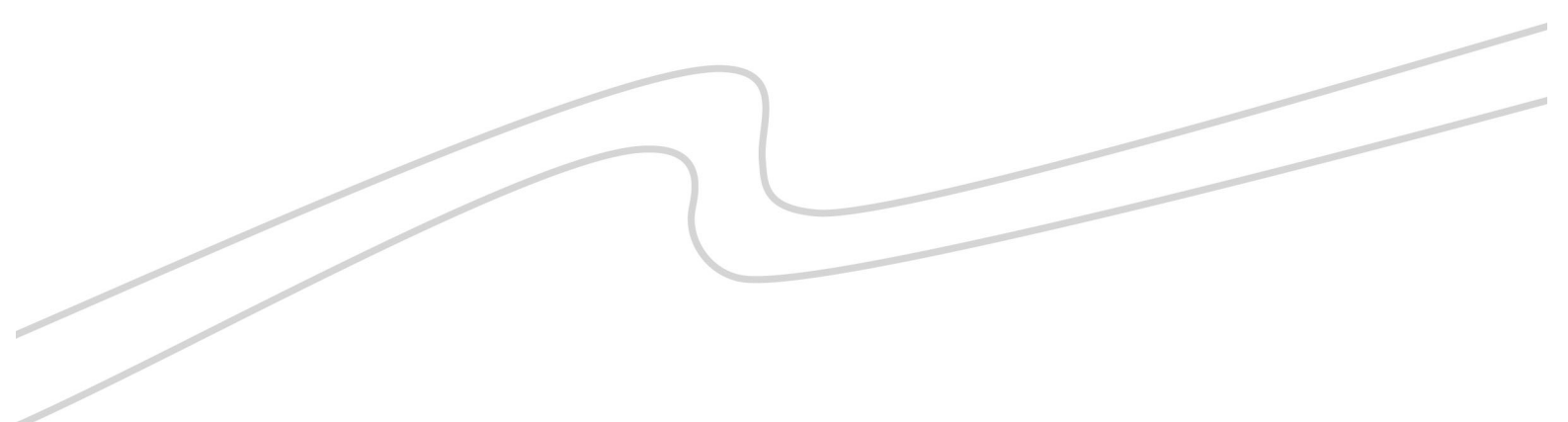


# Counties Manukau DHB

## Health service needs and labour force projections

### Statistical Report to CMDHB

October 2005





## **Preface**

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established *Quarterly Survey of Business Opinion* and *Quarterly Predictions*.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

NZIER was established in 1958.

## **Authorship**

This report has been prepared at NZIER by Simon Hope and Mark Cox.

8 Halswell St, Thorndon  
P O Box 3479, Wellington  
Tel: +64 4 472 1880  
Fax: +64 4 472 1211  
econ@nzier.org.nz  
www.nzier.org.nz

NZIER's standard terms of engagement for contract research can be found at [www.nzier.org.nz](http://www.nzier.org.nz).

While NZIER will use all reasonable endeavours in undertaking contract research and producing reports to ensure the information is as accurate as practicable, the Institute, its contributors, employees, and Board shall not be liable (whether in contract, tort (including negligence), equity or on any other basis) for any loss or damage sustained by any person relying on such work whatever the cause of such loss or damage.

# Contents

|   |           |
|---|-----------|
| <b>1. Introduction.....</b>                                 | <b>1</b>  |
| 1.1 Background.....   | 1         |
| 1.2 Methodology.....  | 2         |
| 1.3 Structure of the report .....                           | 2         |
| <b>2. The Counties Manukau population .....</b>             | <b>4</b>  |
| 2.1 The current population .....                            | 4         |
| 2.2 The projected population.....                           | 10        |
| 2.2.1 Key features of the population projections.....       | 10        |
| <b>3. Current hospital service needs .....</b>              | <b>14</b> |
| 3.1 Demographic analysis .....                              | 14        |
| 3.1.1 Demographic composition of inpatient discharges ..... | 14        |
| 3.1.2 Demographic breakdown of outpatient discharges.....   | 17        |
| 3.2 Analysis by service area.....                           | 19        |
| 3.3 Analysis by MDC .....                                   | 22        |
| <b>4. Projected need for hospital services .....</b>        | <b>27</b> |
| 4.1 Analysis by service area.....                           | 27        |
| 4.1.1 Total ethnic groups – analysis by service area .....  | 27        |
| 4.1.2 Māori – analysis by service area .....                | 31        |
| 4.1.3 Pacific Peoples – analysis by service area .....      | 33        |
| 4.2 Analysis by MDC .....                                   | 34        |
| 4.2.1 Total ethnic groups – analysis by MDC .....           | 34        |
| 4.2.2 Māori – analysis by MDC.....                          | 38        |
| 4.2.3 Pacific Peoples – analysis by MDC .....               | 39        |
| <b>5. The demand for labour .....</b>                       | <b>40</b> |
| 5.1 Existing demand.....                                    | 40        |
| 5.2 Projected demand for labour .....                       | 42        |
| 5.2.1 Projected demand by service area .....                | 42        |
| 5.2.2 Projected demand by MDC.....                          | 44        |
| <b>6. The supply of labour .....</b>                        | <b>46</b> |
| 6.1 Projected labour supply – service area modelling .....  | 46        |
| 6.2 Projected labour supply – MDC modelling .....           | 50        |
| <b>7. The supply/demand balance.....</b>                    | <b>51</b> |

|           |   |           |
|-----------|---|-----------|
| 7.1       | Modelling by service area .....                         | 51        |
| 7.2       | Modelling by MDC .....                                  | 55        |
| <b>8.</b> | <b>Varying the key modelling assumptions.....</b>       | <b>57</b> |
| 8.1       | Introduction .....                                      | 57        |
| 8.2       | The key assumptions .....                               | 57        |
| 8.3       | Example: Switching patients between service areas ..... | 58        |

## Appendices

|                   |  |           |
|-------------------|--|-----------|
| <b>Appendix A</b> | <b>Additional tables.....</b>  | <b>62</b> |
| <b>Appendix B</b> | <b>Methodology .....</b>   | <b>66</b> |
| <b>Appendix C</b> | <b>Major assumptions and caveats related to population projections used.....</b> | <b>69</b> |

## Figures

|           |   |    |
|-----------|---|----|
| Figure 1  | Counties Manukau population by age group .....  | 5  |
| Figure 2  | Counties Manukau population by age group compared to total New Zealand population ..... | 5  |
| Figure 3  | Counties Manukau population by age group and sex.....                                   | 6  |
| Figure 4  | Counties Manukau population – ethnicity by age and sex.....                             | 8  |
| Figure 5  | Counties Manukau population – ethnicity by age compared to all ethnic groups.....       | 9  |
| Figure 6  | Counties Manukau population estimates.....  | 10 |
| Figure 7  | Counties Manukau population projections by ethnic group .....                           | 13 |
| Figure 8  | CMDHB inpatient discharges by age group.....  | 14 |
| Figure 9  | CMDHB outpatient discharges by age group .....  | 18 |
| Figure 10 | CMDHB discharges by service area.....   | 20 |
| Figure 11 | CMDHB discharges by service area and gender.....  | 20 |
| Figure 12 | CMDHB discharges by service area, ethnicity and age.....                                | 22 |
| Figure 13 | Projections of need (inpatient discharges) by service area .....                        | 28 |
| Figure 14 | Projections of need (outpatient discharges) by service area .....                       | 29 |

|  |    |
|--|----|
| Figure 15 Projections of inpatient incidence by MDC – middle ground scenario ..... | 36 |
| Figure 16 Projections of outpatient incidence – middle ground scenario .....       | 37 |
| Figure 17 Index of labour demand vs. labour supply – 3 scenarios .....             | 52 |
| Figure 18 Index of labour demand vs. labour supply .....                           | 55 |

## Tables

|   |    |
|---|----|
| Table 1 Counties Manukau population by ethnic group .....   | 7  |
| Table 2 Counties Manukau population projections by ethnicity.....   | 12 |
| Table 3 CMDHB inpatient discharges by ethnic group.....   | 15 |
| Table 4 CMDHB inpatient discharges by ethnicity and sex.....  | 15 |
| Table 5 CMDHB inpatient discharges by ethnicity and sex – including total and average length of stay .....                                    | 17 |
| Table 6 CMDHB outpatient discharges by ethnic group .....   | 18 |
| Table 7 CMDHB outpatient discharges by ethnicity and sex .....  | 19 |
| Table 8 Counties Manukau DHB inpatient discharges by ethnicity by MDC.....  | 24 |
| Table 9 Counties Manukau DHB inpatient discharges by age group for 10 most common MDC (in terms of number of discharges) .....                | 25 |
| Table 10 Counties Manukau DHB inpatient discharges and average length of stay for 10 most common MDC (in terms of number of discharges) ..... | 26 |
| Table 11 Summary of need by service area (in and outpatients).....  | 30 |
| Table 12 Summary of need by service area (in and outpatients).....  | 31 |
| Table 13 Summary of Maori need by service area (in and outpatients) .....   | 32 |
| Table 14 Summary of Maori need by service area (in and outpatients) .....   | 32 |
| Table 15 Summary of Pacific People’s need by service area (in and outpatients) .....  | 33 |
| Table 16 Summary of Pacific People's need by service area (in and outpatients) .....  | 34 |

|  |    |
|--|----|
| Table 17 Summary of demand from MDC modelling (in and outpatients).....  | 38 |
| Table 18 Summary of demand from MDC modelling (in and outpatients).....  | 39 |
| Table 19 Summary of demand from MDC modelling (in and outpatients).....  | 39 |
| Table 20 CMDHB full-time equivalent staff by occupational group.....   | 40 |
| Table 21 CMDHB full-time equivalent staff by ethnic group .....  | 41 |
| Table 22 CMDHB full-time equivalent staff by service area and occupational group .....   | 41 |
| Table 23 Indices of demand for CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios .....                               | 42 |
| Table 24 Projected demand for CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO .....      | 43 |
| Table 25 Indices of demand for Māori CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios.....                          | 44 |
| Table 26 Indices of demand for Pacific Peoples CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios .....               | 44 |
| Table 27 Demand for CMDHB full-time equivalent staff from MDC modelling by occupational group – 2021 for all 3 scenarios .....                 | 45 |
| Table 28 Indices of supply of CMDHB full-time equivalent staff by service area –for all 3 scenarios .....                                      | 46 |
| Table 29 Projected supply of CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO .....       | 47 |
| Table 30 Indices of supply of Māori CMDHB full-time equivalent staff by service area – for all 3 scenarios .....                               | 48 |
| Table 31 Existing supply of Maori CMDHB full-time equivalent staff by service area and occupational group – 2004 .....                         | 48 |
| Table 32 Projected supply of Māori CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO ..... | 49 |
| Table 33 Indices of supply of Pacific Peoples CMDHB full-time equivalent staff by service area – for all 3 scenarios .....                     | 49 |
| Table 34 Existing supply of Pacific Peoples CMDHB full-time equivalent staff by service area and occupational group – 2004.....                | 50 |

|  |    |
|--|----|
| Table 35 Projected supply of Pacific Peoples CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO ..... | 50 |
| Table 36 Labour supply and demand imbalances – service area modelling.....   | 53 |
| Table 37 Labour supply and demand imbalances – MDC modelling .....   | 56 |
| Table 38 Labour supply and demand imbalances – modelling including substitution between adult acute medicine and surgical services.....                  | 60 |
| Table 39 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario .....                   | 63 |
| Table 40 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario .....                   | 64 |
| Table 41 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario .....                   | 65 |
| Table 42 Counties Manukau population projections by ethnicity.....   | 70 |

# 1. Introduction

## 1.1 Background

NZIER has been commissioned by the Counties Manukau District Health Board (CMDHB) to investigate the potential levels of health service needs in the Counties Manukau area, and the consequent implications for hospital workforce development.

The information will help the CMDHB with its planning. Much of the demand pressure expected will be as a result of the particular demographic characteristics of the Counties Manukau population – both in terms of the absolute level of these factors, and how they are expected to change over time.

This report follows on from several interim reports, which have all contributed to the projections and discussion contained in this report.

The first report presented analysis of the CMDHB 2003 hospital workforce census. That report highlighted the key features and characteristics of the workforce e.g. its composition according to age, sex and ethnic diversity.

The second report examined the demographic background of the Counties Manukau population, and introduced projections for the same population by ethnicity, age group and sex as drivers of future demand for health services from CMDHB.

The third report introduced the basic methodology behind the modelling, explained a number of the alternative assumptions behind the key drivers and presented some preliminary modelling estimates.

This report presents discussion on a number of key areas including:

- The finalised methodology in terms of both the service area and MDC modelling undertaken
- Descriptions of the both the current and projected Counties Manukau population's
- Analysis of the current use of CMDHB hospital services – a demographic analysis and analysis in terms of service area's and MDC
- Projections of demand for hospital services – by service area and MDC
- The demand for labour
- The potential supply of labour; and
- The potential supply/demand imbalance.

**It should be noted that this report is not intended to represent the final output of NZIER's work for CMDHB. This report is largely statistical in nature. The final outputs will actually be three separate reports, each of which will include statistical analysis, but which will focus on the**

**implications for workforce development strategy. One report will focus on the implications of a growing and ageing population for the development of the workforce as a whole. Another will focus on the changing service needs of Pacific Peoples in Counties Manukau and what their particular needs imply for workforce development. The third report will focus on the changing service needs of Maori and what they imply for workforce development.**

## **1.2 Methodology**

Our methodology for producing the estimates and projections included in this report is detailed in Appendix B. However, in brief and expressed simply, we took the following steps to project future hospital service needs and to highlight any potential labour shortage problems future service needs might imply:

1. Current service provision, as represented by the number of discharges (broken down by patient age, sex and ethnic group, and by service area and MDC) is assumed to represent current need.
2. Using different population growth scenarios, service needs are projected into the future by applying current age, sex and ethnic group discharge rates to the different future populations implied by the growth scenarios.
3. Demand for hospital labour (i.e. the people CMDHB will need to employ) is projected into the future by assuming that current staffing patterns change directly in-line with service needs.
4. The supply of hospital labour is projected into the future by assuming that the share of Counties Manukau's population of working age that is accounted for by the hospital workforce remains constant.
5. Projected demand for hospital labour is compared with projected labour supply to examine whether and to what extent there will be labour shortages under the different population growth scenarios.

We emphasise that the assumptions underlying these steps are not rigid, and that they can be (and are) varied in order to answer a number of "what if?" questions. For example, we show what share of the local population of working age the hospital workforce would need to account for, if labour shortages are to be negated.

## **1.3 Structure of the report**

In section 2 we examine the size, structure and composition of the current and projected Counties Manukau population. As we noted above, population is the key factor that influences our service needs and labour demand and supply modelling.

In section 3 we describe the current pattern of hospital service provision, which we take to be equivalent to current demand for services.

In section 4 we project future need for services based on three different scenarios of population growth.

In section 5 we examine the current hospital workforce, which we equate with the current demand for labour. We also show how demand for labour will grow as the demand for services grows.

In section 6 we model the future supply of labour, again using different scenarios of population growth.

In section 7 we compare our projections of labour demand with our projections of labour supply to examine whether and to what extent CMDHB face labour shortages in its hospital services.

Lastly, in section 8 we consider what effect changing some of the inputs and assumptions has on the projected balance between labour supply and demand. We also indicate the other ways in which the modelling assumptions could be changed for the purposes of analysing the workforce development challenges that CMDHB faces.

## **2. The Counties Manukau population**

### **2.1 The current population**

As noted earlier in section 1.2 on methodology, the primary driver of the estimates of demand for health services in the area is the population itself – in particular, its size, age structure and ethnic composition - and how these will change over time. We want to be able to consider the population which could potentially demand services from the CMDHB.

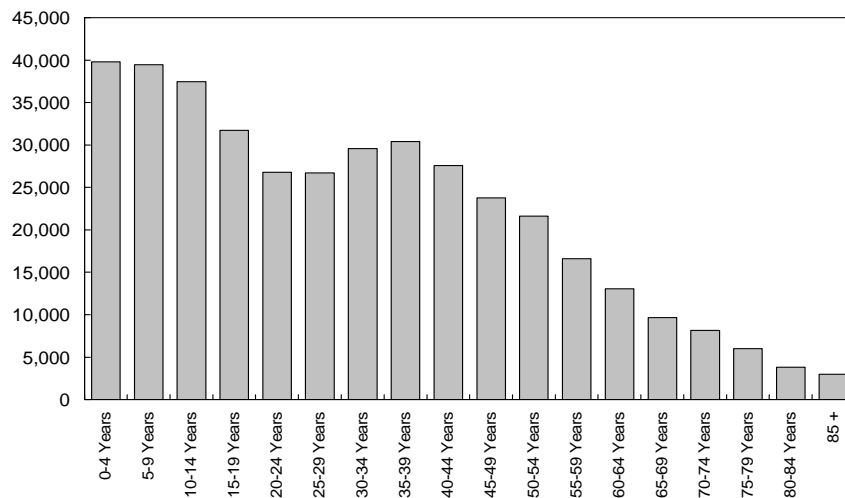
The size, structure and composition of the population are important because, for example, certain age groups and ethnic groups have higher rates of incidence of particular conditions and/or may typically require relatively lower or higher levels of support by the CMDHB workforce. These demands may represent pressures in a variety of service areas across the CMDHB workforce. If the structure / composition of the population is expected to shift to those who typically have high rates of incidence of resource intensive conditions, then this may put pressure on the CMDHB workforce. Even if the conditions are not overtly resource intensive, strong growth in any particular sub-group of the population could lead to increased pressure on a particular service area. Examining the population is especially important in the case of Counties Manukau because the area's population is both rapidly growing and diverse.

The demographic breakdowns have been obtained from Statistics New Zealand, and are Census data from 2001. The 2001 Census is the most up-to-date formal source of detailed breakdowns of specific populations by characteristics such as age/sex/ethnicity.

Encompassing Manukau City, Papakura District and Rodney District, the Counties Manukau area has a population in excess of 400,000 people and is often cited for its diversity.

Figure 1 below illustrates the distribution of the Counties Manukau population by age group from the 2001 Census. Of particular interest is the significant proportion of the population aged under 19 years – nearly 38% of the entire Counties Manukau population. The other primary contributor is the 35 – 39 year age group, contributing nearly 8% to the total population. The contributions of age groups older than this taper off towards the 85+ year age group as we would expect.

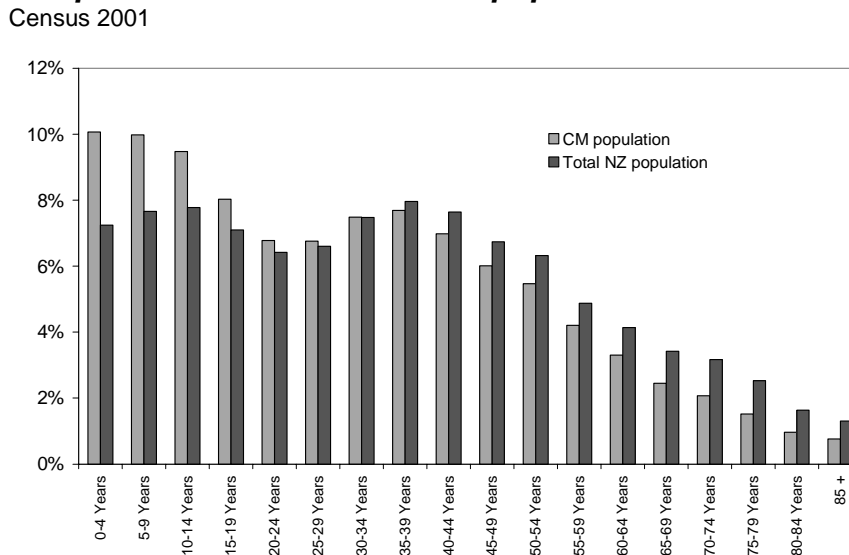
**Figure 1 Counties Manukau population by age group**  
Census 2001



Source: Statistics New Zealand

The information provided by the distribution above is more valuable when placed into the context of the total New Zealand population. Figure 2 below does this by comparing the population distribution by age group for the Counties Manukau area against that for the total New Zealand population.

**Figure 2 Counties Manukau population by age group compared to total New Zealand population**  
Census 2001



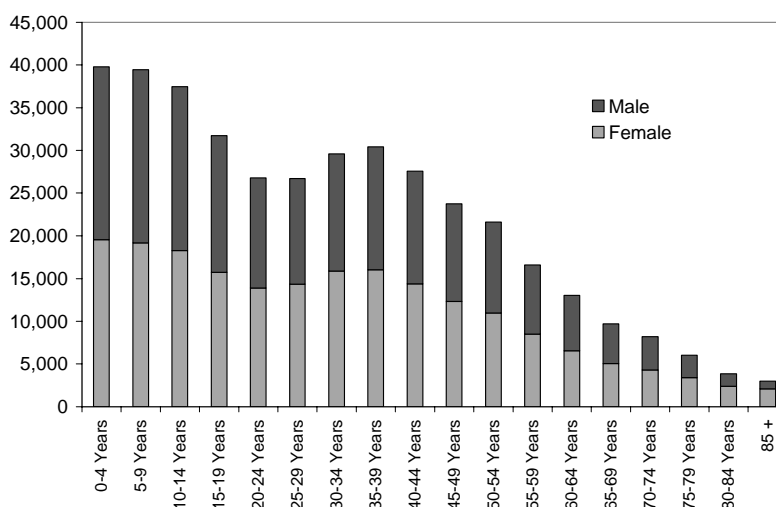
Source: Statistics New Zealand

The Counties Manukau population is clearly younger than the total New Zealand population. As noted before, those aged under 20 account for nearly 38% of the population in the Counties Manukau area, but only 30% for the whole country. The large proportion of young people comes at the expense of those aged over 35, when compared to the total population.

Figure 3 again shows the distribution of the Counties Manukau population by age group, but this time introduces the split between males and females

for each of those age groups. The balance between males and females for those aged under 20 years of age is very even. Above this age, the balance shifts towards more females than males – a difference which narrows towards the 60 – 64 year age group, then spreads again noticeably towards the 85+ age group. The number of females aged over 75 years in Counties Manukau significantly exceeds the number of similarly aged males – a difference of nearly 3,000 people. This imbalance toward females in the older age groups is likely to be a New Zealand wide feature, rather than just for the Counties Manukau population.

**Figure 3 Counties Manukau population by age group and sex**  
Census 2001



Source: Statistics New Zealand

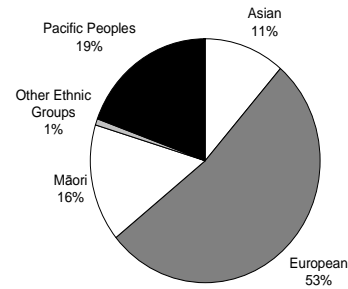
Counties Manukau is an ethnically diverse region of New Zealand, containing a large concentration of Pacific Peoples, Māori and a growing Asian population. The distribution of the Counties Manukau population by ethnicity is shown below.

Note that the ethnic categorisation used in the Census is a subjective one i.e. it seeks the respondents' perception of their ethnicity, rather than necessarily being based on strict genealogical conditions.

**Table 1 Counties Manukau population by ethnic group**

Census 2001

|                     | Number  | Proportion |
|---------------------|---------|------------|
| Asian               | 45,189  | 11.4%      |
| European            | 208,266 | 52.7%      |
| Māori               | 61,386  | 15.5%      |
| Other Ethnic Groups | 3,477   | 0.9%       |
| Pacific Peoples     | 76,899  | 19.5%      |
| Total               | 395,217 | 100%       |



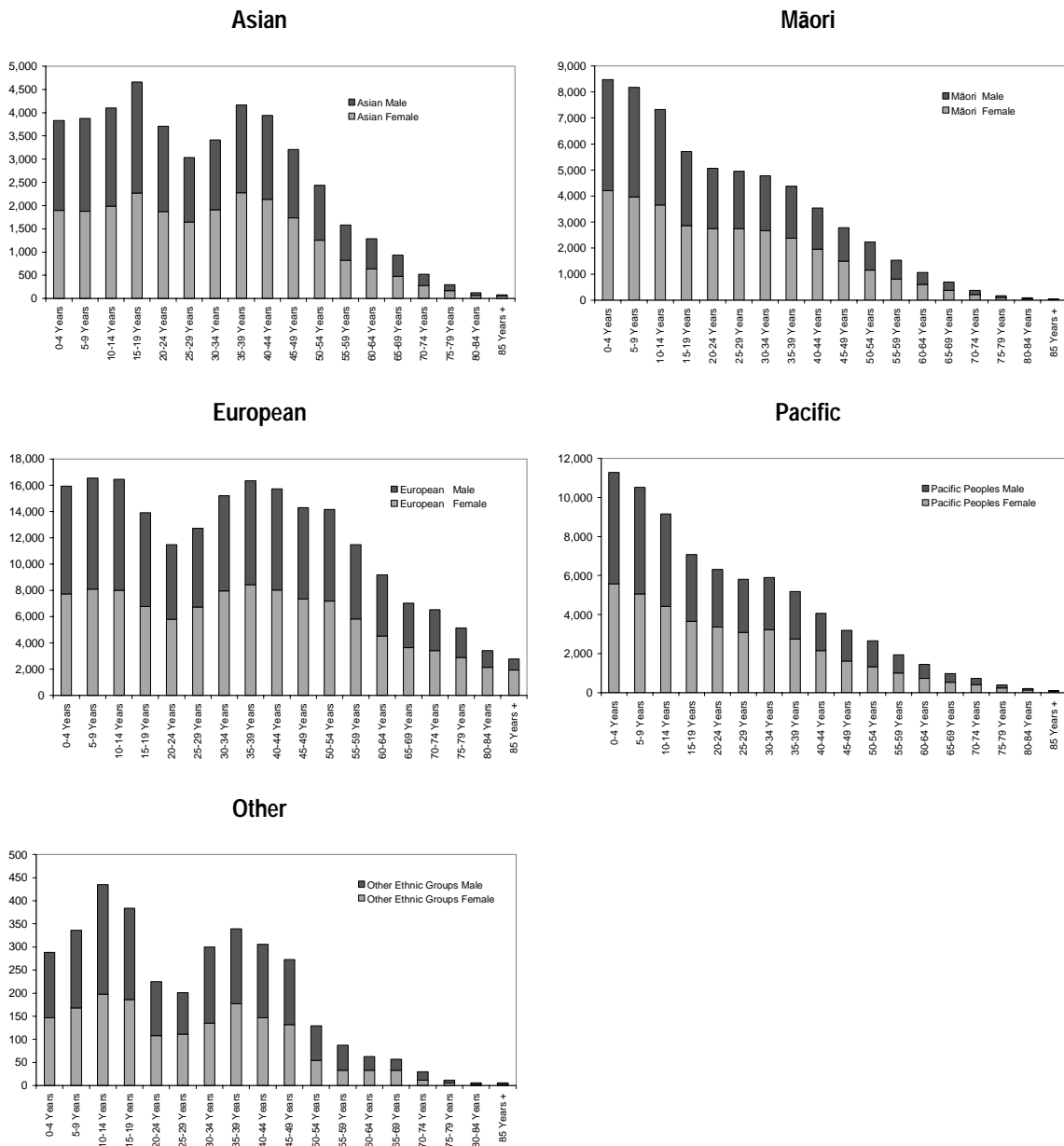
Source: Statistics New Zealand

Figure 4 shows a similar breakdown by ethnic grouping, but with the added dimensions of age and sex breakdowns included.

The age structure for the different ethnic groups is noticeably different. Māori and Pacific Peoples' age distributions are skewed heavily toward the younger age groups, particularly those aged under 15 years. In contrast to the European, Asian and Other categories, there is a noticeable lack of a pronounced 'bulge' in the age distribution around 30 – 50 years. The Asian, European and Other categories have relatively similar age structures, with well-defined peaks at young and middle age and a declining tail towards the 85+ age group.

It should be noted that the vertical scale in the different parts of Figure 4 varies, with the effect that the middle-life bulge in the European age structure is understated visually, although it is very important in terms of population ageing. To a lesser extent, the importance of the Pacific People young population is also understated visually, although this population sub-group seems likely to be important in terms of population growth.

**Figure 4 Counties Manukau population – ethnicity by age and sex**  
Census 2001

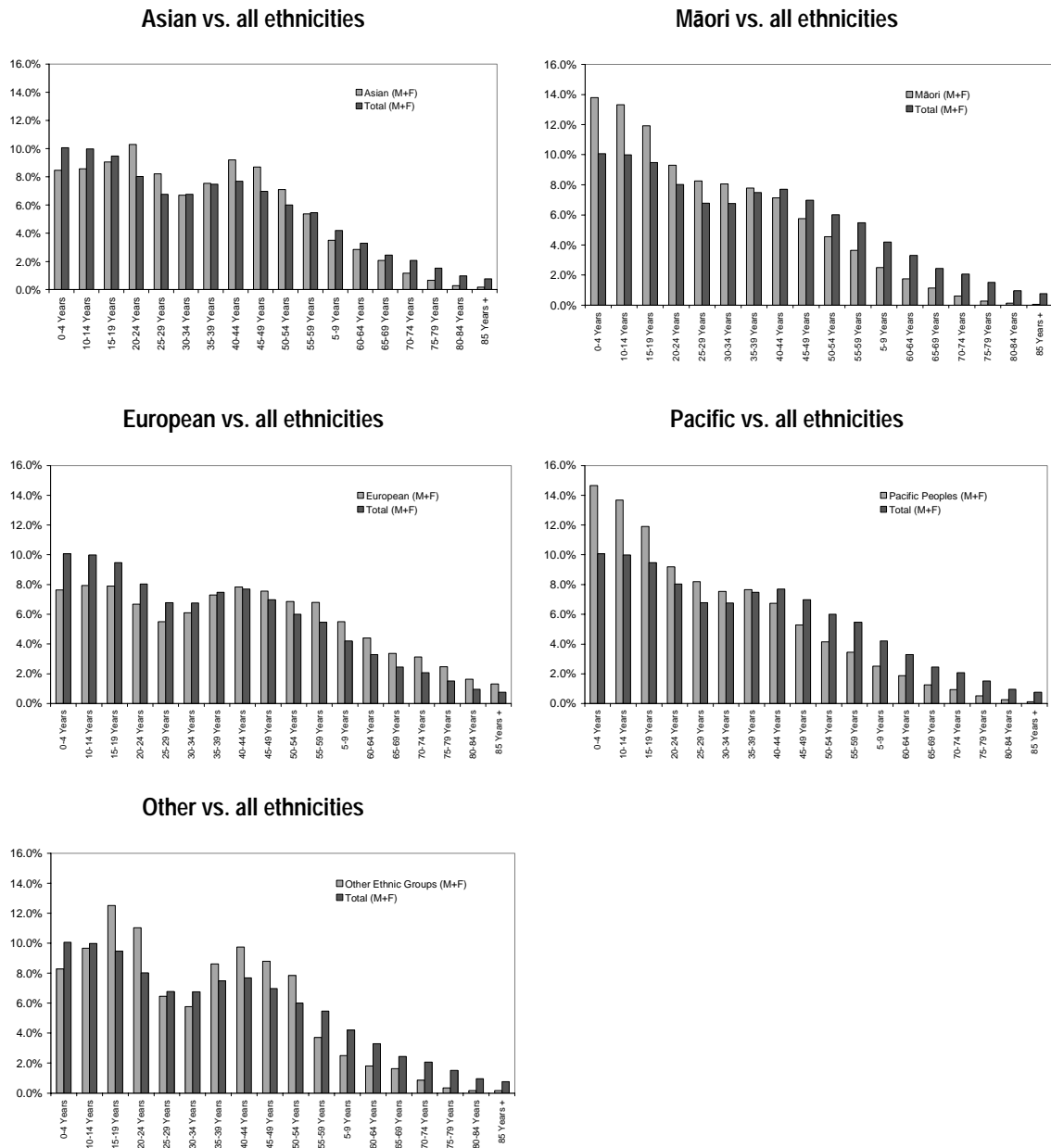


Source: Statistics New Zealand

Figure 5 compares each ethnic group against the ethnic/age/sex breakdowns for the Counties Manukau area in total (i.e. an individual ethnic group against an aggregate group combining all ethnic groups). It highlights the skewed nature of the Māori and Pacific Peoples distribution towards younger age groups. It also shows under-representation in the younger age groups by Europeans (compared to the total) but over-representation in the older age groups.

**Figure 5 Counties Manukau population – ethnicity by age compared to all ethnic groups**

Census 2001



Source: Statistics New Zealand

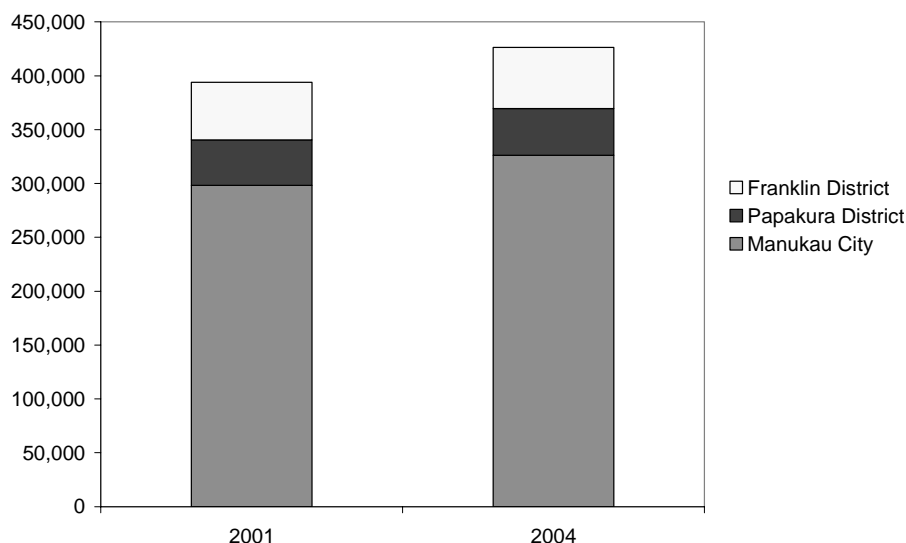
We noted earlier that the 2001 Census provides us with the most up-to-date formal data on particular characteristics of sub-groups of the total population. Clearly, since 2001 the population of the Counties Manukau area will have grown. While we are not able to obtain more recent detailed breakdowns for Counties Manukau, we do know the overall change in the size of the estimated local population.

Figure 6 shows the change in the estimated population of the Counties Manukau area from 2001 to 2004. The estimated population grew by nearly 32,500 people from 2001 to 2004, reaching over 426,000 in total. This represents growth of around 8% from 2001 to 2004.

---

### **Figure 6 Counties Manukau population estimates**

Population estimates 2001 vs. 2004



Source: Statistics New Zealand

---

## **2.2 The projected population**

We have obtained sub-national (i.e. for the Counties Manukau area) ethnic population projections by age group and sex from Statistics New Zealand. It is these projections that will essentially form the main driver of the demand projections.

In this section we summarise the key features of the projections, and note some of the major assumptions and caveats that underpin them. We emphasise at this point that the population projections we have used are essentially the same as those used by CMDHB staff in modelling bed demand in the future.

### **2.2.1 Key features of the population projections**

Table 2 below provides a summary of the Statistics New Zealand medium population projections for the Counties Manukau area by ethnic group, sex and aggregated age group. Projections are shown at five year intervals from 2001, for 2006, 2011 and 2016 with indications of the absolute and percentage growth between the five year periods. Figure 7 shows the medium projections diagrammatically for each ethnic group.

#### **a) Māori population growth**

The Māori population is expected to grow by around 1.5% annually out to 2016 – growth of nearly 20,000 people over the 15 year period. While the Māori population is the third largest (of the four) in 2001, by 2016 Māori form the smallest proportion of the total Counties Manukau population. We noted in the discussion of the current population that Māori have a skewed

age distribution towards the younger age groups. This is expected to change in the 15 years from 2001, with the middle and older age groups growing in relative size. As a result, the median age is expected to grow by over 2 years from 2001 to 2016. It also appears that the younger age groups are not subsequently 'replaced', which may reflect changing fertility rates for this group. This could impact on the future demand for specific services if they were targeted to this group (young Māori).

#### ***b) Pacific People's population growth***

Pacific Peoples formed the second largest ethnic grouping in 2001 and it is expected to remain in this position out to 2016. This implies population growth for Counties Manukau Pacific Peoples of nearly 45,000 people, or around 2.7% per annum. Similarly to the Māori population, the skew-ness evident in the base year is altered by population growth out to 2016, with growth in the middle and older age groups coming at the expense of the younger age groups. Again, this bulge in the younger age groups does not appear to be replaced over time. The median age group is also expected to grow by over 2 years as a result.

#### ***c) Asian population growth***

The Asian ethnic grouping is expected to grow the most out of the four groups – around 56,000 from 2001 to 2016. Growth is expected to be particularly strong between 2001 and 2006 (9.1% average per annum), and even though it tapers off over time it is still relatively strong. By 2016 the Asian population in the Counties Manukau area is expected to be larger than the Māori population. The change in age distribution is different from the Māori and Pacific Peoples groups because the proportion of people aged 0 – 14 declines, the proportion of those aged 65+ grows, and the proportion of the Asian population aged between 15 and 64 is not expected to change significantly. Subsequently, the median age is expected to grow by nearly 4 years. This group may be more affected by migration flows than for Māori and Pacific Peoples, contributing on the static state of the 15 – 64 year age group.

#### ***d) European population growth***

The European age group is the only one expected to experience negative growth over the 15 year period, with average annual growth of around -0.2% per annum. The change in age distribution projected is similar to that for the Asian group, with negative growth in the younger age group counteracted by growth in the 65+ age group.

**Table 2 Counties Manukau population projections by ethnicity**

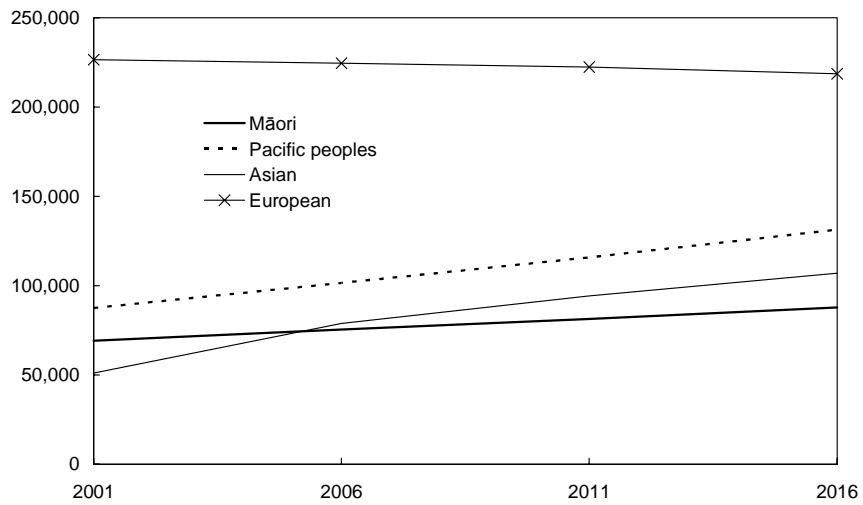
Medium projection – 2006, 2011 and 2016.

| Māori    | Res Māori population         | Population change | Average annual % change | Resident Māori age group distribution (%)           |       |      | Median age (years) |
|----------|------------------------------|-------------------|-------------------------|---|-------|------|--------------------|
|          |                              |                   |                         | 0-14  | 15-64 | 65+  |                    |
| 2001     | 69,200                       | -                 | -                       | 38.5  | 59.2  | 2.4  | 21.4               |
| 2006     | 75,400                       | 6,200             | 1.7                     | 37.0  | 60.1  | 2.9  | 21.8               |
| 2011     | 81,400                       | 6,000             | 1.5                     | 35.0  | 61.4  | 3.6  | 22.6               |
| 2016     | 87,800                       | 6,400             | 1.5                     | 33.4  | 61.8  | 4.8  | 23.7               |
| Pacific  | Resident Pacific population  | Population change | Average annual % change | Resident Pacific ethnic age group distribution (%)  |       |      | Median age (years) |
|          |                              |                   |                         | 0-14  | 15-64 | 65+  |                    |
| 2001     | 87,500                       | -                 | -                       | 39.4  | 57.2  | 3.4  | 20.9               |
| 2006     | 101,500                      | 14,000            | 3.0                     | 37.9  | 58.2  | 3.9  | 21.1               |
| 2011     | 115,800                      | 14,300            | 2.7                     | 35.8  | 59.7  | 4.6  | 22.1               |
| 2016     | 131,300                      | 15,500            | 2.5                     | 34.0  | 60.6  | 5.4  | 23.1               |
| Asian    | Resident Asian population    | Population change | Average annual % change | Resident Asian ethnic age group distribution (%)    |       |      | Median age (years) |
|          |                              |                   |                         | 0-14  | 15-64 | 65+  |                    |
| 2001     | 51,000                       | -                 | -                       | 25.1  | 70.3  | 4.6  | 29.4               |
| 2006     | 78,800                       | 27,800            | 9.1                     | 23.4  | 71.6  | 5.0  | 29.0               |
| 2011     | 94,200                       | 15,400            | 3.6                     | 22.8  | 71.2  | 6.1  | 30.8               |
| 2016     | 107,000                      | 12,800            | 2.6                     | 21.8  | 70.5  | 7.8  | 33.2               |
| European | Resident European population | Population change | Average annual % change | Resident European ethnic age group distribution (%) |       |      | Median age (years) |
|          |                              |                   |                         | 0-14  | 15-64 | 65+  |                    |
| 2001     | 226,500                      | -                 | -                       | 23.2  | 64.8  | 12.0 | 35.7               |
| 2006     | 224,500                      | -2,000            | -0.2                    | 21.9  | 64.3  | 13.8 | 38.2               |
| 2011     | 222,400                      | -2,100            | -0.2                    | 20.0  | 63.8  | 16.2 | 40.7               |
| 2016     | 218,700                      | -3,700            | -0.3                    | 18.1  | 62.3  | 19.6 | 43.1               |

Source: Statistics New Zealand

**Figure 7 Counties Manukau population projections by ethnic group**

Medium projections



Source: Statistics New Zealand

In Appendix C we explain in detail the assumptions underlying the population estimates we have used, as well as the caveats that apply to them. In particular, we explain how we projected to 2021 using official population projections that go out only as far as 2016. We also show how we have taken account of the likely effects of the planned Flatbush development.

### 3. Current hospital service needs

The previous section established the magnitude and characteristics of the potential population which will demand health and disability services in the future. In this section we identify and examine the current hospital service provision. For modelling purposes, we assume that current provision is the same as current need, although we recognise that they might in fact be different.

#### 3.1 Demographic analysis

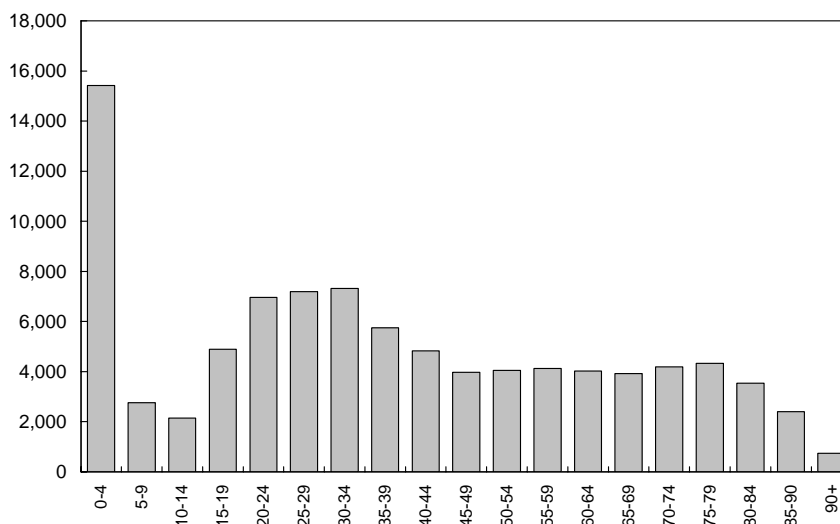
The demographic analysis in the following two sub-sections are based on inpatient discharges and outpatient cases respectively. The two groups are quite distinct in size, so the demographic characteristics of each group are investigated in isolation.

##### 3.1.1 Demographic composition of inpatient discharges

Figure 8 is a simple disaggregation of CMDHB inpatient discharges by age group. It is of interest as it highlights the significant amount of discharges which relate to infants and children aged under 5 – nearly 17% of all discharges. There is another significant contribution to total inpatient discharges by those aged between 20 – 34 years old. For age groups above this, the distribution of discharges is relatively even. There are a small number of discharges for those aged over 90 years.

**Figure 8 CMDHB inpatient discharges by age group**

Year ended 28/02/05



Source: CMDHB – Transition database

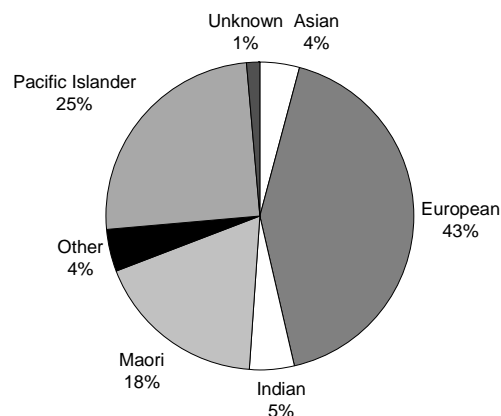
The inpatient discharges in the 12 month period were dominated by those identified as Europeans, with a significant proportion also coming from Pacific Peoples. These two ethnic groupings contributed over 67% of all inpatient discharges. Maori were the next most significant contributor to total inpatient discharges – just under 18%. This distribution is shown in

Table 3. The Transition database allows a more disaggregated breakdown by ethnicity to be extracted.

**Table 3 CMDHB inpatient discharges by ethnic group**

Year ended 28/02/05

|                  | Number        | Proportion    |
|------------------|---------------|---------------|
| Asian            | 3,831         | 4.1%          |
| European         | 39,163        | 42.3%         |
| Indian           | 4,305         | 4.7%          |
| Maori            | 16,599        | 17.9%         |
| Other            | 4,121         | 4.5%          |
| Pacific Islander | 23,281        | 25.2%         |
| Unknown          | 1,235         | 1.3%          |
| <b>Total</b>     | <b>92,535</b> | <b>100.0%</b> |



Source: CMDHB – Transition database

Females dominate inpatient discharges for all the ethnic groups shown. The disparity is particularly prominent for the Indian ethnic group, with the number of female inpatient discharges being 67% greater than for Indian males. The difference is larger than 50% for Asian and Maori also. Female discharges for European inpatients are only 21% higher than European male discharges. In aggregate, the number of discharges for female inpatients is 37% larger than the number for males.

**Table 4 CMDHB inpatient discharges by ethnicity and sex**

Year ended 28/02/05

|                  | Female        | Male          | Total         |
|------------------|---------------|---------------|---------------|
| Asian            | 2,352         | 1,479         | 3,831         |
| European         | 21,481        | 17,682        | 39,163        |
| Indian           | 2,691         | 1,614         | 4,305         |
| Maori            | 10,159        | 6,440         | 16,599        |
| Other            | 2,296         | 1,825         | 4,121         |
| Pacific Islander | 13,886        | 9,395         | 23,281        |
| Unknown          | 649           | 586           | 1,235         |
| <b>Total</b>     | <b>53,514</b> | <b>39,021</b> | <b>92,535</b> |

Source: CMDHB – Transition database

Table 5 below takes the information presented above a step further, by presenting inpatient discharges by ethnicity and sex. As well as showing the

number of inpatients discharges (cases) for each grouping, it also presents the total, and average length of stay for that particular group.

The table shows that when comparing ethnic groups (for both male and female) Europeans have the longest average length of stay at 3.7 nights. Those with an Unknown ethnic group have the shortest average length of stay at only 2 nights. In terms of ethnicity/sex combinations, Maori and Indian male inpatients spend the longest number of nights (on average) with more than 4 nights. The average length of stay over all the cases in the 12 month period is just over 3 nights.

**Table 5 CMDHB inpatient discharges by ethnicity and sex – including total and average length of stay**

Year ended 28/02/05

|                      |        | Cases         | Total length of stay (nights) | Average length of stay (nights) |
|----------------------|--------|---------------|-------------------------------|---------------------------------|
| Asian                | Female | 2,352         | 5,532                         | 2.4                             |
|                      | Male   | 1,479         | 4,006                         | 2.7                             |
| Asian total          | M+F    | 3,831         | 9,538                         | 2.5                             |
| European             | Female | 21,481        | 79,776                        | 3.7                             |
|                      | Male   | 17,682        | 63,365                        | 3.6                             |
| European total       | M+F    | 39,163        | 143,141                       | 3.7                             |
| Indian               | Female | 2,691         | 5,621                         | 2.1                             |
|                      | Male   | 1,614         | 6,647                         | 4.1                             |
| Indian total         | M+F    | 4,305         | 12,268                        | 2.8                             |
| Māori                | Female | 10,159        | 23,333                        | 2.3                             |
|                      | Male   | 6,440         | 26,722                        | 4.1                             |
| Māori total          | M+F    | 16,599        | 50,055                        | 3.0                             |
| Other                | Female | 2,296         | 5,869                         | 2.6                             |
|                      | Male   | 1,825         | 4,376                         | 2.4                             |
| Other total          | M+F    | 4,121         | 10,245                        | 2.5                             |
| Pacific Island       | Female | 13,886        | 30,236                        | 2.2                             |
|                      | Male   | 9,395         | 25,598                        | 2.7                             |
| Pacific Island total | M+F    | 23,281        | 55,834                        | 2.4                             |
| Unknown              | Female | 649           | 1,150                         | 1.8                             |
|                      | Male   | 586           | 1,297                         | 2.2                             |
| Unknown total        | M+F    | 1,235         | 2,447                         | 2.0                             |
| <b>TOTAL</b>         |        | <b>92,535</b> | <b>283,528</b>                | <b>3.1</b>                      |

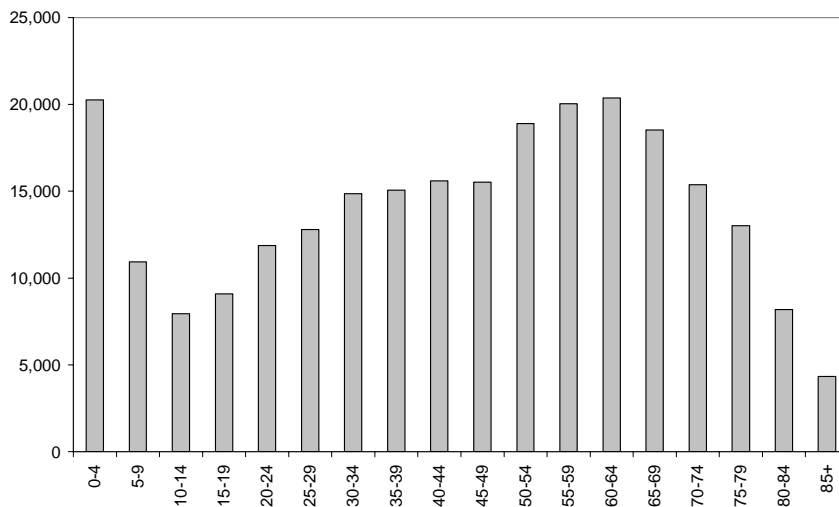
Source: CMDHB – Transition database

### 3.1.2 Demographic breakdown of outpatient discharges

Figure 9 below shows the distribution of outpatient discharges by age group. As with the inpatient discharges, there are a significant number of discharges related to those aged under 5 – around 9% of all outpatient discharges. In contrast to the inpatient discharges though, there is a more pronounced share related to those aged between 50 and 75 years.

**Figure 9 CMDHB outpatient discharges by age group**

Year ended 28/02/05



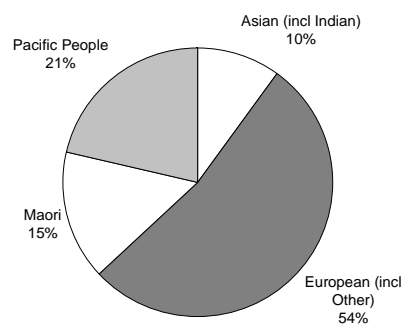
Source: CMDHB – Transition database

In terms of the distribution by ethnic group, Europeans dominate discharges for outpatients, followed by discharges related to Pacific Island patients. Māori contribute the third largest to overall outpatient discharges and collectively with discharges for Pacific Peoples, contribute 36%. The distribution amongst ethnic groups is shown below in Table 6.

**Table 6 CMDHB outpatient discharges by ethnic group**

Year ended 28/02/05

| Ethnic group           | Number         | Proportion  |
|------------------------|----------------|-------------|
| Asian (incl. Indian)   | 25,178         | 10%         |
| European (incl. Other) | 134,410        | 53%         |
| Maori                  | 39,039         | 15%         |
| Pacific People         | 53,940         | 21%         |
| <b>Total</b>           | <b>252,567</b> | <b>100%</b> |



Source: CMDHB – Transition database

The following table identifies current need/current demand in terms of outpatient discharges by ethnic group and sex. We noted above that discharges for Europeans dominate total outpatient discharges, and we see below that the split in European discharges between males and females is slightly in favour of females. The slight balance in favour of females is consistent across the other ethnic groups also. In total, 54% of outpatient discharges relate to females.

**Table 7 CMDHB outpatient discharges by ethnicity and sex**

Year ended 28/02/05

|                            | Female         | Male           | Total          |
|----------------------------|----------------|----------------|----------------|
| Asian (including Indian)   | 14,499         | 10,679         | 25,178         |
| European (including Other) | 70,109         | 64,301         | 134,410        |
| Maori                      | 21,800         | 17,239         | 39,039         |
| Pacific People             | 29,784         | 24,156         | 53,940         |
| <b>Total</b>               | <b>136,192</b> | <b>116,375</b> | <b>252,567</b> |

Source: CMDHB – Transition database

### 3.2 Analysis by service area

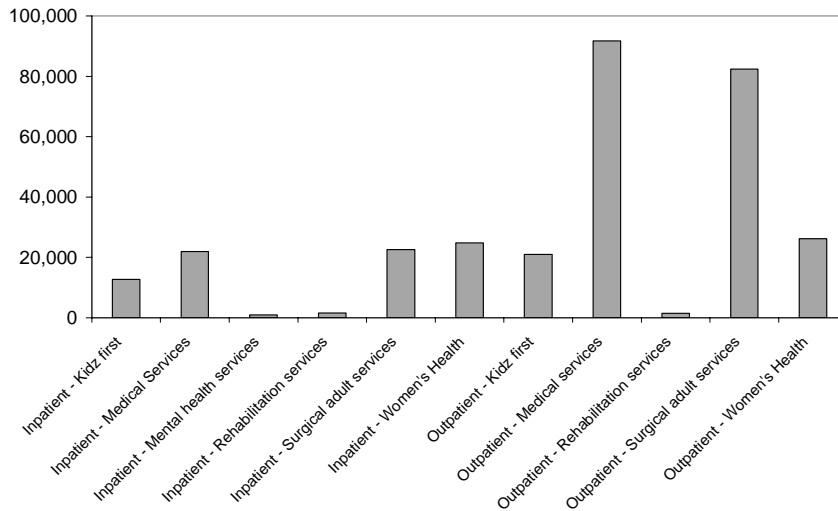
In addition to changes in the composition of the population as a major driver of demand for health care services in the Counties Manukau area, the distribution of demand across service areas will also play a significant role – particularly in terms of the potential impact on the demand for workers in those service areas. As noted in Appendix B (detailing our methodology), rates of incidence by service area are used as the primary source of projecting future demand for health care services.

Given this, the following data considers the breakdown of current demand/need in terms of inpatient and outpatient discharges for the CMDHB by service area.

The following chart indicates the spread of discharges across the various service areas – identifying inpatients and outpatients separately. Clearly, Medical Services for outpatients are the largest contributor to the total number of discharges, contributing nearly 30%. Discharges related to surgical adult services also contribute significantly, contributing nearly 27%. The remaining discharges are primarily spread across 6 other service areas, which cater for both in and outpatients.

**Figure 10 CMDHB discharges by service area**

Year ended 28/02/05



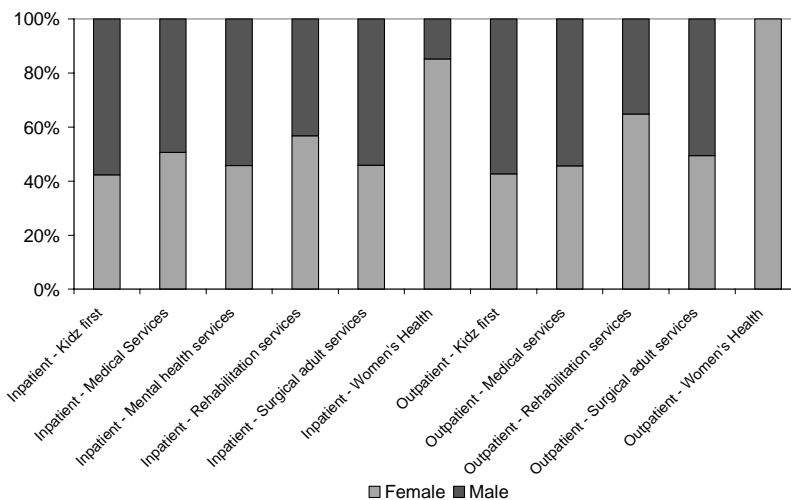
Source: CMDHB – Transition database

In terms of the split of these discharges between males and females, males dominate more individual service areas in absolute terms, but females dominate in terms of overall contribution to the number of discharges.

Both in and outpatient discharges relating to the 'Kidz First' service area are dominated by the male gender, as are surgical adult services. Medical services for inpatients are dominated by females, whereas males tend to account for more medical services discharges on an outpatient basis. Rehabilitation services are clearly dominated by females. The chart below indicates the gender split for each of the CMDHB service areas.

**Figure 11 CMDHB discharges by service area and gender**

Year ended 28/02/05



Source: CMDHB – Transition database

The distribution of discharges by service area, while also taking into account key compositional details in terms of ethnicity, gender and age, is presented in the charts below.

The total pattern of discharges across services areas for Asians is fairly similar to that for all ethnicities i.e. large spikes for medical services and adult surgical services on an outpatient basis. For Asians, these tend to relate to patients aged 30 – 64 years. Discharges related to Women's Health also feature predominantly, for the same age group.

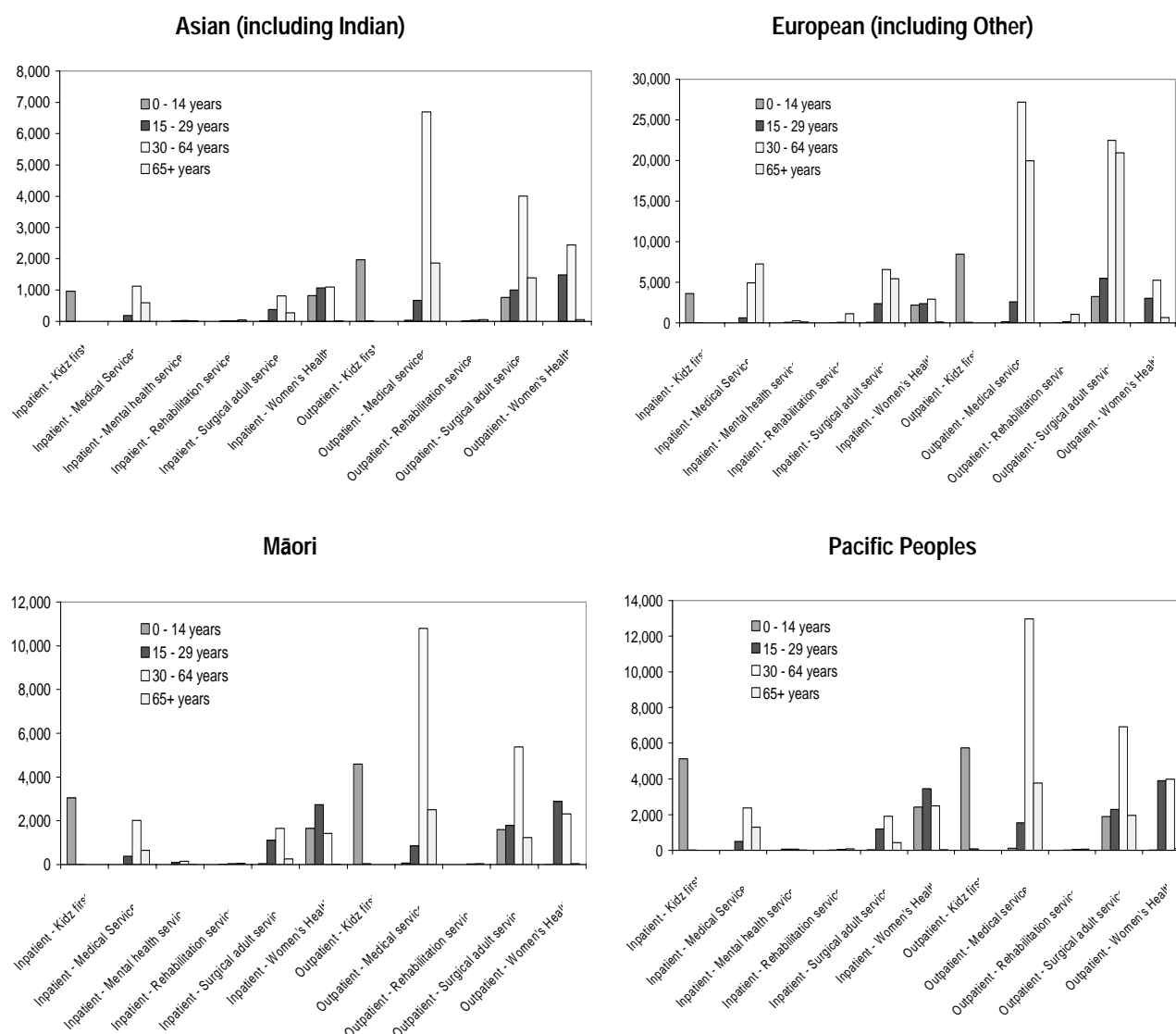
European discharges are also clearly dominated by medical and surgical services on an outpatient basis, but the age composition reflects strong contributions by both those aged 30 – 64 and those aged 65+. Collectively, these two age groups across the two main services areas account for over 60% of all discharges for Europeans.

For Māori, outpatient medical services are also a dominant feature, particularly for those aged 30 – 64 years. The distribution amongst other age group and service area combinations is fairly mixed, although the service area Kidz First (outpatients) is a relatively large individual contributor to total Māori discharges.

The distributions for Pacific Peoples are very similar to those for Māori, both in terms of the age split amongst service areas, and in terms of the relative contributions of various service areas.

**Figure 12 CMDHB discharges by service area, ethnicity and age**

Year ended 28/02/05



Source: CMDHB – Transition database

### 3.3 Analysis by MDC

As noted earlier in the section on methodology, the second source of rates of incidence is the distribution of discharges by MDC. For this reason, we examine here the current level of demand by looking at discharges (cases) by MDC.

It should be noted that the analysis in this section only relates to inpatient discharges. The reason for the focus on inpatients is that no MDC categorisation is collected for outpatients. In the year to February 2005, inpatients accounted for only around 28% of total patient discharges.

Discharges following care during childbirth and pregnancy were the largest contributor to the total number of discharges – around 13%. Pacific Peoples were the largest ethnic group contributor for this MDC, making up over one-third of all discharges in the 12 month period.

The second largest contributing MDC was for diseases and disorders of the musculoskeletal system and connective tissue. They contributed about 12% of all discharges. Europeans were by far the most significant ethnic group contributor to discharges as a result of care for this MDC, at 53%. Pacific Peoples were the second largest contributor.

Discharges as a result of diseases and disorders of the digestive system were the third largest contributor to total discharges. Europeans were the main ethnic group for this MDC, with Pacific Peoples again being the second largest contributor.

These three conditions account for one-third of all discharges.

Table 8 below shows the distribution of discharges for the 12 month period by MDC and ethnicity for the Counties Manukau DHB. Distributions across MDC's for a particular ethnicity, and for a particular MDC across ethnic groups are contained in the Appendix to this report.

**Table 8 Counties Manukau DHB inpatient discharges by ethnicity by MDC**

Year ended 28/02/05

| MDC                           | Asian        | European      | Indian       | Maori         | Other        | Pacific       | Unknown      | Total         |
|-------------------------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| No Code 0                     | 199          | 1,016         | 353          | 1,065         | 122          | 1,581         | 28           | 4,364         |
| DISEASE /NERVOUS SYSTEM 01    | 166          | 2,180         | 189          | 742           | 201          | 958           | 54           | 4,490         |
| DISEASE&DISORDERS OF EYE 02   | 53           | 480           | 57           | 131           | 88           | 307           | 59           | 1,175         |
| DISEASE /EAR NOSE &THROAT 03  | 182          | 1,879         | 172          | 955           | 214          | 1,324         | 94           | 4,820         |
| DISEASE /RESPIRATRY SY 04     | 162          | 2,399         | 194          | 1,592         | 215          | 2,707         | 34           | 7,303         |
| DISEASE /CIRCULATORY SYST 05  | 235          | 4,189         | 443          | 1,027         | 333          | 1,254         | 58           | 7,539         |
| DISEASE /DIGESTIVE SYST 06    | 431          | 4,251         | 441          | 1,128         | 539          | 1,590         | 185          | 8,565         |
| DISEASE /HEPATOBILIARY 07     | 102          | 678           | 64           | 224           | 99           | 262           | 34           | 1,463         |
| DISEASE /MUSC/SKLTL SYST 08   | 395          | 5,668         | 318          | 1,575         | 559          | 2,004         | 142          | 10,661        |
| DISEASE /SKIN & SUBC TISS 09  | 134          | 3,303         | 112          | 800           | 298          | 995           | 111          | 5,753         |
| ENDOCRINE DISEASE & DISOR 10  | 38           | 386           | 37           | 207           | 32           | 225           | 11           | 936           |
| DISEASE /KIDNEY & URINARY 11  | 82           | 790           | 110          | 385           | 90           | 588           | 30           | 2,075         |
| DISEASE /MALE REPRODUCTN 12   | 15           | 114           | 10           | 71            | 17           | 58            | 14           | 299           |
| DISEASE /FEMALE REPROD 13     | 112          | 762           | 124          | 503           | 160          | 593           | 51           | 2,305         |
| PREGNANCY & CHILDBIRTH 14     | 597          | 3,161         | 806          | 2,666         | 378          | 3,898         | 101          | 11,607        |
| NEWBORN DUE TO PERINATAL 15   | 431          | 2,081         | 463          | 1,798         | 228          | 2,682         | 55           | 7,738         |
| DISEASE OF BLOOD 16           | 52           | 535           | 54           | 138           | 42           | 197           | 26           | 1,044         |
| MYELOPROLIFERATIVE DISEAS 17  | 74           | 736           | 33           | 46            | 88           | 142           | 68           | 1,187         |
| INFECTIOUS &PARASITIC DIS 18  | 93           | 683           | 95           | 331           | 78           | 698           | 13           | 1,991         |
| MENTAL DISEASES &DISORDER 19  | 39           | 468           | 29           | 271           | 32           | 167           | 7            | 1,013         |
| SUBSTANCE USE & ORG MENTAL 20 | 3            | 99            | 18           | 23            | 9            | 14            | 2            | 168           |
| INJURY,POISON &TOXIC DRUG 21  | 144          | 1,904         | 124          | 687           | 188          | 730           | 21           | 3,798         |
| BURNS 22                      | 21           | 152           | 13           | 72            | 22           | 82            | 1            | 363           |
| FACTORS INFLUENCING STAT 23   | 66           | 1,230         | 45           | 152           | 86           | 213           | 35           | 1,827         |
| ERROR DRG ER                  | 3            | 17            |              | 7             | 2            | 6             |              | 35            |
| PRE DRG PR                    | 2            | 2             | 1            | 3             | 1            | 6             | 1            | 16            |
| <b>Total</b>                  | <b>3,831</b> | <b>39,163</b> | <b>4,305</b> | <b>16,599</b> | <b>4,121</b> | <b>23,281</b> | <b>1,235</b> | <b>92,535</b> |

Source: CMDHB – Transition database

As a preliminary step to identifying the main MDC drivers of demand in the Counties Manukau area (which will be projected) Table 9 below shows the discharges by aggregated age group for the 10 most common MDC (in terms of number of discharges). These 10 MDC accounted for just under 80% of all discharges for the period.

The discussion above briefly highlighted some key MDC in terms of the which ethnic groups account for the majority of the discharges, but it is useful to see how various age groups contribute also.

As we would expect, discharges related to pregnancy and childbirth are dominated by people in their late 20's/early 30's. The dominance in the youngest age group for the newborn & other neonates MDC (15) is also as we would expect.

The spread across the age groups for the respiratory system disorder MDC is interesting with a relatively small number of case being accounted for by those aged between 15 and 29. This is reflected also in the MDC for diseases of the ear, nose, mouth and throat.

**Table 9 Counties Manukau DHB inpatient discharges by age group for 10 most common MDC (in terms of number of discharges)**

Year ended 28/02/05

| MDC                        | Code | 0 - 14 | 15 - 29 | 30 - 64 | 65 +  | Total  |
|----------------------------|------|--------|---------|---------|-------|--------|
| PREGNANCY & CHILDBIRTH     | 14   | 11     | 6,878   | 4,718   | 0     | 11,607 |
| DISEASE /MUSC/SKLTL SYST   | 08   | 1,854  | 2,118   | 4,189   | 2,500 | 10,661 |
| DISEASE /DIGESTIVE SYST    | 06   | 967    | 1,284   | 3,933   | 2,381 | 8,565  |
| NEWBORN DUE TO PERINATAL   | 15   | 7,737  | 0       | 1       | 0     | 7,738  |
| DISEASE /CIRCULATORY SYST  | 05   | 113    | 295     | 3,670   | 3,461 | 7,539  |
| DISEASE /RESPIRATRY SY     | 04   | 2,782  | 481     | 2,029   | 2,011 | 7,303  |
| DISEASE /SKIN & SUBC TISS  | 09   | 753    | 810     | 2,370   | 1,820 | 5,753  |
| DISEASE /EAR NOSE & THROAT | 03   | 2,512  | 841     | 1,086   | 381   | 4,820  |
| DISEASE /NERVOUS SYSTEM    | 01   | 700    | 699     | 1,843   | 1,248 | 4,490  |
| No Code                    | 0    | 273    | 2,396   | 1,626   | 69    | 4,364  |

Source: CMDHB – Transition database

Table 10 takes the same 10 most common MDC categories and identifies their average length of stay across all age and ethnic groups.

While discharges for pregnancy and childbirth are the largest single contributor to total discharges the average length of stay is relatively small compared to the other conditions shown. Diseases of the musculoskeletal system are another large contributor, but the average length of stay as a result of this conditions is high at 3.4 nights. The highest average length of

stay for the 10 conditions shown is for diseases and disorders of the nervous system at 5.5 nights, which accounted for around 5% of all discharges.

The weighted average length of stay for these 10 conditions is around 2.7 nights

**Table 10 Counties Manukau DHB inpatient discharges and average length of stay for 10 most common MDC (in terms of number of discharges)**

Year ended 28/02/05

| MDC                       | Code | Cases  | Average LOS (nights) |
|---------------------------|------|--------|----------------------|
| PREGNANCY & CHILDBIRTH    | 14   | 11,607 | 1.9                  |
| DISEASE /MUSC/SKLTL SYST  | 08   | 10,661 | 3.4                  |
| DISEASE /DIGESTIVE SYST   | 06   | 8,565  | 2.0                  |
| NEWBORN DUE TO PERINATAL  | 15   | 7,738  | 2.9                  |
| DISEASE /CIRCULATORY SYST | 05   | 7,539  | 3.4                  |
| DISEASE /RESPIRATRY SY    | 04   | 7,303  | 2.8                  |
| DISEASE /SKIN & SUBC TISS | 09   | 5,753  | 2.4                  |
| DISEASE /EAR NOSE &THROAT | 03   | 4,820  | 0.8                  |
| DISEASE /NERVOUS SYSTEM   | 01   | 4,490  | 5.5                  |
| No Code                   | 0    | 4,364  | 1.5                  |

Source: CMDHB – Transition database

## 4. Projected need for hospital services

Using the process identified in the section 1.2 (outlining our methodology), and the current service need and population data described in the preceding sections, we now progress to produce estimates of projected need for hospital services. We present the analysis both in terms of need broken down by service area, as well as by MDC.

As noted earlier, 3 main scenarios will be presented for each type of modelling:

1. **Lower bound scenario** – Low population projections (including Flatbush population), with current shares/rates of incidence for service area distributions/MDC incidence.
2. **Middle ground scenario** – Medium population projections (including Flatbush population), with current shares/rates of incidence for service area distributions/MDC incidence.
3. **Higher bound scenario** – High population projections (including Flatbush population), with current shares/rates of incidence for service area distributions/MDC incidence.

### 4.1 Analysis by service area

#### 4.1.1 Total ethnic groups – analysis by service area

By using the distribution of discharges across the various service areas and the various population scenarios, we have produced projected need for hospital services by service area. For each service area, we have projected the number of discharges in 2004, 2006, 2011, 2016 and 2021.

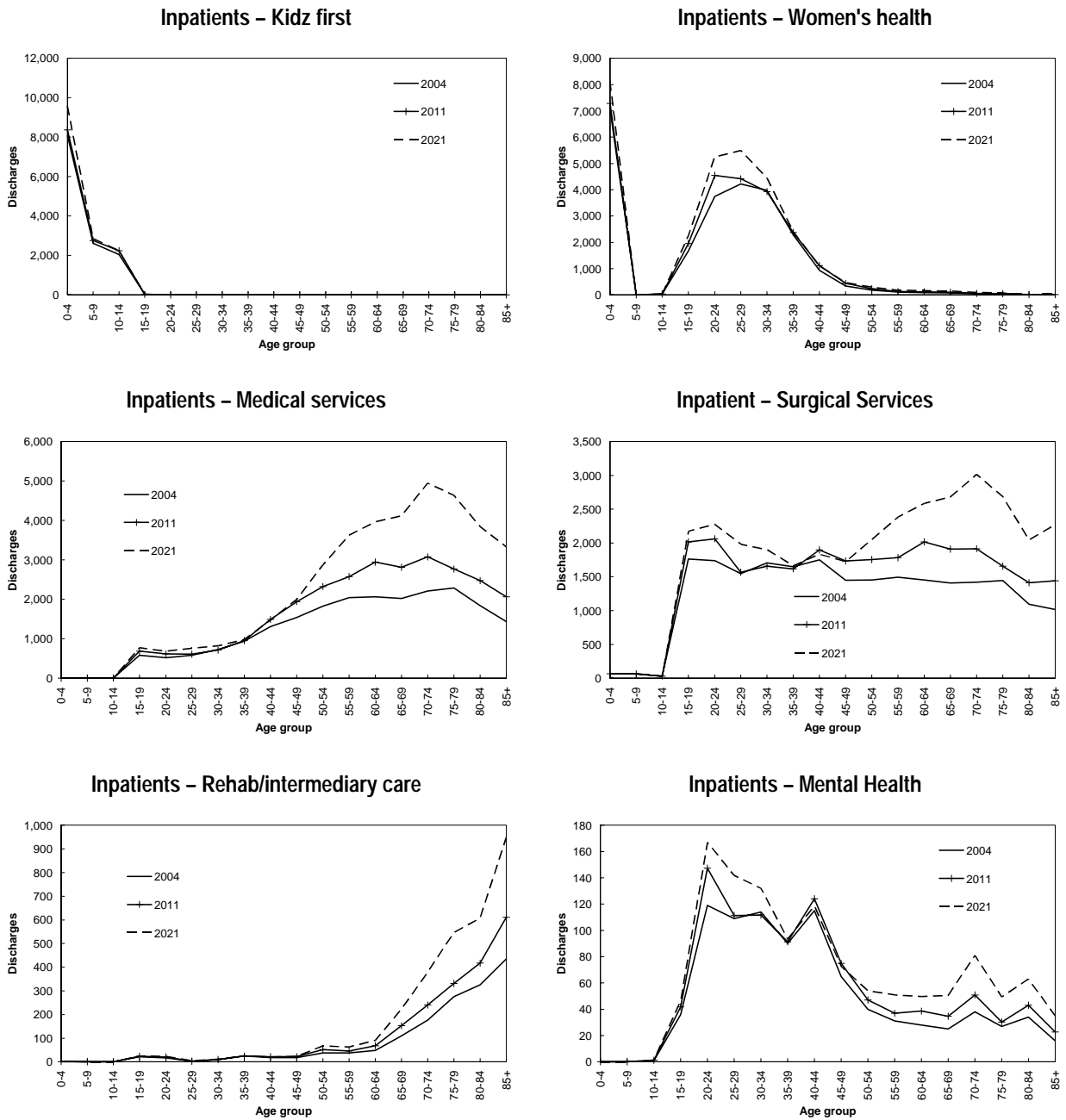
Figure 13 and Figure 14 below show for the middle ground scenario (i.e. medium population projections) the estimates of need by each of the service areas over time. In each chart, a separate line for 2004, 2011 and 2021 is shown to indicate how the pattern and absolute level of need changes for each service area over time.

The area under each curve measures need for the services shown. In general, 'bulges' in need that exist in 2004 (the base year) are typically accentuated by the population growth over time – particularly for service areas where a large proportion of the need relates to those aged over 65 years of age. This is part reflects the ageing of a number of the ethnic groups which contribute to these projections (which include all ethnic groups).

While the absolute levels tend to change with population growth, the changes in age distribution within the population projections do not, in general, affect the shape or distribution of need over the various age groups.

**Figure 13 Projections of need (inpatient discharges) by service area – middle ground scenario**

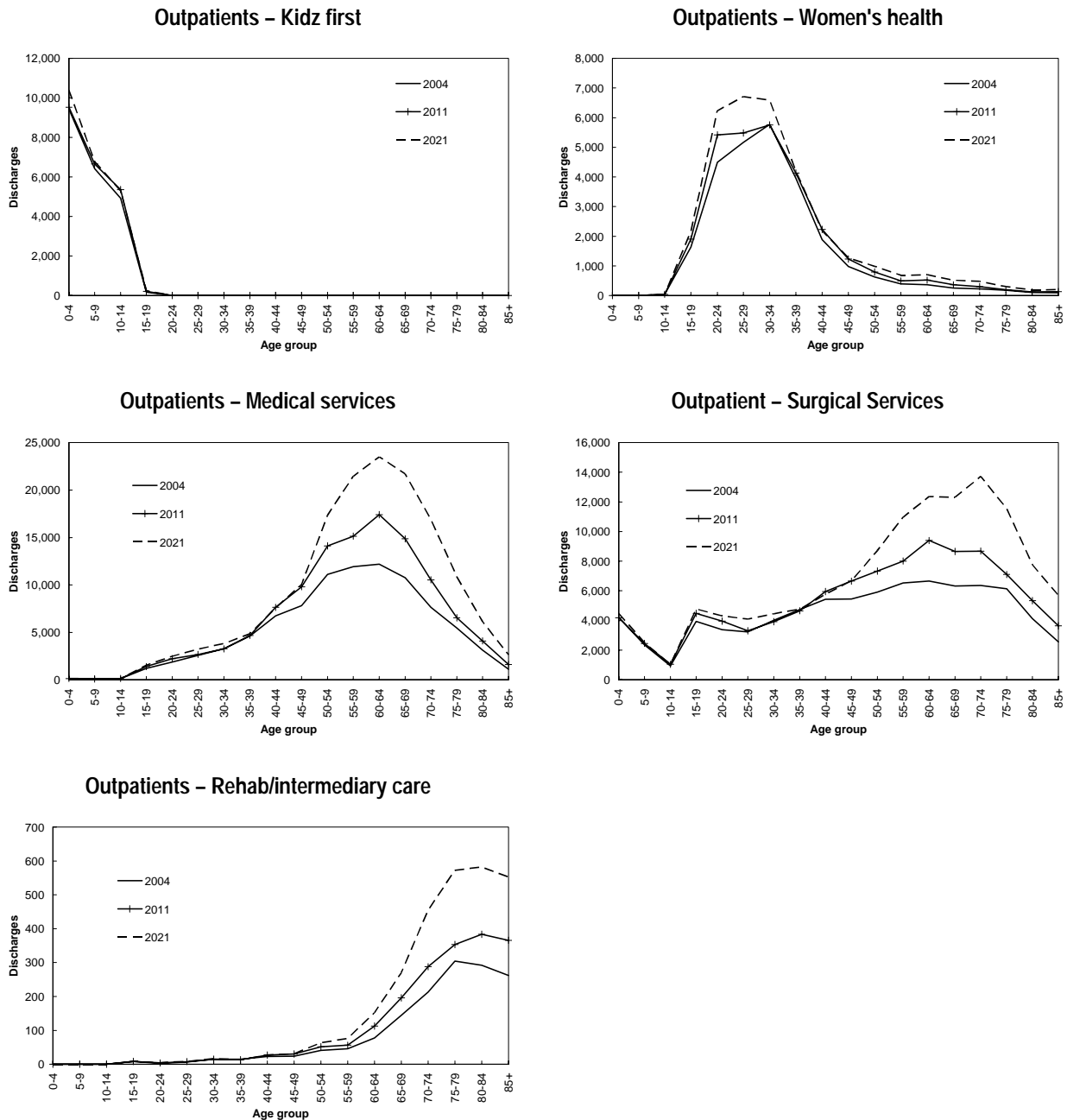
Medium population scenario (Flatbush included) – current incidence.



Source: Statistics New Zealand, CMDHB, NZIER

**Figure 14 Projections of need (outpatient discharges) by service area – middle ground scenario**

Medium population scenario (Flatbush included) – current incidence.



Source: Statistics New Zealand, CMDHB, NZIER

Table 39 in Appendix A summarises this information into total inpatient and outpatient discharges by age group, that result from the service area modelling on the middle ground scenario.

Table 11 below summarises the projections by service area by grouping in and outpatient need over time. This provides us with an easy way to see how the level of need for CMDHB service areas changes over time for the middle ground scenario. An index of need is also produced in the table for each service area from this absolute level need data, with 2004 set to 100.

Need for the rehabilitation/intermediary care service area exhibits the strongest growth in this middle ground scenario, nearly doubling over the 2004 – 2021 period. Need for the acute adult medicine service area is also strong over time, increasing by 70% from its 2004 base under this scenario. The surgical services area also exhibits relatively strong growth in this scenario. In total, need (as modelled by service area) increases by around 50% from 2004 to 2021.

**Table 11 Summary of need by service area (in and outpatients)  
– middle ground scenario**

Medium population scenario (Flatbush included) – current incidence.

|                        | Number of discharges (need) by service area (in and outpatients) |                |                |                |                | Index of need (2004 = 100) |            |            |            |            |
|------------------------|--|----------------|----------------|----------------|----------------|----------------------------|------------|------------|------------|------------|
|                        | 2004   | 2006           | 2011           | 2016           | 2021           | 2004                       | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 113,647  | 122,291        | 144,358        | 168,215        | 193,289        | 100                        | 108        | 127        | 148        | 170        |
| Rehab / Intermed. care | 3,037  | 3,269          | 3,957          | 4,796          | 5,893          | 100                        | 108        | 130        | 158        | 194        |
| Kidz first             | 33,705   | 34,636         | 35,150         | 35,990         | 37,412         | 100                        | 103        | 104        | 107        | 111        |
| Mental health          | 888  | 923            | 1,008          | 1,093          | 1,206          | 100                        | 104        | 114        | 123        | 136        |
| Surgical services      | 104,891  | 110,905        | 125,373        | 140,871        | 159,406        | 100                        | 106        | 120        | 134        | 152        |
| Women's health         | 50,989   | 52,784         | 55,949         | 59,686         | 64,024         | 100                        | 104        | 110        | 117        | 126        |
| <b>TOTAL</b>           | <b>307,157</b>   | <b>324,808</b> | <b>365,795</b> | <b>410,651</b> | <b>461,230</b> | <b>100</b>                 | <b>106</b> | <b>119</b> | <b>134</b> | <b>150</b> |

Source: Statistics New Zealand, CMDHB, NZIER

Table 12 presents the same need by service area projections, but this time for the lower and upper bound scenarios (i.e. low population growth and high population growth) in index form (2004 = 100).

Under the lower bound scenario the rehabilitation/intermediary care service area is still the strongest in terms of need growth to 2021, increasing by over 80%. The largest service area in terms of absolute levels of need (acute adult medicine) is estimated to grow by around 60% in the 17 years to 2021. In total need as modelled by service area under this lower bound scenario grows by nearly 40% to 2021.

Under the higher bound scenario, total need as modelled by service area increases by around 62% to 2021, with the largest service area increasing by around 80%.

**Table 12 Summary of need by service area (in and outpatients)  
– lower bound and upper bound scenarios in index form (2004 = 100)**

|                        | LOWER BOUND SCENARIO |            |            |            |            | UPPER BOUND SCENARIO |            |            |            |            |
|------------------------|----------------------|------------|------------|------------|------------|----------------------|------------|------------|------------|------------|
|                        | 2004                 | 2006       | 2011       | 2016       | 2021       | 2004                 | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 100                  | 105        | 121        | 139        | 160        | 100                  | 110        | 133        | 157        | 180        |
| Rehab / Intermed. care | 100                  | 105        | 124        | 148        | 183        | 100                  | 110        | 136        | 168        | 205        |
| Kidz first             | 100                  | 97         | 94         | 92         | 96         | 100                  | 108        | 115        | 123        | 127        |
| Mental health          | 100                  | 101        | 107        | 113        | 125        | 100                  | 107        | 120        | 134        | 147        |
| Surgical services      | 100                  | 103        | 113        | 124        | 142        | 100                  | 109        | 126        | 144        | 163        |
| Women's health         | 100                  | 99         | 101        | 105        | 113        | 100                  | 108        | 118        | 130        | 139        |
| <b>TOTAL</b>           | <b>100</b>           | <b>102</b> | <b>112</b> | <b>123</b> | <b>139</b> | <b>100</b>           | <b>109</b> | <b>126</b> | <b>145</b> | <b>162</b> |

Source: Statistics New Zealand, CMDHB, NZIER

#### 4.1.2 Māori – analysis by service area

While the projections above encompass need growth for all ethnic groups modelled, we are able to isolate the projections of need for health services by Māori alone.

Table 13 below presents a summary of the need projections for Māori by service area for the middle ground scenario. It shows both the absolute levels of need projected (by service area) as well as an index of need specifically for Māori.

Table 40 in Appendix A summarises the need projections for Maori into total inpatient and outpatient discharges by age group, that result from the service area modelling on the middle ground scenario.

For this middle ground scenario the pattern of growth (in terms of which service areas grow the most) is relatively similar for Māori compared to that for all ethnic groups, but the level of growth differs noticeably. We estimate that need for the rehabilitation/intermediary care service area will grow by around 270% in the period to 2021, with the largest absolute service area, adult acute medicine, growing by over 90%. This growth is noticeably higher than that for all ethnic groups combined. Overall growth under this middle ground scenario for Māori is around 8% higher than for all ethnic groups combined.

**Table 13 Summary of Maori need by service area (in and outpatients)  
– middle ground scenario**

Medium population scenario (Flatbush included) – current incidence.

|                        | Number of discharges (need) by service area (in and outpatients) |               |               |               |               | Index of need (2004 = 100) |            |            |            |            |
|------------------------|--|---------------|---------------|---------------|---------------|----------------------------|------------|------------|------------|------------|
|                        | 2004   | 2006          | 2011          | 2016          | 2021          | 2004                       | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 17,288   | 18,783        | 23,231        | 28,183        | 33,417        | 100                        | 109        | 134        | 163        | 193        |
| Rehab / Intermed. care | 166  | 181           | 245           | 331           | 443           | 100                        | 109        | 148        | 200        | 267        |
| Kidz first             | 7,676  | 7,860         | 8,038         | 8,364         | 8,856         | 100                        | 102        | 105        | 109        | 115        |
| Mental health          | 243  | 252           | 279           | 304           | 334           | 100                        | 104        | 115        | 125        | 137        |
| Surgical services      | 13,036   | 13,849        | 16,087        | 18,513        | 21,260        | 100                        | 106        | 123        | 142        | 163        |
| Women's health         | 11,070   | 11,295        | 11,997        | 12,838        | 13,852        | 100                        | 102        | 108        | 116        | 125        |
| <b>TOTAL</b>           | <b>49,479</b>  | <b>52,221</b> | <b>59,877</b> | <b>68,533</b> | <b>78,161</b> | <b>100</b>                 | <b>106</b> | <b>121</b> | <b>139</b> | <b>158</b> |

Source: Statistics New Zealand, CMDHB, NZIER

The upper and lower bound scenarios do not produce much change in terms of the ranking of service areas by growth, but as we would expect, growth under the upper bound scenario is considerable for Māori. Total need when modelled by service area is expected to increase by 70% by 2021.

**Table 14 Summary of Maori need by service area (in and outpatients)  
– lower bound and upper bound scenarios in index form (2004 = 100)**

|                        | LOWER BOUND SCENARIO |            |            |            |            | UPPER BOUND SCENARIO |            |            |            |            |
|------------------------|----------------------|------------|------------|------------|------------|----------------------|------------|------------|------------|------------|
|                        | 2004                 | 2006       | 2011       | 2016       | 2021       | 2004                 | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 100                  | 107        | 129        | 154        | 183        | 100                  | 111        | 139        | 172        | 203        |
| Rehab / Intermed. care | 100                  | 107        | 141        | 187        | 249        | 100                  | 111        | 153        | 208        | 277        |
| Kidz first             | 100                  | 98         | 96         | 95         | 101        | 100                  | 107        | 115        | 124        | 132        |
| Mental health          | 100                  | 100        | 108        | 114        | 125        | 100                  | 107        | 122        | 137        | 150        |
| Surgical services      | 100                  | 103        | 117        | 132        | 151        | 100                  | 109        | 130        | 153        | 175        |
| Women's health         | 100                  | 98         | 100        | 104        | 113        | 100                  | 106        | 117        | 129        | 139        |
| <b>TOTAL</b>           | <b>100</b>           | <b>102</b> | <b>114</b> | <b>128</b> | <b>146</b> | <b>100</b>           | <b>109</b> | <b>128</b> | <b>150</b> | <b>170</b> |

Source: Statistics New Zealand, CMDHB, NZIER

### 4.1.3 Pacific Peoples – analysis by service area

Just as we did for Māori, the modelling by service area allows us to identify potential growth in need for Pacific Peoples, and to see how this need changes over time in total, as well as by service area.

Growth under the middle scenario for Pacific Peoples is even higher than for Māori, in all service areas except for rehabilitation/intermediary care. We predict strong growth in need across all service areas by Pacific People under this middle ground scenario – particularly for the rehabilitation/intermediary care, adult acute medicine and surgical services service areas, which are expected to account for around two-thirds of total need by 2021 under this scenario.

**Table 15 Summary of Pacific People’s need by service area (in and outpatients) – middle ground scenario**

Medium population scenario (Flatbush included) – current incidence.

|                        | Number of discharges (need) by service area (in and outpatients) |               |               |                |                | Index of need (2004 = 100) |            |            |            |            |
|------------------------|--|---------------|---------------|----------------|----------------|----------------------------|------------|------------|------------|------------|
|                        | 2004   | 2006          | 2011          | 2016           | 2021           | 2004                       | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 22,534   | 24,762        | 31,044        | 38,313         | 45,737         | 100                        | 110        | 138        | 170        | 203        |
| Rehab / Intermed. care | 242  | 269           | 352           | 457            | 576            | 100                        | 111        | 145        | 189        | 238        |
| Kidz first             | 10,947   | 11,466        | 12,289        | 13,449         | 14,652         | 100                        | 105        | 112        | 123        | 134        |
| Mental health          | 143  | 152           | 179           | 212            | 243            | 100                        | 106        | 126        | 149        | 170        |
| Surgical services      | 16,586   | 17,964        | 21,742        | 26,038         | 30,450         | 100                        | 108        | 131        | 157        | 184        |
| Women's health         | 16,371   | 17,140        | 19,163        | 21,838         | 24,407         | 100                        | 105        | 117        | 133        | 149        |
| <b>TOTAL</b>           | <b>66,823</b>  | <b>71,753</b> | <b>84,770</b> | <b>100,308</b> | <b>116,065</b> | <b>100</b>                 | <b>107</b> | <b>127</b> | <b>150</b> | <b>174</b> |

Source: Statistics New Zealand, CMDHB, NZIER

Table 16 presents the results of the service area modelling for Pacific Peoples under the lower bound and upper bound scenarios in index form. Again, the pattern of need stays relatively the same, but the magnitudes of the level need are spread around the middle ground scenario.

**Table 16 Summary of Pacific People's need by service area (in and outpatients)  
– lower bound and upper bound scenarios in index form (2004 = 100)**

|                        | LOWER BOUND SCENARIO |            |            |            |            | UPPER BOUND SCENARIO |            |            |            |            |
|------------------------|----------------------|------------|------------|------------|------------|----------------------|------------|------------|------------|------------|
|                        | 2004                 | 2006       | 2011       | 2016       | 2021       | 2004                 | 2006       | 2011       | 2016       | 2021       |
| Adult acute medicine   | 100                  | 108        | 133        | 162        | 194        | 100                  | 112        | 142        | 178        | 212        |
| Rehab / Intermed. care | 100                  | 109        | 141        | 180        | 227        | 100                  | 113        | 151        | 197        | 247        |
| Kidz first             | 100                  | 100        | 104        | 110        | 120        | 100                  | 109        | 121        | 136        | 148        |
| Mental health          | 100                  | 104        | 120        | 139        | 160        | 100                  | 109        | 131        | 158        | 181        |
| Surgical services      | 100                  | 106        | 126        | 148        | 174        | 100                  | 111        | 137        | 166        | 194        |
| Women's health         | 100                  | 102        | 111        | 123        | 138        | 100                  | 108        | 124        | 144        | 161        |
| <b>TOTAL</b>           | <b>100</b>           | <b>104</b> | <b>121</b> | <b>141</b> | <b>163</b> | <b>100</b>           | <b>110</b> | <b>133</b> | <b>160</b> | <b>184</b> |

Source: Statistics New Zealand, CMDHB, NZIER

## 4.2 Analysis by MDC

As we did with the distribution of discharges across the various service areas, we have also produced projections of need across the various MDC. For each MDC we have projected an estimate of the number of discharges which we assume is analogous to need. An estimate for 2004, 2006, 2011, 2016 and 2021 is produced. Estimates for each of the lower bound, middle ground and higher bound scenarios are also produced.

We should explain here that we have not undertaken the same depth of analysis of need by MDC as we did for need by service area. MDC-based analysis is of restricted value in terms of the subsequent labour demand and supply modelling because the workforce data at our disposal classifies staff according to the hospital service area they work in, rather than according to the MDCs they deal with.

### 4.2.1 Total ethnic groups – analysis by MDC

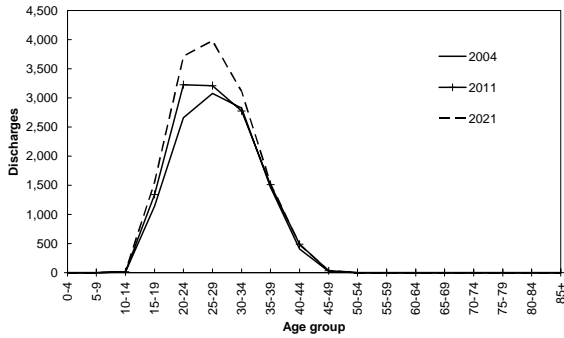
Figure 15 below shows for the middle ground scenario (i.e. medium population projections) the estimates of need for inpatients for each MDC over time (need by outpatients is shown in a subsequent figure). In each chart, a separate line for 2004, 2011 and 2021 is shown to indicate how the pattern and absolute level of need changes for each MDC over time.

As with the modelling by service area, the primary point evident in the charts is the pronouncement of existing 'bulges' in need for particular age groups. The effect of the ageing population is quite evident for the diseases and disorders of the digestive and circulatory systems, as well as of the skin, subcutaneous tissue and breast. Changes in the shape of the distribution are

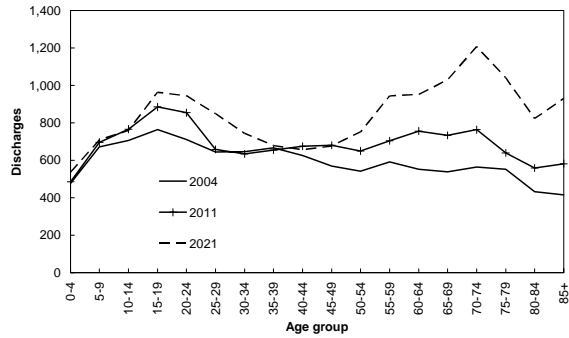
not significant, however the effect of the changes in compositional growth within the Counties Manukau population clearly impact on the level of incidence of most MDCs.

**Figure 15 Projections of inpatient incidence by MDC – middle ground scenario**  
 Medium population scenario (Flatbush included) – current incidence.

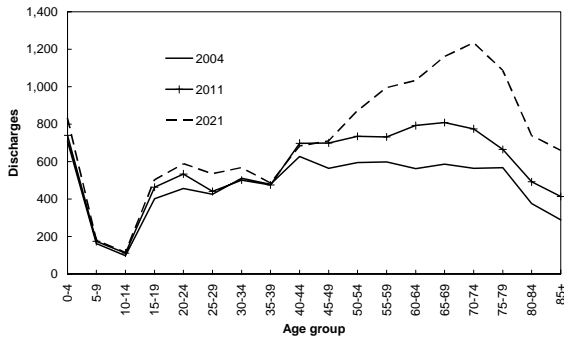
**Pregnancy, childbirth & the puerperium**



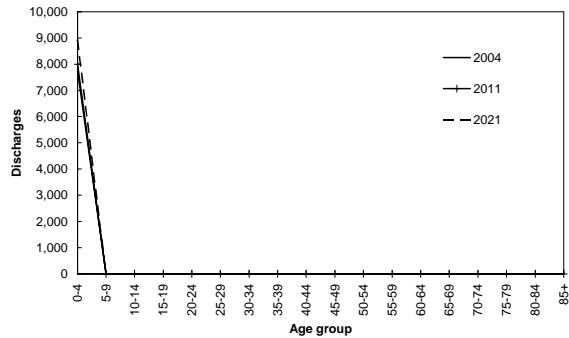
**Diseases & disorders of the musculoskeletal system & connective tissue**



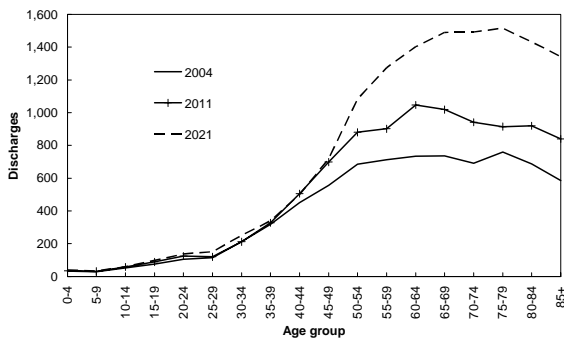
**Diseases & disorders of the digestive system**



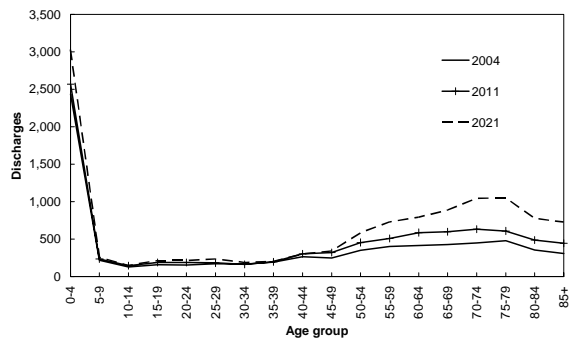
**Newborns & other neonates**



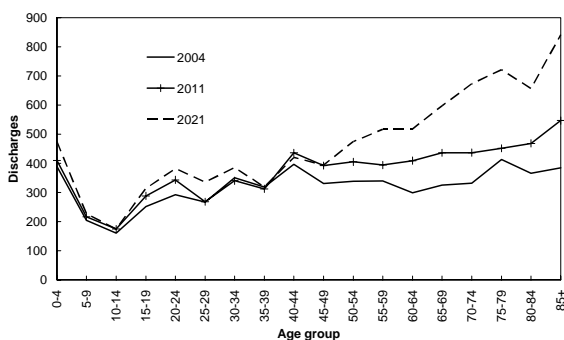
**Diseases & disorders of the circulatory system**



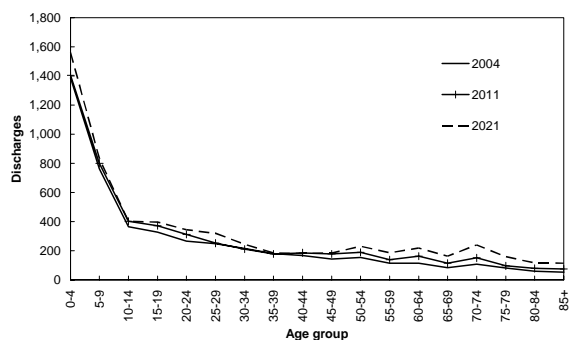
**Diseases & disorders of the respiratory system**



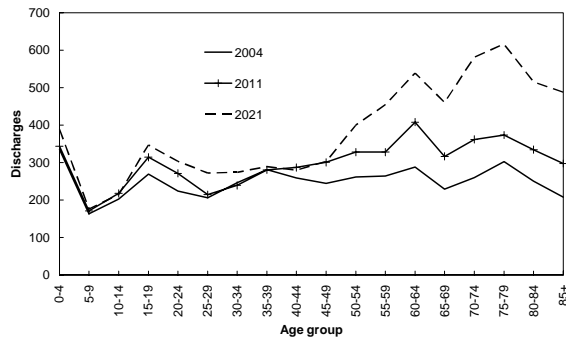
**Diseases & disorders of the skin, subcutaneous tissue & breast**



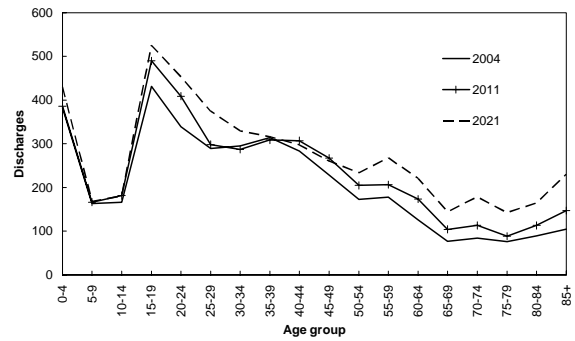
**Diseases & disorders of the ear, nose, mouth & throat**



### Diseases & disorders of the nervous system



### Injuries, poisonings & toxic effects of drugs



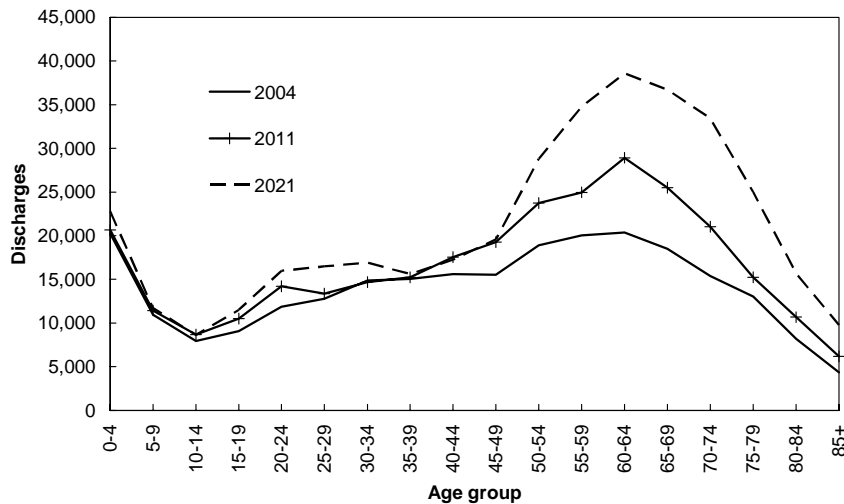
Source: Statistics New Zealand, CMDHB, NZIER

Similarly, for the outpatient projections the effect of strong population growth in the older age groups is clearly evident by the increasing size of the pronounced bulge in incidence for this scenario.

As we noted earlier, no MDC breakdown is available for outpatients, so they are estimated collectively (but still by age group, gender and ethnic group).

**Figure 16 Projections of outpatient incidence – middle ground scenario**

Medium population scenario (Flatbush included) – current incidence.



Source: Statistics New Zealand, CMDHB, NZIER

Similarly to the service area modelling, the focus of the modelling by MDC is to get an index of demand for CMDHB services. This will then be used to indicate the potential effect on the demand for the CMDHB workforce.

The following table shows this index of demand resulting from the MDC modelling for the middle ground scenario. It shows growth of around 42% in demand for inpatients by 2021, with growth of approximately 50% for outpatients.

**Table 17 Summary of demand from MDC modelling (in and outpatients)  
– middle ground scenario (all ethnic groups combined)**

Medium population scenario (Flatbush included) – current incidence.

|              | Number of discharges (demand) from MDC modelling |                |                |                |                |
|--------------|--|----------------|----------------|----------------|----------------|
|              | 2004   | 2006           | 2011           | 2016           | 2021           |
| Inpatients   | 72,274   | 75,689         | 83,309         | 92,216         | 102,877        |
| Outpatients  | 252,567  | 267,453        | 301,768        | 338,401        | 379,193        |
| <b>Total</b> | <b>324,841</b>                                   | <b>343,137</b> | <b>385,016</b> | <b>430,429</b> | <b>481,839</b> |

|              | Index of demand from MDC modelling |            |            |            |            |
|--------------|------------------------------------|------------|------------|------------|------------|
|              | 2004                               | 2006       | 2011       | 2016       | 2021       |
| Inpatients   | 100                                | 105        | 115        | 128        | 142        |
| Outpatients  | 100                                | 106        | 119        | 134        | 150        |
| <b>Total</b> | <b>100</b>                         | <b>106</b> | <b>119</b> | <b>133</b> | <b>148</b> |

Source: Statistics New Zealand, CMDHB, NZIER

When looking at the alternative lower and upper bound scenarios, these levels of growth range from 30% for inpatients by 2021 under the lower bound scenario, to 55% by 2021 under the upper bound scenario.

For outpatients, growth varies around the middle ground scenario growth level (50%) by 2021 – 39% under the lower bound scenario, and 62% under the upper bound scenario.

#### **4.2.2 Māori – analysis by MDC**

As we did for the service area modelling, we are able to identify the estimates of demand for Māori only, in terms of demand for services by MDC. The table below shows these estimates for all MDC combined under the middle ground scenario. Growth is higher for inpatients and outpatients for Māori under this scenario, than for all ethnic groups combined.

**Table 18 Summary of demand from MDC modelling (in and outpatients) – middle ground scenario for MAORI**

Medium population scenario (Flatbush included) – current incidence.

|              | Number of discharges (demand) from MDC modelling |               |               |               |               |
|--------------|--|---------------|---------------|---------------|---------------|
|              | 2004   | 2006          | 2011          | 2016          | 2021          |
| Inpatients   | 13,102   | 13,619        | 15,003        | 16,704        | 18,704        |
| Outpatients  | 39,039   | 41,312        | 47,535        | 54,418        | 61,989        |
| <b>Total</b> | <b>52,141</b>                                    | <b>54,931</b> | <b>62,531</b> | <b>71,102</b> | <b>80,666</b> |

|              | Index of demand from MDC modelling |            |            |            |            |
|--------------|------------------------------------|------------|------------|------------|------------|
|              | 2004                               | 2006       | 2011       | 2016       | 2021       |
| Inpatients   | 100                                | 104        | 115        | 127        | 143        |
| Outpatients  | 100                                | 106        | 122        | 139        | 159        |
| <b>Total</b> | <b>100</b>                         | <b>105</b> | <b>120</b> | <b>136</b> | <b>155</b> |

Source: Statistics New Zealand, CMDHB, NZIER

#### 4.2.3 Pacific Peoples – analysis by MDC

Similarly for Pacific Peoples, the estimates of demand are notably higher than for both inpatients and outpatients under this middle ground scenario, than for all ethnic groups combined. We expect Pacific Peoples to demand significantly more inpatient and outpatient services than other ethnic groups by 2021 under all scenarios.

**Table 19 Summary of demand from MDC modelling (in and outpatients) – middle ground scenario for PACIFIC PEOPLES**

Medium population scenario (Flatbush included) – current incidence.

|              | Number of discharges (demand) from MDC modelling |               |               |                |                |
|--------------|--|---------------|---------------|----------------|----------------|
|              | 2004   | 2006          | 2011          | 2016           | 2021           |
| Inpatients   | 18,316   | 19,435        | 22,252        | 25,910         | 29,621         |
| Outpatients  | 53,940   | 58,033        | 68,814        | 81,381         | 94,043         |
| <b>Total</b> | <b>72,255</b>                                    | <b>77,467</b> | <b>91,061</b> | <b>107,274</b> | <b>123,643</b> |

|              | Index of demand from MDC modelling |            |            |            |            |
|--------------|------------------------------------|------------|------------|------------|------------|
|              | 2004                               | 2006       | 2011       | 2016       | 2021       |
| Inpatients   | 100                                | 106        | 121        | 141        | 162        |
| Outpatients  | 100                                | 108        | 128        | 151        | 174        |
| <b>Total</b> | <b>100</b>                         | <b>107</b> | <b>126</b> | <b>148</b> | <b>171</b> |

Source: Statistics New Zealand, CMDHB, NZIER

## 5. The demand for labour

The previous section identified the projected need for hospital services, both in terms of need by service areas within the CMDHB, and in terms of MDC. It did so by estimating levels of need from both types of modelling, then producing indices of need from these levels.

In this section we initially examine the current level of demand for labour, which we assume to be equivalent to the base year workforce identified in the CMDHB hospital workforce census. We then examine how this base level of labour demand changes given the projected changes in need for hospital services presented in section 4.

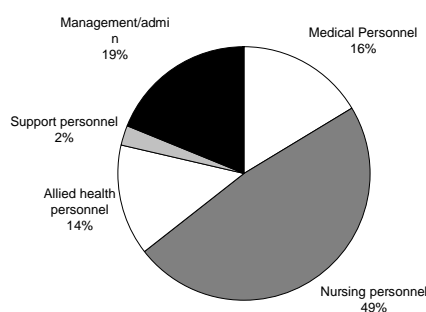
### 5.1 Existing demand

At the time of the CMDHB hospital workforce census there were 3,514 FTE staff<sup>1</sup>, although the “head count” number of employees was 5,236.

Table 20 below indicates the distribution of the 3,514 FTE staff by occupational group. The nursing personnel dominate the total staff numbers, contributing to nearly half of the total number of FTE staff. Medical personnel account for the next largest proportion, and together with Allied health personnel account for 30% of total FTE numbers. Management/administrative and support personnel collectively account for 21% of FTE staff numbers.

**Table 20 CMDHB full-time equivalent staff by occupational group**

| Occupational group      | Number       | Proportion  |
|-------------------------|--------------|-------------|
| Medical Personnel       | 576          | 16%         |
| Nursing personnel       | 1,686        | 48%         |
| Allied health personnel | 502          | 14%         |
| Support personnel       | 86           | 2%          |
| Management/admin        | 664          | 19%         |
| <b>Total</b>            | <b>3,514</b> | <b>100%</b> |



Source: CMDHB – survey of CMDHB workforce

The following table illustrates the distribution of the same total FTE staff numbers in terms of their primary ethnicity. Around 21% of the total FTE staff numbers did not provide an ethnic group identification. New Zealand Europeans contribute the largest number of FTE's to the total CMDHB staff numbers, around 41%. The Asian ethnic group is the next largest

<sup>1</sup> It should be noted that as staff do not necessarily treat inpatients only or outpatients only, no distinction between the two is made.

contributor, followed by the Other grouping. Collectively, Māori and Pacific People contributed around 12% to total FTE numbers.

**Table 21 CMDHB full-time equivalent staff by ethnic group**

| Ethnic group  | Number       | Proportion of all staff | Proportion of those who disclosed an ethnicity |
|---------------|--------------|-------------------------|--|
| Not disclosed | 749          | 21%                     | n/a  |
| NZ European   | 1,454        | 41%                     | 53%  |
| Asian         | 501          | 14%                     | 18%  |
| Other         | 372          | 11%                     | 13%  |
| Pacific       | 249          | 7%                      | 9%   |
| Māori         | 190          | 5%                      | 7%   |
| <b>Total</b>  | <b>3,514</b> | <b>100%</b>             | <b>100%</b>                                    |

Source: CMDHB – survey of CMDHB workforce

Table 22 below presents a cross tabulation of occupational group and service area data, showing the distribution of the total FTE staff numbers. Note again that each of the service areas listed covers both in and outpatients where relevant. The largest single contributor to total FTE numbers is nursing personnel employed in medical services, although in total the medical services category employs slightly less FTE's than the largest service area – supporting services. Management/administrative staff in this service area are also a significant individual contributor to total FTE numbers. Surgical services is another service area with a significant number of FTE's, with nurses being a relatively large contributor to this service area.

**Table 22 CMDHB full-time equivalent staff by service area and occupational group**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total        |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|--------------|
| Medical services         | 170               | 453               | 33                      | 1                 | 72                | 729          |
| Int. care/rehabilitation | 10                | 172               | 41                      | 0                 | 39                | 263          |
| Kidz first               | 42                | 155               | 27                      | 9                 | 31                | 264          |
| Mental health            | 61                | 202               | 90                      | 4                 | 61                | 417          |
| Surgical services        | 202               | 374               | 35                      | 0                 | 78                | 689          |
| Women's health           | 32                | 176               | 0                       | 1                 | 31                | 241          |
| Supporting services      | 58                | 154               | 276                     | 71                | 352               | 911          |
| <b>Total</b>             | <b>576</b>        | <b>1,686</b>      | <b>502</b>              | <b>86</b>         | <b>664</b>        | <b>3,514</b> |

Source: CMDHB – survey of CMDHB workforce

## 5.2 Projected demand for labour

Now that we have established the current (base year) level of demand for labour by CMDHB, we use the indices of need created from the service area and MDC modelling in section 4 to project forward what this means in terms of demand for labour in the future. Implicitly we are assuming here that demand for labour will grow directly in line with service need, although we discuss later in the report what might happen to the modelling outputs, if this assumption were to be relaxed. The indices of service need for years to 2021 are applied directly to the current level of labour demand to 'grow' demand over time.

### 5.2.1 Projected demand by service area

The indices of need by service area produced in the previous are applied to the existing labour demand by CMDHB (i.e. 3,514 FTE workers) to produce the estimates of future demand. The index for each service area is assumed to apply equally be the same across all occupational groups. For the supporting services group, a composite index of demand is created, using a weighted average of the indices for all service areas. This is done because no service need is specifically attributed to this service area.

The table below indicates the indices of labour demand at 2021 for each of the 3 main scenarios. The index for the middle ground scenario shows total demand growth of around 70% in terms of the additional workforce required to meet demand.

**Table 23 Indices of demand for CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios**

| Service Area ↓           | Base index<br>(2004 = 100) | Lower bound<br>scenario<br>(index at 2021) | Middle ground<br>scenario<br>(index at 2021) | Upper bound<br>scenario<br>(index at 2021) |
|--------------------------|----------------------------|--|--|--|
| Medical services         | 100                        | 160  | 170  | 180  |
| Int. care/rehabilitation | 100                        | 183  | 194  | 205  |
| Kidz first               | 100                        | 96   | 111  | 127  |
| Mental health            | 100                        | 125  | 136  | 147  |
| Surgical services        | 100                        | 142  | 152  | 163  |
| Women's health           | 100                        | 113  | 126  | 139  |
| Supporting services      | 100                        | 143  | 153  | 164  |
| <b>Total</b>             | <b>100</b>                 | <b>160</b>                                 | <b>170</b>                                   | <b>180</b>                                 |

Source: CMDHB, NZIER, Statistics New Zealand

The following table translates this into the demand for actual workers for the middle ground scenario. It shows the potential demand for workers in

2021 for the middle ground scenario, and can be compared to the current level of demand shown in Table 22.

The results show a significant increase in the size of demand for labour across a number of service areas for this middle ground scenario in 2021. In total, demand has grown from the 3,514 total FTE in 2004 to over 5,353 FTE in 2021 for this scenario (i.e. an increase of 52%). Given the strong increases in demand for the intermediary care/rehabilitation service area, demand for these workers increases from only around 260 workers in 2004 to over 500 in 2021.

**Table 24 Projected demand for CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total        |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|--------------|
| Medical services         | 289               | 770               | 56                      | 2                 | 122               | 1,239        |
| Int. care/rehabilitation | 20                | 334               | 80                      | 0                 | 76                | 510          |
| Kidz first               | 47                | 172               | 30                      | 10                | 34                | 293          |
| Mental health            | 82                | 275               | 122                     | 5                 | 83                | 567          |
| Surgical services        | 307               | 568               | 53                      | 0                 | 119               | 1,048        |
| Women's health           | 41                | 221               | 0                       | 1                 | 39                | 302          |
| Supporting services      | 88                | 235               | 423                     | 109               | 539               | 1,394        |
| <b>Total</b>             | <b>875</b>        | <b>2,575</b>      | <b>764</b>              | <b>127</b>        | <b>1,012</b>      | <b>5,353</b> |

Source: CMDHB, NZIER, Statistics New Zealand

For the lower and upper bound scenarios the spread of demand across the service areas is similar. However, the absolute levels of demand are lower and higher, respectively, than in the middle ground scenario (as we would expect). The total labour demand for these scenarios in 2021 is 4,972 and 5,748 for the lower and upper bounds, respectively, compared to the 5,353 for the middle ground scenario.

In the previous section we were also able to identify changes in service need for Māori and Pacific Peoples in isolation from other ethnic groups. Given this, we are also able to translate this into demand for labour.

We noted that levels of need and the growth in need across most service areas was typically higher for Māori and Pacific Peoples than it was for all ethnic groups combined. The following tables show what would happen to the number of people in the workforce identifying themselves as Māori and Pacific, if the current numbers in these ethnic groups were to grow in line with service needs from the same groups.

**Table 25 Indices of demand for Māori CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios**

| Service Area ↓           | Base index<br>(2004 = 100) | Lower bound<br>scenario<br>(index at 2021) | Middle ground<br>scenario<br>(index at 2021) | Upper bound<br>scenario<br>(index at 2021) |
|--------------------------|----------------------------|--|--|--|
| Medical services         | 100                        | 183  | 193  | 203  |
| Int. care/rehabilitation | 100                        | 249  | 267  | 277  |
| Kidz first               | 100                        | 101  | 115  | 132  |
| Mental health            | 100                        | 125  | 137  | 150  |
| Surgical services        | 100                        | 151  | 163  | 175  |
| Women's health           | 100                        | 113  | 125  | 139  |
| Supporting services      | 100                        | 154  | 164  | 175  |
| <b>Total</b>             | <b>100</b>                 | <b>146</b>                                 | <b>158</b>                                   | <b>170</b>                                 |

Source: CMDHB, NZIER, Statistics New Zealand

**Table 26 Indices of demand for Pacific Peoples CMDHB full-time equivalent staff by service area – 2021 for all 3 scenarios**

| Service Area ↓           | Base index<br>(2004 = 100) | Lower bound<br>scenario<br>(index at 2021) | Middle ground<br>scenario<br>(index at 2021) | Upper bound<br>scenario<br>(index at 2021) |
|--------------------------|----------------------------|--|--|--|
| Medical services         | 100                        | 194  | 203  | 212  |
| Int. care/rehabilitation | 100                        | 227  | 238  | 247  |
| Kidz first               | 100                        | 120  | 134  | 148  |
| Mental health            | 100                        | 160  | 170  | 181  |
| Surgical services        | 100                        | 174  | 184  | 194  |
| Women's health           | 100                        | 138  | 149  | 161  |
| Supporting services      | 100                        | 168  | 178  | 188  |
| <b>Total</b>             | <b>100</b>                 | <b>163</b>                                 | <b>174</b>                                   | <b>184</b>                                 |

Source: CMDHB, NZIER, Statistics New Zealand

### 5.2.2 Projected demand by MDC

Similarly, we use the indices of need created in the MDC modelling to translate the need for services into demand for labour by CMDHB. The following table shows, for each of the three main scenarios the estimated demand for the CMDHB workforce in 2021, compared to the base year

demand by occupational group. All ethnic groups are combined for the purposes of this table.

It is interesting to note that when comparing the middle ground scenarios from the service area and MDC modelling, the estimated CMDHB workforce demand in 2021 is relatively similar at 5,353 and 5,217 for the service area and MDC modelling respectively.

**Table 27 Demand for CMDHB full-time equivalent staff from MDC modelling by occupational group – 2021 for all 3 scenarios**

| Service Area ↓          | Base year demand | Lower bound scenario<br>(demand at 2021) | Middle ground scenario<br>(demand at 2021) | Upper bound scenario<br>(demand at 2021) |
|-------------------------|------------------|--|--|--|
| Medical Personnel       | 576              | 790                                      | 855  | 922                                      |
| Nursing personnel       | 1,686            | 2,313                                    | 2,503                                      | 2,699                                    |
| Allied health personnel | 502              | 689                                      | 746  | 804                                      |
| Support personnel       | 86               | 118                                      | 128  | 138                                      |
| Management/admin        | 664              | 911                                      | 986  | 1,063                                    |
| <b>Total</b>            | <b>3,514</b>     | <b>4,822</b>                             | <b>5,217</b>                               | <b>5,627</b>                             |

Source: CMDHB, NZIER, Statistics New Zealand

## 6. The supply of labour

Now that we have estimates of the demand for labour by CMDHB, based on the need for services created under three different population scenarios in the service area and MDC modelling, we now produce estimates of the supply of labour under the same three scenarios. Clearly, different population growth will impact on the potential CMDHB workforce, and so we can estimate what level of supply of workers could potentially be available to supply services to meet the demand estimated previously.

To do this, we must assume that the existing demand for labour (the current FTE workforce identified earlier – approx. 3,500 FTE staff) is equal to the supply of labour in the base year (i.e. we assume that there were no labour shortages at the start of the modelling period in 2004. We then use estimates of growth in population to 'grow' this base supply of workers. To create indices of labour supply, we calculate the share of the Counties Manukau area working age population that the hospital workforce accounted for in 2004 and then assumed that this proportion is constant over time. As the population of working age grows over time (at different rates over the three scenarios) the index of labour supply changes. The index is then applied to the base workforce.

By identifying the potential supply of labour, we can then look to see if any gap exists between the demand for, and the supply of, labour.

### 6.1 Projected labour supply – service area modelling

The table below shows the indices of labour supply for each of the three main scenarios for each of the projected out-years. The variation in population – the key driver, clearly impacts on the growth in the supply index. Under the middle ground scenario, we expect the supply of workers to increase by nearly 30% in 2021.

**Table 28 Indices of supply of CMDHB full-time equivalent staff by service area –for all 3 scenarios**

|      | Lower bound scenario | Middle ground scenario | Upper bound scenario |
|------|----------------------|------------------------|----------------------|
| 2004 | 100                  | 100                    | 100                  |
| 2006 | 102                  | 106                    | 109                  |
| 2011 | 108                  | 115                    | 122                  |
| 2016 | 111                  | 122                    | 133                  |
| 2021 | 118                  | 129                    | 141                  |

Source: CMDHB, NZIER, Statistics New Zealand

The following table translates this into the supply of actual workers for the middle ground scenario. It shows the potential supply of workers in 2021

for the middle ground scenario, and can be compared to the current distribution of workers shown in Table 22 (remember that for the base year 2004 we assume demand = supply).

We should note again that the indices shown above are applied equally across all service areas and occupational groups because the index relates to growth in the total Counties Manukau working age population. This means that for each year, the growth rate of each service area/occupational group combination should be the same. Under the middle ground scenario shown below, the total workforce supply increases from just over 3,500 to just over 4,500 by 2021.

**Table 29 Projected supply of CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total        |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|--------------|
| Medical services         | 220               | 586               | 43                      | 2                 | 93                | 943          |
| Int. care/rehabilitation | 13                | 223               | 54                      | 0                 | 51                | 340          |
| Kidz first               | 55                | 201               | 35                      | 12                | 40                | 342          |
| Mental health            | 79                | 262               | 116                     | 5                 | 79                | 540          |
| Surgical services        | 262               | 484               | 45                      | 0                 | 101               | 892          |
| Women's health           | 42                | 228               | 0                       | 1                 | 40                | 311          |
| Supporting services      | 75                | 199               | 358                     | 92                | 456               | 1,179        |
| <b>Total</b>             | <b>745</b>        | <b>2,181</b>      | <b>650</b>              | <b>111</b>        | <b>859</b>        | <b>4,547</b> |

Source: CMDHB, NZIER, Statistics New Zealand

Because of the use of the common index across service areas/occupational groups for a particular year, the distribution of workers will not change for different scenarios. What does change though, is the absolute size of each service area/occupational group permutation in terms of FTE workers. For the lower bound scenario, the total number of FTE workers reaches 4,156 by 2021. For the upper bound scenario, the supply side reaches 4,953 by 2021.

As we did for the workforce demand modelling in the previous section, we can also produce estimates of workforce supply for the Māori and Pacific Peoples ethnic groups.

The table below indicates the changes in the index of supply for Māori only, across the three main scenarios. The index again represents changes in the level of Māori workers as a constant share of total Māori in the Counties Manukau working age population.

**Table 30 Indices of supply of Māori CMDHB full-time equivalent staff by service area – for all 3 scenarios**

|      | Lower bound scenario | Middle ground scenario | Upper bound scenario |
|------|----------------------|------------------------|----------------------|
| 2004 | 100                  | 100                    | 100                  |
| 2006 | 102                  | 105                    | 108                  |
| 2011 | 110                  | 116                    | 123                  |
| 2016 | 116                  | 127                    | 138                  |
| 2021 | 127                  | 139                    | 150                  |

Source: CMDHB, NZIER, Statistics New Zealand

In the following two tables we compared the base year (2004) CMDHB Māori population by service area and occupational group, with that which we predict for 2021 under the middle ground scenario (given the indices above). As we noted for the tables aggregating all ethnic groups, the index in any particular year is constant across service areas and occupational groups so the distribution of workers will not change. The total number of FTE Māori is estimated to grow from 190 in 2004 to 263 in 2021 under the middle ground scenario.

**Table 31 Existing supply of Maori CMDHB full-time equivalent staff by service area and occupational group – 2004**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total      |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|------------|
| Medical services         | 1                 | 16                | 2                       | 0                 | 3                 | 22         |
| Int. care/rehabilitation | 1                 | 12                | 2                       | 0                 |                   | 16         |
| Kidz first               | 0                 | 6                 | 4                       | 1                 | 5                 | 16         |
| Mental health            | 2                 | 21                | 11                      | 1                 | 14                | 48         |
| Surgical services        | 3                 | 17                | 7                       | 0                 | 5                 | 31         |
| Women's health           | 0                 | 5                 | 0                       | 0                 | 2                 | 7          |
| Supporting services      | 0                 | 8                 | 15                      | 4                 | 23                | 50         |
| <b>Total</b>             | <b>7</b>          | <b>85</b>         | <b>41</b>               | <b>6</b>          | <b>50</b>         | <b>190</b> |

Source: CMDHB, NZIER, Statistics New Zealand

**Table 32 Projected supply of Māori CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total      |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|------------|
| Medical services         | 1                 | 22                | 3                       | 0                 | 4                 | 30         |
| Int. care/rehabilitation | 1                 | 17                | 3                       | 0                 | 0                 | 22         |
| Kidz first               | 0                 | 9                 | 5                       | 1                 | 7                 | 22         |
| Mental health            | 3                 | 29                | 15                      | 1                 | 19                | 66         |
| Surgical services        | 4                 | 23                | 10                      | 0                 | 6                 | 43         |
| Women's health           | 0                 | 7                 | 0                       | 0                 | 2                 | 10         |
| Supporting services      | 0                 | 11                | 21                      | 6                 | 32                | 69         |
| <b>Total</b>             | <b>10</b>         | <b>118</b>        | <b>57</b>               | <b>8</b>          | <b>70</b>         | <b>263</b> |

Source: CMDHB, NZIER, Statistics New Zealand

Similarly for Pacific People, we can identify the indices of supply which will drive the potential supply of Pacific Peoples working in the CMDHB. The strong expected growth for the working age population of Pacific Peoples in Counties Manukau comes through clearly in the index values, particularly under the upper bound scenario. This will produce strong growth in the projections of FTE staff.

**Table 33 Indices of supply of Pacific Peoples CMDHB full-time equivalent staff by service area – for all 3 scenarios**

|      | Lower bound scenario | Middle ground scenario | Upper bound scenario |
|------|----------------------|------------------------|----------------------|
| 2004 | 100                  | 100                    | 100                  |
| 2006 | 105                  | 107                    | 110                  |
| 2011 | 121                  | 126                    | 132                  |
| 2016 | 137                  | 146                    | 155                  |
| 2021 | 155                  | 164                    | 174                  |

Source: CMDHB, NZIER, Statistics New Zealand

In the following two tables we compared the base year (2004) CMDHB Pacific Peoples population by service area and occupational group, with that which we predict for 2021 under the middle ground scenario. The total number of FTE Pacific Peoples is estimated to grow from 249 in 2004 to 408 in 2021 under the middle ground scenario.

**Table 34 Existing supply of Pacific Peoples CMDHB full-time equivalent staff by service area and occupational group – 2004**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total      |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|------------|
| Medical services         | 4                 | 34                | 3                       | 0                 | 3                 | 44         |
| Int. care/rehabilitation | 0                 | 13                | 1                       | 0                 | 1                 | 15         |
| Kidz first               | 0                 | 19                | 3                       | 0                 | 4                 | 25         |
| Mental health            | 1                 | 12                | 8                       | 0                 | 5                 | 26         |
| Surgical services        | 1                 | 27                | 5                       | 0                 | 6                 | 39         |
| Women's health           | 1                 | 20                | 0                       | 0                 | 3                 | 25         |
| Supporting services      | 0                 | 6                 | 13                      | 13                | 43                | 74         |
| <b>Total</b>             | <b>7</b>          | <b>131</b>        | <b>32</b>               | <b>13</b>         | <b>66</b>         | <b>249</b> |

Source: CMDHB, NZIER, Statistics New Zealand

**Table 35 Projected supply of Pacific Peoples CMDHB full-time equivalent staff by service area and occupational group – 2021 MIDDLE GROUND SCENARIO**

| Service Area ↓           | Medical Personnel | Nursing personnel | Allied health personnel | Support personnel | Management /admin | Total      |
|--------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|------------|
| Medical services         | 6                 | 56                | 5                       | 1                 | 5                 | 73         |
| Int. care/rehabilitation | 0                 | 21                | 2                       | 0                 | 2                 | 25         |
| Kidz first               | 0                 | 30                | 4                       | 0                 | 7                 | 41         |
| Mental health            | 2                 | 19                | 13                      | 0                 | 9                 | 42         |
| Surgical services        | 2                 | 45                | 8                       | 0                 | 10                | 65         |
| Women's health           | 2                 | 33                | 0                       | 0                 | 6                 | 40         |
| Supporting services      | 0                 | 10                | 21                      | 21                | 70                | 122        |
| <b>Total</b>             | <b>11</b>         | <b>214</b>        | <b>53</b>               | <b>22</b>         | <b>108</b>        | <b>408</b> |

Source: CMDHB, NZIER, Statistics New Zealand

## 6.2 Projected labour supply – MDC modelling

Given that the same supply of workers is used for the service area and MDC modelling, and that the indices of supply relate to growth in the size of the working age population in Counties Manukau (and are used across occupational groups and service areas within a particular year) there is no difference between the service area modelling estimates of supply and the MDC estimates of supply.

## **7. The supply/demand balance**

Now we have both the estimates of labour (CMDHB) demand and of labour (CMDHB) supply - sections 5 and 6 respectively, we can look to identify any potential differential that may exist over the three main scenarios.

### **7.1 Modelling by service area**

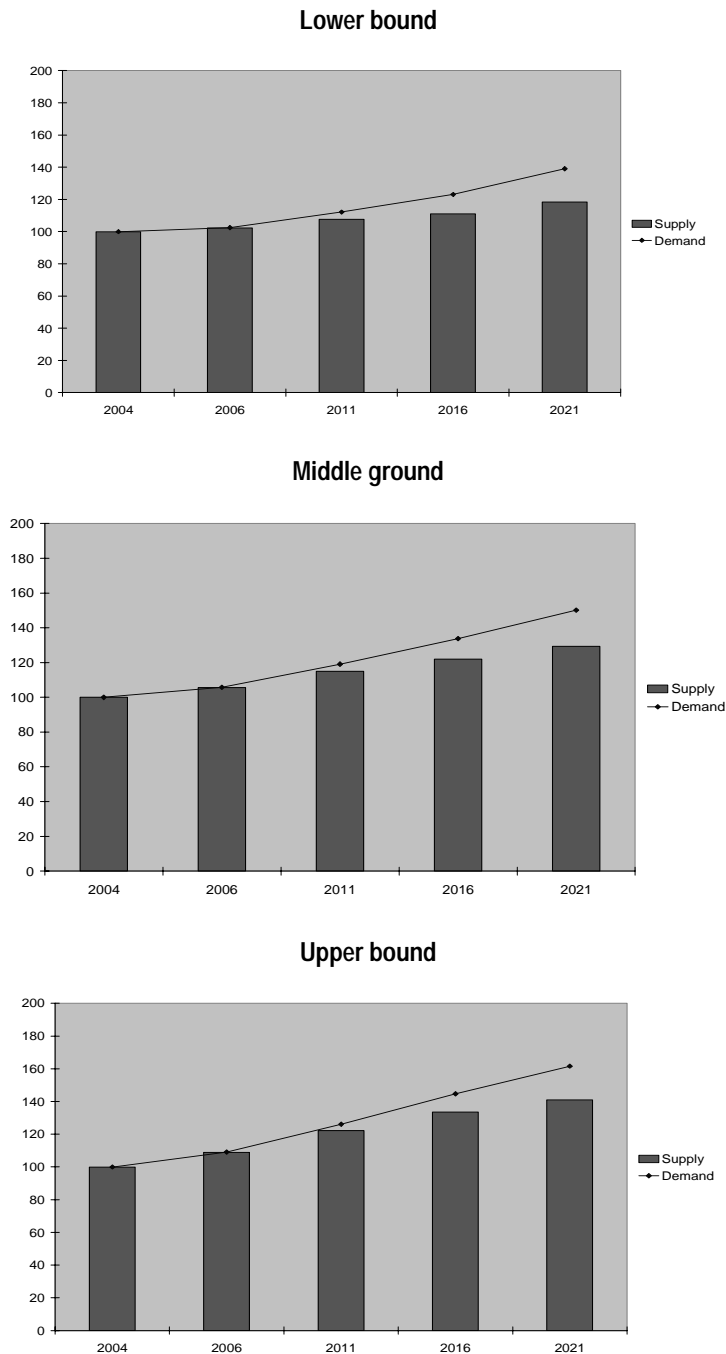
The following set of charts indicates graphically the three main scenarios, showing the comparative growth between labour demand and labour supply that will cause a potential labour shortage/surplus.

No significant differences between the 3 scenarios are evident, indicating potentially that the any shortage/surplus between the demand for, and the supply of, CMDHB labour is unlikely to vary dramatically between scenarios.

In terms of absolute differences between labour demand and labour supply, by 2021 there is a consistent shortage of CMDHB labour (i.e. demand is greater than supply) by around 800 FTE across all 3 scenarios. This is equivalent to approximately 23% of the base year number of FTEs.

If the current relationship between the number of FTEs and the headcount number of staff remains constant, a shortage of around 800 FTEs would translate into a shortage of approximately 1,200 employees.

**Figure 17 Index of labour demand vs. labour supply – 3 scenarios**



Source: NZIER

The following table identifies, for each of the three main scenarios; the size of shortage that exists for each year, what the size of the workforce is when assuming a constant share of the Counties Manukau working age population (as we did in the labour supply section) as well as what the workforce would need to be in order to reduce any shortage to zero (in absolute terms as well as a proportion).

For example, in the base year the current CMDHB workforce accounts for around 1.2% of the working age population in Counties Manukau area. Under the middle ground scenario, given our assumptions about demand, we expect that there could be a shortage of just over 800 workers by 2021,

assuming CMDHB maintains its constant share of the Counties Manukau working age population. For it to reduce this imbalance to zero (i.e. for labour supply to grow enough to meet demand) it would have to have increased its share of the working age population in the area to 1.4%. This would clearly have to happen at the expense of other sectors who would have to lose share. In absolute terms, this would require growth in the workforce of over 2% per year for each of the 17 years to 2021. Employment in the wider Counties Manukau area over all industries has grown on average by around 4% per annum in recent years.

Again, this picture is fairly consistent across all three scenarios.

**Table 36 Labour supply and demand imbalances – service area modelling**

|   | 2004  | 2006  | 2011  | 2016  | 2021  |
|---|-------|-------|-------|-------|-------|
| <b>LOWER BOUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,596 | 3,783 | 3,899 | 4,156 |
| Workforce required for balance between S and D                          | 3,514 | 3,602 | 3,957 | 4,365 | 4,972 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.26% | 1.35% | 1.44% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -6    | -174  | -466  | -816  |
| <b>MIDDLE GROUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,712 | 4,038 | 4,287 | 4,547 |
| Workforce required for balance between S and D                          | 3,514 | 3,714 | 4,195 | 4,729 | 5,353 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.25% | 1.33% | 1.41% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -2    | -157  | -442  | -806  |
| <b>UPPER BOUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,829 | 4,298 | 4,689 | 4,953 |
| Workforce required for balance between S and D                          | 3,514 | 3,827 | 4,436 | 5,105 | 5,748 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.24% | 1.31% | 1.39% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | 2     | -137  | -417  | -795  |

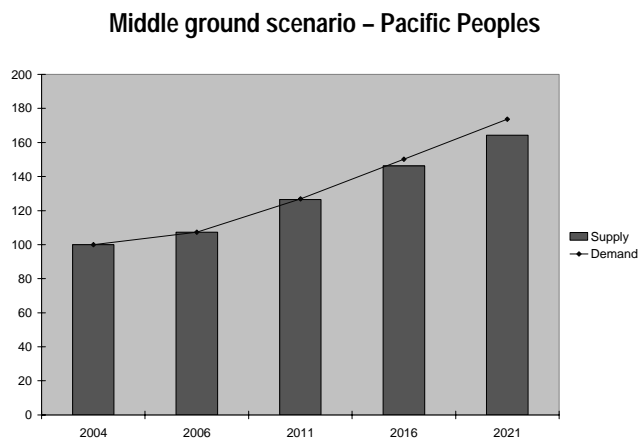
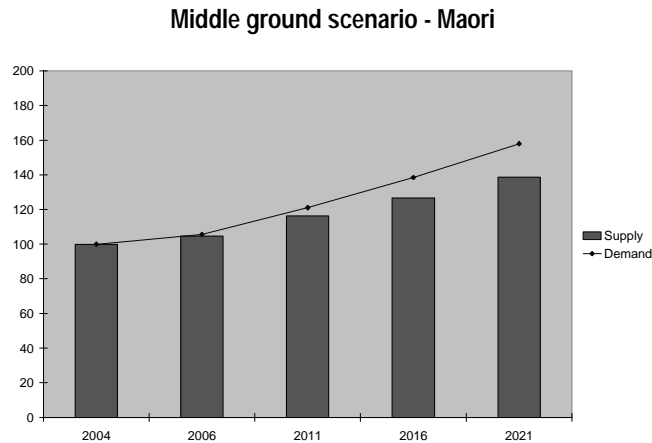
Source: NZIER

In terms of the primary contributing occupational groups to this estimated shortage (by 2021), nursing personnel account for nearly 50% under the middle ground scenario. In particular, nursing personnel in the acute adult medicine and intermediary/rehabilitation service areas are large contributors (23% and 14% of the total estimated shortage under the medium scenario

respectively). Management/admin staff are the next largest contributors to the shortage, followed by medical personnel. In looking at service areas in isolation, the largest contributor to the shortage is the adult acute medicine category, with supporting services also contributing significantly.

While previously we have identified both labour demand and labour supply for Māori and Pacific Peoples in isolation from other ethnic groups, undertaking an investigation of the differences is not entirely logical. When dealing with all ethnic groups in aggregate, we are not assuming any particular ethnic group treats only patients of the same ethnic group. To undertake a comparison of the differences between demand and supply in absolute terms, may lead to erroneous conclusions which indicate that Māori, for example, would only be treating Māori patients, which is clearly not always the case. It does not make intuitive sense to compare these absolute levels directly, although they can be considered in isolation. Instead however, we present below the graphical comparison of the growth in demand and supply for labour (for Māori and Pacific Peoples) for the middle ground scenario. As we identified earlier the demand for each of the ethnic groups is significantly stronger than for the total groups in aggregate.

**Figure 18 Index of labour demand vs. labour supply  
– Middle ground scenario for Māori and Pacific Peoples**



Source: NZIER

## 7.2 Modelling by MDC

As we have done with the service area modelling, we are now able to identify the size of any potential labour shortage by comparing the absolute sizes of labour demand and supply across the years' projected. The following tables identifies the potential differences in the same manner as the service area modelling.

**Table 37 Labour supply and demand imbalances – MDC modelling**

|   | 2004  | 2006  | 2011  | 2016  | 2021  |
|---|-------|-------|-------|-------|-------|
| <b>LOWER BOUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,596 | 3,783 | 3,899 | 4,156 |
| Workforce required for balance between S and D                          | 3,514 | 3,594 | 3,919 | 4,281 | 4,820 |
| Implied proportion of CMDHB population                                  | 1.2%  | 1.2%  | 1.2%  | 1.3%  | 1.4%  |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | 1     | -136  | -383  | -665  |
| <b>MIDDLE GROUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,712 | 4,038 | 4,287 | 4,547 |
| Workforce required for balance between S and D                          | 3,514 | 3,712 | 4,165 | 4,658 | 5,215 |
| Implied proportion of CMDHB population                                  | 1.2%  | 1.2%  | 1.2%  | 1.3%  | 1.4%  |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | 0     | -127  | -371  | -668  |
| <b>UPPER BOUND SCENARIO</b>   |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,829 | 4,298 | 4,689 | 4,953 |
| Workforce required for balance between S and D                          | 3,514 | 3,830 | 4,415 | 5,050 | 5,624 |
| Implied proportion of CMDHB population                                  | 1.2%  | 1.2%  | 1.2%  | 1.3%  | 1.4%  |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -1    | -116  | -360  | -669  |

Source: NZIER

As with the service area modelling, the variance between the size of the estimated shortage across the three main scenarios is not large and the size of the absolute difference is not significantly different from that identified in the service area modelling.

The MDC modelling indicates a potential shortage of around 670 workers by 2021, and again indicates that the CMDHB would need to increase its share of the Counties Manukau working age population to around 1.4% (from its current 1.2%) by 2021 in order for labour supply to meet labour demand.

The distribution of the estimated shortage across occupational groups is similar to that identified in the service area modelling also, with nearly 50% attributable to nursing personnel.

## 8. Varying the key modelling assumptions

### 8.1 Introduction

As we have progressed through this report we have identified the key assumptions made in order to enable us to model future service needs, labour demand, labour supply and the consequent imbalance between labour demand and supply. These assumptions could potentially all be varied, either to present what might be regarded as a more realistic picture of the world, or to answer questions of a “what if?” nature.

In this final section we highlight the assumptions that could be varied, and we how in practice they might be varied. We also present an example of what happens to the modelling outputs when one particular assumption is changed.

Theoretically, a very large number of different modelling outputs could be produced via permutations of the key assumptions. However, this would not be practical, and would probably not be helpful. We, therefore, invite CMDHB to consider, based on what follows, what particular permutation(s) is (are) preferred.

### 8.2 The key assumptions

The key assumptions that could be varied are as follows:

1. **Needs for services change directly in line with changes in population, size, structure and composition.** This means that the rates of patient discharges per thousand people in particular age / sex/ ethnic groups remains constant over time. This does not allow, for example, the number of discharges from adult medical outpatient services to grow disproportionately as a result of increasing incidence and earlier onset of diabetes in the population. However, in order to apply an alternative assumption based on this example, we would need some guidance on what extra growth in need requires to be modelled.
2. **Labour demand grows directly in line with service needs.** This assumption does not allow for changes in labour productivity which might result, for example, from therapeutic breakthrough. Conceivably, labour productivity could increase in some service areas, but decrease in others. The latter might happen if medical advances made conditions that are currently untreatable, treatable albeit resource intensively.
3. **Labour supply grows in line with the Counties Manukau population of working age.** This is a relatively weak assumption because there is no reason why CMDHB could or should recruit all its labour locally. More realistic catchment areas for some occupational groups might be Counties plus Waitakere plus

Auckland city, or the whole of Auckland region, or the whole of New Zealand. Basing the labour supply modelling on anything other than Counties would tend to exacerbate the projected labour shortages because Counties' population is projected to grow faster than most other places.

4. **The workforce of Pacific Peoples or Maori origin grows in line with the growth in these ethnic groups locally.** This probably means that these two groups will still be under-represented in the CMDHB workforce in 2021, both in relation to their shares of service needs and their shares of the local populations. An important 'what if' question that could be asked by varying this assumption is: *“By how much will the numbers of Maori / Pacific People in the CMDHB hospital workforce have to grow in order that, by 2021, neither group is under-represented relative to service needs or population shares?”*
5. **The pattern of service provision stays constant over time.** This implies that there will be no switching of provision for particular service needs from one service area to another, nor from in-patient provision to outpatient provision. This assumption is unlikely to hold, but what will actually happen is unpredictable. However, in the next section we illustrate what happens to the modelling outputs, when there is switching of provision.

### **8.3 Example: Switching patients between service areas**

In terms of the modelling undertaken by service area, we thought it would be valuable to look at the impact of substituting patients between some service areas on the potential shortage/surplus of CMDHB workers.

It seemed likely that the main source of any substitution would be between the adult acute medicine and surgical services areas – both in terms of inpatients and outpatients.

Our model was adapted to be able to substitute a set proportion of patients (discharges) between the two service areas, and then the impacts on the workforce were identified. This may indicate whether the consistent estimated shortage we identified in the previous section would be reduced or exacerbated by substituting between these two service areas.

Here, four examples are considered:

- A substitution of 10% of the surgical service discharges to the acute adult medical service area
- A substitution of 25% of the surgical service discharges to the acute adult medical service area
- A substitution of 10% of the acute adult medical discharges to the surgical services area

- A substitution of 25% of the acute adult medical discharges to the surgical services area

Because of the different shares of these service areas in terms of their contribution to total demand, substituting between them could alter the growth patterns of demand – and hence potentially alter any gap between labour demand and supply.

The following table presents the same comparative information as presented for the initial service area modelling, for each of the four examples – note though that each substitution example is run based on the middle ground scenario assumptions. We also note that we assume that the substitution occurs from 2006 and that the substitution is permanent (and ongoing).

**Table 38 Labour supply and demand imbalances – modelling including substitution between adult acute medicine and surgical services**

|   | 2004  | 2006  | 2011  | 2016  | 2021  |
|---|-------|-------|-------|-------|-------|
| <b>10% surgical services to acute adult medical</b>                     |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,712 | 4,038 | 4,287 | 4,547 |
| Workforce required for balance between S and D                          | 3,514 | 3,719 | 4,203 | 4,739 | 5,364 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.25% | 1.33% | 1.42% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -8    | -165  | -452  | -817  |
| <b>25% surgical services to acute adult medical</b>                     |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,596 | 3,783 | 3,899 | 4,156 |
| Workforce required for balance between S and D                          | 3,514 | 3,602 | 3,957 | 4,365 | 4,972 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.26% | 1.35% | 1.44% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -6    | -174  | -466  | -816  |
| <b>10% acute adult medical to surgical services</b>                     |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,712 | 4,038 | 4,287 | 4,547 |
| Workforce required for balance between S and D                          | 3,514 | 3,722 | 4,199 | 4,730 | 5,352 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.20% | 1.25% | 1.33% | 1.41% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -11   | -161  | -442  | -805  |
| <b>25% acute adult medical to surgical services</b>                     |       |       |       |       |       |
| Workforce assuming constant proportion of CMDHB population              | 3,514 | 3,712 | 4,038 | 4,287 | 4,547 |
| Workforce required for balance between S and D                          | 3,514 | 3,763 | 4,231 | 4,753 | 5,370 |
| Implied proportion of CMDHB population                                  | 1.20% | 1.22% | 1.26% | 1.33% | 1.42% |
| Shortage (S-D) with constant share of CMDHB population (-ve = shortage) | 0     | -52   | -193  | -466  | -823  |

Source: NZIER

The table indicates that the substitution between the two service areas does not have a significant impact on the estimate size of the shortage between labour demand and supply under the middle ground scenario – for each of the four examples. The combination of the relative shares of total demand and the relative growth in demand between each service area does not seem to impact in a material manner.



## Appendix A Additional tables

**Table 39 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario**  
**Total – all ethnic groups**

Medium population scenario (Flatbush included) – current incidence.

|                    | 0-4    | 5-9    | 10-14 | 15-19  | 20-24  | 25-29  | 30-34  | 35-39  | 40-44  | 45-49  | 50-54  | 55-59  | 60-64  | 65-69  | 70-74  | 75-79  | 80-84  | 85+    | Total   |  |
|--------------------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|
| <b>Inpatients</b>  |        |        |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |         |  |
| 2004               | 15,195 | 2,678  | 2,107 | 4,096  | 6,140  | 6,463  | 6,533  | 4,994  | 4,129  | 3,414  | 3,540  | 3,714  | 3,680  | 3,635  | 3,889  | 4,066  | 3,310  | 2,917  | 84,500  |  |
| 2006               | 15,545 | 2,766  | 2,203 | 4,390  | 6,261  | 6,549  | 6,551  | 5,174  | 4,408  | 3,672  | 3,716  | 4,113  | 4,014  | 4,053  | 4,053  | 4,368  | 3,596  | 3,181  | 88,610  |  |
| 2011               | 15,720 | 2,820  | 2,308 | 4,758  | 7,394  | 6,709  | 6,423  | 5,057  | 4,646  | 4,213  | 4,415  | 4,575  | 5,190  | 5,010  | 5,339  | 4,829  | 4,362  | 4,150  | 97,919  |  |
| 2016               | 16,639 | 2,820  | 2,320 | 4,957  | 8,019  | 7,763  | 6,456  | 4,958  | 4,498  | 4,389  | 5,089  | 5,423  | 5,745  | 6,481  | 6,578  | 6,435  | 4,894  | 5,330  | 108,793 |  |
| 2021               | 17,763 | 2,924  | 2,305 | 5,302  | 8,400  | 8,383  | 7,306  | 5,162  | 4,546  | 4,282  | 5,340  | 6,305  | 6,852  | 7,225  | 8,512  | 7,985  | 6,584  | 6,613  | 121,789 |  |
| <b>Outpatients</b> |        |        |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |         |  |
| 2004               | 13,771 | 8,871  | 6,032 | 6,950  | 9,747  | 10,990 | 13,075 | 13,323 | 14,069 | 14,250 | 17,687 | 18,905 | 19,298 | 17,480 | 14,454 | 12,090 | 7,629  | 4,036  | 222,657 |  |
| 2006               | 13,962 | 9,133  | 6,297 | 7,428  | 9,916  | 11,144 | 13,189 | 13,787 | 15,055 | 15,376 | 18,617 | 21,012 | 21,071 | 19,501 | 15,070 | 12,951 | 8,286  | 4,402  | 236,197 |  |
| 2011               | 13,849 | 9,208  | 6,577 | 8,005  | 11,603 | 11,470 | 12,952 | 13,479 | 15,847 | 17,731 | 22,275 | 23,706 | 27,429 | 24,073 | 19,806 | 14,172 | 9,949  | 5,746  | 267,877 |  |
| 2016               | 14,316 | 9,123  | 6,570 | 8,272  | 12,508 | 13,105 | 13,219 | 13,180 | 15,390 | 18,486 | 25,840 | 28,415 | 30,706 | 31,231 | 24,410 | 18,813 | 10,918 | 7,357  | 301,859 |  |
| 2021               | 15,032 | 9,379  | 6,516 | 8,751  | 13,030 | 14,057 | 14,872 | 13,822 | 15,583 | 18,026 | 27,088 | 33,186 | 36,703 | 34,808 | 31,553 | 23,308 | 14,645 | 9,080  | 339,441 |  |
| <b>Total</b>       |        |        |       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |         |  |
| 2004               | 28,966 | 11,549 | 8,139 | 11,046 | 15,887 | 17,453 | 19,608 | 18,317 | 18,198 | 17,664 | 21,227 | 22,619 | 22,978 | 21,115 | 18,343 | 16,156 | 10,939 | 6,953  | 307,157 |  |
| 2006               | 29,507 | 11,899 | 8,499 | 11,818 | 16,176 | 17,692 | 19,741 | 18,961 | 19,463 | 19,048 | 22,332 | 25,125 | 25,085 | 23,554 | 19,123 | 17,319 | 11,882 | 7,583  | 324,808 |  |
| 2011               | 29,570 | 12,028 | 8,885 | 12,763 | 18,997 | 18,179 | 19,375 | 18,536 | 20,492 | 21,943 | 26,691 | 28,281 | 32,619 | 29,083 | 25,145 | 19,001 | 14,311 | 9,896  | 365,795 |  |
| 2016               | 30,955 | 11,943 | 8,890 | 13,229 | 20,527 | 20,868 | 19,674 | 18,139 | 19,888 | 22,875 | 30,929 | 33,837 | 36,451 | 37,712 | 30,987 | 25,248 | 15,812 | 12,687 | 410,651 |  |
| 2021               | 32,795 | 12,303 | 8,821 | 14,053 | 21,430 | 22,441 | 22,178 | 18,985 | 20,129 | 22,308 | 32,428 | 39,491 | 43,554 | 42,033 | 40,065 | 31,293 | 21,229 | 15,693 | 461,230 |  |

Source: Statistics New Zealand, CMDHB, NZIER

**Table 40 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario**  
**Maori**

Medium population scenario (Flatbush included) – current incidence.

|                    | 0-4   | 5-9   | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85+ | Total  |  |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|--------|--|
| <b>Inpatients</b>  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |        |  |
| 2004               | 3,586 | 618   | 527   | 1,342 | 1,620 | 1,372 | 1,247 | 918   | 805   | 593   | 603   | 603   | 507   | 404   | 268   | 179   | 92    | 37  | 15,322 |  |
| 2006               | 3,652 | 630   | 550   | 1,455 | 1,601 | 1,351 | 1,256 | 954   | 868   | 644   | 651   | 680   | 558   | 450   | 307   | 203   | 90    | 35  | 15,934 |  |
| 2011               | 3,684 | 653   | 569   | 1,584 | 1,993 | 1,296 | 1,196 | 961   | 946   | 780   | 805   | 829   | 778   | 592   | 418   | 324   | 165   | 36  | 17,606 |  |
| 2016               | 3,911 | 658   | 589   | 1,651 | 2,162 | 1,629 | 1,150 | 917   | 954   | 850   | 975   | 1,028 | 948   | 844   | 568   | 466   | 277   | 82  | 19,661 |  |
| 2021               | 4,228 | 698   | 590   | 1,824 | 2,252 | 1,768 | 1,445 | 883   | 909   | 855   | 1,060 | 1,248 | 1,179 | 1,036 | 821   | 654   | 442   | 180 | 22,073 |  |
| <b>Outpatients</b> |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |        |  |
| 2004               | 2,698 | 2,179 | 1,377 | 1,653 | 1,974 | 1,948 | 2,095 | 2,159 | 2,419 | 2,287 | 3,123 | 3,370 | 3,064 | 2,052 | 1,045 | 524   | 153   | 39  | 34,156 |  |
| 2006               | 2,749 | 2,218 | 1,437 | 1,792 | 1,955 | 1,918 | 2,112 | 2,240 | 2,607 | 2,480 | 3,354 | 3,802 | 3,365 | 2,289 | 1,194 | 589   | 149   | 36  | 36,286 |  |
| 2011               | 2,772 | 2,301 | 1,486 | 1,960 | 2,434 | 1,851 | 2,013 | 2,262 | 2,835 | 3,008 | 4,140 | 4,592 | 4,695 | 3,010 | 1,646 | 959   | 272   | 36  | 42,271 |  |
| 2016               | 2,944 | 2,319 | 1,539 | 2,036 | 2,649 | 2,327 | 1,945 | 2,162 | 2,864 | 3,258 | 5,021 | 5,682 | 5,731 | 4,293 | 2,209 | 1,352 | 458   | 84  | 48,873 |  |
| 2021               | 3,182 | 2,460 | 1,541 | 2,257 | 2,755 | 2,536 | 2,444 | 2,098 | 2,732 | 3,289 | 5,419 | 6,904 | 7,130 | 5,267 | 3,199 | 1,962 | 731   | 184 | 56,088 |  |
| <b>Total</b>       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |        |  |
| 2004               | 6,284 | 2,797 | 1,904 | 2,994 | 3,594 | 3,321 | 3,342 | 3,077 | 3,224 | 2,880 | 3,726 | 3,973 | 3,571 | 2,456 | 1,312 | 702   | 245   | 76  | 49,479 |  |
| 2006               | 6,401 | 2,848 | 1,986 | 3,247 | 3,556 | 3,269 | 3,368 | 3,194 | 3,475 | 3,124 | 4,005 | 4,482 | 3,922 | 2,739 | 1,501 | 793   | 239   | 71  | 52,221 |  |
| 2011               | 6,456 | 2,954 | 2,054 | 3,543 | 4,426 | 3,146 | 3,209 | 3,223 | 3,780 | 3,788 | 4,945 | 5,421 | 5,473 | 3,601 | 2,064 | 1,283 | 437   | 72  | 59,877 |  |
| 2016               | 6,855 | 2,977 | 2,129 | 3,687 | 4,811 | 3,956 | 3,095 | 3,079 | 3,819 | 4,108 | 5,996 | 6,710 | 6,679 | 5,137 | 2,776 | 1,818 | 736   | 166 | 68,533 |  |
| 2021               | 7,410 | 3,158 | 2,131 | 4,080 | 5,007 | 4,304 | 3,889 | 2,981 | 3,641 | 4,144 | 6,478 | 8,152 | 8,309 | 6,304 | 4,020 | 2,616 | 1,173 | 364 | 78,161 |  |

Source: Statistics New Zealand, CMDHB, NZIER

**Table 41 Summary of projections of demand (in and outpatient discharges) from modelling by service type – middle ground scenario**  
**Pacific Peoples**

Medium population scenario (Flatbush included) – current incidence.

|                    | 0-4    | 5-9   | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59  | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85+ | Total   |  |
|--------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-----|---------|--|
| <b>Inpatients</b>  |        |       |       |       |       |       |       |       |       |       |       |        |       |       |       |       |       |     |         |  |
| 2004               | 5,989  | 965   | 629   | 1,089 | 1,985 | 2,133 | 1,818 | 1,403 | 925   | 677   | 708   | 729    | 612   | 622   | 488   | 413   | 224   | 87  | 21,495  |  |
| 2006               | 6,213  | 1,015 | 673   | 1,210 | 2,043 | 2,212 | 1,848 | 1,502 | 1,029 | 744   | 773   | 812    | 684   | 698   | 537   | 468   | 261   | 96  | 22,815  |  |
| 2011               | 6,532  | 1,098 | 752   | 1,412 | 2,630 | 2,340 | 1,991 | 1,548 | 1,204 | 972   | 971   | 1,009  | 907   | 939   | 743   | 602   | 366   | 158 | 26,173  |  |
| 2016               | 7,331  | 1,149 | 809   | 1,585 | 3,054 | 3,002 | 2,101 | 1,656 | 1,239 | 1,120 | 1,265 | 1,262  | 1,122 | 1,232 | 999   | 848   | 494   | 238 | 30,507  |  |
| 2021               | 8,171  | 1,250 | 818   | 1,770 | 3,348 | 3,415 | 2,589 | 1,699 | 1,273 | 1,138 | 1,448 | 1,624  | 1,388 | 1,505 | 1,327 | 1,138 | 686   | 338 | 34,926  |  |
| <b>Outpatients</b> |        |       |       |       |       |       |       |       |       |       |       |        |       |       |       |       |       |     |         |  |
| 2004               | 3,706  | 2,447 | 1,617 | 1,682 | 2,973 | 3,135 | 3,425 | 3,318 | 3,018 | 2,800 | 3,652 | 4,158  | 3,523 | 2,822 | 1,716 | 886   | 375   | 74  | 45,327  |  |
| 2006               | 3,846  | 2,573 | 1,730 | 1,875 | 3,063 | 3,245 | 3,488 | 3,545 | 3,354 | 3,079 | 3,986 | 4,637  | 3,934 | 3,177 | 1,887 | 1,001 | 437   | 81  | 48,938  |  |
| 2011               | 4,043  | 2,783 | 1,940 | 2,188 | 3,974 | 3,453 | 3,746 | 3,666 | 3,911 | 4,023 | 5,008 | 5,760  | 5,230 | 4,251 | 2,585 | 1,289 | 614   | 132 | 58,596  |  |
| 2016               | 4,538  | 2,914 | 2,082 | 2,447 | 4,614 | 4,491 | 3,974 | 3,913 | 4,037 | 4,639 | 6,525 | 7,199  | 6,473 | 5,618 | 3,492 | 1,812 | 830   | 203 | 69,801  |  |
| 2021               | 5,058  | 3,170 | 2,105 | 2,736 | 5,042 | 5,106 | 4,973 | 4,022 | 4,142 | 4,713 | 7,466 | 9,260  | 7,985 | 6,873 | 4,606 | 2,435 | 1,154 | 293 | 81,139  |  |
| <b>Total</b>       |        |       |       |       |       |       |       |       |       |       |       |        |       |       |       |       |       |     |         |  |
| 2004               | 9,695  | 3,413 | 2,246 | 2,771 | 4,958 | 5,268 | 5,244 | 4,722 | 3,943 | 3,477 | 4,360 | 4,886  | 4,135 | 3,444 | 2,204 | 1,299 | 599   | 160 | 66,823  |  |
| 2006               | 10,059 | 3,589 | 2,403 | 3,085 | 5,106 | 5,457 | 5,335 | 5,047 | 4,383 | 3,823 | 4,759 | 5,450  | 4,617 | 3,875 | 2,423 | 1,469 | 698   | 176 | 71,753  |  |
| 2011               | 10,575 | 3,881 | 2,692 | 3,600 | 6,604 | 5,793 | 5,738 | 5,213 | 5,116 | 4,995 | 5,979 | 6,769  | 6,136 | 5,191 | 3,328 | 1,891 | 980   | 290 | 84,770  |  |
| 2016               | 11,869 | 4,063 | 2,890 | 4,032 | 7,668 | 7,494 | 6,075 | 5,569 | 5,277 | 5,759 | 7,790 | 8,462  | 7,595 | 6,850 | 4,491 | 2,660 | 1,324 | 441 | 100,308 |  |
| 2021               | 13,229 | 4,420 | 2,923 | 4,506 | 8,391 | 8,521 | 7,562 | 5,721 | 5,416 | 5,851 | 8,914 | 10,884 | 9,373 | 8,378 | 5,933 | 3,573 | 1,840 | 631 | 116,065 |  |

Source: Statistics New Zealand, CMDHB, NZIER

## Appendix B Methodology

This appendix explains the process for the generation of estimates of health service demand and the impact of changing service demand on CMDHB's hospital workforce.

In doing so, we use an underlying assumption that the demand/need (and subsequent impacts on the CMDHB workforce) is essentially a function of population size and structure – i.e. the absolute size of the Counties Manukau population, and the number in each age, gender and ethnic group combination. It is this key driver, that will drive demand/need through its distribution over each of the key service areas, and through the incidence of various diseases and disabilities (Major Diagnostic Categories or MDC).

Initially it was hoped that demand/need could be modelled to reflect 3 drivers: i) population size and structure, ii) the prevalence of disease and disability, and iii) the pattern of morbidity as longevity increases. However, in terms of the prevalence of disease and disability, a lack of CMDHB-specific information about potential trends, or informed expectations of changes to the current levels of prevalence, meant that we were restricted to maintaining the 'status quo' levels of prevalence.<sup>1</sup> In terms of the pattern of morbidity as longevity increases, no information about the costs associated with treatment (in a suitable age/gender/ethnicity combination framework) was available.

As a result, the methodology is essentially the following:

- Estimates of the Counties Manukau population were obtained; broken down by age (5 year age groups), gender and ethnicity. Projections of the same population were also obtained, as estimated by Statistics New Zealand.
- Statistics for the year ending February 2005 (which we took to represent the base year 2004) on the current level of discharges (both in- and outpatients) from CMDHB were obtained in two forms:
  1. **discharges by service area** – broken down by age, gender and ethnicity
  2. **discharges by Major Diagnostic Category** – also broken down by age, gender and ethnicity.
- The discharge data is assumed to represent the base year (2004) level of demand or need, in terms of health services provided by the CMDHB. For a base year (2004), the distribution of discharges over the various service areas<sup>2</sup> and MDC is calculated in terms of the relevant share of the population.<sup>3</sup>

---

<sup>1</sup> An attempt was also made to extrapolate recent changes in the rates of incidence into the future, but did not produce useable results. Firstly, annual compound growth rates were extracted from 2001 and 2004 incidence rates. These annual compound growth rates were then applied to the projected years. For a number of groups where the absolute levels are low (e.g. for a particular ethnic group/age /gender combination the number of discharges may be less than 100) the percentage growth may be relatively high. Even on an annual growth rate basis, this can lead to unreasonable projections of future incidence rates (e.g. percentages in excess of 1,000%).

<sup>2</sup> The service areas are defined as: Adult acute medicine (for inpatients and outpatients), Intermediary/Rehabilitation care (for inpatients and outpatients), Kidz first (for inpatients and outpatients), Mental health, Surgical services (for inpatients and outpatients), Women's health (for inpatients and outpatients) and Supporting services (provide resource to a number of service areas – have no discharges allocated specifically).

<sup>3</sup> Note for the MDC modelling, only the 'top' 10 MDC are modelled. These account for approximately 80% of total discharges. They include: Pregnancy, childbirth & the puerperium, Diseases & disorders of the musculoskeletal system & connective tissue, Diseases & disorders of the digestive system, Newborns & other neonates, Diseases & disorders of the circulatory system, Diseases & disorders of the respiratory system, Diseases & disorders of the skin, subcutaneous tissue & breast,

For example, in terms of service area the current level of discharges for male Māori aged between 20 and 24 in terms of inpatient surgical services (a service area) is worked out in terms of the total number of male Māori aged between 20 and 24 in the Counties Manukau population.

Again for example, in terms of MDC, the current level of discharges for male Māori aged between 20 and 24 in terms of diseases of the digestive system (an MDC) is worked out in terms of the total number of male Māori aged between 20 and 24 in the Counties Manukau population.

The service area and MDC shares are calculated for each of the age group/gender/ethnic group combinations.

- Due to the issues around estimating the potential for these shares over service area, and incidence across various MDC to change over time (as noted above) the shares and incidence levels are assumed to be constant over time.

For example, for male Māori aged 20 to 24 years the number of discharges for inpatient surgical services in the base year is 7.7% of the total number of male Māori aged 20 to 24 in the Counties Manukau area. We assume that the 7.7% will not change over time.

Similarly, for male Māori aged 20 to 24 years the number of discharges for diseases of the digestive system in the base year is 1.3% of the total number of male Māori aged 20 to 24 in the Counties Manukau area. We assume that the 1.3% will not change over time.

Clearly there are risks inherent in using this assumption, but the risk around being able to generate suitable (accepted) assumptions around the likely direction and magnitude of change from the status quo shares and rates of incidence was deemed to be too high.

- The population projections for the Counties Manukau area are used to project levels of demand for CMDHB services by service area and by MDC, for each age/gender/ethnic group combination.
- In terms of the key driver – population, the 3 scenarios for projected population growth (low, medium and high) provide us with essentially 3 scenarios of the potential level of demand for CMDHB service by service area and MDC. These 3 population scenarios combine various assumptions around likely fertility rates, mortality, migration and inter-ethnic mobility to give upper and lower bounds on a central medium scenario.

So the three scenarios modelled will be:

1. **Lower bound scenario** – Low population projections, with current shares/rates of incidence for service area distributions/MDC incidence.
  2. **Middle ground scenario** – Medium population projections, with current shares/rates of incidence for service area distributions/MDC incidence.
  3. **Higher bound scenario** – High population projections, with current shares/rates of incidence for service area distributions/MDC incidence.
- While these scenarios address the key demand side driver, there will clearly be supply side drivers which will impact on the Counties Manukau workforce such as changes in technology, and the use of community based service delivery. Incorporation of these into the projections would require a fundamentally different approach which is outside of the scope of this research.

---

Diseases & disorders of the ear, nose, mouth & throat, Diseases & disorders of the nervous system, and Injuries, poisonings & toxic effects of drugs.

- Once the estimates of demand or need have been calculated, the CMDHB's hospital workforce data (obtained from the census of CMDHB workers) is used to indicate, given certain assumptions, how the workforce would need to grow and develop to meet future demand for services. We can then determine whether the demand pressures, and supply growth expected indicate that a shortage/surplus of workers will exist in a particular area, and how any gap will change over time with population growth.

The modelling by service area allows us to identify any potential difference between the demand for services from CMDHB and the CMDHB workforce by service area for each of the main occupational groups. This is possible, as both the demand side (discharge information) and supply side (workforce data) contain information by service area.

For the MDC based incidence modelling, no supply side information is available i.e. workers do not typically treat only patients with one MDC, so supply side information is restricted to the various occupational groups.

## Appendix C Major assumptions and caveats related to population projections used

The projections shown in section 2 of the report are based on the estimated resident population of each ethnic group for the various areas at 30 June 2001<sup>1</sup>. These base figures are then projected forward, indicating changes that would occur if the stated assumptions were to hold over the projected period.

### ***The total response concept***

The population projections are based on the total response concept. This means that the projections for each ethnic group include all people who identify with that ethnic group. People who identify with more than one ethnic group are included in the projections for each ethnic group that they identify with. As a result, by summing the Maori, Pacific, Asian and European ethnic group populations results in larger number than the total population. There are no projections of the Other ethnic group. This ethnic group numbers no more than 25,000 people throughout the country. This then means that ethnic breakdowns are limited to four groupings: European, Māori, Pacific Peoples and Asian.<sup>2</sup>

### ***Growth scenarios***

Low, medium and high variations on these projections are provided, resulting from variations in assumptions around different fertility, mortality, migration and inter-ethnic mobility.

The low series assumes low fertility, high mortality, low net migration and high inter-ethnic mobility for each ethnicity. The high projection series assumes high fertility, low mortality, high net migration and low inter-ethnic mobility for each ethnicity. More detail on the underlying assumptions is available from Statistics New Zealand.<sup>3</sup>

These alternative scenarios are shown below in Table 42 in comparison to the central medium scenario.

---

<sup>1</sup> Which were based on the 2001 Census night usually resident population count for each ethnicity and adjusted for: non-response to the ethnicity question, net Census undercount, residents temporarily overseas on Census night, births, deaths and net migration between Census night and 30 June 2001, and for reconciliation with demographic estimates at ages 0-9 years. (<http://www.stats.govt.nz/additional-information/subnat-ethnic-pop-projections.htm>)

<sup>2</sup> Because of this, in order to be able to derive incidence rates, we had to aggregate the discharge data into similar ethnic groups (the ethnic group for the service area and discharge data were not limited to just four groups). After consideration, we (a) included data on the 'Other' ethnic group with the European group; (b) included discharges for the Indian group with the Asian group; and (c) pro-rated data for the Unknown ethnic group across the other (i.e. known) ethnic groups

<sup>3</sup> <http://www.stats.govt.nz/additional-information/subnat-ethnic-pop-projections.htm>

**Table 42 Counties Manukau population projections by ethnicity**

Low, medium and high scenarios

|             | Māori  |        |        | Pacific |         |         | Asian  |         |         | European |         |         |
|-------------|--------|--------|--------|---------|---------|---------|--------|---------|---------|----------|---------|---------|
|             | Low    | Medium | High   | Low     | Medium  | High    | Low    | Medium  | High    | Low      | Medium  | High    |
| <b>2001</b> |        | 69,200 |        |         | 87,500  |         |        | 51,000  |         |          | 226,500 |         |
| <b>2006</b> | 73,000 | 75,400 | 77,800 | 98,800  | 101,500 | 104,200 | 73,700 | 78,800  | 83,900  | 218,300  | 224,500 | 230,800 |
| <b>2011</b> | 76,300 | 81,400 | 86,800 | 109,900 | 115,800 | 121,600 | 83,500 | 94,200  | 105,100 | 210,100  | 222,400 | 235,000 |
| <b>2016</b> | 79,600 | 87,800 | 96,600 | 121,900 | 131,300 | 141,100 | 90,400 | 107,000 | 124,300 | 200,400  | 218,700 | 238,000 |

Source: Statistics New Zealand

**Base year and projections to 2021**

2004 was selected as the base year for the analysis, given the availability of MDC and service area information, and the desire to project from a relatively recent base year. Given that no population estimates were available for 2004, we interpolated values from 2001 Census data and the Statistics New Zealand estimates for 2006.

Also, population projections were not available for 2021 in the form required. However, CMDHB did have some customised projections which enabled the extraction of a 2016 – 2021 growth rate for the medium population projection scenario. We applied this to our projections, and used the 2016 deviations from the medium projections to get the low and high bounds for 2021. As a result, it should be reinforced that the 2021 projections are not formal Statistics New Zealand projections.

The assumptions underpinning the projections are borne out of necessity, and while they should be noted and acknowledged, the projections provide a valuable, formal and consistent indication of the relative magnitudes and growth of the specific populations going forward.

**Flatbush**

Flatbush is a 'greenfields' subdivision within Manukau City which is expected to have around 40,000 residents by around 2015.<sup>4</sup> CMDHB estimate that only around 50% of the growth expected (in terms of residents) in the Flatbush area has been included in the Statistics New Zealand projections, hence an allowance of 50% of the projected growth is included along with the formal Statistics New Zealand projections.

The only projections available were for total residents, so the demographic composition of the existing population was used to pro-rate the Flatbush population. The report which presents the projections suggests that the Flatbush population might differ slightly in terms

<sup>4</sup> "Flatbush development. A planned approach to development in partnership with Counties Manukau District Health Board. Registrations of interest", February 2005, CMDHB.

of its demographic composition, but insufficient detail is provided to allow us to disaggregate the population suitably.