been declining in Trinidad and Tobago since at least 1960. This has coincided with economic advancement, social change and demographic changes. There is a strong tendency at present for a levelling off in the rates.

Infant mortality declines in Trinidad and Tobago had in all likelihood begun before declines in fertility. In the period 1930–34, infant mortality was estimated to average about 128; over the next five-year period it was about 104; by 1950 it was around 78; it went down to about 68 in 1955; and the period 1960–76 is shown in table 2. The vital statistics rates show a continued downward trend until about 1971 and since then a tendency to remain between 26 and 25. The 1982 figure is 26.4 (Population Reference Bureau 1983). The rates calculated from the TTFS data show a downward trend also but it is less marked and less consistent. The smoothed infant mortality rates from the TTFS are more consistent in pattern. The smoothing helps in correcting for errors in reporting the timing of births and deaths and fluctuations due to small annual numbers of births and deaths. The TTFS-derived infant mortality rates are higher than those from the vital statistics. This is perhaps due to under-reporting of births and deaths for infants in the vital statistics. Infants not born in hospitals who die within a short period are unlikely to be registered as either a birth or a death but would be likely to be recorded as both in the TTFS.

Mortality levels among young children and infants are shown in table 3. For both infant and child rates we find a declining trend up to 1965–9, and then an increase for the next period, followed once more by a decline for the two years preceding the survey. The same picture of declining infant and child mortality can be seen in table 4. Both rates declined over the periods 10–34 years prior to the survey but increased over the periods nine years and less before the survey. The results are similar for the synthetic and the real cohorts.

Because of the small number of cases in the period 25 years and more before the survey, we will confine our attention to the 24 years immediately preceding the survey for the remainder of the analysis.

Fertility in Trinidad and Tobago has declined since at least 1960 from very high levels to moderate levels. Stability, at a moderately high level, in the crude birth rate has recently developed. The crude death rate has been on the decline and is currently at a low level. Infant mortality has declined dramatically. Child mortality has declined in line with declines in its subset infant mortality. Trinidad and Tobago has made significant progress in its demographic transition but there is much room for further advancement and in recent years a tendency for the demographic rates to level off has become evident. The growth in the economy has slowed down also. Improvements in the quality of life have not been occurring at the same tempo as in the late 1960s and early 1970s. When the interrelationships among the

Table 2 Trinidad and Tobago: Infant mortality rates (infant deaths per 1000 live births)

Year	Vital statistics[a]	TTFS	TTFS smoothed[b]
1960	45.4	53.5	54.4
1961	45.0	55.3	50.9
1962	38.5	44.0	44.4
1963	40.9	33.8	39.6
1964	35.3	40.8	37.1
1965	38.1	36.7	40.3
1966	41.8	43.4	41.7
1967	35.8	44.9	45.4
1968	36.6	47.9	42.5
1969	39.8	34.6	41.2
1970	34.5	41.2	40.6
1971	29.2	46.1	42.8
1972	25.0	41.3	47.5
1973	26.4	55.1	45.1
1974	25.6	39.0	45.0
1975	25.8	40.9	38.8
1976	25.5	36.5	38.7

[a]UN Demographic Yearbooks.
[b]Moving three-year averages.

Table 3 Trinidad and Tobago: Probabilities of infant and child death by calendar years

Measure	Calendar years						
	1975–6	1970–4	1965–9	1960–4	1955–9	1950–4	1945–9
Infant ($_1q_0$)	39.6	44.8	40.9	44.9	64.3	86.5	(103.4)
Child ($_5q_0$)	45.2	52.8	48.9	54.1	73.4	(89.0)	(123.2)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

Table 4 Trinidad and Tobago: Probabilities of infant and child death by periods before the survey

Measure	Years before the survey						
	0–4	5–9	10–14	15–19	20–24	25–29	30–34
Synthetic cohort							
Infant ($_1q_0$)	42.5	43.5	38.3	59.4	67.7	(94.2)	(139.8)
Child ($_5q_0$)	50.3	50.6	47.9	70.6	71.7	(104.4)	(139.8)
Real cohort							
Infant ($_1q_0$)	42.2[a]	44.2	38.9	56.0	65.5	93.3	140.7
Child ($_5q_0$)	–	52.1	46.0	66.3	75.2	95.0	163.0

[a]1–4 instead of 0–4 years.
NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

demographic, social and economic subsystems of the society are taken into consideration, they lead to the conclusion that changes in any one sector will serve as a catalyst and get things moving again.

2.3 INFANT AND CHILD MORTALITY, BIRTH ORDER AND AGE OF MOTHER

It is reasonable to speculate that infant and child mortality are associated with birth order as well as the age of the mother at the birth of the child of the particular order. We expect first and high order births to have higher risks of dying in the first five years of life than second and other intermediate order births. Therefore the relationship between birth order and infant or child mortality is believed to be J-shaped. Births to very young mothers are expected to have higher risks of infant and child mortality than those to women in their twenties. The risks are also believed to be high for births occurring to women in their forties and even late thirties. The interaction between birth order and the age of the mother at the birth of the child has implications for the chances of survival through the first year and the first five years of life.

In Trinidad and Tobago as in the rest of the English-speaking Caribbean, childbearing begins early in a woman's life and in many cases is continued late into the reproductive years. Fertility was high in the past and is currently still relatively high. Therefore there is a sizeable proportion of births of high order. In this section we explore the relationship between infant and child mortality and birth order and the age of the mother at the birth of the child.

Looking first at birth order and its relationship to infant mortality (table 5) we observe the expected J-shaped pattern even though the difference between orders 1 and 2–3 is quite small.

Birth order and its relationships to infant and child mortality are shown in tables 6 and 7 for time periods in years before the survey. The patterns are not as consistent as those in the previous table. This is perhaps a result of smaller subsamples. The pattern for child mortality is more in line with our expectation than is the case with infant mortality; however, even in the case of infant mortality two of the time periods have the expected J-shaped distribution. For both infant and child mortality the risks of dying are highest for birth orders 6 and above and lowest in general for birth order 2. Births of order 1, in general, have higher risks of dying in infancy and in the first five years than births of order 2.

Table 5 Trinidad and Tobago: Infant mortality rates by birth order (0–9 years before the survey)

	Birth order			
	1	2–3	4–6	7+
Infant ($_1q_0$)	36.3	34.8	38.4	76.9
Infant ($_1q_0$)[a]	104	100	110	221

[a]Relative levels of mortality rates (birth orders 2–3 = 100).
Source: Rutstein (1983)

Table 6 Trinidad and Tobago: Infant mortality by birth order for periods before the survey

Birth order	Years before the survey					Total
	1–4	5–9	10–14	15–19	20–24	
1	33.3	36.9	30.3	55.8	78.4	44.6
2	34.0	36.3	21.1	77.2	40.0	41.4
3	35.9	39.6	29.5	57.5	72.4	45.2
4–5	34.2	37.9	51.8	48.0	65.3	47.0
6+	64.6	71.2	47.9	57.2	87.7	61.2

Table 7 Trinidad and Tobago: Child mortality by birth order for periods before the survey

Birth order	Years before the survey				Total
	5–9	10–14	15–19	20–24	
1	48.0	40.0	69.5	86.2	58.7
2	40.2	28.3	84.0	49.5	50.2
3	46.0	40.6	73.3	80.7	58.3
4–5	44.9	57.5	52.2	69.7	54.6
6+	80.2	57.5	65.3	105.1	70.1

The age of the mother at the birth of the child is shown in table 8 with reference to infant and child mortality rates. In spite of the problem of small subsamples, a pattern emerges which suggests that births to mothers in their twenties enjoy the lowest risks of infant and child deaths. Children born to women younger than twenty years and those to women in their thirties have quite similar risks of dying in infancy and in the first five years of life. The pattern is more consistent for child mortality than for infant mortality.

The interaction between birth order and age of the mother and infant and child mortality can be seen in tables 9 and 10. These tables allow us to control for either birth order or the age of the mother while looking at the relationship of the other with either infant mortality or child mortality. Overall our previous observations on the nature of the relationships are maintained in spite of our smaller subsamples. The twenties seem to be the best age for having the first two order births from the point of view of reducing the risks of infant and child mortality. High parity births at younger ages have higher risks of infant and child mortality, suggesting in addition to a biological link, a link to child spacing. Sixth and higher order births before a woman is in her thirties have high risks of dying early in life. Births of any order to women under the age of 20 have relatively high probabilities of dying in childhood.

In summary, first order births and births of order 6 or higher have relatively higher probabilities of dying in the first year of life than those in between, and among those births of orders 2–5 the relationship tends to be linear and positive but quite unstable due most likely to subsample sizes. Births occurring to mothers in their twenties have lower probabilities of dying in childhood than those born to younger or older mothers. High order births to young mothers have relatively high risks of dying in childhood. There are a number of possible reasons for these findings. Early childbearing and having high parity births are social class related and so, too, is infant and child mortality. There are physiological problems related to early childbearing and childbearing late in the reproductive period. Child spacing may be a significant factor in infant and child mortality especially where parity is high and the age of the mother is relatively young. These and other relationships merit further investigation.

2.4 INFANT AND CHILD MORTALITY AND LENGTH OF BIRTH INTERVAL

Birth spacing as measured by the period of time between a pair of successive live births is expected to have a bearing upon the probability of survival of the two

Table 8 Trinidad and Tobago: Probabilities of infant and child death by periods before the survey and age of mother at birth

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Mother aged less than 20 years					
Infant ($_1q_0$)	(51.9)	(48.5)	(36.2)	(77.9)	(88.6)
Child ($_5q_0$)	(57.7)	(53.9)	(50.1)	(102.5)	(92.7)
Mother aged 20–29 years					
Infant ($_1q_0$)	33.3	40.7	38.7	53.6	57.1
Child ($_5q_0$)	40.9	49.9	46.4	60.1	(61.0)
Mother aged 30–39 years					
Infant ($_1q_0$)	(59.7)	48.8	(38.9)	(52.3)	–
Child ($_5q_0$)	(69.0)	52.3	(50.9)	(52.3)	–
Mother aged 40 years or more					
Infant ($_1q_0$)	(31.7)	(0.0)	–	–	–
Child ($_5q_0$)	(50.7)	(0.0)	–	–	–

NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

Table 9 Trinidad and Tobago: Infant mortality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey					Total
		1–4	5–9	10–14	15–19	20–24	
⩽20	1	36.4	43.2	34.8	67.7	95.6	54.5
	2	51.4	55.5	25.1	98.5	41.0	55.6
	3	34.1	39.2	27.5	58.1	90.5	50.5
	4–5	–	–	(165.6)	(105.7)	–	118.2
	6+	–	–	–	–	–	–
21–24	1	27.6	34.3	21.4	34.3	39.5	30.6
	2	35.5	24.5	17.8	59.6	19.0	31.4
	3	30.7	51.8	40.1	36.2	90.7	49.4
	4–5	60.3	42.9	42.5	39.3	76.5	50.0
	6+	–	(161.8)	(130.4)	(75.7)	(58.5)	104.2
25–29	1	27.8	27.0	(37.4)	(36.6)	–	28.9
	2	19.6	46.1	13.5	39.8	–	35.5
	3	22.2	26.0	18.4	100.2	(0.0)	37.4
	4–5	21.3	40.7	36.7	42.1	35.0	36.2
	6+	12.2	64.5	46.2	61.9	107.2	57.0
30+	1	–	–	–	–	–	16.4
	2	(0.0)	(0.0)	–	–	–	27.7
	3	(69.4)	(27.8)	(20.4)	–	–	36.6
	4–5	36.0	14.5	57.8	63.3	–	38.8
	6+	75.9	68.0	35.2	48.1	–	57.9

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 10 Trinidad and Tobago: Child mortality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey				Total
		5–9	10–14	15–19	20–24	
⩽20	1	60.1	47.0	84.9	106.4	73.7
	2	55.5	36.5	113.5	51.4	66.4
	3	39.2	52.9	79.2	104.8	70.5
	4–5	–	(165.6)	(105.7)	–	134.3
	6+	–	–	–	–	–
21–24	1	34.3	30.2	34.3	39.5	34.1
	2	34.6	25.3	59.6	29.3	37.1
	3	68.3	54.1	42.5	99.0	63.9
	4–5	42.9	47.1	39.3	76.5	50.1
	6+	(161.8)	(130.4)	(111.8)	(58.5)	112.7
25–29	1	38.6	(37.4)	(59.6)	(0.0)	39.7
	2	46.1	13.5	39.8	–	41.3
	3	26.0	18.4	128.1	(0.0)	49.7
	4–5	52.1	47.1	52.7	47.5	50.0
	6+	83.2	50.7	71.2	135.0	73.7
30+	1	–	–	–	–	(0.0)
	2	(0.0)	–	–	–	42.0
	3	(27.8)	(20.4)	–	–	20.3
	4–5	23.7	57.8	63.3	–	43.7
	6+	73.6	49.5	48.1	–	60.0

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

children involved. The length of the birth interval is more crucial for the child closing the interval than for the one opening it. Short birth intervals are detrimental to the health of the mother and therefore to the children especially the second of the pair. The arrival of a second child soon after the previous one does not allow the mother time to regain her health. Also, two small children to care for may stretch the emotional, physical and material resources of the mother with adverse effects on the health of the children. However, a very long birth interval may signify health problems of the mother which may affect the probability of survival of the subsequent child. It may be long also because of birth spacing or birth stopping with contraceptive use. An accidental pregnancy resulting in a live birth after an attempt at birth stopping may result in less care being given to the unwanted child and therefore a smaller probability of surviving.

Birth interval analysis has received attention from researchers associated with WFS (Hobcraft *et al* 1983; Cochrane and Zachariah 1983). This section examines the data presented in Rutstein (1983) and Cochrane and Zachariah (1983).

Table 11 gives infant and child mortality for children born after three different birth intervals (less than 24 months, 24 to 47 months and 48 months and longer). Also in the same table are presented rates for children born after an interval of less than 24 months and where the preceding child lived until the birth of the subsequent child or at least to 23 months. This is an attempt to remove the spurious relationship between infant mortality and child mortality, and short birth intervals occurring as a consequence of the birth interval being shortened because the previous child died in early infancy ending breastfeeding and shortening of the postpartum amenorrhoea period. First births and multiple births are excluded because they have no interval of time between births (see Rutstein 1983).

Children born after an interval of less then 24 months have higher probabilities of dying in the first year and in the first five years, than those born after intervals of 24–47 months. However, in general those born after an interval of 48 months or longer, also have higher probabilities of dying in the first year or the first five years of life than those born after intervals of 24–47 months. The pattern is the same when we examine surviving intervals, less then 24 months (table 11). The surviving interval probabilities are lower than those of all intervals of comparable length, perhaps not bearing out the point on sibling competition for resources.

The interval resulting in the lowest probabilities of infant and child mortality is the intermediate one (24–47 months). The longest interval (48 months and over) is associated with lower probabilities of dying in infancy or in the first five years than the shortest intervals (less than 24 months).

Table 12 presents birth interval data for three intervals. We would expect that the longer the previous child lives the longer will be the median birth interval. There is some evidence of this for the first row representing all women. The longer the previous child survives, in general, the higher the median interval between births. This is perhaps due mainly to biological factors. However, the difference in the birth intervals between surviving and dying previous children may be due in part to contraceptive use by the mother. This is taken into consideration in the second row of table 12 where only women who have never used contraceptives are included. Here we observe in interval 1 a reversal of the expected pattern. Interval 3 gives some indication of the expected relationship and interval 5 suggests a reversal. The small subsample sizes are perhaps the main reason for this inconsistency. Cochrane and Zachariah (1983) found a more consistent pattern when they examined 25 countries. This needs further investigation with a larger size sample.

Children born within a short interval of time after the birth of previous children are more likely to die in

Table 11 Trinidad and Tobago: Probabilities of infant and child death by periods before the survey and previous birth interval

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Less than 24 months – all intervals					
Infant ($_1q_0$)	45.9	59.5	52.2	59.2	(78.6)
Child ($_5q_0$)	57.1	67.4	63.4	69.7	(80.6)
Less than 24 months – surviving intervals only					
Infant ($_1q_0$)	38.2	45.5	44.2	47.4	(77.5)
Child ($_5q_0$)	50.2	54.0	55.6	(58.0)	(79.7)
24 to 47 months					
Infant ($_1q_0$)	29.1	27.1	17.6	(50.4)	(27.7)
Child ($_5q_0$)	31.9	37.2	(24.2)	(52.7)	(27.7)
48 or more months					
Infant ($_1q_0$)	(42.5)	(26.1)	(38.0)	(58.3)	(23.1)
Child ($_5q_0$)	(51.3)	(26.1)	(44.7)	(58.3)	(80.7)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

Table 12 Trinidad and Tobago: Median birth intervals in months by survival of previous child

	Interval 1			Interval 3			Interval 5		
	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months
All women	(20.0)	22.0	17.9	[15.1]	(16.7)	18.3	NA	(17.7)	18.8
Never use contraceptive	[56.1]	[26.8]	16.7	NA	[15.7]	(20.6)	NA	[23.2]	[18.3]

NOTE: ( ) Less than 25 cases.
[ ] Less than 10 cases.
NA No cases.
Source: Cochrane and Zachariah (1983)

infancy, and even in the first five years, than those with longer periods of birth spacing. However, those children born after birth intervals of 48 months or more have lower probabilities of dying in infancy and early childhood than those with under 24 months birth interval, but higher probabilities than those born after intervals of 24–47 months. There are many possible confounding variables here. There are likely socio-economic ones, behavioural ones (breastfeeding, contraceptive use) and biological ones (subfecundity and health of the mother).

2.5 INFANT AND CHILD MORTALITY AND FERTILITY – RELATIONSHIPS

This section will examine the relationship between infant and child mortality and fertility. Indirectly this is an examination of the replacement hypothesis. It is confined to women 35 years and older in order to include only those women who have completed childbearing and those who are very near to doing so. The assumption is that very few women are currently having children beyond age 35. We have terminated the analysis at parity 5 in order to retain reasonable sized subsamples and to ensure that those women who are likely to replace a lost child have already done so. In the case of infant mortality we are excluding births in the year immediately preceding the survey, and with respect to child mortality births in the five years preceding the survey are excluded. In both cases this is done to avoid the problem of truncation. It also increases the likelihood of parity progression taking place if the 35 years and older women are going to do so.

In tables 13 and 14 we see that there is no significant difference between the percentages of women who went from parity 1 to parity 2 in terms of whether child 1 died or survived. For parity 2 women, we find a reversal in the expected pattern. A larger percentage of those women whose second child survived went on to the third parity than those whose child died. However, for the next three parity progressions the pattern is in the expected direction. For these we find that larger percentages of those women whose child died progress to the next higher parity than those whose child survived. In summary, for the first two births the pattern is indeterminate but for the next three it is consistent and in line with the replacement hypothesis. Women at low parities are likely to progress to the next regardless of whether or not

Table 13 Trinidad and Tobago: The percentage of women who go on to the next parity by whether or not the child of that order died in infancy (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage advancing from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	91.9 (1066)	86.7 (1004)	85.2 (861)	81.8 (747)	80.2 (630)
Dead	92.9 (91)	82.3 (58)	93.3 (58)	89.7 (49)	84.9 (27)

Table 14 Trinidad and Tobago: The percentage of women who go on to the next parity by whether or not the child of that order died in the first five years (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage advancing from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	91.9 (1066)	86.7 (1004)	85.2 (861)	81.8 (747)	80.2 (630)
Dead	92.0 (94)	83.1 (61)	92.0 (62)	90.1 (51)	85.5 (28)

Table 15 Trinidad and Tobago: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in infancy. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	4.38 (1066)	3.82 (1004)	3.37 (861)	2.98 (747)	2.68 (630)
Dead	5.69 (91)	4.39 (58)	4.32 (58)	3.76 (49)	2.98 (27)

Table 16 Trinidad and Tobago: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in the first five years. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	4.38 (1066)	3.82 (1004)	3.37 (861)	2.98 (747)	2.68 (630)
Dead	5.69 (94)	4.35 (61)	4.28 (62)	3.77 (51)	2.90 (28)

the child of the particular order survived. Women of parity 3 and above are more likely to progress to the next highest order if the child of the particular order dies than if it survives. However, we should be aware that the numbers with infant and child death experiences are small.

In tables 15 and 16 we look at each parity to see the number of additional live births taking into account whether or not the birth of that order survived or died. We find that at each parity, if the child of that order died the mother went on to have more additional live births than if the child survived.

Women who experience an infant or child death at any of the first five parities are likely to have more additional live births than those who did not have an infant or child loss at that parity. The replacement effect is suggested here where we have a cumulative situation – additional births.

Tables 17 and 18 are similar to tables 13 and 14 except that in 17 and 18 we present the cumulative infant and child mortality experience up to and including the particular parity. The findings based on these two tables are that at parity 1 women are just as likely to go on to parity 2 if their child died as if the child survived. From parity 2, the expected pattern is maintained. Women who experience either an infant or child loss up to and including a particular parity are likely to have more additional live births than those who have not had a child loss.

Table 17 Trinidad and Tobago: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more infant deaths up to the respective birth order. (First six parities only)

Infant mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	91.9 (1083)	86.3 (951)	84.4 (777)	78.9 (618)	77.5 (473)
1+	92.9 (91)	89.0 (128)	93.0 (158)	94.2 (185)	88.0 (189)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 18 Trinidad and Tobago: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more child deaths (death in first 5 years) up to the respective birth order. (First six parities only)

Child mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	92.0 (1080)	86.2 (946)	84.5 (768)	78.6 (609)	77.4 (463)
1+	92.0 (94)	89.4 (133)	92.1 (167)	94.5 (193)	87.8 (198)

[a]For this first parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 19 Trinidad and Tobago: Average number of additional live births above each of the first five parities by the infant mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Infant mortality experience	Parities				
	1[a]	2	3	4	5
0	4.38 (1083)	3.73 (951)	3.25 (777)	2.78 (618)	2.52 (473)
1+	5.69 (91)	4.94 (128)	4.53 (158)	3.92 (185)	3.12 (189)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 20 Trinidad and Tobago: Average number of additional live births above each of the first five parities by the child mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Child mortality experience	Parities				
	1[a]	2	3	4	5
0	4.38 (1080)	3.73 (946)	3.25 (768)	2.77 (609)	2.53 (463)
1+	5.60 (94)	4.89 (133)	4.45 (167)	3.89 (193)	3.07 (198)

[a]For this parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Tables 19 and 20 are similar to tables 15 and 16. They give the cumulative infant and child mortality experience up to and including the respective parity. The pattern is clear and consistent. At any parity, those women who up to that point have had one or more infant or child deaths went on to have more additional live births than those women all of whose children survived. These differences in additional live births are of the order of 0.6 to 1.3 live births for infant mortality and 0.5 to 1.2 live births for child mortality. The replacement effect is strongly suggested when we combine the cumulative aspects of mortality and additional births.

In this section there is some indication of support for the replacement hypothesis. Women who experience an infant or child loss are likely to have more additional live births than those whose children survived. This may be the result of an effort on the part of these women to replace those children that died. On the other hand it could be due to other factors such as an association between infant and child mortality and social class and the relationship between social class and fertility. The relationship may be spurious or it may be real. Further investigation is warranted but is beyond the scope of this paper.

Assuming there is a replacement tendency, then infant and child mortality is a factor in the number of live births women eventually have. Reducing infant mortality levels should eventually lead to less live births and lower fertility.

2.6 INFANT AND CHILD MORTALITY AND ADDITIONAL CHILDREN DESIRED

If women are in fact replacing children that have died then, controlling for the current number of living children, those who experience infant or child losses should desire more additional children than those who have all their children alive. Of course, it is possible that this is a spurious relationship since those who desire a large number of children may be more likely to sustain infant and child losses because of some confounding variables such as education and quality of life. Our analysis does not rule this out.

In tables 21 and 22 we present the number of additional children desired taking into account the present number of living children and infant and child loss experiences. We find no significant differences in terms of number of additional children desired for women with all children surviving versus women who have lost some of their children, controlling for the current number of living children. The loss of children does not seem to lead women to desire more additional children than those whose children are all alive. Of course it is possible

Table 21 Trinidad and Tobago: Average number of additional children wanted by number of infant deaths and number of living children

Infant deaths	Number of living children			Total
	0–1	2–3	4+	
0	2.19 (946)	0.76 (730)	0.22 (662)	1.19 (2337)
1+	1.96 (45)	0.81 (56)	0.15 (160)	0.60 (262)

Table 22 Trinidad and Tobago: Average number of additional children wanted by number of child deaths and number of living children

Child deaths	Number of living children			Total
	0–1	2–3	4+	
0	2.19 (943)	0.76 (720)	0.21 (632)	1.20 (2294)
1+	1.93 (49)	0.78 (66)	0.18 (190)	0.59 (305)

that the children that died have already been replaced.

In line with this finding, we would expect that women who have lost one or more of their children in infancy or in the first five years to be no more likely to be using contraception than those whose children are all alive. Tables 23 and 24 present the percentages contracepting among these women. Our expectation is not borne out. Controlling for the number of living children we find that in both the case of infant mortality and child mortality, women whose children are all alive are more likely to be currently contracepting than those who have experienced one or more infant or child deaths. Those without infant or child death experience are more likely to be contracepting in order to space their births or to stop having more children than those with experience of infant or child losses. Are those with infant or child losses less likely to use contraception because they are trying to replace their lost offspring? Tables 21 and 23 provide data which could be interpreted to suggest that this is not the case. It is possible, then, that women with high fertility experience relatively high infant and child mortality levels and they are less likely to use contraception because of a number of socio-psychological dimensions. It is also possible that there are biological dimensions to the relationships observed above. But if our previous finding indicates that replacement may have occurred, then this latter finding supports the replacement hypothesis.

Taking this analysis further we look, in tables 25 and 26, at the number of children a woman wants compared to the number currently living. When the number of children living is greater than the number desired those with all their children surviving are more likely to be currently contracepting than those who have experienced an infant or child loss. When the number desired equals the number living then those who have experienced one or more infant or child losses are more likely to be currently contracepting than those with all their children still living. When the number living is less than the desired number the ones with all children surviving are more likely to be using a contraceptive method than those women who have lost one or more of their offspring. It is possible that we are seeing a greater tendency to space as well as stop having additional children by the practice of contraception among women with all their children surviving than among those who have had their number of offspring depleted by mortality. This is in line with our expectation that women who have experienced infant or child loss are likely to want to replace them and hence less likely to use

Table 23 Trinidad and Tobago: Percentage currently using a contraceptive method by number of living children and number of infant deaths

Infant deaths	Number of living children		
	0–1	2–3	4+
0	52.5 (856)	68.1 (767)	64.2 (754)
1+	47.5 (40)	61.0 (59)	57.1 (189)

Table 24 Trinidad and Tobago: Percentage currently using a contraceptive method by number of living children and number of child deaths

Child deaths	Number of living children		
	0–1	2–3	4+
0	52.5 (850)	68.2 (758)	64.5 (719)
1+	46.7 (45)	60.3 (68)	57.0 (223)

Table 25 Trinidad and Tobago: Percentage currently using a contraceptive method by infant mortality experience and number wanted : number alive

	Infant deaths	
	0	1+
Wanted < living	65.1 (418)	54.2 (120)
Wanted = living	68.8 (446)	73.3 (45)
Wanted > living	57.8 (1492)	52.0 (123)

Table 26 Trinidad and Tobago: Percentage currently using a contraceptive method by child mortality experience and number wanted : number alive

	Child deaths	
	0	1+
Wanted < living	65.6 (398)	54.3 (140)
Wanted = living	68.7 (438)	73.1 (52)
Wanted > living	58.0 (1471)	51.4 (142)

contraception than those women with all their children still alive. There is also an indication of an insurance effect among women whose number of living children exceeds their wanted number and who are not contracepting.

In order to examine this a little further tables 27 and 28 incorporate one additional dimension along with the variables of tables 25 and 26. The 'desire for future births' is introduced. The subsamples are now smaller and greater caution is called for in interpreting the data. Among those whose 'wanted children' are greater than their living, and who we would expect to desire more children and in fact do, we find that those with all their children alive are more likely to be contracepting than those who have lost one or more. The ones without infant or child loss are perhaps spacing their pregnancies. Those who have sustained child loss(es) are perhaps less likely to be contracepting since they may be trying to compensate for the lost children. Among those women who want no more children, the consistent groups are those whose living children exceed the desired number and those where they are equal. Among the first group those with no infant deaths and those with no child deaths are the more likely to be currently contracepting. Among the second group it is the reverse. Where the wanted is greater than the living and the women want no more children the probabilities of currently contracepting are quite close for the groups with zero infant or child deaths and for the groups with one or more deaths. The numbers in the 'undecided' group are too small for any sound conclusion. The first two subgroups within the 'wants no more' category are likely to be using contraception for stopping. The third group is likely to be using contraception for the purpose of spacing. In either case we are not sure what our findings are telling us. This indeterminate situation is perhaps due in large part to our small subsamples. Had we enough cases it is possible that our findings would have been more determinate. We would expect to find those women without a child loss and wanting no more to be more likely to use contraception than those with one or more child losses and wanting no more, and it is true for the group whose living children exceed their wanted. In this case even though the women who experience infant or child mortality currently have more children than they wanted they are less likely to be contracepting than women with all their children alive and whose children also exceed the wanted number. Maybe it is an indication that the insurance hypothesis is operating. However the same pattern is not found for the groups where 'wanted = living' and 'wanted > living', suggesting that other factors may be important.

2.7 INFANT AND CHILD MORTALITY AND UNION PATTERNS

In the Caribbean it has been well documented that there is a relationship between union patterns and fertility (Harewood 1983; Lightbourne and Singh 1982). Does it then follow that since many studies have established a link between fertility and infant and child mortality that there is a relationship between family formation patterns (sexual unions and partnerships) and infant and child

Table 27 Trinidad and Tobago: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Infant deaths)

	Desire for future birth					
	Wants more		Wants no more		Undecided	
	Infant deaths		Infant deaths		Infant deaths	
	0	1+	0	1+	0	1+
Wanted < living	60.0 (30)	50.0 (4)	65.8 (365)	55.4 (112)	52.6 (19)	0.0 (3)
Wanted = living	41.9 (31)	66.7 (3)	71.2 (379)	77.5 (40)	64.5 (31)	0.0 (2)
Wanted > living	56.4 (1118)	39.1 (64)	60.8 (278)	64.7 (51)	65.9 (88)	85.7 (7)

Table 28 Trinidad and Tobago: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Child deaths)

	Desire for future birth					
	Wants more		Wants no more		Undecided	
	Child deaths		Child deaths		Child deaths	
	0	1+	0	1+	0	1+
Wanted < living	59.3 (27)	57.1 (7)	66.3 (350)	55.1 (127)	55.6 (18)	0.0 (4)
Wanted = living	32.5 (40)	50.0 (4)	70.8 (373)	80.0 (45)	66.7 (30)	0.0 (2)
Wanted > living	56.3 (1106)	42.7 (75)	61.4 (272)	62.1 (58)	67.4 (86)	66.7 (9)

mortality? This section will examine this relationship using as variables of family formation patterns (1) the current or last sex union; (2) the number of sexual relationships; and (3) the number of sexual partners.

Union formation patterns in Trinidad are a very complex social and cultural phenomenon. We cannot hope to make more than a brief and simple analysis of its relationship to infant and child mortality in this section. These family formation patterns differ in extent and maybe even in form among the two major racial groups in Trinidad (Harewood 1983). With this in mind the sample is subdivided into Non-Indian and Indian. Both groups are socio-economically heterogeneous.

The current (or last) union status is shown in tables 29 and 30. There is no relationship between the present union status (or the last one for women not currently in a union) and infant and child mortality. This is the case for both Non-Indian and Indian. It is likely that this measure of union status does not capture its essence. We know that age and social class are both related to the kind of union a woman enters. To have introduced these or to have looked at union history would have led to quite small subsamples. A more sophisticated analysis is warranted but is beyond the scope of this report.

The number of sex partners with whom the women were associated up to the time of the survey are presented in tables 31 and 32. The relationship between infant and child mortality and the number of partners is a positive one. The pattern of the relationship is more consistent for infant mortality than for child mortality. It is, however, the same for Indian and Non-Indian. The more partners the mothers have had the higher are the infant and child mortality levels.

In the English-speaking Caribbean, in general, and specifically in Trinidad and Tobago, among certain sectors of the population there are several changes of sex partners during a woman's lifetime. It has been documented that there is a positive correlation between the number of partners and fertility (Ebanks *et al* 1974; Ebanks 1973; Baliram and Ebanks 1973). This instability of sexual relationship puts pressure on the woman to have at least one child for each partner in order to stabilize the relationship. However, it seems not to work and in fact a pregnancy may be a deciding factor in the male partner's decision to terminate the relationship. The association between number of partners and infant and child mortality is just as puzzling. Again one would suspect that there are some underlying socio-economic variables that are related to partnership instability and also to infant and child mortality.

The number of relationships that a woman enters, combines aspects of union status and the number of partners. This variable is presented in tables 33 and 34. In capturing aspects of the two earlier variables, it has incorporated both relationships. The lack of association of union status and the positive association of number of partners perhaps combine to give an indeterminate pattern between infant and child mortality and the number of relationships. The direction is still positive but it is much less consistent. There is no clear pattern of association between the number of relationships and infant and child mortality. On the surface it would seem that the number of relationships should capture family pattern instability in Trinidad and Tobago. If it does, then there is no clear pattern between family instability and infant and child mortality. More work is required here.

In summary, of our three indicators of family patterns in Trinidad and Tobago, only the number of partners

Table 29 Trinidad and Tobago: Infant mortality and current (or last) union status by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Married	Common law	Visiting	Married	Common law	Visiting
1–4	28.6	35.4	30.6	47.1	81.2	(54.1)
5–9	47.3	32.3	28.7	54.4	40.3	(68.8)
10–14	18.6	37.5	49.6	49.0	48.0	(49.9)
15–19	48.5	70.3	40.9	58.8	102.2	(97.8)
20–24	64.6	63.7	82.4	65.1	81.8	(37.9)

NOTE: ( ) Less than 50 cases.

Table 30 Trinidad and Tobago: Child mortality and current (or last) union status by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Married	Common law	Visiting	Married	Common law	Visiting
5–9	55.8	44.3	28.7	61.6	52.7	(68.8)
10–14	22.4	40.5	65.4	60.3	60.9	68.2
15–19	55.3	93.6	50.2	66.6	111.4	(97.8)
20–24	78.0	86.4	82.4	66.8	93.7	(37.9)

NOTE: ( ) Less than 50 cases.

Table 31 Trinidad and Tobago: Infant mortality and number of partners by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Number of partners			Number of partners		
	1	2	3+	1	2	3+
1–4	18.9	37.4	48.7	42.3	117.3	(107.9)
5–9	32.7	37.4	58.6	50.3	58.0	82.0
10–14	17.0	32.6	45.3	46.2	40.5	100.7
15–19	32.0	45.6	106.0	51.6	80.5	208.6
20–24	64.0	56.8	85.4	68.3	63.4	(36.4)

NOTE: ( ) Less than 50 cases.

Table 32 Trinidad and Tobago: Child mortality and number of partners by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Number of partners			Number of partners		
	1	2	3+	1	2	3+
5–9	43.9	42.0	65.8	58.2	58.0	103.2
10–14	21.6	41.1	49.2	58.6	55.4	100.7
15–19	33.7	55.2	138.6	59.9	80.5	223.3
20–24	80.2	76.8	85.4	70.0	74.6	36.4

Table 33 Trinidad and Tobago: Infant mortality and number of relationships by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	Number of relationships				Number of relationships			
	1	2	3	4+	1	2	3	4+
1–4	28.6	16.4	30.8	67.2	45.3	54.9	(112.6)	–
5–9	10.8	40.2	38.8	60.8	48.8	58.7	69.7	(63.1)
10–14	5.0	30.7	19.5	45.9	44.7	42.7	91.4	78.3
15–19	29.5	37.0	45.7	94.6	60.3	46.4	67.0	(221.2)
20–24	35.6	77.6	41.9	84.3	74.4	53.9	(35.5)	(37.9)

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 34 Trinidad and Tobago: Child mortality and number of relationships by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	Number of relationships				Number of relationships			
	1	2	3	4+	1	2	3	4+
5–9	21.3	51.1	42.1	67.9	56.9	63.3	69.7	(94.6)
10–14	9.6	36.7	27.9	49.1	58.0	52.2	104.8	78.3
15–19	29.5	41.9	55.0	122.4	70.3	46.4	82.5	(221.2)
20–24	54.7	98.0	49.8	89.2	76.5	60.7	35.5	(37.9)

NOTE: ( ) Less than 50 cases.

shows an association with infant and child mortality. The number of relationships, and the current (or last) union status seem to have no consistent pattern of association with infant and child mortality. These two latter measures may not be capturing the essence of family patterns in Trinidad and Tobago. But if they do, then the patterns of association between them and infant and child mortality are indeterminate. It is possible that the relationships are in flux in this changing society.

2.8 SOCIAL FACTORS AND INFANT AND CHILD MORTALITY

In this section we present the relationship between infant and child mortality levels and three socio-economic factors. The association between infant and child mortality and each of these variables is shown for Non-Indian and Indian subgroups. The Non-Indian population is more urban than the Indian population. For each period of time before the survey the infant mortality of Indians is higher than that of Non-Indians. The Non-Indian infant mortality declined up to 10–14 years before the survey then increased for the period 5–9 years before and declined slightly over the period 1–4 years before. The pattern is similar for the Indian population except that for the period 1–4 years before the survey the rate remained the same as for the period 5–9 years before. The factors included in this section may be common causes of some of the differences we observed earlier. These factors are known to be related to fertility and if they are also associated with infant mortality and child mortality they may be playing confounding roles in the earlier findings.

In tables 35 and 36 the effects of education are presented. For both non-Indians and Indians it would seem that the crucial differences with respect to infant as well as child mortality occur between those with secondary and higher education and those with lower levels of education. No clear pattern of differences emerges among the three primary education levels. We can conclude only that the children of women with secondary and higher levels of education have much lower probabilities of dying in the first year and the first five years of life than those with lower levels of education. Different levels of primary education seem not to have a definite relationship with infant and child mortality.

Rural/urban residence data can be seen in tables 37 and 38. Non-Indian infant mortality shows no pattern of association by rural/urban residence. Indian infant mortality shows rates higher in the rural areas for the two time periods most remote from the survey, lower rural rates for the next two time periods (10–14, 5–9) and higher rural rates over the period 1–4 years before the survey. The child mortality rates of the Non-Indian population show no consistent pattern with rural/urban residence.

In summary, there is no clear pattern of relationship between rural/urban residence and infant and child mortality. Where a pattern seems to exist in the case of the Indians, the change to higher urban than rural rates in the two periods nearest to the survey is unexpected. It is perhaps the case that socio-economic transformation of the Trinidad and Tobago society is removing the urban/rural differences in the quality of life, resulting in the relationships being in flux during the transition period.

Table 35 Trinidad and Tobago: Infant mortality and education by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	<4 yrs primary	4–6 yrs primary	7+ yrs primary	Secondary +	<4 yrs primary	4–6 yrs primary	7+ yrs primary	Secondary +
1–4	21.2	60.8	27.4	16.3	101.5	32.8	57.4	35.0
5–9	31.8	61.3	33.2	26.6	68.6	49.1	41.7	40.2
10–14	55.3	33.7	20.2	18.3	61.3	38.1	47.5	47.4
15–19	12.0	59.5	80.1	23.0	68.0	70.6	45.9	(79.6)
20–24	(136.4)	77.2	48.1	38.5	100.0	40.7	0.0	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 36 Trinidad and Tobago: Child mortality and education by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	<4 yrs primary	4–6 yrs primary	7+ yrs primary	Secondary +	<4 yrs primary	4–6 yrs primary	7+ yrs primary	Secondary +
5–9	31.8	72.8	47.4	26.6	74.8	58.4	46.8	51.2
10–14	55.3	43.7	25.7	18.3	80.4	44.9	58.7	47.4
15–19	32.9	67.8	97.7	27.5	76.4	77.7	53.7	(79.6)
20–24	(136.4)	98.4	60.4	38.5	102.8	40.7	10.5	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 37 Trinidad and Tobago: Infant mortality and urban/rural residence by ethnicity for periods before the survey

Years before survey	Non-Indian		Indian	
	Urban	Rural	Urban	Rural
1–4	30.5	32.1	39.6	62.9
5–9	39.9	40.1	56.4	50.4
10–14	30.1	25.8	58.5	41.1
15–19	54.6	49.8	46.2	83.5
20–24	62.0	74.7	57.5	73.7

Table 38 Trinidad and Tobago: Child mortality and urban/rural residence by ethnicity for periods before the survey

Years before survey	Non-Indian		Indian	
	Urban	Rural	Urban	Rural
5–9	47.6	48.7	66.4	56.3
10–14	35.7	31.3	68.8	54.3
15–19	63.7	63.6	57.1	88.0
20–24	74.5	90.1	60.5	76.6

The relationships between infant and child mortality and the occupation of the mother before the birth of the first child are presented in tables 39 and 40. The Indian population is under-represented among the white-collar occupations. For both Non-Indians and Indians, the white-collar occupations had lower probabilities of infant and child deaths than the blue-collar or those that did not work. This is more consistent for Indians than for Non-Indians but the numbers in the white-collar group for the Indians are quite small. There is no consistent pattern of association with respect to those who did not work and the blue-collar workers. One can therefore only conclude that white-collar workers are less likely to experience infant and child losses among their offspring than blue-collar workers and those who did not work, and that the probabilities for these two latter groups seem similar in pattern and magnitude.

It is possible that the occupation of the mother before the birth of the first child does not capture the essence of the variable we often refer to as occupation, at least in its relationship to infant and child mortality. However, the findings here are as would be expected. There is no reason to believe that the blue-collar occupations are different from those who did not work in quality of life and other aspects related to infant and child mortality. Those who did not work form a very heterogeneous group including those who became pregnant before they had a chance to work, those who did not want to work, and those who could not find work.

Table 39 Trinidad and Tobago: Infant mortality and occupation of mother before the first child by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Did not work	White collar	Blue collar	Did not work	White collar	Blue collar
1–4	32.0	33.2	27.9	53.4	10.4	83.6
5–9	38.8	41.1	41.4	58.9	13.8	29.9
10–14	30.9	25.3	25.2	44.2	(49.7)	89.0
15–19	53.4	40.8	59.4	66.0	(32.9)	73.2
20–24	65.4	60.0	74.5	61.1	–	109.9

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 40 Trinidad and Tobago: Child mortality and occupation of mother before the first child by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Did not work	White collar	Blue collar	Did not work	White collar	Blue collar
5–9	46.5	49.7	49.7	64.8	27.1	47.2
10–14	36.3	34.7	28.4	55.9	(49.7)	107.0
15–19	62.5	46.3	77.9	74.7	(32.9)	73.2
20–24	83.2	60.0	85.7	62.8	–	121.2

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

The three social variables presented in this section give rise to the conclusion that (1) education is associated with infant and child mortality; (2) rural/urban residence has no clear and consistent pattern of relationship to infant and child mortality; and (3) the occupation of the mother before the birth of the child is associated with infant and child mortality. The nature of these relationships leads one to doubt whether these factors constitute common causes for the relationships observed earlier. However, there is always the possiblity that they do confound the earlier relationships. Further analysis is perhaps warranted using multivariate analyses or based on larger samples. For a variety of reasons these are not undertaken in this report.

2.9 SUMMARY AND CONCLUSIONS

Working with data collected on women aged 15–49 years who were not in school in 1977 in Trinidad and Tobago, we examined the relationship between infant and child mortality and fertility. The 1977 Trinidad and Tobago Fertility Survey was conducted as part of the World Fertility Survey. *WFS Summary of Findings* no 33 describes the sample and the data collection. Our analyses are based on the subgroup of 2826 women who had had at least one live birth.

For the subgroup of 3482 women who have been in at least one sexual union we find the average number of infant deaths per woman to be 0.16. For the 2826 women who have had at least one live birth, the average number of infant deaths experienced is 0.20 and the average number of child deaths is 0.23.

Infant and child mortality levels have been declining in Trinidad and Tobago at least since the 1950s. Fertility has been declining at least since the 1960s. These levels are all relatively low at present. In 1982 infant mortality was given as 26, the crude birth rate as 25, the crude death rate as 6 and life expectancy at birth was estimated to be 70. Trinidad and Tobago has entered, it seems, the third stage of the demographic transition.

Data from the TTFS support the downward trends in these rates. The total fertility rates from the survey and from vital registration show declines between 1960 and 1976 from 6.49 and 5.58 to 3.23 and 3.15, respectively. The higher rates are calculated from the survey. The infant mortality rate calculated on the data of the survey shows a decline from 54 in 1960 to 39 in 1976. The vital registration figures are 45 and 26, respectively. Although both sources of data show the declining trend, the survey rates are higher. There could be several reasons for this seemingly overestimation on the part of the survey. WFS investigations and reasoning are quite convincing in concluding that the quality of the survey data is high and the rates perhaps reflect reality rather well.

Infant and child mortality declined up to 1965–9. There was an upturn for the period 1970–4 and a slight downturn over the two years preceding the Survey (1975–6). Looked at in years before the survey, our data show declining infant and child mortality from 30–34 years before the survey until 10–14 years before, with an upturn over the period 5–9 years before and a holding of that level for the 0–4 years before to the survey.

Based on our survey results, infant and child mortality declined very rapidly and significantly over the period covered but towards the end a slight increase was evidenced along with a tendency to stabilize at that slightly elevated level. Fertility showed a similar pattern. It is believed that this slow-down in fertility and infant and child mortality declines and the stabilizing tendency have held to the present.

Births of order 6 and higher have the highest risks of dying in infancy and in the first five years. First births have higher probabilities of dying in infancy and childhood than births of orders 2–5. Among births of orders 2–5 the probabilities of dying over the first year and also over the first five years have a tendency to increase with the order of the birth. The overall relationship between infant and child mortality and birth order is J-shaped.

Births occurring to women in their twenties have the lowest probabilities of infant and child mortality. Births to teenagers have relatively high probabilities of infant and child mortality. High order births to young mothers have low survivorship probabilities.

Short birth intervals increase the probability of dying in infancy and the first five years of life for the child closing the interval. Birth intervals longer than 48 months have lower probabilities associated with infant and child mortality than those less than 24 months. The intermediate birth interval (24–47 months) has probabilities of survivorship higher than either of the above two intervals.

We have identified some support for the replacement hypothesis. It would seem that women who experience infant or child loss(es) are likely to have more additional children and to use contraceptives less, than those whose children are all alive. At any parity above the first, if a woman has had one or more infant or child death(s) she is more likely to have a child of the next order than a woman with all her children still living. It would seem that in order to enhance the chances of replacing the lost child, mothers so affected are less likely to be currently using a contraceptive method than those whose children are all living.

Women who have less children living than they want as well as those with more children living than they want, are more likely to be using contraception if they have not experienced infant or child mortality than if they have. Those with the number living equalling the number wanted are more likely to be contracepting if one or more of their offspring have died. A similar picture emerges but with less clarity of pattern when we consider whether or not these women want more children than they currently have.

The number of sexual partners a woman has had is positively related to her infant and child mortality experiences. However, the number of sexual relationships has no clear pattern of association with infant and child mortality, neither does present union status.

Indians have higher infant and child mortality levels than Non-Indians. Women with secondary level of education and above have relatively low infant and child mortality levels compared to those with only primary education. There is no association between infant and child mortality and level of primary education of the mothers. Urban/rural residence seems to be unrelated to infant and child mortality. Women in white-collar jobs

before the birth of their first child eventually experience less infant and child mortality than those who did not work or those who had a blue-collar job. These two latter groups have somewhat similar infant and child mortality experiences. Children of a woman who is Non-Indian and worked in a white-collar job before the birth of the first child, and who possibly was born and living in an urban setting with secondary or higher level of education, have the best chances of surviving the first year after birth and also the first five years.

There is some evidence in support of the replacement hypothesis and there are even some indirect signs of an insurance effect. If the replacement hypothesis is valid, then a link between infant and child mortality and fertility is made at the level of the individual and by extension to the societal level. Much work remains to be done in establishing this link beyond doubt.

Infant and child mortality have been declining in Trinidad and Tobago. Fertility has also been declining. In recent years infant and child mortality have been showing tendencies towards levelling off, and fertility has been showing a similar tendency. Infant and child mortality are at levels beyond which investment in improving the quality of life is required if further reductions are to take place. It is not very difficult to obtain dramatic declines in infant and child mortality levels when they are high. Public health measures and some general improvements in the standard of living can bring infant mortality levels down to 40 or 50. Widespread improvements in living standards have been necessary to achieve the current levels in Trinidad and Tobago. To reduce infant mortality levels to say 20 or lower requires investment in child care, maternal care, nutrition and generalized improvements in the quality of life. It requires provision of more and better medical care for mothers and infants, pure water, adequate nutrition, adequate shelter, education and all those things which are associated with a good quality life-style. Reductions in infant and child mortality levels are desirable, may be costly, but are affordable by the society. Trinidad and Tobago is one of the most resource-endowed countries in the Caribbean. Reductions in fertility levels comparable to those in Barbados, Cuba, Costa Rica or Puerto Rico would require more widespread socio-economic changes and improvements in the standard of living and perhaps further reductions in infant mortality.

3 Guyana: Infant and Child Mortality and Fertility

3.1 INTRODUCTION

Guyana, an English-speaking country on the South American mainland has its closest links (historical and contemporary) with the English-speaking Caribbean because of a common colonial heritage. It is the largest of the English-speaking Caribbean countries in land area with about 83 000 square miles (215 000 square kilometres). The estimated total population for 1982 was around 800 000. The crude birth rate is given as 28, the crude death rate as 7 and the infant mortality rate as 43 (Population Reference Bureau 1983). The same source gives the life expectancy at birth as 70 years. The population is young (38 per cent under age 15). In spite of its small population relative to its land area, there is great population concentration since more than 90 per cent of the population is concentrated in the narrow coastal strip. Guyana is poor economically, in spite of its reputed wealth in natural resources (per capita GNP, 1982, $723 (US)). However, it has made great strides demographically. The demographic transition is underway. Guyana is well into the last part of the second stage.

The Guyana Fertility Survey (GFS) of 1975 obtained data from a probability sample of 4642 women between the ages of 15 and 49. However, those young women who were between 15 and 19 years old and were still enrolled as full-time students were not interviewed. The above 4642 interviews were obtained from 4432 households. The non-response rate was very small. The GFS was conducted by the Government Statistical Office but assisted by, and under the auspices of, the World Fertility Survey (WFS).

The GFS provides retrospective data on fertility and infant and child mortality. Women who were in the age group 45–49 in 1975 would have been entering the age range 15–19 in 1945. It would be desirable to present mortality and fertility figures for the period 1945–75. This is attempted. Unfortunately Guyana has been virtually neglected in demographic studies and data are spotty or completely lacking on some topics and for some dates.

In 1946 the population was estimated to be 376 000; in 1960 it was 560 000; in 1965, 635 000; in 1970, 714 000; (Bank of Guyana 1974); and the 1982 figure is estimated at 800 000. The population grew rapidly between 1945 and 1960 (an average of 3.0 per cent annually). During the period 1960–70 it averaged at 2.25 per cent annual growth (GFS First Country Report, vol 1). The reduced rate of growth is mainly due to emigration to the United Kingdom, Canada and the United States. The 1970–82 period saw substantially less emigration but declining fertility. The growth rate for 1982 is estimated at 2.0 per cent.

Table 41 Guyana: Crude birth rates, total fertility rates – vital statistics and Guyana Fertility Survey data – 1960–75

Year	Crude birth rates[a]	Total fertility rates (vital statistics)[b]	Total fertility rates (GFS)[b]
1960	43.1	6.2	7.6
1961	42.4	NA	7.4
1962	41.6	NA	7.1
1963	40.4	6.1	6.9
1964	38.8	6.0	6.7
1965	37.9	5.9	6.6
1966	35.8	5.6	7.0
1967	35.7	5.3	6.4
1968	34.0	5.3	6.5
1969	31.7	4.8	5.4
1970	33.4	5.1	5.8
1971	32.9	4.8	5.5
1972	33.9	4.7	5.5
1973	31.9	4.3	4.5
1974	30.1	3.8	4.3
1975	29.7[c]	NA	NA

[a]Guyana Fertility Survey First Country Report, vol 1, table I.E.
[b]Balkaran (1982), tables 12 and 13.
[c]Provisional data.
NOTE: NA Not available.

The crude birth rate in 1945 was around 38 and it seemed to have been increasing and reached a level of 40 in 1950. In 1955 it was at 43, which is the same figure we have for 1960 in table 41 (GFS First Country Report, vol 1). The crude birth rates for 1960–75 are shown in table 41 and a decrease is shown over the period. The 1982 crude birth rate is estimated at 28. There has been in recent years a tendency for the crude birth rate to stabilize at or just under 30. The total fertility rate is not available for the period before 1960. Table 41 presents it for the period 1960–75. It has declined over the period from 6.2 to 3.8 and the 1982 figure is estimated at about 3.9 or roughly the same as in 1975. Again we find a tendency for another measure to indicate fertility stabilization. It should be noted that the GFS-based rates are higher than those derived from vital statistics. One may therefore conclude that there is under-registration of births in Guyana since we do not expect over-reporting in a survey.

The crude death rate was about 11 in 1955; 9.5 in 1960; 8.2 in 1965; 6.8 in 1970; 7.5 in 1975; and 7 in 1982 (*Population Index 47/3*, 1981; Population Reference Bureau 1983). The mortality decline is almost certain to have pre-dated 1955. The infant mortality rate, as shown

Table 42 Guyana: Infant mortality rates (infant deaths per 1000 live births)

Year	Vital statistics[a]	GFS	GFS smoothed[b]
1960	60.0	57.7	53.4
1961	56.3	49.0	54.6
1962	50.8	57.1	59.4
1963	55.6	72.2	57.6
1964	43.2	43.6	58.5
1965	54.6	59.6	53.4
1966	50.5	57.0	59.9
1967	45.2	63.2	58.7
1968	51.2	55.9	54.9
1969	41.3	45.5	50.9
1970	38.2	51.2	54.3
1971	40.7	66.2	52.7
1972	50.5	40.8	55.6
1973	45.9	59.8	55.6
1974	52.3	66.3	63.0

[a]Obtained directly from Guyana Statistical Bureau.
[b]Moving three-year averages.

by the UN Demographic Yearbook 1966, was an average of 141 for the period 1945–9; 77 in 1951; 70 in 1955 and table 42 shows the period 1960–74. A decline is seen for the period 1960–74, from 60 to 52.3. The 1982 figure of 43 shows further decline since then. The GFS-derived rates are in most cases higher than those from vital statistics. We are inclined once more to conclude that there is under-registration of births and infant deaths and especially tempted to say that when an infant dies very soon after birth (first month say) there is a good chance that neither the birth nor the death will be recorded. However, both of these may be reported on in a survey.

Life expectancy at birth in Guyana in 1945 was about 50 years; by 1960 it was about 60; by 1970 about 63 (Harewood 1975); and in 1982, 70. This improvement reflects the declines in infant mortality presented above.

The above is a brief sketch of relevant aspects of the Guyanese demographic situation and is presented to show the wider societal picture as a backdrop to the GFS. The GFS was the first major demographic survey of its kind conducted in Guyana. Even though we have already presented data from this survey, we should perhaps at this point briefly examine the quality of the data obtained, before going on to the main focus of this section.

An extensive evaluation of the data in the GFS is provided by Balkaran (1982). His findings are summarized in this brief presentation. Overall the data would seem to be of very high quality. However, the following should be noted. There seems 'to have been some omission or displacement of early unions among the oldest cohorts'. The 'proportions ever in a union' 'appear to be internally consistent'. There is some omission of births and some displacement of dates but not in serious proportions. 'Analysis of the data on infant and child mortality has not revealed any substantial errors'. However, there is some evidence of omissions of female infant deaths or displacement of dates.

'In general the GFS data on age reporting, nuptiality, fertility and infant and child mortality appear to be reliable'. We believe that the data presented in this report are relatively reliable and valid. Where our subsamples are large we may have confidence in our findings.

Of the 4642 women who were interviewed, 1026 had never been in a sexual union. In this paper, dealing with fertility and infant and child mortality, these are of no interest and have been excluded. Since we are concerned with women who have experienced fertility and hence been exposed to the risk of child loss, we have confined our analysis to women who have had at least one live birth. This stipulation reduces the total eligible subsample to 3163 women between 15 and 49, ever in a union with one or more live births.

3.2 INFANT AND CHILD MORTALITY AND FERTILITY – AN OVERVIEW

We have already given the macro situation in Guyana with respect to fertility and infant mortality. Some of the data used were taken from the GFS and are presented in tables 41 and 42. At the societal level we have been led to conclude that over the period 1960–75 fertility has declined significantly. Balkaran (1982) seems to imply that this is due to rising age at marriage and declining marital fertility due to contraceptive use. There is evidence to suggest that since 1975 there is a tendency for fertility to level off. The downward trends in the crude birth rate and the total fertility rate have been arrested.

Infant mortality has been declining in Guyana, at least since 1950. It is still relatively high and is also showing signs of stability. General mortality as would be expected has been declining. This is quite low and will fall even lower when and if there are further declines in infant mortality. Life expectancy has risen quite significantly and is now relatively high. It will show further increases as infant mortality declines.

Child mortality rates are calculated from the GFS and are shown in table 43. They declined from 1945–9 down to the period 1965–9 and increased for the period 1970–4. The same is true for infant mortality. Balkaran (1982) has shown that infant and child mortality have been decreasing at least since 1953.

Looking at both infant and child mortality and using real and synthetic birth cohorts we see the same picture of declining infant and child mortality levels and some tendency for an upturn prior to the survey (table 44). The synthetic cohort analysis shows child mortality declining up to 5–9 years preceding the survey and the upturn occurring only for the 0–4 years period before the survey. In the real cohort analysis the upturn in child mortality occurs 5–9 years before the survey. The synthetic cohort analysis for infant mortality shows the upturn occurring 5–9 years before the survey and no significant change over the 0–4 years period even though a slight decline is shown. The real cohort analysis for infant mortality shows a decline down to 10–14 years before the GFS and stabilizing of that rate over the periods 5–9 and 1–4 years.

Guyana like her Caribbean neighbours has been

Table 43 Guyana: Probabilities of infant and child death by calendar years

Measure	Calendar years					
	1970–4	1965–9	1960–4	1955–9	1950–4	1945–9
Infant ($_1q_0$)	58.1	56.7	56.9	79.2	87.2	(124.2)
Child ($_5q_0$)	74.1	71.5	75.9	104.4	129.0	(172.6)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

Table 44 Guyana: Probabilities of infant and child death by periods before the survey

Measure	Years before the survey						
	0–4	5–9	10–14	15–19	20–24	25–29	30–34
Synthetic cohort							
Infant ($_1q_0$)	57.6	58.8	56.4	74.5	93.4	(112.2)	(91.6)
Child ($_5q_0$)	77.2	73.7	75.0	96.8	136.6	(159.2)	(132.4)
Real cohort							
Infant ($_1q_0$)	57.3[a]	57.9	57.5	71.3	95.1	101.5	(125.0)
Child ($_5q_0$)	–	74.5	72.9	92.1	127.3	158.2	(160.7)

[a]1–4 instead of 0–4 years.
NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

experiencing the demographic transition. This has been accompanied by economic transformation. The society has witnessed significant socio-economic development and this has been complemented by demographic changes. Since the latter part of the 1970s there has been economic stagnation and even a downturn in the economy. It is quite possible that infant mortality and fertility will increase, albeit slightly, because of the economic situation and the dynamics of the present age structure of the population. Guyana is a poor country, currently in a depressed state. It is rich in resources, however, and a resurgence is possible. With this as background we will now turn our attention to an examination of infant and child mortality, and their interaction with birth order and age of the mother at the birth of her children.

3.3 INFANT AND CHILD MORTALITY, BIRTH ORDER AND AGE OF MOTHER

In general, we expect the risk of a child dying in the first year of life (infancy) and also in the first five years of life (early childhood) to be relatively high for first births and also for high order births (in the present context 6 and higher). In between these two sets of births we speculate that the probability of dying in infancy or early childhood, will increase with birth order. The overall pattern linking infant and child mortality and birth order is expected to be J-shaped.

In the Caribbean, including Guyana, childbearing begins relatively early in a woman's life and in the past was known to continue late into the reproductive period. This is no doubt undergoing change but teenage pregnancy is still very much recognized as a social problem. Our expectation is that births occurring to very young mothers have high risks of dying in infancy and early childhood. Births to women late in their reproductive years should have relatively high risks of dying during the first year of life or during the first five years.

High order births to young women are expected to have high risks of dying in infancy and early childhood. First order births to women in the late reproductive period are likely to have high probabilities of dying in infancy or early childhood. Low probabilities of dying should be associated with low order births in the middle reproductive period (the twenties).

In table 45 infant mortality is seen with respect to birth order. Our expectation is not borne out. The figures of this table point in the direction of a positive association between birth order and infant mortality, i.e. the higher the birth order the higher the probability of dying in infancy.

Tables 46 and 47 show birth order grouped somewhat

Table 45 Guyana: Infant mortality rates by birth order (0–9 years before the survey)

	Birth order			
	1	2–3	4–6	7+
Infant ($_1q_0$)	50.5	52.9	59.4	72.2
Infant ($_1q_0$)[a]	95	100	112	136

[a]Relative levels of mortality rates (birth orders 2–3 = 100).
Source: Rutstein (1983)

Table 46 Guyana: Infant mortality by birth order for periods before the survey

Birth order	Years before the survey					Total
	1–4	5–9	10–14	15–19	20–24	
1	45.6	52.5	39.5	56.0	98.7	55.6
2	45.2	64.3	63.4	80.0	97.7	67.5
3	49.5	42.7	61.2	69.5	72.7	57.8
4–5	64.3	43.4	40.2	66.3	75.4	54.4
6+	70.7	68.1	78.1	80.8	181.8	76.6

Table 47 Guyana: Child mortality by birth order for periods before the survey

Birth order	Years before the survey				Total
	5–9	10–14	15–19	20–24	
1	65.7	47.4	60.3	125.3	71.1
2	88.8	75.1	115.3	120.7	98.4
3	56.2	65.8	90.9	120.0	78.8
4–5	55.9	61.6	83.8	98.4	70.1
6+	84.9	99.7	114.0	242.4	101.4

differently to table 45 and in these tables the periods of time before the survey are included. The overall pattern of the relationship between infant mortality, child mortality and birth order is one in which the rates increase in the different time periods from the first birth order to the second and decline between the second and the fourth to fifth birth orders then increase for the sixth and higher. The relationship is neither linear nor J-shaped but rather some other curvilinear relationship. There are some exceptions to the pattern described above. For infant mortality, during the period 1–4 years before the survey the relationship is linear. The 20–24 period for both infant and child mortality does not fit the pattern but neither is the pattern J-shaped. The influence of birth order on infant and child mortality in Guyana is not very obvious. It would seem that first births have very good chances of surviving and so too do third and fourth to fifth order births, but second order births and those of orders 6 and higher have relatively higher probabilities of dying in childhood.

The relationship between infant and child mortality and the age of the mother is shown in table 48. Here again, Guyana does not fit in with our expectation. The general pattern of the relationship (with exceptions) is positive. The higher the age of the mother at the birth of the child the higher the probabilities of not surviving the first year or the first five years of life. However, where the exceptions occur they are in line with expectation. In those cases, births to mothers in their twenties have lower probabilities of dying than births to mothers younger than 20 years. Births to women in their thirties

Table 48 Guyana: Probabilities of infant and child death by periods before the survey and age of mother at birth

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Mother aged less than 20 years					
Infant ($_1q_0$)	51.0	74.9	36.1	(83.5)	(102.5)
Child ($_5q_0$)	69.3	92.8	57.2	(105.5)	(160.1)
Mother aged 20–29 years					
Infant ($_1q_0$)	54.0	50.4	56.4	67.0	88.3
Child ($_5q_0$)	72.5	62.9	71.7	88.7	(120.4)
Mother aged 30–39 years					
Infant ($_1q_0$)	60.7	61.0	71.1	(97.2)	–
Child ($_5q_0$)	85.2	78.7	(97.2)	(121.5)	–
Mother aged 40 years or more					
Infant ($_1q_0$)	(154.0)	(119.4)	–	–	–
Child ($_5q_0$)	(162.8)	(119.4)	–	–	–

NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

and fourties have relatively high risks of not surviving the first or the first five years of life.

In tables 49 and 50 the age of the mother and birth order are brought together. We now run into a serious problem of small subsamples. A great deal of the absence of a pattern may be due to the random variations associated with small numbers of cases. We can nonetheless make a few observations but due caution is advised in making generalizations. Second and higher order births to mothers under age 20 have high infant and child mortality risks. Births of order 6 and higher have high risks regardless of the age of the mother. First and second order births are born to women before they are 30. Many fourth and fifth order births occur to women under 25. Child-bearing occurs early in Guyana.

In the case of Guyana the relationships between infant and child mortality and birth order and the age of the mother are quite indeterminate. It is possible that the whole set of these relationships is in flux as the society undergoes changes. It is quite possible that had our sample been larger and had we introduced other control variables our findings would have been different. However, we have detected some emerging patterns which merit future research.

3.4 INFANT AND CHILD MORTALITY AND LENGTH OF BIRTH INTERVAL

The length of the interval between successive births has been studied by various researchers both for its implications for mortality and for fertility. In this section we are interested in its effect upon the survivorship of the child that is born at the end of the interval. There is some justification in believing that when a child is born very soon after the birth of a previous child that is still alive, then both children are affected by the relative length of the interval. They are competitors for scarce resources available for child care. Many short birth intervals occur because the first child of the pair dies in infancy and thus shortens the post-partum amenorrhoea period. By confining our attention only to the child born at the end of the interval, we are more likely to see the pure effect of birth interval on survivorship.

In table 51 we present the data on previous birth interval and its relationship to infant and child mortality. Comparing first, all birth intervals less than 24 months with those of similar length but for which the preceding child survived until the birth of the succeeding one or for at least 23 months, we can conclude that 'the surviving intervals only' have lower associated infant and child mortality rates than the 'all intervals'. It would seem that competition between siblings for child care resources (material and otherwise) as captured by this comparison of birth intervals is not a major factor in infant and child mortality.

Of the five periods prior to the survey in table 51 three of them show a negative relationship between the length of the birth interval and the probability of dying in infancy or early childhood. In the other two, it is still the case that the highest risk of dying is associated with the shortest birth interval and the lowest risk is now associated with the intermediate length birth interval.

Table 49 Guyana: Infant mortality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey					Total
		1–4	5–9	10–14	15–19	20–24	
⩽20	1	47.4	53.7	20.6	60.2	95.4	53.8
	2	44.8	94.7	48.4	102.3	106.1	79.8
	3	86.5	67.3	100.9	85.5	64.9	82.2
	4–5	(66.7)	(60.6)	(41.7)	(148.9)	(151.5)	94.2
	6+	–	–	–	–	–	–
21–24	1	32.9	61.1	80.4	44.4	103.9	60.5
	2	45.7	33.5	62.5	47.3	84.0	52.1
	3	43.2	35.2	45.7	64.1	77.9	51.8
	4–5	60.3	44.2	32.1	94.0	49.1	55.4
	6+	(111.1)	51.7	39.0	(108.1)	(156.3)	77.9
25–29	1	(81.6)	(0.0)	(55.6)	(31.3)	–	52.9
	2	22.5	52.6	112.9	(62.5)	(96.8)	62.1
	3	31.6	46.3	65.2	48.2	(68.2)	49.8
	4–5	65.0	46.8	45.9	36.7	91.7	51.9
	6+	49.4	52.3	73.6	53.3	197.0	67.1
30+	1	–	–	–	–	–	74.1
	2	–	(32.3)	–	–	–	82.4
	3	(23.3)	0.0	(23.3)	–	–	29.0
	4–5	69.6	31.8	44.1	(0.0)	–	41.8
	6+	75.0	75.0	85.0	116.9	–	81.0

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 50 Guyana: Child mortality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey				Total
		5–9	10–14	15–19	20–24	
⩽20	1	70.1	29.5	63.3	127.2	70.2
	2	127.6	69.9	139.5	136.4	120.0
	3	86.5	100.9	111.1	129.9	105.7
	4–5	(60.6)	(41.7)	(170.2)	(212.1)	118.0
	6+	–	–	–	–	–
21–24	1	61.1	89.3	44.4	116.9	75.6
	2	39.1	62.5	74.3	100.8	66.0
	3	45.2	50.8	89.7	116.9	72.2
	4–5	53.1	60.7	115.4	61.3	73.1
	6+	51.7	64.9	(162.2)	(250.0)	107.8
25–29	1	(26.3)	(55.6)	(31.3)	–	49.6
	2	78.9	112.9	(104.2)	(96.8)	96.8
	3	64.8	76.1	48.2	(113.6)	70.3
	4–5	56.9	60.1	49.0	119.3	63.0
	6+	71.9	97.0	93.3	242.4	98.2
30+	1	–	–	–	–	–
	2	–	–	–	–	–
	3	(0.0)	(23.3)	–	–	42.1
	4–5	57.3	73.5	(21.3)	–	58.8
	6+	91.9	104.7	136.4	–	101.7

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 51 Guyana: Probabilities of infant and child death by periods before the survey and previous birth interval

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Less than 24 months – all intervals					
Infant ($_1q_0$)	64.7	72.3	69.0	97.4	109.7
Child ($_5q_0$)	89.7	89.3	92.2	123.6	(158.4)
Less than 24 months – surviving intervals only					
Infant ($_1q_0$)	56.6	57.2	55.8	78.6	(94.8)
Child ($_5q_0$)	82.9	73.9	79.9	107.9	(140.7)
24 to 47 months					
Infant ($_1q_0$)	45.0	40.7	44.0	41.6	(53.4)
Child ($_5q_0$)	67.8	53.8	62.0	(67.9)	(82.2)
48 or more months					
Infant ($_1q_0$)	(49.3)	(38.6)	(41.5)	(55.4)	(19.0)
Child ($_5q_0$)	(56.0)	(42.9)	(63.6)	(78.2)	(19.0)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

The general pattern suggested is one of a negative association between infant and child mortality and the length of the previous birth interval.

The length of the previous birth interval may be a product of several factors. We have already mentioned above that the survival of the previous child is one of these. Problems of subfecundity and other related health problems are other possibilities. Lack of exposure to the risk of pregnancy including the effective use of contraceptives is yet another. Some of these factors are biological and some behavioural. We can within our study introduce the role of contraception by looking at the relationship for never users of contraceptives. For these women contraceptive use is not a determining factor in the length of the birth interval.

Table 52 Guyana: Median birth intervals in months by survival of previous child

	Interval 1			Interval 3			Interval 5		
	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months
All women	[12.7]	16.7	19.2	[15.5]	17.3	18.2	[15.0]	(18.8)	21.3
Never use contraceptive	[12.3]	(17.0)	19.7	[17.5]	(19.0)	17.8	[14.0]	[20.5]	21.7

NOTE: ( ) Less than 25 cases.
[ ] Less than 10 cases.
Source: Cochrane and Zachariah (1983)

In table 52 working with median birth intervals for three selected intervals we find that for all women the median birth interval increases with increases in the length of time the previous child survived. It tells us that the length of the birth interval is in part a function of the length of time for which the previous child survived.

Women who have never used a contraceptive method are shown in the same table. The direction of the relationship is the same but it is not as consistent in pattern. This is perhaps related to the smaller subsamples. However, we can conclude that the definite positive relationship seen for all women is not just a function of contraceptive use. There are other biological and behavioural aspects to the length of birth intervals besides contraceptive use and one such factor is the length of time for which the previous child survives.

3.5 INFANT AND CHILD MORTALITY AND FERTILITY – RELATIONSHIPS

In this section we will look at the effect of infant and child mortality on fertility. In so doing we are also examining the replacement hypothesis. We are positing that the desire to replace children that die results in higher fertility for those who experience infant and child mortality. One approach to an examination of this link is the use of parity progression ratios.

In tables 53 and 54 we take each of the first five parities and examine whether the associated birth died in infancy or early childhood, and then find out what percentages of the mothers of each of the two experiences progress to the next highest parity. We confine the analysis to women 35 years and over to increase the probability that they have progressed. For the same reason (and also because of our concern for subsample sizes) we selected only the first five parities. We saw earlier that by age 35 most women have had their first six live births.

Our expectation that a higher percentage of women whose child died would progress to the next parity has not been supported (tables 53 and 54). In fact for infant mortality in the case of the first three parities the reverse took place. Only among parities 4 and 5 women do we see a higher percentage of those whose child died in infancy going on to the next parity. Perhaps with time these too will change or perhaps these higher orders capture the replacement effect. For child mortality (table 54) our expectation is met only in the case of women of parity 4. In general, the data of tables 53 and 54

Table 53 Guyana: The percentage of women who go on to the next parity by whether or not the child of that order died in infancy (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	94.6 (1077)	94.0 (1002)	90.7 (969)	89.5 (885)	85.8 (802)
Dead	89.8 (127)	92.1 (127)	84.3 (89)	91.9 (74)	89.5 (57)

Table 54 Guyana: The percentage of women who go on to the next parity by whether or not the child of that order died in the first five years (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage advancing from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	94.6 (1077)	94.0 (1002)	90.7 (969)	89.5 (885)	85.8 (802)
Dead	89.7 (136)	91.9 (136)	85.7 (98)	92.7 (82)	85.9 (64)

indicate that it is more likely for lower parity women whose child survived to move on to the next parity than those whose child died. Among parities 4 and 5 women there is the trend for those whose child died to progress in larger proportions to the next parity than those whose child survived. It is possible that replacement is more relevant when examined at high parities.

Looking at this in another form, tables 55 and 56 show the additional number of live births instead of the percentages. We now find that for both infant mortality (table 55) and child mortality (table 56), the average number of additional live births beyond a specific parity is higher for women whose child of that order died than for women whose child survived. There is the implication that those women whose child of any order dies, are likely eventually to have more live births than women whose child of the similar order survives. There is an indication of support for the replacement hypothesis and a possible link between infant and child mortality and fertility.

Instead of confining the analysis to the outcome of that particular order birth, we repeat the process but this time looking at the cumulative infant and child mortality experiences up to and including that particular order birth. It can be argued that it is the cumulative infant and child mortality experience that will influence replacement and hence fertility. With this in mind tables 57–60 are comparable to tables 53–56 with cumulative infant or child mortality replacing order-specific outcomes. Grouping is necessary to retain reasonable numbers of mothers.

Tables 57 and 58 show slightly improved support for the replacement hypothesis. In the case of infant mortality (table 57) except for parity 1, the proportion of women who go on to the next parity is higher for those with infant mortality experience than for those without. The differences are small but they are in the expected directions. With respect to child mortality the expected direction of the pattern emerges for parities 3, 4 and 5 (table 58). For parity 2 there is no difference.

The cumulative infant and child mortality experiences point in the direction of support for the replacement hypothesis. Caution is again advised since the differences are small and also some subsamples are small. However, it is interesting to note that the cumulative experience seems more appropriate for an examination of the replacement hypothesis and a link between infant and child mortality and fertility.

The consistent pattern seen earlier with respect to additional live births, taking into account infant and child mortality experiences at the specific parities, again manifests itself in the data of tables 59 and 60, where the cumulative experiences are presented. The differences, in terms of additional live births, for both infant and child mortality between those women who experienced child loss and those who did not, range between 0.6 and 1.0. Women who lost a child are likely to have higher levels of fertility than those for whom all the children survived.

In summary, there is general support for the replacement hypothesis. We can conclude that the experience of infant or child loss(es) is likely to lead to higher levels of fertility compared to those of women with all the children surviving at least through the first five years of life. In spite of the above, caution is advised. Some of the subsamples are small and some differences are also small. Then, too, there are possible confounding variables that may be producing a spurious relationship.

3.6 INFANT AND CHILD MORTALITY AND ADDITIONAL CHILDREN DESIRED

We expect the desire for more children to be related to the total number desired, the number living at present, and whether or not the replacement or insurance effects are being applied. This desire may also be a function of an assessment of the possibilities. We will not be able to examine all these issues but this section will focus on areas which are possible within the available data.

We begin by presenting in tables 61 and 62 infant and

Table 55 Guyana: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in infancy. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	5.47 (1077)	4.82 (1002)	4.14 (969)	3.60 (885)	3.05 (802)
Dead	6.09 (127)	5.38 (127)	4.74 (89)	4.42 (74)	3.60 (57)

Table 56 Guyana: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in the first five years. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	5.47 (1077)	4.82 (1002)	4.14 (969)	3.60 (885)	3.05 (802)
Dead	6.13 (136)	5.29 (136)	4.75 (98)	4.39 (82)	3.33 (64)

Table 57 Guyana: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more infant deaths up to the respective birth order. (First six parities only)

Infant mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	94.6 (1103)	93.7 (942)	90.0 (830)	89.0 (709)	84.7 (603)
1+	89.8 (127)	94.4 (215)	91.4 (256)	92.3 (272)	88.2 (279)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 58 Guyana: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more child deaths (death in first 5 years) up to the respective birth order. (First six parities only)

Child mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	94.6 (1094)	93.9 (926)	89.8 (813)	89.0 (688)	84.6 (579)
1+	89.7 (136)	93.9 (229)	91.9 (273)	92.2 (293)	88.1 (303)

[a]For this first parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 59 Guyana: Average number of additional live births above each of the first five parities by the infant mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Infant mortality experience	Parities				
	1[a]	2	3	4	5
0	5.49 (1103)	4.73 (942)	3.99 (830)	3.40 (709)	2.79 (603)
1+	6.09 (127)	5.63 (215)	4.96 (256)	4.39 (272)	3.71 (279)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 60 Guyana: Average number of additional live births above each of the first five parities by the child mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Child mortality experience	Parities				
	1[a]	2	3	4	5
0	5.48 (1094)	4.73 (928)	3.98 (813)	3.39 (688)	2.80 (579)
1+	6.13 (136)	5.58 (229)	4.94 (273)	4.33 (293)	3.61 (303)

[a]For this parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

child mortality experiences in relationship to the average number of additional children wanted and the current number of living children. Controlling for the number of living children, we find that women without infant or child loss desire more additional live births than those who have lost one or more of their children. This is not what we would expect if the replacement motivation was at work. We should be cautious, however, since the differences are small and we have some relatively small subsamples.

If women who have experienced infant or child loss are likely to be motivated to replace the children that have died, then they are less likely to be using a contraceptive method than the women who have all of their children still alive. We look for evidence of this in tables 63 and 64. This is borne out among women with less than four living children. For those with four or more living children the differences are small and in the case of child mortality in the expected direction, but the reverse is true for infant mortality. In general women who have experienced infant or child loss(es) are less likely to be using a contraceptive method than those whose children are all alive even controlling for the number of living children. There could be a replacement

Table 61 Guyana: Average number of additional children wanted by number of infant deaths and number of living children

Infant deaths	Number of living children			Total
	0–1	2–3	4+	
0	2.25 (702)	1.19 (424)	0.79 (311)	1.12 (1437)
1+	1.65 (60)	1.22 (54)	0.48 (69)	1.08 (183)

Table 62 Guyana: Average number of additional children wanted by number of child deaths and number of living children

Child deaths	Number of living children			Total
	0–1	2–3	4+	
0	2.26 (692)	1.18 (410)	0.81 (288)	1.64 (1390)
1+	1.66 (70)	1.31 (68)	0.49 (92)	1.09 (230)

Table 63 Guyana: Percentage currently using a contraceptive method by number of living children and number of infant deaths

Infant deaths	Number of living children		
	0–1	2–3	4+
0	24.4 (647)	38.4 (635)	43.9 (1034)
1+	13.0 (69)	33.7 (104)	45.2 (292)

Table 64 Guyana: Percentage currently using a contraceptive method by number of living children and number of child deaths

Child deaths	Number of living children		
	0–1	2–3	4+
0	24.7 (635)	39.1 (616)	46.3 (897)
1+	12.3 (81)	30.9 (123)	44.8 (382)

Table 65 Guyana: Percentage currently using a contraceptive method by infant mortality experience and number wanted : number alive

	Infant deaths	
	0	1+
Wanted < living	56.1 (367)	49.5 (111)
Wanted = living	45.6 (579)	38.8 (98)
Wanted > living	29.2 (1308)	32.7 (251)

Table 66 Guyana: Percentage currently using a contraceptive method by child mortality experience and number wanted : number alive

	Child deaths	
	0	1+
Wanted < living	56.1 (333)	50.3 (145)
Wanted = living	46.4 (550)	37.0 (127)
Wanted > living	29.3 (1250)	31.7 (309)

motivation here. On the other hand there could be confounding variables; ones which account for both high risks of infant and child mortality and low levels of contraceptive use.

In tables 65 and 66 we present data in terms of whether the number of living children is less than, equal to, or greater than the desired number, in conjunction with infant or child deaths and current contraceptive use. Where the number of living children is greater than or equal to the number desired, women with all their children surviving are practicing contraception in significantly larger proportions than those who have had one or more infant or child loss(es). However, where the number wanted is greater than the number living the reverse is the case but the percentage point differences are smaller. Where the 'wanted' is still greater than the 'living' the proportion of women contracepting in either group is relatively small. The replacement effect seems to be at work among those women whose living children equal the 'wanted' and among those where the living is greater than the number wanted but not among those whose desired number exceeds the current number living.

Women are divided into three groups in tables 67 and 68 in terms of whether they 'want more' children, 'want no more' or are 'undecided'. The undecided group is relatively small.

Those women who 'want more' children are more likely to be contracepting if all their children are surviv-

Table 67 Guyana: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Infant deaths)

	Desire for future birth					
	Wants more		Wants no more		Undecided	
	Infant deaths		Infant deaths		Infant deaths	
	0	1+	0	1+	0	1+
Wanted < living	46.2 (12)	20.0 (5)	56.9 (334)	52.5 (99)	16.7 (12)	20.0 (5)
Wanted = living	33.3 (9)	0.0 (1)	45.4 (515)	39.8 (88)	42.9 (49)	33.3 (9)
Wanted > living	28.2 (897)	13.3 (105)	29.9 (294)	46.2 (130)	34.5 (116)	36.4 (11)

Table 68 Guyana: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Child deaths)

	Desire for future births					
	Wants more		Wants no more		Undecided	
	Child deaths		Child deaths		Child deaths	
	0	1+	0	1+	0	1+
Wanted < living	41.7 (12)	33.3 (9)	57.8 (303)	51.5 (130)	9.1 (11)	16.7 (6)
Wanted = living	16.7 (6)	0.0 (1)	46.2 (487)	37.9 (116)	43.7 (48)	30.0 (10)
Wanted > living	28.4 (876)	14.3 (126)	29.3 (263)	44.1 (161)	36.0 (111)	25.0 (16)

ing whether or not their desired number of children is less than, equal to, or greater than the number living. The lower percentage contracepting among those with infant or child loss(es) points to a replacement effect.

The 'wants no more' children groups are similar in pattern to those in tables 65 and 66. When the wanted number is less than or equal to the number living, those with all children surviving are more likely to be using a contraceptive method than those who have lost one or more children.

The 'undecided' groups show no consistent pattern due in part to the small number of women.

In general, women whose wanted children are less than or equal to their actual are more likely to be contracepting if their children are all still alive than if one or more have died. Where the wanted number is greater than the living and if they desire no more children, then, as one would expect, those with infant or child losses are more likely to be currently contracepting. It could be the case that these have already replaced the lost children and then some, providing an insurance margin. Further study is warranted along these lines. Overall there is evidence of a replacement motivation and an indication of an insurance one. If this is true then there is an indirect link between infant and child mortality and fertility at the individual level with obvious implications for the societal level.

3.7 INFANT AND CHILD MORTALITY AND UNION PATTERNS

Union patterns or family formation patterns in all their complexities within these Caribbean societies constitute a set of major social variables. In this section we select the current union status (or last for those women who had been in a union but were not in one at the time of the survey), the number of partners, and the number of relationships as aspects of union patterns. We will see if these aspects are related to infant and child mortality in Guyana.

In tables 69 and 70 union status is shown. In all cases married unions have lower infant and child mortality levels than common law, for Non-Indians. In all but one case the visiting unions have higher infant and child mortality levels than married ones among Non-Indians. There is no clear pattern when we compare common law and visiting unions among Non-Indians but there is a tendency for visiting unions to have higher infant and child mortality rates than common law unions.

There are only small numbers of women in visiting unions among the Indians. However, among Indians the common law unions have higher infant and child mortality levels than the married unions.

In general, among Indian and Non-Indians common law unions have higher infant and child mortality levels than married unions. Among Non-Indians visiting unions also have higher infant and child mortality levels than married unions but the situation with respect to common law versus visiting unions is not consistent even though there is some indication that visiting levels are higher than common law ones.

There is some indication of a positive association between infant and child mortality levels and the number of partners (tables 71 and 72). The relationship is stronger for Non-Indians than for Indians. There are few Indians in the three and more partners category.

Table 69 Guyana: Infant mortality and current (or last) union status by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Married	Common law	Visiting	Married	Common law	Visiting
1–4	36.4	76.9	78.4	52.4	83.3	66.7
5–9	42.0	79.9	102.0	53.2	55.2	0.0
10–14	38.5	78.0	71.4	55.7	106.7	(25.0)
15–19	68.5	72.0	114.9	61.7	87.3	–
20–24	103.0	127.4	114.6	76.3	123.5	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 70 Guyana: Child mortality and current (or last) union status by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Married	Common law	Visiting	Married	Common law	Visiting
5–9	56.4	106.5	105.9	70.6	67.5	0.0
10–14	52.8	91.5	83.3	71.1	123.6	(50.0)
15–19	91.9	105.9	121.6	82.3	95.2	–
20–24	139.4	159.2	135.4	105.4	160.5	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 71 Guyana: Infant mortality and number of partners by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Number of partners			Number of partners		
	1	2	3+	1	2	3+
1–4	36.8	61.6	106.3	53.4	64.3	(107.1)
5–9	48.2	62.7	92.4	53.6	43.7	38.5
10–14	45.1	59.7	66.4	53.4	90.9	(106.4)
15–19	68.5	62.5	112.1	59.0	76.5	(193.5)
20–24	113.6	79.1	145.8	77.8	100.9	(111.1)

NOTE: ( ) Less than 50 cases.

Table 72 Guyana: Child mortality and number of partners by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Number of partners			Number of partners		
	1	2	3+	1	2	3+
5–9	63.4	77.7	108.9	71.0	48.0	76.9
10–14	57.2	80.6	78.1	69.1	106.7	(127.7)
15–19	95.9	73.5	146.6	78.1	103.8	(193.5)
20–24	143.9	141.2	145.8	104.3	156.0	(148.1)

NOTE: ( ) Less than 50 cases.

This finding of a positive association between the number of partners and infant and child mortality levels suggests that union instability is detrimental to the well-being of the children. However, the relationship may be spurious and further investigation is warranted.

In tables 73 and 74 we can see that Indians are unlikely to have as many relationships as Non-Indians. The association between the levels of infant and child deaths and the number of relationships is positive but it is even less strong than was the case with number of partners. Larger samples and more controls would possible serve to clarify the situation.

In general it would appear that family instability is related to infant and child mortality in Guyana. Women in the most stable unions are likely to experience the lowest levels of infant and child mortality and women whose family patterns are unstable the highest levels.

3.8 SOCIAL FACTORS AND INFANT AND CHILD MORTALITY

We have alluded to the possible confounding effects of social factors in the earlier sections. We have used, beginning with union patterns, ethnicity as a control variable. This will be continued in this section. The three variables selected for this section have been widely used in fertility and mortality studies. In numerous studies education has been shown to be a major explanatory variable for fertility and infant and child mortality. Urban/rural residence, too, has been used as an independent variable in fertility and mortality studies. Here we use the occupation (work situation) of the mother before the birth of the first child as a third variable. An alternative would have been current occupation. However, we are willing to argue that the first occupation is a good predictor of lifetime occupation. Moreover, for fertility and mortality studies it is perhaps very appropriate as a proxy for occupation.

Among Non-Indians, if we confine our attention to cells where there are at least 50 women, we conclude that women with secondary and above education have the lowest levels of infant and child mortality. There is no clear pattern of differences between the two primary levels for Non-Indians (tables 75 and 76). Among Indians the patterns are even less clear. However, there is still a tendency for women of secondary and above education to have lower levels of infant and child mortality than those with primary education only. Proportionately less Indians than Non-Indians have secondary or higher education.

In general, we may hazard a conclusion with respect to education and infant and child mortality. Secondary and higher educated women experience relatively fewer infant and child losses than primary level educated women. There is no pattern of differences among primary level educated women. Another way of saying this is that children born to women with secondary and higher education have higher survivorship chances than children born to women with only a primary standard of

Table 73 Guyana: Infant mortality and number of relationships by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	Number of relationships				Number of relationships			
	1	2	3	4+	1	2	3	4+
1–4	31.1	49.2	49.6	126.3	52.1	70.9	(51.3)	–
5–9	57.7	45.9	71.4	86.8	53.4	46.5	53.3	(38.5)
10–14	49.4	50.7	55.6	62.2	52.8	75.9	109.4	(114.3
15–19	57.9	74.2	63.1	113.6	59.4	60.2	111.1	–
20–24	133.3	72.2	106.4	145.8	77.2	104.8	(90.9)	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 74 Guyana: Child mortality and number of relationships by ethnicity for periods before the survey

Years before survey	Non-Indian				Indian			
	Number of relationships				Number of relationships			
	1	2	3	4+	1	2	3	4+
5–9	84.6	54.7	89.3	101.9	71.5	52.3	80.0	76.9
10–14	57.6	67.6	70.4	78.8	67.6	98.1	109.4	142.9
15–19	94.7	87.1	85.6	145.5	78.9	78.7	148.1	–
20–24	158.3	116.7	156.0	152.8	103.9	145.2	(159.1)	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 75 Guyana: Infant mortality and education by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	<4 yrs primary	4+ yrs primary	Secondary +	<4 yrs primary	4+ yrs primary	Secondary +
1–4	65.6	66.7	45.2	54.8	62.9	46.4
5–9	109.6	57.8	62.0	70.6	40.4	59.8
10–14	44.8	55.4	51.3	66.4	53.7	48.8
15–19	(41.7)	81.6	67.2	75.6	61.2	(0.0)
20–24	(37.0)	121.6	74.1	79.8	89.5	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 76 Guyana: Child mortality and education by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	<4 yrs primary	4+ yrs primary	Secondary +	<4 yrs primary	4+ yrs primary	Secondary +
5–9	109.6	75.6	74.4	86.3	56.1	81.5
10–14	59.7	72.0	56.4	83.0	67.7	73.2
15–19	(41.7)	110.1	75.6	92.8	77.6	(30.3)
20–24	(74.1)	155.1	98.8	117.2	107.4	–

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 77 Guyana: Infant mortality and urban/rural residence by ethnicity for periods before the survey

Years before survey	Non-Indian		Indian	
	Urban	Rural	Urban	Rural
1–4	54.3	59.9	80.8	51.6
5–9	67.2	55.8	53.7	51.8
10–14	55.6	52.1	77.9	57.2
15–19	69.0	86.2	42.9	67.7
20–24	94.0	128.9	60.6	85.0

Table 78 Guyana: Child mortality and urban/rural residence by ethnicity for periods before the survey

Years before survey	Non-Indian		Indian	
	Urban	Rural	Urban	Rural
5–9	79.6	74.4	62.0	69.4
10–14	62.2	75.4	102.5	71.7
15–19	94.1	109.9	73.6	85.9
20–24	120.8	167.2	111.1	112.8

education. Among the different primary levels of education there is no pattern to the probabilities of survival of the children. Secondary educated women are likely to receive better pre- and post-natal care and are more likely and more able to provide better child care than the less well educated women and therefore their children have higher probabilities of survival.

Urban/rural residence is shown in tables 77 and 78. In both tables and for both Non-Indians and Indians, urban infant and child mortality levels were lower for the periods 15–19 and 20–24 years before the survey. However, for the three most recent periods before the survey the situation is less clear. The trend for these three periods is for the rural infant and child mortality levels to be lower than the urban ones. The differences for the few exceptions are small.

Should we conclude that in the more distant past infant and child mortality levels were higher in the rural areas, but in the not too distant past and leading up to the present rural infant and child mortality levels are lower than urban ones? The data point to this conclusion. It is possible that the quality of life for the urban masses is slipping relative to the rural population. Unemployment is high in the urban areas, housing stock is inadequate, nutrition level may be low and environmental conditions poor. These and other factors differentiating rural and urban areas may account for this apparent turnaround in infant and child mortality rates between urban and rural areas.

White-collar Non-Indians workers' children are more likely to survive infancy and early childhood than those of blue-collar workers or those who did not work (tables 79 and 80). There is no consistent pattern of differences between those who did not work and the blue-collar

Table 79 Guyana: Infant mortality and occupation of mother before the first child by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Did not work	White collar	Blue collar	Did not work	White collar	Blue collar
1–4	65.6	32.7	57.9	54.9	55.6	58.3
5–9	67.0	36.7	66.8	50.5	97.2	50.0
10–14	55.7	59.6	50.8	51.7	(131.6)	80.8
15–19	63.7	51.5	102.4	61.8	(71.4)	72.2
20–24	111.1	95.2	116.2	76.3	–	92.2

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 80 Guyana: Child mortality and occupation of mother before the first child by ethnicity for periods before the survey

Years before survey	Non-Indian			Indian		
	Did not work	White collar	Blue collar	Did not work	White collar	Blue collar
5–9	78.2	49.0	90.5	67.1	111.1	66.7
10–14	66.8	66.2	72.0	67.7	(184.2)	91.9
15–19	91.3	61.9	126.7	82.1	(71.4)	92.8
20–24	148.1	(119.0)	145.2	100.0	–	145.6

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

workers even though there is a tendency for those who did not work to lose relatively fewer of their children in infancy and early childhood.

Among Indian women, those who did not work seem to have relatively fewer of their children dying in infancy and early childhood than the blue and white-collar workers who are quite similar in their infant and child loss experiences.

White-collar Non-Indian women are relatively more numerous than white-collar Indian women. White-collar women are also most likely to be the better educated ones. They and the non-working Indian mothers seem the most likely to provide the proper child care and thereby improve the chances of survival for their children.

In general these three social factors, examined in interaction with ethnicity for their relationships with infant and child mortality, have come out as might have been expected. Education is an important variable for infant and child mortality but the difference occurs between secondary and higher, and primary. It takes secondary level education or higher before a difference is noticed in infant and child mortality levels. Rural survivorship rates were lower than urban in the distant past, but currently and also in the recent past, rural rates seem to be falling and have fallen, below urban ones. White-collar Non-Indian and non-working Indian women have relatively lower infant and child mortality levels than their counterparts.

These differences on these three social factors are perhaps not large enough to nullify our findings of earlier sections. They are perhaps strong enough to reduce the earlier differences and in some cases may even accentuate them. These differences with respect to these three social factors give indications that under the impact of ongoing socio-economic changes many socio-demographic relationships may be in flux. The effects of a stagnant or a declining economy on demographic variables have been little studied and are not well known or understood.

3.9 SUMMARY AND CONCLUSIONS

This study of infant mortality, child mortality and fertility in Guyana is based on a subsample of 3163 women between the ages of 15 and 49, with at least one live birth. They were interviewed in 1975 within the Guyana Fertility Survey (GFS) which was conducted as part of the World Fertility Survey (WFS).

The women in the subsample have had to date an average of 0.293 infant deaths, 0.366 child deaths in the first three years, and 0.381 in the first five years. These figures along with the infant mortality rates from other sources point to relatively high levels of infant mortality in Guyana.

Infant mortality levels have declined over the 15-year period preceding the GFS (1975) but there are indications that the rate is stabilizing at a relatively high level of over 40. Fertility has been declining over the same

time period. Recent figures indicate that the decline in the crude birth rate has slowed and it is levelling off at a relatively high rate of near to 30. At the macro level the evidence shows infant mortality declines in the post-World War II period followed by fertility declines.

There is a positive association between birth order and infant mortality when periods of time before the survey are not taken into consideration. Controlling for periods of time prior to the survey the relationships between birth order and infant and child mortality are not linear as above, nor are they J-shaped as was expected. There is a curvilinear relationship, nonetheless. First births have low probabilities of succumbing in infancy or early childhood. Second order births have high risks of dying and births of order 6 and above have relatively low chances of surviving beyond the first and the first five years of life.

In general, the older the woman at the birth of her child the smaller the probability of that child surviving. Second and higher order births to women before they are 20 years old have relatively high risks of not surviving through infancy and early childhood.

The association between birth interval and infant and child mortality is negative. In general, the longer the birth interval the lower the risk of dying in infancy and early childhood. The median birth interval increases with increases in the length of time the previous child survives. The length of the birth interval is in part a function of the length of time the previous child survives.

The parity progression ratios are higher for mothers whose child of the specific order survives than for those whose child died in infancy or early childhood. However, the cumulative infant and child mortality experience results in a tendency for these progression ratios to reverse themselves. The parity progression ratios for parities 4 and 5 are as expected in both analyses and for both infant and child mortality experiences.

The average number of additional live births a mother has beyond any parity is greater for mothers that have lost a child. This holds for parity-specific mortality situations, or cumulative mortality experiences up to and including that parity. The replacement hypothesis is therefore supported. Infant or child losses are likely to be a deciding factor in the number of additional live births and therefore in the overall number of children born to the mother. The support for the replacement hypothesis shows up best when the cumulative infant and child mortality experience is considered. The cumulative infant and mortality data show differences in additional live births between 'all children surviving' mothers and 'not all surviving' mothers of between 0.6 and 1.0 across the first five parities.

Contrary to expectation, controlling for the number of living children, women without infant or child loss desire more additional live births than those with infant or child loss. Is it possible that those with infant or child losses have already replaced the dead siblings?

Women who have experienced infant or child losses are less likely to be currently using contraceptives than those with all their children living.

If a woman's living children are equal to or greater than her desired number of children, then, if all her children are alive, she is more likely to be currently contracepting than if one or more of the children has died. The reverse is true for women whose desired number of children is greater than the number living. Women who as a group still desire more children are more likely to be using a contraceptive method if they have all their children alive than if one or more has died. This is true also for women who want no more children and whose desired family size is less than the living number of children or greater than it. It is not surprising that, women whose number of living children is less than their wanted, and who still want no more children, do not fit into the pattern. In general the replacement hypothesis receives a measure of support from the above analysis.

Married unions experience lower infant and child mortality levels than common law unions for both Indians and Non-Indians. Very few Indian women are in visiting unions. Among Non-Indian women, visiting unions have higher infant and child mortality levels than married ones. No clear patterns of differences exist between visiting unions and common law ones, even though there is an indication that visiting infant and child mortality levels are higher than common law.

Infant and child mortality levels are positively associated with the number of partners and also with the number of relationships. The associations are relatively weak and that for the former is stronger than that for the latter. Overall, it seems that unstable family patterns are associated with relatively high levels of infant and child mortality.

Infant and child mortality levels are lower for women with secondary and higher levels of education than for those with only some level of primary schooling. There is no pattern of differences between the primary levels.

Over the period 15–24 years before the survey rural infant and child mortality levels were higher than urban levels. Over the period 1–14 years before the survey the tendency is for urban infant and child mortality levels to be higher than the rural ones. Should one conclude that recently the urban centres have become less healthy than the rural areas? On the surface it appears so. However, the relationship may be spurious. Additional data are required to answer the question.

Women who were in a white-collar job before the birth of the first child have experienced lower infant and child mortality levels than those who did not work or those who were in a blue-collar job if they are Non-Indians. If they are Indians the 'did not work' group has lower infant and child mortality levels than those who were in either a white-collar job or a blue-collar one.

These social factors and others may be confounding the relationships observed earlier. However, an examination of this is beyond the scope of the present report. We have raised many questions worthy of additional research using the same data set or a new one.

Our analysis points in the direction of a link between infant and child mortality levels and fertility, both for individual women and for the society. Infant and child mortality experience becomes a motivating force to replace the sibling(s) that died and therefore women who have lost one or more children are more likely to give birth to more children than those women whose children are all alive. In this way societal fertility remains high when infant and child mortality levels are high and vice versa.

Infant and child mortality rates, after a period of quite dramatic declines, seem to have stalled at relatively high levels. Fertility declines which seem to have been occurring alongside these mortality declines also appear to have been arrested. These rates (infant and child mortality and fertility) are all relatively high. It is possible that a vigorous and extensive national family planning programme could set fertility once again on its downward path. There is no such programme in Guyana. It is also possible that a good nutrition programme and an extensive maternal and child care programme could restart infant and child mortality declines. The state of the Guyanese economy in recent years has in all likelihood led to a deterioration in the quality of life. Improvements in the quality of life of the populace would be likely to serve to move both mortality and fertility levels downward.

4 Jamaica: Infant and Child Mortality and Fertility

4.1 INTRODUCTION

Jamaica has the largest population of all the English-speaking Caribbean countries – about $2\frac{1}{4}$ million in 1982 (Population Reference Bureau 1983). In land area it is the largest (about 4400 square miles or 10200 square kilometres) of the English-speaking islands but smaller than Guyana or Belize. It has a fairly diversified economy. Its per capita GNP in 1981 was $1182 (US). It is a poor country whose economy is currently depressed.

The Jamaica Fertility Survey 1975–6 (JFS) was undertaken as a part of the World Fertility Survey (WFS). The fieldwork began in November 1975 and was terminated in January 1976. The JFS was undertaken by the Department of Statistics of the Jamaican Government. Women between the ages of 15 and 49 were eligible for the survey so long as they were not in the age group 15–19 and enrolled full-time in a primary or secondary school. A probability sample of 3096 women was obtained. Of these 2765 were or had been in a sexual union and 2456 had had one or more live births. Because our interest in this report is related to fertility and child loss, these 2456 ever in a union women between the ages of 15 and 49 with at least one live birth comprise our working sample.

An extensive evaluation of the data obtained in the JFS was undertaken by Singh (1982). The following is a very brief summary of her findings as they relate to the key variables of this section of the report. Date reporting is 'in general quite good'. However, there was some age heaping and some age displacement reported for the women. Reporting of the date of first union was not complete but the age at initiation of the first union was much better. There is some indication of displacement and omission of births, mainly among older women. 'Some omission of infant deaths may have occurred at periods earlier than 15 years before the survey'. There may be 'some error in age at death data in the period 5–9 years before the survey'. 'In general, the JFS data on age reporting, nuptiality, fertility and infant mortality appear to be reasonably reliable'. On the surface the data seem reliable and valid and within the context of sample survey data one can use them with reasonable confidence that they reflect reality or very close to it.

The 1943 census showed a population of 1.24 million; in 1960 it was 1.62 million; in 1970 the census showed a population of 1.85 million; and currently (1982) it is 2.3 million. During the first part of this period the rate of growth of the population was held down by emigration. During the last ten years or so fertility declines have been a major factor in holding down the growth of the population as emigrants decline in numbers. The population is currently growing at close to 2 per cent per year. Jamaica is undergoing the demographic transition but seems to be currently stalled at a relatively high rate of growth.

4.2 INFANT AND CHILD MORTALITY AND FERTILITY – AN OVERVIEW

We begin this section by examining briefly mortality and fertility at the macro level as a lead up to infant and child mortality and fertility. This section is intended as an overview and relationships using micro data are not investigated at this point.

The crude death rate in Jamaica has been declining for a long period of time and is currently very low. In 1943 it was estimated to be about 18, in 1960 to be around 12 and by 1970 approximately 8, and for 1982 it is about 6. It has perhaps reached as low a level as it ever will, for even if infant mortality falls and further depresses it, this is likely to be cancelled out by an ageing of the population due to declining fertility.

Life expectancy at birth has been increasing in Jamaica. This is related to the declining mortality rates (infant and general). Around 1945 life expectancy was about 52 years. By 1950 it had increased to about 56 years. By 1960 it was up to about 64, and increased to 68 years by 1970. Currently (1982) it is estimated to be 71 years. This improvement in life expectancy at birth parallels the reductions in the crude birth rate and infant and child mortality rates.

In 1943 the crude birth rate was estimated at approximately 33. It increased, it is believed, to 42 by 1960 (table 81). Since then it has been declining and by 1970 it was down to 34.4, decreasing further to 30 by 1975. The 1982 crude birth rate is given as 27. The rate has slowed considerably over the past five years. It is perhaps to the credit of the national family planning effort that the crude birth rate has not increased. The current age structure could give rise to an increase in the crude birth rate, since some very large cohorts of women are entering the childbearing ages each year.

Total fertility rates are not available from vital statistics for the period since 1963 as they have not been published. The rates have been calculated, however, from the JFS data and are shown in table 81. We do not give the figures for 1975 and 1976, the years of the survey, since they would result in undercounts. There is a trend of a declining total fertility rate over the period 1960–74. The total fertility for 1982 is given as 3.7. The total fertility rate has been declining for at least the period 1965–82.

It should be noted that the JFS-derived rates for 1960–3 are higher than those from the vital statistics. This has been the case in most countries when a comparison is made between the WFS rate and the vital

statistics one. The general conclusion has been that there is under-registration of births or deaths in the vital registration systems. This is perhaps the case in Jamaica. The coverage of the vital registration system especially for births and deaths that occur in quick succession of each other can be improved.

Infant mortality has been declining in Jamaica. In the period 1945–9 the infant mortality rate was about 90 and it had been declining well before then. The earliest figures available show it to be about 144 in 1930–4, 127 in the period 1935–9, and 101 in the period 1940–4 (UN Demographic Yearbook 1966). In 1955 it was 63, and by 1960 it is shown to be 51.5 (table 82). It has continued its decline so that by 1975 the infant mortality rate is shown to be about 23.2. Population Reference Bureau (1983) gives a figure of 28. In spite of this apparent upturn, it can be concluded that infant mortality has declined considerably in Jamaica and is currently relatively low.

Infant mortality rates calculated from the JFS are also shown in table 82. These are higher than the vital statistics rates. They perhaps reflect the true situation better than the rates from vital registration. This conclusion is based on the assumption that in a sample survey women are unlikely to report more child deaths than have actually occurred. However, an under-reporting of births would have the effect of inflating the infant mortality rate. But the evaluation of the data leads us to believe that this is not a very serious problem.

Child mortality data are not available from the published sources. One rate calculated from the JFS is shown in table 83. This rate for the first five years of life is seen to be declining between 1945–9 and 1965–9 and then it increased for the period 1970–4. The accompanying infant mortality rate shows the same trend.

In table 84 we look at infant and child mortality for periods of time before the survey. There are two sets of infant and child mortality rates.

The first is for synthetic birth cohorts and the second is for real birth cohorts. For the synthetic cohorts, infant mortality declined from the period 30–34 years prior to the survey until 5–9 years before, then increased for the period 0–4 years before the survey. The corresponding child mortality rate declined up to 5–9 years before the survey and then maintained that rate for the 0–4 years period as well. The situation is similar using the real birth cohorts.

Table 81 Jamaica: Crude birth rates, total fertility rates – vital statistics and Jamaica Fertility Survey data – 1960–76

Year	Crude birth rates[a]	Total fertility rates (vital statistics)[b]	Total fertility rates (JFS)[c]
1960	42.0	5.7	6.6
1961	40.2	5.6	5.9
1962	39.1	5.6	6.6
1963	39.0	5.7	6.7
1964	39.3	NA	6.5
1965	39.6	NA	7.0
1966	40.0	NA	6.2
1967	37.3	NA	5.9
1968	35.7	NA	6.0
1969	35.1	NA	5.6
1970	34.4	5.5	5.8
1971	34.9	NA	5.5
1972	34.3	NA	5.7
1973	31.4	NA	5.1
1974	30.6	NA	4.6
1975	30.1	NA	NA
1976	29.3	NA	NA

[a]1960–8 UN Demographic Yearbook 1975; 1969–75 Jamaica Fertility Survey First Country Report, vol 1.
[b]Jamaica Fertility Survey First Country Report, vol 1.
[c]Singh (1982), table 23.
NOTE: NA Not available.

Table 82 Jamaica: Infant mortality rates (infant deaths per 1000 live births)

Year	Vital statistics[a]	JFS	JFS smoothed[b]
1960	51.5	70.5	65.6
1961	48.8	60.7	61.8
1962	50.5	54.1	54.7
1963	51.1	49.3	44.4
1964	38.0	29.9	42.3
1965	38.8	47.9	38.6
1966	35.4	38.0	41.7
1967	30.5	39.1	37.3
1968	34.7	34.7	39.5
1969	33.4	44.6	39.4
1970	32.2	38.8	43.0
1971	27.1	45.7	39.2
1972	30.9	33.1	40.2
1973	26.2	41.9	43.8
1974	26.3	56.4	42.2
1975	23.2	28.3	42.3

[a]UN Demographic Yearbooks.
[b]Moving three-year averages.

Table 83 Jamaica: Probabilities of infant and child death by calendar years

Measure	Calendar years					
	1970–4	1965–9	1960–4	1955–9	1950–4	1945–9
Infant ($_1q_0$)	45.0	39.9	55.5	69.2	87.4	(100.4)
Child ($_5q_0$)	59.3	53.6	73.3	92.7	(123.0)	(167.9)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

Table 84 Jamaica: Probabilities of infant and child death by periods before the survey

Measure	Years before the survey						
	0–4	5–9	10–14	15–19	20–24	25–29	30–34
Synthetic cohort							
Infant ($_1q_0$)	43.0	39.6	48.6	74.1	80.0	(95.0)	(133.3)
Child ($_5q_0$)	55.8	55.1	64.4	98.1	(111.8)	(158.8)	(133.3)
Real cohort							
Infant ($_1q_0$)	45.5	37.9	49.0	75.2	78.6	(86.7)	(134.1)
Child ($_5q_0$)	–	54.6	63.5	95.0	103.6	(138.2)	(195.1)

NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

Jamaica has been undergoing the demographic transition. Fertility has been declining. Mortality levels – infant, child and general – have been decreasing. Life expectancy at birth has been improving. The rate of growth of the population is down to about 2 per cent. The economy boomed and has now slowed down. There is some concern as to whether the demographic rates are levelling off and whether they may even swing upward. It seems that the momentum in demographic changes is not being maintained. Jamaica's population growth rate is still high and if maintained at the current level could further aggravate the already poor economic situation.

4.3 INFANT AND CHILD MORTALITY, BIRTH ORDER AND AGE OF MOTHER

Are the chances of surviving through the first year (infancy) and through the first five years after birth (early childhood) a function of one's birth order? Are the survival probabilities also related to the age of the mother at the birth of the child? Is there an interaction effect of birth order and the age of the mother? These are questions for which answers are sought in this section.

We begin by looking at the simple relationship between birth order and the risks of dying in the first year of life (table 85). We find that the relationship between birth order and the probability of dying in infancy is positive and linear. Put another way, the higher the order of the birth the smaller the chances of surviving through the first year. Our expectation of a J-shaped relationship is not borne out.

Complicating the picture somewhat, birth order is regrouped in tables 86 and 87 and the period of time before the survey is brought into the analysis in order to control for secular trends. The relationship between birth order and the risks of dying in the first year and the first five years no longer exists. We can detect no real pattern to the relationship. The relationship seen in table 85 disappears with a regrouping of birth orders and introduction of time before the survey as a control variable. This apparent lack of association between the two variables is in part due to random variation introduced because of the small subsamples of tables 86 and 87.

Table 85 Jamaica: Infant mortality rates by birth order (0–9 years before the survey)

	Birth order			
	1	2–3	4–6	7+
Infant ($_1q_0$)	30.6	36.2	40.6	63.0
Infant ($_1q_0$)[a]	85	100	112	174

[a]Relative levels of mortality rates (birth orders 2–3 = 100).
Source: Rutstein (1983)

Introducing, to start with, the periods preceding the survey, we now examine the relationships between the age of the mother at the birth of the child and infant mortality as well as child mortality (table 88). The problem of small subcells immediately arises. In the case of infant mortality no pattern of relationship is obvious between the age of the mother and the risks of dying in the first year of life. For child mortality we may conclude that in general children born to women in their twenties (20–29) have the lowest probabilities of dying in the first five years of life and those to women in their thirties and older are more likely to die in childhood than those born to women before they are twenty. This is in line with conventional wisdom. Departures from this pattern are probably due to random variations associated with small subcells.

Is it then the case, that the first year after birth is too short a period in which to examine the relationship between the age of the mother at the birth of the child and the probabilities of dying? Our data seem to suggest this. This calls for further research but it is beyond the scope of the present report. However, we will now examine birth order and age of the mother in interaction with infant and child mortality.

In tables 89 and 90 the problem of small subsamples arises leading to inconsistent patterns of relationships. However, the following observation can be made. For both infant and child mortality, the risks of dying associated with first births are higher for mothers 20 years or younger than for mothers 21–24. A first birth to a mother of age 21–24 has a greater chance of survival than one born to a mother 20 years or younger. The same is true for second births. For second births the risks of dying in infancy and early childhood are greater for

Table 86 Jamaica: Infant mortality by birth order for periods before the survey

Birth order	Years before the survey					Total
	1–4	5–9	10–14	15–19	20–24	
1	36.4	23.4	54.5	76.9	78.2	51.0
2	31.8	33.7	55.3	74.1	15.9	51.5
3	35.7	35.5	40.8	63.9	86.1	48.0
4–5	56.4	25.8	50.4	82.6	75.3	52.5
6+	56.3	59.2	45.4	72.2	(58.8)	56.2

NOTE: ( ) Less than 50 cases.

Table 87 Jamaica: Child mortality by birth order for periods before the survey

Birth order	Years before the survey				Total
	5–9	10–14	15–19	20–24	
1	48.9	76.3	90.2	107.5	77.5
2	54.4	67.8	92.6	98.2	75.1
3	41.4	53.3	86.5	112.6	66.1
4–5	36.9	67.2	102.6	95.9	67.3
6+	77.4	55.7	103.1	(88.2)	73.6

NOTE: ( ) Less than 50 cases.

Table 88 Jamaica: Probabilities of infant and child death by periods before the survey and age of mother at birth

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Mother aged less than 20 years					
Infant ($_1q_0$)	35.8	(41.7)	(67.8)	(67.1)	(75.1)
Child ($_5q_0$)	(51.3)	(65.2)	(90.2)	(89.3)	(112.6)
Mother aged 20–29 years					
Infant ($_1q_0$)	38.8	30.0	39.7	78.7	(82.4)
Child ($_5q_0$)	48.4	42.7	54.3	100.2	(111.6)
Mother aged 30–39 years					
Infant ($_1q_0$)	57.8	55.6	(50.1)	(60.5)	–
Child ($_5q_0$)	72.3	67.3	(61.5)	(139.8)	–
Mother aged 40 years or more					
Infant ($_1q_0$)	(56.5)	(23.5)	–	–	–
Child ($_5q_0$)	(81.1)	(113.6)	–	–	–

NOTE: ( ) Less than 500 children exposed.
– Not available.
Source: Rutstein (1983)

those born to women aged 25–29 than for those to mothers aged 21–24. For third births there is no consistent pattern of relationship for infant mortality. For child mortality the following observations can be made concerning births of order 3. Those to mothers 20 years and younger have greater risks of dying than those to mothers 21–24, and the 20 years and younger probabilities of dying are also higher than those for children of mothers 25–29.

High order births (4–5) have higher risks of dying in infancy and early childhood if they are born to women 21–24 than to women 25–29. Births of order 6 and

Table 89 Jamaica: Infant morality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey					Total
		1–4	5–9	10–14	15–19	20–24	
⩽20	1	44.6	22.4	55.4	68.5	79.8	50.7
	2	25.9	43.5	51.4	83.3	68.2	50.5
	3	41.1	48.2	87.7	(43.5)	(93.8)	58.4
	4–5	–	–	–	–	–	129.0
	6+	–	–	–	–	–	–
21–24	1	21.7	14.5	42.9	51.9	57.1	37.0
	2	26.8	16.4	35.1	74.8	69.3	43.2
	3	45.9	28.0	8.1	101.0	96.4	50.3
	4–5	62.0	44.6	56.1	121.5	90.9	70.3
	6+	–	(69.0)	–	–	–	54.1
25–29	1	(0.0)	(57.1)	(66.7)	(166.7)	–	85.7
	2	57.7	34.5	87.0	56.3	(114.3)	66.7
	3	15.2	38.0	33.7	51.5	(55.6)	38.1
	4–5	46.4	15.9	36.6	52.6	75.9	41.0
	6+	40.0	28.8	33.3	72.9	(69.0)	42.7
30+	1	–	–	–	–	–	(41.7)
	2	–	–	(75.0)	–	–	62.5
	3	31.3	30.3	80.0	–	–	43.2
	4–5	54.9	17.5	44.0	36.4	–	35.7
	6+	60.5	67.2	50.3	83.3	–	62.0

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

Table 90 Jamaica: Child mortality by birth order and age of the mother at the birth of the child for periods before the survey

Age of the mother	Birth order	Years before the survey				Total
		5–9	10–14	15–19	20–24	
⩽20	1	53.2	80.0	80.6	108.0	77.0
	2	81.5	80.0	106.1	90.9	88.1
	3	72.3	122.8	(108.7)	(125.0)	100.9
	4–5	(40.0)	–	–	–	135.1
	6+	–	–	–	–	–
21–24	1	14.5	57.1	64.9	85.7	55.9
	2	24.6	35.1	74.8	89.1	54.1
	3	28.0	24.4	121.2	120.5	64.7
	4–5	44.6	56.1	158.9	127.3	86.9
	6+	(69.0)	–	–	–	95.2
25–29	1	85.7	66.7	190.5	166.7	123.3
	2	34.5	87.0	84.5	(142.9)	81.5
	3	38.0	33.7	61.9	(83.3)	49.8
	4–5	42.3	57.6	64.3	88.6	58.7
	6+	43.2	40.0	93.8	(69.0)	55.6
30+	1	–	–	–	–	(78.9)
	2	–	(75.0)	–	–	78.9
	3	(30.3)	80.0	–	–	46.7
	4–5	23.4	69.2	54.5	–	46.8
	6+	87.6	59.7	119.0	–	80.6

NOTE: ( ) Less than 50 cases.
– Less than 25 cases.

higher have greater risks of dying if they are born when the mothers are 30 years or older than if they are born when the mothers are 25–29 years of age.

For births to women 20 years and younger there is no pattern of relationship between risks of dying and birth order. For those to women 21–24 there emerges a tendency for birth order to be positively associated with infant and child mortality levels. For 25–29 there is no consistent pattern, and for 30 and over there are too few cases.

It may be noted that child mortality levels are higher for first births than those of order 6 and higher if the mothers are 25–29 at the births. Births of orders 4–5 have higher risks of dying in early childhood than first births when both groups are born to mothers 21–24 years of age.

The emerging picture when we study birth order and age of the mother at the birth of the children is very blurred. However, it seems possible that had we been working with a much larger sample the picture would have been much sharper. There is a strong indication that birth order has a relationship to risks of dying in infancy or early childhood and so too does the age of the mother at the birth of the child and these two interact to influence the probability of child survivorship.

4.4 INFANT AND CHILD MORTALITY AND LENGTH OF BIRTH INTERVAL

Our speculation is that, all things being equal, a longer birth interval should be advantageous to the well-being of the child at the beginning of the interval as well as to the one at the end of the interval. The longer birth interval allows the mother more time to devote to the child living in the birth interval. It also allows the mother time to regain her strength and health before the arrival of the next child, and if it is a long enough interval, more time is available for caring for this child since the preceding child is not as helpless and dependent. One would therefore posit that the longer the birth interval, the lower the probability of dying in childhood.

But all things are not equal, since it is possible that a long birth interval may be related to the poor health of the mother and her physical condition may affect the survivorship of her children. Also a short birth interval may be due to the fact that the first child of the pair died early after birth and thus was not breastfed or only for a short time. This then would shorten the post-partum amenorrhoea period. In order to avoid some of these complications we will look at the relationship between the birth interval and the risks of dying associated with the child born at the end of the interval.

In table 91, a comparison between all birth intervals less than 24 months in duration and those also less than 24 months in duration but for which the previous child survived to the birth of the succeeding or for at least 23 months, shows that the 'surviving intervals' have lower infant and child mortality levels. The competition of siblings for child care resources is perhaps not an important factor in infant and child mortality. Overall there is a tendency for infant and child mortality levels to decrease with increase in the length of the birth interval. For the earliest two periods before the survey (15–19, 20–24) there is a tendency for the probabilities of dying to rise slightly for the longest birth interval. This could be a function of subsample sizes. Therefore, we venture to conclude that infant and child mortality levels are negatively associated with the length of the previous birth interval.

The length of the birth interval may be a function of biological and behavioural factors. We are unable to do much about the biological except in looking at only the succeeding child. One behavioural factor is the use of contraceptives. We are also unable to relate contraceptive use to the appropriate birth interval mainly because of problems of subsample sizes and matching of the two events (birth interval, and contraceptive use in the interval). But we can look at birth intervals for women who have never used a contraceptive method. This we do in table 92.

Table 91 Jamaica: Probabilities of infant and child death by periods before the survey and previous birth interval

Measure	Years before the survey				
	0–4	5–9	10–14	15–19	20–24
Less than 24 months – all intervals					
Infant ($_1q_0$)	57.8	53.6	61.4	82.0	(70.6)
Child ($_5q_0$)	78.4	68.3	80.5	(108.9)	(111.0)
Less than 24 months – surviving intervals only					
Infant ($_1q_0$)	53.1	48.0	54.7	(75.4)	(79.2)
Child ($_5q_0$)	71.5	62.5	73.2	(100.1)	(123.3)
24 to 47 months					
Infant ($_1q_0$)	33.8	26.1	28.1	(60.0)	(83.2)
Child ($_5q_0$)	39.3	38.8	(40.0)	(78.3)	(103.3)
48 or more months					
Infant ($_1q_0$)	(26.8)	(26.5)	(30.6)	(66.8)	(76.6)
Child ($_5q_0$)	(37.9)	(28.9)	(30.6)	(99.5)	(121.6)

NOTE: ( ) Less than 500 children exposed.
Source: Rutstein (1983)

Table 92 Jamaica: Median birth intervals in months by survival of previous child

	Interval 1			Interval 3			Interval 5		
	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months	Died 0–1 months	Died 2–11 months	Survived 12+ months
All women	[18.0]	22.8	24.8	[20.0]	(25.0)	24.7	[26.0]	[17.3]	22.0
Never use contraceptive	[20.0]	(28.0)	27.0	NA	[26.0]	26.0	[26.0]	[22.0]	(18.0)

NOTE: ( ) Less than 25 cases.
[ ] Less than 10 cases.
NA No cases.
Source: Cochrane and Zachariah (1983)

Unfortunately in table 92 we have a serious problem with small subsamples. However, it would seem that there is a tendency for the length of the median birth interval to increase in line with the length of time for which the previous child survived. This is indicated only for all women. There are too few cases among the never users of contraception for us to risk a conclusion. An examination of this area requires much larger samples. Cochrane and Zachariah (1983) found the expected relationships especially where the samples were large. They concluded 'in summary then medians indicate neonatal mortality increases birth intervals by between 3.2 and 6.0 months on average, and post neonatal by 1.7 to 3.8'.

4.5 INFANT AND CHILD MORTALITY AND FERTILITY – RELATIONSHIPS

The relationship between infant and child mortality and fertility is examined within the context of the replacement hypothesis using parity progression ratios and the additional number of children subsequent to an infant or child loss. If the replacement hypothesis is supported, that is, if women are likely to replace their children that have died, then the link between individual fertility as well as the societal fertility and infant and child mortality is established. In order to remove some of the possible biases we confine the analysis to women who are 35 years and older and only take into consideration the first five parities. In so doing we are trying to ensure that the progression from parity to parity has been completed or is unlikely to be made. It should be remembered that we have already seen that very little childbearing takes place after age 30 and the sixth parity is attained in most cases by age 35. Unfortunately our selection does reduce our sample size, creating for us, as we have already seen, a common problem of small subsamples.

In tables 93 and 94 parity progression ratios are presented. Our expectation is that a larger percentage of those who lost their child of a specific order would go on to have a child of the next order than those whose child survived. This has not been evidenced by the data of tables 93 and 94. Our expectation holds only among women of parity 5. A larger percentage of parity 5 women go on to parity 6 if their fifth child died than if it survived. We can on the evidence come to the obvious conclusion, that those whose child of a particular order survives are more likely to go on to have another child than those whose child died, except with respect to the fifth child. This implies that the replacement hypothesis if it is true at all applies only for parity 5 and maybe higher parity women; at lower parity those whose child survives are more encouraged to have another child; and at parity 5 those whose child dies are motivated to replace it. Unfortunately we do not know whether progression took place before or after the death of the previous child. To have studied this would have meant working with extremely small subsamples.

In tables 95 and 96 the approach is similar to that adopted in the two previous tables, except that the data now show the additional number of live births to date. Since we are assuming that these women who are 35 years and older have completed childbearing, the data represent additional number of live births eventually added.

The picture is clear and consistent. Women who lost a child at a particular parity go on to have a larger number of additional live births than those whose child survived. This implies that women who experience an infant or child loss at any parity eventually have more live births than those whose child survives. The differences are in the range of 0.5 to 0.8 additional live births for those whose child died above those whose child survived.

How do we resolve this apparent conflict in findings between these tables (tables 95 and 96 versus tables 93 and 94)? In one case the replacement hypothesis is supported and in the other it is refuted. One conclusion is that the replacement hypothesis is best investigated within a long-term perspective. Just looking at what happens between two successive parities is too short-term a perspective for a study of replacement. The correct perspective is what the women do over their reproductive period and not what they do between two successive parities. The additional live birth approach captures this long-term perspective and supports the replacement hypothesis.

With this in mind the examination proceeds by looking at the cumulative mortality experience up to and including each parity. We now ask whether the probability of progression from one parity to the next is a function of the cumulative mortality experience up to

Table 93 Jamaica: The percentage of women who go on to the next parity by whether or not the child of that order died in infancy (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage advancing from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	90.8 (851)	88.7 (789)	89.6 (695)	85.2 (643)	81.9 (546)
Dead	88.3 (94)	84.2 (76)	85.7 (63)	80.0 (45)	94.7 (38)

Table 94 Jamaica: The percentage of women who go on to the next parity by whether or not the child of that order died in the first five years (for the first five parities). Women 35 years and over

Outcome of live birth	Percentage advancing from parity n to n+1				
	1–2	2–3	3–4	4–5	5–6
Alive	90.8 (851)	88.7 (789)	89.6 (695)	85.5 (643)	81.9 (546)
Dead	89.5 (105)	84.0 (81)	86.6 (67)	80.9 (47)	95.1 (41)

Table 95 Jamaica: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in infancy. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	4.68 (851)	4.20 (789)	3.77 (695)	3.22 (643)	2.77 (546)
Dead	5.25 (94)	4.72 (76)	4.28 (63)	3.69 (45)	3.58 (38)

Table 96 Jamaica: Average number of additional live births above each of the first five parities by whether or not the child of the respective order died in the first five years. (Women 35 years and over only)

Outcome of live birth	Parities				
	1	2	3	4	5
Alive	4.68 (851)	4.20 (789)	3.77 (695)	3.22 (643)	2.77 (546)
Dead	5.25 (105)	4.67 (81)	4.30 (67)	3.70 (47)	3.58 (41)

and including the first parity of the pair. Grouping infant and child mortality as zero (0) and 1+ was expedient because of our small subsample of women experiencing infant and child mortality.

In tables 97 and 98 parity progression ratios are presented. The situation is not as clear as earlier but the conclusion is basically the same. Our expectation is borne out only for the progression from parity 5 to parity 6. There is a small amount of change at other parities in the expected direction but the differences are small. We again conclude that the replacement hypothesis is not supported. Women, who at a specific parity had all their children surviving, are, with few exceptions, more likely to progress to the next parity than those who experienced one or more deaths among their offspring.

The numbers of additional live births above each of the first five parities are shown in tables 99 and 100 taking into consideration the cumulative infant and child mortality experiences up to and including the child of that order. The replacement hypothesis is supported. Women who up to and including that particular order birth had lost one or more of their children went on to have more additional live births than those for whom all their children were alive. Women who lost one or more of their children eventually had more live births than those whose children all survived. It appears that when a woman loses a child she is likely to attempt to replace it. This effort succeeds in giving these women from 0.6 to 1.0 additional live births compared to those with all their children surviving infancy or early childhood.

The long-term picture within the context of the cumulative infant and child mortality experience lends support for the replacement hypothesis and establishes the link between infant and child mortality and fertility.

Table 97 Jamaica: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more infant deaths up to the respective birth order. (First six parities only)

Infant mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	90.8 (851)	87.9 (734)	89.7 (603)	85.1 (509)	80.8 (411)
1+	88.3 (94)	89.7 (145)	89.0 (172)	84.9 (185)	87.7 (179)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 98 Jamaica: Percentage of women currently 35 years and over who go on to the next parity by whether or not they have experienced one or more child deaths (death in first five years) up to the respective birth order. (First six parities only)

Child mortality experience	Percentage advancing from parity n to n+1				
	1–2[a]	2–3	3–4	4–5	5–6
0	90.8 (863)	88.1 (721)	89.8 (589)	85.0 (500)	80.5 (400)
1+	89.5 (105)	88.6 (158)	88.7 (186)	85.1 (194)	87.9 (190)

[a]For this first parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 99 Jamaica: Average number of additional live births above each of the first five parities by the infant mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Infant mortality experience	Parities				
	1[a]	2	3	4	5
0	4.71 (874)	4.12 (734)	3.65 (603)	3.06 (509)	2.54 (411)
1+	5.26 (94)	4.84 (145)	4.37 (172)	3.80 (185)	3.50 (179)

[a]For this first parity the number of infant deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

Table 100 Jamaica: Average number of additional live births above each of the first five parities by the child mortality experience (cumulative) up to and including that birth. (Women 35 years and over only)

Child mortality experience	Parities				
	1[a]	2	3	4	5
0	4.70 (863)	4.12 (721)	3.63 (589)	3.06 (500)	2.54 (400)
1+	5.25 (105)	4.81 (158)	4.39 (186)	3.77 (194)	3.45 (190)

[a]For this parity the number of child deaths is 0 or 1. For the next column it could be 0, 1, 2 etc.

In summary, the parity progression ratios did not provide evidence for the replacement hypothesis. However, considering additional live births above a particular parity for women without and with infant or child loss lends support for the hypothesis that women will be motivated to replace those children that die and in so doing have more live births than those women whose children are all alive. Fertility rates based on live births will probably show a link between infant mortality and fertility. However, in terms of the net addition of surviving children to the society, women who experience infant or child mortality are not likely to be adding more than those whose children all survived.

4.6 INFANT AND CHILD MORTALITY AND ADDITIONAL CHILDREN DESIRED

Assuming women have a well defined desired number of children, and assuming a rational planning process, then it should be the case that the number of live births is a

Table 101 Jamaica: Average number of additional children wanted by number of infant deaths and number of living children

Infant deaths	Number of living children			Total
	0–1	2–3	4+	
0	1.95 (522)	1.11 (333)	0.86 (183)	1.49 (1038)
1+	1.98 (41)	1.03 (39)	0.97 (40)	1.33 (120)

Table 102 Jamaica: Average number of additional children wanted by number of child deaths and number of living children

Child deaths	Number of living children			Total
	0–1	2–3	4+	
0	1.96 (514)	1.12 (320)	0.89 (167)	1.51 (1001)
1+	1.92 (49)	0.98 (52)	0.84 (56)	1.22 (157)

function of the desired number of children and the perceived or actual probability of child loss. A further assumption of effective control of fertility is necessary. However, it is very debatable as to whether childbearing takes place in such a rational decision-making framework. However, it may still be interesting to see what kind of relationship, if any, exists between child losses and desired number of children.

In tables 101 and 102 are presented the average number of additional children wanted in relation to the number of living children and the infant and child mortality experiences. The differences between the number of additional children desired, controlling for the number living, are very small. In the case of infant mortality two of the three differences are in the expected direction. For child mortality all three differences are in the opposite direction to what is expected based on the replacement hypothesis. The replacement hypothesis leads us to expect that women who have had one or more of their children dying in either infancy or early childhood would desire more additional births than those with all their children living. This has not proved to be the case based on the data of tables 101 and 102. On the other hand, women who have lost one or more of their children may have already replaced it (them), and hence the lack of significant differences or lack of patterns in support of the replacement hypothesis. In fact significant larger differences on the part of those women who have lost one or more of their children in the present context would have meant support for the insurance hypothesis rather than the replacement one.

Tables 103 and 104 are similar in structure to the two previous ones except that in tables 103 and 104 the percentage currently using a contraceptive method replaces the additional children desired. If there is a replacement effect it is expected that smaller percentages of women who have lost a child in infancy or early childhood will be using a contraceptive method than those with all their children living. This is the case based on the data of tables 103 and 104. Significantly smaller

Table 103 Jamaica: Percentage currently using a contraceptive method by number of living children and number of infant deaths

Infant deaths	Number of living children		
	0–1	2–3	4+
0	36.2 (553)	50.3 (511)	56.6 (603)
1+	2.3 (43)	38.2 (68)	46.7 (182)

Table 104 Jamaica: Percentage currently using a contraceptive method by number of living children and number of child deaths

Child deaths	Number of living children		
	0–1	2–3	4+
0	36.4 (544)	50.6 (494)	57.8 (557)
1+	5.8 (52)	38.8 (85)	45.6 (228)

percentages of those women who have lost one or more of their children in the first one or first five years of life are currently using a contraceptive method than those whose children are all still alive.

This line of examination is pursued in tables 105 and 106 where the number of wanted children is compared with the number of living children. Here, we again find that women who experience either an infant or a child loss are less likely to be using a contraceptive method than those women with all their children surviving. This is true for all three possible comparisons of the number of children wanted compared to the number of children currently alive.

It is possible to conclude that, in those cases where the number of children desired is less than the number

Table 105 Jamaica: Percentage currently using a contraceptive method by infant mortality experience and number wanted : number alive

	Infant deaths	
	0	1+
Wanted < living	65.3 (297)	55.1 (89)
Wanted = living	52.2 (335)	44.0 (50)
Wanted > living	41.8 (1000)	27.1 (144)

Table 106 Jamaica: Percentage currently using a contraceptive method by child mortality experience and number wanted : number alive

	Child deaths	
	0	1+
Wanted < living	67.4 (273)	52.2 (113)
Wanted = living	52.9 (323)	41.9 (62)
Wanted > living	41.9 (965)	29.6 (179)

currently alive, the replacement motivation is at work in accounting for the smaller proportion of current contraceptors among the 1+ infant or child mortality groups of women then the zero infant or child mortality groups. Where the number of children alive exceeds the desired number of children and where they are equal, it may be argued that the insurance motivation is stronger among those women who have experienced infant or child mortality than among those who have not and this is responsible for the differential use of contraception at present. Those who have lost one or more of their children not only attempt replacement but are also likely to want to ensure that there is an excess in case of future mortality. Of course there are possible confounding variables and alternative conclusions. Age of the mother at present is a likely confounding variable. Others are the actual number of live births to date and the actual number of survivors. Biological factors may also influence the use of contraception. Unfortunately this kind of analysis does not allow for the consideration of these factors for reasons of subcell sizes and also availability of data.

Pursuing this line of investigation one step further, the desire for future births is introduced in tables 107 and 108. Unfortunately the problem of small subcells arises. However, some observations can be made where the number of cases are relatively large. Regardless of the desire for future birth ('wants more', 'wants no more', 'undecided'), the findings are consistent with the previous findings. Women with infant or child loss experiences are less likely to be currently contracepting than those with all their children surviving. Even in cases where the women have said that they do not want any more children, those with infant or child mortality experiences are less likely to be contracepting. Again it is possible to conclude that the insurance motivation may be working to a greater extent in the subconscious of mothers with infant or child mortality experiences.

Table 107 Jamaica: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Infant deaths)

	Desire for future birth					
	Wants more		Wants no more		Undecided	
	Infant deaths		Infant deaths		Infant deaths	
	0	1+	0	1+	0	1+
Wanted < living	18.7 (16)	28.6 (7)	68.0 (250)	55.3 (76)	52.4 (21)	100.0 (1)
Wanted = living	41.2 (17)	0.0 (3)	51.7 (286)	48.9 (45)	47.8 (23)	0.0 (2)
Wanted > living	39.1 (705)	13.9 (72)	50.0 (188)	40.0 (60)	41.9 (93)	30.0 (10)

Table 108 Jamaica: Percentage currently using a contraceptive method by desire for future birth and number wanted : number alive. (Child deaths)

	Desire for future birth					
	Wants more		Wants no more		Undecided	
	Child deaths		Child deaths		Child deaths	
	0	1+	0	1+	0	1+
Wanted < living	13.3 (15)	37.5 (8)	71.2 (229)	50.5 (97)	50.0 (20)	100.0 (2)
Wanted = living	41.2 (17)	0.0 (3)	52.5 (276)	45.5 (55)	50.0 (22)	0.0 (3)
Wanted > living	38.9 (691)	18.9 (90)	46.2 (173)	40.0 (75)	41.8 (91)	33.3 (12)

4.7 INFANT AND CHILD MORTALITY AND UNION PATTERNS

Instability of sex union patterns has been shown to be related to fertility levels in Jamaica by various authors (see section 2.7). One kind of instability refers to the changes in the types of sexual relationships. With the same partner, a woman may first initiate a visiting union, which then becomes a common law union and may eventually become a married union, or the process may be terminated at any stage. In this case the woman has had one partner but one to three sex union types depending on her progress and one to three relationships. The other type of instability results from changes of sexual partners. Either type has an effect on fertility. This section will examine the relationship between infant mortality and child mortality, and sex union types, the number of sex partners, and the number of sexual relationships.

Women currently in a married union (including those who are separated, widowed or divorced) have lower infant mortality levels than common law or visiting women. The differences in infant mortality levels between visiting and common law unions are not consistent in pattern but visiting unions tend to have lower infant mortality rates (table 109). In the case of child mortality (table 110) there is no consistent pattern of differences among the three union types. However, married women and those in visiting unions are close together in their levels of child mortality with those for visiting unions in general lower. Common law unions have the highest child mortality rates as well as infant mortality rates. Our data do not clarify the situation as to whether or not there are infant and child mortality differentials in terms of union types as proxies for degrees of family pattern stability. The most stable (married) and the least stable (visiting) have rates that are closer to each other than they are to the intermediate union type in terms of stability (common law).

In tables 111 and 112 the number of partners is presented. In general, women who have had only one partner have the lowest infant and child mortality levels. Women with three or more partners tended to have lower infant mortality rates than those with two partners. There is no pattern of differences between those with two partners and those with three or more, in terms of child mortality. Here again we see evidence of the previous finding indicating greater similarity in infant and child mortality experiences between the most stable group (one partner) and the least stable group (three or more partners) than between them and the intermediate (two partners). However, the expected linear and positive association between the number of partners and the risks of dying in infancy and early childhood has not been found.

Women who have been in only one sexual relationship so far have experienced lower levels of infant and child mortality than those who have been in two, three or four or more (tables 113 and 114). The pattern of differences among those with two or more partnerships is not consistent. There is a tendency for those who have been in two relationships to have lower infant and child mortality rates than those who have been in three or four or more. There is no pattern of differences between three and four or more relationships. In summary there is a tendency for women with the most stable pattern of

Table 109 Jamaica: Infant mortality and current (or last) union status for periods before the survey

Years before survey	Union status		
	Married	Common law	Visiting
1–4	32.6	54.1	43.9
5–9	38.8	41.6	25.0
10–14	47.7	48.0	58.7
15–19	65.2	94.0	68.5
20–24	72.1	96.0	73.8
Total	50.3	57.3	46.5

Table 110 Jamaica: Child mortality and current (or last) union status for periods before the survey

Years before survey	Union status		
	Married	Common law	Visiting
5–9	49.6	61.8	46.1
10–14	63.9	60.6	74.7
15–19	88.9	107.4	86.8
20–24	94.3	131.3	98.4
Total	71.1	76.4	67.1

Table 111 Jamaica: Infant mortality and number of partners for periods before the survey

Years before survey	Number of partners		
	1	2	3+
1–4	36.1	55.1	46.9
5–9	35.1	41.8	33.9
10–14	47.0	52.0	51.0
15–19	70.1	62.9	90.5
20–24	55.9	109.3	79.8
Total	46.0	56.9	55.6

Table 112 Jamaica: Child mortality and number of partners for periods before the survey

Years before survey	Number of partners		
	1	2	3+
5–9	49.6	60.7	51.6
10–14	56.4	64.2	76.4
15–19	81.2	88.6	117.0
20–24	71.8	161.9	92.4
Total	61.6	79.7	79.1

Table 113 Jamaica: Infant mortality and number of relationships for periods before the survey

Years before survey	Number of relationships			
	1	2	3	4+
1–4	48.2	35.8	51.5	48.9
5–9	16.7	39.8	46.0	32.6
10–14	35.7	52.8	47.2	54.0
15–19	31.3	67.4	74.2	93.5
20–24	56.3	65.2	96.6	75.9
Total	35.8	48.6	58.1	57.2

Table 114 Jamaica: Child mortality and number of relationships for periods before the survey

Years before survey	Number of relationships			
	1	2	3	4+
5–9	33.3	53.9	71.9	42.4
10–14	40.2	63.3	61.4	78.6
15–19	31.3	77.9	100.4	122.5
20–24	56.3	90.6	141.4	84.8
Total	37.3	66.6	84.7	78.0

relationships to experience lower levels of infant and child mortality than those with the more unstable patterns.

Overall, in this section there is a general trend for the more stable family patterns to be associated with lower levels of infant and child mortality. Family pattern stability is class related in Jamaica and social class may be the confounding variable in the emerging trend which we have seen or maybe it is a disappearing trend.

4.8 SOCIAL FACTORS AND INFANT AND CHILD MORTALITY

This section deals briefly with infant and child mortality and three social factors which are likely to be confounding some of the earlier relationships which were evidenced. Ethnicity is not included in the analyses of this section since it was not obtained in the JFS in view of the lack of a second major ethnic group in Jamaica.

There is a linear negative relationship between education and infant and child mortality (tables 115 and 116). Women with secondary and higher education have the lowest infant and child mortality rates and those with less than four years of primary education have the highest. The four years and more of primary education group falls in between. Education is positively associated with the probability of surviving through infancy and early childhood and hence negatively associated with the risks of dying in those time periods.

Better educated mothers are more likely to receive maternal care and to provide better child care and hence improve the chances of their children surviving.

Table 115 Jamaica: Infant mortality and education for periods before the survey

Years before survey	Education		
	4 yrs primary	4+ yrs primary	Secondary+
1–4	58.6	44.8	33.1
5–9	40.7	39.5	13.0
10–14	62.8	47.2	37.3
15–19	75.4	77.4	46.7
20–24	85.8	74.9	72.7
Total	62.8	52.0	32.8

Table 116 Jamaica: Child mortality and education for periods before the survey

Years before survey	Education		
	4 yrs primary	4+ yrs primary	Secondary+
5–9	63.6	56.6	17.3
10–14	76.7	62.7	49.7
15–19	95.7	99.1	46.7
20–24	111.6	102.8	72.7
Total	83.5	72.9	37.9

Urban infant and child mortality levels are lower in Jamaica than rural levels (tables 117 and 118). This suggests that a higher quality of life, manifesting itself in such things as maternal and child care, better nutrition, and better public health programmes, is more likely to be a feature of the urban than the rural setting in Jamaica.

Women who before the birth of their first child had a white-collar type job have lower infant and child mortality levels than those who did not work or those who had a blue-collar job (tables 119 and 120). There is a tendency for women who did not work to have lower infant and child mortality levels than those who were employed in a blue-collar job. Those with the white-collar jobs at that point in their lives are more likely to be urban and better educated and likely to have begun childbearing at a later age than the blue-collar workers. The 'did not work' group probably comprised women who did not work because they became pregnant very early; women who were unable to find a job, perhaps because of lack of qualifications; and women who did not work because they did not want to for a variety of reasons. It is a very heterogeneous group and hence its intermediate position with respect to infant and child mortality.

Women who, before the birth of their first child, are blue-collar workers, living in a rural area and with less than four years of primary education are likely to have the highest level of infant and child mortality. White-collar workers, with secondary and higher education, residing in an urban centre, are likely to have the lowest

Table 117 Jamaica: Infant mortality and urban/rural residence for periods before the survey

Years before survey	Residence	
	Urban	Rural
1–4	41.5	46.6
5–9	32.2	40.7
10–14	47.6	51.0
15–19	67.7	79.1
20–24	89.3	72.2
Total	48.3	54.5

Table 118 Jamaica: Child mortality and urban/rural residence for periods before the survey

Years before survey	Residence	
	Urban	Rural
5–9	45.3	59.9
10–14	54.5	71.4
15–19	83.3	101.5
20–24	96.4	106.5
Total	61.6	79.1

Table 119 Jamaica: Infant mortality and occupation of mother before the first child for periods before the survey

Years before survey	Occupation before the first child		
	Did not work	White collar	Blue collar
1–4	48.1	19.8	49.4
5–9	37.9	27.8	38.2
10–14	46.4	35.5	57.9
15–19	75.9	74.4	74.1
20–24	65.7	92.3	90.0
Total	51.2	38.7	57.1

Table 120 Jamaica: Child mortality and occupation of mother before the first child for periods before the survey

Years before survey	Occupation before the first child		
	Did not work	White collar	Blue collar
5–9	56.1	37.0	54.9
10–14	62.5	50.8	71.8
15–19	91.1	90.9	100.0
20–24	84.7	92.3	131.8
Total	69.2	58.4	80.1

risks of losing their children in the first year of life or in the first five years.

The three social factors of this section are all related to infant and child mortality and are likely to be confounding some of the relationships (or lack of relationships) established in earlier sections of this report. However, it is not our aim to pursue the validity of that statement here. Much remains to be done in the area of infant and child mortality research.

4.9 SUMMARY AND CONCLUSIONS

The Jamaican Fertility Survey 1975–6 (JFS) was conducted as a part of the World Fertility Survey. A probability sample of 3096 women between the ages of 15 and 49 years comprised the study. Of these, 2765 were or had been in one or more sexual relationships. Of these 2765 ever in a union women, 2456 had had one or more live births. It is these 2456 women who comprise the subgroup for this section of the report on the infant mortality, child mortality and fertility of Jamaica.

Fertility has been declining in Jamaica. The crude birth rate at the time of the JFS was approximately 30. Currently (1982) it is about 27. Infant mortality had been declining for a long time until recently, it would appear. At the time of the JFS it was about 23. Currently it is about 28 (Population Reference Bureau 1983). Infant mortality had been declining prior to the decline in fertility. By 1960 infant mortality had declined to about 52, while the crude birth rate was about 42 and the total fertility rate was about 6.6. By 1970 the crude birth rate was around 35 and the total fertility rate about 5.5. Infant mortality declines preceded the initiation of fertility decline. Until quite recently they paralleled the decline of fertility, but the Population Reference Bureau figure suggests an increase. The validity of this is questionable.

We found that the total fertility rates from the JFS data are higher than those from vital statistics. We also found a similar situation with respect to infant mortality rates. We must recognize a role in these differences for measurement errors of many kinds. However, we should bear in mind the following. The women in the JFS were aged 15–49 in 1975. The data were obtained on fertility and mortality retrospectively. In 1960 the women in our sample who were 15–49, in 1975, would have been 0–34 years of age. Therefore for the earlier periods in our study, our data are relevant for a select group of young women who had survived to 1975 and who had not emigrated. Taking this into consideration it is not surprising that for the earlier periods the young women in the sample would have higher fertility and mortality rates than the general subpopulation in the reproductive ages on which the vital statistics rates are based. However, for recent years, for example 1973 and 1974, the differences should have been less than they actually are if measurement problems were not present. Under-registration of births and deaths cannot be ruled out. In fact we have argued that it seems to be the most likely explanation.

Birth order and the risks of dying in the first year of life (infancy) and also in the first five years (early

childhood) are positively correlated when the period of time before the survey (the secular trend) is not taken into account. However, controlling for period of time before the survey, the relationship between infant and child mortality and birth order disappears.

The age of the mother at the birth of the child and the probabilities of dying in infancy display no clear pattern of relationship. However, in the case of child mortality we find that children born to women when they are 20–29 have lowest probabilities of dying in early childhood. Those children born to women 30 years and older have higher risks of dying in the first five years than those born to women less than 20 years old. It would seem that the relationship between birth order and mortality does not emerge in the first year but does so by the fifth year.

The probabilities of dying in infancy or early childhood for first order births are higher if born to women 20 years and younger than if they are born to women 21–24 years of age. This is also true for second order births. Also for second order births, the probabilities of dying in infancy or early childhood are greater if they are born to women of age 25–29 than if they are born to women 21–24 years of age. For third order births there is no consistent pattern of relationships in the case of infant mortality. However, in the case of child mortality, third order births are more likely to die in early childhood if they occur to women 20 years and younger than if they are born to mothers 21–24 years of age or 25–29 years of age. For fourth and fifth order births as a group, the probabilities of dying in infancy and early childhood are in general higher if born to mothers 21–24 than they are for children born to mothers 25–29 or 30 and over. There is a general tendency for these fourth and fifth order births to have higher risks of dying if their mothers are 30 and older at their birth than if they are 25–29 years old.

Births of order 6 and higher as a group have higher probabilities of dying in infancy and early childhood if their mothers are 30 years and over at their births than if the mothers are 25–29 years old.

Births occurring to women 20 years and younger display no pattern of relationship between birth order and infant and child mortality. Births to women 21–24 years old show a positive association between birth order and infant and child mortality. There is no pattern of relationship for births to women when they are 25–29. Births to women 30 years and over are too few to show any reliable pattern.

First births have higher risks of dying in early childhood than births of order 6 and higher if born to women 25–29 years of age. Fourth and fifth order births are more likely to die in early childhood than first births if born to women 21–24 years of age.

The links among birth order, age of mother at birth, infant mortality, and child mortality are complex. No clear and consistent pattern of relationships emerged. However, we do detect strong indications of an interaction of birth order and age of mother on infant and child mortality.

Infant and child mortality are both negatively associated with the length of the birth interval. It seems also that the median birth interval increases with the length of time for which the previous child survived.

In general, parity progression ratios do not support the replacement hypothesis. Looking at the first five parities we find support only in the case of the progression from the fifth to the sixth parity.

At any parity, if the child of that order dies in infancy or early childhood, the mother has a significantly larger number of additional live births than if the child lives. The differences are of the magnitude of 0.5 to 0.8 additional live births. If instead of viewing only the outcome of that specific order birth we look at the cumulative infant and child losses up to and including the relevant order birth, the finding is similar. At any parity, women who have lost one or more of their children, have significantly larger numbers of additional live births than those women with all their children surviving. The differences range between 0.6 and 1.0 additional live births. This seems to support the replacement hypothesis.

The additional live birth approach is more long-term in perspective than the parity progression ratios approach. It would seem that the replacement hypothesis is best viewed in a long-term perspective. This does make sense as replacement applies to the final outcome in terms of the number of children and not to the short-term behaviour between pairs of births.

The average number of additional children desired, taking into consideration the number currently living, does not support the replacement hypothesis. It is possible that the currently living children already include the replacement factor. On the other hand it may be the case that there is no replacement motivation.

Smaller proportions of women who have lost one or more of their children were using a contraceptive method at the time of the survey than among those women with all their children still living. One may conclude that the women who have experienced infant or child mortality are less likely to be practicing contraception because they are trying to replace the children that have died.

In a comparison of the number of living children with the number wanted we found that for all subgroups those who had one or more child that had died were much more likely to be contracepting than those with all their children living. Again we saw some indication of support for the replacement hypothesis and also some suggestions of an insurance effect at work. When we considered the desire for future births we again found support for the replacement hypothesis and indications of the insurance effect.

Married women experience lower infant mortality levels than either common law women or women in visiting unions. There is no clear picture of differences between women in common law and visiting unions. There are, however, some indications that visiting unions have lower infant mortality levels.

There is no consistent pattern of relationships between child mortality levels and union types. Married and visiting unions tend to be close together in levels, with the visiting slightly lower. The child mortality rates for common law unions are higher than those of either visiting or married.

Overall the pattern of relationship between union types and infant and child mortality is not clear. This is

in line with the results of McKenzie *et al* (1967) where they found that the 'illegitimacy rate was not higher for the dead children, and the proportion of fathers living at home and the type of family group in which the children lived was similar in the samples'.

The relationship between infant and child mortality and the number of partners is not clear. Women with only one partner have the lowest levels of infant and child mortality. But children of women with three or more partners have lower risks of dying than those with two partners. The levels of infant and child mortality are closer for children of women with one and three or more partners than for either of these two groups in comparison with those of women with two partners. The expected positive relationship has not been found.

The pattern of association between the number of sexual relationships and infant and child mortality is not consistent. Children of women with one relationship have the lowest risks of dying in infancy and early childhood, but there is no pattern among those with two, three or four and more relationships.

In general there is a tendency for children born to women with the most stable patterns of family formation to experience lower risks of dying in infancy or childhood than those born to women with more unstable patterns.

The risks of dying in infancy or early childhood are negatively associated with the level of education of the mother. Children of better educated women have better chances of surviving than those of less well educated women.

Children born to urban mothers have greater chances of surviving through infancy and early childhood than those born to rural mothers.

Children of white-collar workers enjoy greater probabilities of living through the first year as well as the first five years of life than those of blue-collar workers and also those who did not work (all classified in terms of occupation before the birth of the first child). Children of women who did not work before the birth of the first child have lower risks of dying in infancy and early childhood than those whose mothers were employed in blue-collar jobs.

Children of women currently married, who have had only one partner and have only ever been in one relationship, with secondary education or higher, living in an urban centre and whose first job was a white-collar one, have very good chances of surviving through infancy and early childhood.

Jamaica's fertility has been declining. Its infant and child mortality levels have been declining. This has been seen at the societal level. We have seen it at the micro level in this study. Jamaica has been changing rapidly since World War II. It has made progress economically and socially. These changes are manifested in its fertility, infant mortality and child mortality levels. We conclude that infant mortality decline preceded fertility decline. Fertility decline is being aided by a national family planning programme. Infant mortality decline is a response to improvements in the quality of life. Fertility is still relatively high but is declining. Infant mortality is relatively low. Continued improvements in the society will influence both positively. However, erosion of the quality of life because of worsening economic conditions could adversely affect infant and child mortality. Stabilization of, or an increase in, infant and child mortality could occur because of the downturn in the economy leading to deterioration in the quality of life. This, and the dynamics of the current age structure may cause an upturn in the crude birth rate. If this happens, an already poor economic situation could be made worse.

5 Summary and Conclusions: Infant Mortality, Child Mortality and Fertility: Trinidad and Tobago, Guyana and Jamaica

This study of infant mortality, child mortality and fertility in the three English-speaking Caribbean nations of Trinidad and Tobago, Guyana, and Jamaica utilizes data from three surveys conducted as parts of the World Fertility Survey (WFS). The Trinidad and Tobago Fertility Survey (TTFS) was conducted in 1977, the Guyana Fertility Survey (GFS) was conducted in 1975 and the Jamaica Fertility Survey (JFS) in 1975–6. The data come from three subsamples of women 15–49 years of age who had had by the time of the survey at least one live birth. The Trinidad and Tobago subsample comprised 2826 women, Guyana 3163 women and Jamaica 2456 women.

Our study is based on fairly large samples of women. Since fertility is relatively high in the three countries, the numbers of births among the women are large. Infant mortality levels are relatively high but the numbers of infant deaths are quite small. Our data would appear to be of high quality. Had we had larger numbers of infant and child deaths there would have been much less random fluctuation in our findings.

At the societal level, Trinidad and Tobago had the lowest crude birth rates in 1960, at the time of the surveys, and in 1982. Jamaica and Guyana have had since 1960 crude birth rates that remain close to each other and substantially higher than those in Trinidad and Tobago. All three countries have experienced substantial fertility declines since 1960. Total fertility rates and crude birth rates reflect the same relative situation with respect to the three countries. The average number of children ever born to the three subsamples are quite similar, (i.e. Trinidad and Tobago 2.2, Guyana 2.1 and Jamaica 2.0). In conclusion, fertility has been declining in all three societies. All three societies still have relatively high levels of fertility. Guyana's fertility was, around the time of the survey, showing signs of stabilizing at a relatively high level. Recent figures, however, show significant declines in the crude birth rates of all three countries over the period 1960–82.

Guyana's infant mortality rates are the highest over the period 1960–82. Trinidad and Tobago's rates are not much different to those in Jamaica. The pattern of differences between Jamaica and Trinidad and Tobago is irregular. Our data show that the average numbers of infant deaths per woman in the subsamples are: Trinidad and Tobago, 0.198; Guyana, 0.293; and Jamaica, 0.213. In summary, infant mortality rates have shown dramatic declines in Jamaica and Trinidad and Tobago over the period 1960–82. Guyana's infant mortality rates are relatively high and currently showing resistance to further declines.

Child mortality rates are available only from the fertility surveys. They are subject to problems of small numbers and to errors associated with reporting the timing of vital events retrospectively. Our calculations show that in the period 1960–4 the child mortality rates were Trinidad and Tobago 54.1, Jamaica 73.3 and Guyana 75.9. In 1970–4 the rates were Trinidad and Tobago 45.2, Jamaica 59.3 and Guyana 74.1. In all three countries, child mortality rates declined from the period 1945–9 down to 1965–9 and then increased during the period 1970–4. Overall though, we can conclude that child mortality has been declining quite significantly in Jamaica and Trinidad and Tobago, and much less so in the case of Guyana. The average numbers of child deaths occurring in the first five years of life to the women in the subsamples are: Trinidad and Tobago, 0.227; Guyana, 0.381; and Jamaica, 0.280.

Data from the three surveys show both infant and child mortality declining in Trinidad and Tobago, Guyana and Jamaica over the period 1945–9 down to the period 1965–9 then increasing over the next period, 1970–4. An alternative way of looking at this is to use time periods before the survey. For all three countries and for both infant and child mortality rates our data show declines between 30–34 and 10–14 years before the surveys. In Trinidad and Tobago's case there is an increase in both rates for the period 5–9 years before the survey and a very slight decline 0–4 years before. In the case of Guyana the infant mortality rate behaves as it did in Trinidad and Tobago but the child mortality increase took place for the period 0–4 years before and the decline continued down to the period 5–9 years before. Jamaica's infant mortality rate declined down to the period 5–9 years and the upturn occurred for the period 0–4 years. The same holds for the child mortality rate except that the increase is very small.

The patterns of infant and child mortality rates as obtained from the three surveys are not too dissimilar. The actual rates are lowest for Trinidad and Tobago and highest for Guyana. Trinidad and Tobago had the highest rate of decline, followed closely by Jamaica and with Guyana far behind.

Jamaica and Trinidad and Tobago are more economically developed than Guyana.[1] They have higher per capita incomes (1982 figures in US $: Guyana, 723; Jamaica 1182; Trinidad and Tobago, 5267). They are less rural than Guyana (Jamaica, 50% urban; Trinidad and Tobago, 49; Guyana, 30). Their populations' quality of life is perhaps slightly better than Guyana's. The per capita calorific supplies as per cents of requirements are: Guyana, 109; Trinidad and Tobago, 111; and Jamaica 114. These factors are partly responsible for the differential levels of infant and child mortality. An interesting point is the fact that Guyana has no publicly supported family planning programme while Trinidad and Tobago

[1]The following indicators are taken from Population Reference Bureau (1983).

and Jamaica have, yet Guyana's fertility levels are not too dissimilar from Jamaica's. The quest for a higher standard of living in these societies is a very powerful force for curtailing fertility, in combination with declining and relatively low levels of infant and child mortality. Infant mortality is a fairly good index of socio-economic conditions. In the three societies it realistically reflects the relative living conditions.

The relationship between birth order and infant mortality, when looked at without taking into consideration the secular trends, is J-shaped for Trinidad and Tobago and linear and positive for Guyana and Jamaica. When we introduce the periods of time before the surveys the relationships disappear. We therefore see the importance of taking the secular trends into consideration but we should be aware that in so doing our subsamples are smaller. This factor is very likely a major reason for the fluctuations observed in patterns of relationships. The secular trends have been introduced in cases where they are thought to be essential.

In Trinidad and Tobago first births and those of order 6 and higher have relatively high risks of dying in infancy and early childhood. The highest probabilities of dying are associated with births of order 6 and higher and the lowest with second order births. In Guyana the probabilities of dying increase between birth orders 1 and 2, decrease between 2 and 5 and increase between 5 and 6+ with those of order 6 and higher having the highest risks of dying in infancy and early childhood. First births have relatively low risks and second relatively high ones. In Jamaica there is no pattern of relationship between birth order and infant and child mortality. Trinidad and Tobago's rates for births of orders 6 and higher are higher than those of Jamaica but lower than those of Guyana.

We can detect no consistent pattern of relationship between the age of the mother at the birth of the child and infant mortality risks in Jamaica. In the case of child mortality, the risks of dying are smallest for those children born to mothers who are 20–29 years of age at their births. Those born to mothers over the age of 30 have higher risks of dying than those born to mothers younger than 20 years. In Trinidad and Tobago the situation is somewhat similar for infant and child mortality and both situations are similar to that described above for child mortality in Jamaica. In Guyana the relationship between the age of the mother at the birth of the child and infant and child mortality is in general linear and positive. Where there are exceptions the relationship is J-shaped. The Guyanese pattern is more regular, perhaps because of the larger number of cases.

We find also in the case of Guyana, that second and higher order births to women under age 20 have relatively high risks of dying in infancy and early childhood. Births of order 6 and higher have high risks of dying regardless of the age of their mothers at their births. The findings for Trinidad and Tobago are in line with those for Guyana. High order births to young mothers have high risks of dying. Births of order 6 and higher have high risks of dying especially if they occur to women before they are 30 years old.

The risks of dying for first births in Jamaica are higher if born to mothers younger than 20 years than if born to women 21–24 years of age. This is true also for second order births. Second order births have smaller risks of dying if they are born to women 21–24 years old than if they are born to women 25–29 years of age. High order births to young mothers have high risks of dying in infancy and early childhood.

The patterns of relationship among infant and child mortality, birth order, and the age of the mother at the birth of the child are far from clear and consistent. We can conclude that births to very young mothers have high risks of dying and that the risks increase as the order of the births increase. High order births have high risks of being depleted by infant and child mortality. Births of low orders occurring to mothers who are in their twenties have relatively good chances of surviving. These chances of surviving are best if they are in Trinidad and Tobago and worst if they are in Guyana.

In Guyana and Jamaica, the length of the birth interval was seen to be negatively associated with the risks of dying in infancy and early childhood (ie one's chances of surviving increase the longer is the birth interval). In Trinidad and Tobago it is not the same. The risks of dying are highest for the shortest interval, followed by the longest interval. The intermediate length birth interval is associated with the best chances of surviving. In general there is a tendency for the median birth interval to be positively associated with the length of time for which the previous child survived. Overall we can conclude that the proper spacing of births enhances the chances of survival for them. Birth spacing will reduce infant and child mortality as well as fertility.

Parity progression ratios do not lend unqualified support to the replacement hypothesis. Our expectation materialized only at the high parities. It is possible that replacement should be viewed in a long-term context and that it would be seen only towards the end of childbearing when there has been enough time for replacing those children who have died. This finding was seen for Trinidad and Tobago as early as parity 3, Guyana at parity 4, and Jamaica at parity 5.

The additional number of live births taking into consideration parity and infant or child loss points in the direction of a replacement motivation at work in all three societies. Those women who have lost one or more of their children have more additional children than those with all their children still alive. The differences range between 0.5 and 1.2 for child mortality in Trinidad and Tobago, using the cumulative child mortality situation at the first five parities. For Jamaica the comparable figures are 0.5–0.9, and for Guyana they are 0.6–1.0. It would seem that in all three societies the replacement motivation is strong and women who experience infant or child losses will replace those children or partly do so. This means that they have more live births than those women whose children all survive. In the long run their addition to the size of the population may be similar. However, rates using live births as a measure of fertility will show them having higher levels.

This finding, using additional live births in the context of the replacement hypothesis, further supports the proposal that replacement has a long-term implication. The use of additional live births captures this long-term perspective. One is more likely to detect a replacement

effect if one examines the cumulative experience of the women both with respect to mortality and fertility. It is what happens by the time childbearing is completed rather than what happens in the short-term between parities that is important in the context of replacing one's offspring who have died.

In studying the average number of additional children wanted our expectation within the context of the replacement hypothesis was not borne out. The additional number of children desired taking into consideration the number currently living is not larger for those with infant or child losses than for those without and in some cases is smaller. This led us to speculate that perhaps replacement has already taken place. Another interpretation is that infant and child mortality experiences affect outcomes but not desires. It is also possible that there are confounding variables which should be taken into account. The above finding holds for all three countries. Further study on this topic seems warranted.

Women who have lost one or more of their children in infancy or early childhood are less likely to be currently using a contraceptive method than those women with all their children still alive. This is the case in all three countries and also for a number of subgroups distinguished by comparisons between the number of children desired and the number at present, and also by whether or not the women desire more children. We conclude that the replacement motivation is at work among women who have lost one or more of their children. They are less likely to be using a contraceptive method because they may be thinking of replacing children that have died. We cannot rule out the probability that the relationship is spurious, but we are inclined to believe that it is not.

With some of the subgroups in the above analysis it was possible to speculate on the existence of an insurance motivation at work. Women whose living children equalled or exceeded their number of children wanted and who were not using a contraceptive method, were not infecund, and were exposed to the risk of pregnancy, consciously or unconsciously may have a wish for an additional child as an insurance against infant or child loss. The insurance hypothesis calls for investigation.

Indians in Trinidad and Tobago have higher levels of infant and child mortality than Non-Indians. In Guyana the two groups are quite close with the Indians slightly lower. Separate analyses were done for these two ethnic groups when we introduced social factors as correlates of infant and child mortality. Jamaica does not have a second major ethnic group.

We have detected a slight tendency for children born within stable family structures to enjoy slightly higher chances of survival than those born into unstable ones. Married unions are associated with the lowest levels of infant and child mortality but the relative position of common law in relation to visiting unions is not consistent. Women with only one partner or those with only one relationship experience relatively low levels of infant and child mortality. There is some tendency for the number of partners as well as the number of relationships to be positively associated with the risks of dying in infancy and early childhood: the strength of these associations varies across the three societies.

The chances of surviving the first year of life and also the first five years are greater for those children born to mothers who have a secondary or a higher level of education. In Jamaica the relationship between education and infant and child mortality is positive. In Guyana and Trinidad and Tobago there is no pattern among the primary levels of education. However, in all three societies women with secondary and higher levels of education experience fewer infant and child losses.

Only in Jamaica do we find a clear pattern of infant and child mortality differences by rural/urban residence. In Jamaica, rural children have higher risks of dying in infancy and early childhood than urban ones. In Trinidad and Tobago there is no consistent pattern. There is no tendency for urban mortality rates to be lower than rural ones. In Guyana there is an indication that the periods closest to the survey saw lower rural rates than urban ones. The societies are undergoing rapid socio-economic and environmental changes. However, not all of these changes are forward in impact. There has been slow-down, stagnation and even a downturn in some areas. The effects of these changes on infant and child mortality are not well understood.

Children born to women who worked in white-collar jobs before the birth of the first child have better chances of surviving than those born to blue-collar workers. Those who are born to women who did not work have somewhat intermediate chances for survival.

All three of the above social factors are associated somewhat with infant and child mortality levels. A lack of patterns is partly due to small subsamples. There are indications, however, of a link between social class and infant and child mortality.

This report has examined some correlates of infant and child mortality. Taking into consideration the time sequencing of these correlates we can treat some of them as determinants of infant and child mortality. They may not have a direct impact on infant and child mortality but they act through such intermediate variables as better maternal and child care and better socio-economic environment and health conditions, in order to enhance the chances of surviving through the early years of life. It is possible to conclude from our results that infant and child mortality will decline further so long as the educational coverage is national and the level of education obtained by women keeps on improving. Delaying the age of first birth and giving adequate spacing to all births will have an impact on infant and child mortality. An increase in the average age of first birth by about three years to say age 20 and an increase in the average birth interval from the current two and a half years to say four years would reduce infant and child mortality by a significant amount.

The level of infant and child mortality is interrelated with the level of fertility. We know that if the number of high order births (5 and over) is reduced, infant and child mortality will be reduced. We have reason to believe, and have produced evidence to support it, that if infant mortality is reduced, fertility will eventually decline as well. We believe fertility will remain relatively high in Trinidad and Tobago, Guyana and Jamaica so long as infant and child mortality remain at or near their current levels. Any programme or occurrence resulting

in a reduction in infant and child mortality will eventually result in a reduction in fertility and vice versa. With fertility and infant and child mortality we cannot go beyond suggesting that they are interdependent.

Significant socio-economic changes in the societies have been important factors in fertility and mortality declines. Fertility will continue to decline so long as infant mortality is low and falling. Further infant mortality declines may be difficult in the future. Except in Guyana, the levels are already quite low and further declines are dependent on improvements in the quality of life. These improvements are becoming more elusive to these societies in the early 1980s. Fertility declines may stop short of the desired levels. An upturn in the crude birth rate may occur due to the present dynamics of the age structure. However, completed family size will continue to decline since educational levels are improving, and also because the motivation for social mobility is high and a large number of children does not facilitate it.

The link between infant mortality and child mortality and fertility has been established but it is impossible within our study to establish cause and effect. It is debatable whether it is possible in any circumstances. However, we must admit that the direction of the cause–effect relationship is left to be established and it is deserving of further effort. Also unanswered is the insurance hypothesis, stated at the beginning of this study. Important topics that are worthy of investigation within this subject area are the following: malnutrition and infant and child mortality; birth weight with reference to child spacing and age of motherhood and infant and child mortality; and quality of life, fertility and infant and child mortality.

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