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DEMOGRAPHIC CHANGE IN THE
WELLINGTON-HUTT URBAN AREA
1956 - 1966

A Contribution to the Population
Geography of New Zealand.

A Thesis Presented in Partial Fulfilment
of the Requirements for the Degree of
Master of Arts in Geography at
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by

MORRIS DAVID MEAR

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INTRODUCTION

Although a number of articles and theses dealing with specific aspects of population and population change in the Wellington-Hutt Urban Area have been written, very few comprehensive studies have been attempted. Among the latter are McGee's (1969) examination of the social-ecological forces operating in the greater Wellington area, and Neville's (1959) thesis which deals primarily with patterns of growth in the population between 1926 and 1956 but also examines changes which have taken place in age-sex structures. Generally speaking, the studies conducted to date have been of two types; (a) point in time, and (b) period studies, both types examining a particular feature of the population such as age-sex structures (Franklin, Gibson and Treeby, 1963), or racial residential patterns (Trlin, 1971a). As these studies have been conducted independently of each other, and their objectives and results unco-ordinated, it was felt that a comprehensive study examining a number of demographic features over a ten year period (1956 to 1966, the latest decade for which full population information is available) was warranted.

The aims of this thesis are thus threefold.

1. To describe and analyse the spatial distribution and inter-relationship of a number of demographic features in the Wellington-Hutt Urban Area.

2. To examine and, where possible, account for the variation which exists between the Maori population (as an example of a minority group) and the total population.
3. To examine the implications of a changing demographic base for planning.

The latter objective arises from the perennial and increasingly chronic 'problem' of planning for people living in New Zealand's urban areas. It cannot be emphasised too strongly that the demographic base and more particularly the spatial variation of demographic variables are the bases for urban planning, which has in the past tended to concentrate on the built environment at the expense of its creators and inhabitants.

To fulfil the above aims the following hypotheses will be examined.

1. That the Wellington-Hutt Urban Area has experienced patterns of demographic change over the decade 1956-66 comparable to those observed in other New Zealand Urban Areas.
2. That the patterns of demographic change observed in the Wellington-Hutt Urban Area can be attributed to the concurrent processes of family formation, suburbanisation and State planning and direction.
3. That patterns of demographic change are inter-related.
4. That minority groups (in this case the Maori) will be at variance with the demographic changes that have taken

place in the total population.

5. That minority group variance will be greatest in the inner urban area and will diminish toward the periphery, e.g. (a) the growth rate of the Maori population will be positive in many of the inner-city sub-divisions, while that for the total population will be negative, and (b) growth for the Maori population will be greatest at the periphery as it is for the total population.
6. That the spatial distribution of demographic phenomena and the variations which exist between the Maori and total population can be explained by the ecological forces operating within the urban environment.

The thesis is divided into six chapters. Chapter one examines the patterns of population growth, distribution and density changes over the period 1956 - 1966. Three population groups are examined - total, non-Maori and Maori - and an assessment is made of net internal migration as a factor contributing to the observed patterns. Chapter two is concerned with racial minority residential patterns. An examination is made of the concentration of non-Europeans in relation to Europeans and then a more detailed examination of each of the major non-European racial groups (Maori, Polynesian, Chinese and Indian) is undertaken in order to assess the extent of residential integration. Chapter three is concerned basically with the intra-urban distribution of age-sex structures and the changes which have taken place over the period under study. To show the variation

which exists between Maori and total population age structures at the sub-division level, tri-graph analysis of both population groups was carried out. A number of indices derived from the basic age-sex profile information are also plotted spatially to give a more accurate picture of the intra-urban variation which exists between the two groups. In Chapter four fertility patterns are examined for the total, non-Maori and Maori population. Spatial patterns are established for the total population in order that changes which occur over the period can be assessed and non-Maori/Maori differentials are presented (a) to illustrate the variation in fertility which exists between the two groups, and (b) to show what effect Maori fertility has on the total population fertility pattern. Chapter five draws on the findings of the previous chapters in that it illustrates the implications demographic change can have for planning in the community. Finally, in the concluding chapter, the results of the thesis are assessed in terms of the initial hypotheses proposed. In addition factor analysis is applied to ascertain the degree to which the variables discussed are inter-related, and to establish (or confirm) the factors underlying the variation in the demographic variables examined.

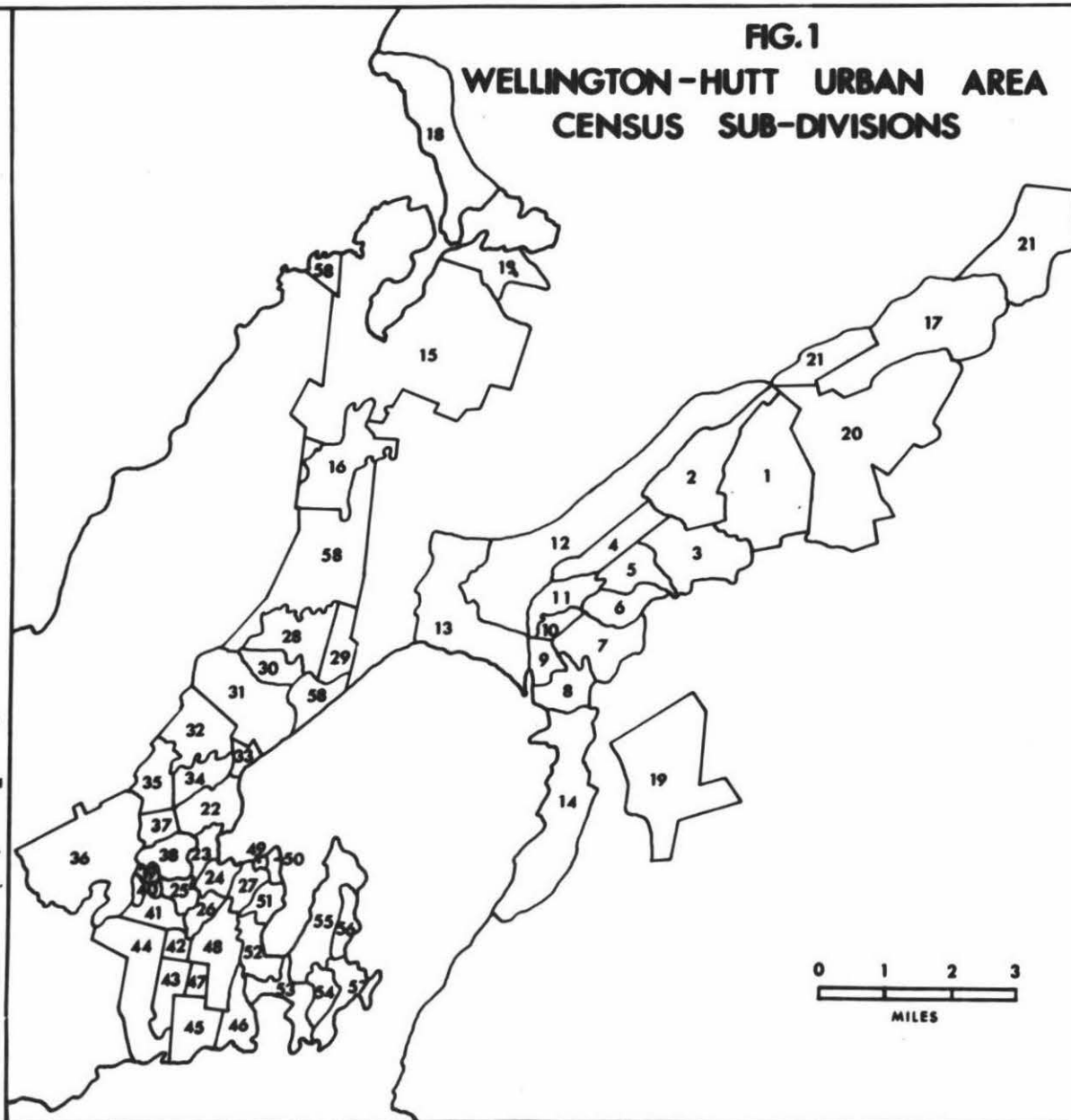
Given the nature of the study and the material being examined, special efforts have to be made to avoid presenting an indigestible mass of statistics. Accordingly, considerable use has been made of maps and other illustrations to present the results of data analysis as clearly and concisely as possible. Such visual aids, however, though facilitating easier reporting and comprehension, do have the disadvantage of requiring the

sacrifice of a degree of precision. To overcome this obstacle, to meet the rigorous needs of an academic study and specialist readers, detailed results of analysis are included in a set of statistical appendices which should be regarded as an integral part of the study.

Limitations imposed on a study such as this are those which are common to most studies dependent on census reports or other official statistics as the primary source of data. What this means in reality is that conclusions drawn are based primarily on the analysis of quantitative data not specifically designed for demographic research. To some extent the results obtained, and spatial patterns identified may reflect the nature or form of the information provided in the census reports. For example, information on the age structure of the population is often heaped artificially at five year intervals. While this practice may well be in the interests (and reflect the capabilities) of official data collection and publication, it nevertheless places restrictions on subsequent analyses, especially as individual census schedules are classed as confidential documents beyond the reach of research workers both inside and outside government departments. Similarly, variations in the size of census sub-divisions and the uneven distribution of the population within them will mean that patterns established are probably more generalised than those that would pertain had a smaller areal unit such as the mesh block been used. The above mentioned factors should therefore be kept in mind when reading the thesis.

CENSUS SUB-DIVISIONS

- 1 STOKES VALLEY
- 2 TAITA
- 3 NAENAE
- 4 BOULCOTT AVALON
- 5 EPUNI
- 6 WATERLOO
- 7 WAIWHETU
- 8 SEAVIEW-GRACEFIELD
- 9 MOERA
- 10 WOBURN
- 11 HUTT CENTRAL
- 12 WESTERN HUTT
- 13 PETONE
- 14 EASTBOURNE
- 15 PORIRUA CITY
- 16 TAWA
- 17 UPPER HUTT CITY
- 18 PLIMMERTON-PAREMATA
- 19 WAINUIOMATA
- 20 HERETAUNGA-PINEHURVEN
- 21 HUTT COUNTY PART
- 22 THORNDON-TINAKORI RD.
- 23 LAMBTON QY.-WELL. TCE.
- 24 WILLIS ST.-CAMB. TCE
- 25 ARO ST.-NAIRN ST.
- 26 MT. COOK - WALLACE ST.
- 27 MT. VICTORIA WEST
- 28 JOHNSONVILLE
- 29 NEWLANDS



CENSUS SUB-DIVISIONS

- 30 RAROA
- 31 KHANDALLAH
- 32 NGAIO
- 33 KAIWHARAWHARA
- 34 WADESTOWN
- 35 WILTON - OTARI
- 36 KARORI
- 37 NORTHLAND
- 38 KELBURN
- 39 TAITVILLE
- 40 MITCHELLTOWN
- 41 BROOKLYN
- 42 VOGELTOWN
- 43 MORNINGTON
- 44 HAPPY VALLEY
- 45 ISLAND BAY
- 46 MELROSE
- 47 BERHAMPORE
- 48 NEWTOWN
- 49 ORIENTAL BAY
- 50 ROSENEATH
- 51 HAITAITAI
- 52 KILBERNIE
- 53 LYALL BAY
- 54 STRATHMORE
- 55 MIRIMAR
- 56 KARAKA-WORSER BAY
- 57 SEATOUN
- 58 HUTT COUNTY PART

C H A P T E R 1

POPULATION GROWTH DISTRIBUTION AND DENSITY

The pattern of population growth and change occurring within the Wellington-Hutt Urban Area between 1956 and 1966, is but part of a phase in New Zealand's history of urban evolution. The observed patterns of growth, evident in the secondary as well as the main urban centres of the country, have revealed themselves in two significant ways: central-city depopulation and rapid residential expansion at the periphery. It is important to realise, however, that while these two trends characterised the pattern of growth for the total population, an entirely different pattern was discernible for certain sub-groups of the population such as the Maoris, Pacific Island Polynesians and other minority groups. While the total population was declining in the inner-city these groups were initially (and in some cases still are) increasing in numbers.

These population trends - overall decline in the central-city, rapid expansion at the periphery and inner-city concentration of minority groups - were by no means unique to the New Zealand urban scene. On the contrary, the patterns of population growth experienced in the urban centres of New Zealand over the decade 1956 to 1966 were similar to those occurring in the majority of urban centres of the western world

(namely Australia, Canada, United States and United Kingdom). Furthermore, while the physical form these trends took differed substantially from one country to another (depending on such factors as population size, rates of growth, ethnic minority groups involved, and government policy) the basic forces responsible were similar.

In addition to the number of general studies on patterns of national and Maori population growth (Franklin, 1966; Gilson, 1969; Heenan, 1965a, 1966; Pool, 1966; Trlin, 1971b) a number of studies have been made on patterns of intra-urban growth (Anderson, 1964; Curson, 1967a; Fairbairn, 1959; Heenan, 1962; Hunt, 1970; McGee, 1969; Neville, 1960; Warren, 1968). The majority of these intra-urban studies have confirmed that while individual urban areas display certain unique features relating to population growth (due to the inter-play of historical and/or physical factors), they also have a number of common characteristics. These general characteristics, which may be noted briefly as (a) spreading central city depopulation, (b) static or slow population growth in the middle suburbs and (c) rapid expansion of population at the periphery, are individually and collectively the result of a number of inter-related factors, which are to be discussed in the following pages.

Growth and Distribution of Population 1956-1966

As the measurement of population growth is one of the most fundamental tasks of demographic analysis, numerous methods

of measurement have been devised. One of the most popular measurements has been the natural rate of increase, mainly as a result of the ease with which it can be calculated. This measure, however, expresses population growth very crudely in that it (a) ignores the age structure of the population, and (b) fails to differentiate between the deaths of the old and the young (Clarke, 1965,138). As a result of these limitations a number of refinements (including potential natural increase, gross reproduction rate, net reproduction rate, marriage standardised reproduction rate) have been proposed, but as yet not widely adopted.¹ In this study the measurement used is the annual rate of increase:

$$\left(\sqrt[t]{\frac{P_1}{P_0}} - 1 \right) \times 100$$

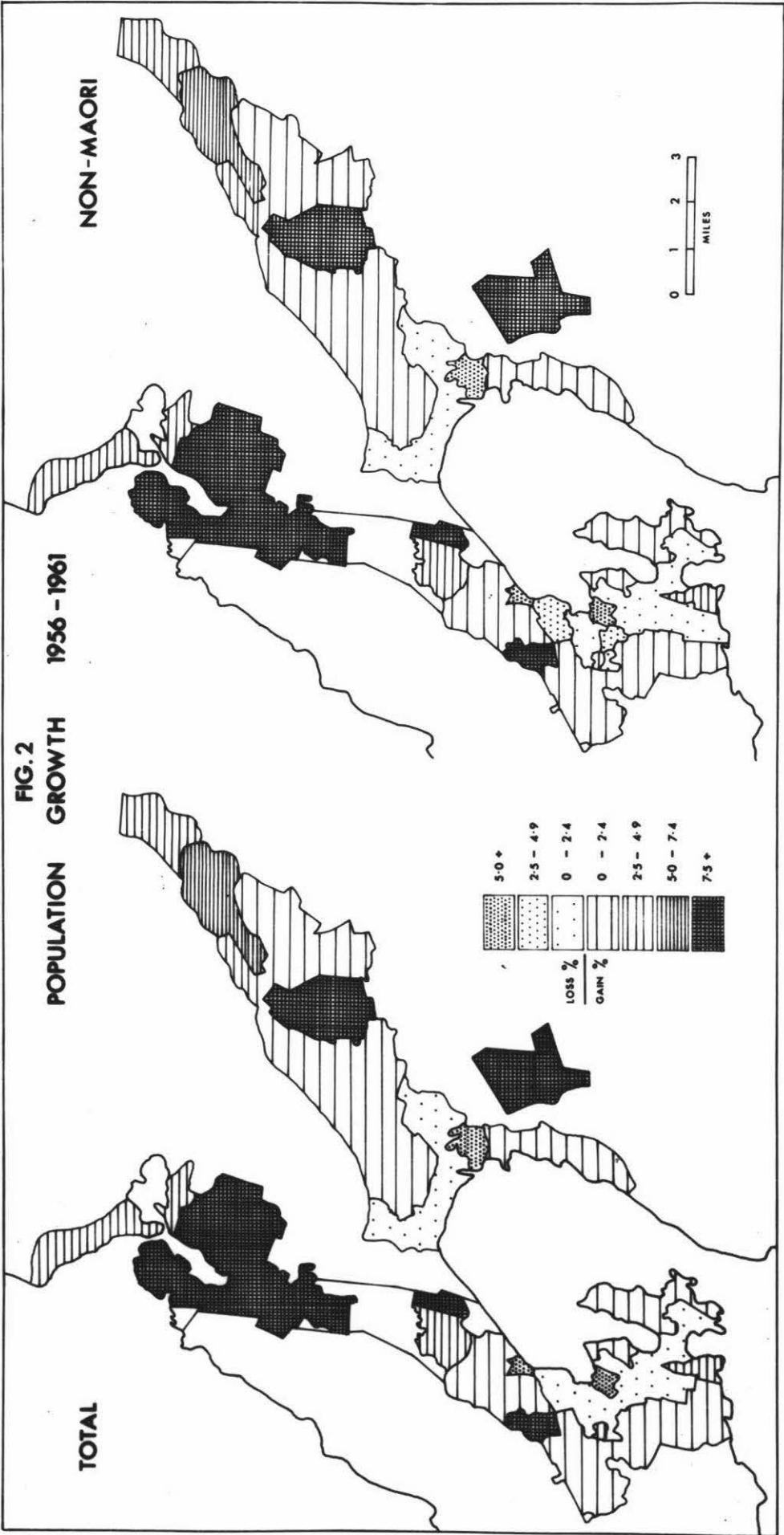
where P_0 = population at the beginning of period
 P_1 = population at the end of the period
 t = number of years between censuses.

In all, the growth rates of three population groups were examined; the total population, non-Maori population, and the Maori population. The reasons for the differentiation between Maori and non-Maori were, first, to show the considerable variation in growth rates between the two populations and, second, to see what effect Maori growth rates had on the total growth rates. Also, as a means of gauging the changing distribution of population in the Wellington-Hutt Urban Area, each of the Urban Areas, as designated in the census, was divided up into a series of concentric zones (one mile in width) centred on the area of earliest development. All sub-divisions falling

within the same zone were grouped together. Where sub-divisions straddled a number of zones (see for example Western Hutt in Figure 1) the zone in which the bulk of the population was located determined where the sub-division would be placed (see Appendix A).

From Table I two significant trends with respect to the changing distribution of population can be discerned; namely, a decline in the proportion of the population in the three inner zones, increasing in magnitude towards the centre, and an increase in the proportion of the population in the three outer zones, increasing in magnitude towards the periphery. These two trends were also reflected in the total and non-Maori annual rates of population growth (see Figures 2 and 3). In the first intercensal period (1956-1961) declines in population were recorded in a continuous belt of sub-divisions from Kaiwharawhara in the north to Lyall Bay in the south. As might be expected the highest rates of population decrease were recorded in the core area of the city. For example, the Willis St.-Cambridge Tce. sub-division experienced an annual population loss at the rate of - 5.1 per cent for the total population and - 5.3 per cent for the non-Maori population. Other sub-divisions experiencing similar rates of decline, although involving considerably less people, were Kaiwharawhara and Seaview Gracefield.

These decreases in population between 1956 and 1961 were by no means new to the city. Neville (1960), in his study of population change in Wellington City, has shown that from as far back as 1926 parts of the inner-city area had been losing population.² The only break to occur in this trend was during World War II when an influx of servicemen and women coming into



the inner-city produced an increase in numbers. After the war, in the period 1945 to 1956, depopulation accelerated and increased in extent to cover an area from Thorndon in the north to Seatoun and Strathmore in the south (very similar to the area experiencing a decline in population between 1956 and 1961).

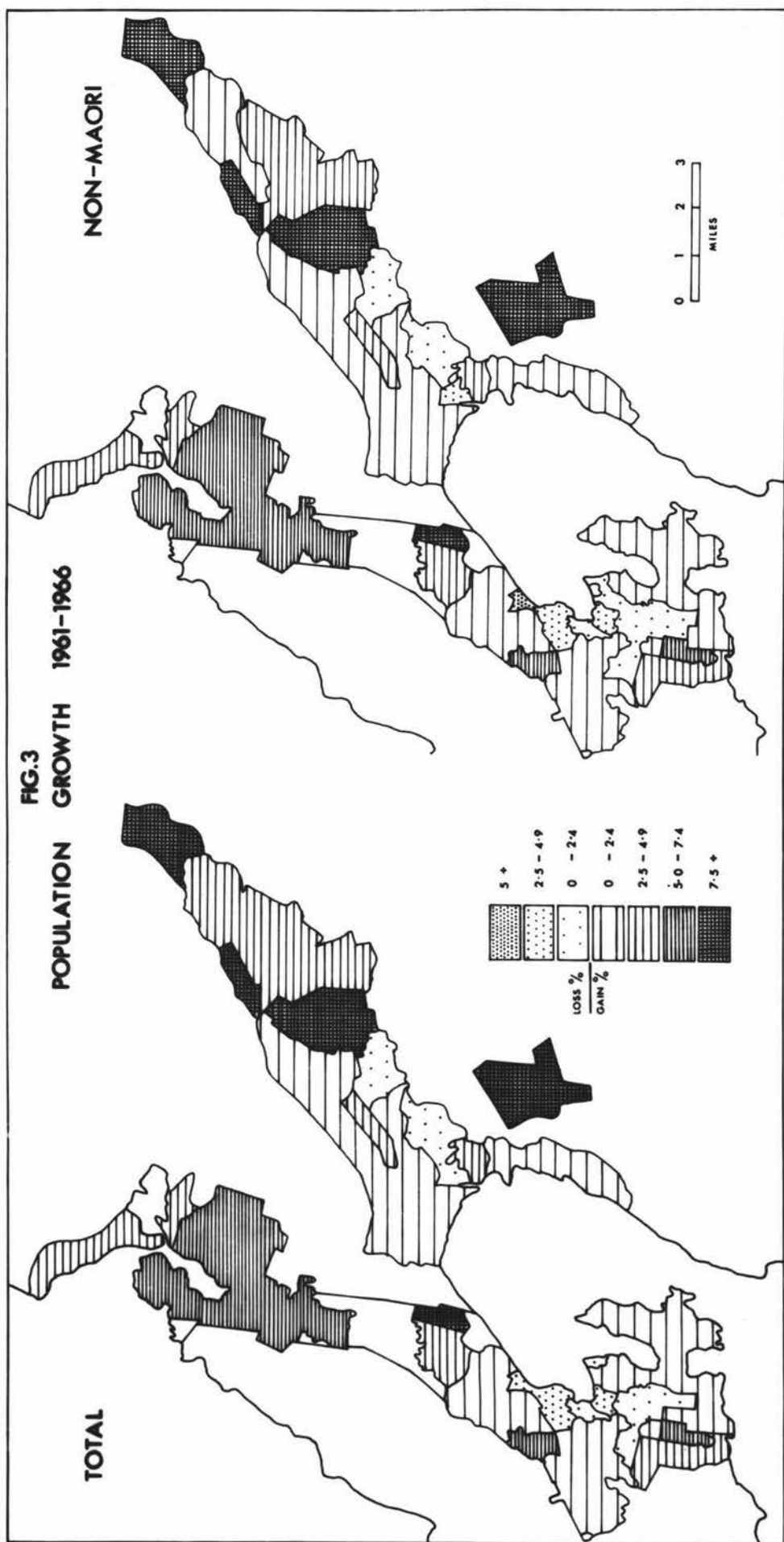
TABLE I: Percentage Distribution of Total Population
in Wellington-Hutt Urban Area 1956 to 1966

Year	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total Pop.
1956	22.04	24.66	18.75	7.42	10.11	16.99	225,279
1961	18.92	23.35	17.41	7.53	11.21	21.54	249,532
1966	16.25	21.80	16.22	8.14	12.20	25.36	282,487

Notes: 1 Figures for table based on 1966 boundaries.

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 1 'Increase and Location of Population'.

These population losses may be attributed to a variety of factors. In the central-city area (especially the area surrounding the central business district) one of the most important factors contributing to declining population numbers has been the encroachment of industrial and commercial enterprises into former residential areas, thus setting in motion a process of industrial or commercial invasion (e.g. Thorndon). Other factors contributing to the dispersal of population from the central-city include the general physical decay of homes, zoning regulations and the (real and/or perceived) inadequacy of flats as places for bringing up young children. Population decline in sub-divisions outside the central-city may be attributed (in part



at least) to the out-migration of young people (either to further their education, to take up employment or as a result of marriage), a movement possibly exceeding general in-migration.

During the second inter-censal period (1961-66) the area involved in depopulation contracted (instead of increasing as it had done since World War II), to cover an area from Kaiwharawhara to Newtown. A return to population increase, albeit small, in Kilbirnie, Lyall Bay and Strathmore was possibly the result of further land sub-division, housing development and the conversion of single residences into flats, factors which proved more than enough to compensate for the concurrent losses incurred (see Figure 3). A number of changes also took place in the pattern of growth in the Hutt Valley. These included (a) Petone returning to an increase in population, (b) Seaview-Gracefield reverting to a moderate increase in place of the substantial decrease for the earlier period, and (c) Naenae joining the group of older sub-divisions on the eastern side of the valley experiencing population decline.

A point worth mentioning at this stage is that the examination of population growth rates at the sub-division level often conceals the fact that while a sub-division as a whole may record an increase or decrease, smaller areas within the sub-division may be at considerable variance with this trend. This situation is most likely to occur in sub-divisions which encompass both areas of recent development and areas which have been long established. For example, while Petone underwent an absolute decrease between 1956 and 1961 (10,374 to 9,891), this decrease was actually confined to the old established area east of the

Western Hutt Motorway (9,386 to 8,863). The area to the west of the motorway (i.e. Korokoro) was undergoing residential development and consequently experienced an increase in population (988 to 1,028). In the Western Hutt sub-division, the population increase recorded was similarly confined to the area west of the motorway (i.e. Maungaraki, Normandale and Belmont), while to the east of the motorway between Alicetown and the Hutt River slight losses were recorded over the period.

Rates of increase varied considerably between the sub-divisions recording positive growth. Areas recording slow rates of growth were of two distinct types. Firstly, those which had been developed for a considerable time, and were therefore mature, stable and with a large female component in late or post child-bearing age groups (e.g. Karori, Haitaitai and Mirimar). Secondly, those sub-divisions at the periphery which had not experienced the 'boom' in housing development and consequent population growth (e.g. Happy Valley-Owhiro Bay and Heretaunga-Pinehaven). Over both inter-censal periods the highest annual rates of growth, for all three population groups examined, were in the peripheral sub-divisions. In the Wellington Urban Area these included Porirua, Tawa, Newlands, Wilton-Otari, and in the Hutt Urban Area, Wainuiomata, Stokes Valley and part of the Hutt County (all with annual rates of increase over 7.5 per cent).

Of the many factors contributing to rapid peripheral growth it has generally been claimed that the technological (in the form of improved transportation services), the economic and the institutional factors have probably been the most important

(McGee, 1969, 151). Most obvious of the institutional factors are the numerous State housing areas throughout the Wellington-Hutt Urban Area. For State housing programmes to be economically viable the land on which they are to be built must (or so it appears) be low priced (thus enforcing a peripheral location), relatively easy to service, and large enough to support a pre-determined minimum number of houses. As a result of these pre-requisites the major areas of State housing over the period have been concentrated in the upper reaches of the Hutt Valley, Stokes Valley, Wainuiomata and the Porirua Basin. Furthermore, a shortage of land available for residential development in the city, together with the lending policy of the State Advances Corporation, has meant that the majority of young people wishing to establish homes have had to do so at the periphery. The influence of the State in encouraging peripheral growth was further enhanced in 1958 when a special rebated interest scheme was introduced so as to further 'assist the younger family man in need of housing'. Where a loan applicant qualified for assistance under the scheme the normal State Advances Corporation lending rate of 5 per cent was rebated to 3 per cent. The fact that until 1964 these 3 per cent loans applied only to new houses meant that the government was virtually forcing young married couples wishing to establish new homes to do so at the periphery.

Maori Population Growth and Distribution 1956-1966

One of the most significant changes that occurred in the Maori population within the Wellington-Hutt Urban Area was the

numerical increase from 3,299 (1.5 per cent of total) in 1956 to 10,500 (3.7 per cent of total) in 1966 (see Table II). While numerically this increase was by no means as great as that experienced in the Auckland Urban Area over the same period (11,361 to 33,922) the magnitude of the increase (approximately threefold) and the factors responsible (low mortality, high fertility and a very high rate of rural-urban migration) were the same.³

Distributional changes were generally similar to those occurring for the total population although two features are worthy of comment. Whereas the total population in the central zone experienced an absolute as well as a proportional decline, the Maori population experienced an absolute increase (906 in 1956 to 2,073 in 1966) but a proportional decline. Moreover, compared with the distribution of the total population, the Maori population was over-represented in the two inner zones, under-represented in the middle zones and over-represented in the two outer zones (Table II).

TABLE II: Percentage Distribution of Maori Population in Wellington-Hutt Urban Area 1956 to 1966

Year	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total Pop.
1956	29.28	12.64	14.09	4.15	11.48	25.52	3,299
1961	28.62	14.01	10.96	4.35	9.18	29.30	5,921
1966	19.72	12.38	8.12	4.20	15.64	36.73	10,500

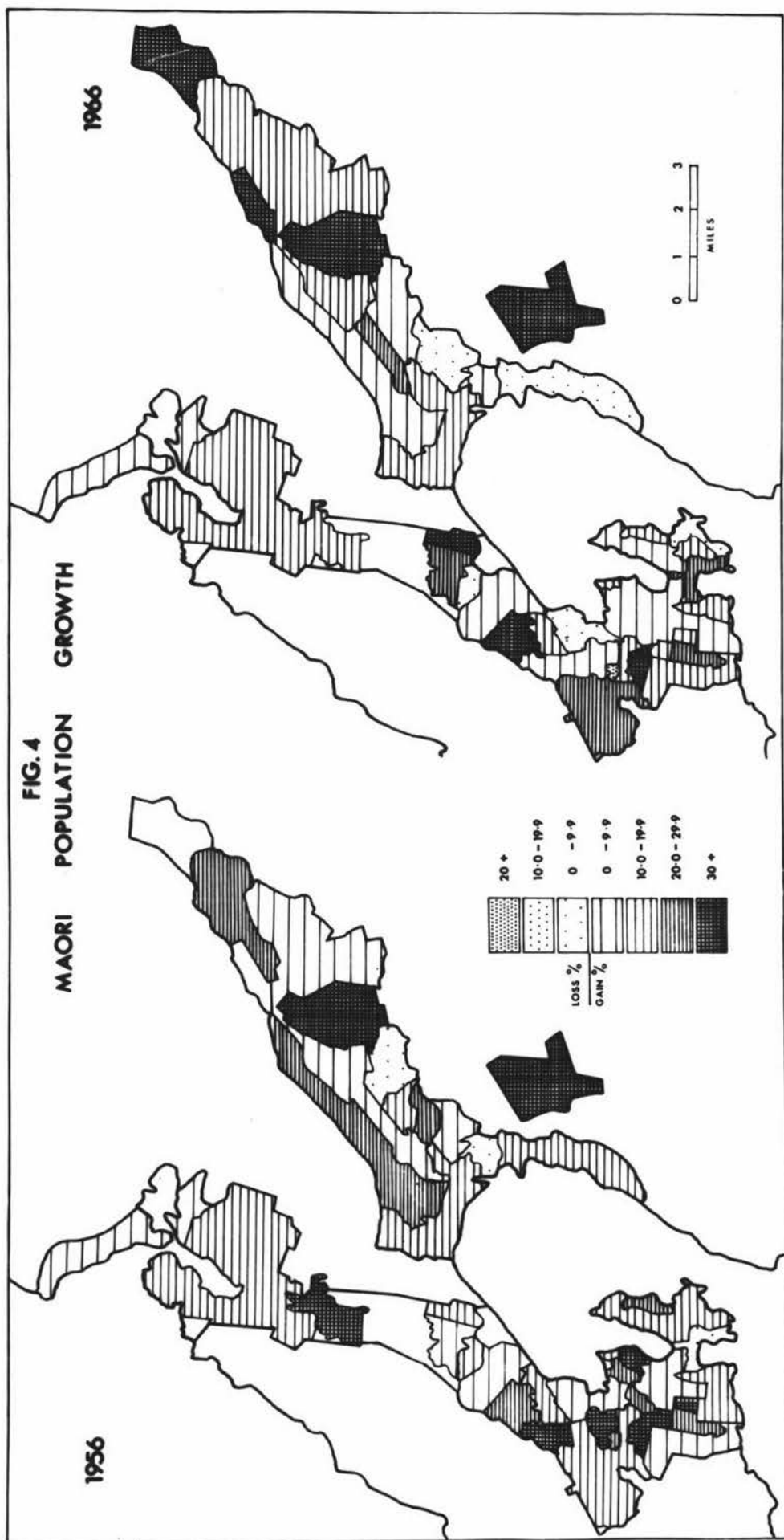
Notes: 1 Figures for table based on 1966 boundaries.

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 8 'Maori Population and Dwellings'.

Distributional disparities similar to the above have also been noted for the Maori population in the Auckland Urban Area (Pool, 1961; Rowlands, 1969; Trlin, 1971a). Two basic factors may be identified to account for this pattern of Maori population distribution in the Wellington-Hutt Urban Area; they are, the availability of old houses for rent in the inner-city and the availability of low cost new houses (mainly State and Department of Maori Affairs) at the periphery.

Average annual rates of increase for the Maori population were often considerably larger than those recorded by the total population. These larger rates of increase may frequently be accounted for by the small base populations in many of the census sub-divisions coupled with comparatively large intercensal numerical increases. These factors are reflected in the haphazard growth rates between 1956 and 1961 (see Figure 4). Between 1961 and 1966 growth rates became more orderly for the Maori population; population losses began to occur in certain of the inner-city divisions, following the trend for the total population (see Table III), and areas experiencing high growth rates were concentrated around the periphery (see Figure 4).

What effect have Maori population growth trends had on total population trends? While the overall effects that Maori population trends had on the total population were small, the areas where they most affected growth rates were in the inner-city and at the urban periphery (see Appendix B for comparison of total, non-Maori and Maori growth rates). As a result of the substantial gains made by the Maori population in the inner-city, non-Maori rates of decline were higher than those experienced by the total



population and at the periphery non-Maori rates of growth were lower than those experienced by the total population due to the very high Maori annual rates of increase (e.g. Stokes Valley and Wainuiomata with annual rates in excess of 40 per cent).

TABLE III: Inner City (Zone 1) Annual Rates of Increase

Sub-Division	Total Population		Non-Maori Population		Maori Population	
	1956-61	1961-66	1956-61	1961-66	1956-61	1961-66
Thorndon - Tinakori Rd	-2.34	-2.68	-2.95	-2.79	9.43	-1.10
Northland	1.43	1.33	1.34	1.27	15.90	6.83
Kelburn	-0.25	1.12	-0.44	1.10	34.49	5.68
Aro St - Nairn St vic.	-1.90	-0.45	-2.62	0.10	12.34	16.40
Mt Cook - Wallace St	-0.53	-0.44	-1.22	-0.85	27.13	6.58
Lampton Quay - Well. Tce	-0.37	-2.30	-0.63	-2.34	8.35	-1.51
Willis St - Cambridge Tce	-5.14	-4.50	-5.34	-4.80	1.60	2.11
Mt Victoria West vic.	-1.11	0.25	-1.37	-0.10	7.89	3.27
Oriental Bay	0.21	1.56	0.27	1.04	5.59	6.67
Petone	0.95	0.50	-1.31	0.09	14.94	10.26

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 1 'Increase and Location of Population'. Volume 8 'Maori Population and Dwellings'.

THE ROLE OF NET MIGRATION - Measurement Problems

One of the major problems associated with studying patterns of internal migration is the accurate measuring of the volume of movement and the demographic characteristics of the migrants. These problems arise largely from a continuing absence of statistics collected specifically for the purpose of migration measurement. Heenan (1968a, 1) has summed up the situation in the following way: 'analysis of actual rather than the inferred role of migration as a force shaping population trends in local communities has been largely precluded by an almost complete absence of readily accessible data directly covering the elements of change'. By comparison with some overseas examples New Zealand census statistics lack the detailed documentation of spatial and demographic components of internal migration and only recently have attempts been made to procure information on migration with reference to the spatial statistical units established in New Zealand.⁴ This has meant, therefore, that research on internal migration has had to rely heavily on source material derived from sample surveys, electoral rolls, Electoral Register records and the use of approximate estimates of net migration derived from either the manipulation of census records, or, alternatively, the use of census records in conjunction with residual procedures making use of vital statistics or life table survival rates.

To date a number of studies using the methods mentioned above have been conducted. Though the majority of these studies (Anderson, 1964; Frazer, 1971; Heenan, 1968a, 1968b; McCaskill, 1964; Moore, 1968; Pool, 1966; Trlin, 1971b) have been concerned

with varying demographic aspects of rural-urban migration, a limited number of studies in which intra-urban population movements form an integral part have been carried out (Aburn, 1971; Clarke, 1970; Fairbairn, 1959; Hunt, 1970; Johnston, 1969; Rowlands, 1969). Research into intra-urban movements as well as being hindered by a lack of readily available statistics, is faced with the additional problem of isolating the intra-urban migrant from other categories (rural-urban, inter-urban) into which migrants might be placed. It is very difficult to isolate the intra-urban migrant without resorting to the use of electoral rolls⁵ or local body/government records of one sort or another (which have serious weaknesses) and large scale questionnaire surveys. Net migration estimates are able to indicate to what extent a particular area has more or less people than might normally be expected, but are unable to indicate the origin or destination of surpluses or deficits, respectively.

The advantages and disadvantages of the various methods available for the calculation of internal net migration statistics, that is, the Vital Statistics method (V.S.), the Life Table Survival Rate method (L.T.S.R.), and the Census Survival Rate method (C.S.R.) have been described by Heenan (1968a) in the introduction to his study on internal net migration in the South Island. In the present study the Life Table Survival Rate method (L.T.S.R.) has been adopted.⁷ While this method has a number of weaknesses it was chosen ahead of the other methods available for reasons pointed out by Heenan (1968a, 15). Estimates yielded by the C.S.R. method tend to vary markedly from those obtained by both the L.T.S.R. method and the V.S. method. Relative to

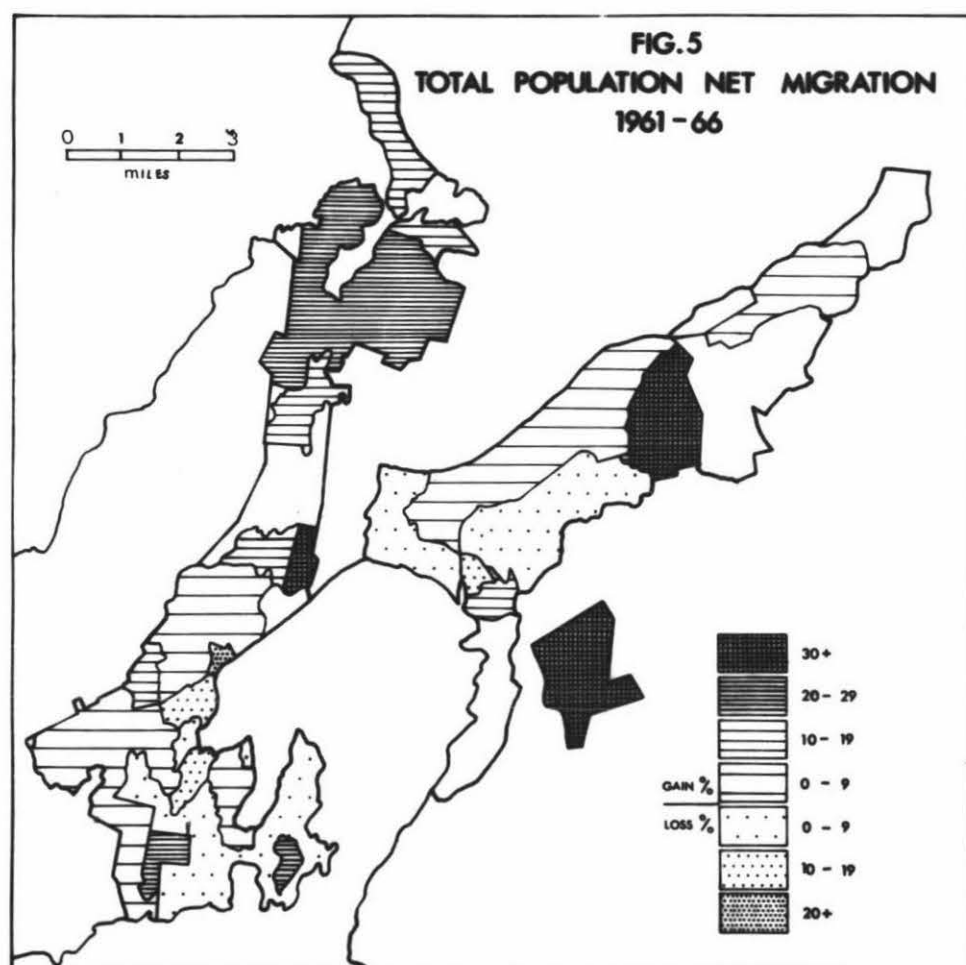
L.T.S.R. estimates, C.S.R. values appear as gross over-statements among certain age groups (e.g. 20-29 years, the most migratory prone age groups) with a pattern of much less pronounced under-estimation in the remaining age groups. Also, if V.S. estimates are assumed to represent the more accurate assessment of net migration experience it would seem that the results yielded by the L.T.S.R. method have greater validity than those provided by the C.S.R. method. It should of course be noted that the base data required for the calculation of V.S. estimates is not available at the level of intra-urban census sub-divisions. Finally, while the exact figures obtained from using the L.T.S.R. method are questionable there is little reason to doubt the facts 'of occurrence, of direction and of relative volume' where migration currents are strongly developed. Conversely, where gains and losses are small they should be seen more as an indication of the unimportance of net migration in total population net change rather than as definite evidence of the size or direction of flow (Heenan, 1968a, 15).

Total Net Migration Patterns 1961-1966

The influence that net internal migration has had on population growth rates has been examined for the second of the two inter-censal periods. While it would have been possible to calculate a survival rate for the 10 year period it was decided to confine the study to the 1961-1966 period for two basic reasons. First, of the two inter-censal periods it could be assumed, given the chronology of peripheral development, that net internal

migration would have played a more significant part in influencing the pattern of growth between 1961 and 1966. Second, in adopting a five year interval only one age group (0-4 years in 1966) could not be quantitatively assessed (see Appendix C). Estimated net migration figures (given the paucity of other data) contribute considerably to a more complete understanding of the overall pattern of intra-urban growth.

Areas experiencing the greatest net migration gains (i.e. estimated net migration expressed as a percentage of the 1961 base population) were the peripheral suburbs of Newlands, Stokes Valley and Wainuiomata (above 30 per cent); all areas which were undergoing extensive housing development (state, group and private) during the early 1960's (see Figure 5). Gains of a slightly lesser magnitude were recorded for Porirua, Berhampore, Strathmore and Mornington (29-29 per cent). These lower percentage gains may be seen largely as a result of their relatively larger 1961 base populations. This latter point can be illustrated via the example of Porirua City which recorded a percentage gain slightly less than other peripheral divisions but numerically its gain was amongst the highest in the Urban Area (1,506 male and 1,625 female in-migrants overall). Census divisions recording moderate gains (10-19 per cent) from in-migration included Paremata-Plimmerton, Tawa, Johnsonville and Wilton-Otari. As was expected the majority of census divisions experiencing net out-migration were located in a belt extending from Kaiwharawhara in the north to Island Bay in the south (approximately the same area experiencing population decline over the period).



In comparing Figure 5 with Figure 3 it appears as though the patterns displayed in a number of divisions are inconsistent. Figure 3 indicates that the area experiencing population decline between 1961 and 1966 extends as far as Newtown whereas Figure 5 shows estimated total net out-migration extends further south and east. An explanation for this apparent inconsistency lies in the volume of net out-migration experienced by the divisions at variance with the overall population trends. In all cases losses are very small, and as Heenan (1968a) has pointed out, when either gains or losses are very small they should be seen more as an indication of the unimportance of net migration as a factor in net change rather than as evidence of either the size or direction of the flow.

Density Patterns (A) Gross Density.

In order to calculate gross densities for each of the census divisions within the Wellington-Hutt Urban Area, maps of sub-enumeration districts⁷ were grouped together to form the census sub-divisions which appear in the published reports and transferred on to maps covering the study area.⁸ The areas of each of the census sub-divisions were then calculated with the aid of a wheeled-planimeter. So as to keep human error to a minimum each of the divisions were measured three times and an average area calculated. As an overall check on the accuracy of this method the areas derived by the planimeter were added together and compared with the appropriate statistics published by the census

reports. The degree of error, overall, amounted to less than 2 per cent (see Appendix D).

Using these gross density figures it was possible to establish a density gradient showing the change in density with increasing distance from the centre of the urban area (see Figure 6). In keeping with the population gradients established for other western cities (Casetti, 1967; Newling, 1964) the inner-zone stood out as an area of relatively high population concentration and tapered off with increasing distance away from the centre. Over the period 1956 to 1966 two major changes were apparent. First, a slight drop in density in the central-zone; a feature consistent with the overall population decline in the inner-city. It should be pointed out that the figures used to construct this and subsequent density gradients were the mean density figures for the respective concentric zones. An indication of the spread above these means is given in Table IV. Second, an increase in density in the outer-zones, resulting from the gradual infilling of new land acquired for the purpose of residential development. While considerable variation is apparent between inner-city and peripheral densities, it must be noted that gross density figures on their own provide little more than a crude index. No account is made of non-residential land (such as that set aside for parks and reserves, industrial land, or land for future development) and as a result gross densities may be misleading and at considerable variance with reality.

TABLE IV: Population Density Variation, Wellington-Hutt
Urban Area, 1966

Zone	Gross Density persons/acre	Std Dev.	Residential Density persons/acre	Std Dev.
1	15.9	8.7	23.60	8.9
2	8.6	4.2	14.9	6.7
3	6.3	2.8	12.9	2.9
4	5.8	2.2	13.2	2.0
5	4.4	0.9	15.2	2.4
6	4.1	3.1	13.3	1.5

Source: New Zealand Census of Population and Dwellings, 1966,
Volume 1 'Increases and Location of Population'.

(B) Residential Density

As a result of the weaknesses inherent in gross density measurements an alternative measure was proposed which would give a more realistic indication of the spatial variation in intra-urban density patterns. This measure involved the delineation and measurement of all areas classified as built-up and distinct from other uses such as recreation, education, or industry. Where land falling within these broad categories lay within areas classified as 'built-up' these combined areas were calculated and subtracted from the 'built-up' area in each of the respective census subdivisions (see Appendix E).

It was realised from the outset that using the 'built-up' area as opposed to the strictly 'residential' area would impose limitations on the accuracy of certain of the densities

recorded. In the majority of census divisions land classified as built-up could readily be equated with residential land. However, in a small number of census divisions, namely, those located at the core of Wellington City and Lower Hutt City, the land classified as 'built-up' but under non-residential uses (e.g. wholesale, commerce, administration) increased to occupy a larger proportion of the census division. Where these larger areas of non-residential land were included, the resulting density figures were slightly lower than expected.

The examination of intra-urban residential density variation was limited to 1966, and based on calculations of the 'built-up' area as at that date. While residential density calculations for 1956 and 1961 using 1966 residential areas would have been permissible for a small number of inner-city census divisions (whose 'built-up' area changed very little over the period), they could not correctly be applied to the remainder. Over the 1956-1966 period the area classified as 'built-up' increased considerably in the majority of census divisions, and consequently if 1966 areas had been applied the figures obtained would have had little real meaning.

From the figures provided it was possible to distinguish a number of zones displaying relatively uniform density patterns (see Figure 7).

1. A zone of relatively low density (10-14 people/acre) in the core area of the central-city.
2. Surrounding the core area and extending south to Newtown

FIG.6 POPULATION GRADIENTS

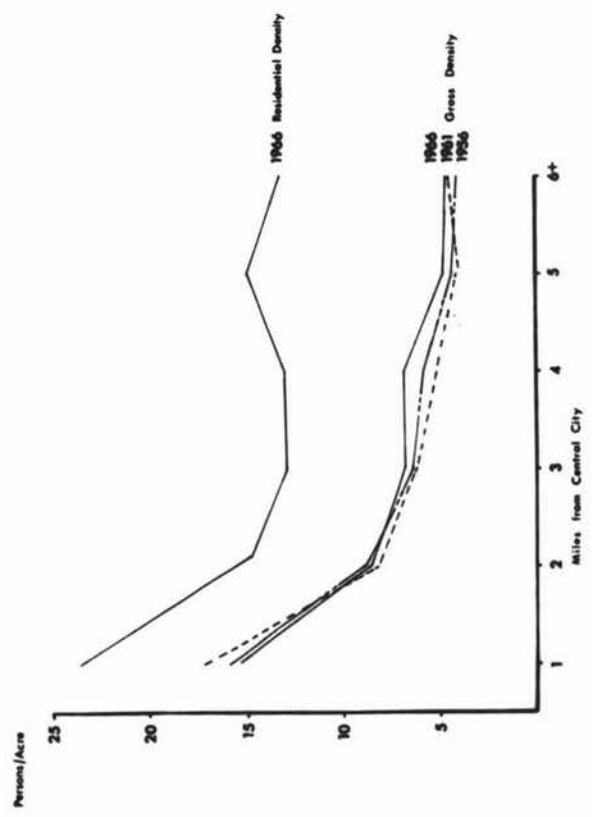
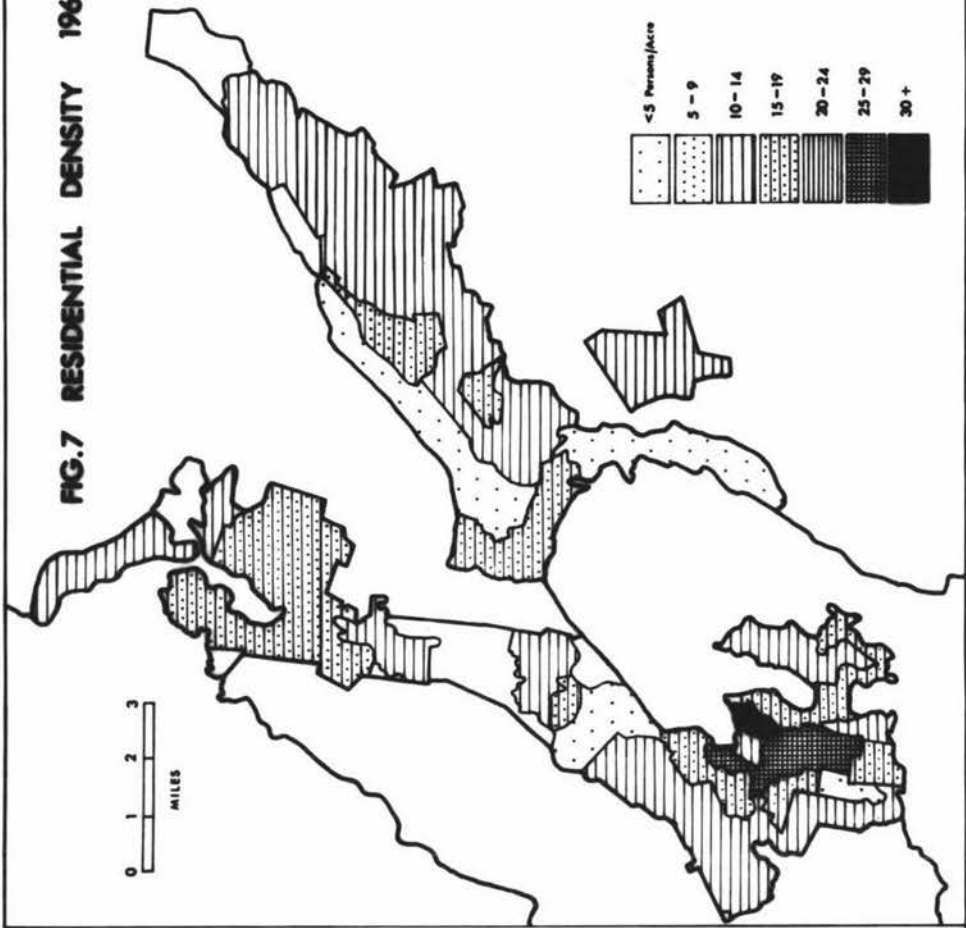


FIG.7 RESIDENTIAL DENSITY 1966



and Berhampore a zone of high density (25 plus people/acre). This relatively high density can be explained by the fact that the majority of inner-city flats, apartments and hostels were located within this zone.

3. A zone of lower density (15-19 people/acre), one section of which extended from Thorndon in the north to Lyall Bay in the south, the other from Roseneath to Seatoun.
4. An outer zone of generally low (but uneven) density extending over the remainder of the urban area.

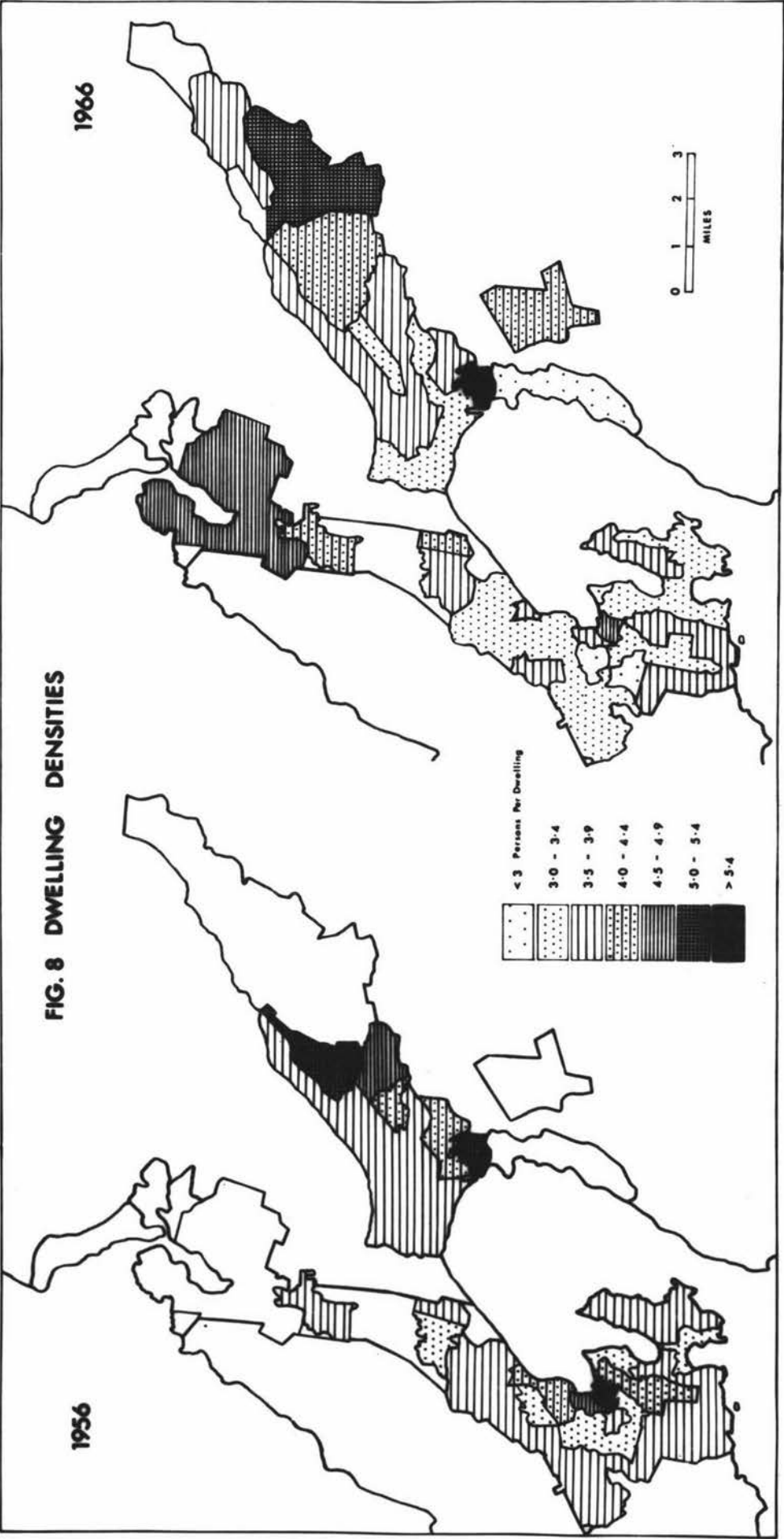
These four zones, generally reflecting the spatial variation in the distribution of population, were similar to those established by Heenan (1962, 54) in his study of intra-urban density variation in Dunedin.

(C) Dwelling Density

While an examination of spatial variation and change in private dwelling densities over the period 1956 to 1966 would have been preferable, the data allowing such an exercise became available for the first time in 1966. This being the case, intra-urban variation and changes in dwelling densities were examined using 'total inhabited dwellings' statistics as provided in the census reports. The densities resulting from the use of these figures (see Appendix F), while practically synonymous with private dwelling densities in residential census divisions, were slightly inflated in the inner-city census divisions which contained a

number of public buildings (hotels, hostels, boarding houses, etc.)
A number of features (evident in Figure 8) are worthy of comment.

1. Over the period the highest dwelling densities were recorded in the inner-city and the newer census divisions at the periphery. High densities in the inner-city can be attributed to the hotels (public and private), hostels and boarding houses within the area, and at the periphery to the recency of residential development coupled with a high proportion of married couples with young families.
2. As a result of a 'cyclical-ageing' process the majority of residential sub-divisions established between 1935 and 1950 (e.g. the middle suburbs of Wellington City and Taita, Naenae and Epuni in the Hutt Valley) have shown a decline in density. 'Cyclical-ageing' is the term used to describe the natural ageing process which occurs within a population. Ageing can occur in two ways; first, as a result of an increase in the proportion of aged persons through declining mortality (ageing at the apex), and second by a decline in the proportion of young persons resulting from declining fertility levels and/or migration (ageing from the base). This process will be elaborated on in a later chapter on age-sex structures.
3. Divisions with the lowest dwelling densities were located in the older and long-established sub-divisions such as Kelburn, Brooklyn, Oriental Bay, Roseneath and Eastbourne Borough. An important factor in this



context is probably the high percentage of households with only one or two members.

Summary

In general the changing patterns of population growth and distribution within the Wellington-Hutt Urban Area 1956-1966, while being influenced to a considerable extent by physical factors (such as the steep terrain and the harbour) were similar to the trends in the other main urban centres. Most significant among the changes which occurred were the decline in the percentage of the population located in the inner-city and the rapid expansion of population at the periphery. Both changes were influenced to a large extent by the patterns of net internal migration which occurred over the period and were also influenced to a considerable degree by the concurrent forces of suburbanisation and government direction and planning. Furthermore, these changes in the distribution of the population had a considerable effect on gross, residential and dwelling density patterns within the area. Overall, gross and residential densities declined in the inner-zones and increased in the outer-zones (trends consistent with the changing distribution of population), and dwelling densities also showed a general tendency to decline especially in the middle-distance sub-divisions (a trend resulting mainly from the 'cyclical-ageing' process).

Patterns of change experienced by the Maori population were generally similar to those experienced by the total

population although, in terms of percentage distribution, the Maori population remained over-represented in the inner-and outer-zones and under-represented in the two middle-zones. Growth rates for the Maori were generally higher than those for the total population (mainly as a result of the smaller base populations) and in a number of inner-city sub-divisions were initially (and in some cases remained) at variance with those of the total population. These variations in the patterns and rates of growth between the Maori and total population can best be explained in terms of the ecological and economic forces in operation within the urban context. Sooner or later urban or prospective urban dwellers are faced with the fundamental decision of where to live. Four of the more important factors determining the choice of housing are (a) price range (normally determined by level of income), (b) type of housing required which is determined by marital status and family size, (c) preferred life style (which limits the range of people acceptable as neighbours) and (d) place of work in relation to place of residence. Initially these factors led the Maori migrant to concentrate in the inner-city. However, as the period progressed the demographic characteristics, and consequently the housing needs of the Maori, changed; inner-city concentrations remained but an increasing proportion were located in private, State and Department of Maori Affairs houses at the periphery.

NOTES

- 1 For an explanation of these measurements refer to Clarke 1965, Chapt. 10.
- 2 Neville was concerned with population changes in Wellington City prior to 1956. Since then the boundary of the city has changed on a number of occasions and consequently the city population has now exceeded the 1945 peak he referred to.
- 3 Due to the range of increase rates it was necessary to devise a broader interval scale for Figure 4. In place of the 2.5 per cent scale used for the total population, an interval scale of 10 per cent was adopted.
- 4 Questions relating to internal migration were asked for the first time in the 1971 Census.
- 5 These have the advantage of providing information on source and destination of both inward and outward migrants. They have the disadvantage, however, of recording only persons 20 years of age and over and can not account for migrants who fail to register on moving to another electorate.
- 6 Net migration estimates using the L.T.S.R. method are calculated using the following equation.

$$Mt = Ac + t - (Ac \times lt)$$

where

$$Mt = \text{net migration during intercensal period 't' years}$$

$$Ac = \text{age cohort 'A' at census 'c'}$$

$$lt = \text{Average life table survival ratio during intercensal period t years}$$

$$Ac + t = \text{Age cohort 'A' at census 'c' + 't' years.}$$
- 7 Sub-enumeration districts are composed of a varying number of 'mesh blocks' - the smallest collective units for which census information is obtained. Sub-enumeration districts are grouped together to form the census divisions which appear in the published census reports.
- 8 Maps published by the Department of Lands and Survey - N.Z.M.S. 17 Wellington 6th edition; N.Z.M.S. 17 Hutt Valley 5th edition and N.Z.M.S. 17 Porirua 4th edition.

CHAPTER 2

DISTRIBUTION OF RACIAL GROUPS

Since the Second World War and especially since the mid-1950's the non-European element of the North Island's urban population has increased considerably, both numerically and as a percentage of the total population.¹ This increase which can be attributed to (a) Maori rural-urban migration, (b) immigration and urban concentration of Pacific Islanders, Chinese and Indians, and (c) high natural rates of increase for each of these groups, has had a considerable effect on the demographic and social character of the larger urban areas of the North Island (especially Auckland, Wellington and Hutt which contain the largest concentrations).

On the basis of studies published over the last decade, two of the most frequently observed urban residential characteristics of non-Europeans have been (a) the initial (and in a number of cases continuing) high concentrations in the inner-city, and (b) the gradual movement of these groups, leap-frogging the older well-established suburbs, to the periphery of the urban area. Numerous studies (Curson, 1968, 1970a, 1970b, 1970c; Hooper, 1961; Pool, 1961, 1966; Rowlands, 1969, 1970a, 1970b; Trlin, 1971a, 1973; Whitelaw, 1971) have demonstrated these two features for Maoris and Pacific Islanders in the Auckland Urban Area, and McGee

(1960) and Taher (1970) have outlined similar patterns of concentration and redistribution for the Indian and Chinese communities in the Wellington Urban Area. Both Curson (1970c) and Trlin (1971a) have illustrated that ethnic and racial minority groups vary considerably in the degree of their residential concentration and in their segregation from each other. Furthermore, it has been shown that the movement (voluntary and forced) of non-Europeans from the inner-city to the outer suburbs has not always resulted in the intended higher level of integration with the larger community. For example, Trlin (1971a) has indicated that the redistribution of Maoris and Pacific Islanders from the inner-city area of Auckland to the peripheral suburbs, the latter characterised by large areas of State and to a lesser degree Department of Maori Affairs housing, has done little towards reducing residential dissimilarity, and in certain areas has resulted in increased residential segregation.

Residential Patterns of Non-Europeans in the Wellington-Hutt Urban Area, 1956 to 1966

The basic objectives of this chapter are: (a) to portray the relative concentrations of non-Europeans in Wellington-Hutt by means of a European/non-European ratio, (b) to outline the concentration (by means of a centrality index) and patterns of intra-urban residential dissimilarity of the four non-European racial groups, and (c) to examine in detail (mesh-block level) the patterns of residential dissimilarity between Maoris and non-Maoris in selected inner-city and peripheral sub-divisions.

The main areas and degrees of non-European concentration are illustrated in Figure 9. Points of interest may be summarised as follows. First, the heaviest concentrations (i.e. more than ten non-Europeans/hundred Europeans) were initially confined to the core area of the central-city. Second, with the proportional and numerical increase in non-Europeans (see Table V) over the decade 1956 to 1966 the number of sub-divisions containing relatively high concentrations increased in the inner-city and also began to appear at the periphery. For example, Porirua and Wainuiomata by 1966 had ratios of 19.33 and 10.83 respectively. The rapid increase in non-European numbers in these two latter sub-divisions can be attributed largely to State housing schemes. Third, over the period 1956 to 1966 there has been a general tendency for the decline in the non-European ratio with distance away from the central-city to decrease, suggesting perhaps an increasing degree of residential integration between non-European groups and the larger community.

Racial Concentration and Segregation

In order to assess the changing residential patterns of the various non-European groups within Wellington-Hutt an index of centrality, defined as the percentage of a particular group living within the central part of the city, was calculated for each of the minority racial groups over three census years. For the purpose of this exercise sub-divisions included within the central-city were those in the technically defined central-zone (see Appendix A) and Newtown. This latter sub-division was

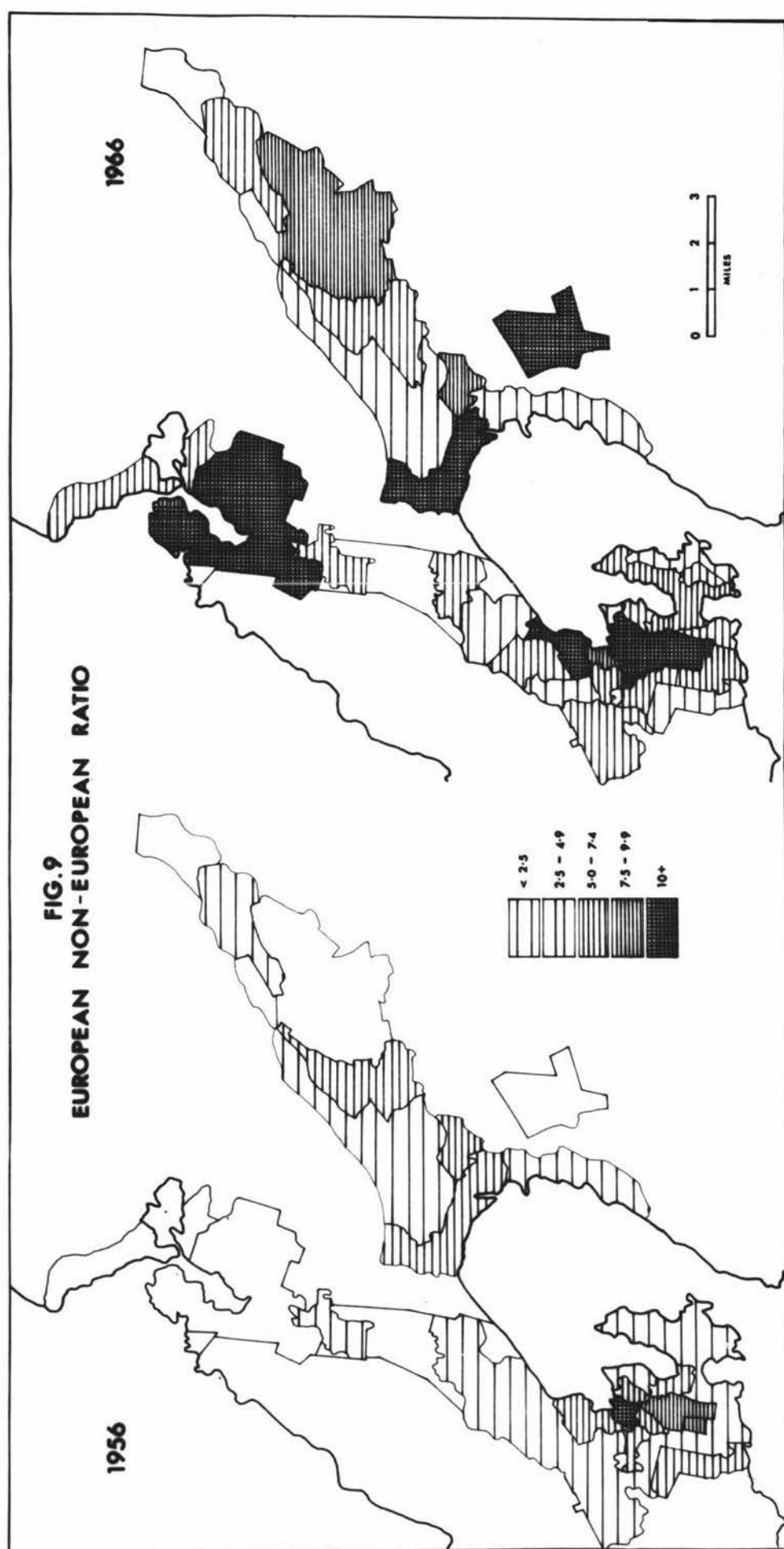


TABLE V: Racial Composition of Population in
Wellington-Hutt Urban Area

Racial Group	1956		1961		1966	
	No.	%	No.	%	No.	%
Europeans	215,956	96.2	235,863	94.5	258,943	91.5
European-Maori Quarter Caste	1,519	0.7	2,501	1.0	3,954	1.4
Maori ($\frac{1}{2}$ Blood-Plus)	3,229	1.4	5,921	2.4	10,500	3.7
Polynesians	1,089	0.5	2,075	0.8	4,262	1.5
Chinese	1,475	0.7	1,773	0.7	2,305	0.8
Indians	690	0.3	856	0.3	1,632	0.6
Other	436	0.2	543	0.2	1,263	0.4
Total	224,394	100.00	249,532	100.00	282,859	100.00

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 7 'Race'.

added because of its general inner-city location and because of the large number of non-European residents it contained. A number of features arise from Table VI and may be summarised as follows.

1. Of the four racial groups the Maori has shown a marked decrease in centrality with a decline from 41.0 per cent to 25.49 per cent over the decade.
2. Both Polynesians and Chinese have also undergone considerable decentralisation with declines of 12.31 per cent (from 50.51 per cent) and 18.08 per cent (from 57.69 per cent) respectively.
3. Indian concentrations have fluctuated; after a decline in

the first inter-censal period from a high 67.39 per cent to 57.59 per cent, the second inter-censal period was marked by an increase (61.53 per cent 1966), largely due to a significant regrouping of numbers in Petone Borough.

4. The significance of the Newtown area as a centre of non-European concentration (especially Indian) can be gauged by comparing the centrality index of zone 1a with that for zone 1b (Table VI). With Newtown included the centrality index for Indians (1966) rose from 39.41 per cent to 61.53 per cent.

While the index of centrality is able to demonstrate changing spatial distributions and the degree of concentration in the central city, it is unable to show the extent to which population movements have resulted in a greater degree of residential integration within the larger urban area. This shortcoming can be resolved by resorting to the Index of Residential Dissimilarity,² which indicates the percentage of one population that would have to redistribute itself in order to achieve the same percentage distribution as another group. Complete dissimilarity (that is, total segregation between the two mutually exclusive population groups being investigated) is denoted by the maximum value of 100 and complete similarity (that is, exactly the same percentage distribution between groups) is denoted by the minimum value of 0.

An Index of Residential Dissimilarity for each of the main racial groups (as compared with Europeans) in the Wellington-Hutt Urban Area is presented in Table VII.³ One of the prerequisites when comparing residential dissimilarity over time is

TABLE VI:

Racial Concentration in the Wellington-Hutt Urban Area

Zone	1956				1961				1966			
	Maori	Poly.	Chinese	Indian	Maori	Poly.	Chinese	Indian	Maori	Poly.	Chinese	Indian
1a	1,059	451	688	254	1,695	666	608	275	2,073	1,035	698	644
1b	1,311	550	851	465	2,079	895	816	493	2,676	1,628	909	1,003
Urban Total	3,185	1,089	1,475	690	5,921	2,075	1,773	856	10,500	4,262	2,295	1,630
Index of Centrality												
1a	33.25	44.41	46.64	36.81	28.63	32.10	34.29	32.13	19.74	24.28	30.41	39.51
1b	41.16	50.51	57.69	67.39	35.11	43.13	46.02	57.59	25.49	38.20	39.61	61.53

Notes: Zone 1a represents the technically defined central zone which includes all sub-divisions located within one mile of the C.B.D.

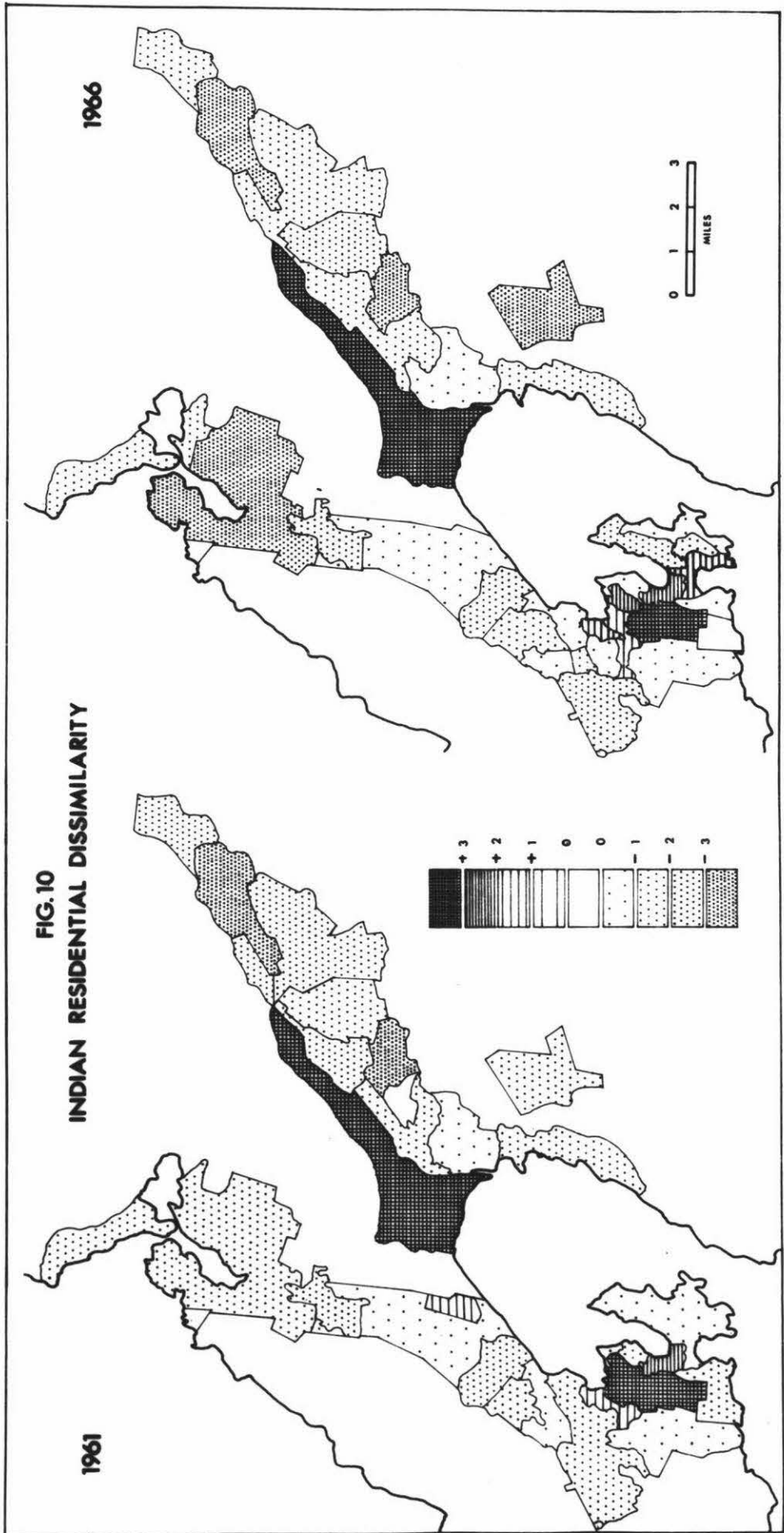
Zone 1b represents the technically defined central zone and the additional inner-city sub-division of Newtown.

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 7 'Race'.

consistency both in the number and size of sub-divisions. For this reason comparison was restricted to the period 1961 to 1966. The main points of interest arising from Table VI may be summarised as follows.

1. All racial groups in the Wellington-Hutt Urban Area, except European-Maori quarter castes, Polynesians (mixed-blood) and Chinese, exhibited increases in residential dissimilarity.
2. The two groups showing the greatest increase in residential dissimilarity were the Maoris (35.67 per cent to 44.67 per cent) and Polynesians (total of full-blood and mixed-blood, 36.33 per cent to 41.76 per cent).
3. For each of the racial groups residential dissimilarity was higher for the full-blood section than for the total group. Trlin (1971a) has suggested that the mixed-blood members of non-European racial groups exert a moderating effect on the degree of residential dissimilarity. In the case of Wellington-Hutt this feature is best exemplified by the Polynesians. Whereas the residential dissimilarity of the full-blood section had increased from 43.62 to 48.10 over the period 1961 to 1966, the mixed-blood group registered a decline from 33.22 to 32.23 per cent.

Figures 10 to 13 illustrate the residential dissimilarity for Indians, Chinese, Polynesians and Maoris within the Wellington-Hutt Urban Area. The maps depict the spatial variation (summarised as the Index of Residential Dissimilarity)



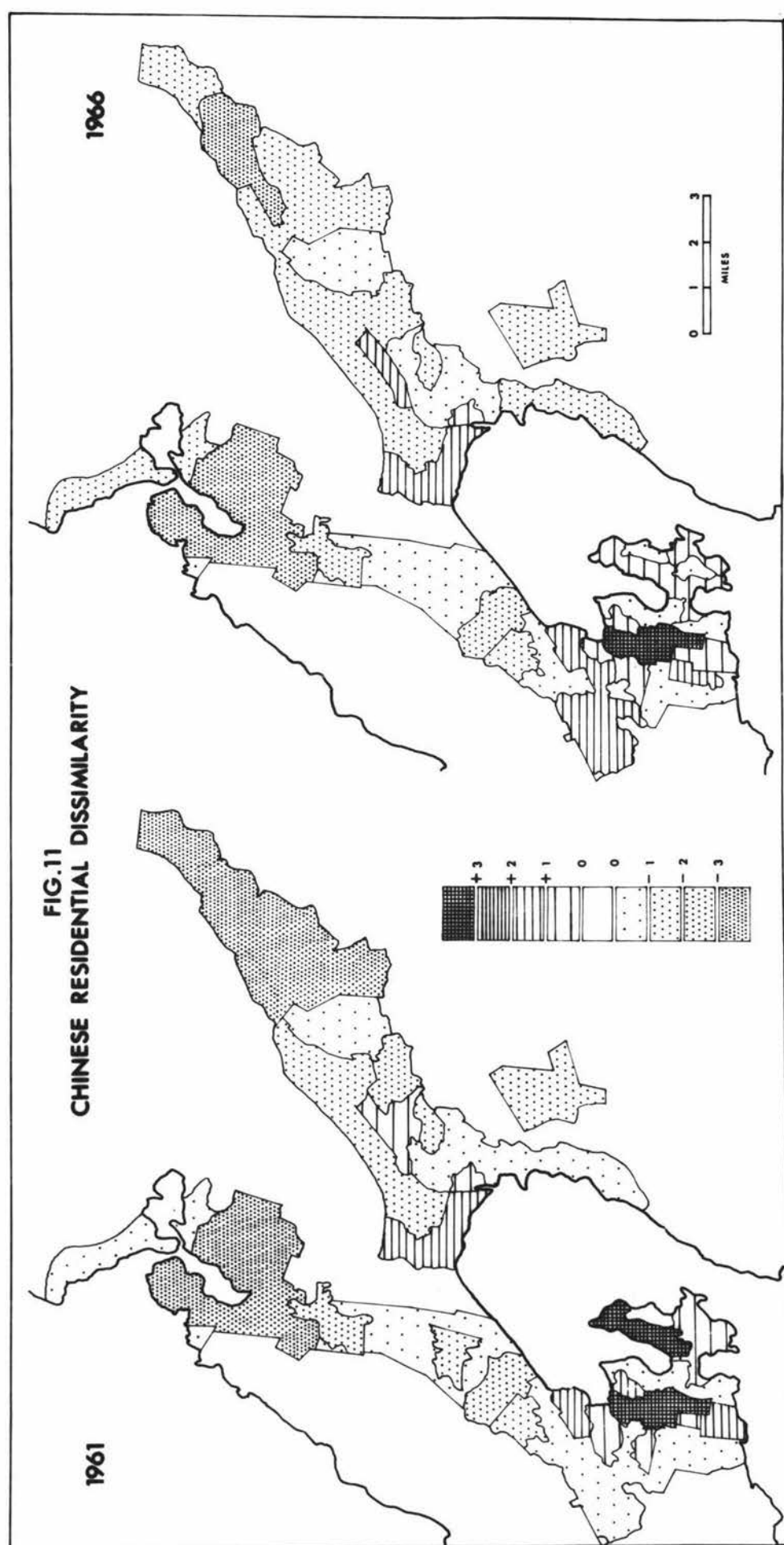
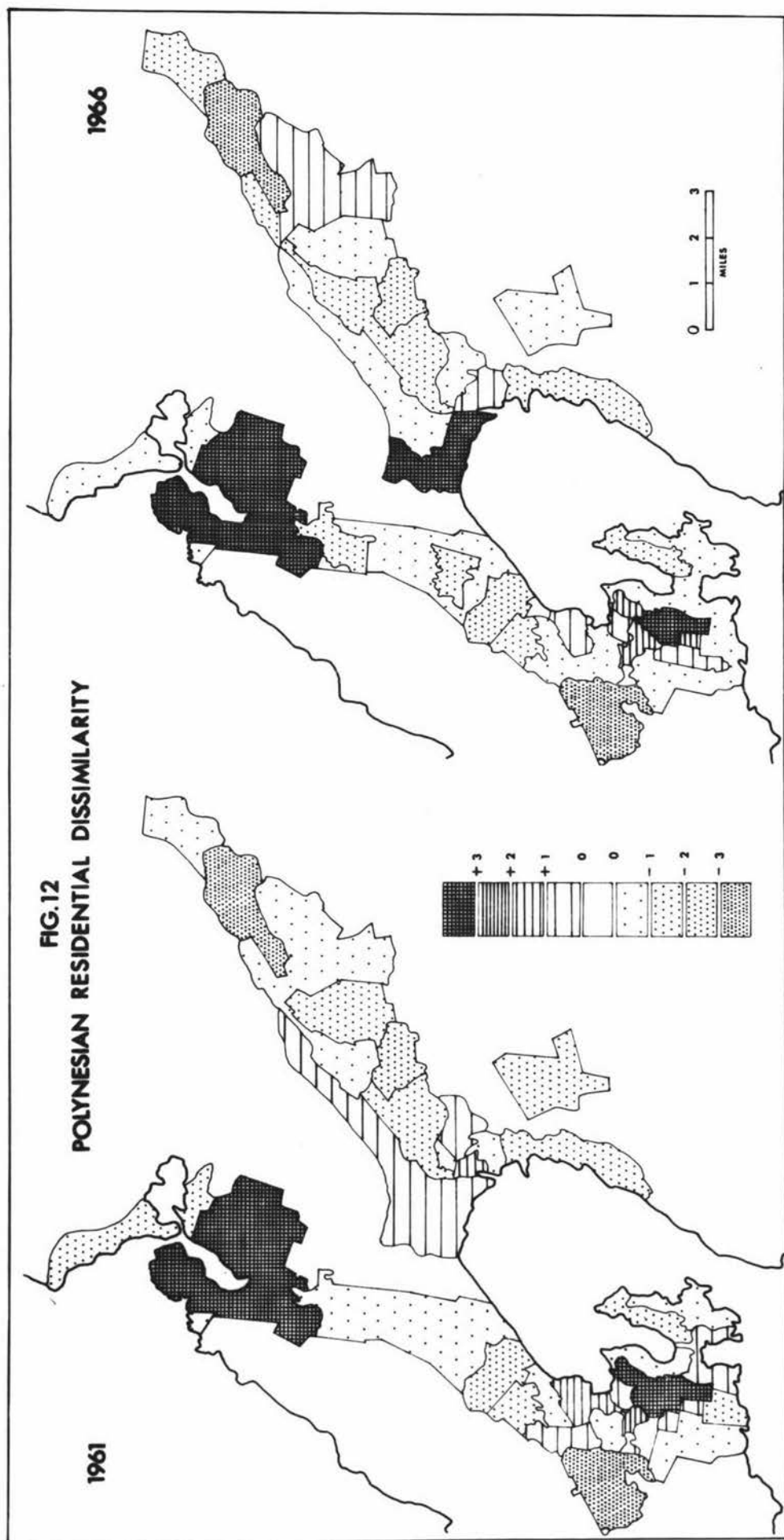


FIG.11
CHINESE RESIDENTIAL DISSIMILARITY



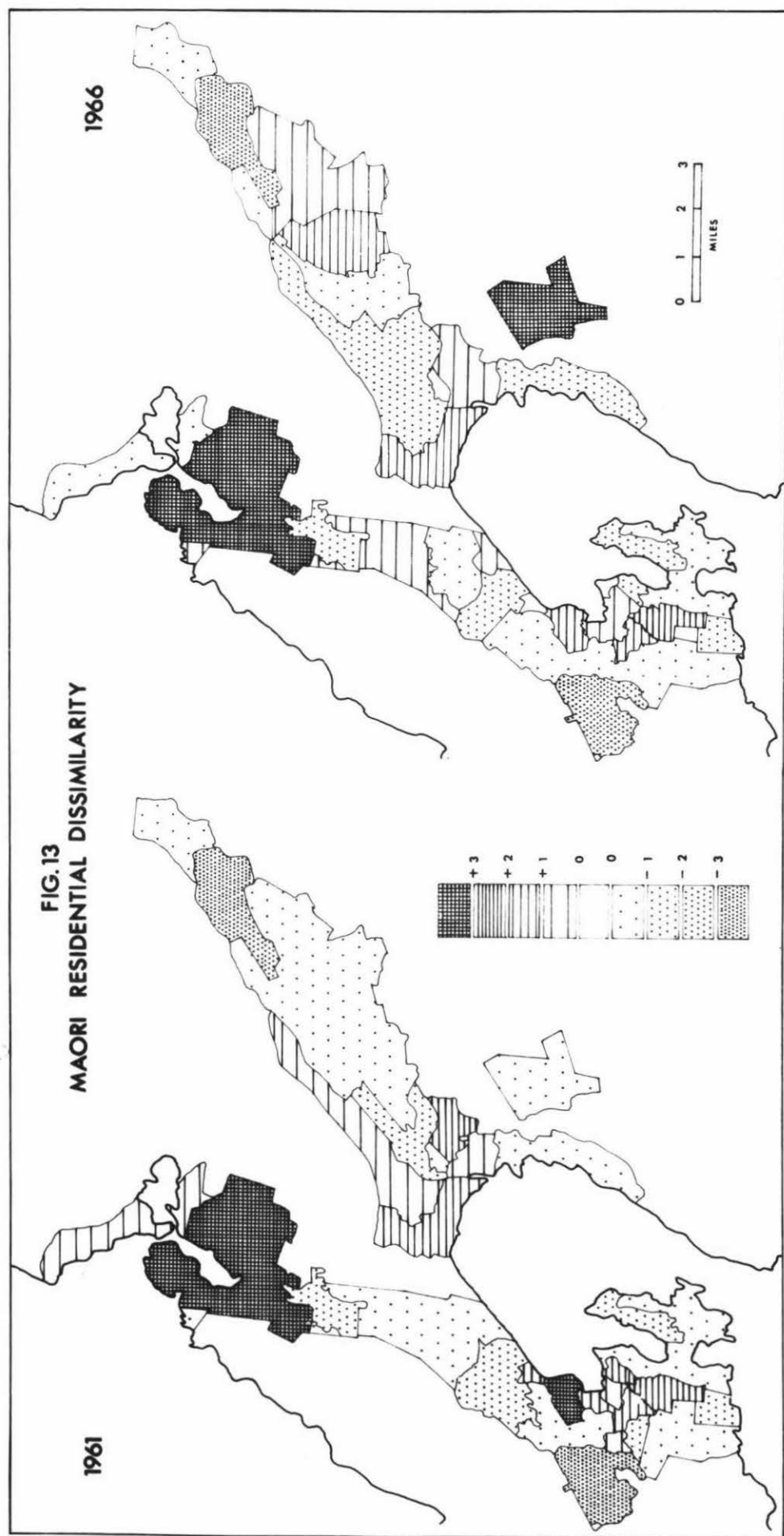


TABLE VII: Residential Dissimilarity of Non-European
Racial Groups in the
Wellington-Hutt Urban Area

Racial Groups	1961	1966
European-Maori Quarter Caste	24.6	23.1
Maori Half Caste Plus	35.7	44.7
Chinese - Total	37.1	34.8
Chinese - Full blood	39.1	36.9
Indian - Total	53.2	57.8
Indian - Full blood	58.7	62.4
Polynesian - Total	36.3	41.8
Polynesian - Full blood	43.6	48.1
Polynesian - Mixed blood	33.2	32.2

Note: Mixed blood in the above table covers admixture with Europeans only.

Source: New Zealand Census of Population and Dwellings, 1961, 1966. Volume 7 'Race'.

in the percentage of one population that would have to redistribute itself in order to achieve the same percentage distribution as another population (in this case European).

Of the four racial groups, the Indian population in Wellington-Hutt has both the highest index of centrality and residential dissimilarity. Over-representation occurs in two distinct parts of the urban area; in the group of inner-city subdivisions extending from Lambton Quay-Wellington Terrace in the north to Newtown in the south, and in Petone and Western Hutt east of the motorway.⁴ Within these two areas the highest concentrations are found in Newtown (over-represented to the extent of 21.60 per

cent in 1961 and 18.87 per cent in 1966). Throughout the rest of the urban area the Indian population is under-represented most significantly in the areas of recent residential development such as Porirua City and Wainuiomata.

The Chinese, with relatively high but declining indexes of centrality and residential dissimilarity display a residential pattern somewhat similar to the Indians. One difference, however, is that in addition to being over-represented in the inner-city (Willis Street-Cambridge Terrace, 7.28 per cent, and Newtown 6.04 per cent in 1966) the Chinese are also over-represented in Miramar (5.68 per cent, 1966), Lyall Bay, Strathmore and Seatoun. Other sub-divisions exhibiting marginal Chinese over-representation (reflecting their wider spatial distribution) include Moera, Epuni and Boulcott Avalon located in the southern portion of the Hutt Valley. Like the Indians, the Chinese are most significantly under-represented in the newer northern residential areas of the Hutt Valley, Porirua City and Wainuiomata.

Maoris and Polynesians, both with relatively high (but declining) indexes of centrality and increasing residential dissimilarity are also over-represented in two distinct areas; the inner-city and certain sub-divisions at the periphery. Both groups are over-represented in the sub-divisions extending from Thorndon-Tinakori Road in the north to Newtown in the south, and also in a band across the southern end of the Hutt Valley. Peripheral over-representation is greatest in Porirua (both groups over-represented by more than 15 per cent in 1966), but is also evident for both groups in Heretaunga-Pinehaven (location of

Police Training School) and for Maoris living in Stokes Valley and Wainuiomata in 1966.

One of the main weaknesses of the Index of Residential Dissimilarity is that it takes into account only the differences in the proportions of groups within each of the sub-divisions in the urban area. Thus while two groups may have similar percentages of their respective populations in a given sub-division, they may in fact be totally or highly segregated from each other. In order to show the existence and extent of intra-sub-division dissimilarity in Wellington-Hutt, six sub-divisions were selected, each with a relatively high proportion of non-Europeans. Three of the sub-divisions are located in the inner-city (Thorndon-Tinakori Road, Newtown and Petone), and three at the periphery (Stokes Valley, Wainuiomata and Porirua). Unfortunately, lack of data on specific racial groups at the mesh-block level meant that residential dissimilarity could only be tested for Maoris as compared with the non-Maori population. Indexes of Residential Dissimilarity for Maoris compared with non-Maoris are presented in Table VIII and the extent of Maori over- and under-representation within each of the sub-divisions is illustrated in Figures 14, 14a and 14b.⁵ As whole units, each of the six sub-divisions portray varying levels of Maori over-representation. When examined in greater detail, however, it was found that over-representation was confined to particular areas (i.e. individual and in some cases clusters of mesh-blocks).

As indicated in Table VIII the degree of separation between Maoris and non-Maoris in the inner-city is very high,

FIG.14
RESIDENTIAL DISSIMILARITY 1966

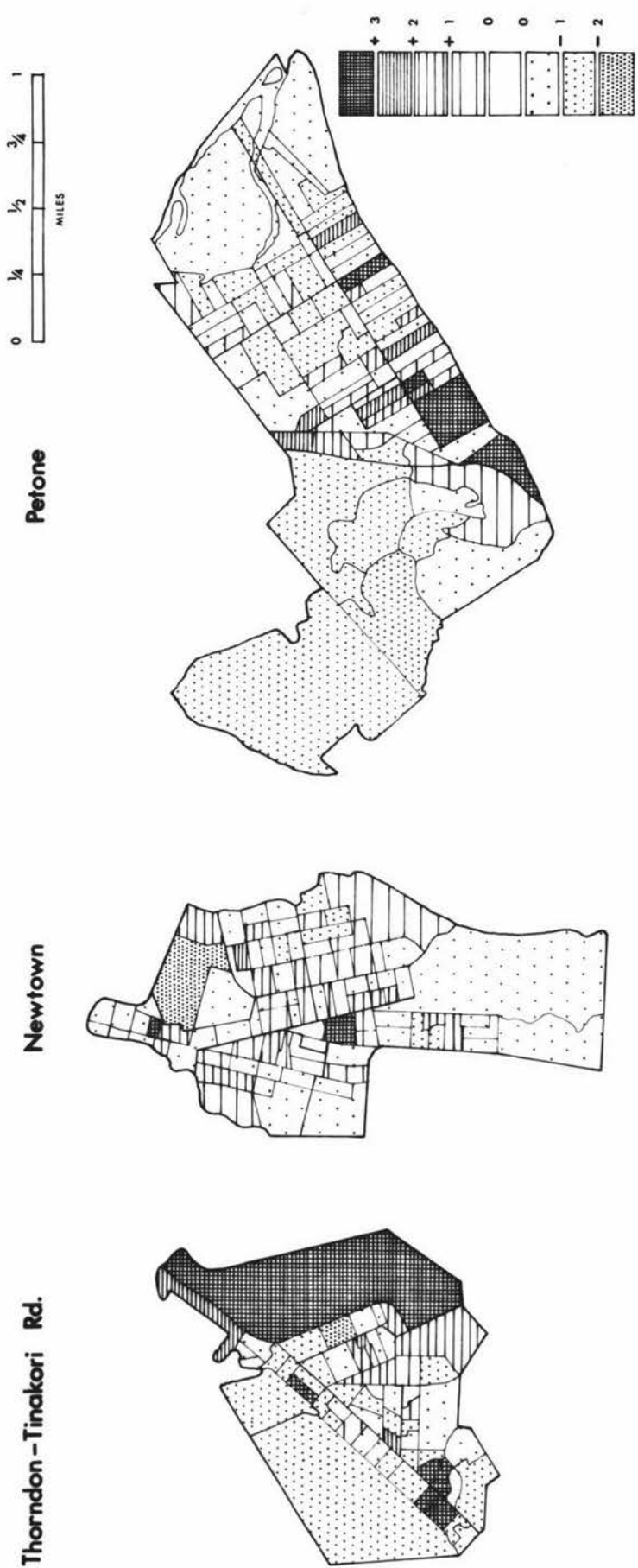


FIG. 14a
RESIDENTIAL DISSIMILARITY 1966

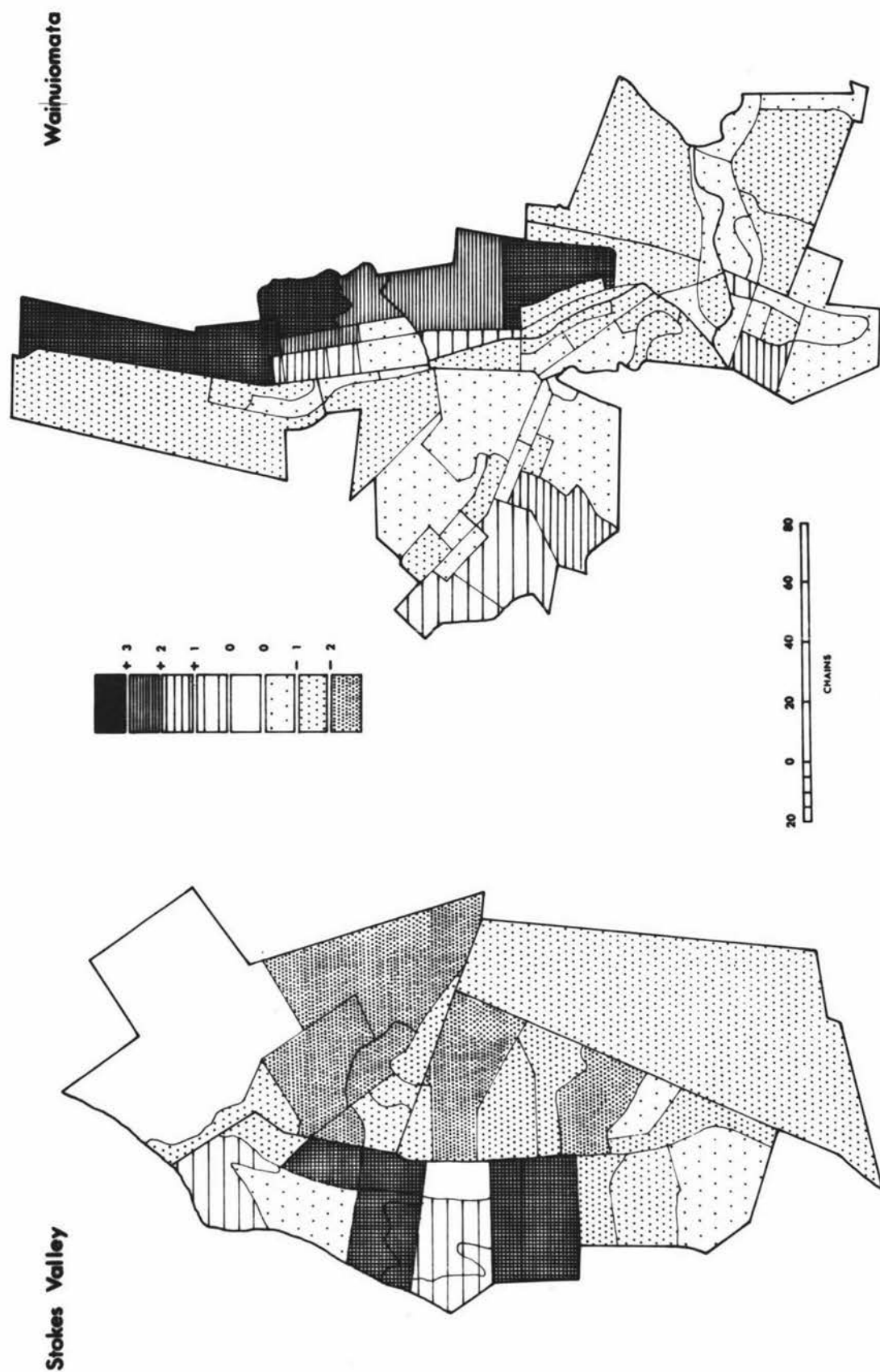
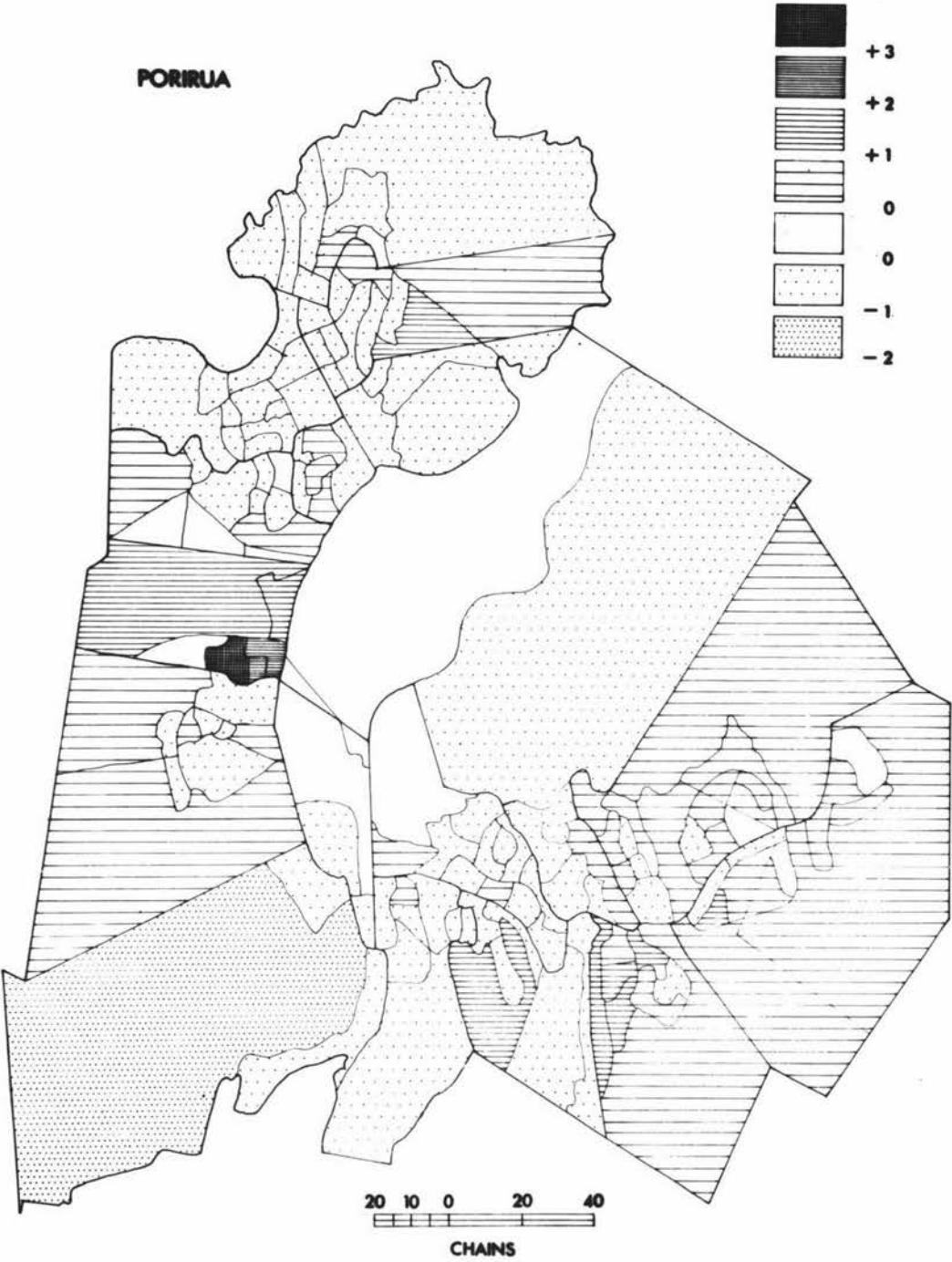


FIG.14b

RESIDENTIAL DISSIMILARITY 1966



especially in Petone and the Thorndon-Tinakori Road area. Maori over-representation is highest at the southern end of Tinakori Road, in central Newtown and the western end of Petone Borough adjacent to the foreshore. Concentrations such as these can be expected in the inner-city largely due to the limited areas in which accommodation is available for rent. At the periphery, however, (especially in Stokes Valley and Wainuiomata) such concentrations are contrary to the official 'pepper-pot' housing policy of the government and have resulted from large areas being devoted to State housing. In most cases the areas of under-representation at the periphery are the older private residential areas established prior to the State housing programmes.

TABLE VIII: Maori/Non-Maori Index of Residential Dissimilarity in Selected Inner-City and Peripheral Sub-divisions, 1966

	Index of Residential Dissimilarity ¹	Residential Dissimilarity ²
A. Inner-City		
Thorndon-Tinakori	49.79	1.82
Newtown	35.45	2.59
Petone	53.68	1.84
B. Periphery		
Stokes Valley	51.77	1.75
Wainuiomata	42.92	5.60
Porirua City	32.43	16.08

Notes: Index of Residential Dissimilarity obtained for each selected sub-division by applying formula to 'mesh-block' totals.

Residential Dissimilarity refers to the difference between the percentage of the total Maori population and the total non-Maori population living in each of the sub-divisions.

Source: New Zealand Census of Population and Dwellings, 1966.
Volume 7 'Race'.

Explanation of Racial Residential Patterns

According to Taher (1970, 55), two opposing sets of factors must be considered in accounting for the spatial distribution of Chinese and Indians in New Zealand's urban areas. First, there are the common social, cultural and economic backgrounds, the recency of arrival and unbalanced sex-ratios, which tend to draw them into the neighbourhood of their own community (e.g. the area between Willis Street-Cambridge Terrace and Newtown), and second, their competing economic activities and occupations which tend to separate them. Most Asians in Wellington-Hutt are involved in similar tertiary industries (e.g. vegetable retailing, laundering) and as a result have tended to select commercial premises far enough away from one another to avoid unnecessary competition. An additional factor in explaining Chinese residential patterns is 'hierarchical attraction'; that is, the aspiration to move from one residential area to another deemed to be of higher residential (social) status.

Maoris and Pacific Islanders, in contrast to the two Asian communities, are markedly over-represented in the outer suburbs. What are the factors responsible for this peripheral concentration? According to a study by Whitelaw (1971) on migration patterns and residential selections of Maoris and Polynesians in the Auckland Urban Area, the key factors contributing to peripheral concentration have been the decentralisation of industry together with the provision of housing either at low rental or (after capitalisation of family benefit) low purchase terms by the State and group housing firms. It would appear that

similar factors are operative in Wellington-Hutt. As well as being located in close proximity to the newer industrial areas of Porirua and Upper Hutt, Maoris and Polynesians are also concentrated in the peripheral suburbs devoted almost exclusively to State housing. Though overlooked by Whitelaw (1971), Trlin (1973) has noted that the presence of a Marae may exert an attracting force, not only for rural-urban migrants, but also for Maoris moving out from the central-city and desiring some form of localised cultural focus. The significance of such an attraction is illustrated in Figure 14b. Maoris are over-represented over the entire township of Takapuwahia (Porirua Pa) and are most concentrated in the area surrounding the meeting house.

From studies conducted initially by Park (1952), and later by Collison (1967), Jones (1967), Lieberman (1963) and Timms (1969) suggestions have been put forward that variations in the degree of residential concentration and spatial distance between two populations act as an index of social distance and differential assimilation. It has also been implied, though not explicitly that physical distance and social distance between groups are mutually reinforcing. More recently Trlin (1971c) has demonstrated the validity of this concept in New Zealand by surveying the attitudes of the host society (via a random sample survey, N=231) to selected immigrant groups (Dutch, Yugoslav, Hungarian, West Samoan and Niuean) in the Auckland Urban Area. Most favoured as neighbours were the Dutch, the group with the lowest Index of Residential Dissimilarity (21.40), and least favoured were the Niueans with the highest Index of Residential Dissimilarity (53.04).

In order to test the suggested relationship between physical and social distance for racial groups in the Wellington-Hutt Urban Area, Indexes of Residential Dissimilarity were examined in the light of attitudes held by the host society towards each of the racial groups. This exercise was made possible by the availability of results from a survey utilising the Bogardus Social Distance Scale, which measures the closeness of contact people claim they are prepared to make with different racial or immigrant groups. The survey was conducted in 1964 and consisted of a random sample survey (N=239) of persons between the ages of 20 and 30 years in the Wellington area. The object of the survey was to test the attitudes of the host society to different immigrant groups.⁶

While Table IX indicates a fair degree of racial tolerance, in that more than half of the respondents were prepared to accept any immigrant group as marriage partners or close friends, the results also show that the highest preferences for close social contact are for people of West European origin and the lowest for Asians (Indians in particular). When these preferences are compared with Indexes of Residential Dissimilarity for each of the racial groups at census dates before (1961) and after (1966) the survey date an interesting feature emerges. In 1961 the most and least preferred racial groups on the Bogardus Social Distance Scale, Maoris and Indians respectively, correlated perfectly with their ranking on the Index of Residential Dissimilarity. By 1966, however, this ranking had changed. The most preferred of the four racial groups under consideration (Maori), as a result of continuing concentration in certain peripheral areas, had increased

TABLE IX:

Residential Dissimilarity and Social Distance Scaling (Bogardus)
of Selected Ethnic Groups

Groups	Residential Dissimilarity		Social Distance Scale 1964							
	1961	1966	Marriage	Close Friend	Workmate	Neighbour	Casual Friend	Outside- Neighbourhood	Keep out N.Z.	Don't Know
Scots	-	-	82.0	8.7	2.9	0.4	2.9	-	-	2.5
Dutch	-	-	66.5	14.6	6.6	0.8	3.8	0.4	0.8	5.8
Maoris	35.67	44.67	53.5	27.6	8.4	0.8	4.6	0.4	0.4	3.8
Italians	-	-	44.3	19.2	6.7	2.5	11.3	2.5	3.3	9.2
Pacific Islanders	36.33	41.76	30.96	27.2	10.5	3.2	10.9	2.5	3.3	10.9
Chinese	37.14	34.85	28.9	31.8	7.1	3.8	10.9	2.5	5.8	8.8
Indonesians	-	-	28.4	21.7	7.5	2.1	12.1	5.0	11.3	11.3
Indians	53.21	57.78	22.2	27.6	9.62	2.9	15.1	5.4	4.6	12.1

Source: Social Distance Scale adapted from table of survey results included in O'Grady (1970).

its Index of Residential Dissimilarity to rank next to the least preferred (Indian) group. On the one hand it would appear as though government social planning (i.e. the relocation and settlement of Maoris in peripheral State housing areas) has done little towards integrating the Maori into the larger community. On the other hand, however, it could also be argued that by concentrating the Maori population at the periphery the government has attempted to locate them among residents of a similar socio-economic level and has thus increased the opportunities for immediate social interaction.

Summary

As a result of Maori rural-urban migration, immigration of Pacific Islanders, Chinese and Indians, and the natural increase experienced by each of these groups, the non-European population has increased considerably, both numerically and as a percentage of the total population. With these increases in mind, the purpose of this chapter has been to examine and explain the changing residential patterns of minority racial groups in the Wellington-Hutt Urban Area.

Non-Europeans in Wellington-Hutt, like their counterparts in Auckland and in urban centres in the United Kingdom and United States, have tended to reside (initially at least) in the inner-city. With time, however, and in response to a variety of factors each group has undergone a process of redistribution. Two distinct patterns are discernable. First, redistribution within

the inner-city and inner suburbs by Chinese and Indians, and second, redistribution from the inner-city to selected peripheral suburbs by Maoris and Polynesians. As has been shown at both the sub-division and mesh block level, redistribution has not always resulted in more racially integrated communities. In fact, the redistribution of Maoris and Polynesians, associated in part with a movement of established residents from the inner-city into peripheral housing estates provided mainly by the State, has resulted in increased segregation from the larger community. Only the Chinese, whose movements have been largely independent of government, have shown signs of increased residential integration. In the first chapter the significance of changing residential patterns of the total and Maori population were reflected in the rapid annual growth rates at the periphery. These growth rates have also influenced other population characteristics such as age-sex structures and fertility patterns and will be examined in the following chapters.

NOTES

- 1 For the purpose of this study 'non-European' refers to four minority racial groups; Maoris, Polynesians, Chinese and Indians.
- 2 Index of Residential Dissimilarity formula is:

$$\frac{1}{2} \sum |X_1 - Y_1|$$
 where $|X_1 - Y_1|$ is the absolute difference between the percentage of group X and group Y living in the same sub-division, the summation being over all sub-divisions.
- 3 The writer is indebted to A.D. Trlin for providing statistics for each of the main racial groups for 1961 and 1966.
- 4 It should be pointed out that over-representation within Petone and Western Hutt (which both include a considerable area of recent residential development) by the various racial groups is confined mainly to the older areas east of the Western Hutt Motorway.
- 4 Figures 14, 14a and 14b were produced from unpublished mesh-block statistics held by the Department of Statistics, Population Branch, Lower Hutt.
- 6 The 1964 survey commissioned by the National Council of Churches was conducted with the help of Dr J.H. Robb, Professor of Sociology at Victoria University, Wellington. The Tabulation of results presented in Table IX is based on a tabulation of results presented by Rev. R.M. O'Grady in a paper entitled 'The Acceptability of Migrants to the New Zealand Community', prepared for the Inter-Church Committee on Immigration, National Council of Churches in New Zealand, Christchurch, May 1970.

CHAPTER 3

AGE-SEX CHARACTERISTICS

In studies dealing with demographic change an examination of age-sex structures and their spatial variation is pertinent for two basic reasons. First, they reflect the relative importance of the three forces responsible for change (i.e. fertility, mortality and migration). Second, they form the basis for planning, indicating the likely needs and spatial organisation of the community at large. The basic aims of this chapter are, therefore, as follows:

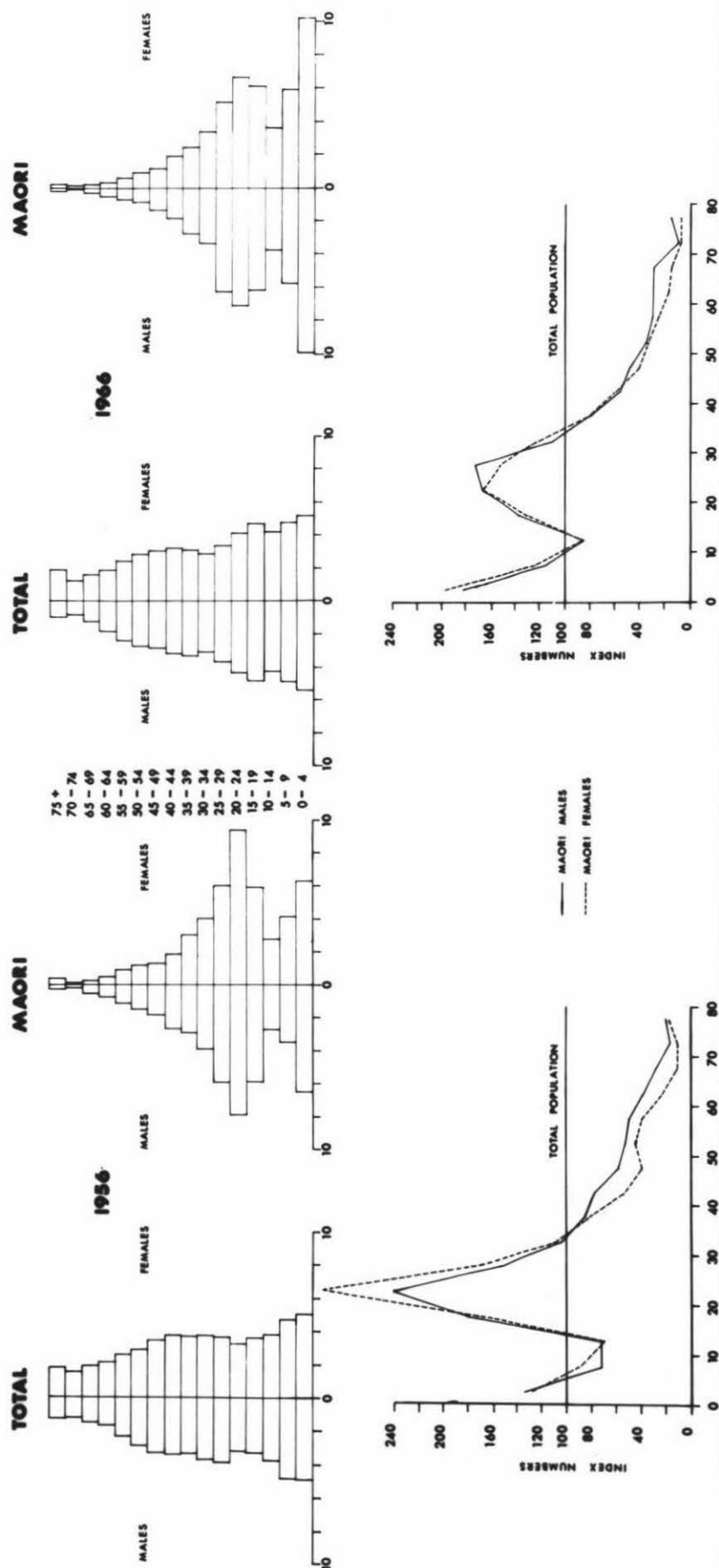
1. To illustrate the range of census sub-division age structures within Wellington-Hutt and the changes occurring in age structures over the period 1956-1966.
2. To describe and explain (a) the spatial distribution of age structures, and (b) the variation which exists between the total and the Maori population.
3. To examine the effect of age-specific net migration on age structures.
4. To quantify observed changes in age-sex distributions by means of various derived indices (e.g. dependency ratio, index of ageing and sex ratio).

Over the ten year period 1956 to 1966 total and Maori population numbers in Wellington-Hutt increased from 224,350 to 282,487 (21.40 per cent) and from 3,229 to 10,500 (225.10 per cent), respectively. The varying effects of these increases on the age structures of the two population groups are illustrated in Figure 15. While the 'mature' age-sex structure of the total population changed very little over the period (slight ageing evident), that of the Maori underwent considerable change.

In 1956 the Maori population of Wellington-Hutt (like that of the Auckland Urban Area) was characterised by a bi-modal age distribution with the highest frequencies occurring in the 0-4 and 20-24 age groups. By 1966 the same basic structure was still discernable although the proportion of children in the 0-4 age group had increased considerably from 12.89 per cent to 20.16 per cent. This change was the result of both an increase in the contribution of fertility in Maori urban population growth and an increase in the number of children in the migration stream (Rowland, 1970).

When the age structure of Maoris in Wellington-Hutt was compared with that of Maoris in Auckland, it was found that the Maori population in Wellington-Hutt was slightly older. For example, whereas 48.0 per cent of Auckland's Maori population were under 15 years of age in 1966, the corresponding figure for Wellington-Hutt was 39.0 per cent. Furthermore, in contrast to Auckland's 1966 Maori population profile which tapered progressively through each older age group, 'under-cutting' or a 'waisted effect' (especially in the 10-14 age group) was still evident in Wellington-Hutt.

FIG.15 COMPARISON OF MAORI AND TOTAL
POPULATION AGE STRUCTURES



The changing age structure of the Maori population in relation to the total population is illustrated by means of two divergence graphs; the proportion of the total population in each age group is given as the base 100. In 1956 the most significant feature of the Maori population, resulting from rural-urban migration, was the relative excess in the 20-24 year age group (241 per cent males, 298 per cent females). Except for the broad 'migrant' age group (15-34 years) and children 0-4 years, all other age groups displayed relative deficits which progressively increased towards the older age groups. As a reflection of both increasing fertility and an increasing youthfulness of Maori rural-urban migration, the relative excess in the migrant age group had decreased by 1966 and the excess of Maori children 0-4 years, had increased (see Figure 15).

Brief Review of Intra-Urban Age-Sex Literature

While the overall age structures of the total and Maori populations of Wellington-Hutt are respectively 'mature' and 'youthful' in character they are far from being representative of the structures found in sub-divisions throughout the urban area. Intra-urban age-sex patterns have been shown to vary in response to a variety of factors. Studies conducted initially in the United States by urban ecologists (Park, Burgess, McKenzie, 1925) and later by Schmid (1968), Newcomb (1961) and Coulson (1968) have demonstrated the dramatic changes which occur in age structures as distance from the centre of the city increases.

Jones (1960) has also demonstrated this feature for Belfast, highlighting the variation in age structures between protestant and catholic districts, between areas devoted primarily to industrial and residential use and between residential areas of varying ages.

In studies such as the above, age-sex structures have been taken as being indicative of a range of social and economic characteristics. Generally, as distance from the central-city increases age structures pass from one end of a continuum to the other (i.e. from 'senile' to 'youthful' in character). In response to changes both in the age and type of housing available with distance away from the central-city, unbalanced inner-city structures containing few children normally give way to structures which are more balanced and contain an increasing proportion of young families.

From the chronology of research undertaken in New Zealand it would appear that Franklin's studies (1956, 1958), illustrating and explaining regional variations in sex ratios and age-sex structures in terms of residential location, economic activities and differential sex migration patterns, provided the initial impetus for research in this field. Age-sex studies which have followed (Bowman, 1969; Curson, 1967a, 1967b; Franklin, Gibson, Treeby, 1963; Heenan, 1962, 1965; Neville, 1959, 1960; Pool, 1961; Rowland, 1969, 1970; Trlin, 1971c) have directed their attention to describing and accounting for (a) the spatial patterns occurring at a particular point in time and (b) changing patterns over a given period.

Within the context of New Zealand intra-urban studies, age-sex patterns for the total population have tended to follow the spatial patterns established in both the United States and the United Kingdom (i.e. unbalanced structures with few children in the central-city becoming more balanced with larger proportions of children as distance from the centre increases). The spatial distribution of Maori age structures, on the other hand, differs considerably from the patterns established by studies conducted overseas for visible minority groups. As a result of the New Zealand Government's social planning programme, young married Maori couples with children are now concentrated at the periphery of the urban area (Rowland, 1970) thus providing a significant contrast with the inner-city concentrations of first and second generation visible minority groups in both the United States and United Kingdom.

Methods of Age-Sex Analysis

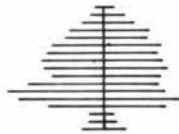
Two of the most widely used techniques for the analysis of age-sex structures have been the age-sex pyramid and the deviation graph. While these two techniques have the advantage of presenting the information graphically (see Figure 15) they do not readily lend themselves to the comparison of a large number of structures. Nor do they express variations in structures in quantitative terms. Comparison of a large number of structures is made possible by summarising the information contained in the pyramid down to a single point on a tri-graph. In place of the quinquennial age groups found in the population pyramid,

information is reduced to three broad age categories (0-14 years, 15-64 years, 65 years and over). The population percentages for each of these three age categories are then plotted on the graph, the sides of which are (normally) divided into one hundred units. Moving in an anti-clockwise direction, the percentage under 15 years is plotted along the base of the tri-graph, the 15-64 age group on the right hand side and the 65 plus age group on the left hand side of the graph. The point of inter-section of the three percentages on the tri-graph represents the summation of a given age structure, providing an index point for comparison with other independent age structures.

In order to illustrate the range of census sub-division age structures, data for each of the sub-divisions (1956, 1961 and 1966) was converted into percentages which expressed the proportion of the population within the age groups 0-14 years, 15-64 years and 65 plus years. Following the example of previous studies (Franklin, Gibson, Treeby, 1963; Curson, 1967b) the percentages were then plotted on a tri-graph. By this procedure it was possible to identify (as clusters on the tri-graph) eight structural types - 'senile', 'old', 'late-mature', 'mature', 'early-mature', 'transitional', 'late youth', and 'youth' - for each of the census years (see Figures 16 and 17). Where sub-divisions were located in close proximity to each other, such as at the peripheries of adjacent clusters, the actual groups in which the respective sub-divisions were located were determined by their location on the tri-graph in respect to certain pre-determined boundaries. One of the main problems encountered with this arbitrary system of classification was that where boundaries

FIG.16
TOTAL POPULATION AGE STRUCTURES 1956

SENILE - 23
LAMBTON QUAY



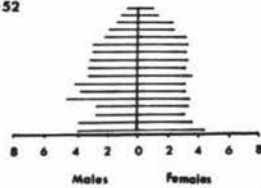
OLD - 22
THORNDON



LATE MATURE - 38
KELBURN



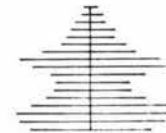
MATURE - 52
KILBURNIE



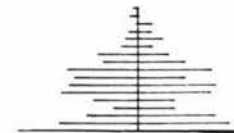
EARLY MATURE - 13
PETONE



TRANSITIONAL - 5
EPUNI



LATE YOUTH - 35
WILTON - OTARI



YOUTH - 2
TAITA

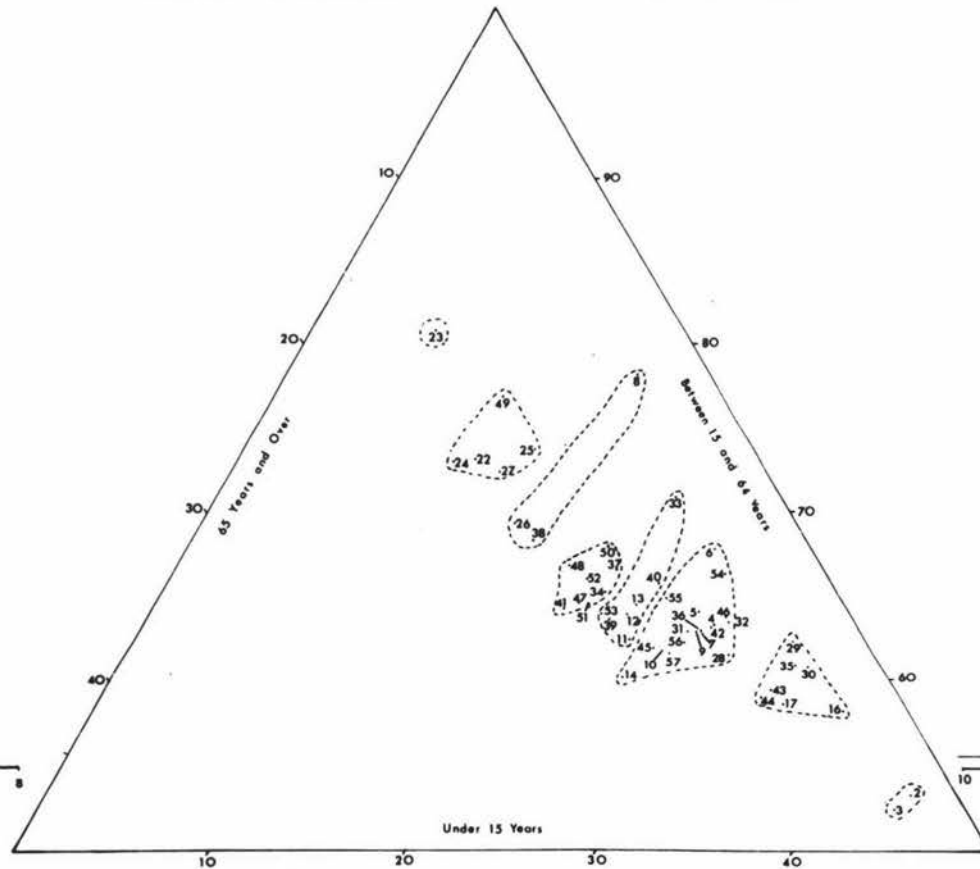
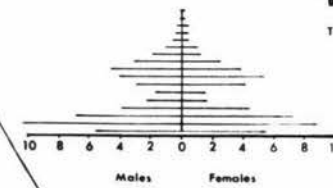
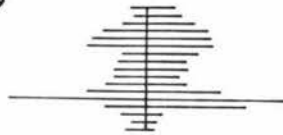


FIG. 17
TOTAL POPULATION AGE STRUCTURES 1966

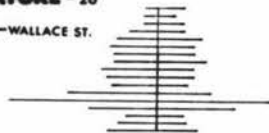
SENILE - 49
ORIENTAL BAY



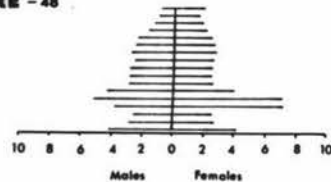
OLD - 24
WILLIS ST - CAMBRIDGE TCE.



LATE MATURE - 26
MOUNT COOK - WALLACE ST.



MATURE - 48
NEWTOWN



EARLY MATURE - 31
KHANDALLAH - NAIRNVILLE



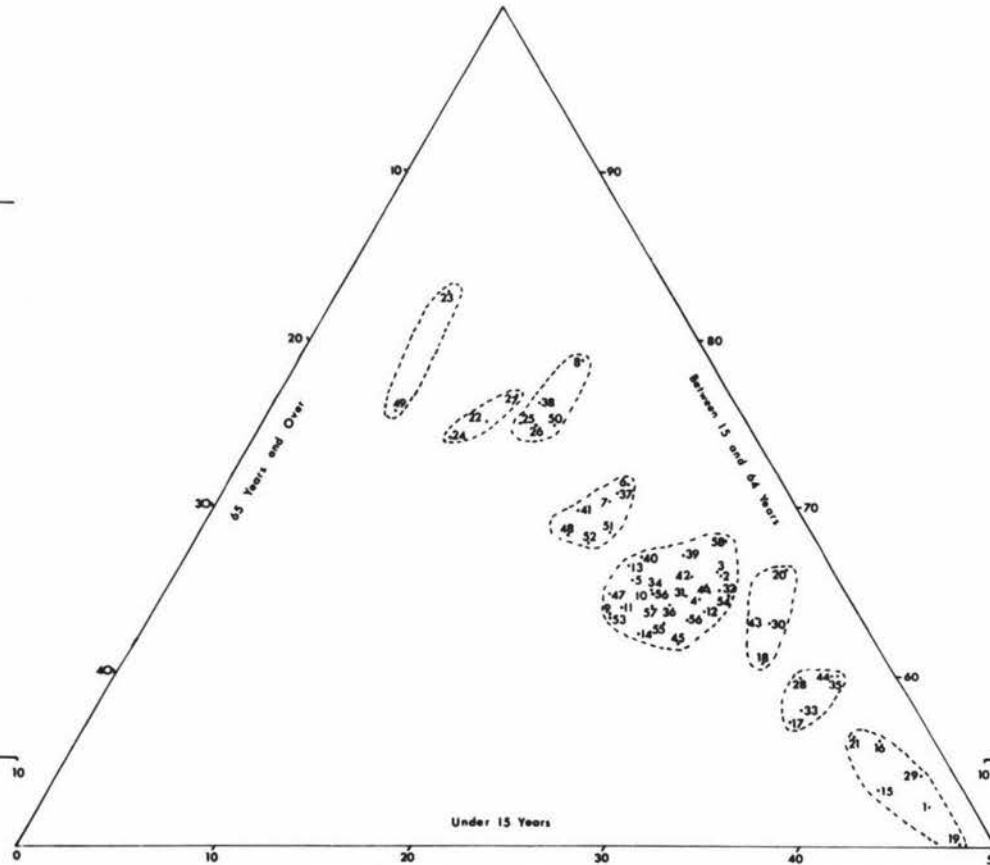
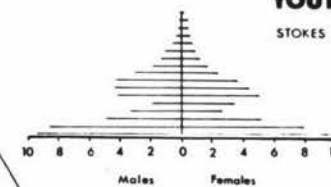
TRANSITIONAL - 43
MORNINGTON



LATE YOUTH - 28
JOHNSONVILLE



YOUTH - 1
STOKES VALLEY



of clusters were not clearly defined, certain peripheral age structures might just as reasonably have been located in the structural category adjacent to the one in which they were actually placed.

For purposes of comparison the Maori population was initially divided into the same three age categories as the total population and plotted on tri-graphs. It was found, however, that as a result of the percentages in the 65 plus age group being very small (and in some cases nil) very little structural differentiation occurred along the 65 plus age group axis. Furthermore, it was evident that within the 15-64 age group the majority were concentrated in the age group 15-34 years. Bearing these points in mind it was felt that a more realistic picture of the Maori community could be established if the age categories were revised. Accordingly, the first category remained the same (0-14 years), the second covered a shorter age span of 20 years (15-34 years) and the third category accounted for the remainder of the population (35 plus years). By plotting these new categories for the respective census years three distinct clusters became apparent. In view of the fact that the resulting structural groups did not strictly comply with those established for the total population the Maori structural types were termed 'migrant', 'transitional' and 'family' (see Figures 18 and 19).

FIG. 18
MAORI AGE STRUCTURES 1956

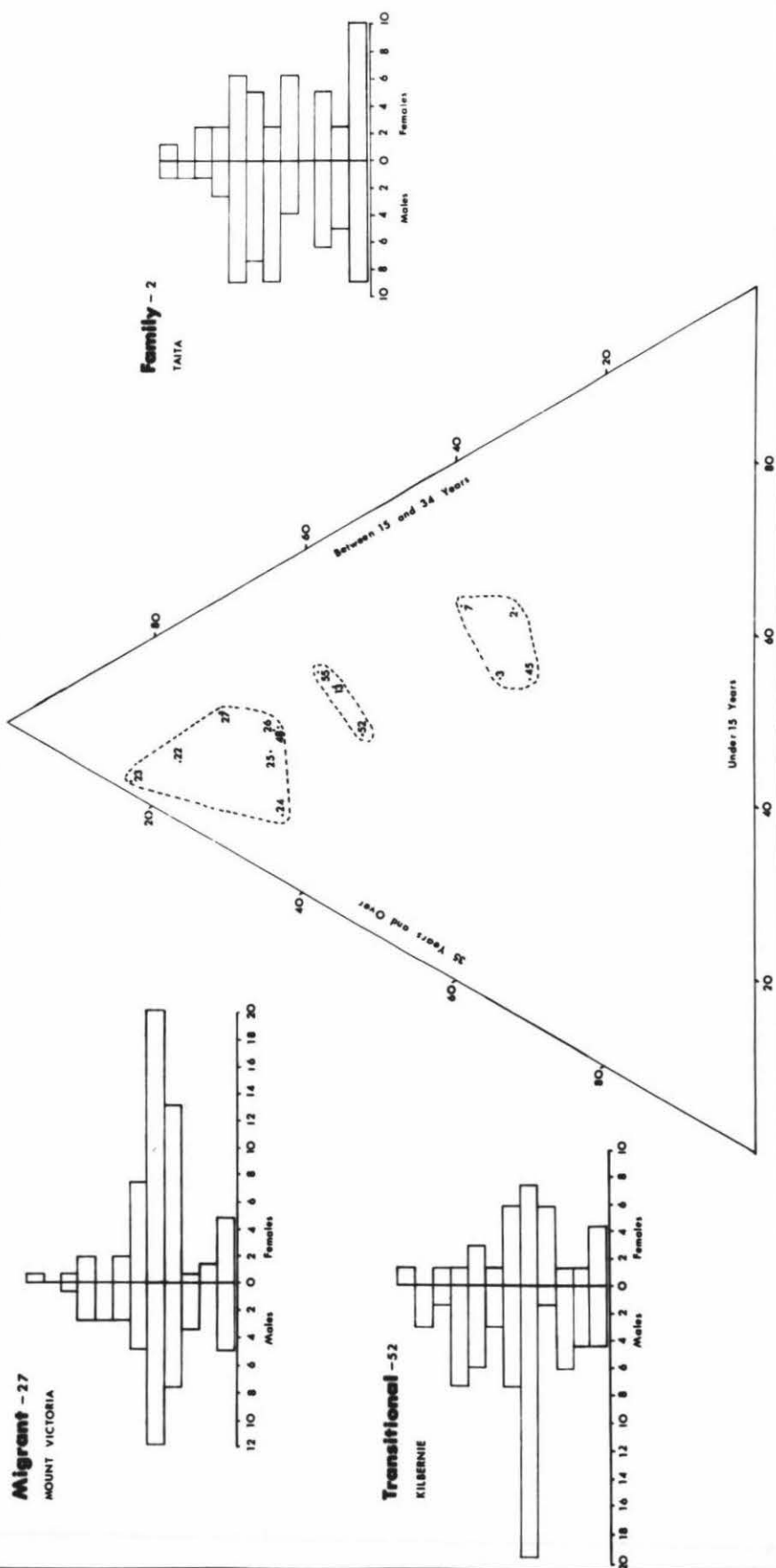
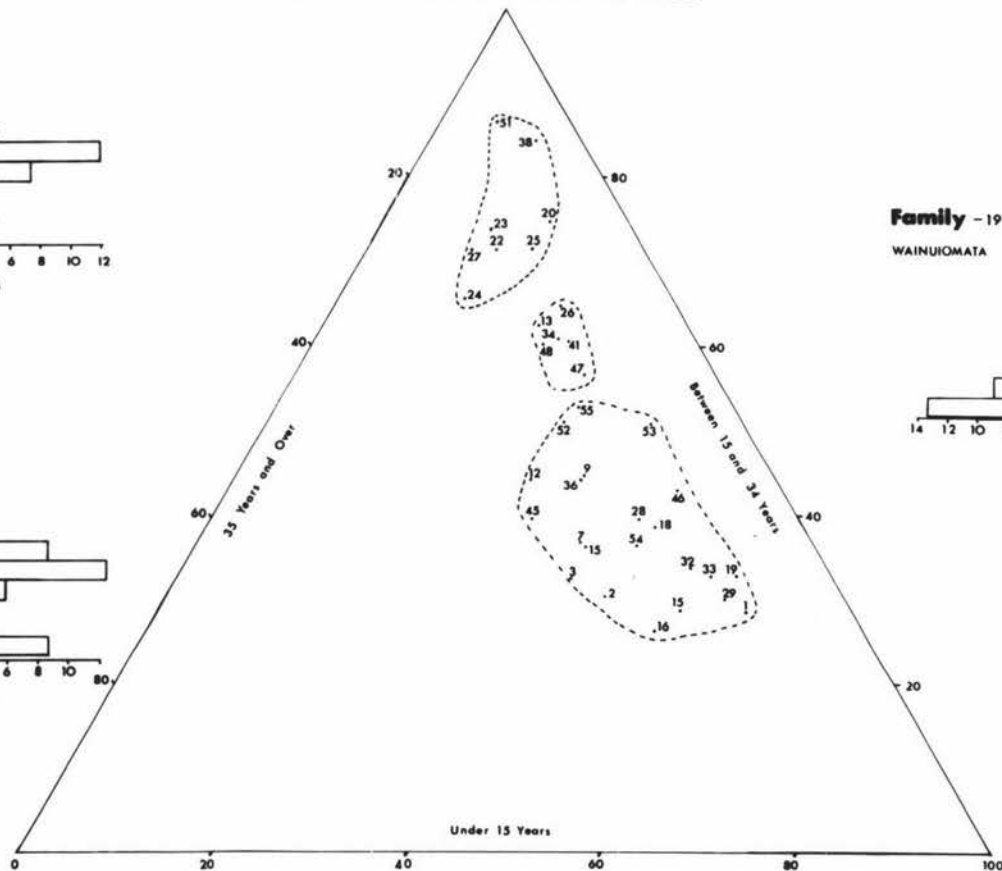
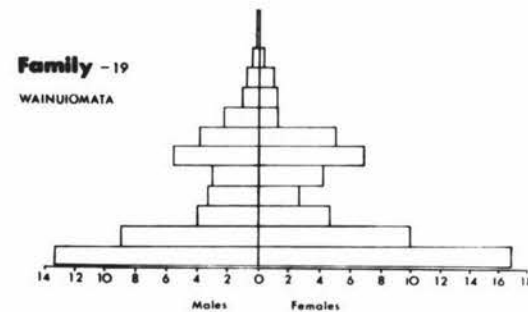
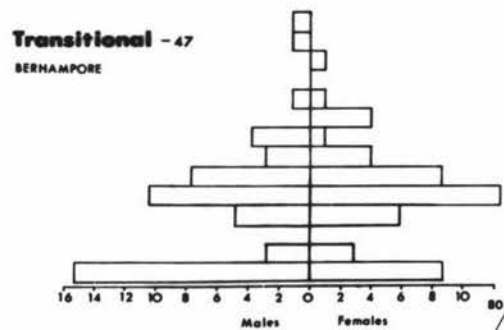
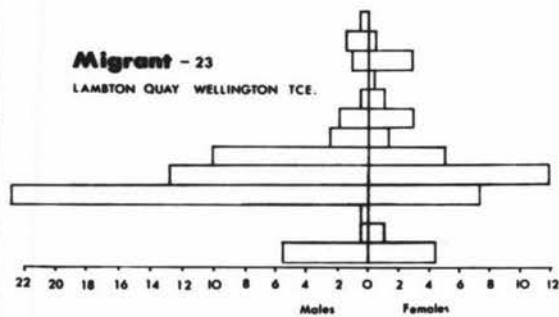


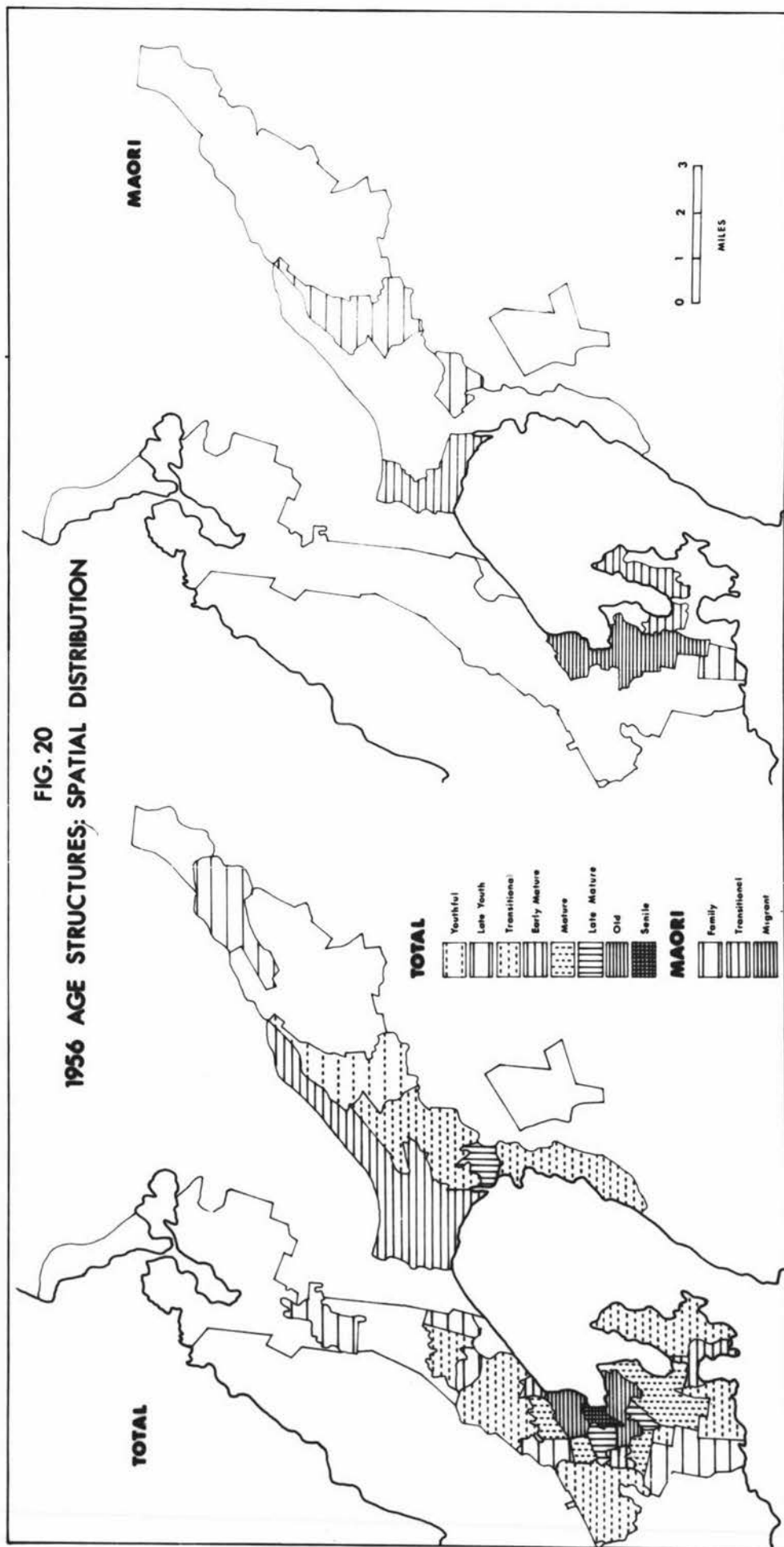
FIG.19
MAORI AGE STRUCTURES 1966

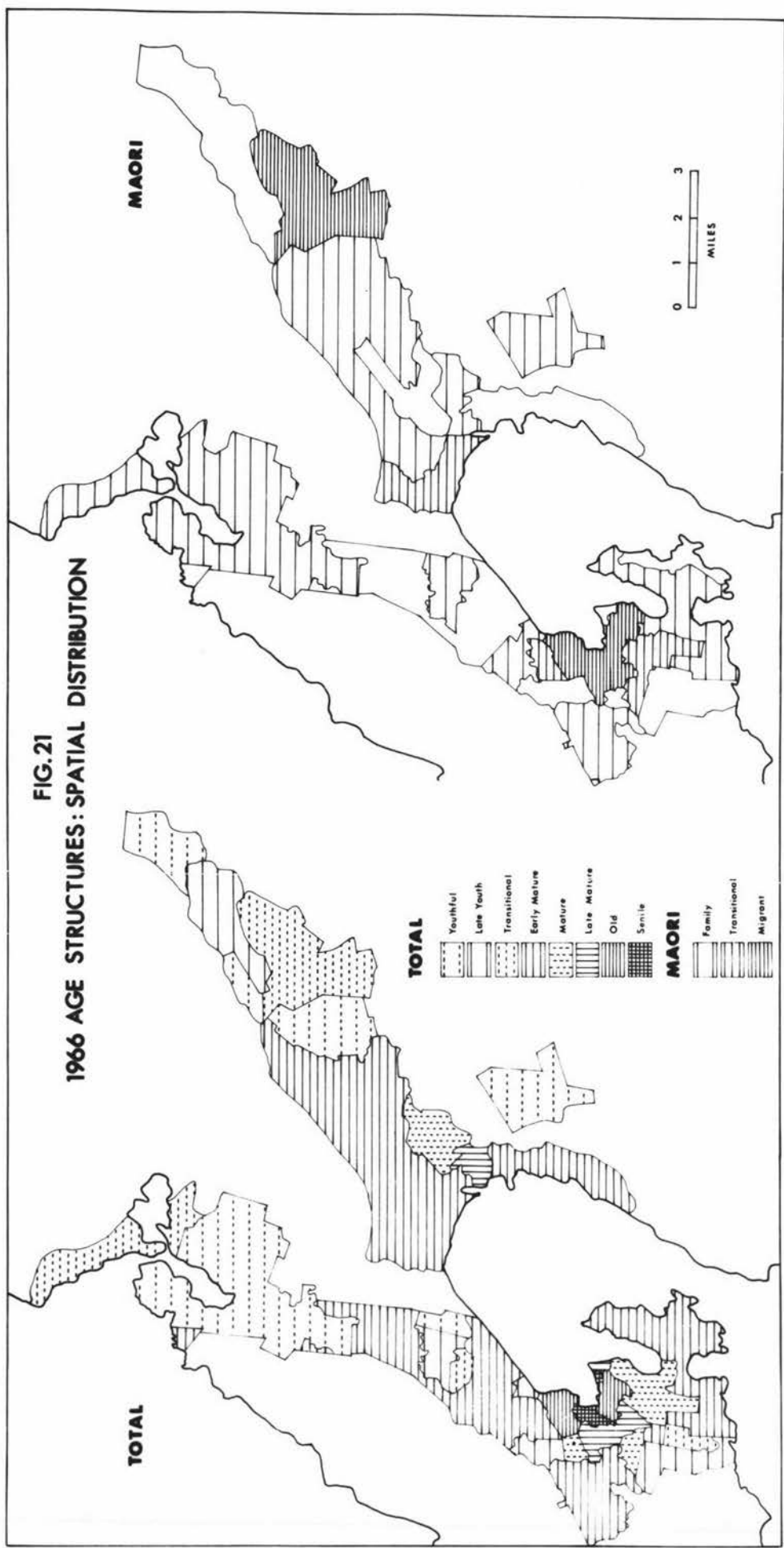


Age Structures : Spatial Distribution

By transferring age structure categories for both the total and Maori population to census sub-division maps of Wellington-Hutt it was possible to illustrate (a) the spatial arrangement of age structures within the urban area, and (b) the variation in spatial distribution between the total and Maori age structures (see Figures 20 and 21). Patterns which emerged for the total population generally paralleled both the studies conducted on overseas cities (Newcomb, 1961; Schmid, 1968; Jones, 1960) and those carried out on urban centres in New Zealand (Curson, 1967b; Heenan, 1962). Further, patterns evident for the period 1956-1966 served to confirm patterns established in earlier studies of both Wellington City (Franklin, Gibson, Treeby, 1963; Neville, 1960) and of the larger combined urban area of Wellington-Hutt (McGee, 1969).

Oldest age structures are found in the inner-city (Lambton Quay-Wellington Tce, Oriental Bay) and as distance from the centre increases age structures generally become more youthful. These changes, while related to variations in both the age and type of housing available, may also be seen as a response to socio-economic forces operating within New Zealand's urban environment. For example, young single adults (20-24 years) with few ties are able to reside in the inner-city close to their place of work (and as a result create a bulge in the age structures of certain inner-city sub-divisions). With marriage and children, new socio-economic factors come into play such as the desire for a home, close proximity to schools and recreation





areas, and, as a result, residential location changes to the periphery.

In comparison with the total population there were only fourteen (out of a possible fifty-one) sub-divisions with more than fifty Maori residents in 1956. These were located predominantly in the inner-city area extending from Thorndon Tinakori Rd in the north to Newtown in the south and were mainly 'migrant' in character (i.e. containing a high proportion in the 15-24 age group). Only four sub-divisions contained youthful (family) structures and these were confined to what were then new 'State housing suburbs' in the Hutt Valley (Taita and Naenae, Waiwhetu - the location of a Marae) and Island Bay on the southern periphery of Wellington City. By 1966, the spatial distribution and character of the Maori population within the urban area had changed considerably. Sub-divisions with more than fifty Maori residents had increased from fourteen to thirty-six (out of a possible fifty-eight) and, rather than being located in or adjacent to the inner-city, were much more dispersed. Of even greater significance is the fact that while the number of sub-divisions with 'migrant' age structures increased from seven to eight over the decade, sub-divisions with 'family' structures increased from four to twenty-two. While such an increase in the proportion of Maori 'family' age structures may (as in the case of the Auckland Urban Area) be explained in terms of (a) an increase in the proportion of rural-urban married migrants with children, (b) high levels of fertility, and (c) comparatively young age at marriage, the expanded spatial distribution is largely attributable to the Government's social planning programme

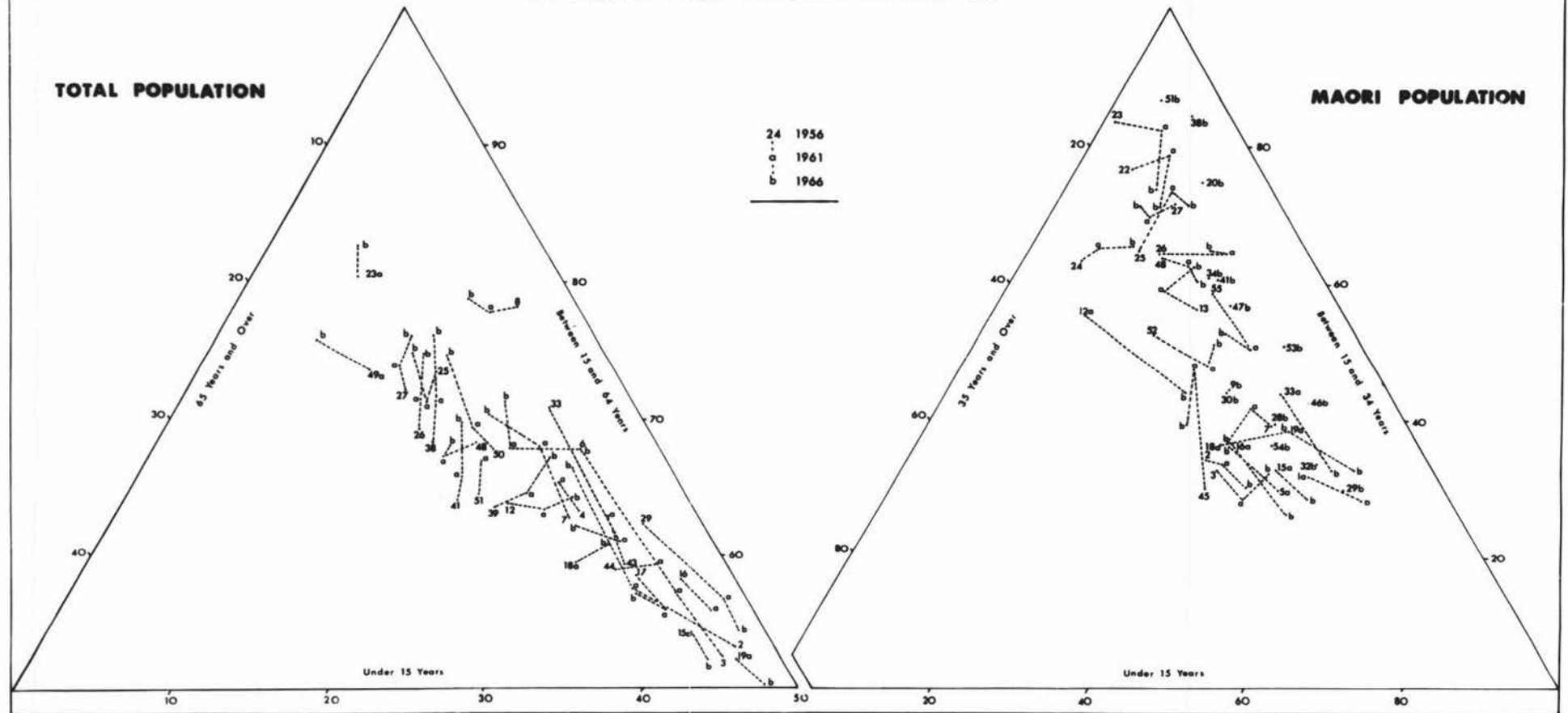
outlined earlier (see Chapter 1). For this reason the greatest concentrations of Maoris are found either in the inner-city or the peripheral sub-divisions rather than in the well established 'middle-class' residential sub-divisions located mid-way between the inner-city and the periphery.

Age-Structure Change

To illustrate changes which occurred over the decade in both the total and Maori age structures, data for selected census sub-divisions at each of the census years was plotted on tri-graphs and the resultant co-ordinates of each sub-division compared and connected (see Figure 22).¹ Although as indicated the prevailing direction of change experienced by the total population (ageing) differed considerably from that experienced by the Maori (rejuvenation), changes occurring in both groups can be explained in terms of the relative importance of two concurrent forces; cyclical ageing and net internal migration.

Cyclical ageing, as might be expected, was most pronounced for the total population in certain of the middle suburbs of Wellington City (e.g. Taitville, Brooklyn, Kelburn and Roseneath) and in the predominantly State housing sub-divisions of the Hutt Valley developed after World War II (e.g. Taita and Naenae). Rejuvenation, on the other hand, for both the total and Maori population, was most pronounced in the peripheral sub-divisions developed for residential use over the period 1956 to 1966 e.g. Stokes Valley, Wainuiomata, Porirua and Newlands).

FIG.22
CHANGING AGE STRUCTURES 1956-66

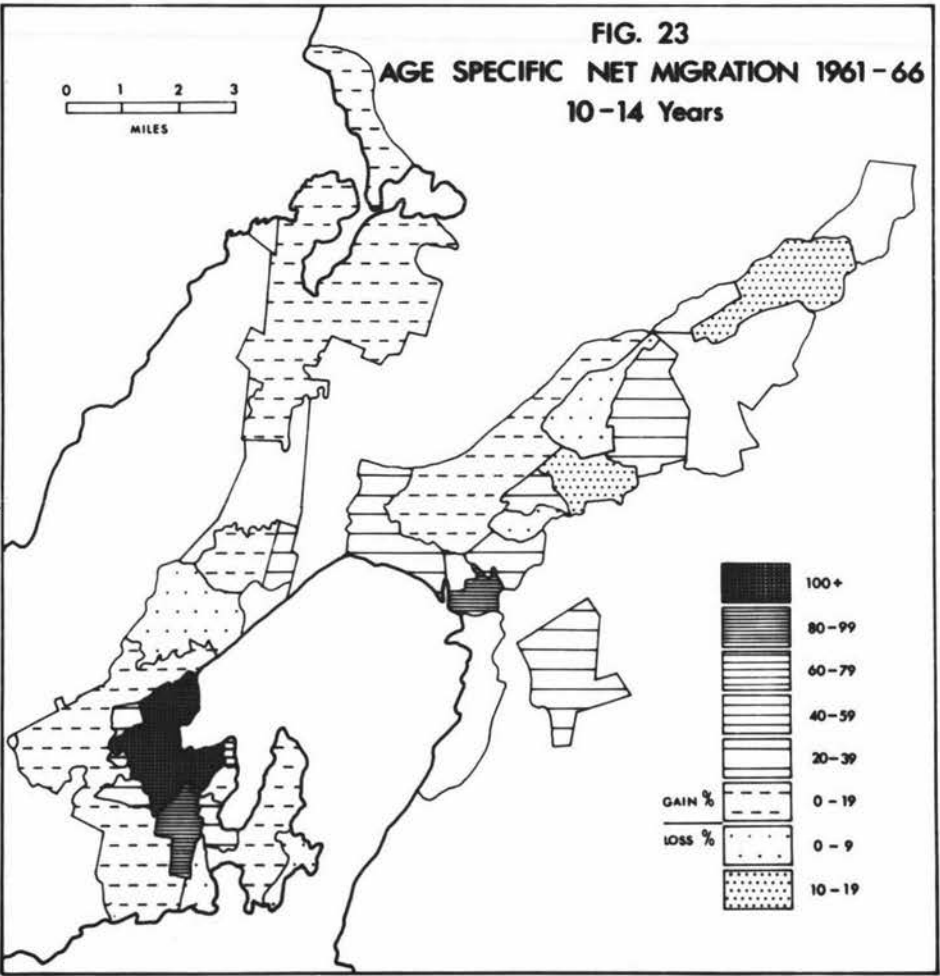


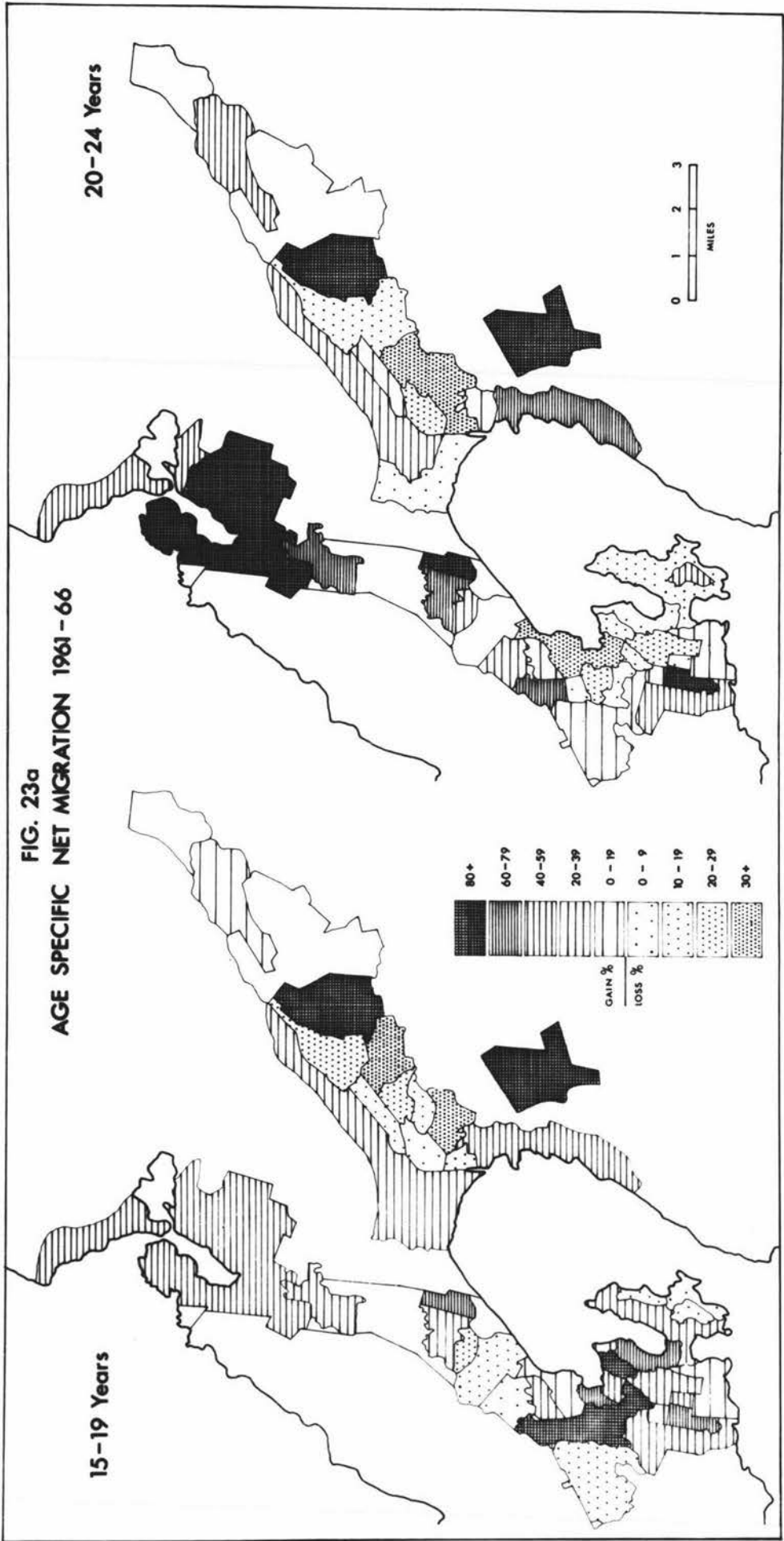
Age-Specific Net Migration

To illustrate the role of net internal migration as a factor in influencing age structure change, areas of migration gain and loss were established (via the L.T.S.R. method) for three specific age groups (10-14 years, 15-19 years and 20-24 years, 1961) known to be prone to intra-city migratory movement. The net migration patterns for these three groups are presented in Figures 23 and 23a.² Points of interest arising from these two figures may be summarised as follows.

10-14 years (1961)

1. Most significant gains in this age group (15-19 years when projected to 1966) took place in the inner-city area of Wellington (Thorndon-Tinakori Rd, Lambton Quay-Wellington Tce, Willis St-Cambridge Tce, Aro St-Nairn St, Mt Victoria and Oriental Bay) all of which experienced gains of more than 100 per cent when expressed as a percentage of 1961 totals.
2. An interesting facet of these large inner-city gains was the variation which existed between males and females (see Table X). This feature was understandable in view of the greater number of (predominantly female) sales, clerical and administrative occupations performed in the central-city, and in the case of Newtown the presence of the Wellington Hospital and nurses home.
3. Moving away from the inner-city area growth attributable to net internal migration falls off markedly and tends to





accentuate the dominance of the central-city as the major area of attraction for this age group.

4. While a large proportion of the migrants moving to the inner-city can probably be attributed to inter-city and rural-urban migration, certain of the older residential sub-divisions in both Hutt (Upper Hutt, Taita, Naenae, Moera, Waterloo) and Wellington City (Seatoun, Melrose, Khandallah-Nairnville, Ngaio) experienced net losses which may well have contributed to the increase in the inner-city.

15-19 and 20-24 years (1961)

1. Out-migration was heaviest in the older State housing sub-divisions on the eastern side of Hutt Valley, such as Taita, Naenae, Epuni and Waiwhetu (all having at least 20 per cent less than the number that could be expected in these two age groups when projected to 1966). Out-migration was also evident to a lesser degree in other sub-divisions of the Hutt Valley and in certain peripheral sub-divisions of Wellington City such as Raroa, Khandallah-Nairnville, Ngaio and Karori in the north, and Karaka Bay-Worser Bay, Strathmore and Seatoun in the south-east.
2. While the 15-19 and 20-24 age groups (1961) generally display similar net migration patterns in the inner-suburbs, patterns differ considerably in the inner city. Whereas the 15-19 age group displayed heavy in-migration into the inner-

TABLE X: Percentage Net Migration Gain by Sex in Selected Inner-city
Sub-divisions 1961-1966

Sub-divisions	Males			Females			Total		
	1961 10-14	1966 Excess	%	1961 10-14	1966 Excess	%	1961 10-14	1966 Excess	%
Thorndon-Tinakori Rd	92	114	123.91	106	376	354.72	198	490	247.47
Lambton Quay-Wellington Tce	59	266	450.85	46	285	619.57	105	551	524.76
Willis St-Cambridge Tce	51	110	215.69	53	40	75.47	104	150	144.23
Aro St-Nairn St	44	94	213.64	64	75	117.19	108	169	156.48
Mt Cook-Wallace St	75	84	113.33	70	116	165.71	145	201	138.62
Mt Victoria West	153	126	82.35	101	226	223.76	254	352	135.58
Newtown	285	101	82.32	254	466	183.46	539	567	132.89
Total		895			1,584			2,480	

Notes: 1 1966 excess calculate using Life Table Survival Rate method for estimation of net internal migration.

Source: New Zealand Census of Population and Dwellings, 1961 and 1966, Volume 2 'Ages and Marital Status'.

city, the 20-24 age group exhibited a strong outward movement.

3. Both age groups exhibited heavy net in-migration into the peripheral residential areas such as Porirua, Stokes Valley, Wainuiomata, Newlands and Wilton-Otari (see Appendix G).

Overall, variation in net migration patterns may be explained largely in terms of (a) the periods in which the sub-divisions were settled, thus affecting the degree of ageing, and (b) whether or not an area possesses the attributes to either hold or attract these 15-19 and 20-24 age groups (i.e. the availability of employment, land or houses). Related to this last point is the question of varying life styles, that is, inner-city 'careerism' versus peripheral 'familism'. As Table XI indicates, inner-city net migration gains in the 15-19 age group resulted in those in the never-married category far exceeding those who were married. At the periphery, however, the opposite case applied.

The above observations concerning net migration patterns are largely supported by the findings of Robb and Carr (1969) in their report of a social survey on Porirua. In a section dealing with migration characteristics the following points were revealed (Robb and Carr, 1969, 23-45).

1. Of the 993 people interviewed in the survey, the majority (733) were intra-urban migrants to Porirua, 184 were internal migrants (from other parts of New Zealand), 36 had migrated from overseas and 40 were non-migrants.

TABLE XI: Inner-City and Peripheral Age Specific (15-19 Years, 1961)
Net Migration Gains 1961-66

Sub-Division	Net Migration Gain 1961-1966			Total 21-24 Years Never Married		Total 21-24 Years Married	
	Males	Females	Total	1966	%	1966	%
A. <u>Inner City</u>							
Aro St-Nairn St	173.68	170.52	172.25	336	72.41	122	26.29
Mt Cook Wallace St	142.36	101.48	122.58	336	70.14	139	29.01
B. <u>Periphery</u>							
Stokes Valley	86.64	164.04	128.48	54	16.46	270	82.31
Wainuiomata	203.03	322.77	273.85	114	16.35	577	82.78

- Notes: 1 Marital status age groupings (21-24 years) differ from net migration age grouping (20-24 years), the effect being an underscoring among marrieds and never marrieds through an inability to account for the 20 year age group.
- 2 Net migration gains calculated by L.T.S.R. method.

Source: New Zealand Census of Population and Dwellings, 1961, 1966, Volume 2 'Ages and Marital Status'.

2. The place of origin of a large proportion of the intra-urban migrants (see Table XII) conforms well with the sub-divisions in Figure 23 displaying net out-migration (e.g. Taita 24.34 per cent, Naenae 39.46 per cent, Waiwhetu 40.28).
3. Of the intra-urban migrants moving to Porirua 541 (74 per cent) were married.
4. Thirty-six per cent and 44 per cent of Porirua migrants from Wellington and Hutt, respectively, were in the 15-29 age group.
5. The three most predominant reasons for migrating to Porirua (accounting for 85 per cent of replies from intra-urban and internal migrants) were the availability of housing, to accompany spouse and to accompany parents.

Derived Age-Sex Indices

As tri-graph analysis provides only a summary measure of the percentages in the three chosen age categories, it was decided that a more complete picture of age-sex characteristics could be established if certain additional measures were examined.

1. Dependency

The dependency ratio, which provides a somewhat crude but nevertheless serviceable measure of the number of people in the active (working) age group as compared with those in the

TABLE XII:

Intra-Urban Migrants : Place of Origin by Sex

Wellington				Hutt			
	Male	Female	Total		Male	Female	Total
Newtown and Bethampore	48	53	101	Petone, Alicetown	9	7	16
City Thorndon and the Terrace	48	55	103	Naenae, Taita, Epuni	30	34	64
Te Aro	22	23	45	Lower Hutt Central, Melling, Woburn	16	19	26
Wellington East, Mirimar etc.	38	30	68	Upper Hutt and Trentham	19	23	42
Kilbernie, Lyall Bay etc.	16	26	42	Transit Camp (Trentham)	8	9	17
Haitaitai, Roseneath, Oriental Bay	17	17	34	Eastbourne and Bays	3	2	5
Island Bay, Vogelstown etc.	25	21	46	Wainuiomata	0	0	0
Wellington N-W, Wadestown etc.	24	25	49	Rural Urban Fringe (up to Paraparaumu)	14	17	31
Johnsonville	24	20	44				
Total	262	270	532	Total	99	102	201

Source: Robb and Carr (1969, 35).

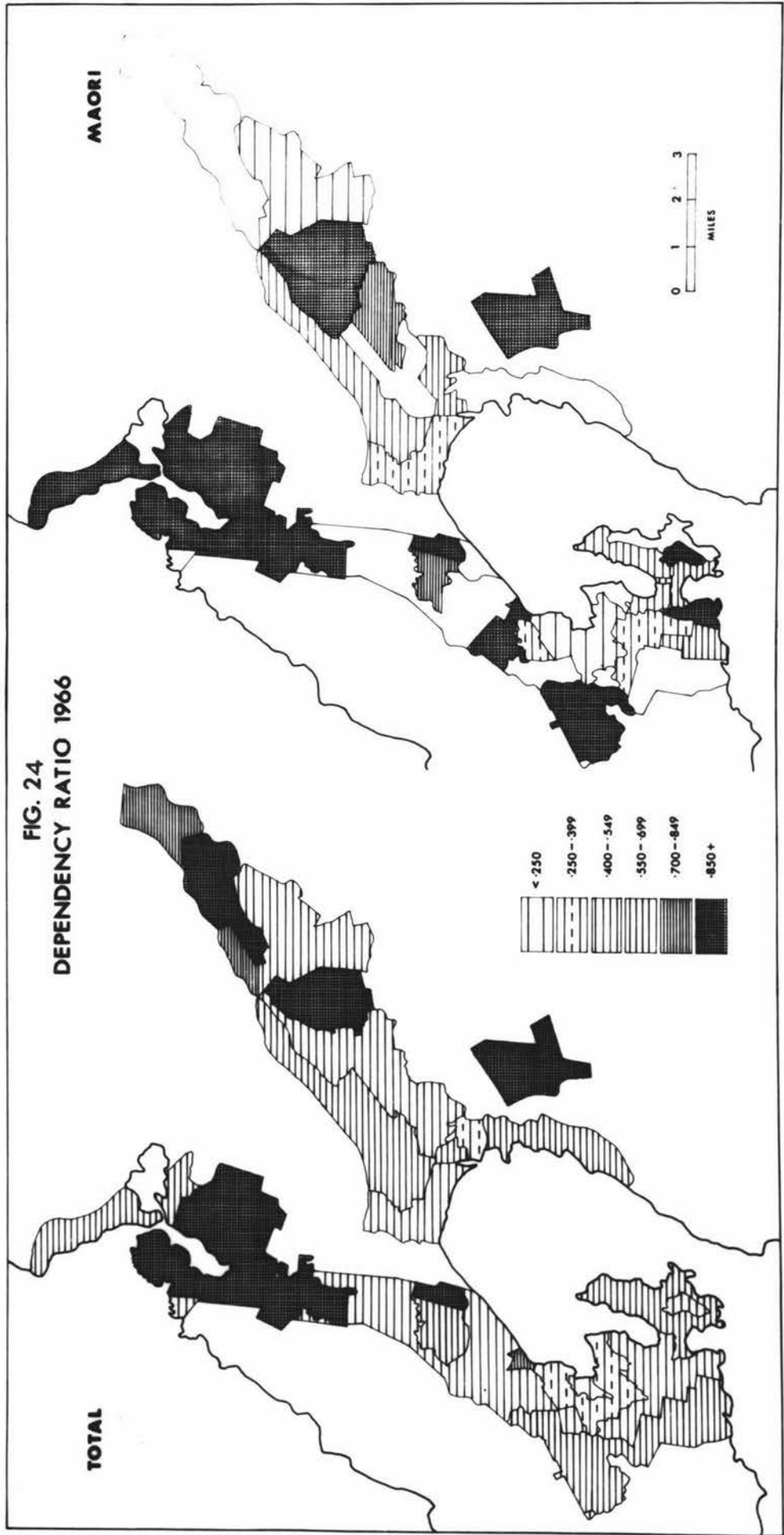
dependent age groups (0-14 and 65 plus years), is obtained by the following formula.

$$Dr = \frac{(0-14 \text{ years}) + (65+ \text{ years})}{(15-64 \text{ years})}$$

The lower the ratio the more potentially productive the population because of its lower dependency load.

As illustrated in Figures 24 and 27 the ratio of dependents to those in the working age group is lowest in the inner-most area of the city (Lambton-Quay-Wellington Tce, 0.205 dependents per independent member of the population). In the group of sub-divisions surrounding the inner-city dependency increases slightly (0.250-0.399) and thereafter increases to reach a peak (in excess of 0.850) in the peripheral zone (e.g. Stokes Valley 0.913, Porirua 0.880, Tawa 0.781, Newlands 0.846, Wainuiomata 0.997).⁴

Unlike the total population whose proportion of dependents increased only slightly from 36.36 to 36.60 per cent over the period 1956 to 1966, dependents in the Maori population increased considerably from 27.60 per cent to 40.11 per cent. This overall change, resulting from factors already outlined, is clearly reflected at the sub-division level. In 1956 the majority of sub-divisions with more than fifty Maori residents were located either in or adjacent to the inner-city and were characterised by extremely low dependency ratios (e.g. Thorndon-Tinakori Rd 0.079, Lambton Quay-Wellington Tce 0.021, Willis St-Cambridge Tce 0.090). Sub-divisions exhibiting moderate to high ratios were limited to the residential suburbs on the eastern side



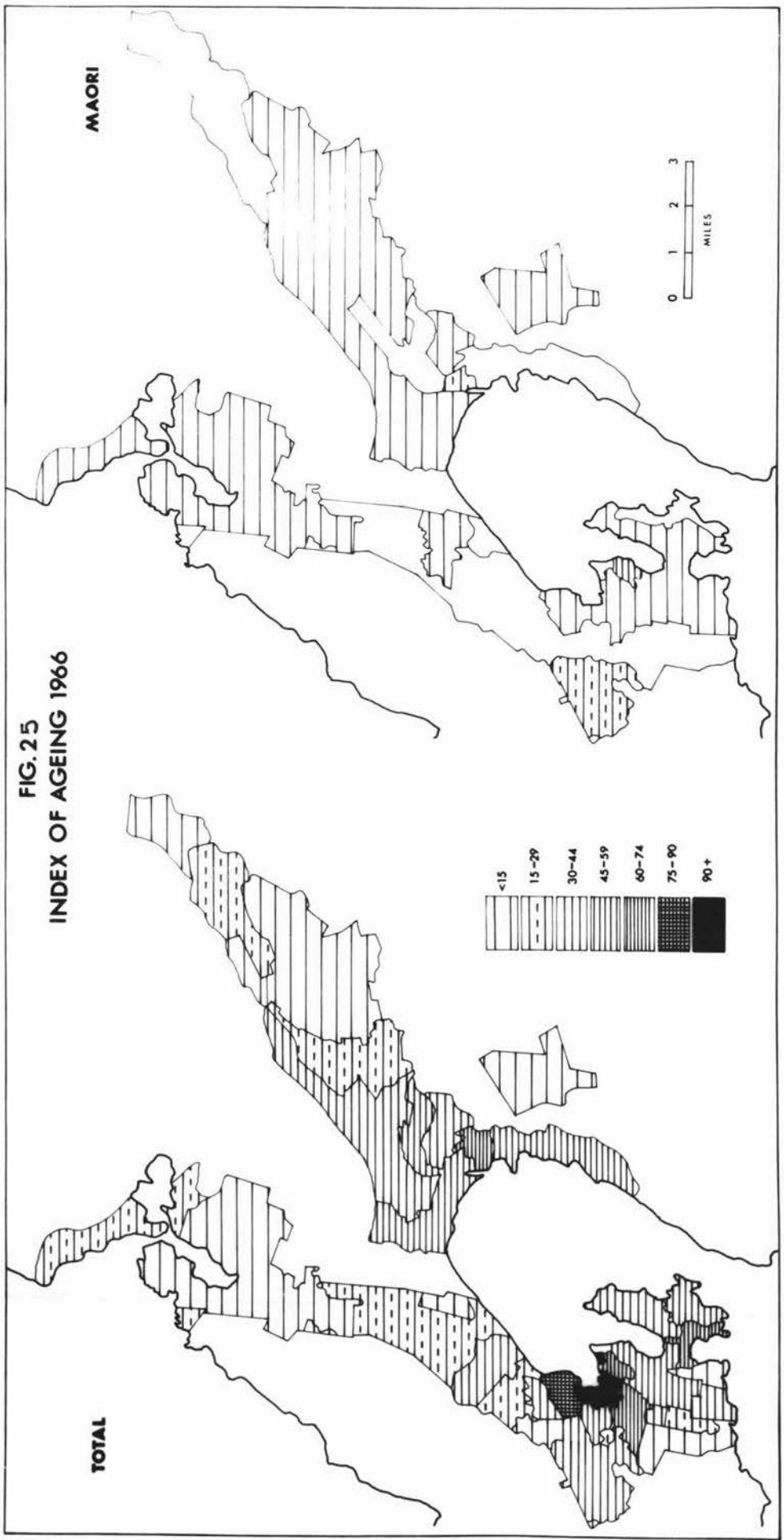
of Lower Hutt (e.g. Taita 0.612, Naenae, 0.940, Waiwhetu 0.697) and Island Bay on the southern periphery of Wellington City. By 1966 not only had the number of sub-divisions exhibiting high ratios grown considerably, but also the number of dependents in certain of the peripheral sub-divisions had grown to exceed those within the active age group (e.g. Stokes Valley 1.552, Porirua 1.213, Wainuiomata 1.359, Newlands 1.368).

2. Index of Ageing

While the dependency ratio expresses both young and old dependents as a proportion of the working age group, it must be remembered that the physical needs and social activities of the young and old dependent age groups differ considerably. Hence there is a need for an index which expresses the relationship of old to young in a given population; that is, an index of ageing which may be obtained by the following formula.⁵

$$I_a = \frac{(60+ \text{ years}) \text{ or } (65+ \text{ years})}{(0-15 \text{ years}) \text{ or } (0-20 \text{ years})}$$

In Figure 25 the spatial patterns of the index of ageing are presented for 1966. The proportion of aged (60 plus years) to young (0-20 years), however, remains highest in the older sub-divisions of the inner-city over the decade 1956 to 1966 (e.g. Lambton Quay-Wellington Tce, 91.21, Willis St-Cambridge Tce, 124.24, Oriental Bay, 162.85). Away from the centre ageing indices decline (see Figure 27), as age structures become more youthful, and at each of the census years reach their lowest level in the peripheral sub-divisions (e.g. Porirua 12.26,



Tawa 9.51, Wainuiomata 3.59, Stokes Valley 6.78, Newlands 5.21).⁶

In contrast to the significant decline in the proportion of aged away from the centre of the urban area exhibited by the total population (see Figure 27) the decline in the index of ageing exhibited by the Maori population is quite slight. As a result of the 'youthful' character of the Maori population the majority of sub-divisions with more than fifty Maori residents fall within a single category (i.e. less than 15 aged 54 years and over per 100 in the age group 0-20 years).⁷ A further point of contrast arises from the fact that although considerably lower than total population ageing, indices for the Maori population reach a peak in zone two as against zone one for the total population. It must be pointed out, however, that as Maoris are not represented in all sub-divisions in each of the concentric zones, it is possible for one relatively high index (e.g. HAITAITAI 50.00) to have a considerable influence on the mean for the zone.

3. Sex Ratios

While it is usual for urban areas as a whole to exhibit a female dominance in the sex composition of the population, due to (a) the greater movement of females into cities for employment, and (b) a slightly longer life span experienced by women, an interesting pattern arises when sex ratios are examined at the sub-division level (see Figure 26). Following the pattern established for the Auckland Urban Area (Curson, 1967a), low female/male ratios are also found in the core of Wellington City (e.g. Willis St-Cambridge Tce 65.17), in the industrial areas (Seaview-Gracefield

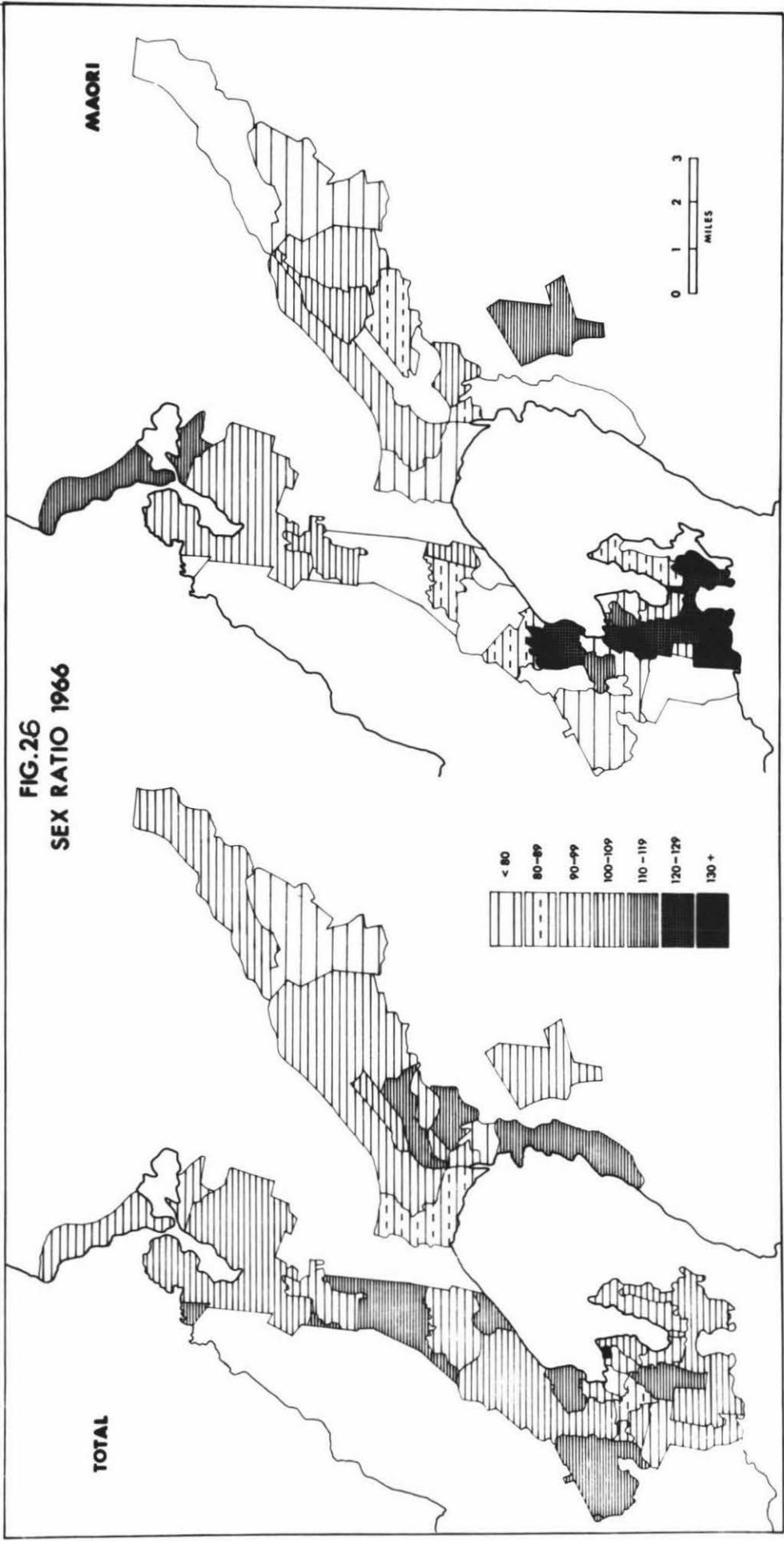
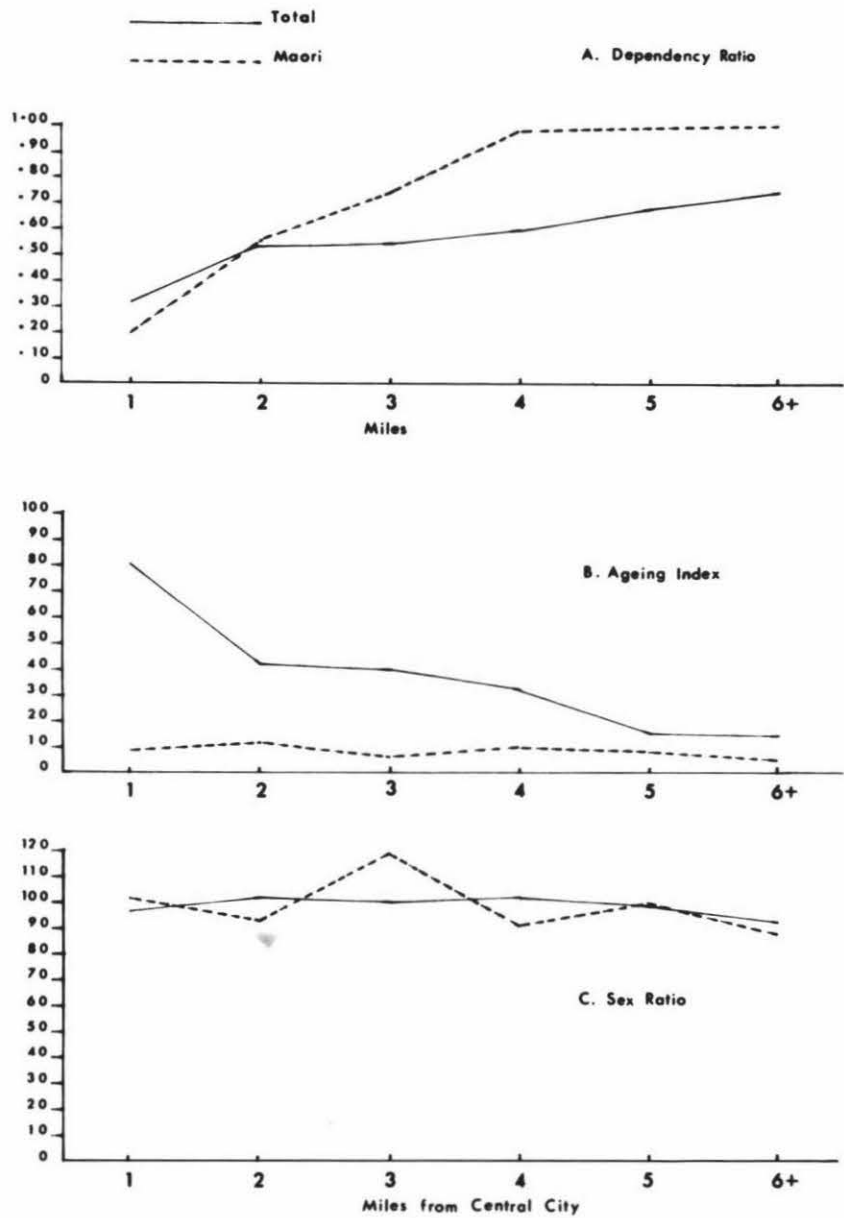


FIG. 27 VARIATION IN DERIVED AGE - SEX INDICIES 1966



39.15, Petone 87.14) and in Heretaunga-Pinehaven (56.62), the latter being the location of three male dominated institutions (Army barracks, Police Training School and Waiako Prison). High ratios, on the other hand, are found in the sub-divisions adjacent or in close proximity to the central business districts of Wellington City (Thorndon-Tinakori Rd 111.17, Oriental Bay 130.84, and Newtown 114.64, the latter being the location of the nurses home) and Lower Hutt (Woburn 109.09, Hutt Central 115.17, Waiwhetu 112.32, Epuni 111.42).⁸ The high degree of femininity for areas surrounding the C.B.D's of both Wellington and Lower Hutt can be explained by the fact that (a) certain of the sub-divisions may be considered as high status areas and as such have an older age structure which favours women, and (b) such locations are highly sought after by young single females for accommodation (flats and hostels).

One of the notable features of Maori sex ratios when compared with those of the total population is the considerably greater excess of females over males in areas where femininity does occur (see Figure 26). In 1956 these high ratios were confined to the sub-divisions adjacent to the core (e.g. Thorndon-Tinakori Rd 158.94, Mt Victoria West 137.70, Newtown 136.36), but have since spread north into Wadestown (166.66) and south into Island Bay (136.95), Melrose (133.33) and Strathmore (139.13), probably as a result of increased rural-urban migration, intra-urban migration and the availability of accommodation over the period 1956-1966. This feature is well illustrated in Figure 27c which depicts the variation in femininity between the Maori and the total population with distance away from the centre of the

urban area. In contrast to the total population, which displays an overall decline in femininity away from the centre,⁹ the Maori population presents a more erratic picture in that the peak of femininity within the urban area is reached in the third zone from the centre and thereafter with the exception of the fifth zone, declines toward the periphery.

Of the changes occurring in sex ratios over the period 1956-1966 one of the most significant was the overall decline in the proportion of females in the inner-city sub-divisions (see Appendix J). Such a decline can be seen primarily as resulting from a change in the age structure of the population. In 1956 the majority of inner-city sub-divisions were characterised by 'late mature' and 'old' age structures (see Figure 16) and as such were more favourable to a larger proportion of females than males. With a decline in the proportion of aged over the period, however, houses have become vacant and available for letting as flats. As such they have encouraged a certain amount of rejuvenation in the population and with it a decline in the degree of femininity.¹⁰

Summary

Apart from the restrictions imposed by the physical environment, tri-graph analysis of the Wellington-Hutt Urban Area population has shown that the range, spatial configuration and change experienced by (a) sub-division age structures and (b) their derived indicies, have tended to conform with patterns identified in other major urban areas in New Zealand. At each of

the three census years age structures have remained 'oldest' at the centre and become progressively more 'youthful' towards the periphery. Over the period age structures and their derived indices have changed at varying rates and in varying directions in response to such factors as the era of residential development, cyclical ageing of the population and net migration by specific age groups.

In contrast to the broad range of age structures exhibited by the total population (eight distinct types being defined) the range exhibited by the Maori population is confined to three age structure categories - 'migrant', 'transitional', and 'family'. Over the period 1956-1966, sub-divisions classified as 'migrant' (i.e. with more than 60 per cent of their population between 15-34 years of age) remained concentrated within inner Wellington, due primarily to the availability of accommodation and proximity of employment. Those sub-divisions supporting 'family' age structures, however, increased in number, became more diffused throughout the urban scene and approximated the 'youthful' structure of the total population most closely in the new State and group housing sub-divisions at the periphery.

As well as forming an integral part of demographic analysis, age-sex structures are also the basis from which all social planning proceeds. It is only through close examination of population age structures that such needs as housing, education, employment and recreation can be planned for adequately. Briefly then, age structures, as well as being important to government and local authorities are also a factor which have to

be taken into consideration by employers wanting to establish industry with access to an adequate labour supply. (This particular aspect of relating planning back to the demographic base will be examined in Chapter 5). Finally it will be noted that the age-sex patterns outlined in the present chapter have a strong bearing on the fertility patterns of Wellington-Hutt discussed in Chapter 4.

NOTES

- 1 For reasons of clarity only changes of more than 2 per cent in age structures along each of the axes were plotted.
- 2 Net internal migration statistics for all age groups within each of the sub-divisions are presented in Appendix G.
- 3 Migration characteristics of Porirua residents form a section of a larger social survey carried out by staff and students of the Department of Social Science (now the Department of Social Administration and Sociology), Victoria University, Wellington, 1966. The survey was undertaken as a result of requests initially from the Porirua Forum and later from a group representing the Forum, the City Council, the Porirua Licencing Trust and the Businessmen's Association.
- 4 Dependency ratios for 1956, 1961 and 1966 are listed in full for both the total and Maori population in Appendix H.
- 5 Following the example of Curson (1967a) and Trlin (1971b) the index of ageing was calculated using the following age groups.

$$I_a = \frac{60 \text{ plus years}}{0-20 \text{ years}} \times 100$$
- 6 Index of Ageing for 1956, 1961 and 1966 are listed in full for both total and Maori population in Appendix I.
- 7 As published census results for the Maori population are recorded in 10 year intervals after 20-24 years of age, indices of ageing were calculated using the formula

$$I_a = \frac{54 \text{ plus years}}{0-20 \text{ years}} \times 100$$
- 8 See Appendix J for excess of females in nursing age group in Newtown sub-division.
- 9 While the peripheral zone exhibits the lowest sex ratios for the total and Maori population respectively, it must be pointed out that these two figures are influenced considerably by Heretaunga-Pinehaven (which, as previously indicated,

contains three male dominated institutions). Excluding Heretaunga-Pinehaven the ratio for the peripheral zone increases to 99.67 for the total population and 103.03 for the Maori population. These revised figures which although in keeping with the new residential character of the zone, contrast with Wilson's (1969, 100) study of Melbourne depicting increasing masculinity towards the periphery.

- 10 For an excellent discussion relating to this typic see McGee (1969, 154).

C H A P T E R 4

FERTILITY

Of the various facets of population research undertaken in New Zealand, the study of fertility patterns is clearly one of the more recent. While studies on patterns of population growth and age-sex structures date back to the 1950's, it has only been since the latter part of the 1960's, after Heenan's (1967) survey of fertility patterns in the South Island, that fertility as a topic for study has become of interest to population geographers in New Zealand. Heenan's survey has been followed up more recently with studies by Hall (1969), on the relationship between fertility and the size of settlement, by Lewthwaite and Forrest (1971), on fertility patterns in Dunedin in terms of 'life-styles', stage of family cycle and residential location, and by Keys (1969), on fertility patterns in the Auckland Urban Area in terms of the differentials most likely to explain their variation. Finally, Trlin (1971b) has compared Maori and non-Maori, rural and urban fertility patterns in the Manawatu region.

Intra-Urban Fertility Patterns, 1956-1966

The basic objectives of this chapter on fertility are two-fold. First, to examine and where possible explain fertility

patterns exhibited by the total population of Wellington-Hutt over the period 1956-1966. Second, to illustrate and explain the variation between Maori and non-Maori fertility patterns in 1966.

Method of Measurement

Fertility in its broadest sense is the occurrence of births within any given population. Fertility levels can be readily assessed by relating births over a given period to the total population (Crude Birth Rate) or to a specific section of the population. In this chapter the child-woman ratio has been used although modified slightly to form a Marital Fertility Index (M.F.I.), calculations being made using the following formula.

$$\text{M.F.I.} = \frac{\text{Number of Children 0-4 years}}{\text{Number of Married Women 16-44}} \times 100$$

While this ratio at first appears to inflate fertility levels due to the inclusion of, for example, illegitimate children, and exclusion of their mothers, the apparent inconsistency is to some degree off set by the unavoidable inclusion (within the married group) of both sterile and childless females. Two advantages of the M.F.I. are, first, that it takes the age structure of the female population into consideration, and second, as Trlin (1971b, 16) has indicated, the Index (as opposed to the ordinary child-woman ratio) 'counteracts the known mobility of young single females and their over-representation in the urban areas'.¹ This point is illustrated in Table XIII using the examples of Porirua and Oriental Bay which recorded the highest and lowest M.F.I.'s respectively, in the urban area. In 1966 73.5 per cent and 22.4

per cent of all women aged 16-44 years were classified as 'married' in Porirua and Oriental Bay, respectively. While the differences in fertility between the two areas is changed only slightly by the use of the Marital Fertility Index (76.77) as opposed to the Child-Woman Ratio (69.60) the order of difference between the fertility indices of the two areas is changed dramatically in that the fertility index of Oriental Bay increases from approximately 10 per cent to approximately 30 per cent of the Porirua fertility index level.

TABLE XIII

Fertility Extremes, 1966

Sub-Division	M.F.I.	Child-Woman Ratio	Difference
Porirua	109.95	76.80	33.15
Oriental Bay	33.18	7.20	24.98
Difference	76.77	69.60	

Source: New Zealand Census of Population and Dwellings, 1966, Volume 2 'Ages and Marital Status'.

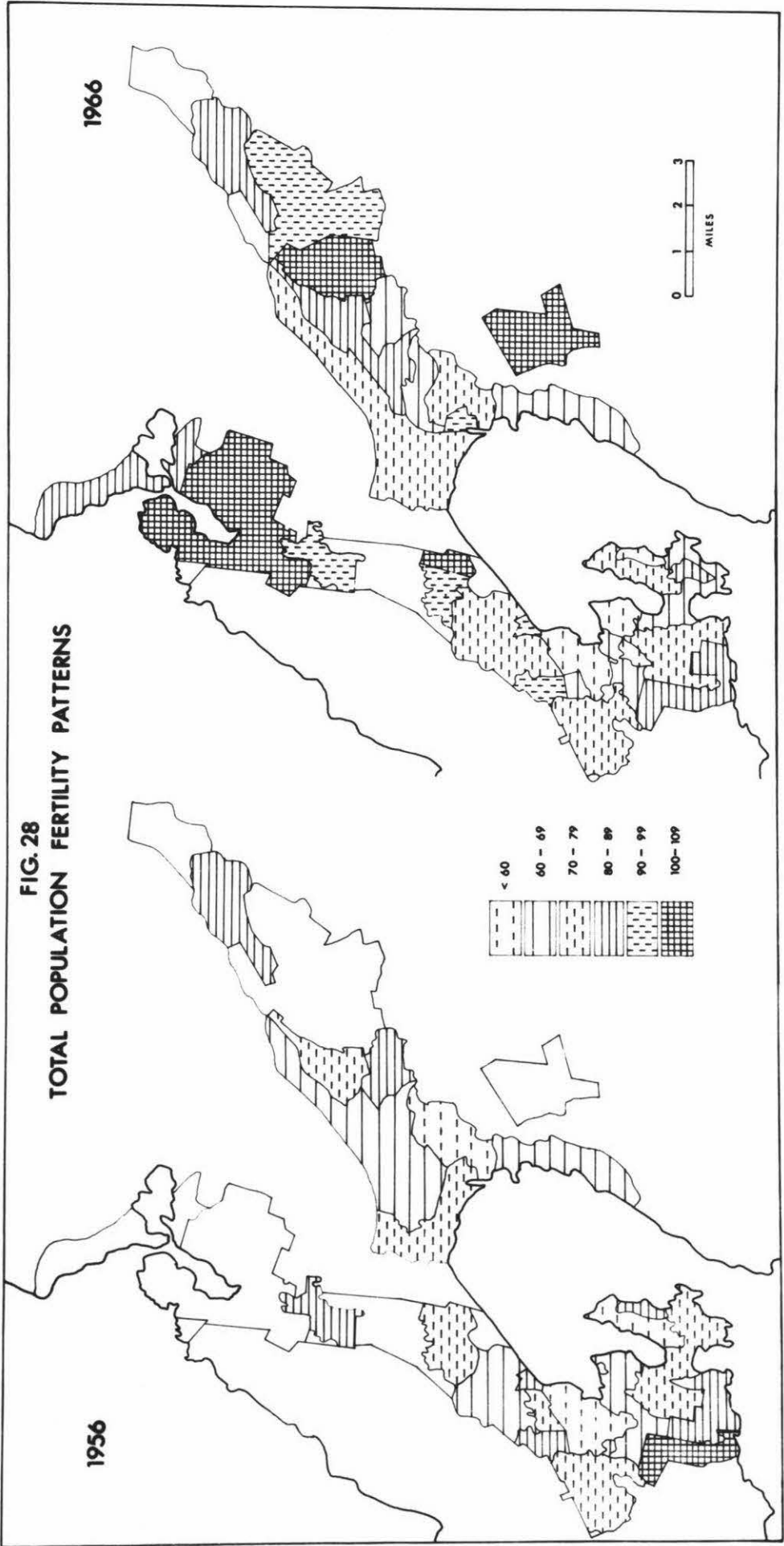
Intra Urban Fertility Patterns, 1956-1966

In keeping with the fertility patterns established for Auckland (Curson, 1967a),² Christchurch and Dunedin (Heenan, 1967) the lowest fertility ratios at each of the census years were located in the inner-city area (e.g. Lambton Quay-Wellington Tce, 33.78 and 42.24 in 1956 and 1966, respectively).³ Ratios of less than 60.0 were also found in certain of the older residential sub-divisions in the southern portion of Hutt Valley (1956) and

in Mirimar, Kilbernie, Roseneath and Oriental Bay (1966).

From Figure 28 it was possible to identify a pronounced, although somewhat irregular, increase in the level of fertility between the inner urban area and the outlying residential subdivisions. In an attempt to clarify this pattern the urban area was again divided into zones and M.F.I. means established for each. The pattern which emerged took the form of a fertility-distance relationship. That is, as distance increased away from the centre of the urban area so also did the M.F.I. mean (see Figure 30). While this pattern tended to parallel those which had been established by Heenan (1967) for the Christchurch and Dunedin Urban Areas, it differed considerably from the 'U' shaped fertility-distance curve for the Auckland Urban Area (Keys, 1969). It must be pointed out, however, that the fertility-distance relationship is only valid as a generalisation, for after constructing a transect from the central-city to the periphery it was found that local fertility levels within a given zone diverged considerably from the M.F.I. mean obtained for the zone as a whole (see Table XIV).

Although the basic explanation for this variation in the total population fertility patterns lies in the widely varying age-sex structures of the population, it is only when this variation is seen in the light of related socio-economic factors that a more complete explanation of the pattern can be offered. For example, low M.F.I.'s in the inner-city area as well as being attributable to the generally older age structures are also a reflection of (a) the career orientated life-styles of the younger single and married inhabitants of the inner-city,



(b) the types of housing available, and (c) the higher occupational status of inhabitants in selected inner-city sub-divisions.⁴

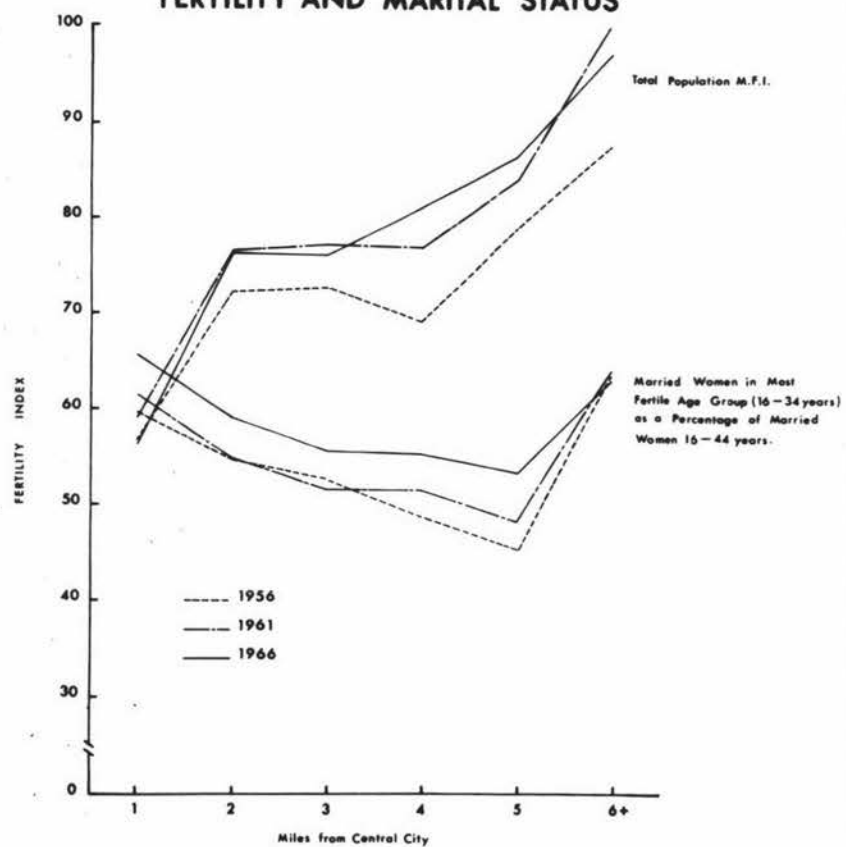
TABLE XIV: Zonal M.F.I. Means 1956 and 1966

Zone	1956	Std Deviation	1966	Std Deviation
1	56.87	10.81	56.13	11.54
2	72.12	7.53	75.08	10.86
3	72.63	13.37	76.03	7.62
4	69.16	7.26	81.18	11.05
5	78.86	4.33	86.52	16.29
6	87.54	1.33	93.31	11.72

Source: New Zealand Census of Population and Dwellings, 1956, 1966. Volume 2 'Ages and Marital Status'.

The point relating to the life-styles of the younger section of the population in the inner-city is exemplified to a certain extent in Figure 31. It depicts the relationship between M.F.I.'s and the proportion of married women in the potentially most fertile age group (16-34 years) to all married women in the reproductive age span 16-44 years. As illustrated in Figure 31 the proportion of married women in the potentially most fertile age group increased (from 59.54 per cent to 65.82 per cent) over the period 1956 to 1966. Over the same period, however, M.F.I.'s for the central zone remained the lowest for the urban area and actually experienced a decline between 1961 and 1966 from 59.06 to 56.13, indicating, it would seem, a trend of continuing employment after marriage and delayed establishment of a family. Other points to emerge from the graph include the following.

FIG. 29
FERTILITY AND MARITAL STATUS



1. A decline in the proportion in the potentially most fertile age group from the central-city out as far as zone five and then a sharp increase due mainly to (a) the recency of residential development at the periphery, and (b) an influx of young married couples in the process of establishing families.
2. A pronounced variation in the extent of fertility change over the period 1956-1966 both with distance from the central-city and within the individual zones, due primarily to the varying rates of cyclical ageing within each of the sub-divisions.⁵

The above features are paralleled to a large extent in the research undertaken on fertility patterns in the Dunedin Urban Area. According to Lewthwaite and Forrest (1971) fertility patterns in the Dunedin Urban Area were explainable in terms of the degree of commitment shown by the population in various areas to a particular life-style. Briefly, the three major life-styles were familism, where child-bearing is the dominant factor, careerism, a way of life orientated towards vertical social mobility, and consumerism, a trade off of family size in favour of material possessions. As in Wellington-Hutt, their study highlighted the zonal dichotomy between the family orientated suburbs of the periphery and the career-consumer orientated inner-city residential areas. Lewthwaite and Forrest also indicated that the variations in fertility within a zone dominated by familism were affected by the age and stage in the family or life cycle. This appears to apply equally well to the Wellington-Hutt Urban Area.

In the majority of cases the average family is unable to purchase a home immediately. As a result (especially in the pre-child stage of the family cycle) it will tend to live initially in rented accommodation in areas dominated by non-familism orientated groups. For couples with children and on low to middle incomes there are two basic possibilities with regard to accommodation. They can either rent houses from the State or participate in any of the various forms of low cost State Advances Corporation financed housing schemes. Such schemes have given rise to the all too common 'one generation' suburbs, evident not only on the periphery of Wellington-Hutt, but also in other major and secondary urban centres throughout New Zealand. For those families who do not qualify for State assistance the choice has very often been limited to renting a home or flat in an inner suburban area otherwise characterised by older families.

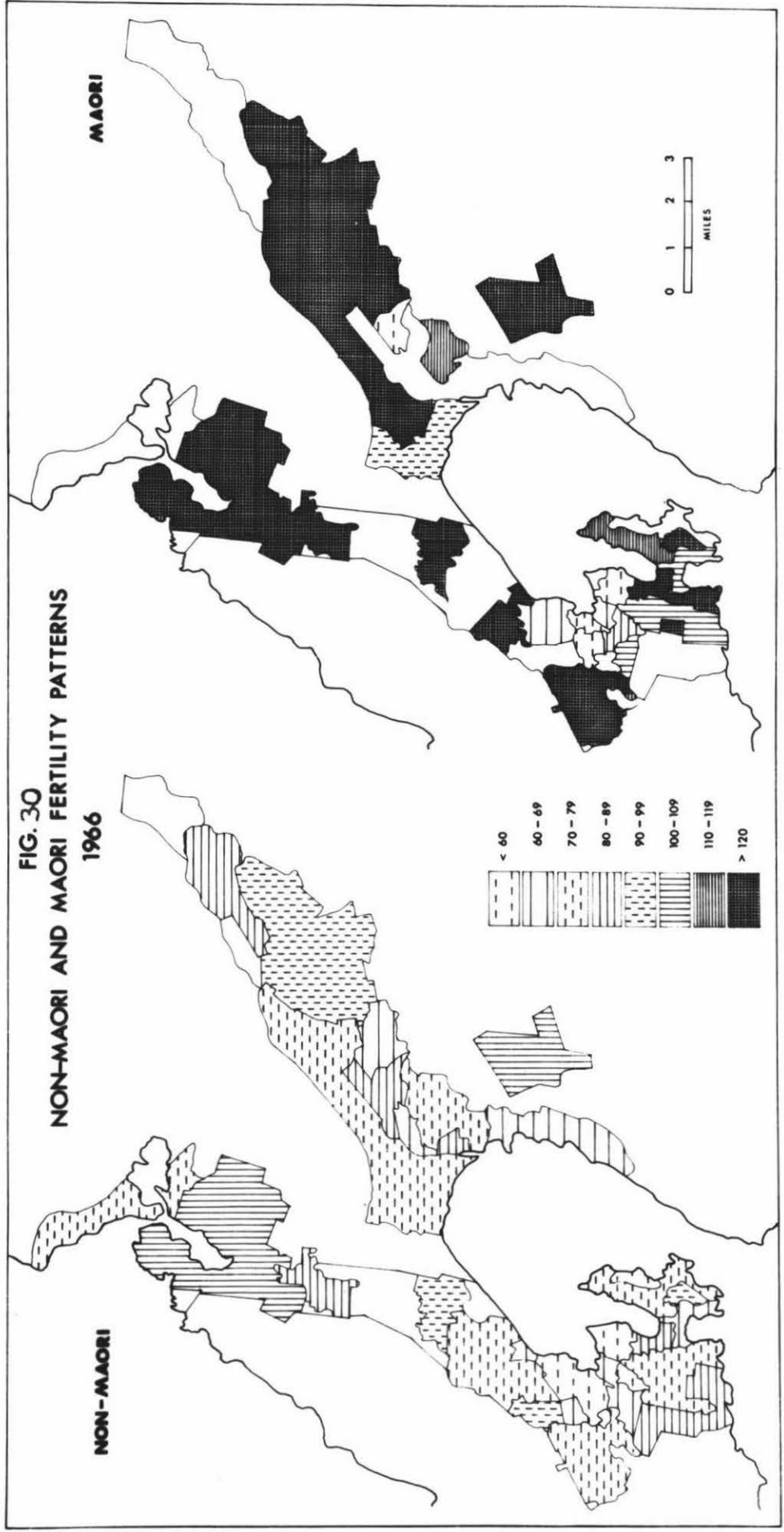
In a review of overseas fertility research Keys (1969) indicated that in recent years the relatively straight-forward linear relationship between fertility and occupational status (i.e. fertility decreases as occupational status rises) has changed. In place of the simple inverse relationship between fertility and occupational status there has been a tendency toward the development of a parabolic curve with low and high status groups exhibiting high fertility and middle status groups remaining low. In his own study of Auckland fertility differentials, Keys was able to suggest that a similar trend was occurring and that although the lowest occupational class was slightly higher in mean fertility than the highest occupational class, wives of lower class white collar workers recorded appreciably lower levels than either of

the other two groups. By limiting family sizes they have the opportunity to purchase considerably more consumer goods than would normally have been the case, thus paving the way for upward social nobility.

From the present study it would also appear that occupational status is a factor worthy of consideration in explaining intra-urban fertility variation. This point can be illustrated with reference to two sub-divisions, Kaiwharawhara and Wadestown, situated in close proximity to each other. In 1966 these two sub-divisions recorded M.F.I.'s of 92.50 and 75.99, respectively. While the age structures of the two sub-divisions differed slightly ('late youth' compared with 'early mature') the importance of occupational status as a determinant of fertility is reflected in the fact that while Kaiwharawhara had only 1.28 per cent of its actively engaged population in higher status occupations (i.e. Professional, Technical, Administrative and Executive) Wadestown had 41.07 per cent.⁶

Maori and Non-Maori Fertility Patterns⁷

Due to a lack of published data for 1956 and 1961 comparison of Maori and non-Maori fertility ratios was limited to 1966. From Figure 30 it is evident that Maori fertility levels followed those of the non-Maori population most closely in the central city area. One of the main reasons for this similarity is that the central-city remained a reception area for young Maori rural-urban migrants, though to a lesser extent than in



previous years due to the gradual redistribution of relatives and friends to the more peripheral parts of the urban area. Frazer (1970), for example, has shown that migrants moving to Wellington-Hutt from the East Coast of the North Island have taken up residence directly at the periphery (Wainuiomata), rather than in the inner-city as had previously been the case.

In accordance with the trend established for the total population the level of fertility for both groups increased, although again somewhat irregularly, with distance away from the central-city. One of the most striking features, however, was the extent to which M.F.I.'s of the Maori population exceeded those of the non-Maori population, not only in the large peripheral sub-divisions of Porirua and Wainuiomata but also in the older residential sub-divisions such as Ngaio and Melrose.⁸

In explaining these variations possibly two of the most important factors to be considered are (a) the rural background of the Maori population with its tradition of large families, and (b) inadequate time or desire to adopt values held by the non-Maori population regarding family size. Ritchie and Ritchie (1968, 312), for example, have noted from their research into Maori child-rearing patterns that while rural-urban migration has delayed marriage slightly, it has as yet done little to reduce family size. This they claim will only come about with time, as a result of the added psychological and sociological pressures encountered in living in an urban (pakeha) environment.⁹

Total, non-Maori and Maori fertility means are presented in Table XV. In order to illustrate the spatial

significance of the variation depicted between the non-Maori and Maori groups, a Maori non-Maori fertility differential was established for each of the sub-divisions and a fertility gradient produced to illustrate the mean variation from the central city to the periphery. The method of obtaining the differential was simply to divide the Maori M.F.I. by the non-Maori M.F.I. Where the differential was above 2.0 the Maori M.F.I. was more than twice that of the non-Maori and where the differential was below 1.0 the Maori M.F.I. was below that of the non-Maori population.¹⁰

TABLE XV: Total, Non-Maori and Maori Fertility
Wellington-Hutt Urban Area, 1966

	Number of sub-divisions with M.F.I.'s above 100	Mean M.F.I.	Std-Deviation
Total	4	75.08	15.21
Non-Maori	2	73.97	14.02
Maori	25	119.28	46.72

Source: New Zealand Census of Population and Dwellings, 1966. Volume 2 'Ages and Marital Status'.
 Unpublished census results, Department of Statistics, Population Branch, Lower Hutt.

Most prominent among the features to emerge was the differential which existed at the periphery. As shown in Table XVI Maori M.F.I.'s in the majority of areas of recent residential development are at least double those of the non-Maori, and in these areas had a considerable influence on the M.F.I.'s recorded by the total population (see Figure 31).

FIG. 31
1966 NON-MAORI AND MAORI FERTILITY DIFFERENTIALS

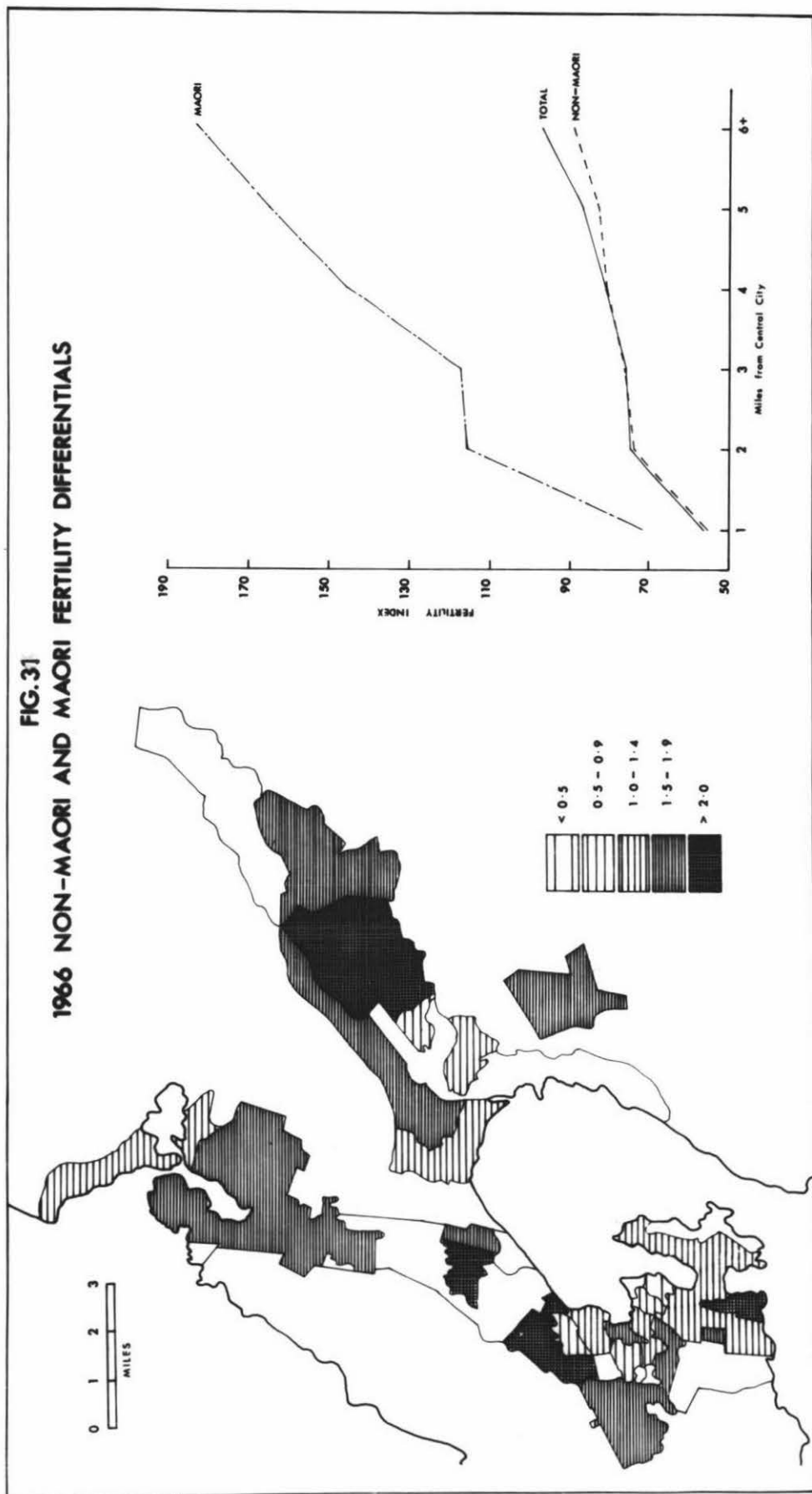


TABLE XVI: Peripheral Fertility Patterns,
Wellington-Hutt Urban Area 1966

Sub-division	Maori M.F.I.	Non-Maori M.F.I.	Differential
Stokes Valley	218.61	90.16	2.42
Johnsonville	194.11	90.58	2.14
Wainuiomata	189.41	102.77	1.84
Newlands	187.50	98.79	1.89
Porirua	181.10	101.77	1.78

Source: New Zealand Census of Population and Dwellings, 1966.
Volume 2, 'Ages and Marital Status'.

Peripheral sub-divisions were not exclusive in recording such high differentials. These were also recorded in certain of the middle sub-divisions, such as Berhampore (1.85) and Brooklyn (1.56), and in inner-city sub-divisions such as Mt Cook-Wallace St (1.58) and Lambton Quay-Wellington Tce (1.92). As only small numbers of Maoris are involved these large differentials for sub-divisions in the inner-city and middle distance sub-divisions are not as significant as those occurring at the periphery. Only five sub-divisions recorded differentials of less than 1.00; these were Epuni (0.68), Mt Victoria West (0.92), Wadestown (0.87), Kelburn (0.94) and Haitaitai (0.46). In the main, Maoris in these sub-divisions were predominantly in the 'migrant' age group. Consequently it could be expected that young Maori families would only form a small proportion of the total Maori population to be found in such areas.

Summary

Just as demographic features examined in previous chapters have generally corresponded with patterns and changes observed in New Zealand's other major centres, so too have fertility patterns. Fertility ratios in Wellington-Hutt were lowest in the central city area, increased away from the central city to reach a maximum at the periphery, and changed over the period primarily in response to either cyclical ageing or rejuvenation of the population within each of the sub-divisions. One point on which variation did occur, however, between Wellington-Hutt and the Auckland Urban Area was the pattern established for the mean M.F.I.'s away from the centre of the urban area. Due mainly to the higher proportion of non-Europeans within the inner-city of Auckland, higher mean fertility ratios were recorded (Keys, 1969) than in Wellington-Hutt.

Patterns exhibited in Figures 28-31 can only be adequately explained when both age-structures and socio-economic factors such as life-styles, houses available and occupational status are taken into consideration.

Due to the limited nature of data only one minority group, the Maori population at 1966, was examined. Despite this limitation one of the most striking features to emerge was the fact that although Maoris and non-Maoris both recorded their highest fertility indicies at the periphery, the fertility indicies of the Maoris were often more than double those of the non-Maori population. As Ritchie and Ritchie (1968) have indicated the higher ratios are probably due primarily to the shorter urban

history of the Maori population coupled with a value system which has been orientated towards a larger family unit.

NOTES

- 1 For examples of this point see Appendix G.
- 2 In the study undertaken by Curson (1967a) fertility ratios were based on all women between the ages of 15-44 years as opposed to married women in the age group 16-44 years. For this reason fertility levels in his study were considerably lower than those established in the present study. For example, while the fertility ratio of central Auckland calculated by Curson (1967a) was 18.9 (1961) the corresponding reading for the central-city area of Wellington-Hutt using the M.F.I. method was 39.90 (Lambton Quay-Wellington Tce).
- 3 For detailed information on fertility ratios in individual sub-divisions see Appendix K.
- 4 This point is also brought out in Rosenberg's (1971) study which examines the relationship between income and family size in New Zealand.
- 5 Rates of increase in fertility from one zone to another, especially in the outer zones which contained fewer sub-divisions, were influenced to a considerable extent by the ratios recorded in only one or two sub-divisions. For example, the higher peripheral reading for 1961 (100.73) than for 1966 (97.31) was brought about to a certain extent by the decline in the M.F.I. of Upper Hutt (94.57 to 80.40) in spite of ratios such as 109.95 and 103.59 being recorded for the sub-divisions of Porirua City and Stokes Valley.
- 6 See Appendix L for a detailed analysis of occupational status at the sub-division level.
- 7 Data for Maoris in this section of the chapter was based on unpublished computer runs from the 1966 Census, the initial year information on Maori Marital Status by age groups at the sub-division level was processed.
- 8 For Maori and non-Maori fertility ratios at the sub-division level see Appendix K.
- 9 For a more detailed discussion of Maori child-rearing patterns see Ritchie and Ritchie (1968) and Ritchie and Ritchie (1970).
- 10 See Appendix K for a complete list of Maori/non-Maori differentials.

CHAPTER 5

DEMOGRAPHIC CHANGE AND PLANNING: AN EXAMPLE

To this point attention has been directed mainly towards the examination and explanation of patterns and changes which have occurred among a number of demographic variables. The purpose of this chapter therefore is to examine both the implications demographic change can have for planning within the community, and the measures needed to overcome problems which may result.

While it is fairly well known that demographic change has a considerable bearing on the demand for certain types of recreational and educational facilities, a fact which is not well known outside industry (and in some cases even within industry) is the effect demographic change, especially family formation and subsequent cyclical ageing, can have on the supply of labour for industry. Woods (1970, 5) has cited this example with regard to the Hutt Valley and ventured the opinion that 'industrialists still exist who will be attracted by areas such as Porirua East, just as an earlier generation of them were attracted by the Hutt Valley.... There are still fingers waiting to be burnt.' For this reason attention will be focussed on this particular aspect of planning within the context of the labour requirements of the Hutt Valley - an area where the problem is most obvious. From an economic and geographic standpoint the Hutt Valley has always been an ideal location for industry. Its central location,

proximity to the port of Wellington, good transport links, large open areas and ready access to raw materials and markets, have enabled the Hutt to become one of New Zealand's major industrial areas.

Until World War I the Hutt Valley was primarily a farming and market gardening area supplying Wellington with primary products. In the late 1920's, however, the pace of development quickened as a result of the transfer of the railway workshops to Woburn and the establishment of motor assembly plants, bulk storage tanks and other industries which were either generated or attracted by them. Thus, with the exception of the freezing works, wool and leather processing, industry in the Hutt Valley over the last forty years has developed along two main lines, namely (a) engineering and the assembly of motor vehicles and electrical equipment, and (b) the processing of foodstuffs, chemicals, rubber, plastics and tobacco. These activities emerge clearly as distinguishing characteristics of the Hutt industrial area in Cant's (1971) analysis of New Zealand manufacturing. Generally, manufacturing industry in the Hutt Valley has tended to be of a heavier nature than in Wellington, has operated on a larger scale and has, as a consequence, required a larger labour force.¹

In the future it is likely that the basic advantages held by the Hutt Valley as a site for the location of industry will remain. However, together with the availability of land,² one of the main factors governing expansion will be the availability of labour. It has been estimated by the Labour Committee of

the National Development Council that in the five years ending April 1973 the New Zealand labour force would have to grow by some 13 per cent if targets for the period were to be reached (see Perry, 1969, 11). By using this figure as a guide it is possible to calculate the rate of labour force expansion required by the Hutt Valley to retain its national position in terms of industrial production.

In the five year period 1961-1966 the Hutt Urban Area population increased from 98,988 to 114,628; an increase of approximately 15 per cent. Over the same period the labour force underwent an increase of 21 per cent. Using the 1961-1966 growth rate it was estimated that the growth likely to occur in the 1966-1971 period would boost the population in the Hutt Urban Area to approximately 130,000 or by more than 13 per cent of the 1966 figure.³

Had the projected increase occurred, the Hutt Urban Area as a whole would have experienced sufficient growth to provide the required labour force. Unfortunately the projected population was considerably in excess of the actual population size attained (i.e. 122,989 in 1971 or only 7.3 per cent above the 1966 figure). While the rate of growth over the period (1961-1971) was behind that required to experience the maximum growth in production, labour shortages were further intensified by the pattern of growth which occurred within the urban area. As indicated in Chapter 1 the major areas of population growth over the period 1956-1966 were the newer peripheral sub-divisions such as Wainuiomata, Stokes Valley and Upper Hutt. The older residential areas in the lower part of the valley contiguous with or adjacent to the

industrial areas, were showing only marginal increases or slight declines (see Table XVII).

What does this changing distribution of population mean in terms of labour force potential? The answer to this question is relatively simple. Industry needs an assured labour supply, which in turn necessitates the continuance of a population that is balanced in terms of its age and sex composition. These, of course, are precisely the requirements jeopardised by demographic changes taking place in the Hutt Valley.

To meet these continuing requirements of an assured labour supply drawn from a balanced population it is essential that a variety of accommodation types be provided - not simply housing for the young family man. When such is the case and the bulk of dwellings for sale are (broadly speaking) houses on the urban periphery and relatively expensive flats in established areas, and when houses from the State, after an initial period of rental, pass into private ownership, then it is likely that after only twenty years serious housing problems will confront new arrivals and new families. Furthermore, the stock of houses in established areas will be occupied by ageing (possibly retired) couples whose children have left home. The implications of this point are clearly illustrated in the Hutt Valley (see statistics on dwelling densities and age specific net migration gains/losses in Table XVII).

Up until the late 1950's, the labour requirements of industry in the Hutt Valley had been met largely by the resident population. Housing areas such as Taita and Naenae, which had

TABLE XVII:

Factors Influencing Labour Shortages in the Hutt Valley

Sub-division	Increase		% Increase	% Distribution of total increase	Dwelling Density		% Age Specific Net Migration 10-14 yrs (1961)	% Age Specific Net Migration 15-19 yrs (1961)
	1961	1966			1961	1966		
Wainuiomata	8,043	13,984	73.4	37.8	4.0	4.4	36.89	273.85
Stokes Valley	4,055	7,155	76.4	19.8	3.9	4.2	32.61	128.48
Upper Hutt City	16,861	19,084	13.2	14.2	3.8	3.7	-18.80	-17.19
Boulcott Avalon	3,724	4,291	15.2	3.6	3.6	3.4	8.66	18.52
Western Hutt	4,524	5,057	11.8	3.4	3.5	3.5	19.47	20.05
Taita	6,664	7,053	5.8	2.5	4.6	3.9	-8.28	-24.34
Petone	9,891	10,143	2.6	1.6	3.4	3.4	39.14	25.42
Epuni	6,104	6,347	4.0	1.6	3.7	3.2	25.13	-28.53
Eastbourne	2,653	(2,795)	5.4	0.9	4.7	2.9	50.69*	46.63*
Seaview Gracefield	416	526	26.4	0.7	5.2	6.3	80.69	51.35
Hutt Central	4,299	4,409	2.6	0.7	3.6	3.3	2.42	-1.85
Woburn	1,672	1,748	4.5	0.5	3.7	3.4	15.38	-9.40
Rest of Urban Area	8,496	(9,505)	32.5	17.7	-	-	-	-
Waiwhetu	11,721	11,491	-2.0	-1.1	3.8	3.3	21.59	-40.28
Moera	3,696	3,531	-4.5	-1.1	3.7	3.4	8.54	-16.44
Waterloo	4,639	4,432	-4.5	-1.3	3.4	3.1	-3.34	-14.46
Naenae	1,530	1,363	-10.9	-1.5	4.2	3.9	-19.28	-39.46

continued over ...

- Notes: 1 Figures which appear in brackets have been adjusted to allow for the 1965 boundary change in respect of Eastbourne.
- 2 Net migration figures for Eastbourne are based on unadjusted figures after boundary changes, therefore net migration gains are over stated.

Source: New Zealand Census of Population and Dwellings, 1961, 1966. Vol. 2 'Ages and Marital Status'.

been developed almost entirely for residential purposes after World War II and occupied by married couples with young families, had aged to the extent that children were reaching school leaving age and were available to take up positions in industry. To take advantage of this apparently 'mushrooming' labour supply, and so increase production, industrialists expanded existing factories and established new plant. What, it would seem, they had failed to take into account was the process of 'cyclical-ageing' no doubt accentuated by the prior pattern of residential development and home ownership. Thus, by the 1960's many of the young single workers who had grown up in the area were reaching the age for marriage, family formation and, by necessity, were establishing their homes in the newer residential areas such as Porirua, Newlands, Wainuiomata, Stokes Valley and Upper Hutt (see Table XVII). This net outward movement has meant that after twenty-five years former reservoirs of labour such as Taita, Naenae, Waiwhetu and Waterloo have embarked upon a process of accelerated ageing, resulting in a rapid decline in the resident labour force and an intensification of the labour shortages experienced by local factories.⁴

This situation has been further aggravated by the fact that the Hutt Valley, to some extent, has become a dormitory area for Wellington City. It was estimated as long ago as 1965 that each day upwards of 14,500 of the Hutt Valley's population, primarily 'white-collar' workers, commuted to work in the capital.⁵

Overcoming the Problem

The problem of a labour shortage as it exists in the Hutt can be looked at from two points of view; first, the measures that have been attempted to overcome the problem to date, and second the additional measures which need to be adopted in the future. To date, one of the most obvious attempts on the part of industry to lessen the problem of labour shortage has been the relocation of factories in areas which have a more balanced population and a greater labour force potential. One example of such a move has been the relocation of the General Motors motor vehicle assembly plant in Upper Hutt after facing continuing labour shortage problems in Petone. Todd Motors, another motor vehicle assembly plant, has also announced relocation plans involving a move from Petone to Porirua.⁶

Moves such as this can be considered most beneficial to industry and the employment needs of newer residential areas. However, the relocation of industry to areas with 'youthful' workforces should be examined very carefully, for although satisfying an immediate demand, the young workforce, unless it has the opportunity to mature and establish homes in that particular area, is likely to act in such a way that these new residential areas will eventually incur much the same problems as the lower end of the Hutt Valley. As the immediate past Secretary of Labour, N. Woods (1970, 5), has indicated, industrialists still exist who are attracted by an immediate supply of labour without fully appreciating what is likely to happen to that supply over a period of time.

Other measures, which have been attempted as inducements to secure labour from more distant areas, have been the payment of a travelling expense and the provision of transport to and from work. These measures have resulted from the following facts:

(a) passenger rail services only pass through a small portion of the Hutt Valley industrial area, and (b) there is no direct public transport link between the labour supply of the Porirua Basin and the employment opportunities of the Hutt Valley. Some indication of the importance of labour from outside the Hutt Valley is gained when the results of a survey conducted by the Hutt Valley Chamber of Commerce and Industry (Inc.) are taken into consideration. From a sample of firms which together employed 5,151 people it was found that 895 or 17.4 per cent of employees lived outside the Hutt Valley, Wainuiomata and Eastern Bays area. To this can be added the current scheme of short-term employment of temporary immigrants from the island of Tonga.

Although the steps taken by industry have gone some way toward alleviating the problem they have by no means been sufficient to overcome it. Labour shortages, while related to the problem of access, have as their root cause the chronic shortage of housing for middle and low income groups. This shortage has been brought about by two factors. First, a large proportion of houses in older residential areas are occupied by only one or two people when in actual fact they may have been designed for a family of four, five or six, and second, while industry has expanded the pace of housing development has declined to such an extent that it is unable to keep up with the demand. For example, of the 1,100 applications for State rental housing lodged with the State

Advances Department in 1970, 460 stated they would accept accommodation in the Hutt Valley and a further 470, already in State housing in the Wellington region (primarily Porirua East) had applied for transfer to the Hutt.⁷ Furthermore these 930 families wanting accommodation in 1970 may be considered a conservative figure. It seems likely that many other families would not have bothered to file applications as it was well known that no new housing development was being contemplated close to industry at that stage.

At present the lack of housing is effecting Hutt Valley industry in a variety of ways:

1. It is preventing employees from taking part in training and retraining programmes provided by the Technical Institutes.⁸ Time that could be profitably spent in continuing education is at present taken up travelling to and from work.
2. It is hindering, if not preventing, the maximum use of factory plant. An increasing number of factory installations are designed for automatic continuous processing. Without the labour to operate shifts, high capital cost equipment has to be operated intermittently and consequently uneconomically.
3. It is limiting the participation rate of women in the workforce. Compared with countries such as Britain and France the labour force participation rate of New Zealand women has been relatively low (see Gilson,

1969b). With changing social attitudes women, and especially married women with few commitments, are prepared to take a more active role in industrial employment. Distance to be travelled to and from work, however, has been one of the prime obstacles.

4. Lack of suitable accommodation in the Hutt Valley has also been a major deterrent to employers using the Assisted Immigration Scheme. The Immigration Division of the Department of Labour maintains that employers seeking assisted immigrants must guarantee suitable transitory accommodation in advance at a rent within the means of the prospective employees. Over the years the Division has offered immigrants to Hutt Valley employers, but a lack of suitable accommodation has meant that they have been unable to accept them. Consequently immigrants have been placed successfully in other urban centres where the housing situation is (relatively speaking) more relaxed.

In recognition of the important role housing will play in the Hutt Valley, local bodies, especially the Lower Hutt City Council, have been active on a number of fronts. These have included (1) acquiring land from government for the development of new sub-divisions, (2) acquiring loans from government through the State Advances Corporation for the development of medium density, pensioner and other housing,⁹ and (3) setting aside certain areas within the city as redevelopment areas¹⁰ for medium and high density housing. Some of these proposals have already

been put into operation, but it remains to be seen how effective they will be in overcoming the problem.

Finally, to put labour shortages in a wider perspective they should be viewed in conjunction with other (closely associated) current urban planning problems. These include (a) the extension of essential services such as water, power, transport and communications to the new peripheral housing areas, (b) the provision of new educational, recreational, commercial and other community facilities at the periphery (when existing facilities in older residential areas are under utilised),¹¹ and (c) the prevention of an overloading of existing facilities, such as drainage and sewerage from the new Western Hutt residential areas. From this wider perspective the nature and extent of structural dislocations (social, economic, political, technological) occasioned by changes in the demographic base of a complex urban system become ever more apparent.

Summary

As a result of changes which have taken place in the distribution and age structure of the population, closely associated with the supply and availability of housing, industries located in the Hutt Valley are facing severe labour shortage problems.

Up until the late 1950's and early 1960's industries were able to capitalise on an abundant supply of 'youthful' labour

found primarily in the post World War II housing areas in the middle and lower valley. By the mid-1960's, however, the picture had changed. Many of those who had formed the workforce were reaching the age of marriage and family formation and were moving to the periphery to set up homes. Behind them they left a rapidly ageing population incapable of furnishing the labour required of it. The result was an intensification of the existing labour shortage.

In an attempt to overcome the problem various proposals have been put forward and attempted. The relocation of industry to areas capable of providing an assured workforce has been one of the most obvious moves on the part of industry. The provision of transport, in the absence of an efficient public transport system linking the peripheral areas to the west with the Hutt Valley industrial area, is another. While these moves may alleviate the problem, it will only be resolved when it is tackled at its root; that is, by overcoming the chronic shortage of housing for middle and low income groups. At the present time interested bodies, especially local government bodies, are working towards this end by setting aside older residential areas within the city for redevelopment, and by acquiring from government loans and land to provide a variety of accommodation types suitable for all sections of the workforce.

NOTES

- 1 As at April 1972, manufacturing accounted for 3,500, 14,503 and 11,105 of the actively engaged in Upper Hutt, Lower Hutt and Wellington Urban Areas, respectively (or 49.4 per cent, 47.26 and 13.75 per cent of the total actively engaged in each area, respectively). See Labour and Employment Gazette, 22 (1972), 63.
- 2 For example, the cost of industrial land per acre in 1970 in selected areas was as follows: (a) vicinity of Lower Hutt and Petone, \$100,000 per acre, (b) Seaview and Taita, \$50,000-\$60,000, and (c) Wainuiomata, \$7,000-\$8,000. See Labour and Employment Gazette, 20 (1970), 51.
- 3 Based on figures provided in Population Estimates, 1966-1986, Town and Country Planning Branch of Ministry of Works, 1967.
- 4 Unfortunately, the only published statistics on vacancies in the Hutt Employment District are the following:

	April 1965 No.	Vacancies per 1,000 employed	October 1970 No.	Vacancies per 1,000 employed	October 1971 No.	Vacancies per 1,000 employed
Hutt Employment District	1,112	33.5	1,916	53.3	1,124	30.7
Total New Zealand	18,938	26.0	26,558	33.9	17,211	21.7

Source: Labour and Employment Gazette, 15 (1965), 40; 22 (1972), 15.

- 5 See Labour and Employment Gazette, 15 (1965), 39-43.
- 6 The immediate reason for the Todd Motors move from Petone is the extension of the Hutt Motorway through the present factory site. However, relocation in Porirua (Elsdon) was governed by the widely publicised availability of land and labour. It is expected that staff size at the new premises will eventually reach 2,000, off-setting the traditional labour problem. See Labour and Employment Gazette, 22 (1972), 50.

- 7 Hutt Valley Chamber of Commerce and Industry (Inc.) 1971, 'Second Submission to Commission of Inquiry into Housing'.
- 8 By 1974 the Hutt Valley will have New Zealand's national centre of technical training, The Central Institute of Technology at Heretaunga in addition to the institute at Petone.
- 9 In The Evening Post, 1971, August 30, it was reported that loans to the extent of \$1,036,500 and land in the vicinity of 70 acres had been acquired from Government for housing development in the Hutt Valley.
- 10 For a detailed discussion of the problems associated with housing redevelopment in the Hutt Valley, see Sears (1969).
- 11 An almost classic example is the short-lived history of the Waiwhetu Girls High School, now converted to other uses.

CONCLUSION

Essentially, the overriding aims of the present study have been to examine and account for population changes which occurred in the Wellington-Hutt Urban Area over the period 1956 - 1966. To fulfil these aims and to give the study an analytical framework a number of tentative hypotheses were formulated (see Introduction). In general the initial hypotheses proposed have been shown to be correct.

Patterns of demographic change experienced by the Wellington-Hutt Urban Area have closely paralleled the changes which have taken place not only in the country's other major urban centres but also in the larger secondary centres as well. For example, despite restrictions imposed by the physical characteristics of the Wellington-Hutt landscape, concentric spacial patterns and changes observed in relation to population growth and decline, the residential distribution of non-European groups, age-sex variation and fertility are very similar to those recorded in centres such as Auckland, Dunedin and Palmerston North. Two of the most important factors underlying this unity of experience and spatial organisation appear to have been the concurrent processes of suburbanisation and government direction and planning. Pressure on land in the older more established areas has meant that both State and private residential development has had to take place on the periphery where land is

more readily available for large scale housing development. This concentration of residential development on the urban periphery has been further reinforced by institutional factors such as the lending policy of the State Advances Corporation which provides maximum loans only for building of new homes.

Patterns exhibited by each of the variables examined are, to varying degrees inter-related. Moreover, as illustrated throughout the first four chapters, there exists a basic polarity between the demographic patterns of the inner-city and the urban periphery. While the inner-city is characterised by population decline, net out-migration, 'senile' age structures and low fertility levels, the new residential sub-divisions on the periphery are characterised by rapid population growth brought about by high levels of net in-migration (especially of young adults and families) and reinforced by high levels of fertility.

When the demographic patterns of the Maori population were isolated from those of the total population it was found that considerable variation existed in the spatial configuration of the variables examined. Inner-city growth rates of the Maori population were positive when those of the total population were negative, age-sex structures more youthful and fertility levels considerably higher. Overall, the variation which existed between the two groups was greatest in the inner-city and diminished toward the periphery. However, with regard to fertility patterns the opposite was the case. Although M.F.I.'s for both groups increased away from the centre of the

urban area and reached a peak at the periphery, the variation between the fertility levels recorded by the Maori and total population was considerably greater at the periphery than at the centre.

From the examination and discussion of patterns and changes in the first four chapters an impression was gradually gained that life-cycle stages and associated age-sex structures were perhaps the most important factors accounting for the demographic patterns which emerged in the study. In order to test this impression a factor analysis of the demographic variables has been carried out. According to Kerlinger (1964, 650) factor analysis may be defined as:

... a method for determining the number and nature of the underlying variables among large numbers of measures. More succinctly, factor analysis is a method for determining k underlying variables (factors) from n sets of measures, k being less than n . It may also be called a method for extracting common factor variances from sets of measures.

The objective here was to determine the underlying factors among twenty sets of population data compiled for fifty-five sub-divisions of the Wellington-Hutt Urban Area. Measures included in the factor analysis were derived from the variables examined in the previous chapters, and are listed in Table XVIII. As complete data sets could not be produced from official published statistics for three (i.e. Heretaunga-Pinehaven and parts of the Hutt County) of the specified fifty-eight sub-divisions of the Urban Area they were excluded from the analysis.

The final results, presented in the form of orthogonal varimax rotated factor loadings on the twenty variables, are recorded in Table XVIII and may be briefly summarised as follows:

- (a) Factor I, with high loadings on (and a high monotonic relationship between) population growth, net migration (especially of young adults), marital status of females and percentage of population under five years of age, is clearly a measure of 'stage in life cycle' which can be interpreted as one of family formation at the periphery of the Urban Area (confirmed to some extent by the positive loadings on variables 9, 11 and 13). This factor accounted for 40.38 per cent of the variance and in many respects resembles the first factor identified by Bowman and Hosking (1971) in their study of the factorial ecology of Auckland.
- (b) Factor II, accounting for 38.88 per cent of the variance, appears to be a basically bi-polar measure of age structure with high positive loadings on variables 7, 8, 12 and 18 (percentage under 5 years, percentage 5-14 years, dependency ratio and marital fertility index, respectively) and high negative loadings on variables 10, 11, 13 and 15 (percentage 20-29 years, percentage 65 years and over, index of ageing and percentage net migration gain/loss 10-14 years, 1961-1966). In spatial terms this factor reflects the dicotomy between the inner-city and urban periphery, particularly when areas recording a net migration gain of those 15-19 years

TABLE XVIII Orthogonal Varimax Rotated Factor Loadings
on 20 Population Variables¹

Variables	Factors			
	I	II	III	IV
1 Annual Rate of Growth, Non-Maori, 1961-1966	-89	23	-28	-15
2 Annual Rate of Growth, Maori, 1961-1966	-47	19	13	04
3 % Net Migration Gain/Loss 1961-1966	-82	11	-29	-07
4 Residential Density, 1966	06	-70	12	04
5 Household Density, 1966	-16	18	14	-78
6 Ratio of Non-Europeans to Europeans, 1966	04	-14	84	-13
7 % Under 5 years of Age, 1966	-75	60	18	-12
8 % 5-14 years of Age, 1966	-40	88	01	03
9 % 15-19 years of Age, 1966	68	-10	-14	04
10 % 20-29 years of Age, 1966	-07	-91	20	03
11 % 65 years of Age and over, 1966	53	-61	06	29
12 Dependency Ratio, 1966	-59	74	19	06
13 Index of Ageing, 1966	34	-80	02	11
14 Sex Ratio, 1966	03	10	-02	81
15 % Net Migration Gain/Loss 10-14, 1961-1966	05	-73	13	-09
16 % Net Migration Gain/Loss 15-19, 1961-1966	-80	-43	09	-01
17 % Net Migration Gain/Loss 20-24, 1961-1966	-91	28	-07	-10
18 Marital Fertility Index, 1966	-44	73	26	-27
19 % Females 16-44 years of Age Married	-77	28	31	-21
20 Married Females 16-34 years of Age as % of all Married Females 16-44 years of Age	-49	-57	55	-09
Per cent 'Explanation'	40.38	38.88	10.30	10.42

Notes: 1 Decimal points omitted.

Source: Data compiled from New Zealand Census of Population and Dwellings, 1961, 1966.

of age (10-14 years in 1961 projected forward to 1966) are recognised as those inner-city areas characterised by pre-family formation 'careerism' implied in the negative loadings on variables 16 and 20. Even the high negative loading on residential density is consistent with the inner-city orientation of the other negative loadings on this factor. Thus factor II might therefore be better interpreted as a bi-polar measure of age structure and associated stage in life cycle, possibly a sub-dimension of Factor I, reflecting the dicotomy between the inner-city and the urban periphery.

- (c) Factor III, accounting for 10.3 per cent of the variance has a high loading on the ratio of non-Europeans to Europeans and a somewhat lower loading on variable 20 (married females 16-34 years of age as a percentage of all married females 16-44 years of age). This combination of loadings suggests the importance of ethnicity as a demographic variable, particularly in the inner-city and on the urban periphery (see Figure 29).
- (d) Factor IV exhibits a high inverse relationship between the sex ratio and household density, adding yet another dimension to the basic inner-city/suburban contrast.

In retrospect the factors extracted in this analysis confirm the impressions gained in the first four chapters of this study. The basic differentiating factors in the population geography of the Wellington-Hutt Urban Area are life cycle stages and associated age structures, Factors I and II together accounting

for 79.26 per cent of the variance among the twenty variables examined. In this respect the results conform closely with those obtained for other New Zealand urban areas (cf Bowman and Hosking, 1971). Translated into spatial patterns the results point unerringly toward the basic polarity between the inner-city and suburbs (particularly the urban periphery).

While the present study has to some extent indicated the nature and magnitude of population changes occurring within a New Zealand urban area, and ventured some preliminary explanations as to the causes, the implications of demographic change have been examined with reference to one example only. It is hoped that future studies will have as their prime objective the examination of the social and economic implications of such change. This, of course, will necessitate research of a sociological type to establish the interests, needs, preferences and prejudices of an urban population as a whole and sections thereof. The need for such research, for planning in particular, has been clearly stated by Sears (1969) and Gilson (1969c) with respect to housing in the Wellington-Hutt Urban Area. Such research should not be considered to lie beyond the customary role of the 'human' geographer.

APPENDIX A: CONCENTRIC ZONATION¹ OF WELLINGTON-HUTT URBAN AREA

- Zone 1 Thorndon-Tinakori Rd, Northland, Kelburn, Aro St-Nairn St vic., Mt Cook-Wallace St, Lambton Quay-Wellington Tce, Willis St-Cambridge Tce, Mt Victoria West vic., Oriental Bay, Petone.
- Zone 2 Kaiwharawhara, Wadestown, Ngaio, Wilton-Otari, Karori, Mitchelltown, Brooklyn, Vogelstown, Berhampore, Newtown, Kilbernie, Haitaitai, Roseneath, Taitville, Moera, Western Hutt.
- Zone 3 Khandallah-Nairnville, Happy Valley-Owhiro Bay, Mornington, Island Bay, Melrose, Lyall Bay, Strathmore, Mirimar, Karaka Bay-Worser Bay, Seaview-Gracefield, Waiwhetu, Woburn, Hutt Central.
- Zone 4 Newlands, Johnsonville Seatoun, Eastbourne, Waterloo, Epuni, Boulcott-Avalon, Raroa.
- Zone 5 Naenae, Taita, Wainuiomata.
- Zone 6 Stokes Valley, Tawa, Porirua City, Plimmerton-Paremata, Heretaunga-Pinehaven, Upper Hutt City, Hutt County Part (Wellington Urban Area), Hutt County Part (Hutt Urban Area)

Notes: 1 Zones centred approximately at area of earliest settlement and one mile in width.

APPENDIX B:

ANNUAL RATES OF INCREASE¹

Sub-Division	Total Population		Non-Maori Population		Maori Population	
	1956-61	1961-66	1956-61	1961-66	1956-61	1961-66
Stokes Valley	13.65	12.03	13.42	10.95	39.32	47.64
Taita	-0.40	1.14	-0.48	0.87	4.69	12.72
Naenae	-0.03	-0.39	0.04	-0.57	-0.73	6.91
Boulcott Avalon	1.81	2.87	1.80	2.77	4.94	21.45
Epuni	1.23	0.78	1.07	0.70	16.09	5.54
Waterloo	-0.96	-0.91	-1.05	-0.90	22.22	-2.82
Waiwhetu	-0.93	-0.91	-1.16	-0.75	2.85	-3.23
Seaview Gracefield	-9.00	4.80	-9.31	4.89	-1.02	2.97
Moera	-1.69	-2.85	-2.12	-2.97	19.88	12.09
Woburn	1.43	0.89	1.35	0.59	10.76	18.63
Hutt Central	0.37	0.51	0.34	0.40	7.88	17.19
Western Hutt	2.32	2.25	1.95	2.31	29.02	0.00
Petone	-0.95	0.50	-1.31	0.08	14.94	10.26
Eastbourne	0.10	1.13	-0.01	1.19	16.46	-8.73
Porirua City	11.50	6.91	11.06	6.13	17.83	15.06
Tawa Borough	12.09	6.46	11.90	6.27	43.44	18.78
Upper Hutt City	6.64	2.51	6.55	2.37	24.38	15.99
Plimmerton-Paremata	4.65	4.30	4.61	4.27	5.92	5.39
Wainuiomata	19.75	11.64	19.44	10.35	42.16	43.18
Heretaunga-Pinehaven	2.01	4.24	1.76	3.84	9.61	12.63
Hutt County Port	2.89	9.43	3.38	8.95	-17.93	35.52
Thorndon-Tinakori Rd	-2.34	-2.67	-2.95	-2.79	9.43	-1.06
Lampton Quay Wellington Tce	-0.37	-2.31	-0.63	-2.34	8.35	-1.51

continued over ...

APPENDIX B: ANNUAL RATES OF INCREASE - continued

Sub-Division	Total Population		Non-Maori Population		Maori Population	
	1956-61	1961-66	1956-61	1961-66	1956-61	1961-66
Willis St-Cambridge Tce	-5.14	-4.51	-5.34	-4.80	1.60	2.11
Aro St-Nairn St vic.	-1.90	0.45	-2.62	0.10	12.34	16.40
Mt Cook-Wallace St	-0.53	-0.44	-1.22	-0.85	27.13	6.58
Mt Victoria West vic.	-1.11	0.05	-1.37	-0.08	7.89	3.27
Johnsonville	3.01	4.99	2.99	4.75	5.08	21.60
Newlands	16.13	19.14	16.18	18.93	13.04	30.26
Rarua	4.13	3.24	3.30	4.05	17.32	-9.71
Khandallah-Nairnville	2.02	1.85	1.99	1.86	7.39	0.00
Ngaio	1.52	2.09	1.46	1.86	24.57	31.58
Kaiwharawhara	-5.66	-3.84	-8.12	-5.48	12.89	2.04
Wadestown	0.49	1.47	0.41	1.29	14.87	16.58
Wilton-Otari	11.09	6.95	10.93	6.99	35.10	3.13
Karori	0.87	2.16	0.84	2.05	15.54	22.10
Northland	1.43	1.33	1.34	1.27	15.89	6.83
Kelburn	-0.25	1.12	-0.44	1.06	34.49	5.68
Taitville	3.88	1.09	3.59	1.54	20.11	-27.52
Mitchelltown	-0.50	0.33	-0.78	-0.21	13.56	14.19
Brooklyn	0.86	-0.02	0.79	-0.42	33.56	37.65
Vogeltown	1.70	0.79	1.58	0.65	37.97	14.87
Mornington	1.60	6.36	1.48	6.14	20.11	21.97
Happy Valley-Owhiro Bay	0.56	4.12	0.45	3.87	6.96	14.04
Island Bay	0.03	1.08	-0.09	1.03	11.71	4.61
Melrose	3.01	0.49	2.89	0.30	17.23	12.55
Berhampore	-0.26	0.30	-0.61	-0.21	36.85	16.72
Newtown	-0.49	-0.36	-0.77	-0.83	8.79	9.44
Oriental Bay	0.20	1.56	0.27	1.04	5.59	6.67

continued over ...

APPENDIX B: ANNUAL RATES OF INCREASE - continued

Sub-Division	Total Population		Non-Maori Population		Total Population	
	1956-61	1961-66	1956-61	1961-66	1956-61	1961-66
Roseneath	2.37	-1.18	2.33	-0.29	12.47	14.87
Haitaitai	0.72	1.29	0.56	1.22	49.23	7.45
Kilbernie	-0.45	0.51	-0.56	0.40	7.46	6.41
Lyall Bay	-1.03	0.49	-0.97	0.27	-6.88	20.34
Strathmore	-0.63	0.31	-0.72	0.12	11.03	15.29
Mirimar	0.22	0.98	0.08	0.89	14.68	6.23
Karaka Bay- Worser Bay	0.75	1.03	0.67	0.89	21.67	16.27
Seatoun	0.18	0.35	0.01	0.36	17.98	-0.63

Notes: 1 a. Method used to calculate annual rates of increase was the compound interest formula

$$\left(\sqrt[t]{\frac{P_1}{P_0}} - 1 \right) \times 100,$$

where P_0 = population at beginning of period

P_1 = population at end of period

t = number of years.

b. The writer is indebted to the Massey University Computer Unit for the calculation of the rates of population increase.

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 1 'Increase and Location of Population'.

Sub-division	Male +/-	Female +/-	Total +/-
Stokes Valley	906	918	1,824
Taita	15	29	44
Naenae	-405	-456	-861
Boulcott-Avalon	133	144	277
Epuni	-49	-38	-87
Waterloo	-146	-60	-206
Waiwhetu	-125	-177	-302
Seaview Gracefield	89	-8	81
Moera	-91	-111	-202
Woburn	-12	27	15
Hutt Central	1	-40	39
Western Hutt	153	-32	121
Petone B.	-4	-191	-195
Eastbourne	799	816	1,615
Porirua City	1,506	1,625	3,131
Tawa B.	658	673	1,331
Upper Hutt City	-18	93	75
Plimmerton-Paremata	236	186	422
Wainuiomata	1,627	1,514	3,141
Heretaunga-Pinehaven	--	-	-
Hutt County Part	-	-	-
Thorndon-Tinakori Rd	-357	-330	-687
Lambton Quay-Wellington Tce	-206	-330	-536
Willis St-Cambridge Tce	-317	-290	-607
Aro St-Nairn St Vic.	21	-19	2
Mt Cook-Wallace St	44	-199	-155
Mt Victoria West Vic.	65	-60	5
Johnsonville	199	280	479
Newlands	704	698	1,402
Raroa	67	63	130
Khandallah-Nairnville	121	75	196
Ngaio	46	28	74

continued over ...

APPENDIX C: TOTAL ESTIMATED NET MIGRATION, WELLINGTON-HUTT URBAN
AREA, 1961-1966 - continued

Sub-division	Male +/-	Female +/-	Total +/-
Kaiwharawhara	-48	-44	-92
Wadestown	5	47	52
Wilton-Otari	153	136	289
Karori	248	293	541
Northland	104	-6	98
Kelburn	84	19	103
Taitville	18	-22	-4
Mitchelltown	-4	-20	-24
Brooklyn	-106	-128	-234
Vogeltown	-48	-25	-73
Mornington	109	93	202
Happy Valley-Owhiro Bay	54	11	65
Island Bay	-50	2	-48
Melrose	-63	-140	-203
Berhampore	-85	-22	-97
Newtown	-445	-210	-655
Oriental Bay	-1	84	83
Roseneath	-37	-13	-50
Haitaitai	67	38	105
Kilbernie	36	5	41
Lyall Bay	-12	-21	-33
Strathmore	290	393	683
Mirimar	-99	43	-56
Karaka Bay-Worser Bay	-6	4	-2
Seatoun	-26	-18	-44
Hutt County Part.	-	-	-

Notes: 1 Method utilised for net migration estimate was the Life Table Survival Rate (L.T.S.R.)

2 Gaps in Table result from the fact that certain sub-divisions did not become part of the Urban Area until after 1961.

3 Large net gains by Eastbourne result from boundary changes.

Sources: New Zealand Census of Population and Dwellings, 1961, Volume 2 'Ages and Marital Status'.
New Zealand Life Tables 1960-62, New Zealand Population Census 1961. Appendix B. Department of Statistics, Wellington, 1965.

APPENDIX D: GROSS POPULATION DENSITIES WELLINGTON-HUTT URBAN AREA
1956-1966

Sub-Division	Area (acres)	1956		1961		1966	
		Popu- lation	Density	Popu- lation	Density	Popu- lation	Density
Stokes Valley	2,480	2,139	0.86	4,055	1.63	7,155	2.88
Taita	1,412	6,798	4.81	6,664	4.71	7,053	4.99
Naenae	1,856	11,704	6.30	11,721	6.31	11,491	6.19
Boulcott- Avalon	716	3,405	4.75	3,724	5.20	4,291	5.99
Epuni	561	5,741	10.23	6,104	10.88	6,347	11.31
Waterloo	569	4,869	8.55	4,639	8.15	4,432	7.78
Waiwhetu	495	3,872	7.82	3,696	7.46	3,531	7.13
Seaview Gracefield	755	667	0.88	416	0.55	526	0.69
Moera	122	1,666	13.65	1,530	12.54	1,363	11.17
Woburn	147	1,557	10.59	1,672	11.37	1,748	11.89
Hutt Central	594	4,220	7.10	4,299	7.23	4,409	7.42
Western Hutt	4,145	4,033	0.97	4,524	1.09	5,057	1.22
Petone B.*	1,132	10,374	9.10	9,891	3.80	10,143	3.90
Eastbourne*	1,546	2,724	1.80	2,653	1.70	4,545	1.40
Porirua City*	4,359	-	-	15,863	3.00	22,190	2.70
Tawa B.*	799	4,071	5.00	7,204	6.00	9,852	8.10
Upper Hutt City	2,165	12,226	5.60	16,861	7.80	19,048	8.80
Plimmerton- Paremata	670	-	-	3,057	4.40	3,774	1.40
Wainuiomata	3,553	3,266	9.90	8,043	2.30	13,948	3.90
Heretaunga- Pinehaven	2,815	-	-	-	-	4,539	1.60
Hutt County Part	-	-	-	-	-	-	-
Thorndon- Tinakori Rd	682	6,444	9.45	5,723	8.39	4,998	7.33
Lambton Quay- Wellington Tce	224	5,903	26.35	5,795	25.87	5,155	23.01
Willis St- Cambridge Tce	209	4,231	20.24	3,250	15.55	2,580	12.34

continued over ...

APPENDIX D: GROSS POPULATION DENSITIES WELLINGTON-HUTT URBAN AREA
1956-1966 - continued

Sub-Division	Area (acres)	1956		1964		1966	
		Popu- lation	Density	Popu- lation	Density	Popu- lation	Density
Aro St- Nairn St Vic.	218	3,381	15.51	3,072	14.09	3,142	14.41
Mt Cook- Wallace St	213	3,827	17.97	3,726	17.49	3,644	17.11
Mt Victoria West Vic.	301	6,125	20.34	5,793	19.25	5,807	19.29
Johnsonville	680	3,380	4.97	3,920	5.76	5,001	7.35
Newlands	541	723	1.34	1,529	2.82	3,666	6.78
Rarea	565	1,459	2.58	1,786	3.16	2,093	3.70
Khandallah- Nairnville	1,517	5,015	3.31	5,542	3.65	6,074	5.00
Ngaio	637	3,703	5.81	3,994	6.27	4,430	6.95
Kaiwharawhara	125	459	3.67	343	2.74	282	2.26
Wadestown	407	2,997	7.36	3,072	7.55	3,304	8.12
Wilton-Otari	289	932	3.22	1,577	5.46	2,207	7.64
Karori	3,040	9,139	3.01	9,546	3.14	10,624	3.49
Northland	354	2,545	7.19	2,732	7.72	2,918	8.24
Kelburn	301	3,591	11.93	3,547	11.78	3,751	12.46
Taitville	47	310	6.60	375	7.98	396	8.43
Mitchelltown	124	610	4.92	595	4.80	605	4.88
Brooklyn	333	3,270	9.82	3,414	10.25	3,410	10.24
Vogeltown	173	1,808	10.45	1,967	11.37	2,046	11.83
Mornington	275	906	3.29	981	3.57	1,335	4.85
Happy Valley- Owhiro Bay	1,600	674	0.42	693	0.43	848	0.53
Island Bay	655	6,279	0.59	6,289	9.60	6,636	10.13
Melrose	486	2,169	4.46	2,516	5.18	2,579	5.31
Berhampore	209	2,239	10.71	2,210	10.57	2,243	10.73
Newtown	734	10,560	14.38	10,301	14.03	10,116	13.78
Oriental Bay	30	1,033	34.43	1,052	35.07	1,115	37.17
Roseneath	117	1,478	12.63	1,662	14.20	1,647	14.08

continued over ...

APPENDIX D: GROSS POPULATION DENSITIES WELLINGTON-HUTT URBAN AREA
1956-1966 - continued

Sub-Division	Area (acres)	1956		1964		1966	
		Popu- lation	Density	Popu- lation	Density	Popu- lation	Density
Haitaitai	305	3,754	12.31	3,892	12.76	4,150	13.61
Kilbernie	469	6,140	13.09	6,002	12.80	6,157	13.13
Lyalls Bay	651	2,944	4.52	2,796	4.29	2,866	4.40
Strathmore	335	2,876	8.58	2,786	8.32	2,830	8.45
Mirimar	1,139	8,042	7.06	8,132	7.14	8,538	7.50
Karaka Bay- Worser Bay	154	1,158	7.52	1,202	7.80	1,265	8.21
Seatoun	410	2,140	5.22	2,159	5.27	2,197	5.36

- Notes: 1 Gaps in table result from the fact that certain of the sub-divisions did not become part of the urban area until after 1956.
- 2 Asterisked sub-divisions are those whose boundaries changed over the period. The areas recorded in the table are those that existed in 1956 or when the sub-division became part of the urban area. Areas after boundary changes (used in the calculation of densities) are as follows:

Area in Acres at Census Years

Sub-Division	1956	1961	1966
Petone	1,132	2,575	2,575
Eastbourne	1,546	1,546	3,146
Porirua	-	4,359	8,226
Tawa	799	1,208	1,208
Plimmerton-Paremata	-	670	2,651

- 3 Mesh-block maps held by Dept. of Statistics used to obtain boundaries.

Source: New Zealand Census of Population and Dwellings, 1956, 1961, 1966. Volume 1 'Increase and Location of Population'.

APPENDIX E: RESIDENTIAL DENSITIES, WELLINGTON-HUTT URBAN AREA, 1966

Sub-Division	Area(acres)	Population	Density
Stokes Valley	650	7,155	11.17
Taita	381	7,053	18.51
Naenae	814	11,491	14.11
Boulcott-Avalon	335	4,291	12.80
Epuni	403	6,347	15.74
Waterloo	394	4,432	11.24
Waiwhetu	255	3,531	13.84
Seaview-Gracefield	25	526	21.04
Moera	84	1,363	16.22
Woburn	139	1,748	12.57
Hutt Central	410	4,409	10.75
Western Hutt	873	5,057	5.79
Petone B.	640	10,143	15.84
Eastbourne	472	4,545	9.62
Porirua City	1,450	22,190	15.30
Tawa B.	720	9,852	13.68
Upper Hutt City	1,533	19,084	12.44
Plimmerton-Paremata	313	3,774	12.05
Wainuiomata	1,081	13,948	12.90
Heretaunga-Pinehaven	432	4,539	10.50
Hutt County Part	-	-	-
Thorndon-Tinakori Rd	262	4,998	19.07
Lambton Quay-Wellington Tce	195	5,155	26.43
Willis St-Cambridge Tce	209	2,580	12.34
Aro St-Nairn St Vic.	106	3,142	29.64
Mt Cook-Wallace St	125	3,644	29.15
Mt Victoria West vic.	158	5,807	36.75
Johnsonville	442	5,001	11.31
Newlands	336	3,666	10.91
Raroa	139	2,093	15.05
Khandallah-Nairnville	1,155	6,074	5.25
Ngaio	340	4,430	13.02

continued over ...

APPENDIX E: RESIDENTIAL DENSITIES, WELLINGTON-HUTT URBAN AREA, 1966
continued.

Sub-Division	Area(acres)	Population	Density
Kaiwharawhara	56	282	5.03
Wadestown	311	3,304	10.62
Wilton-Otari	163	2,207	13.54
Karori	807	10,624	13.16
Northland	224	2,918	13.02
Kelburn	216	3,751	16.36
Taitville	23	396	17.21
Mitchelltown	58	605	10.43
Brooklyn	196	3,410	17.39
Vogeltown	136	2,046	15.04
Mornington	135	1,335	9.88
Happy Valley-Owhiri Bay	77	848	11.01
Island Bay	394	6,636	16.84
Melrose	210	2,579	12.28
Berhampore	80	2,243	28.03
Newtown	339	10,116	29.84
Oriental Bay	30	1,115	37.17
Roseneath	98	1,647	16.80
Haitaitai	248	4,150	16.73
Kilbernie	332	6,157	18.54
Lyall Bay	146	2,866	19.63
Strathmore	278	3,830	10.18
Mirimar	581	8,538	14.69
Karaka Bay-Worser Bay	126	1,265	10.04
Seatoun	140	2,197	15.69
Hutt County Part.	-	-	-

Notes: Gaps in table result from insufficient data being available.

Source: New Zealand Census of Population and Dwellings, 1966.
Volume 1 'Increases and Location of Population'.

URBAN AREA, 1956 and 1966

Sub-Division	1956	1966	1966 ²
Stokes Valley	-	4.2	4.2
Taita	5.0	4.1	3.9
Naenae	4.5	3.9	3.9
Boulcott-Avalon	3.7	3.4	3.4
Epuni	4.0	3.5	3.2
Waterloo	3.7	3.1	3.1
Waiwhetu	4.1	3.5	3.3
Seaview Gracefield	5.4	6.3	3.1
Mocra	4.1	3.4	3.4
Woburn	3.6	3.4	3.4
Hutt Central	3.6	3.6	3.3
Western Hutt	3.5	3.5	3.4
Petone B.	3.6	3.4	3.3
Eastbourne	4.9	2.9	2.9
Porirua City	-	4.9	4.6
Tawa B.	3.7	4.0	4.0
Upper Hutt City	-	3.7	3.7
Plimmerton-Paremata	-	3.3	3.3
Wainuiomata	-	4.4	4.4
Heretaunga-Pinehaven	-	5.2	3.7
Hutt County Part	-	-	-
Thorndon-Tinakori Rd	4.2	3.1	2.5
Lambton Quay-Wellington Tce	4.8	3.7	2.2
Willis St-Cambridge Tce	5.7	4.9	2.8
Aro St-Nairn St Vic.	3.6	3.0	2.7
Mt Cook-Wallace St	3.4	3.2	2.8
Mt Victoria West Vic.	4.0	3.2	2.6
Johnsonville	4.0	3.8	3.7
Newlands	3.9	4.0	4.0
Raroa	3.8	3.7	3.7
Khandallah-Nairnville	3.5	3.3	3.3
Ngaio	3.5	3.4	3.4
Kaiwharawhara	4.3	3.8	3.8

continued over ...

APPENDIX F: DWELLING DENSITIES WELLINGTON-HUTT URBAN AREA, 1956
and 1966 - continued

Sub-Division	1956	1966	1966 ²
Wadestown	3.1	3.0	3.0
Wilton-Otari	3.6	3.6	3.6
Karori	3.6	3.3	3.2
Northland	3.2	3.0	3.0
Kelburn	3.1	2.9	2.8
Taitville	3.1	3.2	3.2
Mitchelltown	3.1	2.9	2.9
Brooklyn	3.1	2.9	2.8
Vogeltown	3.5	3.3	3.3
Mornington	3.7	3.4	3.4
Happy Valley-Owhiro Bay	3.6	3.6	3.6
Island Bay	3.9	3.6	3.3
Melrose	3.6	3.3	3.1
Berhampore	3.5	3.3	3.1
Newtown	4.1	3.9	3.1
Oriental Bay	3.3	2.6	2.3
Roseneath	3.0	2.9	2.7
Haitaitai	3.2	3.1	3.0
Kilbernie	3.5	3.2	3.1
Lyall Bay	3.3	3.1	3.0
Strathmore	3.8	3.4	3.3
Mirimar	3.8	3.5	3.3
Karaka Bay-Worser Bay	3.5	3.4	3.3
Seatoun	3.7	3.3	3.1
Hutt County Part.	-	-	-

Notes: 1 Persons per total inhabited dwellings obtained for 1956 and 1966.

2 Second 1966 Column indicates permanent private dwelling densities published for the first time in 1966.

Sources: New Zealand Census of Population and Dwellings, 1956 and 1966. Volume 1 'Increases and Location of Population', Volume 9A 'Dwellings'.

APPENDIX G:

ESTIMATED NET MIGRATION - WELLINGTON-HUTT

URBAN AREA 1961-1966

Age Groups	Stokes Valley		Taita		Naenae		Epuni		Boulcott-Avalon		Waterloo	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	189	179	52	76	2	22	32	47	-2	-44	33	13
10-14	48	80	25	-4	-25	-33	12	40	39	13	25	23
15-19	51	54	-58	-39	-57	-169	36	-5	31	111	-13	-4
20-24	66	146	-90	-84	-188	-293	-28	-42	-71	-119	-64	-8
25-29	223	207	-28	-17	-65	-27	-	2	-76	-87	-90	-45
30-35	139	97	41	25	20	15	14	22	-15	11	16	16
35-39	75	57	42	32	-	-12	37	42	18	4	12	11
40-44	33	21	1	11	-5	-28	16	20	30	44	-28	23
45-49	37	16	7	-1	-41	-19	11	19	19	-9	12	11
50-54	18	25	4	5	3	31	2	7	3	-1	-15	-12
55-59	10	8	-6	5	1	-4	8	-3	-17	24	-28	-29
60-64	12	13	8	-5	-27	-8	-5	-11	-23	9	-30	-4
65-69	3	7	1	14	-11	17	-2	1	2	10	-7	-21
70-74	2	3	7	-2	-10	13	2	10	2	2	-12	-13
75-79	-	3	1	18	-2	22	-4	6	19	-13	-11	-9
80-84	-	2	8	-5	-	17	2	-11	-8	7	-2	-12
Net Total	906	918	15	29	-405	-456	133	144	-49	-38	-146	-60
	1,824		44		-861		277		-87		-206	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Waiwhetu		Seaview Grace-field		Moera		Woburn		Hutt Central		Western Hutt	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	-7	6	-5	-6	3	-26	-2	25	18	-24	11	-4
10-14	1	5	5	-4	-7	-3	1	16	-4	98	8	-
15-19	8	87	13	4	-7	-7	24	4	52	-41	51	15
20-24	-23	-182	12	7	11	-35	-20	6	23	-30	49	24
25-39	-44	-73	-4	6	-18	-15	-15	-13	-34	-43	42	11
30-34	-1	14	15	-5	-26	-9	-	9	-25	-8	2	8
35-39	-9	-2	20	-1	-4	-1	-5	14	-4	6	42	-
40-44	-11	-2	-2	1	-12	-3	4	-	11	19	8	12
45-49	-2	3	6	-3	1	-3	2	4	24	-1	4	1
50-54	-	-18	8	3	-10	-1	7	7	-6	-3	21	-2
55-59	-3	-17	10	-8	-3	-1	3	5	3	+3	-13	-7
60-64	-14	12	9	-	-4	-4	2	-12	-12	3	-14	-20
65-69	-10	-3	-1	-	-7	8	-7	-8	-18	-22	-18	-17
70-7	-	-7	3	-1	-5	-2	-9	-3	-16	-	-2	-17
75-79	-	6	-	-	-1	-4	-1	-6	-4	5	-17	-15
80-84	-10	-6	-1	-1	-2	-5	4	-3	-7	-3	-5	-21
Net Total	-125	-177	89	-8	-91	-111	-12	27	1	-40	153	-32
		-302		81		-202		15		39		121

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Petone		Eastbourne		Porirua		Tawa		Upper Hutt		Plimmerton-Paremata	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	-76	-48	83	71	355	342	141	98	-43	-13	27	21
10-14	-11	-27	79	76	104	137	14	54	-54	-58	29	12
15-19	181	109	57	53	15	-6	65	26	-237	-96	2	9
20-24	187	12	38	51	103	301	27	67	95	75	29	49
25-29	-13	-2	62	50	334	366	103	133	184	132	48	29
30-34	-27	-21	53	42	266	195	127	73	77	70	40	32
35-39	-46	-11	79	55	101	80	50	74	33	-39	3	19
40-44	19	-5	67	86	86	35	62	40	-3	21	38	34
45-49	8	9	59	49	60	37	27	41	-16	-29	19	12
50-54	-25	-2	73	85	24	12	14	12	-44	1	11	6
55-59	-20	-58	61	66	20	39	5	29	-2	54	-	6
60-64	-63	-40	39	34	13	23	16	6	24	-16	7	-5
65-69	-22	-22	25	50	9	26	8	4	-28	17	1	-11
70-74	-33	-37	16	29	4	9	1	10	-1	-5	-6	-6
75-79	-38	-42	12	21	6	17	3	4	-11	-3	-5	-17
80-84	-25	-6	-4	-2	6	12	-5	2	8	-18	-7	-4
Net Total	-4	-191	799	816	1506	1625	658	673	-18	93	236	186
		-195		1615		3131		1331		75		422

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Wainuiomata		Thorndon-Tinakori		Lambton Quay-Wellington Tce		Willis St-Cambridge Tce		Aro St-Nairn St		Mt.Cook-Wallace	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	277	192	-45	-54	-53	-45	-32	-33	-51	-51	-39	-62
10-14	121	104	-25	30	-19	-16	-7	-11	-18	-28	-15	-22
15-19	85	88	114	376	266	285	110	40	94	75	85	116
20-24	201	396	130	-87	234	119	56	31	198	162	205	137
25-29	436	359	-64	-156	-112	-178	-85	-32	2	-36	10	-88
30-34	222	117	-68	-91	-119	-132	-24	-46	-74	-52	-76	-45
35-39	91	69	-79	-56	-105	-44	-41	-23	-59	-40	-36	-38
40-44	52	47	-68	-31	-20	-37	-39	-11	-24	4	6	-18
45-49	51	51	-30	-9	-19	-18	-3	-30	-18	-17	-15	7
50-54	49	34	-38	-44	-31	-28	-29	-29	5	-5	-12	-23
55-59	20	27	-24	-29	-45	-40	-37	-20	-2	-8	-1	-28
60-64	14	10	-43	-50	-35	-50	-58	-29	-2	-2	-7	-15
65-69	3	11	-12	-28	-63	-42	-50	-16	-9	-	-17	-42
70-74	2	5	-37	-32	-38	-40	-38	-32	-	-17	-20	-32
75-79	4	4	-39	-37	-32	-32	-28	-35	-14	5	-15	-33
80-84	-1	-	-29	-32	-13	-30	-11	-13	-7	-9	-9	-13
Net Total	1627	1514	-357	-330	-206	-330	-317	-290	21	-19	44	-199
	3141		-687		-536		-607		2		-155	

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Mt. Victoria West		Johnsonville		Newlands		Raroa		Khandallah- Nairnville		Ngaio	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	-48	-30	15	78	107	109	19	12	55	44	33	22
10-14	60	-32	25	17	66	50	13	8	13	39	-5	-3
15-19	126	226	10	2	21	22	16	6	13	-23	12	-17
20-24	255	267	-1	73	58	120	-15	-14	-27	-47	-16	-11
25-29	-23	-85	89	70	155	168	4	18	-10	10	17	50
30-34	-75	-68	56	66	110	87	15	19	31	24	30	20
35-39	-44	-40	29	20	97	65	9	6	70	45	18	3
40-44	-42	-41	30	9	36	26	9	14	34	35	3	9
45-49	-3	6	13	-8	24	20	4	-2	24	8	9	2
50-54	-11	-52	-1	6	15	9	12	12	-12	-1	6	1
55-59	15	-23	-26	-17	5	7	2	-	-	-3	-17	-12
60-64	-51	-50	-7	-13	-1	1	-9	-13	-16	-35	-18	-22
65-69	-39	-33	-13	1	3	8	-5	3	-15	3	-12	-4
70-74	-32	-37	-6	-9	6	5	-5	-2	-13	-12	-3	-3
75-79	-12	-42	-15	-3	3	1	-2	-	-13	-2	-5	-7
80-84	-11	-26	1	-12	1	-	-	-4	-13	-10	-6	-
Net Total	65	-60	199	280	704	698	67	63	121	75	46	28
	5		479		1402		130		196		74	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Kaiwharawhara		Wadestown		Wilton-Otari		Karori		Northland		Kelburn	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	-6	-16	20	10	6	-6	70	74	-26	-31	-7	-15
10-14	-8	-5	-1	-1	5	-12	38	97	-14	-9	3	-2
15-19	-1	4	-2	19	11	11	24	38	15	55	138	148
20-24	-	4	37	15	23	38	-41	-100	101	59	215	120
25-29	-3	-9	-12	13	46	36	-16	40	-6	-7	-61	-56
30-34	-11	-1	-1	7	36	21	64	37	3	-26	-36	-53
35-39	-8	-5	19	8	3	11	67	55	24	-9	-37	-8
40-44	-1	-3	-1	22	12	21	39	29	6	7	-1	-26
45-49	-2	2	14	-3	6	11	37	40	5	5	7	9
50-54	+2	-2	-11	-1	8	2	5	6	12	-2	19	2
55-59	-2	-4	-13	-5	3	2	16	10	-13	4	-5	-22
60-64	-1	-5	-6	2	1	-3	-6	-12	-4	-15	-12	-8
65-69	-2	-3	-19	-7	-5	5	-15	-19	-8	-11	-13	-16
70-74	-2	-1	-10	-6	-1	-2	-13	21	-9	-16	-5	-24
75-79	-2	-	-8	-12	-1	1	-2	-19	-4	-6	-12	-11
80-84	-1	-	-1	-14	-	-	-19	-4	-4	-4	-9	-19
Net Total	-48	-44	5	47	153	136	248	293	104	-6	84	19
	-92		52		289		541		98		103	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Taitville		Mitchelltown		Brooklyn		Vogeltown		Morningtown		Happy Valley -Owhiro Bay	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	6	-5	-2	-13	-56	-8	-21	-10	13	5	14	-7
10-14	1	-2	3	-3	-28	-30	-11	3	2	9	4	2
15-19	9	-2	-5	8	30	26	4	4	-2	7	4	-1
20-24	19	-	13	13	21	44	-2	12	15	28	7	-1
25-29	3	-6	-	-4	25	-21	9	5	42	15	13	6
30-34	-5	-	2	-9	1	-12	-9	-9	8	23	5	8
35-39	-3	-1	-13	-	-28	-16	3	-2	19	6	6	4
40-44	-2	7	-2	-3	-6	-5	-1	5	14	5	-	-3
45-49	-1	-1	8	7	4	-8	-5	-	10	1	-	3
50-54	-2	-3	5	-2	-8	-3	12	-4	-3	6	5	2
55-59	1	2	-5	-8	-9	-5	-11	-2	1	-6	-	3
60-64	-2	-2	-3	-6	1	-13	-	-	-	-6	1	2
65-69	-2	-2	-7	-	-12	-19	-1	-6	-4	2	-3	-3
70-74	-	-2	2	1	-15	-13	-4	-9	-1	-3	-2	-3
75-79	-3	-3	1	-1	-15	-17	-8	-9	-3	-	-	-1
80-84	-1	-2	-1	-	-11	-28	-3	-3	-2	1	-	-
Net Total	18	-22	-4	-20	-106	-128	-48	-25	109	93	54	11
	-4		-24		-234		-73		202		65	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Island Bay		Melrose		Berhampore		Newtown		Oriental Bay		Roseneath	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	5	-29	-27	-44	-24	-11	-124	-127	-6	-11	-20	-16
10-14	-28	67	-8	-17	-2	-5	-56	4	-4	-4	-9	-10
15-19	14	7	-3	-18	8	3	1	466	11	54	70	10
20-24	17	-1	8	-1	28	55	180	60	74	57	6	54
25-29	16	30	9	-4	-8	-5	-12	-214	-10	-14	-5	20
30-34	-1	-	19	-7	-17	-1	-109	-120	-16	-11	-19	-16
35-39	14	16	-10	-2	8	-6	35	-18	-17	-5	-3	-12
40-44	-15	-1	-5	-12	-22	-	-42	-36	-16	-7	-13	-6
45-49	-	-15	7	6	3	-2	-17	-13	-11	-4	-8	-4
50-54	-3	4	-6	-6	-	-1	-33	-44	-7	9	2	14
55-59	-9	-13	-3	-11	-12	-9	-46	-33	-5	7	-4	-22
60-64	-8	-29	-12	-7	-8	-15	-37	-18	8	10	-9	-8
65-69	-22	-9	-8	-2	-17	3	-32	-25	6	6	-8	4
70-74	-9	-13	-10	-12	-12	-10	-25	-22	-4	-	-11	-13
75-79	-15	-2	-8	-1	-2	-14	-33	-34	-2	3	-2	-
80-84	-6	-10	2	-2	-8	-4	-25	-36	-2	-6	-4	-8
Net Total	-50	2	-63	-140	-85	-22	-445	-210	-1	84	-37	-13
	-48		-203		-97		-655		83		-50	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Haitaitai		Kilbernie		Lyall Bay		Strathmore		Mirimar		Karaka Bay- Worser Bay	
	M	F	M	F	M	F	M	F	M	F	M	F
5-9	-15	-4	-37	-37	-21	-22	69	66	3	22	3	11
10-14	24	17	8	6	-1	14	89	54	11	30	1	-4
15-19	17	30	42	65	1	15	13	40	36	-11	-	11
20-24	150	72	166	81	20	29	-58	1	25	47	-8	-4
25-29	-4	11	21	-31	-3	-18	35	45	-65	-8	-3	-13
30-34	-31	-24	-69	-11	1	-5	40	39	-11	-1	4	13
35-39	-20	10	-23	34	7	-4	41	56	-4	22	13	-1
40-44	5	16	-10	9	-1	-3	38	20	-18	-2	-2	-5
45-49	-9	-3	-4	-6	-5	3	33	41	8	-9	-	-
50-54	3	-5	17	-6	4	6	12	12	-17	-17	-4	-9
55-59	-8	-22	11	8	-5	-18	12	2	8	-29	-1	-
60-64	-11	-9	-20	-21	3	13	-9	4	-32	-5	-3	6
65-69	-11	-16	-13	-10	2	-5	-10	11	-13	-1	-	-
70-74	-	-20	-17	-26	-5	-12	-9	-2	-14	-2	-3	5
75-79	-15	-8	-19	-13	-4	-5	-6	-2	-	11	-5	-
80-84	-8	-6	-17	-37	-4	-9	-	6	-16	-4	2	-6
Net Total	67	38	36	5	-12	-21	290	393	-99	43	-6	4
	105		41		-33		683		-56		-2	

continued over ...

APPENDIX G: ESTIMATED NET MIGRATION - WELLINGTON-HUTT URBAN AREA 1961-1966 - continued

Age Groups	Seatoun	
	M	F
5-9	11	11
10-14	-5	4
15-19	-27	9
20-24	19	-25
25-29	-8	-8
30-34	-5	-2
35-39	-4	12
40-44	-3	-
45-49	11	9
50-54	2	-5
55-59	-4	-7
60-64	1	-
65-69	-7	-5
70-74	2	-4
75-79	-10	-4
80-84	1	-3
Net Total	-26	-18
	-44	

Wellington-Hutt Net Migration

$$\begin{array}{r} + \\ \text{Males} = 8,558 - 2,760 = +5,798 \end{array}$$

$$\begin{array}{r} + \\ \text{Females} = 8,337 - 3,010 = +5,327 \end{array}$$

$$\begin{array}{r} + \\ \text{Total} = 16,895 - 5,770 = +11,125 \end{array}$$

Notes: 1 Net Migration figures obtained using the L.T.S.R. method (see Chapter 1, footnote 7).

2 Where gaps appear in appendix, sub-divisions became part of urban area after 1961.

Sources: New Zealand Census of Population and Dwellings, 1961, 1966, Volume 2 'Ages and Marital Status'.

New Zealand Life Tables 1960-1962,

New Zealand Population Census 1961 Appendix B.

APPENDIX H: DEPENDENCY RATIOS WELLINGTON-HUTT URBAN AREA

Census Sub-Division	Total			Maori		
	1956	1961	1966	1956	1961	1966
Stokes Valley		.854	.913			1.552
Taita	.878	.714	.514	.612	.718	.897
Naenae	.903	.749	.506	.930	.833	.716
Boulcott-Avalon	.577	.529	.550	-	-	-
Epuni	.556	.513	.521	-	1.064	.716
Waterloo	.505	.478	.434	-	-	-
Waiwhetu	.552	.475	.421	.828	.683	.697
Seaview Gracefield	.280	.285	.271	-	-	-
Moera	.589	.642	.570	-	-	.614
Woburn	.617	.609	.539	-	-	-
Hutt Central	.596	.593	.572	-	-	-
Western Hutt	.561	.567	.565	-	.216	.494
Petone B.	.550	.547	.502	.397	.264	.306
Eastbourne	.661	.634	.600	-	-	-
Porirua City		.922	.880	-	.964	1.213
Tawa B.	.714	.792	.781	-	.700	1.137
Upper Hutt City	.709	.789	.730	-	-	-
Plimmerton-Paremata	-	.682	.654	-	.633	.875
Wainuiomata	-	.880	.997	-	.874	1.359
Heretaunga-Pinchaven	-	-	.508	-	-	.220
Hutt County Part	-	-	.774	-	-	-
Thorndon-Tinakori Rd	.366	.340	.331	.079	.125	.169
Lambton Quay-Wellington Tce	.232	.236	.205	.021	.085	.141
Willis St-Cambridge Tce	.366	.362	.375	.090	.113	.149
Aro St-Nairn St Vic.	.375	.389	.333	.239	.165	.218
Mt.Cook-Wallace St	.440	.402	.328	.233	.344	.322
Mt.Victoria West Vic.	.376	.350	.305	.182	.158	.137
Johnsonville	.624	.658	.672	-	-	.847
Newlands	.603	.769	.846	-	-	1.368
Raroa	.646	.667	.585	-	-	-
Khandallah-Nairnville	.591	.562	.543	-	-	-
Ngaio	.577	.573	.534	-	-	1.088
Kaiwharawhara	.412	.673	.730	-	.833	1.212

continued over ...

APPENDIX H: DEPENDENCY RATIOS WELLINGTON-HUTT URBAN AREA continued

Census Sub-Division	Total			Maori		
	1956	1961	1966	1956	1961	1966
Wadestown	.533	.561	.535	-	-	.333
Wilton-Otari	.640	.678	.669	-	-	-
Karori	.586	.584	.557	-	-	.900
Northland	.501	.505	.414	-	-	-
Kelburn	.402	.404	.312	-	-	.115
Taitville	.563	.550	.489	-	-	-
Mitchelltown	.516	.495	.490	-	-	-
Brooklyn	.557	.523	.433	-	-	.355
Vogeltown	.586	.602	.515	-	-	-
Mornington	.684	.609	.576	-	-	-
Happy Valley-Owhiro Bay	.698	.686	.609	-	-	-
Island Bay	.613	.641	.615	.852	.500	.551
Melrose	.569	.583	.539	-	-	.867
Berhampore	.548	.532	.528	-	-	-
Newtown	.500	.479	.461	.213	.294	.334
Oriental Bay	.340	.359	.320	-	-	-
Roseneath	.470	.440	.335	-	-	-
Haitaitai	.549	.496	.460	-	-	-
Kilbernie	.513	.555	.494	.288	.455	.456
Lyall Bay	.563	.603	.575	-	-	.656
Strathmore	.503	.491	.540	-	-	.897
Mirimar	.519	.536	.574	.364	.558	.450
Karaka Bay-Worser Bay	.604	.616	.579	-	-	-
Seatoun	.624	.600	.560	-	-	-
Hutt County Part.	-	-	.470	-	-	-

Notes: 1 Dependency Ratios obtained using the following formula

$$\frac{(0 - 14) + (65+)}{(15 - 64)} \times 100$$

- 2 Gaps in Appendix for total population result from sub-division becoming part of urban area during 1956-66 period. Where gaps appear in the Maori dependency ratios, sub-divisions did not have the required 50 residents.

Sources: New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 2 'Ages and Marital Status'.
New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 8 'Maoris Population and Dwellings'.

APPENDIX I: INDEX OF AGEING WELLINGTON-HUTT URBAN AREA

Census Sub-Division	1956	Total 1961	1966	1956	Maori 1961	1966
Stokes Valley		8.68	6.78	-	2.94	1.35
Taita	6.60	15.40	20.92	6.67	12.90	12.50
Naenae	9.71	12.63	20.44	3.79	6.98	9.14
Boulcott-Avalon	26.48	29.73	34.15	-	-	-
Epuni	28.44	35.10	42.50	-	7.27	8.22
Waterloo	27.57	43.58	53.56	-	-	-
Waiwhetu	21.08	30.77	42.00	4.80	5.59	7.32
Seaview Gracefield	29.65	39.62	61.73	-	-	-
Moera	38.51	41.71	53.50	-	-	15.91
Woburn	42.59	40.78	41.51	-	-	-
Hutt Central	47.51	47.50	49.34	-	-	-
Western Hutt	50.65	39.34	31.39	-	43.75	8.70
Petone B.	48.43	49.73	45.10	11.11	13.87	9.84
Eastbourne	53.81	56.15	52.65	-	-	-
Porirua City		12.98	12.26	-	7.97	5.69
Tawa B.	11.41	9.00	9.51	-	5.41	4.42
Upper Hutt City	21.43	18.60	19.63	-	-	-
Plimmerton- Paremata		33.94	27.70	-	13.16	7.69
Wainuiomata		3.88	3.59	-	5.26	1.45
Heretaunga- Pinehaven			7.88	-	-	2.38
Hutt County Part.			13.40	-	-	-
Thorndon- Tinakori Rd	99.46	89.40	72.28	8.08	4.46	7.01
Lambton Quay- Wellington Tce	125.71	114.57	91.21	1.96	1.10	7.06
Willis St- Cambridge Tce	126.67	146.19	121.24	28.57	11.76	9.76
Aro St- Nairn St Vic.	90.62	76.53	72.91	26.32	15.09	4.88
Mt.Cook- Wallace St	89.44	78.44	66.12	29.41	5.88	7.92

continued over ...

APPENDIX I: INDEX OF AGEING WELLINGTON-HUTT URBAN AREA - continued

Census Sub-Division	1956	Total 1961	1966	1956	Maori 1961	1966
Mt. Victoria West Vic.	87.42	95.06	70.15	1.92	12.73	9.46
Johnsonville	27.48	23.71	17.98	-	-	10.71
Newlands	13.27	5.66	5.21	-	-	5.36
Raroa	15.19	19.94	18.49	-	-	-
Khandallah- Nairnville	34.41	35.09	35.86	--	-	-
Ngaio	25.81	25.42	27.97	-	-	-
Kaiwharawhara	29.93	22.69	19.51	-	9.68	-
Wadestown	60.91	49.94	44.81	-	-	-
Wilton-Otari	16.52	12.78	12.31	-	-	-
Karori	33.28	37.10	40.21	-	-	15.00
Northland	52.86	46.00	44.84	-	-	-
Kelburn	78.88	64.24	58.11	-	-	-
Taitville	61.36	43.80	27.20	-	-	-
Mitchelltown	43.78	44.57	42.70	-	-	-
Brooklyn	72.83	66.35	60.60	-	-	-
Vogeltown	34.01	31.89	30.93	-	-	-
Mornington	25.20	25.79	20.03	-	-	-
Happy Valley- Owhiro Bay	23.77	17.85	13.33	-	-	-
Island Bay	42.37	42.31	37.12	13.04	9.38	5.88
Melrose	28.26	28.32	27.48	-	-	5.88
Berhampore	65.92	60.80	54.15	-	-	7.14
Newtown	68.07	63.60	57.71	11.69	9.26	7.33
Oriental Bay	109.14	125.54	162.85	-	-	-
Roseneath	57.10	51.22	53.28	-	-	-
Haitaitai	61.74	56.99	50.74	-	-	50.00
Kilbernie	63.67	66.14	59.12	5.26	5.13	10.71
Lyall Bay	59.95	57.52	60.44	-	-	4.00
Strathmore	19.08	25.21	45.38	-	-	3.57
Mirimar	35.96	37.80	40.07	13.64	8.16	5.56
Karaka Bay- Worser Bay	34.80	34.90	36.57	-	-	-

continued over ...

APPENDIX I: INDEX OF AGEING WELLINGTON-HUTT URBAN AREA - continued

Census Sub-Division	Total			Maori		
	1956	1961	1966	1956	1961	1966
Seatoun	43.47	41.88	46.40	-	-	-
Hutt County Part.	-	-	16.07	-	-	-

Notes: 1 Index of Ageing for total obtained using the following formula

$$Ia = \frac{(60+)}{(0 - 20)} \times 100$$

$$\text{Maori Ia} = \frac{(54+)}{(0 - 20)} \times 100$$

- 2 Gaps in Appendix for total and Maori population appear as a result of sub-divisions (a) not becoming part of urban area until during 1956-66 period or (b) insufficient data.

Sources: New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 2 'Ages and Marital Status'.

New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 8 'Maori Population and Dwellings'.

APPENDIX J: SEX RATIOS, WELLINGTON-HUTT URBAN AREA

Census Sub-Division	1956	Total 1961	1966	1956	Maori 1961	1966
Stokes Valley	-	97.13	99.08		80.00	91.34
Taita	98.62	99.76	97.01	79.54	96.77	100.00
Naenae	98.44	97.98	97.06	107.43	96.74	85.71
Boulcott-Avalon	104.99	105.06	104.91	-	120.00	81.42
Epuni	113.73	111.87	111.42	-	-	-
Waterloo	103.12	99.69	99.81	-	-	-
Waiwhetu	116.79	113.88	112.32	123.15	128.03	100.97
Seaview Gracefield	44.37	49.64	39.15	-	-	-
Moera	95.30	95.40	91.97	-	-	80.39
Woburn	102.73	102.42	109.09	-	-	-
Hutt Central	114.10	116.03	115.17	-	-	-
Western Hutt	104.44	102.41	94.05	-	122.64	93.44
Petone B.	93.27	90.50	87.41	55.14	59.52	62.50
Eastbourne	92.64	112.40	110.31	-	-	-
Porirua City	-	102.27	101.91	-	112.23	99.09
Tawa B.	99.25	99.11	99.47	-	123.68	109.37
Upper Hutt City	100.26	100.08	99.47	-	-	-
Plimmerton- Paremata	-	102.31	98.42	-	95.12	112.24
Wainuiomata	-	101.22	98.29	-	140.00	110.29
Heretaunga- Pinehaven	-	-	56.62	-	-	21.96
Hutt County Part.	-	-	97.69	-	-	-
Thorndon- Tinakori Rd	117.04	109.71	111.77	158.94	118.07	127.32
Lambton Quay- Wellington Tce	101.46	100.58	95.33	75.90	105.66	65.57
Willis St- Cambridge Tce	71.08	68.04	65.17	62.68	87.30	129.82
Aro St- Nairn St Vic.	106.78	90.33	88.48	58.33	95.18	77.23
Mt. Cook- Wallace St	97.88	99.57	86.48	112.00	120.00	132.69

continued over ...

APPENDIX J: SEX RATIOS, WELLINGTON-HUTT URBAN AREA - continued

Census Sub-Division	1956	Total 1961	1966	1956	Maori 1961	1966
Mt. Victoria West Vic.	103.01	101.21	97.53	137.70	105.82	116.52
Johnsonville	91.86	92.06	96.81			87.93
Newlands	96.54	91.35	93.76			109.30
Raroa	99.86	95.61	95.06			82.05
Khandallah- Nairnville	105.70	110.16	107.58			
Ngaio	101.35	104.50	102.19			
Kaiwharawhara	85.82	98.26	104.34			82.50
Wadestown	115.45	109.83	109.11			166.66
Wilton-Otari	105.28	105.60	100.63			
Karori	111.69	111.47	110.16			75.92
Northland	111.73	107.12	101.51			
Kelburn	120.57	117.60	104.86			100.00
Taitville	112.32	121.89	102.04			
Mitchelltown	97.41	96.36	91.45			
Brooklyn	112.19	107.79	101.89			71.42
Vogeltown	100.88	93.03	96.73			
Mornington	94.83	103.10	103.19			
Happy Valley- Owhiro Bay	87.74	96.31	83.15			
Island Bay	112.91	109.91	109.46	127.27	97.27	136.95
Melrose	110.37	105.05	103.07			133.33
Berhampore	96.40	97.85	104.46			96.22
Newtown	107.34	110.91	114.64	186.36	124.56	120.07
Oriental Bay	123.59	114.25	130.84	-	-	-
Roseneath	110.24	96.91	100.12	-	-	-
Haitaitai	112.93	104.30	102.83	-	-	55.88
Kilbernie	108.06	103.25	99.25	55.81	76.47	92.64
Lyall Bay	107.32	109.12	108.89	-	-	120.83
Strathmore	95.11	95.50	101.89	-	-	139.13
Mirimar	93.81	92.01	93.21	106.89	101.69	80.89
Karaka Bay- Worser Bay	114.04	105.47	107.37	-	-	-

continued over ...

APPENDIX J: SEX RATIOS, WELLINGTON-HUTT URBAN AREA -- continued

Census Sub-Division	Total			Maori		
	1956	1961	1966	1956	1961	1966
Seatoun	101.50	99.35	101.37	-	-	-
Hutt County Part.	-	-	123.04	-	-	-

Notes: 1 Sex Ratios for total and Maori population obtained using following formula

$$Sr = \frac{F}{M} \times 100$$

- 2 Gaps in Appendix for total and Maori population appear as a result of sub-divisions (a) not becoming part of the urban area until during the 1956-66 period or (b) insufficient data.

Sources: New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 2 'Ages and Marital Status'.
New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 3 'Maori Population and Dwellings'.

APPENDIX K: MARITAL FERTILITY INDEX, WELLINGTON-HUTT URBAN AREA

Sub-Division	Total			1966		Maori
	1956	1961	1966	Non-Maori	Maori	Non-Maori
Stokes Valley	-	104.37	103.69	90.16	218.61	2.42
Taita	74.53	63.25	82.08	78.91	166.66	2.11
Naenae	83.20	66.37	69.15	66.80	137.50	2.05
Boulcott-Avalon	66.59	73.05	80.11	81.06	-	-
Epuni	61.34	66.56	80.12	80.81	55.55	0.68
Waterloo	56.02	50.79	69.21	70.25	-	-
Waiwhetu	55.53	59.47	77.92	74.91	112.00	1.49
Seaview Gracefield	59.72	65.95	78.00	78.00	-	-
Moera	73.72	93.10	91.34	89.36	110.00	1.23
Woburn	67.61	71.42	75.79	78.80	-	-
Hutt Central	65.90	81.63	67.93	68.55	-	-
Western Hutt	66.74	81.90	79.50	78.35	133.33	1.70
Petone	74.72	76.47	73.20	71.90	94.11	1.30
Eastbourne	68.52	80.24	67.28	63.20	-	-
Porirua	-	107.79	109.95	101.30	181.10	1.78
Tawa	88.88	99.92	90.32	89.14	142.85	1.60
Upper Hutt City	86.21	94.57	80.40	81.73	-	-
Plimmerton-Paremata	-	86.27	80.80	79.37	118.13	1.48
Wainuiomata	-	121.99	103.32	102.77	139.41	1.84
Heretaunga-Pinehaven	-	-	93.16	91.35	150.00	1.64
Hutt County Part.	-	-	-	-	-	-
Thorndon-Tinakori Rd	57.83	55.03	56.55	55.25	65.85	1.19
Lambton Quay-Wellington Tce	33.78	39.90	41.24	38.53	74.07	1.92
Willis St-Cambridge Tce	64.36	59.41	66.31	66.07	68.18	1.03
Aro St-Nairn St	58.54	67.44	64.64	62.05	87.50	1.41
Mt.Cook-Wallace St	62.98	64.08	58.69	52.04	82.60	1.58

continued over ...

APPENDIX K: MARITAL FERTILITY INDEX, WELLINGTON-HUTT URBAN AREA cont.

Sub-Division	Total			1966		Maori
	1956	1961	1966	Non-Maori	Maori	Non-Maori
Mt. Victoria West Vic.	61.38	53.70	53.81	54.09	50.00	0.92
Johnsonville	73.91	88.96	92.80	90.58	194.11	2.14
Newlands	73.42	102.76	100.65	98.79	187.50	1.89
Raroa	75.81	85.71	75.53	76.34	-	-
Khandallah- Nairnville	62.00	75.00	75.03	75.80	-	-
Ngaio	68.91	70.55	79.37	77.20	190.90	2.47
Kaiwharawhara	85.18	113.20	92.50	60.00	146.66	2.44
Wadestown	70.82	64.40	75.99	76.27	66.66	0.87
Wilton-Otari	83.43	94.53	94.37	95.59	-	-
Karori	71.16	77.05	71.02	70.33	126.66	1.80
Northland	57.13	75.14	61.99	63.18	-	-
Kelburn	55.17	59.71	53.02	53.06	50.00	0.94
Taitville	86.48	75.00	63.63	64.18	-	-
Mitchelltown	68.42	72.50	70.88	76.71	-	-
Brooklyn	61.49	69.25	69.95	68.73	107.69	1.56
Vogeltown	63.57	71.08	77.12	77.98	-	-
Mornington	89.92	76.97	76.41	78.82	-	-
Happy Valley- Owhiro Bay	100.00	91.80	80.88	85.27	-	-
Island Bay	80.93	84.37	81.12	80.60	100.00	1.24
Melrose	83.28	84.55	76.66	74.07	158.33	2.13
Berhampore	76.09	75.39	79.13	74.90	138.88	1.85
Newtown	70.30	73.33	74.86	72.19	101.98	1.41
Oriental Bay	42.85	39.78	31.88	33.33	-	-
Roseneath	68.88	62.50	56.62	58.02	-	-
Haitaitai	62.70	62.89	58.12	58.80	27.27	0.46
Kilbernie	71.04	69.78	66.87	84.44	125.00	1.48
Lyall Bay	74.40	86.32	68.02	66.96	100.00	1.49
Strathmore	53.76	70.38	92.82	91.72	130.20	1.42
Mirimar	69.44	78.08	78.57	77.99	104.34	1.33

continued over ...

APPENDIX K: MARITAL FERTILITY INDEX, WELLINGTON-HUTT URBAN AREA cont.

Sub-Division	Total			1966		Maori
	1956	1961	1966	Non-Maori	Maori	Non-Maori
Karaka Bay-Worser Bay	81.76	73.29	59.30	59.64	-	-
Seatoun	76.44	71.12	69.87	70.46	-	-
Hutt County Part.	-	-	-	-	-	-

Notes: 1 Fertility ratios for total, non-Maori and Maori population obtained by using the following formula

$$M.F.I. = \frac{\text{Number of children under 5 years}}{\text{Number of married women 16-44 years}}$$

- 2 Gaps in Appendix for total, non-Maori and Maori population appear as a result of (a) sub-divisions not becoming part of urban area until during the 1956-66 period or (b) insufficient data.

Sources: New Zealand Census of Population and Dwellings, 1956, 1961, 1966, Volume 2 'Ages and Marital Status'.
 Unpublished computer runs from 1966 Census on Maori Marital Status at the sub-division level. Held in the Department of Statistics, Population Division, Lower Hutt.

APPENDIX L: OCCUPATION CHARACTERISTICS, WELLINGTON-HUTT URBAN AREA,

1966

Sub-Division	P.T. and A.E. %	C. and S. %	R. %
Stokes Valley	17.25	19.66	63.00
Taita	9.39	20.51	70.10
Naenae	11.00	19.12	69.88
Boulcott-Avalon	26.42	21.20	52.38
Epuni	21.11	23.19	55.70
Waterloo	21.33	27.15	50.97
Waiwhetu	15.56	18.71	65.74
Seaview Gracefield	7.72	11.58	80.71
Moera	7.03	12.70	80.27
Woburn	36.96	23.35	39.69
Hutt Central	37.42	21.70	40.87
Western Hutt	19.85	19.98	60.17
Petone B.	10.81	14.88	74.31
Eastbourne	38.18	27.20	34.62
Porirua City	12.95	17.49	69.56
Tawa B.	27.59	31.29	41.13
Upper Hutt City	22.98	23.56	53.47
Plimmerton-Paremata	27.70	22.63	49.67
Wainuiomata	13.86	19.11	67.03
Heretaunga-Pinehaven	18.94	14.85	66.20
Hutt County Part.	-	-	-
Thorndon-Tinakori Rd	19.53	25.87	54.61
Lambton Quay-Wellington Tce	22.90	28.19	48.91
Willis St-Cambridge Tce	15.57	19.37	65.05
Aro St-Nairn St Vic.	12.89	24.42	62.69
Mt.Cook-Wallace St	9.86	17.80	72.33
Mt.Victoria West Vic.	14.05	25.77	60.18
Johnsonville	16.66	27.19	56.15
Newlands	20.91	29.76	49.33
Raroa	15.73	24.88	59.39
Khandallah-Nairnville	40.43	29.50	30.07
Ngaio	27.01	25.82	47.17

continued over ...

APPENDIX L: OCCUPATION CHARACTERISTICS, WELLINGTON-HUTT URBAN AREA

1966 continued

Sub-Division	P.T. and A.E. %	C. and S. %	R. %
Kaiwharawhara	1.28	6.41	92.31
Wadestown	41.07	29.95	28.98
Wilton-Otari	34.58	26.92	38.50
Karori	41.77	28.98	29.25
Northland	28.65	31.13	40.23
Kelburn	42.18	32.89	24.93
Taitville	29.92	28.35	41.73
Mitchelltown	15.58	23.62	60.80
Brooklyn	19.70	28.87	51.43
Vogeltown	19.56	24.57	55.87
Mornington	19.48	29.22	51.31
Happy Valley-Owhiro Bay	9.38	16.41	74.22
Island Bay	18.25	23.25	48.85
Melrose	17.84	25.40	56.75
Berhampore	11.58	17.09	71.33
Newtown	10.79	18.21	71.00
Oriental Bay	37.87	31.20	30.93
Roseneath	35.66	30.96	33.39
Haitaitai	27.36	33.21	39.42
Kilbernie	20.14	24.74	55.12
Lyall Bay	16.99	25.72	57.29
Strathmore	19.18	25.18	55.65
Mirimar	18.36	24.13	57.51
Karaka Bay-Worser Bay	31.11	28.61	40.28
Seatoun	27.47	28.84	43.69
Hutt County Part.	-	-	-

continued over ...

APPENDIX L:

Notes: 1 Occupational Status abbreviations are as follows:

P.T. and A.E. = Professional, Technical,
Administrative and Executive.

C. and S. = Clerical and Sales

R. = Remainder (this group includes
Farmers, Fishermen, Loggers,
Miners, Quarrymen, Transport and
Communication workers, Craftsmen,
Factory workers, Labourers,
Service workers).

2 Gaps in Appendix result from insufficient data
being available.

Source: New Zealand Census of Population and Dwellings,
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