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THE PEOPLE OF SIWAI:
POPULATION CHANGE IN A
SOLOMON ISLAND SOCIETY

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"Every society tends to keep its vital processes in a state of balance such that population will replenish losses from death and grow to an extent deemed desirable by collective norms. These norms are flexible and readjust rather promptly to changes in the ability of the economy to support population".


INTRODUCTION

Bougainville island is the easternmost island in Papua New Guinea and constitutes the province of the North Solomons. Geographically it is a part of the Solomon Islands further east and the population of Bougainville tends to share social characteristics with Solomon Islanders to the east rather than Papua New Guineans to the west. This is especially true of south Bougainville and the people of Siwai in the centre of the south Bougainville plain (see Figure One). This paper is an account of the recent population history of Siwai and as such is one of a series of papers (e.g. Connell, 1977, 1978) that compares the present economic and social organization in Siwai with that of 1938-39 when the area was first studied in some detail (Oliver, 1955).

The most distinctive characteristic of Bougainvilleans is their blackness, unlike Melanesians to the west and east, and together with the nearest Solomon Islanders (including those from Choiseul and New Georgia) to the east. Bougainvilleans often comment in derogatory terms of the "skins" of Papua New Guinea. The physical anthropologist, Friedlaender, distinguishes Bougainvilleans by "their very dark complexion, frizzy hair and generally African appearance" (1975, p.28). Yet there are also regional differences within the island; Friedlaender confirmed that the three divisions recognized in the early twentieth century by the first European observers, between the coastal peoples and the people of the northern and southern interiors, were both recognized by some of his Bougainvillean informants, who talked about the long-headed beach people, the big, broad and heavy northern mountaineers and the small and short-headed southerners, and also eventually emerged from his own multivariate analysis of physical characteristics (ibid., p.29). In this context however Siwais tend to fit between the first and third groups. Indeed there are considerable variations in all physical characteristics within Siwai. Some Siwais have much lighter skin, a trait which Siwais believe to be more common in the Haisi area; some individuals have redder hair whilst there are even a few Siwais with almost straight hair. Bougainville is quite
Figure One. Bougainville
unique (amongst areas tested in this way) in its "extremely fragmented population structure' (Friedlaender, 1971, p.24), a social phenomenon which leads to localized inbreeding, hence little interrelationship among communities, and therefore has tended to preserve or induce marked local differences in physique (and also blood types). Unlike Friedlaender's informants (from an unspecified part of Bougainville), Siwais did not conceive of their own physical uniqueness; they believed that it was generally impossible to distinguish Siwais from other Bougainvilleans in this way. Their uniqueness was a product of language and culture.

Historic separation and uniqueness was never absolute; genealogies from villages on the fringes of Siwai record marriages with neighbouring language groups at all periods of recent history, and there was trade rather than enmity between the language groups of south Bougainville. In the nineteenth century marriages were contracted at least as far as Nasioi in east Bougainville and with the islands of the Bougainville Strait, and this was a pattern that has been maintained to some extent until the present day. Oliver (1954, p.18) recorded that less than 30 per cent of all births were a result of breeding between Siwai and the Shortlands (Alu) and Treasury Islands (Mono) of the Bougainville Strait. But in the mid-twentieth century marriage links began to extend; if Siwais had contracted marriages with the "redskins" of New Guinea or the central Solomons before the war Oliver does not record that fact and genealogies do not demonstrate it. Such marriages became a little more common as mobility increased and there are now a small number of permanent residents in Siwai born beyond the island of Bougainville and the Bougainville Strait. Even so most households with one partner from Siwai and one from outside Bougainville do not live in Siwai; thus none of the five Siwais who have married Europeans live in Siwai. Since the war in three villages of central Siwai there have been no more than nine marriages beyond Siwai (three to Buin, two to Buka and one each to Nissan Island, Eivo, Rotokas and Nagovisi) and none beyond Bougainville; in three villages of north eastern Siwai there have been more than a dozen marriages with Buin, one to Nasioi and three marriages beyond Bougainville (to New Ireland, New Britain and Morobe). Although marriages beyond the bounds of Siwai are increasingly more common they remain exceptional and are actively discouraged; many of these couples live outside Siwai. Consequently fear and distrust of "redskins" remains and the cultural significance of these marriages is slight. Permanent migration into or out of Siwai has been almost non-existent and recent cultural changes
in Siwai are primarily a response to universal Western developmental changes rather than an incorporation of other Melanesian traditions.

Siwai has never been an entirely closed population yet Siwais regard themselves as a distinct ethnic community, although with recognizable similarities to neighbouring Bougainville populations. However this similarity is recognized primarily at the fringes of Siwai rather than at the centre. Moreover at any point in time all persons can be classified as either natives or aliens and although an alien might be described as "like a Siwai" the division is immutable. One is only a Siwai if at least one parent is a Siwai; one does not become a Siwai through marriage. (During 1975 the relatives of one three-year old child whose father was an Australian and who usually lived in Arawa town rather than Siwai were already discussing possible marriage partners for him. There was no doubt that he was a Siwai). Since this category covers almost all the population resident in Siwai, there being no adoption of aliens, the population is effectively homogeneous. Moreover emigration is such a recent phenomenon that there is no out-migrant or his children who could not easily establish themselves in Siwai. There is no dispute about who is a Siwai.

The Siwai language (sometimes called Motuna) is one of the Papuan (or non-Austronesian) languages which have probably been in Melanesia a longer time than the more recently immigrant Austronesian languages. Wurm (1975) classifies Siwai as part of the East Bougainville stock; this group consists of the Nasiol family, including Nasiol and Nagovisi, and the Buin family, which includes Buin and Siwai. (Wurm also puts Baitsi into the Buin family, as a dialect of Siwai, although based on the percentage of shared cognates and the feelings of the people themselves, it is probably more satisfactory to consider it as a separate language). Siwai is therefore most closely related to the Buin language and shares with it around 40 per cent of basic vocabulary cognates (Wurm, 1975, p.792). Bougainville island is divided into two linguistic stocks, the east and west, which share many characteristics with stocks from New Britain, New Ireland and the central Solomons. The two Bougainville stocks seem no closer to each other than either is to the central Solomons stock (ibid.). If this is correct it indicates that the populations in these areas have been settled there for a considerable time (well over a thousand years) with a long period of language divergence following early migration. There is insufficient linguistic or archaeological data to determine more accurately the origin of south Bougainville populations and the length of the period in which, for example, the Siwai language diverged from that of Buin.
POPULATION HISTORY

The early history of Siwai population change is almost unknown. Oliver records that Siwai went through the critical initial contact period without suffering the "customary decline" (Oliver, 1955, p.10) that was typical of so many other parts of the Solomon Islands and Melanesia. There is no subsequent evidence to suggest that this was not true and Siwai had very slight contact with the trading and plantation world before the twentieth century. Nor are there oral accounts of epidemics or other dramatic influences on the Siwai population. Even so it would be improbable that the historic population of Siwai remained entirely stationary since populations do not remain unchanging in every respect for long periods of time; whatever fluctuations there were seem to have more or less balanced at least for around fifty years before the last world war.

The earliest government estimate of the population of Bougainville Island alone was made retrospectively by the Australian administration for 1914 when the island had an enumerated population of 9,160 and an estimated population of 23,500 (PCA, 1923, p.134). The first estimate of the Siwai population was made for 1922 when a total of 3,272 persons were enumerated (PCA, 1924, p.93). A year later the total was raised to 3,713 and in 1924 it reached 4,115 (Figure Two). By the late 1920s few new Siwai villages were enumerated and the rapid increase in numbers began to level off; in Siwai the period of contact was over. The actual pattern of population change in this period is impossible to assess; there is no means of recording either natural increase or the number of absentee contract labourers on plantations (a figure which probably changed little during the post-war period) who were excluded from the census totals. Nor can the possible vagaries of particular censuses be understood; there is therefore no explanation of the substantial fall in population between 1938 and 1939.1 The only complete pre-war administration censuses of Siwai that remain in existence are those for 1936 and 1938 (Oliver, pers. comm., 1977). These suggest that there was a slowly growing population at this time although the

1. Such a decline seems implausible; there is no record of an epidemic then and had there been such a significant decline when Oliver was in Siwai he would surely have observed and commented upon it.
records themselves seem unlikely to be absolutely accurate.\(^1\) Oliver recorded the Siwai population in October 1938 as 4,658 (Oliver, 1955, p.9); however this includes the primarily Buin-speaking villages of Tarowa and Tupopisau and excludes all the villages between Muwoku and Misiminoi (both of which seem to have been entirely excluded from the census) and the Haie area (see Figure Three). By substituting all of these villages for the two Buin villages the 1938 population of the area that corresponds with the present Siwai area was slightly over 5,000. This estimate is the only one that can be compared with post-war administration censuses.

By the end of the 1920s, when all the Siwai villages seem to have been enumerated, the quality of the counting seems to have been quite good, at least in terms of absolute numbers, but this may be an illusion based on the expedient of patrols being almost entirely dependent on the census of the previous year. The earliest census, as opposed to the earlier administration head-counts, albeit incomplete, was conducted by the government anthropologist, E.W.P. Chinnery, in December 1928 (Chinnery, 1930, p.88). In 33 villages he enumerated a population of 2,363 which represented therefore about half the Siwai population. Of this population some 28 per cent were classified as aged under 14, which is a very small figure compared with the present proportion of about 45 per cent and is probably a result of the under-enumeration of small children. However in the 1938 census no less than 40 per cent of the Siwai population were recorded as being aged under 14 and Oliver's own data for north-east Siwai (Oliver, 1955, p.10) give a figure of 36 per cent. Even though both missions entered Siwai in the 1920s, and began some medical programmes, it would not be possible for the change to be so rapid in less than a decade. The 1928 census figures are almost certainly incorrect; a decade later the censuses were more accurate.

Oliver reported of the 1938 population of Siwai (and also Nagovisi and Buin) that "...we believe that the average size of those populations were not markedly different in the period 1888-1938" (1954, p.17). There was good reason why this should have been so. Until the war the administration had had very slight impact in the area; medical services were available only from the missions and may have lowered the infant and child mortality rate to some extent (but the

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1. Thus between 1936 and 1938 there are a number of villages where the population grew so rapidly (e.g. Tonu from 78 to 139) as to be implausible without compensatory decline elsewhere. Similarly, as in almost all administration censuses, there are a few cases where the mathematics of the census compiler seems to have been in error.
Figure Two  Siwai Population Growth

Sources:  1921-40  PCA Annual Reports
         1948-on  Irregular Patrol Reports
Siwai

Figure Three
impact of this was reduced by the maintenance of infanticide and abortion) whilst the administration's movement of Siwais into line villages may have raised rather than lowered the death rate as it did in parts of the Solomon Islands. There had been no nutritional changes although there is no reason to suppose that the historic Siwai diet was in any way seriously deficient (ibid., p.41). Nevertheless there are slight indications from the population totals and compositions that the Siwai population was already beginning to change in size and composition at the end of the 1930s.

The war had a devastating impact on the population of south Bougainville; the crude figures suggest that between 1940 and 1948 the Siwai population fell by around 1,000 people. Censuses were carried out throughout Bougainville early in 1948 and Cole recorded that the Siwai population had fallen from 4,613 to 3,663, a drop of 20.6 per cent (R.R. Cole, P.R. Bougainville 10/47-48). This was exactly the same rate of decrease as in Nagovisi; in Baitsi there was a reported fall of 22.7 per cent and in Buin an alarming 30.3 per cent. The population pyramids of Siwai indicate very clearly the resultant "waist" in the wartime-born age groups, and although it is improbable that as much as a quarter of the Siwai population died during the war the actual proportion was probably not much less. Many Siwais, especially young children, died and there were few births to replenish the population. However people suffered more from malnutrition, lack of medical care and exposure than from direct military action. During this time, and especially in the final year of the war, infanticide and probably also abortion (see pp.22-23) were conscious and frequent choices of many Siwais. Fecundity may also have declined. The only presently available comparable data is from the Tolai of east New Britain; there the war history was not dissimilar to that of Bougainville and there too there is a clear waist in the age-sex structures both in specific villages (Epstein and Epstein, 1962, pp.77-78) and more generally throughout the whole region (Granger, 1971, pp.110-111). In Bougainville Nash has observed a similar situation reflected in Nagovisi genealogies (1974, p.12). Since Long (1963, p.90) estimated that some 16,000 Japanese died in Bougainville as a result of sickness, it would be surprising if many of the local population were not similarly affected. Siwais themselves think of the war years as being a time of exceptional hardship although they do not usually characterize the period as one in which many people died. Constraints on fertility were more important than deaths in causing the population decline. The decline was so severe that it took more than a decade for the population to reach its pre-war level.
After the war the Siwai population began to grow and there was a steadily increasing population (Figure Two); indeed the rate of population change has accelerated and there is no indication that this is changing. Present trends suggest that the population may double in less than twenty years, an extremely rapid rate of increase. The 1975 administration census, carried out in difficult political conditions, was incomplete and exists only for two-thirds of Siwai villages although in seven of these the census data were collected more carefully and in more detail than ever before. An accurate account of the Siwai population is made even more difficult because the 1972 census, which was quite inaccurate, recorded a total of 8,559 thus giving an increase of 21 per cent in two years, a demographic impossibility in the absence of migration. My own estimate of a total Siwai population of about 9,000 in 1975 is based in part on the 1972 and 1975 censuses and in part on my own censuses of eight villages and hence comparisons between these. Of this population some 55 per cent are Catholics, 44 per cent United Church (including a small proportion of evangelists) and less than 1 per cent are Baptists and Seventh Day Adventists.

Administration census data are inadequate for examining the age distribution of the contemporary Siwai population since the only age divisions are less than one year, 1-5 years, 6-10 years, 11-15 years, 16-45 years and 46 and over, and these exclude all absentees, including students and workers. The dates themselves are crude estimates. The administration census data are represented graphically below (Figure Four) and despite its limitations the graph does show the broadening of the population base rather more clearly than the 1971 Roman Catholic data (Figure Five). The Monoitu Catholic Mission records represent about 50 per cent of the population of Siwai (therefore excluding the four villages in the Haisi area and also Horino, Kumuki and Sininai and all the United Church villages); however there is no reason to suppose that the age-sex structure of United Church villages is at all different from that of Catholic villages. Every possible check suggests that they are exactly the same. Mission records followed the establishment of the Monoitu mission in 1922 hence ages of around fifty and over are only estimates. Otherwise the Catholic records are both accurate and comprehensive (although after 1971 a different form of recording was introduced and the records become less useful) whereas the United Church (Methodist) records are discontinuous and even then not maintained in detail. In conjunction

1. This distribution is derived both from allocating populations to villages, most of which are of one religion only, and by analysing all births registered by Siwai Local Government Council (some 3,019). The two procedures produce almost identical results.
with the health centre records they were useful for checking some more recent
demographic events but they could not be used to produce the sort of population
pyramid that was derived from the Catholic mission records. I carried out
censuses, using administration data as a base in eight villages; four of these
were United Church villages in Rataiku (Moroka’imoro, Hanong, Maisua and
Noronai) whilst four were Catholic villages in Korikunu (Siroi, Kaparo, Amio
and Unanai). These are unlikely to be atypical of the general Siwai population.
The population data collected in these eight villages are likely to be rather
better than both the data from the Catholic records and from the administration
censuses.

1. For example the administration census records one Siwai man as aged 64 whilst
in the Catholic register he is 79; by cross-checking with him and other
older villagers I was convinced that he was either 67 or 68. However these
discrepancies in ages are only true for the very old and after the 1930s age
estimates are usually accurate.
The total of 9,000 is derived primarily from a reformulation of the census estimates of 1972 and 1975 and hence overstates the numbers actually resident in Siwai by including almost all absent Siwais. Only those who have married outside and stayed there are actually excluded from the administration census. However, since most if not all of these could return at any time, build a house and acquire garden land, it is a reasonable representation of the population pressure on the land area of Siwai. Siwais themselves, when carrying out village government censuses at the end of 1975, incorporated numerous migrants from Siwai who had not returned for years. It is possible to differentiate three categories of population. The first group are the permanently resident population who are almost invariably present in the village, but may occasionally be absent in other villages, hospital or in town. The second group are those "usually resident"; this is effectively the legal definition used in the census and therefore incorporates all school children, migrant workers and other absentees who are considered to belong to that village although some may visit their village only rarely. It is also the definition of the Siwai population that is used here, whilst the "absentees" indicated in Figure Five are essentially migrant workers and high school children. Finally there are those whose "name remains" in the village but who are no longer a real part of it; this is especially true of those who have married outside Siwai. One of these, for example, was a man from Siroi village who had married an east coast woman. He had worked on an east coast plantation for many years and had not even visited Siwai after 1972. His whole family (including five children) was included in the village government census. Bringing the administration census up to date gave Siroi village a 1975 resident population of 131, plus 11 school children at high school or vocational school and 20 outmigrant workers (including two University students). The village government census early in 1976 produced a Siroi population of 236. The discrepancy between the administration census total for Siroi of 162 and the village government census figure of 236 was partly explained by differences in classificatory procedures. The administration adopted a fairly straightforward approach in which the old "line"villages, that Siwais had been ordered and encouraged to live in during the early periods of Australian administration (cf. Oliver, 1955, pp.15-17), were the basic centre of each village and scattered houses and hamlets nearest to that were grouped in with it. Siwais themselves prefer to recognize population distribution according to the preferences of individual males. Thus the village government census of Siroi included households that had already been resident for more than five years in the village of Hukuha (three households)
and near Kaparo, Kotu, Silaruho and Tonu and also other households that had been resident for some years outside Siwai (including both Kieta town and Numa Numa plantation). None of these had houses in Siroi and no more than one or two were ever likely to return to live near the line; on the other hand none were also recorded elsewhere. They preferred that their names remain in Siroi.1

The administration has attempted to come to terms with the Siwai classification system; consequently the census diligently records population totals for Toira and Kupingku villages where the lines were completely abandoned in the 1960s. Almost all Toira villagers live in Tonnui and Kupingku villagers at Ko'okai near Matukoli. Although the absolute totals in both censuses are reasonable guides to the population of Siwai and the actual and potential pressure on land since many households have moved to land where they have the best claims to ownership and use, they are not such good guides to the actual location of that population and the likely areas of population pressure. The Siwai population is much more widely distributed than at any time in the past and the line villages are becoming steadily less important centres.

Contemporary population data are inadequate for sophisticated demographic analysis, yet manipulating statistics compiled by missions, administration and myself enables some simple statements to be made. The composite age-structure of the Siwai population (Figure Five), which includes all migrants who have maintained village homes, reveals the still-growing population of Siwai, which is not dissimilar to the rest of the southern half of Bougainville island (Friedlaender, 1975, pp.54-58). The profile is typical of populations that have experienced a decline in the death rate whilst maintaining a high birth rate. Relatively few people are in the older age groups; both the 1971 and 1975 data suggest that only 15 per cent of the Siwai population were aged over 45, although this is actually a greater proportion than in eastern Bougainville where there were only 11 per cent (Friedlaender, 1975, p.55) and also in some other lowland areas of Melanesia, such as Karkar island (Hornabrook, 1974, p.231) where this figure was 12 per cent. By contrast the 1971 and 1975 figures for the Siwai population of less than ten years of age are 33 per cent.

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1. On my first week in Siroi I inquired about one of the line houses, "whose house is that?" and was told that it was the house of Lising; it took rather more systematic inquiry to reveal that three years earlier he had left to live in his wife's village near Kapana and that the house was now permanently occupied by his sister who was divorced and had returned to Siroi with her children. Siwais do not easily lose their original village affiliations.
and 31 per cent respectively. Although the Siuai population seems to be not quite so broadly based as these other two Melanesian populations it is still a very broadly based pyramid and one that is steadily becoming more so. The rapid expansion of the Siuai population has been a little delayed by wartime deaths.

Males tend to dominate slightly in almost all age groups, a phenomenon which characterizes much of Melanesia (Lea and Lewis, 1975; Chapman and Pirie, 1974, 3.26) and this does not change significantly between different age groups. Women tend to die earlier than men although it seems probable that the female infant mortality rate is much higher than that for males whilst female life expectancy, after childhood, is probably as great as that of men (cf. Lea and Lewis, 1975). This masculinity of the population may well decline following continued access to local health services.

The post-war growth in population is reflected in, amongst other things, changing household sizes; on average households are consistently larger than in pre-war years despite the reduction in the proportion of polygynous households. Households in Melanesia are always difficult to define adequately. Oliver refers to the Siuai household as "the principal residential and subsistence unit. Members sleep together in their own house and preserve a high degree of privacy. Most households also act separately to produce and consume their own food and many other basic economic essentials" (1955, p.104). In recent years households have become rather more fragmented but by defining contemporary Siuai households as all those who customarily eat in one place, simple comparisons may be made between the size of households now and before the war. Before the war adult males with four or more dependent children were excused tax payments; thus when the 1936 census was carried out only 71 out of 1,500 adult males were excused. Four decades later more than half the households (66 out of 122) in four random villages have six or more members although because of the absences of school children and migrant workers rather less than half (56) are likely to regularly eat together. Reapplying the 1936 tax demands in 1975 would have resulted in as many as 52 out of 163 adult males being excused taxes. By whatever standards households are defined their size has increased enormously since the war.
Figure Five  Ace Components of the Siwai Population
MARRIAGE AND FERTILITY

The changing relationship between factors encouraging or discouraging population growth can now be examined in some detail, especially as they affect changes in Siwai fertility and mortality. The most basic of these influences is marriage. Marriage itself is almost universal in Siwai although it is possible that this may not have been so in the past (partly because of the greater proportion of polygynous marriages). Chinnery (1934, p.88) records that 65 adults (39 men and 26 women), that is some five per cent of the total adult population in 33 villages, were unmarried; since it is not clear how these were defined and their ages are unknown, it is probable that they intended to marry subsequently. Oliver's work suggests that before the war marriage was as universal as it is now; in north-east Siwai there was only one confirmed bachelor and no spinsters (Oliver, 1955, pp.138-139).

In 1975 few people were even able to name an adult Siwai man or woman who had not married and seemed unlikely to do so; in eight villages there were none aged over 27 and all those who were younger were likely to marry at some point. There are a few unmarried males in their thirties in Siwai and a few more outside, often working in urban employment, but apparently not one unmarried healthy female. Males have a greater latitude for choice but there is no cultural provision for permanent celibacy; their position remains a curious anomaly. All Siwais are expected to marry and there are no restrictions on the re-marriage of widows and widowers; some indeed marry within a couple of years of the death of a spouse and most eventually re-marry. Those who do not re-marry are usually those beyond childbearing age or, in some cases, those who have outlived several wives or husbands and are consequently feared by possible spouses. Before the war "by the time Siwai men and women reach senility most of them will have been married more than once" (Oliver, 1955, p.220); the same is less true now as many couples survive to old age. Thus almost all Siwais marry and most remain married more or less throughout their period of fertility.

The mean age of marriage has changed very little since the war (Table One). In the last decade rising affluence has allowed brideprices to be found more

1. Data were collected primarily from the Catholic mission records, supplemented by the Siwai Local Government Council records. Consequently nearly 90 per cent of all these marriages, including all those before 1960, are of Catholics. There is no reason to suppose that these are any different from Methodist/United Church marriages. The ages are those at which a Siwai and/or a church marriage ceremony were held and therefore represent the effective start of cohabitation.
quickly and men no longer migrate to contract labour; even so the age at which men marry has declined only slightly whilst for women it has not declined at all. Education has not delayed the age of marriage; rather a combination of affluence and the end of plantation migration have tended to bring the age of male marriage forward. Since there is a still tiny but growing incidence of pre-marital conceptions family formation is beginning rather earlier.

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The impact of polygyny on fertility is more or less unknown (Benedict, 1972, p.76) and there are conflicting opinions from different areas. Casual observation of the household sizes and known birth intervals of polygynous Siwai households provides no clues; there are both very large and very small households. Consequently the effect of the decline in the rate of polygyny is even more imponderable. Blackwood (1935, p.137) argues that the main effect of a decline in polygyny in north Bougainville has been a weakening in the controls exerted on the post-partum taboo period which has consequently decreased. There is no evidence for or against this in Siwai. Although a man gains from polygyny (for example by improved access to land or additional labour for rearing pigs) he does not necessarily gain or lose from a large number of children. Overall polygyny is declining rapidly and in the post-war years there have been relatively few such marriages.

Because of all the changes that have followed contact, especially the arrival of two Christian missions in Siwai, reconstruction of traditional beliefs and practices relating to sexual activity is almost impossible. However, like many other societies in Melanesia (Bulmer, 1971, p.145), it seems certain that the single most important cultural factor affecting fertility was a post-partum taboo on sexual intercourse. In these, and in other attitudes to fertility, Siwai was certainly very similar to other south Bougainvillean societies such as Nasioi and Nagovisi (Ogan, Nash and Mitchell, 1976). In common with these
two areas and also Teop (Shoffner, 1976, p.60) most Siwais believe that multiple acts of intercourse are necessary to produce pregnancy; the rare illegitimate children are sometimes referred to as "children of many men". Siwais are also generally unaware that nine months is the usual gestation period.

Siwais have always appreciated the practical problems of providing adequate care for children born too close together, hence twins were a special problem. This was usually phrased in terms of this level of care being too demanding on the mother's health and preventing her gardening activities; it was less usually phrased as concern for the health of the children. The post-partum taboo on intercourse was probably much longer in the past that it is today; thus in pre-contact Nagovisi and Nasioi it is possible that births were spaced around four years apart (Ogan et al., 1976, pp.535, 541). Blackwood (1935, p.156) considered that in north Bougainville there was then an almost universally observed post-partum taboo period of two to three years. This sort of period was probably also true of Siwai and there as elsewhere birth intervals have subsequently become rather shorter.

Siwais generally claim that a post-partum taboo on sexual intercourse should be maintained until the nursing child is old enough to walk properly, exactly the same claim made in other parts of Bougainville (Blackwood, 1935, p.156; Ogan et al., 1976, p.536; Ring and Scragg, 1973, p.109; Shoffner, 1976, p.60). (Occasionally this was phrased in different ways such as, for example, until a child could talk or, before the war, until the child contracted yaws). Overall these taboos suggest, much as they do in Nasioi, a taboo period of around fifteen months, somewhat shorter than in other Melanesian societies. If strictly observed such a taboo would result in birth being spaced at intervals of at least two years.

In order to test the degree to which Siwais actually observed their stated post-partum taboo on intercourse, data were collected on birth intervals in contemporary Siwai; it was impossible to obtain sufficient accurate data on early years hence intervals from the pre-war and immediate post-war years have been excluded from the analysis (Table Two).

Data on birth intervals were collected from a sample of 55 families in three Catholic villages of central Siwai: Siroi, Kaparo and Amio. These were checked against administration censuses and mission records and rechecked in the villages by interviews. It was almost impossible to collect data from United Church villages in the same way since mission records were inadequate and
Table Two. Siwai Birth Intervals

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<th>Year Period</th>
<th>Number of intervals</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1950-54</td>
<td>16</td>
<td>2.94</td>
<td>0.73</td>
<td>1.68 - 4.46</td>
</tr>
<tr>
<td>1955-59</td>
<td>31</td>
<td>2.87</td>
<td>0.82</td>
<td>1.65 - 4.36</td>
</tr>
<tr>
<td>1960-64</td>
<td>62</td>
<td>2.76</td>
<td>0.65</td>
<td>1.46 - 4.19</td>
</tr>
<tr>
<td>1965-69</td>
<td>74</td>
<td>2.90</td>
<td>1.03</td>
<td>1.41 - 6.38</td>
</tr>
<tr>
<td>1970-74</td>
<td>90</td>
<td>2.46</td>
<td>0.77</td>
<td>0.99 - 5.04</td>
</tr>
<tr>
<td>1975-76</td>
<td>11</td>
<td>2.12</td>
<td>0.44</td>
<td>1.36 - 3.04</td>
</tr>
</tbody>
</table>

census and clinic records rarely gave sufficient data. However data from four United Church households in Maisua village have also been included; these and casual inspection of the remaining patchy information on other United Church families suggests that there are, once again, no particular religious variations yet it would perhaps be unwise to state this categorically. Certain intervals were removed from the analysis including children of polygynous households and second marriages, families with long histories of illness of parents and intervals following early neonatal deaths (up to one year) and stillbirths. This is basically the procedure that Ogan, Nash and Mitchell (1976) followed elsewhere in Bougainville. The final two-year period (1975-76) is included only for the sake of completeness; because it is not a five-year period the birth intervals in these two years are significantly below those for a full five-year period. The final period is not suitable therefore for statistical testing.

The data show that there has been a decrease in birth intervals since the war (although the change is only just statistically significant) and is not apparently as rapid as elsewhere in Bougainville (Table Three). The decrease might have been more apparent in the most recent time periods if there had been more mothers in the 25 to 29 age group, the group that often has the highest birth rate but which in Siwai is relatively small following the impact of the war. Comparison of the birth interval data also indicates that the east coast areas, with historically greater change and contact with Western ideas (in terms of education, health centres, plantation establishment and so on), experienced a rather earlier decrease in birth intervals. Siwais are still more or less observing the post-partum taboo, since there is no significant usage of non-
traditional methods of birth control (pp.26-27). Shame is still attached to those who depart substantially, and regularly, from this particular norm; Siwai attitudes are firmly opposed to family restrictions and generally consider a large number of children to be the ideal situation. Indeed it is quite possible that the decrease in birth intervals reflects not so much changes in attitudes to the post-partum taboo but the almost total disappearance, over this twenty-year period, of contract labour migration associated with the absence of husbands for at least two years at a time. It also reflects the influence of modern medical care on the survival of children; survival can now be achieved with shorter periods of lactation.

<table>
<thead>
<tr>
<th></th>
<th>Siwai</th>
<th>Nasioi</th>
<th>Nagovisi</th>
<th>Buka</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945-49</td>
<td>-</td>
<td>-</td>
<td>4.30</td>
<td>2.71 (1947-49)</td>
</tr>
<tr>
<td>1950-54</td>
<td>2.94</td>
<td>-</td>
<td>3.71</td>
<td>2.73</td>
</tr>
<tr>
<td>1955-59</td>
<td>2.87</td>
<td>2.98</td>
<td>3.68</td>
<td>2.46</td>
</tr>
<tr>
<td>1960-64</td>
<td>2.76</td>
<td>2.71</td>
<td>3.16</td>
<td>2.17</td>
</tr>
<tr>
<td>1965-69</td>
<td>2.90</td>
<td>2.75</td>
<td>2.68 (1965-72)</td>
<td>-</td>
</tr>
<tr>
<td>1970-74</td>
<td>2.46</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Ogan, Nash and Mitchell (1976, pp.537, 543); Ring and Scrugg (1973, p.100); Connell, field notes.

By comparison with the Tolai of east New Britain where women even in the late 1950s "affirm that breach of the injunction no longer carries the social stigma that attached to it in former times, and is in fact frequent" (Epstein and Epstein, 1962, p.74), Siwai birth intervals are very long indeed (Table Four) and population growth is correspondingly rather slower. Nevertheless all the available evidence suggests that Siwai is moving slowly but inexorably towards the Tolai situation.

It was also stressed that sexual intercourse should not restart until menstruation had also restarted. The period of post-partum amenorrhea, when there is no menstruation, may be quite long, especially when the child has survived and breastfeeding is maintained. The only record of this period in Bougainville comes from Blackwood's observations made in 1930 in the north coast village of Kurtatchi; breastfeeding there was often maintained for four or five years.
Table Four. Siwai and Tolai Birth Intervals

<table>
<thead>
<tr>
<th>Interval in Months</th>
<th>9-11</th>
<th>12-14</th>
<th>15-17</th>
<th>18-20</th>
<th>21-23</th>
<th>24+</th>
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<tbody>
<tr>
<td><strong>Tolai</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of births</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td>34</td>
<td>74</td>
</tr>
<tr>
<td>percentage</td>
<td>2.2</td>
<td>4.3</td>
<td>7.2</td>
<td>8.6</td>
<td>24.5</td>
<td>53.2</td>
</tr>
<tr>
<td><strong>Siwai</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of births</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>19</td>
<td>253</td>
</tr>
<tr>
<td>percentage</td>
<td>-</td>
<td>0.4</td>
<td>0.4</td>
<td>3.5</td>
<td>6.7</td>
<td>89.1</td>
</tr>
</tbody>
</table>

after a birth and menstruation quite often did not resume until after a year (1935, p.163). Apparently there are no other, more recent, records of this period in Melanesia but it may be that rural Bougainville is not totally different from rural Punjab where Wyon and Gordon found that eleven months after delivery only 50 per cent of mothers whose child survived had resumed menstruation although almost all had resumed menstruation at least once by the time the child was 30 months old. Breastfeeding there suppressed menstruation for a period of ten months past the expected time (Wyon and Gordon, 1971, p.158). Other evidence from some parts of Africa (Dow, 1976, p.7) suggests that the Punjab results may not be untypical of some African rural areas, although the relationship between lactation and the resumption of menstruation in different cultures has scarcely been studied. It may also be that in Siwai as elsewhere (Bleek, 1976) although all are strongly in favour of spacing children, actual spacing is not the intentional result of sexual abstinence but rather a coincidental result of a long period of.
The significance of other traditional kinds of family limitation, contraception, abortion and infanticide, is less easy to interpret as evidence is somewhat ambiguous. Before the war some plants were eaten with betel nut to produce short-term sterility (Oliver, 1955, p.500). They were therefore contraceptives; the same plants (S-tana, kutapaka, kimam, rumai) could also be used in different ways to induce permanent sterility. The normal explanation of childlessness, which is not considered to occur naturally, remains that these plants have been eaten. Although the effectiveness of these and other plant materials is unclear (Bulmer, 1971, p.151) they are locally considered to be effective and are still used to some extent in Siwai; they do indicate some desire to control pregnancy. Before the war Siwais claimed that abortion was never practiced and Oliver states that the whole idea was repugnant to them (Oliver, 1955, p.171). However since Hilde Thurnwald describes abortion in Buin (1934, p.163), Blackwood describes it in north Bougainville (1935, p.117) and Devereux (1955, pp.183, 321) cites two old accounts of abortion in the Shortland Islands (Alu), where there is additional documentary evidence of its persistence at least until 1937 (J. Bennett, pers. comm., 1977), it is quite possible that it has occurred in the past in Siwai. In Solos, Buka it seems to have been rare in a past but is becoming increasingly common (Sarei, 1974, pp.42-43), whilst it was reported in Rotokas in 1947 (A.C. Jeffries, P.R. Kleta 1/47-48) and, also after the war, at Nissen (Hannett, 1974, p.48). Techniques for producing abortions were known in Teop in 1973 but it was reported that they were not used (Shoffner, 1976, p.61). Abortion is certainly not incompatible with infanticide which certainly existed before the war. However the extent to which contraception and abortion have limited Siwai fertility is unknown.

Infanticide was a definite brake on population growth and, before the war at least, was generally practiced on one of a pair of twins (usually the male), and also occasionally when births were too closely spaced or when the mother of a very young child died (cf. Ross, 1942, pp.158-159; Thurnwald, 1934, p.166). On this latter occasion the child would be buried or cremated with the mother; a baby who later became the first Siwai Catholic priest was saved from this in 1931 by a Methodist missionary who volunteered to look after the baby himself. Although children were occasionally buried alive it is probable that infanticide could be more accurately considered a selective neglect with male children usually being the less favoured. Again, in north Bougainville, Blackwood found that no-one admitted to infanticide but "there was general agreement that the
mother simply neglected to give one or both of them proper attention, with the result that both died, or the more vigorous of the two might survive" (1935, p.164). Before the war after childbirth, "for the first four or five weeks after delivery such women undergo diet restrictions which they said leaves them continually hungry, and which appeared to keep them physically weak for some time and probably affected the quality of their milk with possible consequences for selective survival" (Oliver, 1954, p.40). These diet restrictions seem to have now disappeared, possibly because of mission influence. Infanticide did not disappear quickly from Siwal; it certainly remained after the war and even in January 1958 an administration patrol was investigating possible infanticide in Maisua village and finding what seemed to be a case of selective neglect.¹

There is therefore an unresolved conflict between the existence of abortion and infanticide in the past with, at the same time, culturally sanctioned specific lactation and abstinence periods, intended primarily to ensure a minimum period between pregnancies during which lactation could be maintained thus improving the likelihood of the child surviving. However we know very little about either abortion or infanticide and it is probable that both existed only in extreme situations for example, in the case of abortion, where a conception had occurred which violated social norms or, in the case of infanticide, where it was considered that the child would die in any case because of the unavailability of adequate maternal care. How often these conditions might have occurred is impossible to say.

Siwais claim that in the past the acceptable number of children was lower than it is today; before the war three children was sometimes considered to be enough. Now almost all households anticipate having more than that. Oliver argues that "for most women, as well as for men, having offspring is one of the main goals of married life" (1955, p.169) but even then not all women were apparently convinced. Moreover it seems apparent from neighbouring Buin that several women were uninterested in large families. Why this was so there, and elsewhere in south Bougainville (Thurnwald, 1934, p.163; Ogan et al., 1976) is unclear. Hilde Thurnwald argues that some Buin women "do not like to be troubled with the upbringing of children and confess it candidly" (1934, p.163) whilst some Buin girls apparently preferred to retain their good looks. Both

¹ One missionary, in 1975, believed that occasionally in large families, one of a pair of twins was still allowed to die even after the child had returned healthy from birth at the mission health centre. I have no direct evidence for this.
these explanations were also proffered in Siwai. Indeed Thurnwald contrasts the aversion displayed by a number of women against having and bringing up children with the subsequent importance attached to children (ibid., p.164). There has been, since the 1930s, some change in attitudes to family size, in part a response to mission education and partly simply a recognition of the fact that family sizes are growing rapidly. Children are probably more welcome now than they were forty years ago.

Since abortion and infanticide have now disappeared from Siwai, amongst a very few other cultural practices which have suffered a similar demise, it is possible that they were never particularly important (although, equally, missions would have reacted very unfavourably to them). Moreover Siwai explanations for infanticide especially are so varied that it is difficult to believe that there was a straightforward explanation for the practice. Explanations include the following which overlap considerably. The size of family that could be looked after was quite small then so that later children were killed; for similar reasons a twin or a second child born too close behind another might be killed. The death of a child, like that of anyone else, necessitated a substantial distribution of shell money and other wealth, and since many children died in infancy and childhood, it was both hard work and expensive to look after them for a short time. If infants could be killed before their birth was generally known (which might have been possible) the expense of holding memorial ceremonies could be avoided (cf. Thurnwald, 1934, p.163). Whatever the validity of these explanations, the most plausible solutions, the argument is primarily economic; it was hard work to look after children and expensive were they to die. However Siwais, unlike some residents of the south Solomons (Chapman and Pirie, 1974, 4.12), do not believe that infanticide was practiced at times of general economic hardship when adequate food was unavailable. They do not believe that there have ever been such periods. This does not conflict with the view that pre-contact Siwai was a world of subsistence affluence but it is possible that there was sometimes individual economic hardship, perhaps primarily a result of disease, that could only be reduced by resorting to the direct and dramatic extreme of infanticide. Alternatively infanticide may have been an example of what Douglas (1966, p.271) has called "the cysters and champagne factor in population control". Thus population control occurs when a smaller family appears to give a relative social advantage. "A small primitive population which is homogeneously committed to the same
pattern of values and to which the leaders of social status offer a series of worthwhile goals which do not require large families for their attainment is likely to apply restrictive demographic policies" (ibid., p.272). It would be dangerous to argue that Siwai leaders preferred rearing pigs to people yet it would not be going too far to argue that a climate of opinion was engendered in which some individuals would be willing to make that sort of decision. It is probable that the decline in infanticide is partly a function of a change in attitudes to status and prestige.

In some societies the long post-partum taboo resulted in the institutionalization of polygamy, prostitution and homosexual relations to limit the sexual frustrations experienced by males. This was true of the eastern Solomons (Davenport, 1965) and of parts of Guadalcanal (Chapman and Pirie, 1974, 4.16) and, generally, seems to have been more true of the Solomons than New Guinea (Bulmer, 1971, p.150). In this context Siwai seems to have been somewhat intermediate; institutionalized prostitution which had died out in north-east Siwai before the war (Oliver, 1955, pp.149-150) was maintained in parts of central Siwai (Koriku) until after the war and one of these prostitutes (S-nanapoko) was still alive in 1975. ¹ There is no evidence of homosexuality in Siwai now although there was in the past (Oliver, 1955, pp.498-499), and it seems unlikely that prostitution was a significant control on population increase. Other measures that would have slowed long-term population growth, such as the direct encouragement of emigration, monogamy or late age of marriage seem never to have existed in Siwai. Ultimately too little is known about historic Siwai society to evaluate the extent of any of these cultural practices, their relative importance at different periods of time and in different households and therefore the balance between economic and cultural controls over fertility. It is evident only that every constraint to increased fertility has declined during the present century.

Apparently permanent infertility only rarely occurs; thus in 1975 there were no more than five households (out of 186) in eight villages who, after five

¹ Rapio-Lioko, an old leader from Tootoi village, had at one time two such nanapokos. One was from Nagovisi and had been obtained by him as part of a fight compensation payment. It was also asserted by informants, on several occasions, that a similar (possibly the same) form of institutionalized sexual relations occurred when the mother of a newly born child would give her husband a small segment of shell money, no more than wrist length, which he could then present to another woman in exchange for her sexual favours (cf. Thurnwald, 1934, pp.155-156).
years of married life, had not had children and seemed unlikely ever to do so. Before the war Oliver found that 220 out of 900 families had no children that survived infancy (Oliver, 1955, p.500) which is much the same proportion that Hilde Thurnwald found in Buin (1934, p.164), thus there seems to have been a substantial drop in sterility possibly because of declining use of contraceptive plants at the same time as improved health. In most cases women cease to have children around the age of forty; to some extent this is a definite result of their own lack of desire to have more, whilst fecundity too is dropping sharply by this age. By this time a woman may already have seven or eight children, one or two of whom may be starting their own families; this seems to be a culturally approved time for the childbearing of the mother to cease so that it is very rare for a grandmother to have children. In eight villages there were only three women who had produced children after the age of 45 (although around this point ages become somewhat unreliable); none of these had less than ten children.

Children incur some costs and these costs increase as Siwai villages become more monetized; educational costs steadily increase as does clothing and store food. However children also provide benefits. For example they play a role in child-minding which enables mothers to spend extra time in the gardens, although this is a somewhat circular time-saving, whilst children of less than school age are able to make some contribution to the domestic economy through nut or green vegetable collecting, pig rearing, agricultural labour (especially in carrying) and so on. Siwais do not concern themselves with the costs of children; these costs, apart from education, are at the moment small and unconsidered.¹ They are not a disincentive to high fertility. Nor, at a time when real incomes are rising, does it seem likely that this will be the case for a long time. In a climate of economic affluence Siwai attitudes have become more strongly in favour of larger families, an attitude fostered in part by missions and politicians. Only a tiny proportion of younger men, primarily in lineages with relatively poor access to land have begun to query some of these attitudes. This has not yet had any affect on practice.

Fertility rates calculated from the data for eight villages (Table Five) from two separate years give results that (even from a small sample) are not greatly

¹. It is intended to study the costs and benefits of children in more detail in a subsequent analysis of labour utilization in Siwai.
different from those calculated elsewhere in other similar coastal Melanesian environments, including Buka. The Table covers all women hence the proportions actually married are small in the youngest age group. The low fertility rates in the youngest and oldest Siuai age groups are probably mainly attributable to a small sample size although they do suggest that the reproductive age-span of Siuai women is not yet at its maximum and fecundity may be low in these age groups. Moreover Siuai women are as fertile as Buka women only in the age-group 20-24. Since Buka has had a much greater exposure to Western education and medicine and birth intervals are much smaller there, it seems probable that Siuai fertility will eventually rise to at least the same level as that of Buka.

Modern family planning is almost unknown in Siuai; in 1975 Monoitu Catholic mission aid post was supposedly a government family planning centre but it was so in name only. Catholics were being taught that the safe period was the only good, in both respects, kind of birth control. The United Church began to discuss family planning at their clinics in 1972 but found little initial response; it was no more than a laughing matter and there were always men around to deter possible recruits. However by the end of 1975 there were 22 users, some of whom were Catholics, half receiving pills and half IUD, which was a slower take-up rate than parts of north Bougainville (P. Beaumont, pers. comm., 1975). Family planning is growing extremely slowly and there is no indication that attitudes to it have changed. None of the users were generally known to other Siuai people and most were older women with very large families. There is no likelihood that adoption of family planning will increase significantly in the next decade or so.

As others have observed elsewhere in Bougainville it is not easy to assess changes in cultural practices affecting fertility. Missions have effectively eliminated infanticide and the Catholic mission has opposed both traditional and European methods of birth control; both Catholic and Methodist missions have generally emphasized "the joys of parenthood" (Ogan et al., 1976, p.538) and to stress these attitudes the missions themselves frequently raised orphans or sick children. Even in 1975 this era had not completely ended, and as Ring and Scragg expressed it for Buka "The Christian church and government have been silent on the social pattern that should be adopted while they welcome the munificent increase in children" (1973, p.118). There may be differences between the attitudes of the two missions in Siuai but the results remain the same. Changes in Siuai have been towards a decline in those customs and beliefs
Table Five. Births and Age-specific Fertility Rates

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>births/women</td>
<td>rate/1000</td>
<td>rate/1000</td>
<td>rate/1000</td>
</tr>
<tr>
<td>15-19</td>
<td>17 : 288</td>
<td>59</td>
<td>135</td>
<td>170</td>
</tr>
<tr>
<td>20-24</td>
<td>68 : 206</td>
<td>330</td>
<td>348</td>
<td>279</td>
</tr>
<tr>
<td>25-29</td>
<td>43 : 128</td>
<td>336</td>
<td>383</td>
<td>258</td>
</tr>
<tr>
<td>30-34</td>
<td>37 : 114</td>
<td>325</td>
<td>355</td>
<td>174</td>
</tr>
<tr>
<td>35-39</td>
<td>32 : 139</td>
<td>230</td>
<td>320</td>
<td>121</td>
</tr>
<tr>
<td>40-44</td>
<td>16 : 125</td>
<td>128</td>
<td>188</td>
<td>55</td>
</tr>
<tr>
<td>45-49</td>
<td>3 : 98</td>
<td>31</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

Total fertility rate 7.4 8.5 5.4 6.8


that maintained the birth interval; moreover the more recent exposure of women to the Western influences that allowed these changes is resulting in a continued decline.

Labour migration, rather than changes in attitudes, has in practice been a more substantial influence on fertility and the process of population growth. Plantation labour disrupted family life for periods of at least two years; indeed one Siwai missionary has gone so far as to claim (P. Beaumont, pers.com., 1975) that men designed their periods of absence on plantations to coincide with the difficult periods of birth and the following few months, but it may have been no more than an incidental result of conception following a man's return home at intervals between work periods, which, for many men, were quite regular occurrences following two year work-periods on plantations. During the 1960s the successful adoption of cash-cropping and the construction of a copper mine at Panguna resulted in there being very few workers absent for more than a few weeks at a time, hence the potential for sexual intercourse is now much greater than before. The current permanence of families is much the best explanation for higher fertility. Ogan, Nash and Mitchell (1976) have separately come to the same conclusion for Nagovisi.
MORTALITY

Data for estimating mortality are more inaccurate than those for fertility. There are no estimates available for pre-war mortality rates but they must have been high in Siwai; in 1938 after a brief period of exposure to Western medical practices there were still a number of potentially fatal diseases in Siwai. "Malaria, pneumonia and pulmonary tuberculosis are prevalent and seem to be the principal killing diseases but dysentery and filariasis are also common" (Oliver, 1955, p.10). Hookworm, yaws and leprosy existed then but since the war have largely been eradicated by Western techniques. Nor are the other killing diseases apparently so prevalent now. Very few epidemics have ravaged Siwai since the war; that of January 1947 when there were 35 deaths from a meningitis-pneumonia epidemic, was probably the most lethal. Indeed Siwai generally has escaped serious epidemics and by 1948 it already had a reputation for being free of sickness and disease compared with other parts of south Bougainville (P.R. Kien, 10/47-48), whilst in 1960 one patrol officer recorded that "the general health of the Siwai people is I think the best I have seen anywhere in the Territory to date" (P.R. Buku, 2/60-61). Other patrol officers too have obviously found Siwai health to be at least adequate. In 1956 one officer claimed to have seen child malnutrition in Siwai (P.R. Buin, 1/55-56) but when this was investigated further from the Tono Health Centre there was no evidence for the assertion. There has been no other reference to malnutrition within Siwai; even at times of heavy rain Siwais have managed to find adequate food. By 1956 there were six aid posts throughout Siwai, which were capable of treating primarily minor illnesses. The main diseases observed on one patrol in 1951 were yaws (10), tropical ulcers (79) and tinea (grille) (44) although conjunctivitis and dysentery have subsequently been more common in the sporadic references to health made by the patrol officers.

Between 1960 and 1972 causes of death were recorded with varying degrees of enthusiasm in Siwai Local Government Council records but in this thirteen-year period no more than 130 deaths are actually recorded there. Other than to note the consistent and general prevalence of such diseases as dysentery, tuberculosis, influenza and, in the earlier years, malaria it is therefore impossible to derive useful conclusions from these data. Epidemics of influenza and whooping cough have reached Siwai in the 1970s but Western medicines have been able to prevent a significant increase in mortality. In the post-war years although all the major diseases seem to have decreased in incidence it is only
for malaria that the decline has been substantial following a spraying campaign which began in 1960 (cf. Scragg, 1969, p. 77); the main causes of the decline in mortality have been the greater availability of penicillin and anti-malarials, increased numbers of clinics and DDT spraying against malaria. Improved housing has reduced respiratory diseases whilst the disposal of garbage in holes and the almost universal adoption of pit latrines have each reduced illness. Throughout the post-war years health measures have gradually reduced the mortality and morbidity of diseases such as malaria, yaws and gastroenteritis and so far the more obvious Western diseases, such as cardio-vascular degeneration, have had only the most limited impact in Siwai. Overall Siwais are now almost certainly healthier and have a lower mortality rate than at any time in the past. This improved health is reflected in the stature of the present population; Friedlaender and Oliver (1976, p.157) found that Siwai males were bigger than their fathers by at least a centimetre. Moreover before the war in the whole of north-east Siwai there were no cases of a child living at the same time as its great-grandparent (Oliver, 1955, p.244). Now there is one in almost every village.

The administration censuses enable estimates to be made of the crude death rate at different periods in Siwai but they are often imprecise since the census period was rarely exactly one year. With the exception of the last census in 1970-71 all these substantially underestimate the death rate because of their exclusion of some infant mortality; even so they do indicate the fairly continuous decline in the death rate since the war. Since 1971 the mortality rate has probably continued to fall. Even so it remains a high death rate compared, for example, with parts of eastern Bougainville (cf. Friedlaender, 1975, pp.60-61) but one that is likely to continue to fall, especially because of the developing youthfulness of the Siwai population.

<table>
<thead>
<tr>
<th>Year</th>
<th>All deaths</th>
<th>Population</th>
<th>Death Rate (Deaths/1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>132</td>
<td>3,919</td>
<td>34</td>
</tr>
<tr>
<td>1954-55</td>
<td>225</td>
<td>4,228</td>
<td>53</td>
</tr>
<tr>
<td>1955-56</td>
<td>86</td>
<td>4,291</td>
<td>20</td>
</tr>
<tr>
<td>1960-61</td>
<td>101</td>
<td>4,994</td>
<td>20</td>
</tr>
<tr>
<td>1970-71</td>
<td>99</td>
<td>8,559</td>
<td>12</td>
</tr>
</tbody>
</table>
It is possible to calculate crude infant mortality rates from the pre-war administration censuses, but given that Siwais "often do not report births and infant deaths" (Oliver, 1955, p.10) the official rates have no real validity. (Thus in 1937-38 there were 233 births and only three recorded deaths of infants less than one year old, compared with 32 deaths of children between one and five. By 1971-72 there were 458 births, 23 deaths in the first year and 7 in the ensuing four years).

Data from the health centre attached to the Tonu United Church mission provide the following figures on infant mortality (measured as the number of deaths, including stillbirths, at Tonu which followed births there) plus additional figures from the clinic records of deaths of infants before the age of one. These figures after 1960 represent around half the births in Siwai, most of the remainder being at Monoitu. Before 1960 less births were at the health centres

<table>
<thead>
<tr>
<th>Year</th>
<th>Births</th>
<th>Deaths at Tonu</th>
<th>Other Deaths of Infants under One</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>69</td>
<td>8</td>
<td>?</td>
</tr>
<tr>
<td>1958</td>
<td>79</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>1961</td>
<td>130</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>1964</td>
<td>142</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1967</td>
<td>104</td>
<td>3 (plus 4 stillborn)</td>
<td>1</td>
</tr>
<tr>
<td>1970</td>
<td>115</td>
<td>1 (plus 4 stillborn)</td>
<td>?</td>
</tr>
<tr>
<td>1973</td>
<td>174</td>
<td>? (plus 12 stillborn)</td>
<td>1</td>
</tr>
<tr>
<td>1974</td>
<td>140</td>
<td>? (plus 5 stillborn)</td>
<td>?</td>
</tr>
</tbody>
</table>

and all these data refers only to births at the Tonu centre. Deaths of infants aged less than one are derived from the clinic records which may not be accurate. Overall these records, despite being underestimates themselves, clearly demonstrate that the administration censuses (which in 1955 and 1961 recorded 3 and 5 infant deaths respectively) are substantial underestimates of the infant mortality. They do not however provide enough data to allow a true figure to be calculated. Inspection of the administration censuses would even suggest a gradual increase in infant mortality since before the war: the exact reverse of the actual situation. It is impossible to determine accurate mortality rates and it is primarily the consistent oral evidence of Siwais and local observers such as missionaries and health workers that permits the opposite conclusion to
be drawn. The infant mortality rate is certainly falling but there are no measures of the rate of decline.

CONCLUSION

The Siwai population is still rapidly expanding and many of the influences on this expansion are those associated either with the development of better health services enabling people to live much longer or with the decline of various kinds of social control applied to population growth enabling the level of fertility to have risen rapidly. There is no evidence that rapid population increase itself has directly altered traditional practices. Analysis of fertility suggests that the Siwai population growth rate is not yet at its peak whilst there appear to be no significant influences that will prevent a continuing rise in fertility. Fertility decline would require community participation in child spacing to re-establish pre-war family size levels; this would entail the establishment of modern techniques of family planning to fill the role previously taken by post-partum abstinence from intercourse and high infant mortality. There are now almost no socially imposed impediments to realization of maximum potential fertility; moreover at the moment for a Siwai household there is almost no economic cost to high fertility. Aspirations favour large families rather than small families and there are neither province nor national incentives or propaganda that convince otherwise. The pattern of mortality decline followed at an early date by fertility decline, has not yet occurred in Bougainville; fertility is still increasing. The relative influence of cultural change, improved infant survival rates and improved maternal health are impossible to distinguish.

The 1971 census indicated that the annual growth rate of the Bougainvillean population (within Bougainville) was 3.4 per cent; only three other districts in the country exceeded this growth rate (Howlett et al., 1976, p.39). The evidence from Siwai, and from Nagovisi and Nasiol (Ogan et al., 1976) suggests that in these parts of Bougainville at least the population growth rate is still not as fast as it might be, especially when compared with areas such as Tolai in east New Britain where population and land problems are now critical (Granger, 1972). Especially in the absence of an effective family planning programme, all available evidence suggests that the Siwai population, and that of the rest of Bougainville, will continue to grow at an increasing rate so that there, as in east New Britain, population density will become critical in some areas. Mitchell concludes for the neighbouring Nagovisi; there is an "absence of realistic efforts to reduce the rate of population growth ... The rate of growth is much
too high. How can rural people plan their future when their population will
double in less than fifteen years?" (1976, p.148). It is much the same in
Siwai.

ACKNOWLEDGEMENTS

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NOTE

The abbreviation P.R. in the text refers to unpublished Patrol Reports. These
are not listed separately in the bibliography because of their general unavail-
ability.
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