NEW GUINEA RESEARCH BULLETIN

Number 42

POPULATION GROWTH AND SOCIO-ECONOMIC CHANGE

Papers from the second demography seminar,
Port Moresby 1970

September 1971

Published by the New Guinea Research Unit,
The Australian National University,
P.O. Box 4, Canberra, A.C.T.

and

P.O. Box 1238, Boroko, Papua New Guinea
THE AUSTRALIAN NATIONAL UNIVERSITY
Research School of Pacific Studies
New Guinea Research Unit

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Preface

The second seminar on the demography of Papua New Guinea, called 'Population growth and economic development', was held at the University of Papua and New Guinea in November 1970. Participants in the seminar came from several Administration departments, the University of Papua and New Guinea, the New Guinea Research Unit and Department of Demography of the Australian National University, the East-West Center, the National Economic Development Board of Bangkok and the Economic Commission for Asia and the Far East (ECAFE). Mr Toua Kapena, the Ministerial Member for Labour, opened the seminar.

The following fifteen papers were presented:

C.L. Beltz  
R.N.H. Bulmer  
J.C. Caldwell  
E.K. Fisk  
K.J. Granger  
G.W. Jones  
D.A.M. Lea and H.C. Weinand  
A.W. McCasker  
D.V.R. Murty  
Peter Pirie  
R.F.R. Scragg  
M. Singarimbun  
G.E. Smith  
R. Gerard Ward

Population growth and the workforce
Traditional forms of family limitation in New Guinea
Population trends, policy and programmes in tropical Africa
The labour absorption capacity of subsistence agriculture
Population and land in the Gazelle Peninsula
Population growth and economic development
Some consequences of population growth in the Wosera area, East Sepik District
Population growth and productivity in the Territory
Population growth and policies in Asia
Population developments in the Pacific Islands
Health aspects of population growth
Population problem and family planning in Indonesia
Population growth and education planning in Papua New Guinea
Internal migration and urbanisation in Papua New Guinea
D.J. van de Kaa  The future growth of Papua New Guinea's population

Ten of these papers are included in the present publication and Professor J.C. Caldwell has contributed a concluding chapter which sums up the most important facts and proposals relating to Papua New Guinea presented at the seminar.

The seminar was organised by the Department of Geography of the University of Papua and New Guinea, assisted by the Administration's Department of Public Health.
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Chapter 1

Introductory address

Toua Kapena*

The theme of this seminar, 'Population growth and economic development', draws attention to a relationship which has occupied the minds of many scholars and politicians in every developing country during the last few decades.

Some consider population growth as a convenient hook on which to hang all the problems for which they cannot find solutions; these are the people who look at population growth as the one great evil prohibiting or retarding development. Others proclaim their interest because they want to be regarded as modern, progressive, 'with it'. There is also, however, a large number of people who are sincerely concerned about the problems facing the developing world and who wish to contribute positively to the solution of these problems. The organisers of and contributors to this seminar belong to this last category.

The papers to be presented here describe the experiences of our neighbours in the Pacific and of countries in other developing areas in Africa and Asia. They discuss also various aspects of the problem in Papua New Guinea. And the problem is one we will have to face.

Our population is growing, and growing fast on all accounts. How reliable and exact these accounts are, however, we do not know. Much more information is urgently needed on the population for which we are trying to develop this country, its characteristics and growth patterns, and possible differences between various groups. The government's resources for this research are limited. However, academic research workers will find here not only a fascinating field of study, but the satisfaction that the results of their work will be used to improve materially the lives of Papuans and New Guineans.

My personal experience of rapid population growth is what I have seen and observed in my own community over a long number of years.

* Mr Kapena, the Ministerial Member for Labour and Member of the House of Assembly for Hiri, opened the seminar.
There the growth is largely a result of the very much improved health services which are provided at small cost by the Administration from funds created by the Australian taxpayer. We owe a great debt to all Australians for this.

My people want to improve their living conditions as much as anybody else, but they do not see the problems associated with population growth. The provision of food, clothing and shelter for children is accepted as a normal obligation and one which all people meet after their own fashion. But nowadays children must also be educated and trained in order to secure gainful employment. Despite all efforts to increase the number of new jobs, there will not be enough for all who want them. And you can find examples in my community, of people who themselves are unemployed, but still have some eight children whom they cannot look after in the way that is required at this stage of rapid change and development. There are serious problems here, and even more serious is the future for these children whom everybody would wish to see get a fair share of the fruits of development.

This brings me to the second part of the theme, economic development. I am happy and proud to say that economic development in Papua New Guinea has gained tremendous impetus over the last few years and that the prospects for the future look bright. In order to realise them, we will all have to give the best we have. The calculations of economists and statisticians, the amounts of capital investment, and the creation of new plants and buildings do not add up to development. The one vital factor, and at the same time the reason for any development, is the people. Economic development is not a good in itself: it derives its purpose and meaning from the people and without their participation and involvement there can be no real development. It is with this in mind that the relationship between population growth and economic development should be examined.
Chapter 2

Population developments in the Pacific Islands

Peter Pirie*

The aims of this paper are to describe some of the models of population development to be observed in the Pacific Islands and to assess their relevance to the present and future population of Papua New Guinea. There are three major conditions which affect differently the populations of the Pacific Islands and Papua New Guinea. The first is magnitude: the population of Papua New Guinea (about 2,250,000 in 1968) is considerably greater than the population of all the other Pacific Islands combined (about 1,500,000 in 1968, excluding Maori and Hawaiian populations). Secondly, the small size and degree of separation and dispersal of the Pacific Islands other than New Guinea have meant that each has its own distinctive demographic history, conditioned by events specific to it alone. The physical and cultural barriers in Papua New Guinea have had a similar but not so extensive effect. Thirdly, although New Guinea was among the first of the Pacific Islands to be contacted by Europeans, exploration persisted there long after the process was complete elsewhere in the Pacific, and the effect of alien influences on the New Guinea populations therefore shows a wider range.

Population trends in both areas have been profoundly affected by the different timing of the several stages of European intervention. During the first stage, of discovery and exploration, the islands were accidentally contacted by European explorers and later surveyed in some detail. This occurred for most groups between the 1520s and 1830s, but in the case of New Guinea the period extended well into the twentieth century in some more remote areas. Knowledge of what occurred during this period, between one contact and the next, is sketchy or non-existent; the only descriptions are cross-sectional, and of people rather than populations. Many accounts are conditioned by cultural prejudice and some owe much to a colourful imagination.

* Dr Pirie is Associate Professor of Geography, University of Hawaii, and Research Associate of the East-West Population Institute.
During the second stage, of continuous contact, Europeans came as semi-permanent residents and had intimate contact with the local people. Usually ship deserters and miscellaneous vagabonds arrived first, followed by missionaries, traders, consular representatives, planters and administrators. The missionaries, consuls, administrators, and sometimes planters were apt to leave some account of their industry, but the activities of the others (often more influential in their demographic effects) were very rarely recorded. The period was normally one of population decline; the mortality rate rose due to introduced diseases, which could be epidemic such as measles or influenza, or of continuous effect such as tuberculosis or gonorrhea. Sometimes, to a very variable degree, a fall in fertility related particularly to the introduction of venereal diseases also occurred. Medical assistance during this period was occasional and amateurish.¹

The work of trained medical personnel among the local people on a regular basis initiated the third stage. This phase is characterised by the organisation of health departments by colonial administrations, although missions have played an important part in some areas. Populations during this phase begin to increase, and rates often rise to extremely high levels as infant mortality is reduced and debilitating or fatal environmental and epidemic diseases are controlled. Control of malaria has had a particularly dramatic effect in some areas. Fertility may also rise somewhat. This increase may be actual as fertility-depressing diseases or conditions are alleviated, or merely apparent as the registration of births and deaths improves to the extent that the role of infant mortality can be more exactly measured. Regular censuses are often a feature of this phase, and vital statistics, normally much less than complete, may be collected.

Finally, prior to independence when the colonial administration is committed to preparing the population to govern itself, the contemporary international political climate usually ensures that the population has good access to modern public health facilities, a well-developed education system up to the tertiary level, and a middle-class group increasing in numbers, with paid employment in government, commerce and industry.

The recent trend has been to compress these phases into an ever-decreasing time span or even, in some cases such as in parts of Papua New Guinea, to collapse some of them completely. Two extremely important aspects of this timing in regard to health and population change are the changes in technology and philosophy which have occurred in the metropolitan countries during the last few centuries, and the intensity with which these have been applied through colonial policies. For

¹ The negative processes by which island populations were diminished are widely understood (though there are still some points of debate in the area). Consequently this aspect is not discussed here.
example, it is extremely important whether the population was in prolonged and close contact with foreigners 'before penicillin' as in Guam or Hawaii, or whether among the first newcomers was someone wielding a hypodermic needle charged with medicaments able to eliminate diseases which had terrorised the group for centuries, as has occurred in the more inaccessible parts of the New Hebrides, the British Solomons, and particularly of Papua New Guinea. Another major change has been the demographic transition', involving an altered perception toward the preservation of life and a revision of the traditional value placed on large families, as well as technological changes in medicine and contraception. The administering powers in the Pacific have been in the process of introducing this transformation, but unevenly and incompletely, with much greater stress on mortality than on fertility.

The traditional view of the model of demographic transition has been one associated, first, with improved medical and sanitation techniques which gradually reduced mortality (innovations such as smallpox control, pure water and sewerage systems); and secondly, with the trends of modernisation, industrialisation and urbanisation which affected fertility (by processes rather vaguely described) so that women had smaller families.

More recent examinations of what actually occurred, on a province by province basis in Europe, modify this view in several important ways. The declines in fertility were found to correlate poorly with the conditions usually attributed to them, such as the diminishing economic value of children and their increasing cost, particularly in urban situations. Fertility first began to decline in rural peasant settings in parts of France and Hungary, and the mechanisms included late or postponed marriage, a high rate of female celibacy (10 to 30 per cent being not uncommon), as well as declining nuptial fertility related to the practices of abstinence and coitus interruptus (Coale 1969:17-19; Demeny 1968:512). This trend began before sophisticated techniques of contraception were developed. The proportion of women married or 'at risk' of conceiving a child has risen considerably in Western Europe since the 1930s, as improving contraceptive techniques have largely removed the need to postpone or renounce marriage. This characteristic, of low birth rates related to low proportions of women at risk and to lowered nuptial fertility, preceding the prevalence of paid employment, monetisation, urban living, and sometimes even literacy, obviously has very important implications for the Pacific Islands.

Important too is another characteristic noted, that of the contiguity of areal units in which the trend towards lower fertility first became evident; linguistic or other major cultural barriers were important obstacles to the spread of the trend, but within homogeneous areas it was ubiquitous. The key factor appears to have been not literacy, urban living or industrial employment, but primarily the acceptance by women of a rational concept, the recognition of their disinclination to reproduce, and their acquisition of knowledge of how they could avoid
conception, often transmitted 'over the back fence' by persons 'on speaking terms'. The other factors, of course, then reinforce the practice and demonstrate its social and economic utility. By implication the notion that peasant or tribal women want large families is also called into question. It is possible that statements to this effect may be rationalisations relating to expectations of the inevitable rather than a true choice between possible alternatives.

In the Pacific Islands, with the exception of some mission-sponsored clinical and dispensary systems, the most important vehicle for the introduction of Western medical technology has been the government health departments. Samoa provides a good example (Pirie 1970:494-500). Although missionaries with medical training began work among Samoans in the 1860s, and techniques such as vaccination for smallpox were being used from that time, an effective public health programme was not organised until after 1900 when the United States Navy assumed the administration of the eastern group. The Navy had an almost endless supply of medical personnel who, in those peaceful years, were normally at something of a loose end. Environmental diseases such as hookworm, typhoid, dysentery, tuberculosis, yaws and pneumonia were attacked, attention was turned to cleaning up water supplies and, possibly for its own sake, the Navy also began a vigorous campaign against gonorrhoea. The results were quick to appear. For example, by 1930 American Samoa had an extremely high fertility with a child-woman ratio of 967, and by 1950 this was 1,089. These indices were probably the highest experienced to that time in the entire Pacific area.

In Western Samoa the situation was a little different. During the German period, from 1900 to 1914, little medical work was done among rural Samoans, and in 1918 about one-fifth of the population was killed by an influenza pandemic. This disaster, for which the New Zealand authorities were largely responsible (since American Samoa was successfully quarantined), made the administration unusually sensitive to the issue of public health. So priority was given to the organisation of the Health Department and some imagination was employed in its organisation. One innovation, considered startling in 1924, was the training and use of Samoans in much of the health work. Another was the organisation of Samoan women into committees often concerned with child-health and environmental sanitation. From this time, the early 1920s, there was a rate of population growth similar to that which took place earlier in American Samoa. The child-woman ratio increased: it was 852 in 1951, 969 in 1956, 1,064 in 1961 and 1,086 in 1966, and although diminishing in acceleration, has possibly not yet reached its peak. Other dimensions of fertility in 1966 were: an average size for the completed family of between 7 and 8 children; about one-third of all women produce 10 children or more; families exceeding 20 children to one woman are not rare with 28 as the current record; and only about 6 per cent of all women pass out of childbearing age without giving birth. These conditions apply to a population which has felt little or no social, economic, physiological or psychological restraint on its
fertility. Several populations in Polynesia and Micronesia show similar or only slightly lower levels.

A prediction made by Ward (Ward and Moran 1959:236) in 1959, that such conditions would appear in Melanesia within two or three decades, shows every indication of being fulfilled. In Melanesia the control of malaria (not a problem in Polynesia and Micronesia) has brought about a spectacular decrease in mortality and an increase in fertility, and other prevailing public health measures, particularly the astonishing alteration in disease levels wrought by the use of antibiotics, are working together to produce higher levels of population increase.

The 1967 census of the New Hebrides showed a fertility scarcely lower than prevailing Polynesian levels: the average size of the completed family was between 6 and 7; the proportion of the population under 15 years was 46 per cent; and the number of women of recently completed fertility who had no children was only 7 to 8 per cent (McArthur and Yaxley 1968:35, 44-5). But mortality here, and probably throughout western Melanesia, remained significantly higher than among most Polynesian populations. For instance, it is likely that infant mortality in the New Hebrides overall is still in the vicinity of 100 deaths per thousand live births. Most Polynesian populations have reduced this level to below 60 per thousand, and in American Samoa for example, it is under 30 per thousand based on good registration (this level is generally below that of the non-white population of the continental United States).

Along with this trend in American Samoa have gone changes of an economic and social nature which appear to be related to, or at least associated with, some changing attitudes to fertility. These include a massive and largely successful attempt to convert the traditional subsistence agricultural system of the Samoans to one based on paid employment in industries such as fish-canning, tourism and government. (Agriculture is still practised but on a largely commercial basis.) This has been achieved only by the investment of large amounts of United States federal money. As a prototype for development in other areas the model therefore has its limitations, as the same processes would take considerably longer where much less capital is available. Demographic changes parallel the transition to a monetised economy. Fertility appears to have declined substantially (although confirmation of this awaits analysis of the 1970 census); the child-woman ratio declined from 1,089 in 1950 to 936 in 1960 and 743 in 1967, due partly to a reduction in the proportion of women aged 25-34 in the total population (their fertility by 1967 had not shown any noticeable decline), but also to a decline in the fertility of women in the 15-24 age range. This appears to be a case of postponement of marriage and childbearing, rather than of a decline in the fertility of married women, but available statistics are inadequate to be sure of this. Migration from the two Samoas has assumed great significance and since families with young children find it difficult to migrate, it is probable that this
is acting as a real deterrent to early marriage. A small-scale family planning programme, using the I.U.D. (intra-uterine device), has been underway since 1965 in American Samoa.

The Pacific Island group which has gone farthest in organising a government-sponsored family planning programme is Fiji. Although the Indian component has been much more active in this area than the Fijian, the case is nevertheless instructive. The Commission of Enquiry into the Population Trends and Natural Resources of the Colony of Fiji recommended that the government set up a full family limitation programme (Colony of Fiji 1960:8-9, 125). The Fiji government had already moved in a modest way in this direction in 1958, but in 1962 it adopted the recommendation and gave some priority to its implementation. In 1963 the Family Planning Association of Fiji, a multi-racial body, was formed to encourage family planning, and it co-operates closely with the Fiji Medical Department which gives practical assistance. Fiji has a doctor to population ratio of 1:2,370 (most doctors are government employees) and efficient health services throughout the country. The contraceptive methods employed are the pill (available at 10 cents per month during 1970) and the I.U.D. (fitted free of charge). Other methods and advice are available free or at very nominal cost. Sterilisation is also offered under some conditions; no monetary or other inducements are offered.

Since 1963 when family planning programmes became very active, the use of family planning has increased dramatically, and by 1968 about 23 per cent of all women 'at risk' (that is, about 18,000) were protected. The results are clear in the birth rate decline from a level around 40 per thousand in 1959-62 to about 30 per thousand in 1968-69 (see figure 2.1). This reduction in fertility has stabilised the numbers born at about 16,000 annually (Fiji Family Planning Association 1969:1-6). The new target is 25 per thousand by 1972, and a reduction to 20 per thousand as soon as possible thereafter.

The lowered birth rate is extremely important for educational institutions, which previously had to expand facilities at an annual rate of 3-4 per cent merely to maintain their existing position. Now it is likely that the educational authorities will be able to concentrate on raising the proportion of children attending schools, since education is not yet compulsory or entirely free, and also to improve the system. If the birth rate had not been stabilised and the rate during 1963-70 had followed the trend during 1951-61, 170,000 children would have had to be accommodated in primary schools in 1976, rather than the 130,000 which is now likely.

Falling fertility may also contribute to a continued improvement in the health of mother and baby. Infant mortality has fallen from levels usually in excess of 40 per thousand live births before 1960 to under 25 per thousand currently, based on fairly good registration. The maternal death rate has also fallen and is presently only one death per 2,000 deliveries (1968). Thus the Maternal and Child Health Service
has been able to concentrate on improving the quality of its work as well as on increasing the number of cases handled. While the rather dramatic results of the Fiji experience justify some optimism about future control, the consequences of delay are illustrated by the sequence of Fiji age structures for 1936-66 (see Figure 2.2).

Two interesting questions arise out of the Fiji experience: first, what is the contribution of the Fijian component to fertility decline, compared with the Fiji Indian; and secondly, what is the weight of technological birth control relative to sociological factors such as

Source: Fiji Family Planning Association (1970-1).

Figure 2.1. Fiji birth and death rates, 1931-70

Figure 2.2. Fiji age and sex profiles, 1936-66.
marriage at an older age? The definite answers to both questions must await the census in 1976 (a very good example of the disadvantage of a ten-year inter-censal period in populations subject to swift changes), but some indications are available. Fijian fertility has been limited by the tendency of Fijian women to begin childbearing later than the Indian, and this differential still exists in spite of the recent trend among Indian women. Moreover, there is also a tendency for Fijian women, particularly young ones, to postpone the birth of their first child. The number of Fijian women who had had their first child before age 20 in the responding 20-24 age group declined by 8 per cent between 1956 and 1966, and this is much lower than the trend for Indian females in the same age group (see Table 2.1). A birth rate decline for Fijians from a level consistently between 36 and 37 births per thousand between 1959 and 1967 to 27 per thousand in 1969 is the first convincing evidence that the diffusion of anti-fertility concepts is spilling over to the more traditionalist Fijian component. Reports from the field that acceptance of clinical family planning by Fijian women is exceeding first expectations is additional corroborative evidence. If this is occurring already it stands in interesting contrast to the situation in New Zealand, where the Maori component was very slow to follow the Pakeha (European) practice of lowering fertility.

Table 2.1

Ages of women at first birth, Fiji, 1956 and 1966
number of women per 1,000

<table>
<thead>
<tr>
<th>Age</th>
<th>Before 20 years</th>
<th>Before 25 years</th>
<th>Before 30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fijian 1956</td>
<td>Indian 1956</td>
<td>Fijian 1956</td>
</tr>
<tr>
<td>20-24</td>
<td>306 282</td>
<td>685 452</td>
<td>. . .</td>
</tr>
<tr>
<td>25-29</td>
<td>315 301</td>
<td>731 581</td>
<td>776 761</td>
</tr>
<tr>
<td>30-34</td>
<td>315 304</td>
<td>766 655</td>
<td>750 756</td>
</tr>
<tr>
<td>35-39</td>
<td>320 317</td>
<td>734 701</td>
<td>739 755</td>
</tr>
<tr>
<td>40-44</td>
<td>296 274</td>
<td>723 713</td>
<td>749 741</td>
</tr>
<tr>
<td>45-59</td>
<td>292 261</td>
<td>675 693</td>
<td>750 708</td>
</tr>
<tr>
<td>60 and over</td>
<td>231 242</td>
<td>503 572</td>
<td>716 721</td>
</tr>
<tr>
<td>All ages</td>
<td>298 283</td>
<td>702 604</td>
<td>749 739</td>
</tr>
</tbody>
</table>

. experience incomplete.

Source: Colony of Fiji (1968:35).

Changes in attitudes resulting in a tendency to marry later or avoid marriage, and within marriage to postpone childbearing and to space births more widely, apply more particularly to the Indian component and antedate the adoption of clinical methods by many years. For instance,
between 1946 and 1956 the proportion of Fiji Indian females aged 15-19 not married rose from one-quarter to over one-half, clear evidence that already profound changes in social attitudes were occurring and that the field for clinical family planning was a fertile one (see Table 2.2).

| Year | Males | | | | | | | |
|------|-------|---|---|---|---|---|---|---|---|---|---|---|
|      | 15-19 | 20-24 | 25-29 | | | | | | | | | |
| Fijian | | | | | | | | | | | | | |
| 1946  | 983   | 729   | 350   | | | | | | | | | |
| 1956  | 989   | 762   | 367   | | | | | | | | | |
| 1966  | 990   | 775   | 359   | | | | | | | | | |
| Indian | | | | | | | | | | | | | |
| 1946  | 784   | 223   | 96    | | | | | | | | | |
| 1956  | 936   | 382   | 99    | | | | | | | | | |
| 1966  | 969   | 546   | 142   | | | | | | | | | |

Source: Colony of Fiji (1968:29).

Fertility within marriage also fell. For example, 68 per cent of all Indian women aged 20-24 years had borne at least one child in 1956, but ten years later this proportion had fallen to 45 per cent. However, there can be no doubt that the acceleration in fertility decline noticeable since 1965 is related principally to the increased effectiveness of clinical family planning. It is apparent that Fiji is following the European pattern of transition in that the increase in decisions to lower fertility and a consequent change in marital and childbearing customs have preceded the adoption of clinical family planning, and this has occurred in a population which is still largely rural, agricultural, and not very well educated. It must be admitted, however, that the evidence for the initiation of similar change in a truly indigenous Pacific Island population is still very slight. Closer analysis is needed of the Fijian, American Samoan and Tongan populations, which are likely to be among the first to show a definite trend.

There is some evidence from several Pacific Island groups, including Western Samoa (where the government has only recently endorsed family planning), that the fertility of urban indigenous populations tends to be significantly lower than of rural, and that this correlates with the numbers holding paid employment and, less certainly, with increasing levels of education (Government of Western Samoa 1968 vol.1:37; vol.2:4-5).
Two questions which emerge from recent trends toward political independence in the Pacific Islands are: what effect, if any, does this have on the demographic characteristics of the populations concerned; and what is the effect on the population policies of the governments? Since the trend is still so recent, long-term effects are not yet apparent. However, it has been observed recently in Western Samoa, and over a longer period also in Tonga, that non-colonial administrations tend to allocate a lower proportion of their resources to health departments than did colonial administrations, and instead emphasise education and capital investment in the infrastructure and in economic development projects. In Western Samoa expenditure on public health is not maintaining its proportion of rising costs, and a policy of higher service charges to the public has also been adopted. There has been some indication that mortality, particularly infant mortality, is rising slightly, but since the collection of vital statistics is accorded a priority even lower than public health, it is difficult to be sure.

Regarding the degree of willingness of governments, independent or colonial, to adopt family planning programmes, the case of Tonga, where a programme has strong government support, shows that independent governments will adopt programmes and that they have an advantage in that these are less likely to be rejected as plots invented by malevolent foreigners (a possibility worse than inertia). The case of Fiji, however, indicates that colonial governments can also successfully initiate programmes under some circumstances, and this case could be the pioneer of the notion that a family planning organisation, with technical and clinical assistance from government health departments, is an institution that no country treading the path to independence should be without.

All the evidence suggests that the problems of excessively rapid population growth rates characteristic of Polynesia, and since World War II of Micronesia, are developing to some extent in Melanesia. Population growth rates of about 2.5 per cent annually are now normal and in local instances have risen considerably higher.¹ Because of relatively low population densities, again with local exceptions, the immediate problems are likely to lie mainly in the difficulties of expanding education and other services at or above the rates imposed by population growth, rather than in the permanent development of excessive congestion. The technologies related to both mortality control and fertility control are arriving in Melanesia, belatedly, but at a much more developed level than was the case in Polynesia.

The continued neglect which most Melanesian populations have suffered, reflected in their high mortality levels persisting long after other

¹ The rate in the New Hebrides is approximately 2.5 per cent (McArthur and Yaxley 1968:vii); in Papua New Guinea about 2.6 per cent (see Table 3.6); and in the British Solomon Islands about 2.5 per cent (Smith 1970). See also Chapman (1969:123-7).
Pacific Island populations enjoyed the benefits of relatively efficient public health systems, should be perceived as providing a unique opportunity. It is now feasible to provide the Melanesian populations with access to the means of limiting their fertility at the same time as their long-standing health needs are attended to. Most Melanesian societies, unlike those of Polynesia, show a notably restrained attitude towards fertility, and there is some reason to believe that an effective means of limiting family size would be welcomed.¹

It may be that the building of excessive densities now becoming prevalent in many other parts of the Pacific could in Melanesia be forestalled. The period of rapid population growth consequent upon entry into the 'phase of demographic transition' could conceivably be reduced to little more than a decade, a situation which none other of the world populations has yet been able to achieve.

Bibliography


¹ See pp.158-9.


Chapter 3

The future growth of Papua New Guinea's indigenous population

D.J. van de Kaa*

An earlier paper (van de Kaa 1970) used the very limited information available on population growth during the five-year period preceding the 1966 census in combination with age data from the census in order to estimate the vital rates of the indigenous population. These rates were then used to smooth or correct the obviously distorted age structure reported, and assumptions on future trends of mortality and fertility were used to make a projection of the smoothed population to 1971 and 1976. The estimates of fertility and mortality levels were preliminary in character for not all relevant census information had been tabulated, and in particular an independent estimate of mortality was needed before the accuracy of the figures given could be improved. Further tabulations have now become available and revised estimates of vital rates have been obtained.¹ These may have to be modified again in the light of information that will result from future censuses or surveys, but for the present they are probably the best obtainable, and in that sense final, estimates. They will therefore be used in this paper, which aims to examine the likely growth of the indigenous population over the period 1966 to 1991.

Revised estimates of vital rates

Table 3.1 shows the revised estimates of several population parameters alongside the preliminary figures. The additional information suggested strongly that the mortality estimate first arrived at was too high and

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¹ The author is grateful to the Papua New Guinea and Commonwealth Statisticians for the provision of data from which these revised estimates were derived, and to Mrs A.T. Davis for assistance with the computations.
that the male and female life expectancies at birth were not about 40.8 and 39.4 years respectively but about 43.75 and 43.25 years instead. In conjunction with the reported age structure these mortality levels yield an estimate of fertility slightly below the preliminary figure, while the population growth rate per annum turns out to be somewhat higher than the 2.2 per cent calculated for 1961-66 from the headcount data published by the Department of District Administration (van de Kaa 1970:9-10). However, the general agreement between the two sets of estimates is surprisingly good if allowance is made for the very fragmentary nature of the information upon which the preliminary results especially were based.

Table 3.1

Preliminary and revised estimates of some 1961-66 population parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Preliminary estimates</th>
<th>Revised estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Birth rate (per 1,000)</td>
<td>44.4</td>
<td>46.0</td>
</tr>
<tr>
<td>Death rate (per 1,000)</td>
<td>22.4</td>
<td>24.0</td>
</tr>
<tr>
<td>Growth rate (per 1,000)</td>
<td>22.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Life expectancy at birth (Oe0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fertility rate (T.F.R.)</td>
<td>6.560</td>
<td></td>
</tr>
<tr>
<td><em>m (in years)</em></td>
<td>29.6</td>
<td></td>
</tr>
</tbody>
</table>

* m is the mean age of the fertility schedule

Adjustment of reported age distribution

The changes in estimated levels of mortality and fertility affect the previous smoothing of the reported age distribution (van de Kaa 1970:15-18), which was obtained by projecting a test population over the period 1946-66 under conditions considered to be similar to those which the actual population experienced, and by substituting the age distribution so constructed for the reported distribution. With minor modifications the same procedure can be used again, and of the many sets of assumptions tried, those listed in Table 3.2 appear to give the most satisfactory results. They postulate that the male and female populations were stable in 1946 and that they experienced a gradual decline in mortality during 1946-66. Fertility is assumed constant until 1961, but as the new tabulations suggest that the fertility level has been under upward pressure in recent years, a fertility increase of approximately 2.5 per cent per annum over 1961-66 is incorporated in the projection.
Table 3.2

Mortality and fertility assumptions underlying the projection of
the test population, 1946-66

<table>
<thead>
<tr>
<th>Period</th>
<th>Mortality ((\text{%}<em>\text{e}</em>\text{o}))</th>
<th>Fertility (T.F.R.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Initial stable population, (r = 12.93) per 1,000*</td>
<td>32.15</td>
<td>30.75</td>
</tr>
<tr>
<td>1946-51</td>
<td>33.30</td>
<td>32.00</td>
</tr>
<tr>
<td>1951-56</td>
<td>36.20</td>
<td>35.10</td>
</tr>
<tr>
<td>1956-61</td>
<td>39.70</td>
<td>38.90</td>
</tr>
<tr>
<td>1961-66</td>
<td>43.75</td>
<td>43.25</td>
</tr>
</tbody>
</table>

* \(r\) is the rate of natural increase

The resulting smoothed age distribution differs only slightly from the one previously published (van de Kaa 1970:6).

Population projection to 1991

Although some hundreds of West Irianese appear to have settled in Papua New Guinea since 1962 and border crossings on a limited scale may continue, it is unlikely that the future growth of the indigenous population will be affected to an appreciable extent by international migration. Therefore all that is required for the estimation of future growth is the formulation of a reasonable set of assumptions about the future development of mortality and fertility.

There is no doubt that mortality will continue to decline between 1966 and 1991, but its exact course is difficult to predict. Improvements in education, communications and standard of living may all contribute to the expected increase in life expectancy, although the main impetus is likely to come from the further development of health services. The aim of the first five-year plan (Territory of Papua and New Guinea 1968:93-7), which covers the period 1968-69 to 1972-73, is to increase total expenditure on health services, but to decrease their share of the budget. The general policy is to relate more realistically the cost of public health to the capacity of Papuans and New Guineans to pay for it, and while reasonable medical services will be maintained, the emphasis will be on community health, including anti-tuberculosis and leprosy control campaigns and maternal and child health services. The proportion of the population 'protected' against malaria is expected to increase from 53 per cent in 1967-68 to 88 per cent in 1972-73, and if this trend continues, protection could be almost complete some five to ten years after that. At the same time the Faculty of Medicine of the University of Papua and New Guinea will turn out an increasing
number of physicians, nearly all of whom will seek employment in Papua New Guinea. Thus it should be possible to maintain a high standard of services even after recruitment of expatriate officers ceases.

It seems reasonable to assume, then, that the mortality rate will decline rapidly during the next decades. However, the decline will probably not be uniform. With the increase in life expectancy at birth the magnitude of the increase per year of elapsed time will probably diminish. It is further likely that the life expectancy at birth for males will not continue to be higher than for females. As life expectancy at birth increases, the relationship will probably become similar to that observed in Western societies, so that by 1991 the female life expectancy at birth might well exceed that of males.

These considerations underlie the assumption of mortality change given in Table 3.3. This appears to form a sensible continuation of what was postulated earlier for the period prior to 1966.

Table 3.3

**Mortality change assumption, 1961-91**

<table>
<thead>
<tr>
<th>Period</th>
<th>Life expectancy at birth, in years*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>1961-66</td>
<td>43.75</td>
</tr>
<tr>
<td>1966-71</td>
<td>48.30</td>
</tr>
<tr>
<td>1971-76</td>
<td>52.35</td>
</tr>
<tr>
<td>1976-81</td>
<td>55.65</td>
</tr>
<tr>
<td>1981-86</td>
<td>58.20</td>
</tr>
<tr>
<td>1986-91</td>
<td>60.00</td>
</tr>
</tbody>
</table>

* West model life tables

The increases envisaged in life expectancy at birth are quite considerable, though not implausibly high. The average annual gain in life expectancy would be just over 0.7 of a year for females and almost 0.65 of a year for males. This compares with an average annual figure of 0.7 for Japan between 1935-36 and 1949-50 when life expectancy at birth increased from 48.24 years to 57.86 years (Basavarajappa and Tye 1969:55). It is higher than the 0.5 of a year generally used by the United Nations and, for example, adhered to for Ghana by Gaisie (1969:57). However, as Australia's financial and material assistance is likely to continue, even after independence, it seems plausible.

Fertility assumptions are much more difficult to formulate, for while the mortality rate will undoubtedly decrease steadily, the fertility rate could rise or fall depending on different factors. Several forces may push fertility upward. The continued decline in mortality will
probably raise the proportions married at each age, and marital fertility is, at least initially, more likely to increase than decrease as a result of social change. Birth intervals will tend to become shorter as taboos on sexual intercourse within marriage weaken, particularly the post-partum taboo. Restrictions on the remarriage of widows and divorcees may also gradually disappear. Therefore during the next two decades there may be a repetition of the slight increase in fertility which is thought to have occurred during 1961-66.

However, over a longer period social change may have the opposite effect. Though fertility appeared to be higher in urban than in rural areas in 1966, this may be only a temporary phenomenon. The problems of urban living may become clearer to a growing number of couples with large families, and the demand for modern means of family planning may increase with education. Urbanisation will be rapid. Since the data on urban areas have little time depth it is particularly difficult to forecast the size of the urban population in Papua New Guinea in twenty years time. Langmore (1970:29) estimates that Port Moresby will have 252,000 indigenes by 1990, and Ward suggests that this may give a national urban population of three-quarters of a million if Port Moresby is to maintain its position relative to the other towns. On the basis of a comparison of 1966 census data with the results of counts conducted in 1970 in Port Moresby, Lae and Madang and the results of the 1970 census pretest in Goroka, Ward reaches a slightly lower estimate, but he still thinks that more than 15 per cent of the indigenous population will live in urban areas by 1991.

This figure is the most plausible derived so far, and the number of females in the reproductive age group living in urban areas in 1991 would probably be in excess of 125,000. Although this would not be a very large proportion of the total number of women aged 15-44 and probably at first only a fraction would adopt modern methods of family limitation, their example could soon lead to wider acceptance.

Family planning

It is Administration policy to provide family planning assistance when requested. According to the five-year plan (Territory of Papua and New Guinea 1968:96), 'It is proposed to make family planning services increasingly available in both urban and rural areas'. However, this is unlikely to lead to a significant reduction in fertility in the relatively near future, even with rapid urbanisation. By 1970 no voluntary family planning association had been established in Papua New Guinea and government activities are very recent. Bowler (1968) reports that the first small clinic was opened in Port Moresby in 1961 and oral contraceptives were offered to mothers with more than four

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1 See pp.145-8.  
2 See pp.98-100.  
3 See p.98.
children. In 1966 the I.U.D. was introduced and in 1967 it was decided to make general advice on family planning and practical assistance available to all who wanted it, through the Department of Public Health. During 1967-68 about 2,300 loops were inserted with little persuasion, and information about the service spread almost entirely by word of mouth. Why the response was good in some rural areas and not in others is little understood.

Little publicity has been given to the availability of the services as the Administration does not wish to push family planning strongly. Public comment has said variously that only the leaders of an independent government should decide whether to launch a campaign or not; that great publicity now would only antagonise certain religious and other groups; that rapid population growth should be encouraged for increasing pressure on land resources will motivate more persons from the subsistence sector to offer themselves on the labour market, and this will produce economic benefits. As there is in general no feeling that family planning is a matter of urgency in Papua New Guinea, it would be surprising if a major campaign deliberately aimed at lowering fertility were to be launched by the Administration.

The attitude of an independent government will probably not be favourable to family planning on a significant scale. The present Speaker of the House of Assembly was reported in a statement by the Catholic bishops issued from their annual conference in July 1970 to have told his people 'Populate or perish', and the bishops declared themselves in full support of this and in strong opposition to Administration policy. In fact, they 'remind all Catholics that should it ever happen that any over-zealous or misguided person fails to respect their conscience or bothers them in this matter of family planning...they should inform, without delay, their Member of the House of Assembly, their Bishop or their pastor'.

But at least as important as the attitude of the responsible authorities will be the attitudes towards family planning held by the indigenous population. The many reports of the alleged use of various methods of abortion and contraception suggest that a tradition of family planning or limitation is probably present in most groups, but as yet no systematic survey into the attitudes of the population has been undertaken. Bulmer suggests that family planning programmes are more likely to be accepted in societies where the breakdown of traditional forms of family limitation would severely affect women's routine of work, family responsibilities and general welfare.¹ But it is especially in these societies that the degree of illiteracy among women is extremely high, and the least educated section of the population may not be sufficiently motivated to use modern contraceptives for sustained periods. So until field surveys have shown otherwise, it is advisable to assume that the urge

¹ See pp.158-9.
to restrict families substantially below six or seven children will not 
be strong in societies characterised by what Fisk (1970) calls 'subsistence affluence'. 

There is no reason, therefore, to expect substantial fertility changes 
in Papua New Guinea, and although decline is possible it will probably 
take time and result from urbanisation, social change, and increasing 
publicity of the availability of family planning assistance.

Fertility change assumptions

Three different assumptions about fertility development have there- 
fore been formulated. All assume an increase in the rate for 1966-71. 
Under the high assumption the increase continues until 1976-81 when the 
total fertility rate reaches a level of 6.690 per woman, that is, 7.5 
per cent above the rate thought to exist at present. A gradual decline 
then takes place, but the total fertility rate does not drop at any 
time during 1966-91 below its 1961-66 level. This sequence could occur 
if no attempts were made to disseminate contraceptive knowledge and if 
it takes another fifteen years or so before the effects of social change 
start bringing fertility down instead of pushing it upward. 

The medium assumption considers that by 1976 the decline in mortality 
has become so strongly noticeable in its effects upon population growth 
and numbers of children surviving that, possibly largely because of 
social reasons, a family planning publicity campaign is sponsored offi-
cially. Some direct action is therefore envisaged, but it is probable 
that no all-out campaign would be required to prevent further fertility 
increase and to bring fertility down by a fairly modest 10 per cent at 
the end of the period. 

The low assumption also considers that fertility increases by 2.5 
per cent during the first five years, but from then onward the tendency 
to decline outweighs the tendency to increase. A good deal of delibe-
rate effort would probably be required to bring about this situation, 
because it cannot be expected that family planning publicity will be 
more than moderately successful. The assumed decline of 17.5 per cent 
over a twenty-year period is thus not so modest as it appears initially. 

Table 3.4 summarises the three fertility assumptions by expressing 
the fertility rates in force during each period as a proportion of 
those estimated for 1961-66. 

These three assumptions differ markedly from those employed in 
various other studies, indicating that expectations about changes in 
fertility can indeed be rather different in different countries, and 
that there is very little consensus amongst demographers as to what is 
standard or plausible in respect of fertility change in developing 
countries. Moreover, demographers' views on the purposes of long-term 
population projections may differ. Two cases will be mentioned here, 
one relating to Africa and one to Asia.
In the preparation of long-term projections for the African population of Kenya (Kenya Statistics Division 1966:80), two different fertility assumptions were used. The high assumption specified a constant total fertility rate of 6.8 over the entire period from 1960 to 2000. The low assumption specified constant fertility until 1965, a very sharp decline during the decade 1965-75, and a rate constant at the new level for the rest of the period. The pattern of fertility decline adopted 'was that shown by the trend in age-specific fertility rates of Japanese women between 1949 and 1959', which represents a decline in total fertility rate from 6.8 to 2.873.

Two different fertility assumptions were also used in projections prepared by an expert committee for India (Government of India 1969:16); these assumptions 'represent the judgement of knowledgeable persons... who have faith in the ultimate success of the [family planning] programme'. The percentage declines in the general fertility rate under the high assumption are specified as 0 during 1966-70, 5 during 1971-75 and 15 during 1976-80, while under the low assumption declines of 10, 15 and 25 per cent are specified.

The two examples illustrate the diversity of approach and opinion clearly, and show also that it is somewhat unusual to specify such small differences between the various assumptions as has been done for Papua New Guinea. But here drastic fertility change is not likely to take place, nor in the New Hebrides or the British Solomon Islands Protectorate. Dr N. McArthur,¹ who prepared projections of the populations of these countries a few years ago, did not incorporate a fertility decline of more than 10 per cent after 1975 in her calculations. She also found that almost ten years of family planning campaigns in Fiji did not affect the growth of the Fijian population at all.

¹ Personal communication, 1970.
Seen in this light the small changes specified for Papua New Guinea appear plausible.

Results

1. Total population and vital rates

The changes in total indigenous population size up to 1991 which would follow from the various assumptions are set out in Table 3.5. The total size varies from 4.29 to 4.61 million, and even under the low assumption the female population will more than double between 1966 and 1991. Under all assumptions much of the numerical increase will occur during the last ten years of the period, and it is also then that the main differences in population size will develop.

Table 3.5

Projected size of the population under three different fertility assumptions, 1966-91

<table>
<thead>
<tr>
<th>Year</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>1,122.0</td>
<td>1,122.0</td>
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The consequences of the postulated changes in mortality and fertility for Papua New Guinea's birth, death and growth rates are summarised in Table 3.6. The death rate during 1986-91, compared with that during 1961-66, will be more than halved under all assumptions. By 1991 a death rate of well under 10 per thousand can be expected. This means that the average annual growth rate under the high fertility assumption would reach about 3.2 per cent, under the medium assumption about 2.9, and under the low assumption about 2.8. The specified declines in
fertility under the medium and low assumptions, in conjunction with age distributional effects, about sufficient to keep the growth rates constant after 1976.

Table 3.6

Development of vital rates under three different fertility assumptions, 1966-91

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2. Age composition

The changes in age composition that would occur simultaneously with the increase in population size are shown in Table 3.7. Under all assumptions the proportion under age 15 would increase above that estimated for 1966, but the increase is much greater under the high than under the medium and low assumptions. At the same time the proportion aged 65 and over, although not changing greatly, will tend to increase, and the proportion of the population of working age will
consequently decline markedly. For example, under the high assumption the male population of working age (taken here as 15-64 years) will decline from 55.8 per cent of the total male population in 1966 to only 51.4 per cent in 1991.

Table 3.7

Percentage age distribution of the projected population,*

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</table>

* Due to rounding figures may not add up to 100.

But in actual size the population of working age will be the same under all assumptions until 1986. It is not until 1991 that the effect
of the fertility differences becomes noticeable; the population aged 15-19 is then 483,000 under the high and medium assumptions but only 461,000 under the low assumption. The numerical increase in the working-age population over the period 1966 to 1991 is very substantial. There will be more than 1,220,000 males aged 15-64 by 1991, compared with 626,500 in 1966, and a similar increase will take place in the female population. If the population of working age is restricted to the age group 15-49, as is usually done by the Manpower Planning Unit of the Department of Labour, the numbers by 1991 under the high and medium assumptions are 1,050,000 and 970,000 respectively. In 1966 only 35.9 per cent of the males and 9.0 of the females in this age group were reported to be in the monetary sector workforce (see Table 5.2). If this proportion is even to remain constant, the existing number of positions must be more than doubled by 1991.

A problem which will undoubtedly give planners even more difficulties is that of the increase in the school-age population. Between 1968 and 1973 the primary course will change from a seven-year course with entry at age 6 to a six-year course with entry at age 7 (Fry 1970:71). Table 3.8 shows the results for the two age groups 5-6 and 7-12 years. Although preparatory classes will be phased out, 5 and 6 year-olds are potentially of school age and may, because of uncertainty about birth dates, actually compete with 7 year-olds for entry into primary school.

Table 3.8
Projected size of the infant and primary school-age population, 1966-91

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The 5-6 years age group which could profitably attend kindergarten or infant school comprised about 122,000 children in 1966. This number increases to 292,000 by 1991 under the high assumption, to about 264,000 under the medium assumption, and to somewhat less than 250,000 if fertility decline is more substantial. The size of the 7-12 years age group, estimated to be about 318,000 in 1966, under the same assumptions and over the same period increases to about 774,000, 708,000 and 672,000 respectively. Thus, while under the high assumption 1,066,000 children aged 5-12 would compete for a place in an infant or primary school in 1991, their number could be 145,000 lower if a moderately large fertility decline occurred. Since total enrolment in primary T schools was slightly below 200,000 children in 1967 (Fry 1970:91), such a difference could be very significant.

The problem is approached from a slightly different angle in Table 3.9, where the sizes of the entry-age cohorts for primary, secondary

Table 3.9

Projected size of the entry-age cohorts for primary, secondary and tertiary education, 1971-91

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<tr>
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<td>37,400</td>
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and tertiary education are shown. Since the figures were obtained by interpolation of the five-year age group totals using Sprague's multipliers they are to a certain extent approximate, but the trends are clear. It is quite apparent that even the small fertility differences postulated can have a very noticeable effect on the size of the cohorts seeking entry to the educational institutions at the various levels:

Conclusion

It must be expected that mortality decline will continue to be rapid in Papua New Guinea; life expectancies at birth of approximately sixty years for both males and females seem possible for 1986-91. However, although the future course of fertility is less certain, it seems reasonable to assume that fertility will initially rise slightly and that later, but probably not before the mid-1970s, a nominal decline in fertility will commence. This decline, which is expected to result from increased publicity given to family planning and from rapid urbanisation and de-tribalisation, may nevertheless exert a significant influence on population growth. But, barring the unlikely event of a massive government-sponsored family planning campaign, development planning should be based on the assumption that the population will more than double in the twenty-five years from 1966 to 1991.

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Chapter 4

Population growth and economic development

G.W. Jones*

The effect of population growth on economic development is a broad topic, and despite continuing debate of greater or lesser intensity since the time of the classical economists, it is still not a closed issue. This short paper makes a few points about the subject that seem to have fairly general validity, attempts to relate them to the rather special circumstances facing Papua New Guinea, and refers the audience to some of the relevant literature.1

To understand the economic effects of rapid population growth in a country such as Papua New Guinea, the causes and dynamics of this growth must be understood. Papua New Guinea's population growth is rapid (about 2.6 per cent per annum), though less rapid than in much of the developing world. It is not only rapid, but accelerating, for the same reason that population growth has accelerated in most of the developing world over the past two decades: the maintenance of high fertility levels in the face of declining mortality levels. Growth rates are lower in Papua New Guinea mainly because mortality has not yet reached the low level attained in many developing countries; a further decline in mortality towards levels already reached in Thailand and Malaysia could raise the growth rate above 3 per cent per annum in the not-too-distant future.

In the context of history the present demographic situation of the developing countries is highly unusual. Traditionally, high birth and death rates tended to cancel each other out and population growth was slow. The results of the rapid decline in death rates, brought about largely by remarkable advances in public health and environmental sanitation, are an abnormally large family size and abnormally high rates

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1 A longer and non-technical treatment of the subject is given in Jones (1969).
of population growth. This is an unstable situation that cannot long be sustained. In time, a return to less frenetic population growth is inevitable.

There are several forces of adjustment that can be expected to result in slower population growth. The old Malthusian forces, including a rise in the death rate, lurk in the background; but, as a result of urbanisation, mass education, and 'modernisation' of all kinds (including changes in the role of women), there are also likely to be both a gradual adjustment of the number of births to the altered mortality conditions and a downward revision of the size of family desired. The main questions at issue are how long these adjustments will take and whether the rapid growth of population will in itself hinder the very processes of modernisation that can be expected to slow that growth. Those taking a pessimistic line on these questions are more likely to favour government intervention to lower the rate of population growth, either by going slow on health measures designed to lower mortality, or by attempting to stimulate a fertility decline through adoption of a family planning programme and other measures designed to affect the ease or subjective desirability of limiting family size.

Since mortality is still relatively high in Papua New Guinea, government policy can influence population growth rates through the mortality variable to a greater extent than in many countries.

Even though in Papua New Guinea, as in probably all countries today, the government is committed to lowering mortality and improving health, there is still the question, 'How fast?'. For it is sometimes argued that even on humanitarian grounds the aim of rapidly lowering mortality is invalid, since further reductions in mortality, by contributing to the population explosion and its attendant ills, will reduce the total welfare of the society below the level that would result from a perpetuation of the current relatively high mortality levels. While the problems of measuring total welfare are almost insurmountable, it is at least possible, through the use of macro-economic growth models, to simulate in a very simplified way the growth paths of the economy in situations of greater and less mortality reduction, and to derive estimates of trends in that magical indicator of economic well-being, the per capita income, in these alternative situations. Barlow (1968) has attempted such an analysis, related to the eradication of malaria in Ceylon. He found that malaria eradication raises per capita income in the short run but lowers it in the longer run as the negative effects of the accelerated rate of population growth begin to outweigh the positive effects arising, in the main, from increased labour productivity. (This conclusion held for a very wide range of assumptions regarding the effect of malaria eradication on the quality of skilled and unskilled labour,) Another study for Pakistan, using a different model, yielded similar results (Hoover and Perlman 1966).

These findings support my suspicion that per capita income cannot be used satisfactorily as a proxy for personal welfare. It would be
naive to infer from them that malaria should be left unchecked or, more generally, that mortality should not be lowered; rather, the lesson to be drawn is that it is unwise to interfere with the mortality side of the growth rate equation without taking some steps to keep the fertility side in balance. One hard-headed argument for continuing efforts to lower mortality rates is that fertility is unlikely to be brought down very much until mortality rates are lowered. If it is granted that it is not 'births' that people want, but rather a given number of children growing up to adulthood, then their experience of having more children survive infancy from a given number of births than their parents experienced is a potent reason also to want fewer births than their parents wanted. Birth and death rates cannot be brought into low-level equilibrium until death rates are low.

This, of course, does not answer the question of how much effort should be put into programmes specifically directed towards lowering morbidity and mortality compared with other development objectives. The government of any country that has a relatively high death rate must weigh alternative levels of health expenditure against other pressing demands on the national budget; with less or greater expenditure in other areas such as education, transport, and power supplies, a larger or smaller number of premature deaths will be prevented. But in most developing countries, given political realities and accepted national goals, the range of possible choices in this matter is fairly narrow and the future trends in mortality fairly predictable.

It is therefore assumed that mortality in Papua New Guinea will continue to decline as a result of improvements in nutrition, living conditions, and public health services, and that population growth rates will tend to rise unless fertility is lowered. In the absence of fertility reduction, not only will population growth rates increase, but the percentage of the population in the under-15 age group will increase somewhat also. This age group already contains about 42 per cent of Papua New Guinea's population, compared with about 25 per cent in Western countries.¹ In analysing the economic implications of rapid population growth, both the rate of growth and the youthful population structure must be borne in mind.

One traditional approach to the relationship between population growth and economic development was concerned with the relation of population size to 'resources' and hence with a search for the elusive 'optimum population'. The problem with such an approach was that all conditions relevant to income and output, other than population size, were assumed to remain unchanged. To allow changes in the state of technical knowledge, in production functions, in attitudes and institutions affecting productivity and so forth, was to turn the 'optimum

¹ Van de Kaa's latest estimates (see Table 3.7) are used for the details on population structure.
population' being sought into a will-o-the-wisp. These days, optimum population theory is being given a new lease of life through the concern with ecological balance and the environment. In this case the unchanged factors (and unchanged factors are indispensable to optimum population theory) are held to be the supply of resources such as the earth's biosphere, non-renewable minerals, and space itself on this planet. This new emphasis on ecological balance might appear to have little relevance to the question of the relationship between population growth and economic development in developing countries, but the ecologists have several most important and troublesome observations to offer to those economists who accept as an article of faith that technological advance will always come to the rescue when resource shortages seem imminent. These arguments are summarised in the contention that the rapidly growing populations of the developing countries can never hope to reach the current levels of production and consumption of the United States, because success in doing so would impose intolerable strains on the world's supply of industrial metals and sources of energy, and on the means of waste disposal and pollution control.1 Clearly, one thrust of the ecologists' arguments is that whatever goals the developing countries set for themselves, they had better get there with as little population growth as possible.

A second traditional approach to the subject was to examine whether a reduction in population growth rates would assist in breaking through the key bottlenecks to economic development. Certain characteristics are, almost by definition, common to all underdeveloped countries: low rates of saving and investment, low rates of material capital per worker, and a poorly educated labour force. These, among other characteristics, account for the low levels of output per worker and per head of population. Unfortunately, one of these characteristics, the shortage of capital, tended to be identified in the literature of the 1950s as the crucial bottleneck. As a result, the earlier post-World War II approach was to concentrate on the capital requirements of maintaining current levels of output per head and per worker, given different trends in population growth. A certain ratio between extra capital and extra output was assumed, and was summarised in the capital-output ratio. Given this simple model, an increase in the labour force raises the demand for a certain amount of capital investment - 'demographic investment', using Sauvy's expression (1969) - simply in order to keep total product per head unchanged. The relationship is usually expressed in the following way:

If population increases by 2 per cent annually and if the marginal capital-output ratio is 3 to 1, 6 per cent of the national income must be saved and invested per year in order to maintain the present level of income per head. If it is

1 For a useful discussion of the problem, see Ogburn (1970).
desired to increase income per head by 2 per cent a year, another 6 per cent of the national income must be saved and invested.

This approach illustrates in a simple way the indisputable fact that rapidly growing populations must invest a substantial share of their annual output to prevent per capita income from declining, and if this is all that is claimed for it, there are no problems. However, it is a mechanistic approach which gives a misleading impression of precision. In the form usually stated it implies a constant ratio of labour force to population, which in turn implies an unchanged age distribution and therefore a constant birth rate over a long period. This neglect of the dynamic aspects of population trends does not matter too much if fertility has remained high. More importantly, though, the model implies that capital alone is the crucial variable. An enormous ceteris paribus assumption is hidden in the constant capital-output ratio.

With the renewed interest in the late 1950s and 1960s in the sources of economic growth apart from conventionally defined labour and capital, the 'capital bottleneck' approach began to look rather sterile. A more sophisticated approach has been developed in which macro-economic growth models are designed that give due recognition to the linkages between population dynamics and key economic variables such as personal savings rates, the structure of government spending, and the size and quality of the labour force. By feeding alternative population projections into such models, the interaction of the population variables with other inter-related variables can be traced. These models are typically expressed as a set of equations with known or assumed coefficients of inter-relationship and timing, which can be tested by fitting them to a period in the past, and used to project the growth of the economy in the future. Early macro-economic models treated population in a very formal way, normally assuming a constant rate of population growth, but since the mid-1950s a number of models have been constructed in which population change plays a central role.

The best known of these models is the Coale and Hoover study (1958) of Indian economic and demographic trends. They use what is basically a Harrod-Domar growth model that makes output solely a function of the capital stock, though instead of a simple measure of investment they use 'equivalent growth outlays', a measure of total investment adjusted for the varying productivity and gestation time of its components. These components are respectively 'direct growth outlays' (which include most of private investment other than housing, and five-year plan expenditure by the government other than on social services, housing

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1 The growth models of Harrod (1939 and 1959) and Domar (1947) were originally constructed for analysis of advanced nations, and that of Domar was concerned to maintain effective demand in a mature economy.
and rehabilitation) and 'welfare type outlays' or investments in human resources. The latter are further subdivided into welfare outlays required by the current population, and those attributed to the needs of the current addition to population. Coale and Hoover assume that it takes ten times as much to meet the initial needs of an addition to the population as to maintain that person thereafter. The welfare type outlays are made to affect output more distantly and weakly than the direct growth outlays.

The results of the Coale-Hoover projections indicated that not only would per capita income be substantially higher after thirty years in the declining-fertility model, but also that total income would grow faster. The reasons are clear enough. Because of higher per capita income in the low-fertility case, the proportion of income assigned to investment was larger than in the high-fertility case. And of these investment expenditures a greater proportion was of the high productivity capital goods type as opposed to the welfare type.

Another notable finding of Coale and Hoover (1958:281) was that, even though their wide range of projections yields widely varying incomes after thirty years, the differential in income associated with reduced fertility is remarkably constant, ranging only from 38 to 48 per cent. But Myrdal has argued convincingly that the stability of this differential is largely spurious because of certain characteristics of the model. He also criticises (1968:2073-4) the key assumption that savings become an increasing proportion of rising income per head, noting that if the assumption of a constant ratio of savings to income is substituted, a substantial part (two-thirds) of the differential in total income between the low and high fertility assumptions is wiped out.

A number of more recent studies (Demeny 1965; Hoover and Perlman 1966) have explored variations on the Coale-Hoover model, but the Harrod-Domar model is in many ways inappropriate for examining long-term growth (for example, it makes the marginal productivity of labour zero). Attention has therefore shifted to the neoclassical growth model, using a Cobb-Douglas production function, which enables labour inputs to be brought more meaningfully into the model and reduces the importance of the assumptions made about the form of the savings function. Many of the models using this approach incorporate an autonomous growth assumption in order to counter the criticism that increases in gross national product can occur because of increased

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1 The simple form of the Cobb-Douglas production function includes labour and capital as factors of production and assumes constant returns to scale, so that if labour and capital inputs are both doubled, output is doubled also.

2 These models are evaluated in some detail in Robinson (1971).
labour quality or enhancement of productivity through technical progress, aside from the quantity of capital or labour inputs. Most do not include land as an input, either reasoning that the extensive margin of cultivation is already reached (Enke 1967 and 1970) or alternatively that it will not be reached during the projection period (Newman and Allen 1967). Ruprecht's model (1967) for the Philippines, however, does give an important place to the land input, with the exponent on land shifting when the extensive margin of cultivation is reached.

The results of using the various models are summarised in Table 4.1. According to all of them, a decline in fertility yields higher per capita income throughout the period of time covered. But they all show that it takes time for a substantial differential in per capita or per consumer income to emerge between the high and low fertility projections. After ten years the difference is negligible, except in Enke's model, and even after twenty years the differences are far from spectacular. Yet much depends on the vantage point from which they are examined. After all, a 10 or 20 per cent difference in per capita income after twenty years probably means that per capita income has grown by one-third or one-half as much again in the declining-fertility as in the high-fertility case.

These models do not, of course, analyse comprehensively the effect of a decline in fertility on per capita income. Indeed, the remarkable degree of consistency in the results of models applied to a wide variety of high-fertility countries is in itself reason to suspect that they do not give the full story. This consistency is partly due to the emphasis in the models on population growth and structure as responsible for the economic gains when fertility declines; in terms of the potential change in these parameters the underdeveloped countries are very much alike. 'Nevertheless', as Demeny (1969) observes, 'it is likely that the presumed insensitivity of these gains to the vastly differing economic characteristics of these countries merely reflects the inadequacy of the underlying theoretical apparatus rather than the intrinsic nature of the mechanisms involved.'

None of the models, for example, adequately incorporates the effects of alternative trends in fertility on the quality of the labour force, or adequately treats foreign trade relationships, which are of key importance for many developing countries. In general, the models are

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1 Newman and Allen (1967:55-6) experiment with a wide range of values for the key coefficients and a wide range of combinations of these coefficients. They find that, according to a few unrealistic sets of coefficients, continued high fertility yields better results than more sharply declining fertility. But even in these cases, there is always some level of lower fertility which is better than continued high fertility.
Table 4.1
Comparison of the models

<table>
<thead>
<tr>
<th>Model</th>
<th>Per capita income: percentage ratio of declining-fertility case to high-fertility case after:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>10 years</td>
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<tr>
<td>Coale and Hoover</td>
<td></td>
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<tr>
<td>Hoover and Perlman</td>
<td></td>
</tr>
<tr>
<td>No autonomous GNP growth</td>
<td>103</td>
</tr>
<tr>
<td>2% annual GNP growth</td>
<td></td>
</tr>
<tr>
<td>Ruprecht:* Historic performance</td>
<td>101.2</td>
</tr>
<tr>
<td>+ high productivity growth</td>
<td>101.2</td>
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<tr>
<td>+ high productivity + high structural shift</td>
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<tr>
<td>Enke</td>
<td>109</td>
</tr>
<tr>
<td>Newman and Allen</td>
<td>101.5</td>
</tr>
</tbody>
</table>

* The percentage ratio of the declining-fertility case to the high-fertility case varied very little according to a variety of combinations of lower and higher rates of productivity growth and structural shift.

Unable to express the complexities of the process of economic growth; they are unable to say whether, and if so to what extent, a decline in fertility affects all sorts of important underlying determinants of economic trends, such as the extent of corruption, the efficiency of the bureaucracy, the degree of tension between rival ethnic groups, the aspirations which people have for themselves and their children, their willingness to take risks, to adopt new practices in agriculture, and so forth. Many of these determinants may be regarded as relatively little affected by the difference between the population growth alternatives; in other cases there may be an effect but its size and direction can only be conjectured. However, in some cases the effect may be of the utmost importance. For example, rapid population growth, by requiring a doubling of government services and facilities in twenty-five years or less merely to maintain base-year levels, imposes tremendous strains on the administrative capacity of a developing country. If the administrative apparatus is not equal to the task, the potential for unrest and violence (with their attendant effects on investment and economic growth generally) will no doubt be heightened.

Unless it can be shown that declining fertility is likely to affect some of the underlying determinants of economic trends in a way that
will hinder economic growth, and this does not seem to have been demonstrated, then the models are justified in ignoring them in calculations of the minimal differential growth effect of a decline in fertility. This may lead, however, to serious understatement of the benefits of fertility control, because the 'non-measurables' referred to determine, to a large extent, whether economic growth occurs or not; they are the hidden determinants of the 'measurables', such as savings rates and capital-output ratios, with which these models are concerned.

There is little doubt that any of these macro-economic models, if applied to Papua New Guinea (or to any other developing country), would indicate that a decline in fertility would yield economic benefits similar to those shown in Table 4.1. However, three features of Papua New Guinea's economy make it a rather special, though by no means unique, case, and these must be considered in applying the models.

The first is the generally subsistence and 'pre-industrial' nature of the economy which makes it one of the least monetised in the world. An adequate treatment of the effects of population growth on economic development in this context would have to analyse its effects on subsistence agriculture at the local level, for example, its effect on cropping practices, on patterns of out-migration and seasonal wage labour, and to what extent land shortages will become a problem.¹

Since personal savings almost certainly constitute a smaller share of total monetised savings in Papua New Guinea than in more highly monetised developing countries, the effect of population trends on personal savings rates will be of relatively less importance to the pace of economic development. But its importance will increase over time as the economy becomes more highly monetised. However, some writers have claimed that the increase in per capita income resulting from a fall in the birth rate in a developing country will not lead to higher personal savings than would the maintenance of high birth rates. The reasons for this claim are not always clearly stated, but two common arguments appear to be: first, that the goal of parents in restricting family size is more likely to be increased consumption than increased savings;² and secondly, that irrespective of motivation, the marginal gain in per capita income for a family that averts a birth is small and likely to be swallowed up in increased consumption levels, particularly if that family is a low-income rural family.

But the point at issue is not whether a particular family saves more out of its given income because of the rise in average income among the family members caused by the avoidance of an extra birth. Avoiding an extra birth does not raise the average income of family members; all that happens is that they have a higher average income than they would

¹ See Chapters 7, 8 and 9.
² See, for example, Zaidan (1968).
have had if a baby had been born. Avoiding a birth, then, does not have any noticeable effect on the average income or well-being of the family members; acquiring an extra mouth to feed does, even though this effect might admittedly be negligible in a large, poor, rural family. Thus the question really is whether or not there is likely to be at least temporarily lower savings (or higher dissavings) when a family acquires a new baby than when it avoids doing so. And the answer is surely affirmative.

It is therefore hard to argue that, on balance, personal savings will not be higher when the birth rate falls than when it does not.\(^1\) A more important question is whether or not the effect is large enough to warrant much attention. Probably, in the current Papua New Guinea situation, it is not.

Yet the likelihood that the 'savings' effect is relatively unimportant in Papua New Guinea does not mean that a reduction in birth rates would have little economic significance. First, the savings effect will become more important over time; and secondly, Papua New Guinea will derive important medium-term benefits from another of the major effects of falling birth rates, the effect on the structure of investment. A fall in fertility enables a government to meet its goals for the coverage of social services (education and health in particular) more cheaply than otherwise. This opens two favourable alternatives: either to set more ambitious goals for the social services or to divert money to other investments without lowering social service objectives. These effects are not insignificant, although like all the benefits of a decline in fertility, the savings in social service expenditures take time to build up. Compared with a situation of constant fertility, a reduction of 50 per cent in fertility over a thirty-year period is likely to lead to savings of more than 1 per cent of the country's gross national product per annum after twenty-five or thirty years, if the objective is a steady rise in the proportion of children in school.\(^2\) A detailed set of projections for Ceylon has indicated that even in the first ten years, the savings in health costs would exceed the entire expenditure on health services in the base-year (Jones and Selvaratnam n.d.).

The second special feature of the Papua New Guinea economy is its heavy dependence on international trade and aid, and especially on imported capital and intermediate goods for the development of its own

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\(^1\) Although this question needs to be studied further, indirect evidence is available from Leff's study (1969), which suggests that the 'burden of dependency' is important in explaining the large differences in savings ratios among the countries of the world.

\(^2\) For a detailed study of the implications for education, see Jones (1971).
productive capacity. There are many imponderables here: the size of the Australian grant, the trends in export volume and prices, and the rate of development of import-replacement industries. But given the level of export earnings and of foreign aid, the amount of foreign exchange available for the purchase of capital and intermediate goods can be viewed as whatever is left over after the import of consumer goods. A wide range of policies is possible regarding the freedom to import consumer goods; but some such imports are essential, the amount depending largely on population size. Ceteris paribus, the lower the birth rate, the more goods can be imported to develop the economy's productive capacity.

The third special feature is Papua New Guinea's very small domestic market. Although its population is comparable to that of New Zealand, its market is very much smaller because of its low income levels. Its task is to develop as a small country with a small market, because this is going to be its condition in the foreseeable future. If the rate of population growth accelerates soon to 3 per cent per annum, the population by the end of this century will still be below six million. Papua New Guinea could try to follow the population growth route to a larger domestic market and economies of scale, or the rising incomes route, or some combination of both. The important point is that if, in fact, rapid population growth holds back economic development, it may cause the size of the market to grow more slowly than it would with a more slowly growing population. The domestic market will grow more rapidly if population grows at 1 per cent per annum and per capita income at 5 per cent than it will if population is growing at 3 per cent and per capita income at 2 per cent.

A comprehensive analysis of the effect of population growth on economic development in Papua New Guinea would have to take into account the special characteristics of its economy, but there is no reason to expect that such an analysis would alter the broad conclusion that a decline in fertility, beginning now, would increase the likelihood of rapid economic growth.

This, however, raises the further question of how much money it would be economically justifiable to invest in a programme designed to lower birth rates. There is no time here to go into this complex question; however, although cost-benefit analysis of family planning programmes is still at an unsatisfactory level of sophistication, in general those who have attempted such analyses agree that family planning programmes of the kind developed in many Asian countries yield returns that would be considered very high if calculated for the more traditional kind of government investment.\(^1\) Many would argue that, quite aside from their economic returns, such programmes can be justified simply on the basis of their contribution to the welfare of

\(^1\) For a good summary and an extensive bibliography, see Robinson (1971).
mothers and children and their role in widening the range of choices available to individual couples.

In summary, then, a decline in the birth rate in a developing country has two major beneficial results: it slows the increase in the number of children and, as a corollary, results in a higher ratio of workers to dependants. Since, in the medium term, the size of the labour force is virtually unaffected, output will be as high as it would be in the absence of a fertility decline. But as the total output is to be distributed among a smaller population, income per head rises relative to what it would be in the absence of a fertility decline. The lowered dependency rates and higher per capita incomes may generate a number of other favourable effects: probably the proportion of income saved and invested and hence the amount of capital per worker can be raised; the investment needed to maintain current levels of social services per head of population is reduced, and funds can be released for more directly productive investments; educational enrolment rates (and, after a lag, the educational attainment of the labour force) can be raised more rapidly; the gains in income per capita may have a feedback effect on labour productivity through better health and nutrition. For these reasons, total income could well grow more rapidly if fertility declines.

It is specious to argue, as some have, that because the economic benefits accruing from a decline in the birth rate could be equally realised by a relatively small increase in savings rates, attention should be given to raising savings rates rather than to lowering birth rates. Raising savings rates is not easy, and it is made no easier by the perpetuation of high birth rates. One has the impression that those using this argument are over-reacting, in justifiable irritation, to the tendency in some quarters to peddle population control as a panacea for the economic ills of the developing world.

This paper has not dealt at all with the effects of rapid population growth, or of a reduction in the birth rate, at the family level. Assuming that the fall in the birth rate results from the voluntary decisions of couples in the community and involves no expenditure of public funds, an unequivocal increase in welfare should follow. Individual families, both those who lower their fertility and those who do not, will benefit from the increased per capita income that will result from a decline in fertility (that is, there will be no 'losers'), but some will gain more than others, in particular those families whose averted births are responsible for the reduction in the birth rate. In other words, there will be some 'redistribution of income' effects. However, if expenditure on a family planning programme, financed out of tax revenue, is required to bring down the birth rate, the possibility arises that some people in the community will become net losers. But to embark on this topic is to enter the sacred precincts of welfare economics, and that deserves a separate paper.
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Chapter 5

Population growth and the workforce in Papua New Guinea

C.L. Beltz*

Western forms of economic organization, even when established in the partial isolation of the typical enclave, cannot be completely insulated from the influence of the indigenous social and institutional environment. When transferred to South Asia, Western economic institutions and practices have quite different effects on the utilization of labor and on output per head from the effects normally expected in Western countries. This difference, among others, calls into question the applicability of Western concepts and theories to even that small segment of South Asian economic life which is most nearly similar to Western conditions.

(Myrdal 1968:1094)

This comment about South Asia may be applied to developing countries regardless of their geographical location. It is certainly relevant to Papua New Guinea where economic organisations and institutions are predominantly of the Western type, transplanted by small groups of expatriates. As Papua New Guinea's human resources are developed, they are being equipped for a workforce whose structure and size are by and large determined by these Western economic institutions, but whose effective utilisation may prove to depend on a successful blending of Western values and forms of organisation with traditional indigenous ones.

It is proposed, first, to examine briefly some of the important characteristics of the population and the workforce revealed by the 1966 population census which is the only set of benchmark data on the indigenous population so far available; and secondly, to discuss in the

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context of overall population growth the changes in size, racial composition and skill category which are likely to take place in the workforce.

Population and workforce in 1966

According to reports of the 1966 census, the total population in 1966 was 2,187,788, including almost 35,000 non-indigenes. Of the total indigenous population, 592,741 or 27.5 per cent lived in Papua, and 1,560,225 or 72.5 per cent lived in New Guinea. The respective percentages for the non-indigenous population were 41.5 per cent and 58.5 per cent, indicating that the seat of government, Port Moresby, has attracted a disproportionate number of expatriates. The non-indigenous population was and is largely urban; the census enumerated 70.2 per cent living in urban areas, 29.1 per cent in rural non-village areas, and less than 1 per cent in rural villages. By contrast the indigenous population is primarily rural; some 88.4 per cent lived in rural villages, with 6.8 per cent in rural non-village areas and 4.8 per cent in urban areas.

The age distribution for 1966 has been analysed by van de Kaa (1970: 5-9, 15-18) and his latest estimates will be used for the indigenous population (see Table 3.7). These vary considerably from the census data, and as variations in the size of age groups can have major implications for government planners (for example, in respect of coverage of the population by health and educational services), van de Kaa's more reliable data will be used.

The different age composition of the indigenous and non-indigenous population is clearly shown in Table 5.1. The working-age population is defined for the purposes of this paper as the population in the age group 15-49 years for indigenes, and 15-59 years for non-indigenes. The working-age group contained slightly less than half of the total indigenous population and slightly more than two-thirds of the non-indigenous.

The working-age population must be clearly distinguished from the monetary sector workforce. In economically advanced countries where every single member depends in some way on a continuous cash income for

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1 Population and workforce figures, unless otherwise indicated, are from the most recent cross-classifications of 1966 census data (unpublished), which differ slightly from the published data (Bureau of Statistics 1969).
2 'Urban' is defined by the census as all centres with a population of five hundred or more; 'rural non-village' consists of separately located plantations, government and mission stations and institutions, and commercial leases and settlement areas, with populations of less than five hundred.
Table 5.1

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>% of total</th>
<th>Females</th>
<th>% of total</th>
<th>Persons</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in group</td>
<td></td>
<td>in group</td>
<td></td>
<td>in group</td>
<td></td>
</tr>
<tr>
<td>Indigenous</td>
<td>533,385</td>
<td>47.5</td>
<td>477,661</td>
<td>46.3</td>
<td>1,011,046</td>
<td>47.0</td>
</tr>
<tr>
<td>Non-indigenous</td>
<td>14,252</td>
<td>70.8</td>
<td>9,298</td>
<td>63.3</td>
<td>23,550</td>
<td>67.6</td>
</tr>
<tr>
<td>Total</td>
<td>547,637</td>
<td>47.9</td>
<td>486,959</td>
<td>46.6</td>
<td>1,034,596</td>
<td>47.3</td>
</tr>
</tbody>
</table>

a livelihood, the two terms may be almost synonymous and are often used interchangeably, but in Papua New Guinea relatively few people are committed to continuous and regular work for money, and for most there is a livelihood available outside the monetary sector of the economy. Thus the participation of many indigenous people in the workforce is largely optional, which is not the case, particularly for males, in advanced societies.

The census distinguished four components in the workforce: wholly money raising; mainly money raising with some subsistence; mainly subsistence with some money raising; and wholly subsistence. For planning purposes, as in the first five-year plan (Territory of Papua and New Guinea 1968:84), the wholly and mainly money raising components have been combined to constitute the monetary sector workforce. This categorisation has been used consistently by the Manpower Planning Unit to make projections and will be used here, referred to as the workforce. The dividing line between the mainly money raising and mainly subsistence component is relatively clear-cut in terms of available statistics, but it is blurred in practice for the dividing line between 'mainly money raising' and 'some money raising' is difficult to establish. Moreover, a large number of workers included in the monetary sector may be only temporarily in the workforce, as was true of an estimated 4,000 workers employed for the coffee harvest when the 1966 census was taken; this will be a characteristic of Papua New Guinea's workforce for some time to come and increases the rate of wastage in the workforce, but it is likely to be of diminishing importance over time with the increase in the number of educated young people. Their aspirations and expectations will make them increasingly committed to and dependent upon the regular earning of a cash income.

Table 5.2 shows the distribution of the workforce according to the three area categories used by the census, and the participation rates of the indigenous and non-indigenous populations.

The non-indigenous workforce was distributed in almost the same proportion as the total non-indigenous population, with 71.7 per cent
Table 5.2

Distribution and participation rates of the workforce, 1966

<table>
<thead>
<tr>
<th></th>
<th>Indigenous</th>
<th>Non-indigenous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>P</td>
</tr>
<tr>
<td>Urban</td>
<td>41,286</td>
<td>3,084</td>
<td>44,370</td>
</tr>
<tr>
<td>Rural non-vil.</td>
<td>66,576</td>
<td>4,827</td>
<td>71,403</td>
</tr>
<tr>
<td>Total</td>
<td>191,505</td>
<td>42,926</td>
<td>234,431</td>
</tr>
</tbody>
</table>

Participation rate*

|               | 35.9 | 9.0 | 23.2 | 102.2 | 63.2 | 86.8 | 37.6 | 10.0 | 24.6 |

* This is the number in the workforce taken as a percentage of the number in the working-age population.

in the urban workforce. It is noteworthy that there were more non-indigenous than indigenous females in the urban workforce, which is one indication of the lack of educational opportunities for indigenous females in the past. Non-indigenes are almost completely absent from the rural village workforce; those engaged in rural industry are almost exclusively in the rural non-village workforce. Figures for employment by industry show that in primary production there were 1,220 non-indigenes or 6.0 per cent of the total non-indigenous workforce, and 142,078 indigenes or 60.6 per cent of the total indigenous workforce.

It is clear from the participation rates that the indigenous population is only beginning to take part in the economic modernisation of Papua New Guinea, and as a large proportion of the indigenous workforce is transiently employed, the participation rates probably give a highly inflated picture of indigenous participation. Moreover, indigenous participation considered qualitatively and not numerically is very low, as shown by Figure 5.1. More detailed analyses of the composition of the workforce by occupation, industry and skill structure have been made elsewhere (Beltz 1970a:100-11 and 1970b:38-42, 52-6; Manpower Planning Unit 1969a and 1969b).

The dependence on expatriate skills is the most significant feature of Figure 5.1. Expatriates held nearly all professional, top managerial and executive positions (class A) and 87 per cent of all sub-professional positions (class B).\(^1\) At the trade and equivalent clerical/commercial

\(^1\) For a more detailed description of the positions and educational qualifications represented by each manpower class, see Beltz (1970a:100).
level (class C) there was an almost equal number of indigenes and non-indigenes, but there were still 4,489 non-indigenes in the semi-skilled positions and below (classes D and E). For both socio-economic and political reasons it was to be hoped that the 1971 census would show the complete elimination of expatriates from the unskilled and semi-skilled occupations, but in view of developments like the Bougainville copper project this census is likely to show an increase in the number of expatriates in the semi-skilled category.


Figure 5.1. Racial composition of the workforce by skill structure, 1966.
The growth of the population

Van de Kaa's projections for the indigenous population are the most authoritative available and will be used here. Some tentative projections have been added for the non-indigenous population because the population projections are to be related to the workforce projections. Workforce projections to 1981 are not yet available so that the analysis will be restricted to the period to 1976. The reliability of the data should not be overstretched as the benchmark data are already dated by five years now and workforce projections are notoriously difficult to make in a developing country. Table 5.3 shows the projected growth of the indigenous population in 1966, 1971 and 1976 and Table 5.4 the percentage increase in the indigenous working-age population between these years.

Table 5.3

Projected growth of the indigenous population by age group, 1966-76

<table>
<thead>
<tr>
<th>Year</th>
<th>Age group</th>
<th>Males</th>
<th>Females</th>
<th>Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>0-14</td>
<td>461,692</td>
<td>433,740</td>
<td>895,432</td>
</tr>
<tr>
<td></td>
<td>15-49</td>
<td>533,385</td>
<td>477,661</td>
<td>1,011,046</td>
</tr>
<tr>
<td></td>
<td>50+</td>
<td>126,894</td>
<td>119,594</td>
<td>246,488</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,121,971</td>
<td>1,030,995</td>
<td>2,152,966</td>
</tr>
<tr>
<td>1971</td>
<td>0-14</td>
<td>541,577</td>
<td>510,009</td>
<td>1,051,586</td>
</tr>
<tr>
<td></td>
<td>15-49</td>
<td>592,817</td>
<td>534,460</td>
<td>1,127,277</td>
</tr>
<tr>
<td></td>
<td>50+</td>
<td>144,230</td>
<td>135,997</td>
<td>280,227</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,278,624</td>
<td>1,180,466</td>
<td>2,459,090</td>
</tr>
<tr>
<td>1976</td>
<td>0-14</td>
<td>645,852</td>
<td>609,180</td>
<td>1,255,032</td>
</tr>
<tr>
<td></td>
<td>15-49</td>
<td>667,626</td>
<td>606,203</td>
<td>1,273,829</td>
</tr>
<tr>
<td></td>
<td>50+</td>
<td>164,826</td>
<td>155,514</td>
<td>320,340</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,478,304</td>
<td>1,370,897</td>
<td>2,849,201</td>
</tr>
</tbody>
</table>

Table 5.4

Percentage increase in the indigenous working-age population, 1966-67

<table>
<thead>
<tr>
<th>Period</th>
<th>Males</th>
<th>Females</th>
<th>Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966-71</td>
<td>11.1</td>
<td>11.9</td>
<td>11.5</td>
</tr>
<tr>
<td>1971-76</td>
<td>12.6</td>
<td>13.4</td>
<td>13.0</td>
</tr>
<tr>
<td>1966-76</td>
<td>25.2</td>
<td>26.9</td>
<td>26.0</td>
</tr>
</tbody>
</table>

1 See Chapter 3.
The total indigenous population is expected to increase by 32.3 per cent between 1966 and 1976 and the working-age population in the same period by 26 per cent, thus indicating the delayed effects of changes in mortality and fertility on the latter. All children who will survive to join the working-age population in the years to 1981 (five years beyond the period discussed here) were already born by 1966.

The urban nature of the non-indigenous population, whose growth is governed more by development needs than by demographic factors, makes it reasonable to assume that future increases will be restricted mainly to the urban areas. There is likely to be no increase in the number of non-indigenes in the rural villages, and no significant increase in the number in rural non-village areas. Some increase in the latter may result from new agricultural and forestry projects, but a decrease in the number employed in the plantation industry (due to the diminishing economic viability of marginal enterprises) could cancel this out.

Population counts in 1970 in four major urban centres and a pretest for the 1971 census in Goroka show a widely varying rate of increase in the urban non-indigenous population, from 1.3 per cent per annum in Rabaul to 13.0 per cent in Lae (Bureau of Statistics 1970; Division of District Administration 1970).¹ In the five centres combined this population increased in four years by 6,254 persons (that is, 33.3 per cent) from 18,756 to 25,010. In 1966 these five towns accounted for more than three-quarters of the total non-indigenous urban population of 24,439. There is little doubt that urban growth has also occurred in other centres so that it seems reasonable to adopt an overall rate of increase for the non-indigenous urban population of 8 per cent per annum in the five-year period to 1971. Because of the pressures for increased localisation of the workforce and the possible effect of political developments on overseas recruitment, a growth rate of 5 per cent per annum is assumed for the five years 1971-76. This may prove to be an underestimation. Table 5.5 shows the results of these calculations.

Table 5.5

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban</th>
<th>Rural non-village</th>
<th>Rural village</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>24,439</td>
<td>10,132</td>
<td>251</td>
<td>34,822</td>
</tr>
<tr>
<td>1971</td>
<td>35,910</td>
<td>10,132</td>
<td>251</td>
<td>46,293</td>
</tr>
<tr>
<td>1976</td>
<td>45,831</td>
<td>10,132</td>
<td>251</td>
<td>56,214</td>
</tr>
</tbody>
</table>

¹ The differences in time of enumeration in the various centres (between February and June 1970) are disregarded here.
The 1971 census will show the degree of error of these estimates for that year; however, they cannot be far out as the increases over four years in the five towns noted above take the total to already over 41,000 by mid-1970. It may be pointed out that if these estimates are reliable the concomitant increase in the indigenous urban population, which in none of the five towns is less than 7.7 per cent per annum, will create enormous problems for this country (Beltz 1970c).

The expansion of the workforce

Workforce projections have been made at various times by the Manpower Planning Unit. The latest, which will be used here, are based on a macro-model of the relationship between contribution to gross national product, and productivity and size of the workforce by industrial sector. Not only are the data deficient, but the model has inherent weaknesses of its own, one of which is that it must either disregard inevitable changes in the structure of the workforce or make implicit assumptions about what constitutes the ideal workforce. The model approach is also not very satisfactory owing to the almost unlimited possibilities of skill mix, the lack of empirical knowledge of occupational mobility and skill substitutability, and the effects of localisation. However, with the available data no other approach is more reliable; when the results of the 1971 census become available much better analysis of growth and change can be undertaken. It may be added that all the qualitative knowledge accumulated by the Manpower Planning Unit over the past years has gone into this model approach and that different techniques are tried continually to check and improve the results.

The workforce is expected to grow from 255,000 in 1966 to 345,000 in 1971 and 469,600 in 1976. If primary industry (which does not include mining and quarrying) is excluded, what is called the modern sector workforce will grow from 111,600 to 156,000 and 220,000 respectively.

In order to estimate the racial composition of the workforce, it is necessary to calculate first the non-indigenous component. In 1966, 70.2 per cent of the total non-indigenous population was in the workforce. It is assumed, for lack of other evidence, that this percentage remains constant throughout the period; this percentage taken of the projected non-indigenous population gives the results shown in Table 5.6.

The proportion of non-indigenes in the workforce will rise from 8.0 per cent in 1966 to 9.4 per cent in 1971, and then drop back to 8.4 per cent in 1976. This in itself would appear very promising as it would, prima facie, tend to indicate that more indigenes are moving into positions previously occupied by expatriates. The same pattern appears in the modern sector of the workforce, though predictably the percentages are much higher, 17.3, 20.1 and 17.4 respectively. It is assumed that all expatriates in the workforce are needed because they contribute particular skills which are not available locally or are in short supply.
Table 5.6

Racial composition of the workforce, 1966-76

<table>
<thead>
<tr>
<th>Year</th>
<th>Indigenous</th>
<th>Non-indigenous*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total workforce ('000)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>234.4</td>
<td>20.5</td>
<td>254.9</td>
</tr>
<tr>
<td>1971</td>
<td>312.5</td>
<td>32.5</td>
<td>345.0</td>
</tr>
<tr>
<td>1976</td>
<td>430.1</td>
<td>39.5</td>
<td>469.6</td>
</tr>
</tbody>
</table>

**Modern sector workforce**

('000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Indigenous</th>
<th>Non-indigenous*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>92.3</td>
<td>19.3</td>
<td>111.6</td>
</tr>
<tr>
<td>1971</td>
<td>124.7</td>
<td>31.3</td>
<td>156.0</td>
</tr>
<tr>
<td>1976</td>
<td>181.7</td>
<td>38.3</td>
<td>220.0</td>
</tr>
</tbody>
</table>

* Non-indigenous workforce in primary industry is assumed to be constant.
** This excludes primary industry.

Table 5.7 shows the numbers in each manpower class in 1966, 1971 and 1976. It is assumed that the skill categories, which are broadly defined, can 'absorb' any changes during the decade so that the skill structure will remain basically the same.

Table 5.7

Skill structure of the workforce, 1966-76

<table>
<thead>
<tr>
<th>Manpower class</th>
<th>1966</th>
<th>1971</th>
<th>1976</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,748</td>
<td>2,400</td>
<td>3,200</td>
</tr>
<tr>
<td>B</td>
<td>5,713</td>
<td>7,700</td>
<td>10,500</td>
</tr>
<tr>
<td>C</td>
<td>19,031</td>
<td>25,800</td>
<td>35,100</td>
</tr>
<tr>
<td>D</td>
<td>40,650</td>
<td>55,000</td>
<td>74,900</td>
</tr>
<tr>
<td>E</td>
<td>187,729</td>
<td>254,100</td>
<td>345,900</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>254,871</td>
<td>345,000</td>
<td>469,600</td>
</tr>
</tbody>
</table>

It is necessary to calculate how many indigenous workers will join the workforce between 1966 and 1976, and the supply sources must first be determined. At the professional and sub-professional level, classes A and B, this can be fairly accurately done as indigenous occupants of those positions will come almost exclusively from post-secondary training institutions. Both time series of past data (Manpower Planning Unit 1970; Department of Labour 1970) and projected inputs/outputs are available, the latter not yet in published form. Although there are some
in institutional supply sources for manpower classes C and D, these are augmented and probably exceeded by informal supply through such means as upgrading of the existing workforce, on-the-job training, and part-time study. There is very little information available on these informal supply sources.

According to the most recent data, manpower class A supply in the years 1966-71 will amount to approximately 60, but will accelerate rapidly in the following five-year period to some 520. For class B these figures are 1,400 and 4,300 respectively, and for class C, 3,900 and 5,600. Wastage due to death, marriage, invalidity and overseas study will reduce the stock at the end of each period to some extent. The wastage rate is estimated roughly to be 15 per cent of the stock at the beginning of each period and 10 per cent of the supply produced during the period. Table 5.8 shows the results of these calculations for the racial composition of classes A, B and C.

Table 5.8

Racial composition of high level manpower, 1966-76
('000)

| Year | Class A | | | Class B | | | Class C | |
|------|---------|---|---|---------|---|---|---------|---|---|
| 1966 | 0.02    | 1.73     | 1.75  | 0.7    | 5.0      | 5.7   | 9.8    | 9.3      | 19.1  |
| 1971 | 0.07    | 2.31     | 2.38  | 1.9    | 5.8      | 7.7   | 14.5*  | 11.3     | 25.8  |
| 1976 | 0.53    | 2.71     | 3.24  | 5.5    | 5.0      | 10.5  | 21.9** | 13.2     | 35.1  |

* Includes an addition of 3,000 from informal supply sources.
** Includes an addition of 5,000 from informal supply sources.

The most surprising result of comparing the number of non-indigenes in classes A, B and C in Table 5.8 with the total non-indigenous workforce in Table 5.6 is the surplus of expatriates, 13,100 in 1971 and 18,600 in 1976, who would need to be placed in occupations below class C level. Although there is bound to be an increase in the number of expatriates in class D in 1971, if for no other reason than the Bougainville copper project, these large numbers are unlikely to be absorbed without severe political repercussions. However, this apparent surplus of expatriates may be a direct result of assuming the structure of the workforce remains the same. A convincing case could be made for a much more rapid increase of high level manpower than is postulated for the workforce as a whole, but there is no evidence at present to indicate the differences in growth rate between skill levels. It seems plausible, however, that as the rate of economic development continues to increase, and in the absence of adverse political developments, the
need for high level expatriate manpower will continue to grow, and much faster than is suggested in Table 5.8.

Conclusion

At this stage the population projections appear to be more reliable than the workforce projections, partly because demographic techniques have been so developed and refined over the last twenty years as to enable fairly reliable projections to be made on the basis of scarce and deficient data, whereas no such techniques have yet been developed for manpower planning. Demographers may claim that their projections of working-age population could be put to greater use, but they do not provide planners with techniques which allow the establishment of firm relationships between working-age population and the workforce.

The two are not the same in a developing country. The factors which determine size, nature and structure of the workforce are, in a developing country such as Papua New Guinea, mainly social, cultural and economic. At an early stage of development the demographic factors do no more than set ultimate limits. The facile usage of terms and concepts such as unemployment and underemployment with reference to those parts of the population which could theoretically be regarded as potential workforce contributes little to better understanding of the problems.

The data presented in this paper give a fairly hopeful picture for Papua New Guinea. Having had a late start in development, the country is rapidly widening its economic base and participation by indigenous people should increase quickly. The estimated workforce growth rate exceeds by a substantial margin the growth rate of the working-age population, although this may no longer be the case once the effects of the rapid population growth become evident in the latter. The indigenous workforce as a percentage of the working-age population is expected to increase from 23.2 per cent in 1966 to 27.7 per cent in 1971 and 33.8 per cent in 1976. (No allowance is made here for the fact that increasing numbers in the 15-19 age group and beyond will continue full-time studies and training.) Papuans and New Guineans' legitimate desires for participation at the higher levels of the workforce are subject to the constraints of the post-secondary educational structure, though undoubtedly more positive attitudes on the part of expatriates could accelerate this process.

The greatest problems likely to beset Papua New Guinea as a result of population growth and rapid economic development are urbanisation and the uncritical supposition of economic and other forms of organisation which do not consider the traditions and social characteristics of the indigenous population. If economic development is to benefit the whole population and not be largely restricted to an urban elite, the direction of development efforts may have to be changed.

The most fundamental change needed is the abolition of the all-pervasive attitude that what Westerners have brought to Papua New
Guinea is by definition the best for it. Systematic and sympathetic analysis of the structures of indigenous society and of the resources available within it, both physical and human, could help establish a pattern of development which is much more genuinely indigenous. But this would require calling into question the validity of many things now taken for granted: for example, the role and operation of the public service and the legal and educational systems non-indigenes have created; the encouragement of Western social and recreational patterns; the promotion of industrial organisations and the introduction of highly capitalised, technologically advanced industries; and the belief that economic development will solve all the problems.

Such a dramatic change, however desirable for the sake of the country, is hardly likely at this stage. At best, some adaptations will be made. But it is still possible to change the emphases in development efforts in order to avoid creating a lasting dichotomy in the indigenous population through the creation of a relatively small urban elite while leaving the large majority of the population lagging behind in the rural areas. Other developing countries have made that mistake and are finding the results disturbing. Myrdal (1968) has shaken the complacency of economic planners with his monumental study of the poverty of Asia, and Dumont (1966) provides a refreshing and pragmatic analysis of mistakes made in another major part of the developing world. Jointly, they may be able to supply answers to some of the most important problems facing Papua New Guinea.

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Chapter 6

Population growth and education planning in
Papua New Guinea

G.E. Smith*

Development of educational policy

In 1955 the then Minister for Territories determined (Hasluck 1955): 'First attention [is] to be given to primary schools, with the goal of teaching all children in controlled areas to read and write in English.' This priority has often been criticised as representing an Australian policy of gradualism and uniform development, but emphasis on primary education was a widely accepted policy for other developing countries in the era that led from the memorandum on Mass Education in African Society (His Majesty's Stationery Office 1944) to the Karachi Plan (UNESCO 1961).

Since then Third World experience in pursuing the goal of universal primary schooling has not been generally encouraging. The speed of population growth makes the objective increasingly difficult to reach, and the wide diffusion of low-level, low-quality education has not generated the economic growth required to make progress self-sustaining. Indeed the reverse has been widely suspected. Heavy investment in general primary education has reduced the capital available for investment in other activities more directly related to production. Instead of increasing economic output, formal education has in many cases unfitted school leavers for a rural life and encouraged them to migrate to town along with pupils seeking the greater educational opportunities of the urban situation. There they swell the crowd of urban unemployed turned out by the schools faster than they can be absorbed into the modern economy.

In the 1960s many countries determined to concentrate their educational investment on a more selective system which increases the proportion of children receiving secondary education and improves the quality of primary education in a smaller number of schools. Papua New Guinea is now committed to such a policy. Educational expansion on this

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basis assumes a non-schooling gap and is therefore not directly dictated by population growth, although it is affected indirectly through political pressure. A statement by the Director of Education in August 1970 (McKinnon 1970) indicates that 'the current enrolment objectives of the government are to quickly bring enrolments in the lagging areas up to 50 per cent of available school-age children, while so far as possible maintaining the percentages in areas which already have more than 50 per cent'. Although cognisance has to be taken of regional population growth rates, these departmental targets leave a substantial non-schooling block so that enrolments can be flexibly deployed to cope with District inequalities, to encourage girls' education, and to concentrate on building up schools to levels which can be expected to provide an economic return.

The emphasis on quality rather than quantitative expansion has been built into the legal structure of Papua New Guinea's education system through the 1970 Education Ordinance which ensures that only teachers in schools which take the majority of their students through to standard 6 receive full salary. In this way the new Ordinance reinforces the trend that has gathered strength through the 1960s towards a restructuring of primary education. In rural Central District alone the number of mission schools was reduced by half between 1965 and 1970 although the number of pupils at mission schools increased. Nationally, however, a large number of schools still terminate at a low level as shown in Table 6.1.

Table 6.1

<table>
<thead>
<tr>
<th>Agency</th>
<th>Prep.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>2</td>
<td>18</td>
<td>38</td>
<td>11</td>
<td>34</td>
<td>71</td>
<td>327</td>
</tr>
<tr>
<td>Catholic mission</td>
<td>4</td>
<td>50</td>
<td>57</td>
<td>80</td>
<td>93</td>
<td>62</td>
<td>180</td>
</tr>
<tr>
<td>Protestant mission</td>
<td>3</td>
<td>25</td>
<td>149</td>
<td>127</td>
<td>103</td>
<td>59</td>
<td>127</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>93</td>
<td>244</td>
<td>218</td>
<td>230</td>
<td>192</td>
<td>634</td>
</tr>
</tbody>
</table>

* Schools which have opened recently may be in the course of building up from lower grades.


When education is given in a foreign language, children cannot become permanently literate in a school which terminates at standard 2 or 3. It may be possible to draw pupils from smaller local schools to larger central schools at a higher level, and this feeder system is allowed under the Ordinance. But this pattern clearly does not account for the
majority of pupils who attended small schools in the last decade, since less than one-third of the total new enrolments in 1959-63 reached standard 6 in 1965-69. Economically there is little direct return to the individual or the country from investment in an incompleted stage of general primary education. In order for their teachers to become full members of the teaching service, some agencies may be forced to close their smaller schools while 'blocking up' others to run the full six-year course. This should improve the economic returns of investment in education but the full political and social costs are impossible to estimate.

The Weeden Report (Weeden, Beeby and Gris 1969:9) describes with insight and characteristic fairness how the missions developed historically a village-centred concept of education in Papua New Guinea, and it sensitively suggests (1969:17) that the implications of a nation-centred perspective might seem 'confusing and upsetting' to some mission followers in the village. At the village level there is evident distress, even over the closure of some miserably inadequate sub-standard schools. A letter from a mission worker gives one impression of the situation: 'At our last Mother's Union mountain course all the ladies could read their Wedaun prayers, etc., and wrote answers. Some biggish children with them from the mountain villages couldn't do it. We are going backwards! The next generation here won't be able to read their Bibles.'¹ At the national level one may ask whether an educational policy oriented to economic and manpower goals by itself encompasses sufficient of national life to be adequately nation-centred.

Reimer (1970:1-2) confronts these dilemmas in the following:

Some would argue that peasants in India, sharecroppers in Alabama and dishwashers in Harlem do not need more education until the world is ready to absorb them into better jobs and that these better jobs can be created only by others who must, therefore, be given educational priority. But this argument, typical of development economists, ignores the economic, demographic and political factors of life. Economic growth, where it is actually occurring, bolsters the level of living of the already better off, fattens military and security-police budgets, and supports the markets of more developed nations. Population is growing so much faster than the rate at which real educational opportunities can be expanded by means of schools that deferring the education of the masses merely creates a more difficult task for the future. On the other hand, people will not voluntarily curtail birth rates until they have a minimum not only of education but also of the social mobility which real education implies. If there were a monopoly of power in the world, population growth might be curtailed arbitrarily. In the world as it is, to ignore

¹ Personal communication: K. Kendall, August 1970.
popular demands for education is not only morally indefensible, it is politically impossible. For most people this would be, in any case, an unbearably cynical position.

The basis of this argument is partly emotional. Educational policies nearly always are, and even the educational planner must acknowledge this fact. The basic question remains: if, in Reimer's terms, it is impossible to ignore popular demands for education, is it practicable to satisfy them? The following sections of this paper examine, first, the implications of relating schooling more directly to population growth, and secondly, the costs of schooling, before attempting in the last section to draw out some consequences for educational planning.

Implications of population growth

If the provision of schooling for all children in Papua New Guinea was taken as our aim, the relationship between population growth and educational planning could be stated in brief, blunt terms. The pattern of population distribution by area would necessitate a type of schooling which at the primary level was comparatively inefficient and at the secondary level comparatively expensive. The distribution of population by age and occupation would provide a relatively small tax base for the maintenance of a relatively large school system, while the rate of population growth would ensure that problems increased faster in Papua New Guinea than in countries having none of its disadvantages. Table 6.2 illustrates these points.

Table 6.2

Some population comparisons, Australia and Papua New Guinea, 1966

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rural population as % of total</td>
<td>Children aged 5-14</td>
<td>Labour force wholly or mainly money raising</td>
<td>Ratio of B:C</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>94.1</td>
<td>556,635</td>
<td>254,002</td>
<td>2:1</td>
<td>2.3</td>
</tr>
<tr>
<td>Australia</td>
<td>16.6</td>
<td>2,249,344</td>
<td>4,778,764</td>
<td>1:2</td>
<td>1.8*</td>
</tr>
</tbody>
</table>

* Australia's growth rate comprised natural increase 1.03 per cent and net migration 0.75 per cent.

Source: Statistics for Papua New Guinea are from Table 3.1 and Bureau of Statistics (1969:7, 48); those for Australia are from Commonwealth Bureau of Census and Statistics (1968:123, 132, 135, 1150-1).
Column A contrasts population distribution in Papua New Guinea and Australia, the one predominantly rural, the other highly urbanised. An attempt at complete primary school coverage in Papua New Guinea while population is so scattered and communications so poor would tend to result in a large number of relatively small schools. Inevitably the poorest teachers and the poorest teaching materials and accommodation would tend to be found in the remoter areas where the teaching problems are greatest and the chances of professional assistance are least. At the secondary level a predominately rural population means again a large number of small schools with the absence or relatively inefficient use of specialist facilities. The high-cost solution of providing boarding facilities could double the cost per pupil in both capital and recurrent expenditure.

Papua New Guinea is typical of developing countries in having a large proportion of its population under the age of 15. According to the 1966 census 42 per cent of the indigenous population were in this category, whereas the corresponding figure in Britain in 1964 was 23 per cent (Whitaker 1966:614). Any developing country has a larger proportion of its population of school age, and the adult population has a proportionately heavier burden to provide the schools and pay the teachers. But again Papua New Guinea is typical of low-level developing countries in that most of the adult population are outside the money earning sector of the economy and those who are not wage earners contribute relatively little to the central government taxes which are needed to support the teachers. The comparisons in columns C, D and E illustrate this point dramatically: in Australia there are two adult wage earners for every one child aged 5-14, whereas in Papua New Guinea the situation is reversed, and there are two children aged 5-14 for every one adult wholly or mainly in the money raising workforce.

Australia has a high rate of population growth in comparison with other developed countries. Column E shows that Papua New Guinea has an even higher rate, and the figure of 2.3 per cent given there for 1966 is already out of date. For the first half of the 1970s a growth rate of 2.9 per cent per annum has been forecast (see Table 3.6), and since this is substantially affected by a reduction of mortality in the early years of life, the growth rate of the school-age population is likely to exceed 3 per cent per annum. The difference between the growth rate of the 7-12 years age group and the overall growth rate is not a constant, but on any assumption it remains a significant factor throughout the twenty-five year period to 1991. Averaged over this period, van de Kaa's low fertility assumption yields a growth rate of 3 per cent per annum for this age group and his high fertility assumption gives a rate of 3.5 per cent. Even if the rate per annum were to rise no higher than 3 per cent, the school-age population would double in about twenty-two years, and this could well occur sooner.

The immediate effects of population growth are, however, less uncertain. We can count noses. The children who will be of school age when
the current five-year plan ends in 1972-73 had already been born when the 1966 census was taken. Unfortunately there are problems in determining which noses to count, but smoothing of census data provides an estimate for 1968 of 340,000 in the 7-12 years age group and a conservative estimate for 1973 of 395,000, an increase of 55,000. According to the annual reports (Commonwealth of Australia 1967-68a:376 and 1967-68b:155), there were 209,645 children enrolled in primary A and T schools in 1968, and the total primary school plan target for 1973 is stated as 249,000 (Territory of Papua and New Guinea 1968:100), an increase of less than 40,000. Primary enrolments in 1970 were behind schedule on the five-year plan because of the rapid replacement of unqualified permit teachers, but even if the plan target is achieved there will be more school-age children not at school when the plan ends in 1973 than there were when it began in 1968. An increase of 55,000 children in the 7-12 years age bracket is matched against a maximum increase of 40,000 in the number of places. Such is the pace of population growth that we must run faster even to keep the same number of children out of school! How fast would we need to run to catch up?

The costs of schooling

In 1958 the then Director of Education presented the Minister for Territories with a plan for achieving universal primary education within fifteen years. To give the Director his due, it should be acknowledged that the expansion of Administration primary schools compares very well with the revised targets he set the following year; he claimed that under the most favourable circumstances the Administration could have 100,000 children in government schools in ten, fifteen, or twenty years, and the Administration did in fact have 69,000 pupils in primary school and another 9,000 in post-primary institutions after only seven years. Where his calculations went sadly astray was in overestimating the speed at which missions could expand their teacher-training facilities which he hoped would reach an output of 1,000 per year. (A re-calculation a fortnight after the original plan upped his estimated requirement of mission teachers to 2,000 per annum without apparently altering the planned capital subsidy.) Even more serious was his underestimation of the effect of population growth. Assuming this was only 1 per cent per annum he hopefully suggested it would not seriously affect the time of reaching the objective, universal primary education. In reality the growth rate has reached three times as high over Papua New Guinea as a whole and five times as high in some areas. But the target of universal primary education has not been officially abandoned. Would it now be feasible as the goal of a twenty-year programme from 1971?

Fry (1970:71) projected District populations of the 7-12 years age group forward to 1990 and added them to give a total figure of 690,000. Van de Kaa has now put forward (on the basis of medium fertility assumptions) a slightly higher figure for this age group of 707,700 in 1991, rising from 371,800 in 1971 (see Table 3.8).
Primary school enrolment in March 1970 was reported as 215,258, and an estimate of 223,500 was made for 1971 (Territory of Papua and New Guinea 1970c:49). If this is reached it will be equivalent to 60 per cent of the 7-12 years age group in 1971, although it should be noted that as approximately 20 per cent of these enrolments are over-age, slightly less than half of the actual age group would in fact be attending school. Figure 6.1 shows enrolment projections rising to 424,600 in 1991 on the assumption that a 60 per cent equivalent is maintained. It also shows enrolment requirements if universal primary education is to be achieved; the enrolment proportion would have to be 65 per cent in 1976, 75 per cent in 1981, 85 per cent in 1986, and 95 per cent in
1991 when the number of places needed would reach 672,300. These calculations are based on van de Kaa's projections.

Measured against this rising demand, quantitative trends in the training and employment of indigenous teachers at the primary level appear somewhat alarming. They do, however, reflect a strong concern to upgrade the quality of teachers already in the schools and those now entering initial training. The annual incremental increase of indigenous teachers in recognised primary schools has declined every year since 1964. However, the figures in Table 6.3 do not reflect actual additions to schools; in particular the very high increases in the early years are due to the inspection and recognition of existing teachers rather than to an influx to the profession. Another factor which has affected the declining annual incremental increase in the number of mission teachers is the rapid retirement of unqualified permit teachers in recent years. It is not possible to provide comparable data for 1970 because the statistics are now collected on a different basis, but it has been stated by the Director of Education that 'The net increase in teachers for 1970 for Administration primary schools was less than 50 for all districts'.

Table 6.3

Indigenous teachers in recognised primary schools, 1964-69*

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Administration</th>
<th>Mission</th>
<th>Increase over previous year Administration</th>
<th>Mission</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>1,119</td>
<td>2,960</td>
<td>205</td>
<td>1,249</td>
<td>1,454</td>
</tr>
<tr>
<td>1965</td>
<td>1,255</td>
<td>3,364</td>
<td>136</td>
<td>404</td>
<td>540</td>
</tr>
<tr>
<td>1966</td>
<td>1,417</td>
<td>3,531</td>
<td>162</td>
<td>167</td>
<td>329</td>
</tr>
<tr>
<td>1967</td>
<td>1,563</td>
<td>3,644</td>
<td>146</td>
<td>113</td>
<td>259</td>
</tr>
<tr>
<td>1968</td>
<td>1,721</td>
<td>3,676</td>
<td>158</td>
<td>32</td>
<td>190</td>
</tr>
<tr>
<td>1969</td>
<td>1,867</td>
<td>3,664</td>
<td>146</td>
<td>-12</td>
<td>134</td>
</tr>
</tbody>
</table>

* Exempt schools are not included.


Statistics of teacher training are another useful index of trends. A cursory glance at annual reports shows that enrolments in primary training courses at teachers' colleges have been rising steadily since 1964. However, closer inspection is less encouraging since it is evident that the higher enrolment figures are largely the result of

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longer courses so that each prospective entrant to the teaching force is counted in two successive years. Therefore, to estimate the trend of teacher inputs, a more useful basis of year-by-year comparison is the first year intake of teachers' colleges, shown in Table 6.4.

Table 6.4

<table>
<thead>
<tr>
<th>Year</th>
<th>Administration</th>
<th>Mission</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>256</td>
<td>264</td>
<td>520</td>
</tr>
<tr>
<td>1965</td>
<td>239</td>
<td>568</td>
<td>807</td>
</tr>
<tr>
<td>1966</td>
<td>259</td>
<td>592</td>
<td>851</td>
</tr>
<tr>
<td>1967</td>
<td>234</td>
<td>514</td>
<td>748</td>
</tr>
<tr>
<td>1968</td>
<td>276</td>
<td>623</td>
<td>899</td>
</tr>
<tr>
<td>1969</td>
<td>270</td>
<td>575</td>
<td>845</td>
</tr>
<tr>
<td>1970</td>
<td>230</td>
<td>552</td>
<td>782</td>
</tr>
</tbody>
</table>

* Indigenous trainees only


First year indigenous enrolments in primary training courses in 1970 were lower in Administration teachers' colleges than in any other year since 1963, and in the missions (with the exception of one year) than in any other year since 1964. Two reasons for this drop are the withdrawal of the one-year A Certificate course for standard 6 leavers, and in the Administration colleges (where this withdrawal happened earlier) the rapid build-up of secondary teacher training. Both measures were necessary, even if the result is sadly to confirm the dictum that the quality and quantity of a developing country's education system cannot be improved simultaneously. There is no doubt that raising the standard for entry has cut out some possible applicants, and perhaps more importantly, at this higher level students are far more aware of alternative careers.

The trends revealed in Tables 6.3 and 6.4 give little indication that the manpower costs, in terms of teachers to overtake, or even match, the anticipated growth of population and school enrolments, can be met. With only 211 indigenous permit teachers left in primary schools, however, it may be hoped that mission staff statistics have 'bottomed-out' and better career prospects in a unified teaching service will produce an upward trend. This will only be achieved by higher financial costs which at the primary level will have to be borne almost entirely in Papua New Guinea. Any large expansion of primary education, even to maintain existing ratios, must be achieved by Papuan and New Guinean teachers. It is probably as undesirable as it is unlikely that the Australian
government will meet these local salaries if it means committing Papua New Guinea to a level of expenditure it cannot maintain without distorting the economy.

Some estimate of future educational costs on the basis of expected population growth and alternative enrolment policies is therefore a necessary prerequisite for planning. In view of the many variables such estimates are bound to be speculative. But provided the necessary assumptions are made explicit, an attempt at costing is worthwhile and is a reasonable exercise in view of the budgetary changes announced by the then Prime Minister, Mr J.G. Gorton, while visiting Papua New Guinea in 1970, and the move to equalise basic salaries within the teaching profession under the 1970 Ordinance. Both these changes help to estimate the costs of primary education excluding overseas allowances.

The method adopted is that reported by Coombs (1968) using data from Uganda. The basis of the calculation is the unit cost per pupil assessed in two components: non-teacher and teacher costs, the former being assessed as a constant and the latter increasing in real terms at the same rate as monetary gross territory product per capita. Table 6.5 gives the result of this (using van de Kaa's medium fertility projections for the population in the 7-12 years age group, given in Table 3.8), and Figure 6.2 shows the costs of the two enrolment policies, one aiming at universal primary enrolment and the other to hold enrolment at 60 per cent.

Non-teacher costs include books, classroom materials, vocabulary stores items, Parents and Citizens Associations' subsidies, publications, etc. and have been estimated at $5.8 per pupil on the basis of the 1969-70 and 1970-71 budgets. If the total overheads of education services and administrative costs for the Education Department were distributed between the teaching divisions in proportion to their shares of the budget, the non-teacher cost per primary pupil would be approximately doubled. But the apportionment of these overheads between divisions on this basis seems indefensible, and in any case the overheads are largely salaries which should be appreciated with teacher costs instead of remaining constant in the non-teacher component. Therefore the figure of $5.8 per pupil will be used and the result will be applicable only to actual primary school costs excluding overheads such as servicing examinations, collecting statistics, and supporting Konédoubu.

Calculation of the teacher component of the unit cost on the basis suggested required manipulation of two variables, total population and monetary gross domestic product. Van de Kaa's medium fertility projections have again been used for population; the rate of increase of monetary gross domestic product is averaged at 12 per cent per annum for the period of intensive mining investment up to 1976 and at 6 per cent per annum thereafter. This somewhat arbitrary selection of growth rates for population and national income provides the scale of increase
Table 6.5
Enrolments and costs: projections for primary schooling in Papua New Guinea, 1971-91

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population aged 7-12 ('000)</td>
<td>371.8</td>
<td>444.4</td>
<td>537.3</td>
<td>627.7</td>
<td>707.7</td>
</tr>
<tr>
<td>Gross territory product (monetary $ mill.)</td>
<td>324</td>
<td>571</td>
<td>764</td>
<td>1,022</td>
<td>1,368</td>
</tr>
<tr>
<td>Unit cost ($) per pupil (salary + $5.8 per pupil)</td>
<td>41.2</td>
<td>76.1</td>
<td>87.0</td>
<td>99.5</td>
<td>114.2</td>
</tr>
<tr>
<td>60% enrolment ('000)</td>
<td>223.1</td>
<td>266.6</td>
<td>322.4</td>
<td>376.6</td>
<td>424.6</td>
</tr>
<tr>
<td>Cost ($ mill.)</td>
<td>9.2</td>
<td>20.3</td>
<td>28.0</td>
<td>37.5</td>
<td>48.5</td>
</tr>
<tr>
<td>% of gross territory product</td>
<td>2.8</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Rising % enrolment</td>
<td>60%</td>
<td>65%</td>
<td>75%</td>
<td>85%</td>
<td>95%</td>
</tr>
<tr>
<td>Enrolment ('000)</td>
<td>223.1</td>
<td>288.9</td>
<td>403.0</td>
<td>533.5</td>
<td>672.3</td>
</tr>
<tr>
<td>Cost ($ mill.)</td>
<td>9.2</td>
<td>22.0</td>
<td>35.1</td>
<td>53.1</td>
<td>76.7</td>
</tr>
<tr>
<td>% of gross territory product</td>
<td>2.8</td>
<td>3.8</td>
<td>4.6</td>
<td>5.2</td>
<td>5.6</td>
</tr>
</tbody>
</table>

for the calculation of the teacher component of the unit costs. It remains to establish the base rates from which this scale is projected.

In the 1970-71 financial year overseas allowances to expatriate Administration teachers have been budgeted against a separate Australian grant so that the cost of all Administration teachers is given at local rates. The mean cost per teacher will tend to rise as the higher standards of training for the new intake to the profession shift the balance of teacher qualifications, but the effect of this will be offset to some extent through the replacement of expatriates (who come with increments credited from Australian service) by indigenous officers who will enter the same salary scales but lower on the incremental structure.

The costs of voluntary agency teachers can be included by adding their numbers and the budget allocation to bring the total cost of primary teachers in the unified teaching service to approximately $1,177.5 per capita or $35.4 per pupil assuming a teacher-pupil ratio of 1:33.3. The figure of $35.4 was adopted in Table 6.5 for 1971 but it is unsatisfactory as a base unit because it does not take into account the future implications of the new structure of the teaching service. The Weeden Report (Weeden, Beeby and Gris 1969:63) costed the changes forward (on the basis of the old Administration wage rates) only to the end of the five-year plan in 1972-73. However, the full effect of the changes will not be felt until 1976-77, when the voluntary agency teachers who have been awarded increments from 1971 will be reasonably scattered across the incremental scale. By that time the structure of the profession will have changed considerably. In 1971 two-thirds of
the voluntary agency indigenous teachers were on scale 'teacher' with a base salary of $720. By 1977 two-thirds of the voluntary agency indigenous teachers should be in categories Teacher Grade 1, Education Officer 1, or higher (with base salaries in November 1970 from $1,125), if the wastage rate of 5 per cent per annum continues and if the teachers' colleges reach their projected outputs, regardless of any transfer of teachers from Administration schools.

A new unit rate was therefore calculated by projecting base salary costs forward to 1977 and adding incremental advances. This gave

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1 This category comprises staff with primary education only (or form 1 secondary) and one year's teacher training. Staff with further secondary education and a two-year teachers' course certificate are classified as Teacher Grade 1 or Education Officer 1.
an average salary of $1,266.5 at current rates for voluntary agency teachers in 1977. By applying this to the 1971 teachers, a notional cost could be estimated. It was then necessary, on the basis of school sizes, to estimate the number of positions of responsibility in the voluntary agency system in 1971 corresponding to those in categories Education Officer 2 and Teacher Grade 2 to Education Officer 5, for which promotional posts will be declared in 1972. From the salaries for these positions a corresponding number at base rates was then deducted, and adjustment made for the increment lost on promotion of staff to a higher salary scale. The marginal increase of $1,239,000 for 1971 was then reduced to allow for vacancies and positions filled on temporary higher duties allowance. It was impossible to assess this saving accurately but since previous calculations had estimated reduction by approximately one-fifth, a round figure of $1 million seemed a reasonable approximation of the notional cost for higher duty positions. Adding this element to the 1971 costs gave a notional figure of $1,541.5 per teacher in the unified teaching service, or a teacher component of $46.2 per pupil in the unit cost.

Using the scale of increase already calculated it was possible to estimate the teacher component of the unit cost in 1976 and use this as a basis for the later years. It should be noted, however, that beyond 1976 no account was taken of further changes in structure due to higher qualifications, and it was assumed teachers' salaries rise at the same rate as gross territory product per head of the population. Both assumptions are likely to understate the true costs of education, which may be further understated because unless there is a positive programme of family planning the population estimates are likely to be too low. Therefore these figures should be taken as minimum estimates.

One of the more startling conclusions is that even if the proportion of children at school was not increased beyond 60 per cent of the 7-12 years age group, costs of primary schooling would more than double between 1971 and 1976 and increase five-fold over a twenty-year period at constant prices. Nevertheless, the percentage of gross territory product (monetary sector) spent on primary schooling would remain fairly constant after the initial period of adjustment to the new system if this enrolment policy was followed.

Politically, however, this policy is not viable, since maintaining the current enrolment ratio would perpetuate unacceptable regional inequalities or involve a substantial reduction of the enrolment proportion in some areas. By comparison, the costs of a policy aimed towards universal primary schooling would absorb a steadily increasing percentage of the gross territory product until Papua New Guinea was spending a substantially higher proportion of its national income on primary schooling alone than most countries can afford on the whole of their education systems. For comparison, it may be noted that expenditure on education currently averages around 3.5 per cent of gross national product in the Asian region, and to reach universal primary schooling Papua New Guinea
would have to spend at least 5.6 per cent of gross territory product on primary schooling alone.

Reimer (1970:1) argues:

Most of the children of the world are not in school. Most of those who enter drop out after a very few years. Most of those who succeed in school still become dropouts at a higher level. No child, however, fails to learn from school. Those who never get in learn that the good things in life are not for them. Those who drop out early learn that they do not deserve the good things of life. The later dropouts learn that the system can be beat, but not by them. All of them learn that school is the path to secular salvation, and resolve that their children shall climb higher on the ladder than they did.

For most members of the present generation this hope, that their children will benefit more from school than they, is doomed to disappointment. Schools are too expensive for this hope to be realized.

This is not simply a dilemma for the poorer country. Illich (1970: 11) suggests that:

The U.S. is proving to the world that no country can be rich enough to afford a school system that meets the demands this same system creates simply by existing: because a successful school system schools parents and pupils to the supreme value of a larger school system, the cost of which increases disproportionately as higher grades are in demand and become scarce.

The argument for increasing expenditure on the higher levels of education is under pressure in the United States, but it is very strong on economic grounds in Papua New Guinea. It is indicative of the latter's early stage of educational growth that in the 1970-71 budget, departmental recurrent expenditure on primary education is nearly equal to recurrent expenditure on secondary, technical, teacher education and the university all combined. Local government revenues used for education are devoted almost entirely to the primary level so that an even higher proportion of total education finance is probably spent on primary schooling than is shown by the budget.

If education is to promote economic growth, investment in secondary education must increase significantly. As the education system matures, the proportion of the educational budget devoted to primary education should decrease, but this will be difficult to achieve in view of Papua New Guinea's commitment to a system of primary education, the cost of which will rise between 1971 and 1976 from 2.8 per cent to 3.5 per cent of gross domestic product (assuming a constant overall enrolment ratio), and to at least 4.0 per cent if the limited official enrolment targets are achieved by 1980. Indeed, it is obviously a danger that existing commitments at the primary level and the essential requirement of
Table 6.6
Recurrent expenditure from central Administration
for levels of education, 1970-71*

<table>
<thead>
<tr>
<th>Level</th>
<th>Expenditure ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>8,714,500</td>
</tr>
<tr>
<td>Secondary</td>
<td>3,838,400</td>
</tr>
<tr>
<td>Technical</td>
<td>1,124,900</td>
</tr>
<tr>
<td>Teacher education</td>
<td>1,333,000</td>
</tr>
<tr>
<td>University (general)</td>
<td>2,590,000</td>
</tr>
<tr>
<td>(special)</td>
<td>200,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,086,300</strong></td>
</tr>
</tbody>
</table>

* Capital grants and overseas allowances funded by the Commonwealth are not included in this table which shows appropriations in the Papua New Guinea budget.


raising primary enrolment ratios in Districts which are markedly below 50 per cent will be met only by reducing the amount spent on other levels of education and by restricting educational services which are outside the structure of formal schooling.

At least it is clear that Papua New Guinea cannot afford primary schooling for a higher rate of population growth if the enrolment objective of 50 per cent is to be achieved during 1970-80 in lagging areas and existing enrolment percentages are to be maintained in areas which exceed that figure. It is also clear that universal primary education is unlikely to be achieved this century unless either the standard of schooling is lowered or there is some unforeseeable technological breakthrough.

Some strategic considerations for the educational planner

The problem is stark. Referring to the limited percentage enrolment targets projected by the Department for the immediate future, the Director of Education (McKinnon 1970) has acknowledged that 'these enrolment policies are very difficult to sustain'. Given a twenty-year time scale, schooling for all is not feasible. Control of population growth would ease the problem but would not enable the non-schooling gap to be closed. Is Papua New Guinea then committed to a 'nation-centred' view of education which caters for only part of the nation, or is there another policy option?

There is a danger lest the contemporary pursuit of qualitative improvement in education leads educators to ignore the problems of
defining quality and the social consequences of directing policy towards such an ill-defined goal. In the context of a developing country, raising the quality of education is generally taken to mean raising the qualifications of teachers with the hope of improving pupils' performance at the primary level in the competencies required for entry to secondary education, and increasing the output from secondary and higher education. These changes may be intrinsic to qualitative improvement but they may also tend to push primary schooling in a direction which is increasingly dysfunctional for the majority of primary leavers, while providing at the upper levels, as Huberman (1970:10) has warned, an increasing number of academically trained students with 'superior qualifications which entitle them to high-level posts, without having proved they can perform the necessary skills'.

The net effect of concentrating a developing nation's educational resources on this type of qualitative improvement would be 'to deprive a large number of that nation's children of any educational opportunities and to provide most of those who receive some education with a schooling that increases their dissatisfaction more than their earning capacity, while providing a few with an assured income without necessarily increasing the nation's productivity. In the long run such a policy is self-destructive and the qualitative gains would be lost when the pressure of those excluded overwhelmed the system. The moral, surely, is not to abandon qualitative improvement but to shape the formal education process so that at all levels it is realistically related to the tasks that have to be done in the society, and if universal primary schooling is not feasible in the foreseeable future in Papua New Guinea, then to provide alternative forms of non-schooled education. Unless educators look creatively for solutions in these areas, the worse alternative of sacrificing quality for quantity will be politically forced upon them.

Within the structure of formal education a strong case can be made for giving high priority to the expansion of secondary education over the next five years. As manpower demand grows from economic development such as copper mining, and as localisation pressures increase, there is a danger that the price of secondary-educated labour will be forced up to levels where expansion of the primary teaching force becomes excessively expensive in later years. Growth at secondary level in the immediate future is therefore a necessary precondition for resuming expansion of primary education when the higher average costs of the unified teaching service have been absorbed.

The growing proportion of women in teachers' colleges and the wide range of alternative careers to which men are more likely to be drawn have further implications for the structure of the teaching service. Provision of more satisfactory career prospects for women to continue teaching after marriage is long overdue, and the effect of this on postings has to be accepted. The restrictive influence of public service precedents must be overcome if vocational centres are to provide the follow-up services needed to make them an effective educational
investment. A successful vocational centre probably requires more staff time devoted to extension advisory, supply and purchasing services for its former students than it does for teaching its current enrolment. To starve the one makes the other unproductive. Nor is it an acceptable solution to entrust the outgoing pupils to the care of extension officers from other departments who have established no links of mutual confidence with those pupils in their training period.

Changes in the formal curriculum may require changes in the training and employment of education staff. The present shape of the economy suggests the need for a strong agricultural emphasis at all levels of the formal education system even if the growth of secondary industry figures largely in long-term goals. The University of Papua and New Guinea produced its first graduates in 1970 but there is still no Faculty of Agriculture. This too is overdue. Development at this level needs to be co-ordinated not only with Vudal Agricultural College but also with the training of teachers in agricultural subjects as a major concern of teachers' colleges. Studies in village development, agriculture, and communication methods should also form a significant part of the first two years in high school, and agricultural education should be given in primary schools in those areas where modern farming methods are already being adopted in the community. The idea of self-reliance has some following in Papua New Guinea as a means of economising on central government expenditure, but the philosophy of education for self-reliance as developed by Nyerere makes heavier demands. It involves co-operation of staff and students at all levels of education in the physical work of agriculture (with teachers actively working and not merely supervising), and it requires specialist teachers trained in agriculture.

It was perhaps fortuitous in Tanzania that the new role for the secondary teacher was promulgated just when the first teachers graduated from the university, so that from the outset of their teaching careers they were given a more relevant model to copy than their expatriate predecessors had devised. A change of emphasis in the formal education system is equally necessary in Papua New Guinea if population growth and the costs of schooling continue to exclude some children from the classrooms. The challenge was put by President Nyerere when he reminded students:

Those who receive this privilege [of schooling] have a duty to repay the sacrifice which others have made. They are like the man who has been given all the food available in a starving village in order that he may have strength to bring supplies

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1 For an exposition of this philosophy, see Nyerere (1968) and Svendsen and Teisen (1969).
2 Address to Parliament, 12 May 1964.
back from a distant place. If he takes this food and does not bring help to his brothers he is a traitor. Similarly, if any of the young men and women who are given education by the people of this Republic adopt attitudes of superiority, or fail to use their knowledge to help the development of this country, then they are betraying our Union.

Relating the curriculum of formal education to the agricultural basis of the economy might help to promote this spirit, which should be encouraged increasingly with the drive to nationhood. Co-ordination between the structure of formal education and the provision of other education services at the village school could give significant expression to this ethic of service among school pupils and foster a sense of national unity in the whole community. No single system of out-of-school education will suffice as the pattern of development must be related also to local needs. Two examples drawn from different areas give some indication of the range of activities to be explored.

One is the use of small-scale rural settlements. At the Commonwealth African Regional Youth Seminar in 1969 the view was expressed that small-scale, low-cost settlements, closely linked to the way of life and level of living of the local community, could provide a useful outlet for trained young people and could offer a base from which they could work outwards in achieving more widespread rural progress. The following account describes one such community (Commonwealth Secretariat 1970:40):

In this area, the primary task was to bring the diffused rural population together into groups upon which development activity might be focussed and prove to them their potential progress if they lived and worked together. Again in this instance the first initiative was by indirect example. A trained group of young people banded together to form a village and slowly persuaded others in the surrounding community, not necessarily young people, to join them. Over several years, a balanced village community emerged and achieved remarkable development gains largely through the efforts of the community itself. Over a wide surrounding area, interest slowly grew in emulating this particular method of village development. Frequently, however, requests were made to the original village community for direct guidance in how to set about the task. Already in the original village a new generation of young people had emerged and had been allotted a place in the decision-making process of the community. It was rapidly agreed that the task of spreading the particular ideas of the community should be entrusted to selected groups of young people, an experiment which in the event proved particularly successful, satisfying their need to work progressively within their own environment and providing them with the opportunity for social challenge on a broader scale.

A second example is the use of radio and television in education in rural areas. UNESCO reports (UNESCO 1967) on the rural radio forum in
India reveal many of the problems encountered in this type of educational innovation, but they show also that non-schooled education can be effective in promoting decision-making for modernisation at the village level. The following are some of the decisions made for practical action as a result of participation in the forums:

Will grow fruit trees in backyards; add fruit to daily diet.

Will use poison against rats; call on the agricultural officer for help.

Will keep a good breeding bull or otherwise will send cows for artificial insemination.

Will try to introduce better poultry; will vaccinate poultry.

Will see that there will not be any illiterates in the village after five years; will read the newspaper aloud in one or two places in order to increase the knowledge of the people.

Will use cow dung for fruit trees, will not burn cow dung as fuel; even the refuse is more productive when used in the fields.

Will keep wells clean, prohibit the public from washing in the wells, fix sign boards, instruct the public not to make the water dirty.

Will introduce contour bunding to preserve wetness in land.

In 1970 it was reported that an experimental project is being established in India to beam television pictures to large community television receivers in some villages. However, use of educational television in Samoa suggests the need for a cautious appraisal of its results.

Can the traditional schoolroom accommodate this type of innovation or is it more effective operated away from the setting of formal education? As a medium for non-schooled education, television faces immediate opposition on the grounds of cost, but under an overseas aid agreement it might be easier to obtain solar-powered television receivers than the salaries of extra teachers. In terms of effectiveness there can be no doubt that television would provide strong visual focus of attention in the village, and that presentation of programme material dealing with other parts of Papua New Guinea could contribute significantly to national integration and development.

These are examples of an innovatory approach to non-schooled learning which could complement the vigorous policy of innovation in formal schooling in Papua New Guinea. Other examples already in progress are literacy and literature programmes in the vernaculars and Pidgin English, as well as a variety of extension activities. It is probably inevitable that in the tussle for funds these varied aspects of education appear competitive, but the educational demands of Papua New Guinea cannot be met unless they are also recognised as complementary.
Educational expansion during the 1960s has been made possible by a willingness at many levels to spend more money on schools and tertiary institutions. Existing commitments to teachers and continuing population growth will create demands for even greater increases in educational finance during the 1970s. Population, budgetary and manpower policies, and the perception of educational priorities will shape those demands and must develop the means to meet them. In practice it is unlikely that popular demand for education will be fully satisfied in this or in any other country, but here for the first time the way in which it is met will be determined by Papuans and New Guineans who have in the House of Assembly increasing control over the allocation of financial resources, and who already form a majority of the Territory Education Board.

However, the alternatives open to them in educational policy are not unlimited. Those alternatives which affect primary schooling relate to enrolment, finance, population growth, and the choice between emphasising rural or urban, and primary or secondary education.

There are four main enrolment options. First, an attempt can be made to expand the present system of formal primary education to provide for all school-age children within twenty years, by devoting a far higher percentage of gross national product to primary schooling. However, to do this it would be necessary to reduce the proportion of expenditure on activities more directly related to economic growth such as roads and bridges, health and other social services. Even if there was sufficient money to expand high schools at the same time, the proportion of children progressing from standard 6 to form I would decline considerably. Rural-urban drift would be accelerated and unemployment of school leavers greatly increased. It is unlikely that enough teachers or money could be found to achieve this schooling target by 1990.

Secondly, the cost of education can be reduced so that all children can have a shortened form of primary schooling lasting perhaps only four years. However, permanent literacy would not be achieved in English, and Pidgin or other languages would have to be used as the medium of instruction. This option would not have all the serious financial implications of the first, but it would still reduce the proportion of children progressing from primary to secondary education and would increase language problems at the secondary level. For children without the opportunity of further education, an agricultural orientation in this primary course would be useful, but if primary education lasted only four years the entry age would have to be raised to at least ten in order to give the children a realistic opportunity of using their agricultural knowledge on leaving school. If this primary stage were used to select the most able students for secondary education, it is likely that teachers would be pressured to concentrate on teaching the skills necessary at high school rather than the agricultural knowledge needed by a farmer. Perhaps high schools should be largely agricultural too?
Thirdly, priority can be given to raising the proportion of enrolment in areas where this is low within an overall target of 75 per cent primary school enrolment in twenty years, while providing some form of non-schooled education (by television and other means) for the remainder. However, there would be strong local pressures to raise the primary schooling enrolment proportion above this level unless the non-schooled education was provided widely and was shown to produce some economic benefits in the village. Programmes of non-schooled education need to be locally adapted and are difficult to administer, but they could make a valuable contribution to political integration at a wide range of age levels.

Fourthly, an attempt can be made to hold the 60 per cent primary school enrolment proportion and reduce regional inequalities by allocating extra teachers to lagging areas and reducing proportionate enrolment in primary schools in areas which have currently high levels of enrolment. However, this might encourage secession in some advanced areas and the rise of independent school movements which would probably reduce educational levels as a whole. All the political parties appear committed to overall expansion of the school system.

The option between rural and urban education can place major emphasis on one or the other. As most of the people live in the rural areas they should have a major share of educational benefits. On the other hand, education broadens the awareness of rural children and often encourages the rural school-leaver to go to town. However, if all urban children are able to attend school, rural families are encouraged to migrate to town for its educational advantages. So 'solving' the problem of urban education in one year increases the problem for the next. Yet children in towns who are not in school cannot be absorbed into the urban way of life and present a greater social danger there than in the village.

Next, it is possible to change the proportion of funds allocated to primary and secondary education, but the proportion for secondary education cannot really be reduced. Expansion at the secondary level is urgently demanded to enable faster localisation, to develop commerce and industry, and also to provide teachers' colleges with the input necessary to maintain or expand the primary school system.

Financially, a substantial rise in primary school fees at all Administration-subsidised schools could ease the pressure on enrolments and help meet costs; at present primary schooling is free apart from a very small supplies charge and voluntary Parents and Citizens Association's fees. However, the fee would need to be fairly high (possibly $10-12 per child per year), as it would become harder or impossible to collect the voluntary contributions and these would need to be replaced by allowing a rebate from the fees collected back to the school through the District Education Board. There are the problems that it would be a heavier burden on parents in some areas and might discourage efforts to increase enrolment of girls.
Finally, an attempt can be made to reduce population growth. If medical programmes continue to lower the death rate without encouraging the use of means to reduce the fertility rate through voluntary limitation of family size, the school-age population will grow by more than 3.5 per cent per annum over the next twenty years, so that by 1991 there will be at least 774,000 in the 7-12 years age group. The population will grow in any case, but a positive programme of family planning could reduce the rate of increase to 3.0 per cent so that the 7-12 years age group numbers about 671,000 in 1991. The difference between these two figures is equivalent to half the present primary school enrolment. If the nation opts for the higher growth rate these 100,000 children will either swell the costs under the first two enrolment options or increase the non-schooling gap under the second two. If the nation opts for the lower population growth rates some money would have to be spent on a voluntary family planning programme, but this would be far less than the cost of the extra schools and would have side benefits in the improvement of maternal and child health services.

None of these choices is easy, but choices will have to be made in all these five areas where the options are open. If choices are not made explicitly and urgently, then in each case one of the options will be adopted simply by failing to make a positive decision. For the last five-year plan the choices, and the compromises between them, were made by expatriates. It is one reason for encouragement that from now on Papuans and New Guineans will themselves have the opportunity to shape the decisions on these educational issues vital in the building of their nation.

Bibliography


Chapter 7

Internal migration and urbanisation in Papua New Guinea

R. Gerard Ward*

The process of social and economic change that began in Papua New Guinea with intensive contact between the indigenous population and alien visitors in the mid-nineteenth century has continued at an accelerated rate and has had widespread demographic effects. Rising death rates and sometimes falling fertility followed the introduction of new diseases; this situation has now been replaced throughout most of the country by rapidly falling death rates and high to very high birth rates. Papua New Guinea is now experiencing rapid population increase - probably more rapid than at any time since the earliest days of human settlement, perhaps 50,000 years ago.

Along with these changes in size and rate of growth of population have gone changes in the distribution of the people. This redistribution is essential to economic development and it cannot be stopped. This paper reviews some of these changes and in particular considers the trend for an increasing proportion of migrants to move to towns; it argues that migration and the rapid expansion of towns are essential for economic and social progress and that urbanisation should be facilitated and encouraged, rather than frowned on and discouraged. Increasing urbanisation, and the consequent spread of urbanism (the urban way of life) into the countryside, provide a path to more effective use of some of Papua New Guinea's scarce resources and a faster route to national unity than can be found in the careful maintenance of the rural village ideal. Adlai Stevenson, in his last speech to the

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Economic and Social Council of the United Nations, developed a similar theme (quoted in Beyer 1967:v):

...For too long we have proceeded on the false assumption that people would really rather live in villages than anywhere and that it is better for society if they did. The trouble is they don't - even when the village is modernized and sanitized and electrified, people move into larger towns and cities.

Some countries have in fact recognized that the problem is not less urbanization but more urban areas - not just one or two in each country. Some are experimenting with regional development programs...in an effort to create new urban centers which will not only deflect migration headed for already overcrowded capital cities but will have an impact on the surrounding countryside and improve rural living in a wide area around the new cities. But the process of decentralization is difficult and complex and failures - temporary or permanent - are as common as successes.

Redistribution of population has, of course, taken place in Papua New Guinea throughout the whole period of human occupation. The expansion of villages, the spawning of daughter settlements, and the relocation of settlements under the stress of war, disaster or hunger resulted in the gradual occupation of most of the country. This cell-like reproduction of the village unit is an effective means of coping with population growth provided that ample land is available and the economy is largely self-sufficient. In these circumstances small and scattered settlement units provide a satisfactory means of distributing the people in accordance with the resources they use. The location factors for villages are essentially local - water, soils, building sites, stone and plant resources - and these are relatively ubiquitous in their availability. After the frontier of settlement had passed on, and as demographic processes resulted in increases or decreases in the population of particular villages, inter-village migration allowed adjustments to cope with the changing demands for land, wives, security and material goods.

European contact brought new locational forces into play which were external to the village. Missions and government stations, trading points and employment centres such as plantations and later goldfields, offered opportunities not to be found in the villages. Areas with access to these opportunities were favoured as destinations for migrants from places less well located; people therefore began to move towards the areas of alien-sponsored economic activity.

In the period prior to 1940 most internal migration was temporary in nature and was based on the contract labour system. Workers were recruited in their home areas, particularly the Sepik, Morobe and Madang in New Guinea and what are now Gulf and Milne Bay Districts in Papua, and taken to work for set terms on the plantations of the New Guinea islands or Central District, or in the gold mines of Central, Milne Bay
and Morobe Districts.¹ Most returned home when their contracts expired; and some re-engaged after a period of rest and recuperation.

This early circulation of labour had two important effects on future migration patterns. First, it fostered a growing desire in the home areas for material goods which could only be obtained by increased labour migration; and secondly, it spread information about particular employment areas to particular source areas. It is the limits of this knowledge which has had a channelling effect on migration flows in both pre-war and post-war years. Even in the late 1950s the migration pattern revealed by Brookfield's study (1960) is one which follows the information flows established in much earlier times. The basic elements are one migration stream from the Sepik and Morobe to New Britain and New Ireland, and another from the outer Papuan districts to Central District. For the Papuan migrant the New Guinea islands were still largely terra incognita, and likewise few New Guineans ventured across the central cordillera to Papua. One of the critical changes of the last decade has been a breaking down of the separate information fields and the creation of a national field within which migrants move much more freely.

In the post-war period a new type of migrant appeared in growing numbers: he did not sign a contract; he paid his own way to the place where he hoped to find employment; and he did not return home at the end of any set period. This type of migrant brought an entirely new dimension to the scene, one aspect of which was that the preferred destination of half of them was the town. The modern migrants move with more confidence, knowledge and independence; like the East Germans migrating to the West in the days before the Berlin Wall, they are voting with their feet.

Two maps published elsewhere (Ward and Lea 1970:15) show that in general those Districts with limited indigenous cash cropping and few employment opportunities in expatriate-owned enterprises had a net outflow of migrants in 1966. Of those people born in West New Britain and Central Districts, 18 and 15 per cent respectively had left their natal Districts in 1966. East New Britain and Central Districts were the principal destinations for migrants and 22 and 18 per cent respectively of their residents were born in other Districts.² Since 1966 both

¹ In this paper the term 'District' refers to the administrative unit and 'district' to an area which may not coincide with current administrative boundaries. For example, MilneBay District was not designated until March 1950 and the boundaries between this District and Central and Northern Districts have been altered slightly since then. See Ward and Lea (1970: 2-3) for a description of the changes on District boundaries since 1946.

² The fact that Central District is an important source and destination for internal migrants reflects the great contrast in socio-economic conditions in different parts of the District. It also reflects the 'stream' and 'counter-stream' phenomenon.
Bougainville and the Western Highlands have become more important as destinations. Chimbu and Eastern Highlands Districts figure prominently on the maps (Ward and Lea 1970:15), but the creation of Chimbu District in the middle of the census period has resulted in considerable misreporting and therefore unreliable data for these two Districts.

This apparently simple description of migration patterns in the mid-1960s masks an extremely intricate set of migration streams, counter streams and cross currents. For simplicity, however, the present migration complex may be viewed as three relatively separate systems: inter-village migration, agreement (formerly contract labour) migration, and independent migration.

Relatively little is known about inter-village movement within the traditional realm where the economy is mainly or wholly subsistence. However, one type of such migration which has developed in recent decades has been relocation of settlements following an end to inter-village warfare. In many areas, notably in the high density Chimbu District, land that was formerly unoccupied because of its frontier or 'no-man's land' status between antagonistic groups has now been occupied. Such movement does help alleviate population pressure. Similarly, the adjustment of local populations in a traditional way continues. But the relationship of these movements in the traditional sector to the processes of modernisation is slight. This is characteristically short-distance migration. Census data for rural villages in 1966 show that in only two Districts (New Ireland and Manus) were more than 0.6 per cent of the people born in Districts other than that of residence or those immediately contiguous. Even in Central District, which had over 18,000 net in-migrants in 1966, only 87 of some 85,000 village residents were not born in Central, Gulf, Morobe, Northern or Mile Bay Districts. Indeed less than 1.0 per cent were born in any single District other than Central.

The local nature of this inter-village migration system illustrates the limited horizons of the village and the difficulty of creating a sense of national unity at the village level. Although villagers do return home with news of other Papuans and New Guineans who live far away, the experience of actually living alongside people from distant areas is simply not available to the vast majority of villagers. And as a channel for the diffusion of technical, social or economic innovations, inter-village migration has a limited role. In the context of modernisation the other two migration systems are much more significant.

The contract labour system and its successor, the agreement system, operating through the government-managed Highland Labour Scheme and through licensed recruiters in non-highland areas, have long been the principal channels through which villagers make their first step into the modern sector. This step, as with any shift of residence whether short or long-term, short or long-distance, requires that the potential migrant weigh up the information available to him about his likely
destination and assess whether it offers better prospects than his home situation. If he thinks it does, he must pay the costs and overcome the intervening obstacles between home and destination. The agreement system has made possible long-distance movements from areas whose people would otherwise have no chance of breaking out of the traditional realm. The recruiter (or patrol officer) brings in information about other areas which could not penetrate through traditional channels; no doubt he often tells an over-enthusiastic story and actively persuades the potential migrant to leave home; and the recruiter (or Labour Scheme) removes the individual's transport problem by organising his passage and having the employer rather than the migrant bear the immediate cost. There is of course a considerable cost to the migrant and his kin. He has a limited choice of where he goes; in effect the village must subsidise his journey by supporting his dependants in his absence; and, particularly in the past, the rewards for his labour have not been over-generous. Nevertheless, the fact that over 10,000 new recruits sign on each year shows that the system still provides many with an attraction greater than that offered by their home villages. And in 1968 perhaps one-third of those who signed on in the Highland Labour Scheme were doing so for at least the second time.

Figure 7.1 shows the 1967 pattern of agreement labour migration in Papua New Guinea. Since 1957 (Brookfield 1960:238) there has been little change in destinations, but the highlands have become the major source of agreement workers, with the remoter parts of Morobe District also contributing a larger number. The Sepik, which ten years ago was a major source, is now relatively insignificant. The reasons for this change are fairly clear: agreement labour is most attractive to people who have had limited contact with the outside world, know little about the range and location of places of employment available outside, and lack the means to pay their own fares. At any time these conditions exist most obviously in areas of recent administrative control. In areas of longer contact many have been away before, have knowledge of alternative places of employment, and have the cash resources to pay their own way; they may also have developed a dissatisfaction with plantation work and the financial rewards offered by agreement labour.

A typical area will send out agreement migrants soon after the establishment of initial contact or control (see Figure 7.2). After the first few groups return there is usually a decline in the number offering for agreement work and this may coincide with the increase in local sources of cash, usually from cash cropping. Agreement recruiting drops to a relatively low and stable level; recruits now tend to be older than previously and a higher proportion are married. Perhaps these are the less adventurous men, preferring security and lack of responsibility to higher wages and independence. Once financial resources in the area increase and the initial flush of cash crop establishment is passed, out-migration is renewed, generally involving larger numbers than ever before, but now on a non-agreement, independent basis.
Source: Department of Labour records, 1967. The flow lines are based on a random 20 per cent sample of all agreements entered into during 1967.

Figure 7.1. Movement of agreement workers from district of birth to district of employment, 1967
Figure 7.2. Model of out-migration from a rural area

Viewed another way the changing source of agreement labour can be envisaged as a wave moving across the country. In the last decade the wave has spread out from Goroka and later Mt Hagen, and the crest has now reached the furthest parts of the highlands (see Figure 7.3). The implications of this for the future are clear. Although the current rate of recruitment may be maintained for a year or two longer it will inevitably begin to fall. Whereas 43 per cent of the total enumerated workforce were employed under agreements in 1960, the figure for 1968 was only 20 per cent. Even in the strongholds of the agreement system, the non-indigenous rural holdings, only 40 per cent of the workforce were engaged under agreements by 1968 and in only five Districts did agreement workers outnumber casual or day-workers (Department of Labour 1969:20 and 45).

Figure 7.3 shows the number of agreement workers leaving the Koroba, Mendi and Minj sub-districts from 1958 to 1969. Of the three, Minj sub-district in Western Highlands District is the most accessible and has the longest history of contact and administration. Mendi and Koroba, both in the Southern Highlands, have been under administration for shorter periods and the local opportunities for paid employment have so far been more limited than in the Minj sub-district.

The agreement system carries within it the seeds of its own destruction. By spreading information into the remotest areas, it undermines
the need for recruiters to act as disseminators of knowledge of the outside world. The information carried by returning workers is more realistic than that imparted by recruiters and allows prospective migrants to discriminate between alternative destinations. By providing a channel for innovations to spread into the villages, the agreement system both creates alternative avenues for earning cash and ultimately provides the means for further travel to the outside world without the ties of an agreement. Clearly, unless there are radical changes in the conditions of employment under agreements, this migration system will die.

The agreement migration system is being replaced by the third system (see Figure 7.2) which, for want of a better term, I shall call the independent system. In 1967, of the 55,000 enumerated workers who were outside their District of birth, 59 per cent were 'independent' migrants (Department of Labour, unpub.). Whereas the agreement migration system is fairly simple to portray, the independent system is much more intricate. Figures 7.4 and 7.5 showing the movement of workers to three Districts illustrate some of its basic features.
Source: Department of Labour, unpublished tabulations from annual employment returns, 1967.

Figure 7.4. Movement of non-agreement workers to Western Highlands and East New Britain Districts, 1967
Source: Department of Labour, unpublished tabulations from annual employment returns, 1967.

Figure 7.5. Movement of non-agreement workers to Central District, 1967
Western Highlands District (see Figure 7.4) is now second only to East New Britain District in terms of numbers employed on non-indigenous rural holdings (Department of Labour 1969:45), but in 1968 agreement labour accounted for only about 7 per cent of the total. Independent migrants come in from surrounding districts seeking casual employment on coffee and tea plantations. This sort of situation is now the pattern for Madang, Morobe and Northern Districts, as well as for the Eastern Highlands. In the case of East New Britain, the long-established links with the New Guinea mainland coast are reflected in continued independent movement from the latter area; the agreement wave has passed on, but the informational and historical links continue to channel independent migrants along the old routes.

In the case of Central District (see Figure 7.5) the pattern is rather different, and may indicate certain important trends which will become more obvious in the future. With increasing circulation of people, mail and other news, awareness of the attractions of some employment areas is now spread over the whole country and these areas are beginning to draw their migrants from a truly national field. Central District is the clearest case, as one would expect from a consideration of the amount of information disseminated from and about each district.

Figure 7.6 presents an information index map which is certainly provisional but does give an impression of the relative amount of news circulating about each district. It is based on a composite index derived from data on newspaper news items about each district, the outward flow of mail from each district, and newspaper circulation to each district. The correlation between this index and the number of independent in-migrants in each district \( r = 0.92; \rho = 0.82 \) is indicative of the way in which the flow of information about different areas influences the direction of migration, though deficiencies in the index and the fact that both may be underlain by a common dimension (European activity) mean that too much reliance should not be placed on the correlation.

The great variety of independent migrants makes generalisations about them rather dangerous, for the people involved range from the most highly paid indigenous civil servant to the unskilled youth hitchhiking down the Highlands Highway to seek his first job in Lae. But the independent migrant is certainly a rather different person to the agreement migrant. He generally has more experience of the world outside his village; he has the confidence to organise and the funds to pay for his own travel; he is more likely to remain away from his village for a long time; he is more skilled and receives a higher cash wage; he probably hopes to bring his wife and family to his new home when he can afford to; and he is likely to be urban-orientated, for at least 48 per cent of independent migrants are resident in urban areas (Department of Labour, unpub.). Incidentally, it is also more difficult to find data on him.
Source: Based on data from the Department of Posts and Telegraphs and circulation data from the Papua-New Guinea Post-Courier, Port Moresby.

Figure 7.6. Information index by district, 1968-69
The 1966 census showed that 8.6 per cent of indigenous males were living outside their District of birth. A much higher percentage had left their natal village. Some indication of the varying impact of out-migration on different areas is provided by Figure 7.7, which shows absenteeees as a percentage of the de jure male population of working age of each census division. In some census divisions the proportion of male absenteeees is over 50 per cent and large and widely scattered areas have over 30 per cent away. These are often places which have had long (even if not intensive) contact with the commercial world, and where either the physical environment or relative isolation limits local cash earning. But some of the most developed areas, which do not suffer these disadvantages, also have high absentee rates. Data are not available to account fully for this, but two conclusions can be drawn from the evidence embodied in Figure 7.7 and from our knowledge of the changes taking place in the relative importance of the three migration systems. First, the proportion of absenteeees in many parts of the highlands must be expected to rise rapidly in the next few years. For example, as the Western and Southern Highlands as a whole achieve the level of indigenous cash cropping now enjoyed in the Eastern Highlands, and as independent migration replaces agreement, there will be a greater exodus than ever. Secondly, and this is implied above, there is little evidence that increasing indigenous participation in commercial agriculture in an area will in fact stem the outward flow of adult males from that area. This prediction, a rather gloomy one for those who see the retention of men on the land as being of prime importance, needs more explanation.

Part of the explanation lies in the model of the change from agreement to independent migration (see Figure 7.2). The increase of local cash resources makes possible more independent movement as often as it acts as an incentive to stay. Ten years ago it looked as if the outward movement from the Eastern Highlands might slow down as local coffee production rose (Brookfield 1961:311); today it looks as if local income is providing a secure base from which men (and now women) migrate independently, in the knowledge that they can go back to a partially money raising economy if they wish. Certainly the number of workers from Eastern Highlands and Chimbu Districts employed outside them has continued to rise steadily, and between 1965 and 1968 the increase averaged 8.5 per cent per annum for total workers and 34.2 per cent per annum for non-agreement workers (see Figure 7.8). Brookfield (1968:111) shows how changing aspirations, land-use pressures and changing coffee prices influence this out-migration in part of Chimbu District. Subjective evidence so far indicates that the wish to return home is not very strong, just as Adlai Stevenson suggested is the case elsewhere in the world.\(^1\)

There are other reasons why the outward flow of people from many rural areas is likely to grow both absolutely and relatively. The

\(^1\) See p.82.
Source: Department of District Administration records from village censuses. The date of the censuses varies between late 1967 and mid-1969.

Figure 7.7. Percentage of the de jure adult male population of each census division absent from their villages at the time of the last Department of District Administration village census.
Source: Department of Labour, unpublished tabulations from annual employment returns, 1963-68.

Figure 7.8. Number of agreement and non-agreement workers from Eastern Highlands and Chimbu Districts and West Sepik and East Sepik Districts employed outside their District of birth, 1963-68

The process of modernisation, especially the commercialisation of agriculture, has two important effects on the man-land ratio. First, a new location factor, accessibility, becomes prime importance. Without access to markets by road or sea, effective participation in cash cropping is impossible. There are many parts of Papua New Guinea which cannot expect to be accessible for several decades. Such areas do and may continue to support a subsistence population but these areas can be expected to become less and less attractive as their residents' knowledge of the outside world increases.

Secondly, the desire to engage in cash cropping often causes a change in the appraisal of land quality by the cultivators themselves. Commercialisation of agriculture usually means specialisation and a consequent reduction in the range of soils in an area which are considered valuable.
With the varied crops and short cultivation periods of shifting agriculture a wide range of soils and slopes may be used; slopes which are far too steep for permanent cultivation may be used safely with short cropping and long fallow periods. But most forms of commercial agriculture are permanent, and over large areas of Papua New Guinea the pockets of land which are able to support such cultivation are too small and too scattered to make it economic to provide the access which is essential if they are to be brought into the modern economy. At a rough estimate some 250,000 people, or 10 per cent of the population, live in such areas and these areas must be expected to become progressively depopulated. This is happening in most of the larger island territories of the Pacific.

Even in some of those areas with satisfactory conditions of access, a net outflow of population must be expected. This is especially likely in the more densely settled areas, for a change from predominantly subsistence gardening to primarily cash cropping is likely to increase the area needed to support a family and hence to reduce the density of population which may be supported per unit area of rural land.

It might be argued from the nineteenth century Indonesian experience, that by the process which Geertz (1963) called 'agricultural involution', a steadily increasing labour input combined with technical changes and skillful elaboration of the agricultural system would allow a steady increase in rural densities without a corresponding rapid fall in levels of living. If Papua New Guinea had a wet-rice agricultural system this would certainly be possible. But as most Papuans and New Guineans depend on some variety of shifting cultivation, a growing population and larger demands of land per head are more likely to result in longer cropping and shorter fallow periods and generally in a deterioration of the environment and a reduction in its carrying capacity. To change the basic agricultural system to one which is likely to sustain a process of 'involution' would be a very difficult undertaking and indeed one leading to a blind alley in economic development. Papua New Guinea is more likely to follow the other path, whereby the further development of technology in agriculture increasingly limits the number of people who can gainfully live from agriculture (C. Garces-Vernaza, quoted by Beyer 1967:94).

Where will these people go to find employment, or land? Through resettlement schemes the Administration has been active in attempting to assist in the relocation of rural population and in increasing their involvement in the modern economic and social sector. In the case of the Hoskins oil palm project such development is essential for the establishment of a potentially very profitable industry. However, resettlement through government agencies is still contributing relatively little towards population redistribution in terms of numbers of people moved. (Of course it should soon begin to contribute very significantly to Papua New Guinea's exports.) Since 1961 some 3,750 farm blocks have been made available in resettlement schemes and about
3,500 families resettled. In ten years, therefore, resettlement schemes have catered for about three months increase in population at current rates of growth. In the same period the growth of the indigenous population of Port Moresby alone from 20,000 to about 43,000 represents the equivalent of resettling a considerably larger number of families. If it is to act as a counterbalance to rural-urban migration the resettlement programme needs to be greatly accelerated. At present rates of planning it cannot keep pace with the potential demand, and unplanned resettlement of the type going on around the margins of Chimbu District is unlikely to prove more than a temporary palliative. Furthermore, it still remains to be seen whether the resettlements will be more successful than the villages in retaining people in the rural areas.

So far I have tended to imply that the principal motive for internal migration is the desire to earn cash. To date little work has been done on the motivation of migrants, but it is clear that a whole range of social as well as economic motives is involved. They include the desire to extend one's range of experience; the wish to avoid communal and council obligations and the dullness of village life; the need to earn cash for tax payments; the desire to get children into school or to get further education oneself; the attraction of the variety of town life and the higher level of services, public and commercial, which are available in non-village areas. Until rural areas are able to offer modern social as well as economic attractions, it will be very difficult to stem the drift away from village life.

The recent change in the relative importance of the two main migration systems has been accompanied by changes in the directions of movement. By 1967 about half of the independent migrants were working in urban areas and in 1968, 33 per cent of the total enumerated workforce were in the thirteen main towns (Department of Labour 1969:22). Insofar as wage differentials influence potential migrants, it is significant that these urban workers in 1968 received over 50 per cent of the total amount of salaries and wages paid to indigenous workers in Papua New Guinea (Department of Labour 1969:34-9). Although higher living costs in towns reduce the effectiveness of the higher wage, it is likely that the apparent differential is of greater importance than the real differential as an attractive force for potential migrants.

The 1966 census showed that 5.9 per cent of the total population and 4.8 per cent of the indigenous population were resident in urban areas. These are very low figures compared with other parts of the world, and even compared with other developing countries, especially as the definition of an urban area included several centres with well under one

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1 Personal communication: A. Ploeg, October 1970.
2 The labour migration research project (of which this paper is part) will study motivation more comprehensively.
thousand people. Until the next census is taken in mid-1971 we have only a hazy idea of how rapidly the towns are growing. And to attempt to predict with any pretense of real accuracy their likely sizes in, say, 1991 and to suggest what proportion of the population will be urban dwellers by that date is somewhat foolhardy. Nevertheless, I would like to explore some of the possibilities.

Fortunately counts were made in 1970 of the population of Port Moresby, Lae, Madang, Goroka and Rabaul (Bureau of Statistics 1970; Division of District Administration 1970). In 1966 the first four of these towns contained 56 per cent of the urban population. (Rabaul is omitted as the urban boundaries used for the 1966 census were quite unrealistic and excluded considerable areas which were urban in nature.) The total population of these four has increased at a rate of 8.3 per cent per annum since 1966 and the indigenous population at 8.1 per cent (see Figure 7.9). Goroka had the highest indigenous increase rate per annum, 13.3 per cent, and Port Moresby the lowest, 6.8 per cent.\footnote{These figures make allowance for boundary changes between 1966 and 1970.} Although estimates of the population of other towns are made annually by officers of the Division of District Administration it is impractical to use these as an accurate guide due to problems of enumeration and definition of urban boundaries. However, figures for eleven of the smaller towns (including Mt Hagen, Wewak and Daru) suggest that their total population is probably increasing by over 6 per cent per annum, and it seems reasonable to assume that the total urban population is increasing at about 8 per cent per annum.\footnote{Cf. pp.51-2.}

If the rate of increase of the four enumerated towns is paralleled by overall urban growth, the mid-1971 indigenous urban population will be 153,000; this would include 6.2 per cent of the indigenous population, using van de Kaa's medium projection for total indigenous population (see Table 3.5). Continued expansion at this rate would mean that by 1976, 7.9 per cent of the indigenous population would be urban dwellers, and in 1991 the country might have 725,000 urban dwellers, or about 16.0 per cent of the projected indigenous population. By comparison it is interesting to note that Fiji reached this level of urbanisation in about 1950 and Western Samoa shortly after 1956; by 1966, 19 per cent of Fiji's population lived within legally delimited towns and 33 per cent in areas which could be defined as urban (Colon of Fiji 1968:6).

The only detailed projection of population for an urban area in Papua New Guinea is that by Langmore (1970:29) for Port Moresby (Figure 7.9); this gives a population in 1990 of 270,000, including 252,000 indigenes. The 1970 population enumeration suggests that Langmore's
Source: Port Moresby data from Langmore (1970:29); Lae, Madang, Rabaul and Goroka data from Bureau of Statistics (1970) and Division of District Administration (1970). Figures for 1966 are from Bureau of Statistics (1969). The projections for Arawa were obtained from the Town Planning Branch, Department of Lands, Surveys and Mines.

Figure 7.9: Population growth of major towns
estimate for the 1966-80 period may be too low, but provided that Port Moresby remains the capital it will have at least a quarter of a million indigenous residents by 1990. By the end of the century it could have over half a million. And if Port Moresby continues to have a similar proportion of Papua New Guinea's urban dwellers as it does now, a national total of 750,000 persons may be living in towns in twenty years time.

It has been noted that in many countries there is a fairly regular relationship between the relative size of towns and their rank in the urban hierarchy of the country. The 'rank-size rule', in its simple form, states that the size of town number 'n' in the hierarchy will be \( \frac{1}{n} \) the size of the largest town. In 1970 the towns of Papua New Guinea fitted this model fairly well - better apparently than in 1966. If Port Moresby were to continue to grow as predicted and something approaching a rank-size relationship were maintained, by 1991 at least 20 per cent of the population would be urban dwellers.\(^1\)

It may be argued that these figures of 16 or 20 per cent urbanised require rates of increase considerably in excess of those projected for the increase in the size of the money raising part of the workforce. This is true. But those sectors of the money raising workforce which are urban-based are also those likely to have the highest rates of growth: manufacturing, public authority, transport, storage and communications, mining and so on. This is of course a characteristic of most modern economies.

But there are other reasons why the urban areas are likely to grow at least as fast and perhaps even faster than the rates suggested above - and certainly faster than the rate of increase in urban jobs, even though this will result in large numbers of apparently unemployed people residing in the towns. In many Third World countries urbanisation outstrips the growth of urban employment opportunities. In a Western society one might expect the rate of rural-urban migration to fall as urban unemployment rises and a state of over-urbanisation develops; but too often we tend to forget that in Papua New Guinea we are not dealing with a 'Western' society, even in those parts of the country which are most urbanised and most modernised.

It might be argued that to be unemployed in town is to be destitute, whereas back in the village land and kin are available for support. Yet one of the most important features of urban areas in Papua New Guinea (as in many parts of the Third World) is that the society is not individualised to the extent that people are left destitute. Reciprocity still operates; kinship and place of origin groups support those

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\(^1\) Strict application of the rank-size rule would imply a considerably higher percentage of urban dwellers, but this would require the establishment of a very large number of towns with between 1,000 and 5,000 residents, and this is unlikely to occur.
in need, and income is spread through traditional-type channels. As a result the burden of supporting those who are temporarily out-of-work is spread widely in what Wertheim called 'shared poverty' (Armstrong and McGee 1968:359). And even if the urban underemployed went home to their villages it is doubtful if they would be materially better off, unless of course their home area is one where ample land is available for cash cropping, there is good road access to markets, services such as schools and shops are available, and jobs are also obtainable in the long period before coffee or tea or coconuts provide any cash return. These conditions do not exist over much of Papua New Guinea. If many more resettlement-type projects were operating the case might be different, but we are not dealing with a situation in which jobs are readily available in rural areas. To those who have opted out of the mainly subsistence sector there are too few opportunities in the rural areas.

Browning (1967:74) has pointed out in relation to Latin America that 'any society suffering from overurbanization is one certain to be suffering from over-ruralization as well'. Labour underused in the town would in all probability still be underused if it had remained in the country.1 This is the case in Papua New Guinea. As a result the underemployed urban dweller who stays in town is not weighing his urban underemployment against full rural employment, but against rural underemployment. And urban 'shared poverty' is often more exciting than rural 'shared poverty'.

Armstrong and McGee (1968) take over Geertz's term 'involution' to describe the way in which, in Third World cities, the non-capitalist sections of the tertiary sector of the urban economy can continue to absorb increasing labour to an extraordinary extent. The organisation of Koki market in Port Moresby is an example of this situation, and shows how the urban 'bazaar economy' interacts with the rural village economy to spread the load of urban support still wider. There is not a clearly defined urban-rural dichotomy but rather two separate, interacting forms of urban economy: one is expatriate and capital-intensive, while the other is indigenous and labour-intensive and overlaps into the rural peasant economy. After all, by supporting the dependants of urban migrants the village is subsidising the town just as it is subsidising the plantation. All this means that an increment in the capitalist sector of the town's economy may well support a disproportionately large increment in the 'bazaar' sector. We should be wary of urban population predictions for Papua New Guinea which are tied too closely to estimates

1 This rural underemployment is itself a product of the process of modernisation. It is the introduction of low-cost, factory-made goods which has eliminated the village handicraft industries, local trading systems, and several other labour-intensive activities of the traditional economy.
of growth in the money sector workforce, for the situation is one in which the relationship between them is not wholly clear. Experience elsewhere suggests that even if the commercial sector of the economy were to stagnate, urbanisation would continue. General unrest in the country may increase the rate, as in Indonesia, where the urban population increased by 231 per cent between 1930 and 1961, though the total population rose by only 60 per cent (Milone 1966:97), and the country's economy was disrupted by war, the revolutionary period, and the policies of the Sukarno regime.

Other reasons why the towns of Papua New Guinea should grow at a rapid rate in the next few years lie in the sex ratio of the urban population and changes which appear to be occurring in this ratio among migrants to the towns. In 1966 the towns had 183 males for every 100 females. This imbalance obviously depressed the crude birth rate in urban areas. Unfortunately, as birth and death registration is not compulsory, regional differences in the rates cannot be accurately assessed.

It has been a common experience for fertility rates in urban areas to be lower than in rural areas and a whole complex of factors lies behind this. It is a tendency which is encouraging for planners. But there are indications that this is a far from universal situation and recent experience in Latin America suggests that urban fertility rates are rising rather than falling (Browning 1967:87), and the same tendency has been noted in some cities in other parts of the developing world. Van de Kaa suggests that this is already the case in Papua New Guinea.\(^1\)

The enumerations of the major towns in 1970 revealed that their indigenous adult female population was increasing much faster than the male; this reflects a growing stability in the urban population with more men deciding their future lies in the towns and bringing wives (and families) to town. As the sex ratio becomes more balanced the urban birth rate is likely to increase, temporarily at least.

The whole question of the permanency of the urban population is a vexed one. Few data are available on the rate of circulation between village and town, but what there are suggest that the urban population is much more permanently committed to the town than is commonly supposed. Ryan (1964) showed that of Toaripi men in Port Moresby in 1963-64, nearly 70 per cent had first left home over ten years previously; approximately 80 per cent were married and had their families with them; and about 75 per cent of the children were either born outside the village or left the village in their first year. These figures appear high but relatively long periods of extra-village residence are recorded by other workers. Oram (1968:16) reported that of those males from Hula village who were over 34 years of age and resident in Port Moresby in

\(^1\) Personal communication, November 1970.
1964, 61 per cent had spent over fourteen years away from the village. Moreover, the fact that many urban residents are temporary does not imply that total urban populations will in future fall, relatively or absolutely. Even if many of the current town-dwellers do return to their villages, it is likely that they will be replaced by an even greater number of new rural-urban migrants.

The 1971 census, in which questions on length of residence will be asked, should provide very valuable data, but meanwhile the evidence suggests that to talk of temporary urban dwellers with the implication that they will go home in due course is largely wishful thinking. Furthermore, as the degree of permanency increases and crude birth rates rise, natural increase within the towns is likely to go some way towards compensating for any falling-off of rural-urban drift. With their medical facilities, the towns tend to be at least as healthy as rural areas. This is a different situation to that of the growing towns of the Old World in the eighteenth century, and it is one which will encourage high rates of natural increase in Papua New Guinea's towns.

The whole trend of this argument leads to the belief that an urban population nearer 1,000,000 than 500,000 should be expected in 1991. But what sort of an urban pattern is Papua New Guinea likely to have? In many countries there is a high level of primacy in the urban structure, that is, a very high percentage of the urban population lives in one town, usually the capital city. For example, in Mexico, Mexico City is about four times the size of the next largest town, and in Victoria, Melbourne is twenty times the size of Geelong. Such a situation may have advantages in a developing country where the high-level skills and technical equipment needed in modernisation are scarce resources, for they may be more effectively utilised within one large urban centre than if spread over several smaller ones. This argument has been put forward in Papua New Guinea in relation to tertiary education: the cost of fragmenting tertiary education in a number of small, scattered institutions results in duplicating of teaching personnel, library resources and classroom facilities, and in significantly higher costs per student. The same argument applies equally to many other high-level services, such as medical, legal and administrative ones. Ideally, we might plan to develop a high level of primacy in our urban structure.

However, a high level of primacy is unlikely to develop. Although the post-war administrative union of Papua and New Guinea has resulted in administrative centralisation, the fragmentation of the country into several large islands, the lack of a unified land transport network, and the high costs of internal transport have all encouraged the development of a number of semi-independent urban centres, each with stronger (and often more direct) economic links with overseas cities than with one another. The urban scene in Papua and New Guinea may still be viewed as representing several separate bridgeheads tied to Australia rather than a unified urban hierarchy within Papua New Guinea itself.
This situation is likely to continue until a unified transport network and lower internal transport costs make a national market a reasonable goal for industrialists. Until then, unless the seat of government is moved to Arona or elsewhere, Port Moresby can be expected to retain its dominant rank. But Lae, Rabaul (or perhaps a Tolai linear city stretching from Nonga through Rabaul to Kokopo and Vunapope), Mt Hagen, Madang and Goroka are unlikely to drop back in relative size. And in twenty years the Kieta-Arawa-Panguna complex is likely to have 20,000 people. These increases in the present major centres will happen even without much active government encouragement.

At the other end of the urban hierarchy there is need for government encouragement. As the changing pattern of migration shows, it is the towns which are providing the most attractive environment for those who have left the villages. If rural life is to be maintained and modernised, the country should be urbanised as much as possible so that the advantages of urban living are spread as widely as possible; the small towns should be actively fostered and people pursuing both urban and rural occupations should be encouraged to live in small towns wherever practical.

Much could be done without any great increase in expenditure. At Hoskins a large settlement scheme has been developed and some 950 farms (950 families) established. Each farmer has his house on his separate block. He is irrevocably a rural dweller. But if the settlers all lived in central townships there would be many advantages: road costs could be reduced; a piped water supply could be more easily and cheaply installed; electricity supply to houses would not be out of the question; travel to school and to shops would be easier. In other words, the settlers would have the opportunity to enjoy an urban type of life. And there are other advantages - for the speed with which new innovations spread is directly proportional to the amount of contact between farmers. It is easier to introduce new techniques in an urban-type situation than through a dispersed rural population. Of course there are disadvantages in nucleation, but where farms are small and the distance between homestead and farm is not great, these disadvantages are far outweighed by the advantages. The Malayan settlement schemes that form the model for much of what has been done at Hoskins use a nucleated settlement-form so that the oil palm farmers can enjoy a small-town life.

Outside the resettlement schemes there are plenty of opportunities to foster the growth of the embryonic central places which are appearing. But this requires regional planning of a type not yet begun in Papua New Guinea. It is to be hoped it will begin soon.

It is often felt that the allocation of financial resources to urban areas means diverting funds from development needs elsewhere. This may be true, but an urban area also brings very great economic and social benefits to the surrounding rural community in return for relatively little development expenditure. The costs of providing government and
social services such as schools and medical facilities are likely to be significantly lower per head for a concentrated population than for a dispersed one. Why not encourage concentration?

Smith points to the high cost of raising the proportion of school children in all Districts to the national average. At present the policy is to hold steady the proportion of urban children who get into school in order to increase the rural proportion more quickly. This finds favour among rural politicians but I would submit that it is far more dangerous politically to leave urban children outside the classroom than to leave rural children without schooling. At least a child of ten in a rural area may be partly productive, but in the towns he is forced to wait until he is sixteen before he can work legally, and without education he is condemned, in effect, to unemployment. The uneducated urban child cannot go back to the land - he has neither the land to go to nor the agricultural background to make him a successful farmer. He is likely to become a very discontented person, and a discontented urban dweller is much more dangerous to the structure of established authority than a discontented villager.

Proposals have sometimes been made to introduce measures which would keep people out of the towns. But even the elaborate measures of the South African pass system and police state have not been able to do this. No country has successfully controlled rural-urban migration. If economic development is fostered with one hand, rapid migration to the towns cannot be stopped with the other. A more positive approach is needed, but this might require a revolution in administrative attitudes and in economic planning - a revolution which would accept urbanisation and would plan for it and use it. There are economic advantages in doing so and the political advantages are even greater.

One of the often heard arguments against urbanisation is that in the towns the traditional values of community life disappear: extended family living with its sense of community is replaced by the nuclear family with its loneliness and isolation; the ideals of mutual cooperation with kin and fellow villagers are replaced by individualism and a hard materialism. But too often this is a conclusion reached by comparing the traditional village with the Western city. In the southeast Asian city or the towns of the Pacific Islands, all that is good in the traditional life is not lost.

In a study of Medan, a Sumatran city with 360,000 people in 1959, Bruner (1963:4-12) found that kin ties were still strongly maintained both between city dwellers and between the townsmen and their rural kin. Nayacakalou (1963:34-5) found similar conditions in Suva; and Ryan (1964), Oram (1968) and others have shown that in Port Moresby the old systems of social organisation retain much of their vitality. Certainly the

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1 See pp.71-2.
linkages are modified, but they are modified in a manner which is vital to the future political development of this country. For essentially what happens in the town is that the individual widens his concept of kinship or affiliation to include people from other villages and neighbouring areas to whom he would be considered but distantly linked if at home. Regional identity and the prospect of co-operation in wider groups are often forged most quickly among people away from their own region. Such widening of horizons through the finding of common interests by and among people from different regions and language groups is essential to the creation of national identity. If national identity is to be created quickly the best return will be found in the towns where people meet and talk with strangers and not in the villages where only one person in a thousand is a stranger who brings in new ideas.

The House of Assembly, the Administrative College, the Institute of Technology, the university, the teachers' colleges, the factories, the army and the political demonstrations, are essentially urban institutions. It is in these institutions, in the towns and not in the remote villages, that the concept of the Papua New Guinea nation will be proclaimed and its reality created. And if the towns are stunted, so will be the nation.

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Chapter 8

Population and land in the Gazelle Peninsula

K.J. Granger*

Since the late nineteenth century when European traders and missionaries first settled in the Gazelle Peninsula, the demographic situation and economy have undergone radical changes, with consequent pressures being exerted upon the traditional beliefs and customs of the indigenous people.

The first Europeans settled along the shores of Blanche Bay in the early 1880s. The indigenous population then numbered approximately 15,000, of which the group now known as Tolai was by far the most numerous (Parkinson 1907); the growth rate of the population was probably less than 1.0 per cent per annum. The first enumeration of the indigenous population of the Gazelle Peninsula in 1904-05 indicated 20,055 persons (Territory of New Guinea 1904-05). Since then enumerations have been conducted at irregular intervals. Although the data obtained by these counts are subject to error, they do show the general trend in population growth (see Figure 8.1). Between 1901 and 1942 the Tolai population increased at an overall rate of 1.04 per cent per annum. During 1942-45 there was a tragic drop in the population as a result of direct military action, malnutrition, and the general breakdown of medical services. In the post-war period from 1946 to 1969 the Tolai population increased rapidly at a rate of 4.45 per cent per annum.

During the period from 1904 to 1969 the non-Tolai population increased also; large numbers of indentured and agreement labourers have worked on the many expatriate-owned plantations because the Tolai were unwilling to do this type of work (Salisbury 1962:337). The non-Tolai population reached a peak during the war years when more than 120,000 Japanese troops were garrisoned in the area; the Japanese garrison totalled 89,291 when it surrendered in 1945 (Long 1963:556-7).

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* Mr Granger was Management Clerk in the Department of Forests, Port Moresby, at the time this paper was written. Opinions expressed in this paper are the author's and do not necessarily represent those of the Administration or the Department of Forests.
Figure 8.1. Population growth, Gazelle Peninsula, 1904-69
Table 8.1 shows the population of the Gazelle Peninsula in 1969.

Table 8.1

Population of the Gazelle Peninsula, 1969

<table>
<thead>
<tr>
<th>Indigenous</th>
<th>Non-indigenous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolai</td>
<td>European</td>
</tr>
<tr>
<td>68,000</td>
<td>3,100</td>
</tr>
<tr>
<td>Other</td>
<td>Asian</td>
</tr>
<tr>
<td>27,000</td>
<td>1,400</td>
</tr>
<tr>
<td></td>
<td>Mixed race</td>
</tr>
<tr>
<td></td>
<td>500</td>
</tr>
<tr>
<td><strong>Total: 95,000</strong></td>
<td><strong>5,000</strong></td>
</tr>
</tbody>
</table>

Source: Bureau of Statistics (1969:11-12, 14-15); Division of District Administration (1968-69).

The age structure of each of these populations is quite distinct, as shown in Figure 8.2, which is based on the 1966 census. In the total indigenous population the exaggerated loading of males in the 15-29 years age group is due to the large number of indentured labourers employed on expatriate-owned plantations. The Tolai population, however, is strongly biased to the age group under 19 years, which comprises 60 per cent of the total Tolai population. This bias is due mainly to two factors; first, the losses during the war years, particularly in the 1938-46 cohorts; and secondly, a dramatic decline in the death rate, particularly infant and child deaths (Scragg 1969: 81-2), as a result of the post-war increase in medical services, child and infant welfare programmes, and anti-malarial and anti-tuberculosis campaigns.

The non-indigenous population is heavily biased towards males in the working-age group, with a major distortion in the school-age group because many expatriate children attend school in Australia.

The establishment of law and order by the German administration in the late nineteenth century effectively determined and stabilised the boundaries of Tolai territory, and this, together with the alienation of large tracts of land, has had a considerable influence on the present distribution of population. Figure 8.3 shows the de jure Tolai population distribution in 1970. The main concentrations are along the shores of Blanche Bay and Talili Bay, with a decreasing density towards the edge of the traditional Tolai lands. The broken and steep country of the Rembarr Range and the volcanic peaks surrounding Rabaul are the only uninhabited areas.

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1 Data for the Tolai population were obtained from unpublished census tabulations of twenty sample villages enumerated in 1966.
Figure 8.2. Age structures of the total indigenous, total Tolai and total non-indigenous populations, Gazelle Peninsula, 1966
Figure 8.3. Tolai population distribution, Gazelle Peninsula, 1970
The lineal distribution pattern in the central plateau area is due mainly to the existence of a developed road system. The Tolai, though rural dwellers, have what could be described as an 'urban philosophy'; with the amenities of an urban centre no more than an hour's drive away, the Tolai have become accustomed to regular trips to 'town' to go to the market, participate in sporting events, conduct business such as banking, or just talk to friends from other villages. Consequently, the attraction of living near a road is strong.

The non-Tolai indigenous population, plantation labourers and their families, is distributed fairly evenly over the alienated land, while the non-indigenous population is concentrated in the urban centres of Rabaul, Kokopo and Vunapope.

Figure 8.4 shows the de jure Tolai population density with arithmetic densities ranging from more than 5,000 persons per square mile in the peri-urban area of Matupit Island to less than 50 persons per square mile on the edges of the Tolai area. The average density on indigenous land is calculated to be 329 persons per square mile and on alienated land 135 persons per square mile.

Tolai land tenure is vested in the matrilineal clan (vunatarai); individuals are granted usufructuary rights to land each gardening season. With the traditional agricultural practice of shifting cultivation there was no reason for an individual to retain land for his exclusive use (Smith and Salisbury 1961).

For the first ten years or so after European contact little land was alienated, but from 1882 when the first expatriate plantation (Ralum) was established, the alienation of land by 'purchase' and confiscation increased rapidly. The Deutsche Neu-Guinea Kompanie, under a charter from the German imperial government, assumed the functions of government in 1885 with the power, among others, to 'acquire ownerless land, [and] to enter into agreements with native landowners' (Mackenzie 1940: 107). Most of the alienated land was on the plateau country behind Herbertshöhe (Kokopo), an area of dense population. In the first few years of colonial administration over 4,000 hectares of land were removed from indigenous tenure and the pattern was set for the alienations which were to follow.

After the German imperial government directly assumed administrative authority in 1899, legislation was introduced to control the sale of land by indigenes to Europeans. However:

land alienation had passed the stage where native rights could be uniformly conserved.... Existing titles could not be interfered with; legislative action could be applied only to future grants of land.

(Mackenzie 1940:276)

The purchases of this and the earlier period were subsequently confirmed by the imperial government and freehold titles granted. However, it is
Figure 8.4. Tolai population density, Gazelle Peninsula, 1970
clear that Tolai concepts concerning the disposal of land differed radically from those of the European purchasers (Salisbury 1970:76-9), and furthermore, the Tolai claim that in many cases the individual who sold the land had no power to dispose absolutely of the land of the group (Irwin 1965).

By 1914 when the Australian expeditionary force occupied the Gazelle Peninsula approximately 40 per cent of the land had been alienated, though several reserves had been established on alienated land to resettle people displaced from freehold areas. The new Administration did little to alter this situation, which has persisted to the present day.

Figure 8.5 shows the present land holdings in the area and Table 8.2 gives the areas of indigenous and alienated land.

**Table 8.2**

<table>
<thead>
<tr>
<th>Tenure*</th>
<th>Area (ha)</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native land</td>
<td>56,592</td>
<td>50.86</td>
</tr>
<tr>
<td>Alienated land:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freehold land</td>
<td>54,680</td>
<td>49.14</td>
</tr>
<tr>
<td>Leasehold land</td>
<td>21,023</td>
<td>18.89</td>
</tr>
<tr>
<td>Occupied Administration land</td>
<td>8,686</td>
<td>7.81</td>
</tr>
<tr>
<td>Vacant Administration land**</td>
<td>5,239</td>
<td>4.71</td>
</tr>
<tr>
<td>Native reserves</td>
<td>16,699</td>
<td>15.01</td>
</tr>
<tr>
<td>Total</td>
<td>3,033</td>
<td>2.72</td>
</tr>
</tbody>
</table>

*This nomenclature is that used by the Department of Lands, Surveys and Mines.*

**This classification is inappropriate as most of the land so classified is included in the Keravat Forest Reserve and is under silvicultural management to ensure a perpetual supply of timber to the Rabaul area.*

Source: Department of Lands, Surveys and Mines (1970).

Closely allied to the problems of population growth and land tenure is the question of land use. Concentrations of cacao/coconut cash cropping almost invariably coincide with the densest populations, for example, Kabakada, Pila Pila, Matupit, Raluana Point and Vunamami. Not only has the land available to the Tolai been almost halved by alienation, but a further large area has been excluded from subsistence gardening by extensive plantings of these commercial tree crops.

Prior to 1949 copra was the main indigenous cash crop, and as food crops were planted underneath the coconuts, little reduction had to be
Figure 8.5. Land tenure, Gazelle Peninsula
made in the area available for subsistence gardening. The introduction of cacao as a cash crop altered this balance radically, as cacao requires shade and therefore cannot be planted along with subsistence foods. As a result of an intensive extension programme by the Administration and a rapid acceptance of the crop by wealthy (that is, land-rich) Tolai, cacao plantings increased rapidly, to the extent that by 1951 co-operative fermentaries were established and the Tolai Cocoa Project came into being. In 1953 the project processed 38,752 lb of dry cocoa beans, and this rose to 4,010,048 in 1963, tapering off slightly to 3,359,552 in 1965 (Epstein 1968:116). At an estimated yield of 2.2 lb of dry beans per tree per annum (Epstein 1968:119), this represents an increase in the number of producing trees from 17,615 in 1953 to 1,527,069 in 1963, and an increase in area under crop from 88 acres to 7,635 (calculated at 200 trees per acre).\(^1\)

Traditional Tolai customs account to a much smaller extent for some land being unavailable for subsistence agriculture. Bush land or forests considered as sacred ceremonial grounds still remain in even the most densely populated areas.

The fertile nature of the andesitic soil in the Gazelle Peninsula makes possible garden rotations with fallow periods as short as five years without undue degradation of the soil. Fallow under forest regrowth is practised and consequently grasslands are surprisingly small for an area of such dense population. Those grasslands which do exist, such as round Vunakanau airstrip, were reported to exist at the time of contact (Parkinson 1907) and are still gardened.

The most striking consequences of the relation of population and land in the Gazelle Peninsula can be seen in the socio-economic realm rather than in the physical environment or demography. In most areas of high population density where shifting cultivation is practised, degradation of the environment is usually the most prominent feature. However, there is little degradation evident in the Gazelle; the five-year fallow period practised over most of the Peninsula appears to be adequate for the sufficient rejuvenation of soil fertility, while the short cropping period reduces the risk of a build-up of weeds, pests and diseases (Newton and Jamieson 1968:26).

In the two years from January 1967 only two deaths due to malnutrition were recorded at the Nonga Base Hospital in Rabaul; both were of children aged twelve months who probably suffered from congenital defects.\(^2\) This demonstrates the adequacy of subsistence production,\(^3\)

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1 This figure is based on rates for interplanted cacao of the Department of Agriculture, Stock and Fisheries (1970:50).

2 Personal communication: Dr J.O. Beatty, Medical Superintendent of Nonga Base Hospital, November 1970.
and also the ability of the Tolai to purchase food with cash earned from cash cropping, sale of produce, or casual labour.

Fertility is high and no attempt appears to have been made by the Tolai to limit the size of their families. The majority of women bear from six to eight children. From the limited data available this would appear to be little different to the pre-contact situation one hundred years ago.

The unequal distribution of land, particularly in areas of dense population, is the major problem facing the Tolai people. A sample survey conducted by Epstein in Matupit, for example, revealed (1969: 196) that 'while some [people] had far in excess of their immediate requirements, there were others whose resources were very meagre'. Salisbury (1970:137) reports a similar situation in Vunamami. The landed 'haves', who are able to plant substantial areas with cash crops, become not only wealthier but also occupy their time more fully than the landless 'have-nots'; the latter must turn to casual labour or non-agrarian pursuits to gain wealth. But as such work is not readily available, except for those in the peri-urban settlements, they are generally underemployed. This invariably leads to frustration and discontent, which is evident in the popularity of and support for the Mataungan Association and Warbete Kivung group.

There appears to be a close correlation between the areas of most intense political unrest and those where informal small-holder cash cropping is most concentrated; there appears to be little correlation between areas of political unrest and concentration of alienated land. There are six centres (see Figure 8.3) in which political unrest is strongest: Kuraip-Vunalaka on the plateau west of Rabaul; Vunamami-Kunakunai near Kokopo; Malmaluan on the coast near Vulcan; Tabukar-Viviren in the Varzin area; Matupit-Nonga within the Rabaul peri-urban area; and isolated places such as Putanagorai and Kabakada, Raluana, Ralabang, Kulon and Livuan. All of these centres are in densely populated areas with a high concentration of indigenous cash cropping.

The extension of cash cropping is also placing pressure on the traditional land tenure system, particularly on the custom of matrilineal inheritance. The landed 'haves' who have established cacao would prefer the benefits of their labour to pass to their own, rather than to their sisters' sons, and in some cases men have 'sold' their land to their sons, thus removing it from the control of the vunatarai. Considerable pressure is being exerted on the matrilineal system as a whole and it is probable that it will give way to a bilateral society emphasising patrilineal inheritance, and ultimately to elementary family inheritance (Gough 1961).

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1 Personal communication: Dr J.O. Beatty, November 1970.
The Tolai's 'urban philosophy’ also contributes to the population/land pressure. Like most inhabitants of relatively developed areas the Tolai is accustomed to the amenities of his home area and is loath to forgo them and 'rough it' in undeveloped areas; if he does so he sacrifices much more than pioneers from less developed regions. Several of the resettlement schemes aimed at relieving land shortages in densely populated centres such as Vunamami have consequently had limited success. The people would not live on their blocks at Vudal or Warangoi because the facilities there were poorer than in their own villages; therefore they worked mostly at weekends, thus defeating the purpose of resettlement. Despite their urban philosophy the Tolai regard farming as the elite occupation, with wage employment as merely supplementary; the desire for land is paramount, with the obligation to provide for future generations the motivating force.

Much has been written and said about the land and population problem of the Gazelle Peninsula and many proposals have been made to solve it. There are several aspects of the problem which have received too little attention, or have been considered in an emotional rather than a rational way. One of these is the question of alienated land. This comprises almost half the total area, but it also supports 30 per cent of the total population. Any large-scale transfer of alienated land to Tolai ownership would not only have a severe impact on Papua New Guinea's economy but would also, if it is assumed that the Tolai would work the land themselves, displace some 27,000 indigenes, the majority of whom come from areas with land shortages such as Maprik, Chimbu or Tari.

The provision of land is only a small part of the solution to the problem. Most of the landless Tolai are unskilled in commercial agriculture and lack the finance necessary to establish themselves as cash croppers. They would require considerable financial and technical help, neither of which is readily available in Papua New Guinea. There is little undeveloped land in the Gazelle Peninsula within easy access of Rabaul, and the House of Assembly would anyway be unlikely to approve the expenditure of a large amount of public funds to acquire any such land. Rural solutions alone are not sufficient, and some consideration must be given to urban employment. This is pointed out by Kaputin (1970), whose proposed Development Corporation aims to provide employment opportunities in business other than primary production.

The combination of population increase, land alienation, and changes in the agricultural pursuits of the Tolai has created socio-economic stress. Relief of this demands not only changes in the demographic situation (particularly a reduction of the very high birth rate) but also in social attitudes. In particular, the Tolai's reluctance to migrate, their almost exclusive preference for rural employment, and their xenophobia must be modified if a lasting solution to the land problem is to be found.

1 See p.113.
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Chapter 9

Some consequences of population growth in the
Wosera area, East Sepik District

D.A.M. Lea and H.C. Weinand*

The distribution of population in Papua New Guinea is extremely uneven but only in a few places does the population density rise above 50 people per square mile (Ward 1970:11). Areas of serious overcrowding where the population/food relationship is precarious are limited, but a study which would locate areas of most need, or most responsive to aid, could greatly assist developmental planning (Gosling 1960:124).

The Wosera group comprises approximately 18,000 people who live six to twenty miles southwest of Maprik in the East Sepik District. The Wosera are part of the dense population living on the southern foothills of the Prince Alexander Ranges (see Figures 9.1 and 9.2), and form a well-defined dialectal group of the Abelam tribe of 40,000 people. Although the Wosera live in both the North and South Wosera census divisions, this paper deals mainly with the former, which has one of the densest lowland rural populations on the mainland of Papua New Guinea.

In 1968 the North Wosera census division consisted of forty-one censused village segments or groups of village segments containing 13,514 people1 (see Figure 9.3). The division occupies approximately 55.5 square miles of which about seven square miles consist of Themeda-Ischaemum grasslands which are rarely used for gardening. Excluding the grasslands, the population density within the census division is 278 people per square mile. Population, however, is not

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1 Three villages included in the North Wosera census division in the 1968 village directory (Department of District Administration 1968) have been excluded from these figures. They are Nala to the east of the Pagwi-Maprik road and Nungwaia and Weikor well to the west of the area shown on Figure 9.3. They are all non-Wosera villages and are excluded from all the recent censuses made of the North Wosera division.
Figure 9.1. Rural population distribution in part of East Sepik District, 1968
Source: East of 143° is taken from CSIRO (1968)

Figure 9.2. Land systems in the Wewak-Maprik area
evenly distributed. The lands of some villages, particularly to the west, are sparsely occupied, while much higher densities are found in the central Wosera near the Nanu River. For example, in this area Stapikum and Serakum (see Figure 9.6), which had a total population of 960 in 1968, have only 2.00 square miles of gardening land, a physiological population density of about 480 people per square mile. Population densities within the Wosera are therefore exceptionally high for shifting cultivators.

Lea (1965) shows that because of severe land shortages and traumatic initial culture contacts, severe ecological and social stresses exist in the Wosera which are more significant than elsewhere in the Abelam area. Lea used a number of indices to demonstrate this and subsequent work continues to support the contention that soils are shallower and poorer, yields are lower, fallow periods shorter, land and sago disputes are more frequent,\(^1\) and there is a higher incidence of both council and criminal offences in the Wosera than elsewhere in the sub-district.\(^2\) In terms of economic development, land shortage limits the opportunity to obtain cash from crops such as coffee and rice. Figure 9.4 shows how little rice is grown in the North Wosera compared with the other non-grass areas to the north and northeast which are just as far away from Bainyik. Coffee growing shows a similar trend.\(^3\) More qualitatively, we have never heard of any visitor to the area who doubted the existence of severe land shortage, or of any inhabitant who is not acutely aware of it.

The evidence of stress, however, is not just relative. Bailey (1963a and 1963b) and Schofield (1963) show that in absolute terms the situation is serious. Schofield found high mortality rates in the 0-15 age group (620 deaths per thousand live births), high stillborn rates (96 per thousand total births), and high maternal mortality rates (32 deaths per thousand total births), and concluded that the Wosera were in a 'state of chronic under nutrition, and worse off for calories than any group studied scientifically in this Territory'. Bailey found that there were significant seasonal fluctuations throughout the year in the body weight of both males and females (2 lb loss between December 1962

\(^1\) During a 28-month period from June 1960 to October 1962, there was one land or sago dispute per 423 people in the North and South Wosera divisions and only one per 7,319 people in the rest of the sub-district.

\(^2\) During a 15-month period from November 1968 to February 1970, the Wosera had one crime per 62.6 people while the rest of the sub-district had one crime to 216.1 people. In the same period the Wosera had one council offence to 45.3 people, while the rest of the sub-district had one offence to 250.5 people.

\(^3\) Personal communication: R.T. Shand, October 1970.
Figure 9.3. Distribution of village population in the North Wosera census division, 1954-68.
and June 1963), and he concluded (1963a:8) that there is 'an apparent chronic total food shortage of some severity in the Wosera'.

In addition to the population pressures and dietary stresses, the Wosera were, and to some extent still are, subject to real socio-cultural pressures. The missions, particularly the Roman Catholic, were the first Europeans to show any real interest in the people, and until 1963 when the Wosera Council was established their influence was considerably greater than the Administration's. However, some of the early missionaries were heavyhanded and gauche and one encouraged the wholesale destruction of ceremonial objects and tambaran houses. This, combined with poor communications, Administration neglect and poor medical and educational services, resulted in persistent but incipient cargo cult thinking until about 1965 and possibly even later. The Wosera men felt that they were despised by Europeans, the indigenous police, and other Abelam; they knew they were discriminated against by employers as they had a reputation for thieving and deserting. They frequently acknowledged their own inferiority.

In 1963 the Wosera Local Government Council was established, and subsequently a new school near the Nanu (in addition to one established earlier at Serangwantu) and some excellent young patrol officers have helped to give the Wosera a new self-respect. As well, since 1965 the Administration has believed the situation to be so critical that it has made some 4,552 acres of land available for resettlement purposes some sixteen miles west of the Nanu River. The sole purpose of this resettlement scheme is to ease the population pressure. Although the psychological impact of the scheme has been beneficial and some 186 families have registered blocks, only about five have actually moved into the resettlement area and these can only be considered intermittent settlers. The people complain that the resettlement area is too isolated and unhealthy, medical and school facilities non-existent, and there is little chance of earning a cash income.

It is in this context that an analysis has been made of population data since 1954 to see what trends emerge. All data were obtained from the Department of District Administration quasi-annual censuses and checks were made against more detailed censuses of one sample village in the central part of the Wosera area.

**Population growth**

In the thirteen-year period 1956-68 the *de jure* population of the North Wosera census division increased at the average rate of 2.9 per

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1 Figures were supplied by R. MacLennan (personal communication, 1963) and are based on Bailey's data.

2 In July 1969 the Department of District Administration became part of the Department of the Administrator and was renamed the Division of District Administration.

Figure 9.4. Rice growing in the Maprik area
Figure 9.5. Growth rates of villages, North Wosera census division, 1954-68
cent per annum (that is, the population will double at this rate in 24.25 years), but the rate of increase varied considerably during this period. No trend is discernible. The annual rate of increase was 3.0 per cent in 1956-59, 3.3 per cent in 1959-62, 2.2 per cent in 1962-65, and 3.0 per cent in 1965-68. (Growth rates for different villages are shown on Figure 9.5 but the spatial variation is discussed later.\(^1\))

The percentage death rate per annum declined from about 250 per thousand in 1954-57 (Pemberton 1963) to about 85 per thousand in 1965-68,\(^2\) and net emigration from the sub-district is officially very small (0.07 per cent of males and 0.25 per cent of females in 1968). However, there has not been a constant rise in the rate of population growth because the birth rate, after gradually rising to around 4.5 per cent in 1959-61, fell to around 3.4 per cent per annum in 1965-68. This decrease is due mainly to the high rate of male absenteeism in the 16-45 age group, though it may also be due in part to overcrowding. Many of the so-called 'absentees' are in fact permanent out-migrants, for some individuals have not returned to their villages for many years and the villagers are unwilling to admit losing one of their members. Nevertheless, absenteeism of males has remained at about 9.3 per cent of the de jure male population since 1962 (it was 14.82 per cent of the male population in 1954), although many men say that they would like to emigrate. This desire is evident in the fact that 73.9 per cent of the applicants for blocks at Hoskins from the Maprik sub-district came from the North Wosera census division, which contains only 15.7 per cent of the sub-district's population. Absenteeism of females of the North Wosera census division is increasing (see Table 9.1).

Table 9.1

<table>
<thead>
<tr>
<th>Year</th>
<th>Absentee males as % of all males</th>
<th>Absentee females as % of all females</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>9.35</td>
<td>0.24</td>
</tr>
<tr>
<td>1965</td>
<td>9.24</td>
<td>0.73</td>
</tr>
<tr>
<td>1968</td>
<td>9.45</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Absenteeism also results in an imbalance of the sex ratio in the 16-45 age group; in the North Wosera census division the de facto sex ratio for this age group is 93.0 males per 100 females and this must

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1 See pp.131-3.

2 Crude death rates are not reliable as many infant deaths are not shown in the village census.
impeir the breeding capacity of the population. This is in spite of the overall imbalance in the census division of the sex ratio in favour of males, 112.0 males per 100 females. (This imbalance is common throughout Papua New Guinea which as a whole has 111.5 males per 100 females; the East Sepik District has 108.1 males per 100 females.) Everywhere this disparity is most marked in the age group 45 years and above; in the East Sepik District there are 125.4 males per 100 females in this age group and in the North Wosera census division 126.8 males per 100 females.

Present trends will probably continue as increasing absenteeism and migration will probably offset any decline in the death rate. Thus, by 1980 we can expect a population in the North Wosera census division of approximately 19,044, giving a population density of approximately 393 people per square mile.

Regional differences within the Wosera area

With an increasing population there must be either intensification of land use with considerable change in present methods, or movement of people out of the area. One of the cheapest ways of encouraging both is to improve communications so that ideas can flow in and people can readily flow out. At present the all-weather Maprik-Pagwi road runs along the eastern margin of the Wosera and several roads run through the area which are suitable for four-wheeled drive vehicles for most of the year. However, the Amogu, Amuk and Nanu Rivers act as communication barriers, especially in the wet season from October to April. We attempted to test the following hypotheses: first, that with increasing distance from the Maprik-Pagwi road, absenteeism decreases and rate of growth increases; and secondly (because the central part of the Wosera is the most densely populated part of the area), that absenteeism is highest and birth rates are lowest in the most densely populated areas.

Figure 9.6 shows the census division divided into four traditional village confederacies which lie wholly or mainly within the division. In order to maintain consistency throughout the statistical analysis and to have a rational grouping of villages, it is necessary to eliminate three villages which lie within the division boundaries yet outside the four village confederacies. They are Pa'apumuma in the northwest corner of Kwasengwa, Tatumbu in the extreme northwest corner of Staka near the Nanu-Staka boundary, and Kamge on the Staka's southern boundary.

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1 The confederacy grouping (defined in Oner 1965 and in a report to the Assistant District Commissioner of the Sepik District, 30 September 1965, 25-1/167) implies dialect differences, co-operation and group sentiment, but no political solidarity.
Figure 9.6. Traditional confederacies of the North Wosera census division
The first or distance hypothesis is tested using simple linear regression, expecting a positive relation for the rate of growth and a negative relation for absenteeism. The distance measure is the straight line distance to the road rounded to the nearest third of a mile.

The correlation coefficient between distance from the Maprik-Pagwi road and the rate of growth is 0.01, indicating that the variables are quite independent of each other. Attempts were made to define some regularity in growth rates by confederacies and by population density, but in both cases the results were not statistically significant. The only relationship confirmed was the intuitively obvious inverse correlation between birth rates and percentage absentees ($\phi = -0.33$ significant at $\alpha = 0.05$).

The attempt to predict the percentage absentees given the distance from the Maprik-Pagwi road yielded an 'r' value of 0.58 (significant at $\alpha = 0.01$), thus accounting for 33.5 per cent of the variation in absentees. However, the correlation is positive, indicating an increase in absenteeism with increasing distance from the road; this inverts our original hypothesis.

From the regression equation ($y = 2.32 + 0.024 x$) standardised residuals were calculated and Figure 9.7 prepared. The figure suggests that the pattern of residuals conforms in some way to the village confederacies; the strength of this association was tested using the Kruskal-Wallis one-way analysis of variance by ranks (Siegel 1956:184-93), and was found to be significant at the 0.06 level. Further investigations show that Kunjingini is the only confederacy to differ significantly from all the others combined. All the residuals from this confederacy are positive, indicating a far larger number of absentees than would be expected given their easy access to the road. The reason for the striking departure of these villages from the norm is difficult to locate because factors such as individual idiosyncrasies, local leadership, and the success or failure of local entrepreneurs, can have overwhelming importance at the scale used in this study.

The second hypothesis, that birth rates and absenteeism can be linked to the relative population density, was approached by dichotomising both variables about the mean and using a Chi square test on the resultant $2 \times 2$ contingency tables. The null hypothesis was that there is no significant difference between Nanu, the most densely population confederacy, and the other confederacies combined. In neither case was Chi square found to be significant. It was also interesting to note that using the same technique the percentage absentees does not differ significantly even after correcting for the distance between each village and the road.

The results can be summarised in this way: there is a strong tendency in the North Wosera census division for the more remote and less accessible villages to have a higher proportion of absentees than those villages not so poorly located with respect to road access. This statement can
Figure 9.7. Standardised residuals from regression of percentage absenteees against distance from Maprik-Pagwi road
be further refined by observing that the local village confederacies incorporate a significant proportion of the remaining variation, thus indicating the action of strong local or group attitudes. Furthermore, the relative population density or pressure on the land has had no observable effects on either the rate of absenteeism or the birth rates.

The results of a single study in one area are no basis for broad generalisations, but they are significant enough to warrant continued research, though on a somewhat larger scale and incorporating both quantitative and qualitative assessment. Research which integrates the all-important insights gained by long-term field work with the precise and reproducible results of quantitative analysis allows particular processes to be separated from the complex interacting whole.

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Chapter 10

Traditional forms of family limitation in New Guinea

R.N.H. Bulmer*

All human populations culturally restrict their reproduction - none breed like the proverbial rabbit. They do this by four direct and many indirect methods. The direct methods are: institutionalised restrictions on opportunities for normal sexual intercourse; knowledge and deliberate use, by individuals, of techniques to reduce the probability of conception when sexual intercourse takes place; knowledge and deliberate use of techniques to terminate pregnancies by abortion; infanticide.

The indirect methods include: culturally preferred nutritional patterns which affect biological fertility; culturally preferred or permitted practices which may favour transmission of diseases which affect biological fertility (for example, gonorrhoea) or survival of infants (for example, malaria); cultural conditioning of individuals of either or both sexes to reduce their preparedness to have normal sexual intercourse even where this is institutionally legitimate, of females to reduce their preparedness to conceive or bear children or let children survive, and of males to permit females to conceive or bear children or let children survive; cultural practices affecting pregnant and parturient women, nursing mothers and young infants, which affect live birth rates, infant survival rates, and life expectancies for females up to and during their reproductive periods.

This second list is certainly not exhaustive. Factors listed there will be discussed either casually or not at all in this paper, but it must be emphasised that these factors are of very great importance. And in the analysis of fertility and mortality rates in any given population, they can be extremely difficult to factorise out and evaluate vis-a-vis the more direct methods.¹

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¹ Nag (1962) provides a most useful survey of this topic on a worldwide basis. His monograph considers factors affecting fertility under three main headings: factors relating to probability of coitus; factors
In discussing the direct methods by which fertility and the survival of infants are controlled I shall try to indicate whether a particular rule or practice is recognised by those who impose or obey it as having a limiting function, or whether it is explained in some other way and seen merely as a part of the natural order of the social universe.¹

Restrictions on marriage

As it appears that no traditional New Guinea society favoured the bearing of children by unmarried women we may first consider those restrictions on marriage which limited a woman's procreative capacity, and later restrictions on sexual relations within marriage,² though some of these might be regarded equally as restrictions on sexual activity which are not directly linked to marital status.

In any population the potential of women to bear children is affected by: the extent to which spinsterhood is permitted or approved; normal age of first marriage (or age at consummation of first marriage); and patterns of termination of marriage through death of husband or through divorce and restrictions on remarriage of divorcees and widows.

Permanent spinsterhood is a rare but not unknown phenomenon in traditional New Guinea societies. Such women are generally physically or mentally handicapped, or have broken some very serious sex taboo, and in these cases are not necessarily effectively prevented from having

¹ (continued)
relating to probability of conception; factors relating to growth of foetus and survival of offspring. These factors cross-cut the 'direct' and 'indirect' methods of restricting reproduction listed above. I prefer to retain my classification because, unlike Nag, I am not concerned with fertility levels so much as with cultural forms of restriction of fertility. For the purposes of the present symposium it seems useful to maintain the distinction between 'direct' methods, most of which are at least partially recognised by the people using them for what they are, and 'indirect' methods, the significance of which would not in general be recognised by the populations adopting them.

¹ I am very grateful to Dr Ann Chowning for providing me with most useful information on the four New Guinea societies in which she has worked (the Lakalai, Kove and Sengseng of New Britain and the Molima of Fergusson Island) and for references to literature on other New Guinea peoples which I might otherwise have missed. I must also thank Mr T.G. Barnett, Mr and Mrs J.W. Leach and Dr A.R. Radford for unpublished information and Mr E.P. Wolfers for drawing my attention to relevant literature.

² See pp.144-9.
sexual relations and bearing children. I am aware of one case of a traditional New Guinea society where a small proportion of apparently normal women are required by their kin to remain permanent spinsters, to assist their fathers and other members of their extended family in garden and domestic work.

In the small minority of societies in which prostitution was institutionalised, prostitutes were probably in most cases unmarried women. However, after spending a few years in this capacity they normally eventually married.

There are traditional societies in other parts of the world where delay in first marriage of women until some years after they have become biologically capable of bearing children is known to relate significantly to family size and general fertility rates. While so far as I am aware there are no clear cases of this reported for New Guinea, it may well be that in some areas it has some significance. Establishing this, however, is difficult in a region where natural fertility and the genetic and environmental factors determining this are so little understood, and accurate data on age are also often lacking. Delay in consummation of marriage and restrictions on frequency of intercourse in early years of marriage are discussed later.

Probably more important influences on birth rates in New Guinea societies than delay in first marriage are restrictions on remarriage of widows and divorcees who are still of childbearing age, and enjoined celibacy following termination of marriage. Although I am unable to

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1 Malinowski (1932:157) on the Trobriand Islands provides the classic case in the literature. Among Kyaka Enga I noted a few cases of sub-normal or physically handicapped women who were unmarried but bore children (Bulmer n.d.). Cf. Oliver (1955:152) on Siuai of Bougainville.

2 Karam of Kaironk Valley, Schrader Range (Bulmer n.d.).

3 For example, Buin (H. Thurnwald 1934:55-6) and Siuai (Oliver 1955:149). But in some societies prostitutes normally died young, during or, if they were eventually permitted to return home, soon after their brief period of service (Mead 1942:148).

4 For example, Tikopia (Borrie, Firth and Spillius 1957:245-6, 251). Chowning (1958:75-93, 260; 1969:1123; personal communication, October 1970) notes that Lakalai of New Britain married relatively late (very late teens or early twenties for girls, and older for boys) unless a girl got pregnant. In general women in this society are very fertile. However, although premarital pregnancies and even pregnancies early in marriage are condemned, it appears that premarital and extramarital sexual activity is extensive.

5 See pp.141-2.

6 See p.144.
provide any figures to support this contention, it seems likely that in pre-contact and early contact periods widowhood was or is more significant than divorce in direct influence on birth rates, even in those societies in which divorce rates were high.\(^1\) Where divorce is a frequent occurrence it is often rapidly followed if not precipitated by the woman joining another man, so little break in cohabitation need occur. Furthermore, in many New Guinea societies the great majority of divorces occur in the first year or two of marriage, before children have been born and often before marital intercourse is occurring with any great frequency.

However, widowhood can occur at any stage in a marriage, and remarriage of the widow is seldom if ever possible while she is still in mourning, which may last for a period ranging from a few weeks to several years, depending on the complexity of the mortuary rites for the dead husband. Mourning may remove women from all contact with men. In some societies widows, even those of childbearing age, are not encouraged to remarry. In the extreme case any prospect of their remarriage is prevented by the custom of killing them after the death of their husbands.\(^2\)

Given that in traditional New Guinea societies a fairly high proportion of marriages were terminated by death of husband while the wife was still of childbearing age,\(^3\) restrictions on the remarriage of widows

\(^1\) Meggitt (1965:129-61), Bulmer (1960:478-81) and contributors to Glassey and Meggitt (1969) give figures on termination of marriage by divorce and death of spouse in a number of highlands societies.

\(^2\) In Telefomin, for example, it appears that most widows remarry, but an average period of at least three years elapses before remarriage (Craig 1969:191). Three years are also reported for Siane (Salisbury in Nag 1962:100). Among the Mae Enga it appears that while the majority of widows do not remarry, young and fertile ones are likely to, and there is a delay of only twelve to twenty months before they may do so (Meggitt 1965:154, 132). Among Sengseng and other peoples of southwest New Britain women were killed when their husbands died and sometimes when a child died (A. Chowning: personal communication, October 1970). Among Kove of West New Britain it was normal for the wife of an important man to commit suicide (Chowning 1970). At the other extreme, Kapauku, of Wissel Lakes, West Irian, permitted a widow to remarry after ten days (Pospisil 1958:61).

\(^3\) It is hard to document this point as authors giving figures on termination of marriage do not in most cases distinguish women putatively still of childbearing age. Salisbury (in Nag 1962:206) estimates that one in twenty Siane women were widowed during their childbearing periods. None out of seventy-eight (11.5 per cent) Kyaka Enga women of childbearing age whom I interviewed in 1955 had been widowed, and I think the proportion would have been higher if I had made my census ten years earlier,
may be assumed to have had a minor but nevertheless significant effect on average family sizes and fertility rates.

Restrictions on sexual relations outside marriage

In this category can be considered premarital and extramarital sexual relations, and sexual relations after termination of marriage.

Traditional New Guinea societies were, and to a large extent still are, extremely diverse in the extent to which they permitted premarital sexual relations. Broadly, two patterns may be recognised. First, societies in which a high value was set on the chastity of unmarried girls and premarital sexual relations were unconditionally condemned; and secondly, societies in which some degree of latitude regarding sexual relations of unmarried girls was allowed, but pregnancies and the bearing of illegitimate children by unmarried women were condemned. A third pattern, well represented in some other parts of the world, in which premarital sexual relations are accepted and a premarital pregnancy is a normal prelude to marriage, appears to be unreported in traditional New Guinea societies. However, it may develop, or already be developing, in some parts of this country.

The fact that so few illegitimate children and so few obvious pregnancies by unmarried girls are recorded in those Melanesian societies

3 (continued)

when warfare was still endemic and medical facilities had not been provided (Bulmer 1960:480-1). And compared with many highlands societies, death rates in war were probably low among the Kyaka.

The tendency in many New Guinea societies for husbands to be older than their wives is also probably important in this regard.

1 For example, Mountain Arapesh (Mead 1950:77 ff.), Busama (Hogbin 1946:47:131), and a number of societies of the Western Highlands and adjacent areas, including Mae Enga (Meggitt 1965:104), Kyaka Enga (Bulmer 1960:284), Melpa (A. and M. Strathern 1969:145) and Karam (Bulmer n.d.).

2 These include both societies such as the Trobriands (Malinowski 1932: 53-64) and Wogeo (Hogbin 1946) where premarital intercourse was not normally disapproved, and societies where technically girls were supposed not to have affairs but where nevertheless premarital sexual experience was apparently quite general. For example, Siuai (Oliver 1955:141-4), Lakalai (Chowning 1958:75-6) and Benabena (Langness 1969: 42-3). The Benabena constitute something of an exception to my generalisation, as Langness reports that while surprisingly few girls get pregnant, bastard children are not disposed of or discriminated against and the proof of the girl's fertility may make her more desirable in marriage.
which permit considerable sexual freedom before marriage has puzzled anthropologists for sixty years. Two main hypotheses have been advanced by anthropologists and human biologists and, independently, by at least some members of the indigenous societies concerned. One is the 'adolescent sterility' hypothesis which argues that for whatever reason or combination of reasons, genetic and nutritional, girls in general and Melanesian girls in particular are not normally fertile for a considerable period after they have reached puberty.¹ The other is the theory that promiscuity in itself reduces fertility substantially.² As Chowning (1969) has pointed out, this is for a number of reasons scarcely an adequate explanation for reduced fertility in unmarried girls in Melanesia, the most notable of these being that promiscuity is not a marked feature of premarital sex in many of the societies concerned.³

However, it is also possible that the infertility of unmarried girls has been overestimated by observers, through the effective concealment of instances of abortion or infanticide.

In regard to sexual relations after termination of marriage, I have come across no case in which a traditional New Guinea society encouraged widows or divorcees (except in those few instances in which prostitution was recognised and approved) to engage in sexual relations. However, the severity with which sexual affairs by widows or divorcees was condemned varied greatly.⁴ Restrictions on the remarriage of widows have been discussed.⁵

¹ See Ashley Montagu (1946) and Chowning (1969). Hogbin (1946:206) reports that the Woge o were firm believers in the adolescent sterility theory, having 'worked out the rule that at least four taro harvests - between two-and-a-half and three years - separate the coming of age ceremonies [held at the menarche] and pregnancy'.

² See Greenfield (1968) for a discussion of the theory that infertility of women can be brought about by production of sperm-agglutinating antibodies in reaction to semen from two or more different donors. New Guinea people who hold what is in effect the same view (though not based on the same biological theory), that promiscuous intercourse does not result in pregnancy, include the Molima of Fergusson Island and some other groups in the Southern Massim (Chowning 1969:1122).

³ See also Nag and Bedford (1969).

⁴ Societies in which widows were allowed considerable latitude include Lesu (Powdermaker 1933:231, 246) and the Trobriands (Malinowski 1932:69), both matrilineal societies. In the patrilineal societies of, for example, the highlands, a widow's lapses would be considered very seriously unless, as was sometimes the case, she was involved with a man who could appropriately become her subsequent husband.

⁵ See pp.139-41.
Extramarital sexual relations include not only adultery (illicit sexual relations by married women), but prescribed or permitted sexual intercourse by married women with men other than their husbands.

In a few New Guinea societies marriage was initiated by a man other than the groom (usually a senior kinsman in some specific relationship to the groom) having intercourse with the bride.\(^1\)

In others it is reported that close kin of the husband\(^2\) or honoured visiting ceremonial trade partners of the husband\(^3\) might have permitted access to the wife.

In a fair number of societies there were brief periods of ceremonial licence when promiscuous sexual relationships took place (barring only those persons between whom intercourse would be regarded as incestuous), or when men in certain categories of relationship to each other exchanged wives.\(^4\)

We may assume that adultery is as ancient and universal in human society as the institution of marriage. However, the seriousness with which it is viewed certainly varies enormously between different traditional New Guinea societies,\(^5\) and it is probable that its frequency varies similarly.

The extent of adultery and of permitted extramarital sexual relations is probably significant for fertility rates. On the one hand it may permit women whose husbands are sterile or of low fertility to conceive (and in doing so to bolster the widespread New Guinean view that while some wicked or unfortunate women are barren, there is no such thing as

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\(^1\) For example, Banaro (R. Thurnwald 1916:261-2) and Buin (H. Thurnwald 1934:151).

\(^2\) Normally if the husband was sterile or impotent on account of age or for other reasons. Mae Enga (Meggitt 1965:144-5) and Banz, middle Wahgi (Bulmer n.d.).

\(^3\) According to a Motu student of the University of Papua and New Guinea who obtained information from elderly men who had formerly participated in the Hiri, Motu men were sometimes granted such privileges by their Gulf trade partners: this contradicts Barton (in Seligmann 1910:112).

\(^4\) In some cases, for example, Keraki (Williams 1936:159), this was normally by consent and arrangement of husbands, hosts and guests at a ceremony making mutually satisfactory transfers of their wives; in other cases, for example, Lesu (Powdermaker 1933:130, 144), the individuals concerned apparently made their own choices, without reference to their spouses.

\(^5\) At one extreme are those highlands societies in which a woman caught in adultery might be drowned (Ryan 1969:174), maimed for life by having her nose lopped or leg-tendons cut, or have heated stones thrust into her vagina (Meggitt 1965:143; Bulmer n.d.).
male sterility); on the other hand it may facilitate the transmission of venereal diseases which decrease fertility.¹

Restrictions on sexual intercourse within marriage

Of institutionalised restrictions on cohabitation which may affect family size and fertility rates the most notable are limitations enforced in the early period of marriage, post-partum sex taboos, and taboos associated with male rituals or ceremonial activities.

A period of avoidance between bride and groom is a common feature of traditional New Guinea marriage arrangements. In some cases this does not prevent the bride from having sexual relationships with other partners.² However, in a number of societies (in most of which both males and females are expected to be virgins at the time of first marriage) there are limitations on or complete avoidance of cohabitation for a period of up to several months after the main marriage ceremony. In some cases this occurs when girls are married early, at an age when they are not regarded as physically mature.

The rationalisation given for this restriction in one highlands society is that it allows a bride, even if physically mature, a decent period to adjust to her new social role in a strange community. It is up to the bride to indicate when she is prepared to receive her husband's advances, though if she delays too long he may attempt to use force or to terminate the marriage. It was a fact that in this society very few women bore their first children until two years after the marriage ceremony.³

Three periods of abstinence probably enforced to some degree in all New Guinea societies are during a woman's menstrual period, during the last months of her pregnancy,⁴ and for a period after she has given

¹ See Scragg (1954) on Tabar and other New Ireland societies, for a region where the best functional ethnographic study made at a fairly early stage (Powdernaker 1933 on Lesu) reports a high level of extramarital promiscuity.
² For example, H. Thurnwald (1934:151) on Buin.
³ Kyaka Enga (Bulmer n.d.). Other societies in which newly married couples were supposed to avoid each other for a considerable time after marriage were Lakalai of New Britain and, especially, Molima of Fergusson Island, and in these cases there was real condemnation if the woman became pregnant too soon (A. Chowning: personal communication, October 1970).
⁴ This may be for the whole period of her pregnancy as locally recognised - no traditional New Guinea society appears to recognise that a normal pregnancy lasts nine months, most believing that it lasts from
birth, normally defined as the whole or greater part of the period in which she is breast-feeding the infant. The first two taboos certainly do not restrict fertility: in fact the first may possibly increase slightly the chance of conception, if the taboo extends for a slightly longer period than the menstrual period does,¹ and the second may possibly increase the chance of successful delivery. However, the post-partum taboo is in many New Guinea societies probably the most important single cultural factor directly determining family size and overall fertility.

The post-partum sex taboo

In different societies the normal period of abstinence varies from a few months to over three years. It is variously terminated when the ceremonies are performed which enable the mother to leave the seclusion of the hut where birth took place, or otherwise to resume normal social and economic activities;² when the child cuts its second tooth;³ when the child has learned to walk,⁴ and when the child has learned to speak four to six months, depending on the signs interpreted as indicative of conception. In some societies it appears that full pregnancy is not recognised until the unborn child begins to move; in others changes in the nipples are noted, as in the probably fairly typical case of the Mountain Arapesh where frequent intercourse continues, to build the child, until the mother's breasts show the characteristic swelling and discolouration of pregnancy (Mead 1950:33).

It is unclear from Mead's account, as from other ethnography consulted, how and when 'partial' pregnancy is recognised, that is, the onset of the period during which husband and wife work together, through many acts of intercourse, to create a complete child. Dr Chowning (personal communication, February 1971) makes the valid point that one must draw a distinction between the female's own knowledge of her physiological condition and the public recognition of visible external signs of pregnancy. The fact that little specific reference to missing menstrual periods is reported may indicate that in some New Guinea populations women do not menstruate as regularly or frequently as European women do. This is the opinion of at least one female anthropologist who has tried to make some estimate of this matter (I. Riebe: personal communication, 1969, on Karam of Kaironk Valley).

¹ Glasser (1968:59) makes this point clearly for the Huli, where a couple should in theory only copulate for four days of each menstrual cycle, but the approved days roughly coincide with the period of ovulation.
² For example, in Buin (H. Thurnwald 1934:165) where this period may last from three months to one year.
³ Benabena (Langness 1969:48).
⁴ For example, Mundugumor (Mead 1950:141).
and is sufficiently mature to be appropriately passed over to its father's care for a substantial portion of the time.\(^1\) Even within the highlands Districts, which form in some respects a fairly homogeneous culture area, there is a great deal of variation, from an average period of one year or less to an average period of three years or more.\(^2\) Where the period is relatively brief it may possibly do little to extend the period of reduced biological fertility on the part of the mother brought about (it is argued) by lactation plus poor nutrition.\(^3\)

Beliefs directly sanctioning these periods of abstinence are also varied; periods of brief duration are mainly justified by fear of contamination by blood of childbirth, while those of longer duration generally reflect a prime concern for the well-being of the suckling infant. Some highlands societies believe that semen entering the mother's body would contaminate her milk and poison the child,\(^4\) and in one of these groups the few cases of infringement of the taboo came to light through couples, whose infant child became sick, confessing

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\(^1\) For example, Kyaka Enga (Bulmer n.d.; Binns 1969).

\(^2\) The period in Benabena is apparently less than 1 year (see p.145, n.2). In Chimbu in the early 1960s the period of abstention was at least 1 year, and there was some indication that it had been reduced somewhat over the past generation (Brown and Winefield 1965:176-7, 187). In Hagen the period in the 1930s was 2 to 3 years (Vicedom and Tischner 1943:245), and this appears not to have declined by the mid-1960s, when A. and M. Strathern (1969:152) gave it as averaging 2½ to 3 years, range 1 to 3½ years. For Mae Enga the period is apparently about 2 years (Meggitt 1965:167). For Kyaka Enga in 1955 I estimated the period as normally 3 years but sometimes as long as 5 years (Bulmer 1960:134); more recently missionary medical staff describe it as usually 4 to 5 years, but perhaps contradict this very high estimate by noting the mean interval between a woman's first two children as 5.2 years (Binns 1969). There is one case in the highlands (Minj) where breast-feeding is continued for a very long period, but women recommence intercourse before the previous child is weaned and wean the child when the mother becomes pregnant. This case is also interesting in that it is reported that wealthy polygynists observe a taboo on intercourse while the woman is breast-feeding, but most other men do not (Reay 1959:76, 84).

An example from outside the highlands is the Mountain Arapesh, where intercourse may commence once the previous child can walk, but it is not weaned until much later or until the mother again becomes pregnant (Mead 1950:37).

\(^3\) Cf. Nag (1962:78).

\(^4\) Mae Enga (Meggitt 1965:164), Kyaka Enga (Bulmer 1960:134) and Melpa (Hagen) (A. and M. Strathern 1969:152).
with considerable show of guilt to having had sexual relations.\textsuperscript{1} Interestingly, intra-uterine devices are now being made available to women in this society, and though couples are coming forward to request these, none so far have thought it appropriate to have one fitted until their youngest child is at least two years old (Binns 1969).

In some societies abstinence is enforced during the suckling period not merely on the wife but on the husband as well, which may affect the potential fertility of wives of polygynists vis-a-vis other women:\textsuperscript{2}

The variation in duration of the post-partum sex taboo in different New Guinea societies provides an interesting problem for sociological explanation. I am myself inclined to see this and other deliberate measures to space children, of which infanticide is probably the most significant,\textsuperscript{3} as related to the extent to which women have to undertake demanding domestic and garden activities on a purely individual basis, rather than co-operatively. Where a woman is solely responsible for feeding her husband and children, tending her own garden plots, looking after pigs, and caring for her younger offspring, it may be very hard for her to manage two young and entirely dependent infants at one time. A four or five-year spacing brought about by a prolonged suckling period and associated sex taboo means that her older children will not merely be able to some extent to fend for themselves, but even help her with the youngest child. In contrast, where domestic arrangements normally permit women to assist each other in garden activities, cooking, and care of children and livestock, there is little pressure for extended spacing between births.\textsuperscript{4}

\textsuperscript{1} Kyaka Enga (Bulmer 1960:134-5).

\textsuperscript{2} For example, Lakalai (Chowning 1958:289).

\textsuperscript{3} Widely practised as infanticide is in human societies, it appears to be the opinion of anthropologists that only in very few populations is this a major factor restricting fertility and of more significance than the post-partum taboo. Nomadic societies may form the exception here: in ten such societies surveyed by Whiting (1964), infanticide alone or in combination with abortion was the most common method of spacing children, accounting for four cases, whereas the post-partum taboo and abortion alone or in combination accounted for only three cases. In New Guinea the only society I am aware of where it is reported both that the post-partum period is brief and that infanticide is of major significance is that of the Sengseng of West New Britain (A. Chowning: personal communication, February 1971).

\textsuperscript{4} I am struck by the marked contrast between the two highlands societies which I have studied myself. The Kyaka, who have possibly the longest period of post-partum taboo so far recorded in New Guinea, define women's domestic and horticultural roles in such a way that most young mothers simply have to be entirely self-reliant. In contrast, the Karam
However, there are many other variables which may also be associated with the duration of the post-partum taboo, notably the extent of fear of heterosexual activity on the part of both males and females, and the degree of availability of other sexual outlets for the husband, for example, through polygynous marriages, extramarital affairs or homosexual relations. It has been pointed out (Whiting 1964) that, in a sample of the world's cultures, there is a fairly strong correlation between polygyny and prolonged post-partum taboos. To the extent that these two customs are functionally related, one might expect a reduction in the duration of post-partum taboo periods in New Guinea as the incidence of polygyny is reduced.

It may be noted that when an infant dies, cohabitation is normally resumed soon after. Thus the post-partum taboo is probably least restrictive of fertility in those populations where mortality rates in the first year of life are markedly high, and most restrictive where infant mortality rates are low or do not decrease very sharply after the first year.

Finally we may note one of the few cases in which anthropologists have been able to provide fairly clear evidence of the extent of the breakdown of the traditional post-partum taboo under conditions of cultural and social change. According to the Epsteins, the traditional taboo period among the Tolai ensured that births would normally be spaced out at intervals of at least two years (it was thus still brief in comparison with many New Guinea societies). But in their fieldwork in Matupit in 1960 they found that 46 per cent of successive births in a sample of 139 were separated by intervals of less than two years. They described present Tolai attitudes as firmly opposed to family restriction of any kind (Epstein 1962:74-5).

**Periods of abstinence for other social and ritual reasons**

Periods of enjoined total abstinence from heterosexual intercourse for social or ritual reasons appear to have been usual in most traditional New Guinea societies. Performance of major cult cycles typically involved periods of abstinence for participants. Ritual preparation for war or warlike activities, hunting, fishing, or ceremonial trade voyaging involved periods of abstinence for both men and women (though not necessarily coinciding periods for the two spouses), as in the well-known

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4 (continued)

of Kaironk Valley, who observe a much briefer period of abstention, normally less than two years, have a domestic organisation which permits considerable mutual assistance between women in the same or nearby households (Bulmer n.d.).

1 For a general discussion of the causes and correlates of the post-partum taboo, see Allen (1967:18 ff.).
case of the Motu Hiri expeditions. Apart from communal restrictions of this kind, individual men and their wives may be required to undergo personal restrictions, most typically in the case of men who wish to practise some particular form of sorcery or other magic.

One interesting and perhaps unusual case is of a society in which traditionally a couple had to refrain from intercourse when a family pig was about to give birth and for approximately a month after she had littered. Should this taboo be broken, it was thought that the young pigs would sicken and die.2

I must also in this context report a personal impression that even in societies in which periodic formal and total prohibitions on cohabitation are absent, there is a marked tendency for seasonal variations in the incidence of marital relations. One highlands orator, addressing a gathering of men to discuss the programme of future ceremonial exchange activities, put it something like this: 'We have got all these ceremonies to perform, so let us get on with the job soon, as after that we have to make gardens and after that we have to work hard copulating with our wives.' (This was a jesting reference to the general highlands view, shared also by the majority of New Guinea peoples, that serious copulation, to procreate children, involves multiple acts of intercourse and is very much to be considered as 'work'.)3

Other sexual outlets for males

Most, possibly all, traditional New Guinea societies provided at least some approved outlets for sexual activity by males which could

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1 Barton in Seligmann (1910:100, 101, 112-13). For analogous taboos in relation to the Trobriand Kula, see Malinowski (1922:484). In Molima, Fergusson Island, informants stated that abstinence was necessary for several months before overseas trading voyages, and for wives while husbands were absent on these voyages (A. Chowning: personal communication, October 1970). Vicedom and Tischner (1943:215) note that for the Melpa (Hagen) people sexual intercourse was avoided as injurious before (pig) sacrifices, during the harvest of particular crops, before festivals, before the Moka (ceremonial exchange), and in times of sickness.

2 Lesu (Powdermaker 1933:79-80). This is obviously a kind of extension of Lesu taboos on intercourse during 'full' pregnancy and for two to three years while children are being breast-fed.

3 Kyaka Enga in 1959. This is only an approximation (though I think a fair one) of what the big man actually said, as I have not had the opportunity to check his statement from the tape-recording I made of his speech. Cf. statements by the Lakalai of New Britain that men become 'old before their time' through the rigours of procreation (A. Chowning: personal communication, February 1971).
have affected the frequency of normal heterosexual relations likely to result in conception and childbirth. The most widespread though probably the statistically least significant was rape of women of hostile groups, either in war or casually as opportunity occurred, or, occasionally, punitive collective rape of a woman married into the local community.¹ In certain culture areas homosexual relations between males were an important and institutionalised feature of male cults and of the segregated life of males in the club-houses.² The third outlet was the use of prostitutes, normally either women captured in war or women who had lost their reputation through sexual misconduct, in a small number of traditional New Guinea societies.³

Contraception and sterilisation

In this field our knowledge is very fragmentary and anecdotal, though for a considerable number of New Guinea societies there are reports of alleged use of plant substances as oral contraceptives, abortifacients or even agents of sterilisation, and for a few there are reports of other techniques of contraception.

The simplest and possibly least effective method allegedly practised by some females in New Guinea societies is to sleep with a number of different male partners. This devolves from a widespread traditional belief that not merely many acts of intercourse, but many acts of intercourse with one particular partner, are required for conception to take place. The converse, male, policy reflecting this belief, that one should avoid sleeping with any particular woman too often if one does not wish to get her pregnant, may have more prospect of success.⁴

Coitus interruptus is described for some areas,⁵ though not widely: but it may well be that in this as in many other intimate aspects of

¹ A custom recorded in a number of societies as a means of disciplining a dissident wife. For example, Keraki (Williams 1936:163-4), Kyaka Enga (Bulmer n.d.) and Fore (Berndt 1962:173 and passim).

² On present evidence, in a section of Western District from Mt Bosavi to the lower Fly River area (cf. Williams 1936:158-9; Landtman 1927:237); among the so-called 'Kukukuku' (Anga) peoples; and possibly in parts of the Sepik region (Hogbin 1946:205 and 1946-47:127).

³ The only records I have noted are those referred to on p.139, n.3, as well as Rossel Island (Armstrong 1928). Prostitution was perhaps a rather more widespread institution in the traditional societies of the Solomon Islands.

⁴ Chowning (personal communication, October 1970) reports deliberate use of the former (female) strategy by the Molima and the latter (male) strategy by Lakalai.

⁵ For example, Lakalai (Chowning 1958:87).
sexual behaviour, anthropologists' records are not as adequate as they might be.

I have been given two accounts of the use of vaginal insertions in attempts to avoid conception, one the use of a leaf (not considered to be very effective),¹ and the other of the shell of a small unripe coconut, allegedly used as a pessary.²

Dr Ann Chowning notes that in all the New Guinea societies she has studied or read about,³ except the Trobriands,⁴ women are thought to be able to produce sterility, temporary or permanent, by ingesting plant substances. In most cases (she continues) all women do not know what the substance is, and they may also be thought to conceal the use of it. Dr Chowning reports, however, that in one island the plant is well known and widely used and men are said to chew it as well: she points out that this is a most unusual case for this region of the recognition of the possibility of male sterility.⁵

How efficacious these plant substances are is still, as far as I know, an open question. Although samples from many different areas have now been collected, pharmacological testing does not appear to have produced any very positive results (Barnes, Price and Hughes 1970). However, it is probable that in some instances incorrect plants have been supplied to collectors, either deliberately or through the ignorance of the indigenous supplier.

Malinowski (1932:168-9) comments amusingly on European credulity regarding the alleged extent of use and efficacy of such substances in

¹ Lakalai (Chowning 1958:87).
² A story reported by a colleague to whom it was related by a medical worker in the Sepik region.
³ Dr Chowning's own field research has been among the Lakalai, Kove and Sengseng of New Britain and the Molima of Fergusson Island.
⁴ Malinowski (1932:168, 169) was convinced that Trobrianders had no contraceptives, botanical or otherwise. Recent evidence, though somewhat contradictory, appears to refute Malinowski. Holdsworth and Heers (n.d.) provide botanical identifications for two plants allegedly used to prepare potions which act as oral contraceptives. J.W. and M. Leach (personal communication, June 1971) report from fieldwork in progress that no contraceptive practices of any kind have as yet been recorded by them in the northernmost villages of Kiriwina. They have, however, tentative evidence that a very effective abortifacient solution is known and frequently used by some women of these northern villages. The solution is made by boiling a number of leaves collected from the northwestern swamp. Abortion takes place within one to two hours of drinking the mixture.
⁵ Goodenough Island (M.W. Young, personal communication to A. Chowning).
indigenous Papuan societies. European desire to believe these stories is perhaps as fit a topic for sociological examination as the indigenous belief systems of which they also form a part.

Where, as is often the case, administration of plant substances to produce sterility or for other purposes is accompanied by spells and rites it is impossible to draw the line between medicine and magic, or poisoning and sorcery. But there are cases where ritual practices alone are believed to produce sterility. Thus in one highlands society I was told of a rite performed on a barren hilltop to ensure the sterility of a married couple. In this case the groom was an albino who suffered a physically miserable existence, and though his kin thought it appropriate that he should have a wife, they did not think it appropriate that they should bear children who might inherit their father's disability.1

Abortion and infanticide will be considered before discussing attitudes to contraception and the reasons why individuals attempt to practise it.

Abortion

It appears that in nearly all traditional New Guinea societies abortion was a recognised, if often strongly disapproved, method of preventing childbirth.2

In some instances it may be that the ingested plant substances referred to above act as abortifacients rather than as contraceptives. If abortion occurred in the first three months of pregnancy it is possible that the woman or members of her group did not regard her as pregnant, so that an early miscarriage would be considered a menstrual disorder. In some societies, however, two categories of plant substances were differentiated, one believed to act as a contraceptive, the other as an abortifacient.3 In some instances a plant is specifically credited with producing abortion, but is also believed to render a woman who takes it permanently sterile.4

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1 Karam of Kaironk Valley (Bulmer n.d.).
2 The only exception I have noted relates to the Mae Enga, for whom Meggitt (1965:145) found no evidence of the practice of abortion.
3 For example, on Wogo (Hogbin 1946:207). In Lesu different leaves are used in attempts to induce abortion and to produce sterility (Powdermaker 1933:242). Schiefenhövel (1970) reports, with botanical identifications, plants used by Purome, Kerewo and Gope of Gulf District and Roro of Central District, but notes that in these societies a sharp distinction is not drawn between abortifacients and contraceptive or sterilising medicines.
4 For example, Molima (A. Chowning: personal communication, October 1970). However, in nearby Dobu the two plants used as abortifacients are apparently not credited with producing permanent sterility (Fortune 1932: 239-40).
The most widely reported methods used in attempted abortions are crude and dangerous physical ones applied in relatively late stages of pregnancy: physical exertion such as jumping from a tree; heavy massage; constrictive binding of the abdomen; and application of hot stones to the abdomen.\(^1\) I have come across two references to the use of vaginal uterine insertions.\(^2\)

In general abortion appears to be most commonly practised by unmarried girls, but in some areas it is also used by married women who feel that they have had enough children.\(^3\) Married women may also attempt abortions if they are dissatisfied with their marriages and the birth and survival of a child would make it more difficult for them to leave their husbands, or to annoy their husbands, or if they have become pregnant through failure to observe the post-partum sex taboo,\(^4\) or through adultery, while their husbands are abstaining from sexual relations.

**Infanticide**

Some cases of infanticide probably occurred in every traditional New Guinea society, but in general the practice tended to be limited to one of a pair of twins, to deformed infants and, in most societies, to illegitimate children.

Another circumstance in which infanticide sometimes took place, reported by members of a highlands society, was when a male child was much desired (after one or more daughters had been born) and the new baby was female (in the case of twins of opposite sex it is almost always the female which is killed). It was also alleged that on some occasions husbands would permit or encourage their wives to kill children because they were not prepared to undergo the long period of sexual

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\(^1\) For example, Northern New Ireland (Parkinson 1907:267-8), Buin (H. Thurnwald 1934:163) and Busama (Hogbin 1946-47:131).

\(^2\) A. Radford (personal communication, November 1970) noted a case recently of a stick among the Orokaiva of Northern District; M. Leach (personal communication, June 1971) was told that a vine was sometimes used in the Trobriands.

\(^3\) For example, Buin (H. Thurnwald 1934:162), Lesu (Powdermaker 1933:243) and Dobu (Fortune 1932:239-40).

\(^4\) Interestingly, it is said by Kyaka Enga informants that an unmarried girl who conceives, or a married woman who does so in breach of the post-partum taboo will say that she has a 'weed' in her womb and not a child, and justify abortion on these grounds. This rationalisation is supported by the belief that it takes many acts of intercourse to form a child, and it is assumed that unmarried girls and nursing mothers would only very occasionally have intercourse (Bulmer n.d.).
abstinence required by the post-partum taboo. But there are also cases reported in the same society (as in many others) where husbands or other kin have intervened to prevent a woman committing infanticide.\(^1\) There is only one clear case so far reported for New Guinea of a society in which relatively frequent infanticide is, in the absence of a long post-partum taboo, the main deliberate means of spacing children.\(^2\)

The commonest method of infanticide appears to be to lay the child face down and smother it, but abandonment and exposure are also reported, including from one area a case of exposure in a basket hung in a treetop.\(^3\)

Attitudes to infanticide may be expected to vary in relation to beliefs and customs concerning a child's formal entry into society. An un-named child whose mother has still not left the seclusion of the birth-hut is not yet considered a member of society, and its death by natural or other causes does not normally require mortuary ceremonies to be performed and the accompanying taboos to be observed by its kin.\(^4\)

It is extremely difficult to obtain quantitative information on the incidence of infanticide, for a number of reasons. One is that in nearly all societies the woman is secluded at the time of birth, and sometimes completely alone, so that often no-one except the mother can really know whether a child was stillborn, died of natural causes, or was killed. Even where other women are normally present to attend on a parturient mother, the baby may be born so quickly that she is alone when it appears. A second reason is that even in societies in which some categories of infanticide are regarded as legitimate, the practice is now covert because of knowledge of disapproval by missionaries and other outsiders and of possible punitive action by Administration authorities. It is also difficult to know where to draw the line between deliberate infanticide and selective lack of positive care for new-born or very young infants of one or both sexes, or of a twin.

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\(^1\) Kyaka Enga (Bulmer n.d.). Reay (1959:80, 175) gives cases for the Kuma of female infanticide being practised at the insistence of the father, and being prevented by paternal grandmothers.

\(^2\) Sengseng of West New Britain. See p.147, n.3.

\(^3\) In a riverine Sepik village, probably May River (T.G. Barnett: personal communication, November 1970).

\(^4\) The case referred to in the previous footnote is a particularly good illustration of this point. The parents had lost a number of children, and the father was unwilling to risk the abandonment of gardens and other severe prohibitions which he would have been under if the child had survived for longer than the initial 'pre-human' period of its life and then died. So he committed infanticide.
Reasons underlying traditional forms of family limitation

On the basis of this account the following tentative generalisations can be made about the most important cultural factors directly influencing fertility and family size in traditional New Guinea societies. First, illegitimate children are disfavoured and few are found, for a varying combination of the following reasons: early age of marriage in relation to physical maturation and fertility of girls; stress on pre-marital chastity; use of abortion and infanticide by unmarried girls and, possibly, of contraceptive techniques by unmarried girls and their lovers.¹

Secondly, within marriage the main cultural factors limiting family size are probably the post-partum sex taboo and periodic taboos associated with ritual or ceremonal activities. (It would be interesting to check if there is, in general, an inverse correlation between duration of post-partum taboo periods and duration and frequency of taboos related to ceremonial activities.) It is likely that abortion and infanticide are significant factors in a few populations, and possible, though unlikely, that contraceptive practices are also significant. It is also possible that culturally conditioned restraints on enthusiasm for heterosexual intercourse, expressed in many New Guinea societies as a fear that female contamination will sap the strength of the male, may have some effect on fertility, though as far as I am aware there is no good evidence to demonstrate this.²

¹ Stott (1962) discusses the evidence, drawn mainly from industrial societies, for reduced fertility in individuals and populations under stress. If his arguments are accepted one might expect a low rate of live births resulting from extramarital conception and a high mortality rate of illegitimate infants for causes other than and additional to abortion and infanticide in most traditional New Guinea societies.

² Estimates of frequency of marital intercourse in New Guinea societies are hard to obtain but many anthropologists share Salisbury's impression (in Nag 1962:76) that rates in many New Guinea societies fall well below Kinsey's estimates for Americans. I have also heard a number of anthropologists comment in private conversation on what is to them the remarkable degree of sexual restraint shown by the majority of individuals in certain New Guinea societies, notably in parts of Western and Southern Highlands and Gulf Districts. Conversely, New Guineans from these societies tend to be shocked by the direct and indirect evidence they observe of lack of restraint by Europeans - and by their own younger and more acculturated generations.

Of course, as Glasse (1968) has argued of the Huli, it is possible for a high degree of restraint to be exercised but opportunities for conception by married women still to be good, through the coincidence of the brief approved period for coitus with the woman's most likely
Thirdly, restrictions on the remarriage of widows may have an important effect on general reproductive rates in a few societies, and are likely to have a small but significant effect in most societies.

The important question left to answer is what beliefs, values and attitudes underly these practices. In particular, how far in traditional societies are limitations on fertility and family size imposed as such, and how far are they accepted or imposed for other reasons? This is an important question, for answers to it should help us both to interpret changes in family size and fertility as traditional societies become involved in rapid social change, and to give some indication of the potential acceptability in these societies of new introduced methods of birth control.

With this question in mind we may consider the three main groups of factors limiting family size. The first, periodic taboos on sexual intercourse for ceremonial or ritual reasons are, by definition, scarcely likely to be maintained essentially to limit family size. These are also the limitations most likely to break down under conditions of social change as warfare, major traditional cults, and ceremonial exchange systems break down.

Secondly, the post-partum sex taboo is rationalised by those who observe it as protecting the health either of the last-born child or, more rarely, as protecting the health of the father. I have never heard of New Guinea people justifying it explicitly as a means of spacing births and limiting family size. However, its effects in limiting family size are certainly appreciated, and it is likely that a prolonged post-partum taboo period is functionally related to the self-sufficiency in terms of domestic and horticultural labour expected of the individual woman. ¹ Both this restriction and other forms of limitation of family size may also be related to absence of provision for adoption or fostering of children other than orphans or offspring of broken marriages. I have an impression, which I have not had time to check against the literature, that in those societies, mainly in coastal regions, where adoption of children by kin of husband or wife

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² (continued)

period of ovulation. However, the evidence quoted by Nag (1962:75) from Pearl's study in Baltimore, that for American married couples not using contraceptive techniques only one out of 254 copulations results in pregnancy, suggests that any diminution of frequency of intercourse may restrict fertility. Thus the traditionalists from, for example, Kerema groups in the Gulf District, may perhaps be quite correct in relating increased family size among the younger generation of married couples in urban areas to a disregard of traditional restraints on marital sexuality.

¹ See p.147.
was an approved and frequent practice, post-partum taboos were generally of briefer duration than in societies in the highlands and elsewhere where there is little if any adoption of children whose parents are still living and married to each other.

If these arguments hold, the post-partum taboo can be expected to break down or to be significantly reduced, either through reduction in the breast-feeding period or through attrition of traditional beliefs in the deleterious effects of intercourse on the previous offspring, in those societies where there are significant changes in domestic organisation and female work routines. However, it is also likely that the availability of tinned or powdered milk for feeding infants may alone be very effective in reducing the spacing of births.

Thirdly, the attempted use of contraception and the use of abortion and infanticide by married women may be either mainly features of attempts to dissolve unwelcome marriages or deliberate attempts to space children or place an overall limit on family size. It is often hard to tell whether the ideal is set in terms of the spacing of children or in terms of a limit on total family size. For example, when an educated New Guinean comments that he and his wife are criticised by kin in their home community for the number of children they have had, it may be that in fact the criticism is directed at the brief intervals between births rather than at the family size as such.

Childlessness or very small numbers of children in a family are probably very seldom desired ends in themselves, though there may be occasional cases where a polygynist with numerous children by certain of his wives may wish to retain one who does not get pregnant and is thus not barred from his sexual attentions.1 In some societies a man needs to father three children before he is considered fully mature, but in others some women, at least, seem to feel that three children are the ideal maximum rather than minimum number.2 In yet another society having four children was said to be the ideal (provided that two were of each sex) but up to seven was all right; however, having as many as nine was animal-like.3

As might be expected, it appears that in those societies where general life expectancies for women are low, large families are approved,

1 Such a case is recorded for the Laiapu Enga (Reko 1968).
but only a relatively few women have successfully borne a large number of surviving children.¹

There is evidence from a number of New Guinea societies that individual women are anxious not merely to space their children but to limit their total number. Motives reported include avoidance of the bother of caring for more children, reluctance to discontinue sexual activities, reluctance to give up dancing or other pleasurable social activities and, sometimes quite explicitly, dislike of the pain of childbirth.² There is, however, in New Guinea little evidence of deliberate attempts to limit family size either because of consciousness of general over-population in relation to land and food resources or because of pressure on land available to the individual family or local kin group.³

It may be assumed that the incidence of infanticide is generally reduced under conditions of social change, and it is possible, though by no means certain, that abortion rates also drop. However, for a number of areas there are indications that attempts to limit family size by contraception increase as other factors of family limitation decline. For one highlands society where there is no clear evidence of traditional contraceptive practices, it is reported that a powder with alleged contraceptive properties is now purchased and smoked with tobacco. This is said to originate from some other part of New Guinea.⁴ A number of missionaries, anthropologists, and other expatriates who enjoy the confidence of local people have commented on requests (sometimes very pressing) made to them for help in obtaining modern contraceptive devices or medicines.

In conclusion I would like to offer the opinion that family planning programmes have the best prospect of acceptance in those societies

¹ A good example is provided by the Sengseng of West New Britain. In this society cultural practices including the killing of widows mean that many women do not survive through their total possible childbearing period. There is also a rather high degree of biological infertility. But those who are fertile and do survive have large numbers of children, and it is not at all rare for a woman to have seven offspring who survive to adulthood (A. Chowning: personal communication, October 1970).
² Not surprisingly it is female anthropologists who come up with the fullest information on this point. For example, H. Thurnwald (1934: 162) on Buin, Powdermaker (1933:243) on Lesu, and Chowning (personal communication, October 1970) on Kove, Molima, and, with E. Valentine, on Lakalai.
³ In this respect there is a marked contrast with some African and European societies and with at least one case in the Pacific, the Tikopia (Firth 1936:491).
⁴ Central (Laiapu) Enga (Reko 1968).
where women's routines of work, family responsibilities and general welfare are being or would be most drastically affected by breakdown of the post-partum taboo and of other traditional forms of family limitation. They probably have least chance of acceptance in those societies where traditional forms of family limitation have already broken down and women's lives, and the lives of whole local communities, have already been adapted to the presence of a disproportionately large number of children.

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Chapter 11

Conclusion

J.C. Caldwell*

The preceding papers deal with many aspects of the complex relationship of population growth to social and economic change. Underlying all discussion are the vital rates of Papua New Guinea's indigenous population presented by van de Kaa, and based very largely on his analysis of the 1966 census data.¹ By 1970 his estimates were: a crude birth rate of probably about 44 per thousand (about average for developing countries); a crude death rate of about 17 per thousand (about average for Asia but lower than most rates found in tropical Africa); an annual rate of population growth of about 2.7 per cent (somewhat higher than the average for the developing world); an expectation of life at birth of almost 50 years (that is, the level Britain passed only around 1900); and an average completed fertility of somewhat over six children per woman.

Given the relatively low level of economic development and the comparatively short period of transition from almost complete dependence on subsistence agriculture and related crafts, the surprising statistic among these is the low mortality level, which gives a higher rate of population growth than might have been anticipated. The main reason for this is that health services have been developed further in Papua New Guinea over the last twenty years than has been the case in most developing countries, so that by 1970 expenditure on health services was over A$8 per head (two or three times that in most of the developing world), and penicillin and chloroquin (a malarial suppressant) were readily available at the village level. The birth rate is lower than that found in many African countries; this is partly because over a considerable part of Papua New Guinea there is little emphasis on the virtue of high fertility and quite extensive practice of pre-modern forms of fertility restriction, especially post-natal taboos on sexual

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¹ See Chapter 3.
relations. (Thus there is some basis for rural family planning pro-
grammes employing modern contraception - a point already established
by the Community Health Practice Unit of the Kainantu Hospital.)
However, there is likely to be a slight rise in fertility due partly
to the shortening or abandoning of the post-natal sex taboo, particu-
larly among urban populations. This possibility is incorporated in the
projections discussed below.

If population trends follow the pattern observed in much of the
developing world over the last generation (and barring a serious set-
back to the present pace of economic development this seems probable),
the death rate should be below 10 per thousand by the late 1980s, with
an expectation of life at birth of approximately 60 years (see Table
3.3). Even a slower decline, of the order now predicted for parts of
tropical Africa, would produce by that date a crude death rate of 12
and an expectation of life at birth of 55 years. Van de Kaa makes
three different assumptions about the course of fertility change (see
Table 3.6): without government involvement in fertility control, or
ineffectual involvement, the birth rate would be about 42 per thousand
in the late 1980s (3.2 per cent population growth per annum); with
moderate involvement it would be about 39 (2.9 per cent growth per
annum); and with what (by New Guinean standards) would be very consi-
derable involvement, it would be 38 (2.8 per cent growth per annum). It
is possible, of course, that some form of economic crisis for an inde-
pendent government would lead to a family planning programme a decade
hence on the scale now found in some Asian countries; and that this,
together with advances in contraceptive technology, could cut birth
rates and population growth considerably more than has just been
suggested.

The 1966 census estimated a total indigenous population of 2,153,000,
and by the end of 1970 this was probably about 2,425,000. A birth rate
unaffected by governmental attempts to assist in its reduction (that is,
van de Kaa's high projection) would yield an indigenous population by
1991 of about 4,609,000, and the steepest likely decline in the birth
rate (excluding the possibility of massive government intervention in
family planning) one of 4,294,000, a reduction of about one-third of a
million. In the quinquennium 1986-91 the population would grow by
681,000 according to the high projection and by 559,000 (18 per cent
less) by the low projection (see Table 3.5), compared with an addition
of about 306,000 in the quinquennium 1966-71. Thus there is no decline
in the birth rate which is going to prevent the population increments
becoming very much larger than now, although some reduction in the size
of the increments might be of very considerable importance.

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Two other factors will be of very great significance in determining the population situation with which they interact: one is the urban-rural balance (and hence, among other things, the employment balance), and the other is the educational structure of the society.

Ward suggested that present trends indicate an indigenous population for Port Moresby of at least a quarter of a million in 1990 and possibly half a million by 2000 (compared with a total population of about 50,000 in 1970), and a total urban population in 1990 of around three-quarters of a million (compared with under 150,000 in 1970).\(^1\) Thus the towns, although now containing only about one-twentieth of the country's population, may absorb about 30 per cent of the population increase over the next twenty years, so that one-sixth of the indigenous population are urban residents by 1990. This high rate of urbanisation is likely for several reasons. The first is the mobility of the rural population. For example, by 1966 one male in twelve was living outside his District of birth and half of all independent migrants were making the towns their destination.\(^2\) Secondly, the rural subsistence sector will find it very difficult to continue to absorb an increasing population without reducing standards of living (Fisk 1970), and, virtually by definition, will be unable to provide much cash income except perhaps by arranging for remittances from migrants to the towns (thus encouraging rural-urban migration). Thirdly, the proportion of children attending school has increased very substantially over the past two decades, and the experience of other countries is that rural residents who have been to school are much more likely to seek urban employment than are those who have not.

The major event which could reduce the rate of urbanisation below that projected by Ward would be a reduction in the volume, or perhaps in the rate of growth of that volume, of Australian financial grants to Papua New Guinea. If this does not happen, the workforce projections made by Beltz (see Table 5.6) indicate that the expansion of the economy should provide extra town jobs (this excludes the question of the strain on the budget in providing town amenities) at least until 1976 (and, by implication, for the years immediately beyond) at perhaps 90 per cent of the rate of arrival of migrants seeking work.

The interrelation between population growth and schooling is more significant in the short run than is that between population growth and employment, because fertility changes affect potential school enrolment much earlier than they do the workforce. Thus van de Kaa's low projection envisages the population of economically active age (15-64 years) in 1991 being only one per cent smaller than that given

\(^1\) See pp.98, 100. The population estimates quoted here by Ward employ the rather generous estimate of urban population used in the 1966 census.

\(^2\) See pp.91, 93.
by the high projection; whereas the number in the primary school age group would be 13 per cent (or 103,000) lower, and the number in the seven-year-old group coming of school age would be 14 per cent (or 20,000) lower (see Tables 3.5, 3.7 and 3.8). These variations could be very important, as they may mean the difference between being able to accept 95 per cent instead of 81 per cent of all children for school in twenty years time.

Education can prove tremendously costly to a developing country. There appears to be evidence that the number (and even the proportion) of children of primary school age who cannot be offered school places has grown during 1968-70. Furthermore, this seems to have taken place in urban as well as rural areas, thus increasing the problems of the town child in fitting himself for the types of job usually found in his environment, wasting the chance of maximising the intake of children whose break with traditional society makes them most likely to benefit from Western education, and very likely proving politically dangerous in the longer run. Smith (see Table 6.5) forecast that, employing the medium population projection, the cost of keeping 60 per cent of the country's children in primary school would rise from 2.8 per cent of the gross national product in 1971 to 3.5 per cent in later years (and inevitably a very much larger fraction of the budget); and the cost of getting 95 per cent into school by 1991 would raise the proportion of gross national product spent in 1991 to 5.6 per cent or double its 1971 level (6.1 per cent according to the high projection and 5.3 per cent according to the low projection).

Papua New Guinea's rate of population growth is fairly high by global standards, but it appeared to be widely agreed at the conference that a massive family planning programme is not desirable at present, although it may well become imperative within perhaps a decade. Three major reasons why it was not yet desirable were put forward.

First, Papua New Guinea is not densely settled. The population density at the end of 1970 was about 14 per square mile, and this, although more than three times that of Australia, was far below that of Asia and Europe, and only half that of the Americas, the U.S.S.R. and Africa (although higher than Middle and North Africa, as well as some of the developed world before industrialisation). Of greater importance for the expanding rural populations is the evidence of unused agricultural land. However, because of the ethnic divisions of the country, sparsely settled land is more likely to be of use to the people in its immediate vicinity than to the population as a whole. Furthermore, in regimes of shifting cultivation, land which appears to be unused is often merely lying fallow and, if it is used again prematurely, soil deterioration will result. There are already rural areas with land shortages\(^1\) but, as economic development continues, the most important

\(^1\) Granger (Chapter 8) demonstrates this for the Gazelle Peninsula, and Lea and Weinand (Chapter 9) for the Wosera areas of the East Sepik District.
consideration will be the annual rate of growth of the population and not the present or ultimate carrying capacity of the country. In all societies and economies, except some countries of overseas European settlement (which are unique in that originally small populations were fed from their areas of cultural origin with people who were frequently literate and skilled and who tended to attract capital along with the migration stream), there is little evidence of successful industrial 'take-offs' with population growth rates above 1½ per cent per annum.

Secondly, a large-scale family planning programme in Papua New Guinea would not be politically acceptable at present. The acceptance of government population policies and the organisation of family planning programmes became possible in the majority of ECAFE countries only during the 1960s (although there is now evidence that these policies are unlikely to be revoked as the political parties in power change). By 1970 governmental or government-supported family planning programmes had been established in India, Pakistan, South Korea, Taiwan, Singapore, Malaysia, Iran, Nepal, Indonesia, Thailand, the Philippines and Hong Kong, and in the rest of Asia in Turkey and apparently Mainland China. There was some evidence that this would happen during the 1970s in much of Africa and Latin America and perhaps also in the Pacific. By 1970 programmes were established in Africa in the United Arab Republic, Tunisia, Morocco, Kenya, Ghana, Botswana, Mauritius and Nigeria; in Latin America in Puerto Rico, the Dominican Republic, Jamaica, Barbados and Trinidad and Tobago, with some governmental involvement in Columbia; and in the Pacific in Fiji. In some of these countries there appeared to be a pattern whereby policy makers were little concerned with the economic and social implications of high rates of population growth during the euphoric years immediately after independence, but became much more interested as the first independent development plan failed to reach its targets, and as demands on the budget for expenditure on education and urban facilities rose more steeply than revenue.

Thirdly, a programme in Papua New Guinea at this time would probably not succeed in attracting enough clients to justify it. Van de Kaa suggested that the first sizeable demand for family planning services would be among urban populations and among those with some schooling, both groups which will be very considerably larger in the 1970s than the 1960s.1 But it was also suggested that, as many indigenous rural populations do not favour maximum fertility, they too might well produce clients for a family planning programme, especially perhaps in areas of dense settlement or land shortage. It should be noted that the Administration's health services have already offered limited family planning services and found there is some demand for them (Scrugg 1970).

The expected shorter and longer-run advantages of fertility decline in Papua New Guinea were argued by Jones,2 McCasker (1970) and Fisk

1 See p.20.  
2 See Chapter 4.
(1970), with a measure of agreement on the floor of the conference that the immediate economic gains would be rather small (except in limited areas of the country with real shortages of land), but that eventually continued and satisfactorily rapid economic advance would probably depend on a substantial reduction in fertility. There was greater agreement among participants that family planning services should be provided now to those wanting them, on the grounds that future mass acceptance will probably depend on the precedent of small groups (especially elite groups) having already adopted such new practices, and that social change requires so much time that the earlier the initial steps are taken the better. It was also argued that poor rural populations in most developing countries could practise modern contraception only if contraceptive assistance was provided by government health services.

In the summary session of the conference various policy recommendations were suggested. All were based on the beliefs that a major family planning programme will one day be necessary in Papua New Guinea; that social change in this direction should begin as soon as possible; that the experience gained from limited family planning provision will prove invaluable once a large scheme has to be initiated; and that there will be a little immediate economic gain, as well as social gain to the families themselves, in ensuring that whatever demand there already is, or that does develop, for contraceptive services is fully met. To this end the Administration's health services should be permitted and encouraged (and provided with a budgetary allocation) to provide family planning assistance through trained staff (doctors, certificated nurses, etc. with some in-service training in family planning) working at all health facilities in Papua New Guinea.

These services should not be wasted because their existence is unknown; the Administration's health services should have permission and a budgetary allowance to provide information (and perhaps to use the radio and newspapers to a limited extent) on the existence of family planning services. In a decade or more Papua New Guinea will probably have to follow the lead of other ECAFE region countries and employ family planning information workers, usually young women with social welfare or nursing training who visit homes discussing family welfare and informing those who are interested how to get family planning assistance. Valuable experience, as well as some improvement in welfare, could be obtained in Papua New Guinea if the health services were to employ a small number of these persons immediately and gradually increase their numbers. Valuable experience would be built up for both official and private services if a voluntary family planning association (with, in due course, branches and clinic services in the main towns) were to be formed. Such associations exist in nearly all countries of the ECAFE region and are usually affiliated with the International Planned Parenthood Federation (with headquarters in London) which is supported by the governments of most of the developed aid-giving countries. Such
associations in many countries are often assisted in their work by being allowed to use some governmental facilities, and such co-operation would probably also be in Papua New Guinea's interest.

Some assessment should be made of Papua New Guinea's need for family planning assistance and the potential for future expansion; this can be done by surveys, known as KAP surveys (knowledge of, attitudes towards, and practice of, family planning). These have now been carried out in samples of most of the world's populations and can be done skilfully and tactfully.¹ In accordance with the practice adopted by an increasing number of developing countries, courses on family planning should be included in all medical training and in all training (as well as in-service courses) for nurses and medical auxiliaries. The possibility of assisting private doctors who give family planning assistance should also be considered, perhaps by reimbursing costs and providing contraceptive supplies. At the same time it might be ensured that no duty or sales tax is paid on contraceptives and that there is no ban on their advertisement.

The cost of family planning programmes is usually much lower than that of most other forms of government investment, and the evidence to date indicates that the return is much higher. Most programmes operate in the range of 4 to 10 cents per head annually, the cost being lower where a comprehensive health service exists. A sensible budgetary allocation in Papua New Guinea might be to provide 3 cents per head for one year, which is less than half of one per cent of current health expenditures (1 cent for family planning services, 1 cent for informational services, and 1 cent for surveys); to reduce it during the following years to 2 cents (that is, the initial survey will be over); and to envisage that in a decade it might rise to a plateau of possibly 5 to 8 cents. This would mean a 1971 allocation of about $75,000, one thereafter of about $50,000, and a scale of expenditure in the 1980s of perhaps $150,000 to $250,000 per year (possibly nearer the lower end of the range if the expenditures proposed for the 1970s have been made). Presumably these sums would be spent through the Department of Public Health, although the survey could be undertaken by the Faculty of Medicine of the University of Papua and New Guinea.

¹ A questionnaire compiled by the International Union for the Scientific Study of Population has been published by the United Nations and a procedure manual by the Population Council; technical advice and perhaps assistance could be sought from the Population Divisions of either the United Nations Secretariat or ECAFE, the Population Council, the International Union for the Scientific Study of Population, or the Department of Demography of the Australian National University.
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