

# Causes of excess hospitalisations among Pacific peoples in New Zealand: implications for primary care

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## ABSTRACT

**INTRODUCTION:** Pacific people suffer disproportionately poorer health and reduced life expectancy at birth compared to the total New Zealand population.

**AIM:** To assess causes of excess morbidity in the Pacific population, and identify lesser known or previously unknown causes which require further investigation.

**METHODS:** We obtained public hospital discharge data from July 2000 to December 2002. The population data were from the 2001 Census. Standardised discharge ratios were calculated to compare Pacific peoples with the total New Zealand population.

**RESULTS:** Pacific peoples were six times more likely to have a diagnosis of cardiomyopathy and gout, and four to five times of rheumatic fever, gastric ulcer, systemic lupus erythematosus (SLE), and diabetes. Respiratory diseases, skin abscesses, heart failure, cataracts, cerebral infarction and chronic renal failure were also significant causes of excess morbidity. Unexpected causes of excess morbidity included candidiasis, excess vomiting in pregnancy (hyperemesis gravidarum) and pterygium.

**DISCUSSION:** The magnitude of established causes of excess morbidity among Pacific peoples were similar to our findings. Other causes of excess morbidity are less widely known, or are identified here for the first time. These are systemic lupus erythematosus, hyperemesis gravidarum, cardiomyopathy, gastric ulcer, candidiasis and pterygium. The findings draw attention to specific causes of excess morbidity in Pacific communities where effective interventions are available in primary care, and where further research may identify preventive or curative interventions.

**KEYWORDS:** Pacific peoples; primary care; hyperemesis gravidarum; morbidity; hospitalizations

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## Introduction

The Pacific population makes up approximately 7% of the total New Zealand population from the 2006 Census.<sup>1</sup> Pacific people suffer disproportionately from poorer health and, in 2001, their life expectancy at birth was five years less compared to the total New Zealand population.<sup>2,3</sup> The focus of many health intervention programmes is on addressing this disparity in health status. To decrease disparities it is important to understand the range of health problems which disproportionately affect Pacific peoples. Some of these problems have already been identified from

mortality and health survey data.<sup>2-5</sup> Nevertheless, there is limited information published on the occurrence of chronic conditions among Pacific peoples in New Zealand.

This study was carried out as part of a health needs analysis for Pacific peoples commissioned by the Ministry of Health. Our aim was to determine the specific causes of hospital admissions which are significantly elevated in the Pacific population. This will provide information that may assist early diagnosis and treatment in primary care, and may result in better outcomes for Pacific peoples.

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## Methods

We undertook a systematic examination of public hospital discharge diagnoses (as a measure of morbidity) to determine which conditions are relatively important causes of morbidity among Pacific peoples compared to the total population in New Zealand. The results presented are for those who were admitted to hospital only. Patients who were seen at the emergency department and discharged were excluded.

The hospital activity data used in this study were obtained from the New Zealand Health Information Service of the Ministry of Health, and relate to public hospital discharges for the period July 2000 to December 2002. The population data were derived from Statistics New Zealand census data for 2001. Discharge diagnoses were coded to International Classification of Diseases (ICD) 10. 'Pacific peoples' included anyone who reported sole Pacific Island ethnicity or Pacific Island ethnicity as well as another ethnic group or groups from hospital discharges.

Standardised discharge ratios (SDRs) were calculated using the rate of discharges per capita by age group for the total population, applied to the age structure of the Pacific population. This provides an estimate of the expected number of discharges that the Pacific population would have had, given its own population structure, but with discharge rates equal to those in the population at large. Effectively we adjust for the younger age structure of the Pacific population. The expected number of discharges for Pacific people formed the denominator, and the observed number of discharges the numerator. SDRs higher than one thus imply higher standardised discharges among Pacific peoples compared to the total population.

Further adjustment were made to the expected number of discharges to allow for the different fertility pattern of Pacific peoples. For those conditions that relate to pregnancies and births, we multiplied the expected number of hospitalisations by the relative birth rate for Pacific peoples compared to the population as a whole.

Given the relatively small number of hospitalisation events, the frequency of occurrence in the

two population groups can differ by chance. Confidence is usually represented statistically by confidence intervals (CIs); these intervals show the range of values in which we can be 95% confident that the 'true' value lies. The CIs for the SDRs were calculated using an algorithm described by Byar.<sup>6</sup> This algorithm makes allowances for the lower confidence we can place on estimates from smaller samples. Because the SDRs are distributed non-normally, we applied a log transformation before calculating the standardised distance from the mean in terms of the number of CIs. The method is effectively a measure of our certainty that the disease differs from the population standard, and might be thought of as equivalent to a 'z' score. The ICD-10 diagnoses where the standardised distance from the mean was in the top 5% of values are presented.

Permission for access to data was granted from the Ministry of Health.

## Results

During the study period July 2000 to December 2002, there were 2831 789 discharges from all public hospitals in New Zealand. Of these, 99 476 (3.5%) were identified as Pacific peoples. The number of people responding to the ethnicity question in the 2001 Census was 3 586 731 (96%), and 231 801 (6.2 %) identified themselves as Pacific peoples. The apparent lower proportion admitted to hospital is because of differences in the age structure of the Pacific population compared to the total population.

Table 1 shows the 24 discharge diagnoses which were most elevated for Pacific peoples; that is, the top 5% of values. Pacific peoples were around two to six times more likely to be discharged from hospital with these conditions. More specifically, Pacific peoples were six times more likely to have a diagnosis of cardiomyopathy and gout, and four to five times more likely to have rheumatic fever, gastric ulcer, systemic lupus erythematosus (SLE), diabetes and its associated complications. Respiratory diseases were also a significant cause of excess morbidity with discharges for bronchiectasis nearly five times, and pneumonia at least two times more in comparison. Skin abscesses, heart failure, cataracts, cerebral infarction and chronic

renal failure were at least twice as likely to be discharge diagnoses. There were some unexpected findings also, where Pacific peoples were five times more likely to have candidiasis, and 'other disorders of the conjunctiva' and two times more likely to have hyperemesis gravidarum compared to the total New Zealand population, after adjustment for fertility rates. When looking at the four-character ICD code for candidiasis, 90% of Pacific cases were due to either cheilitis (candidiasis of the mouth) or enteritis. The four-character ICD code for other disorders of the conjunctiva showed 97% of cases were pterygium. Of the six

## WHAT GAP THIS FILLS

**What we already know:** The main known causes of excess morbidity amongst Pacific peoples in New Zealand are respiratory and cardiovascular diseases, diabetes, gout, skin infections, rheumatic fever, and their associated complications.

**What this study adds:** Causes of excess morbidity among Pacific people that are less well known, or reported here for the first time, are: cardiomyopathy, systemic lupus erythematosus, hyperemesis gravidarum, gastric ulcer, candidiasis, and pterygium. Early diagnosis and treatment of these conditions in primary care will reduce morbidity.

Table 1. Public hospital discharges for Pacific peoples compared to the total population in New Zealand, July 2000 to December 2002

Description	3 digit ICD-10 codes	Standardised Discharge Ratio (age and fertility adjusted)	Lower confidence limits	Upper confidence limits	Standardised distance from the mean	N*
Pneumonia, organism unspecified	J18	2.35	2.27	2.43	12.91	3532
Non-insulin-dependent diabetes	E11	4.54	4.25	4.83	11.88	964
Cardiomyopathy	I42	6.26	5.65	6.91	9.11	389
Gout	M10	6.39	5.74	7.10	8.74	350
Cutaneous abscess, furuncle and carbuncle	L02	2.36	2.24	2.48	8.62	1571
Acute bronchiolitis	J21	1.83	1.76	1.90	7.94	2674
Bronchiectasis	J47	4.63	4.20	5.09	7.93	422
Care involving dialysis	Z49	5.67	5.02	6.39	7.19	272
Heart failure	I50	2.62	2.44	2.81	6.89	801
Other disorders of conjunctiva	H11	5.29	4.63	6.03	6.30	227
Hyperemesis gravidarum	O21	1.98	1.87	2.10	6.07	1230
Other cataract	H26	2.64	2.42	2.87	5.71	544
Senile cataract	H25	3.01	2.71	3.34	5.23	355
Acute lower respiratory infection, unspecified	J22	1.98	1.85	2.12	5.00	835
Gastric ulcer	K25	3.90	3.36	4.50	4.65	186
Cellulitis	L03	1.62	1.53	1.71	4.53	1377
Other chronic obstructive pulmonary disease	J44	1.88	1.76	2.02	4.51	793
Asthma	J45	1.46	1.39	1.52	4.36	2099
Rheumatic fever	I01	5.52	4.51	6.68	4.36	105
Systemic lupus erythematosus (SLE)	M32	3.87	3.28	4.54	4.14	150
Diabetes mellitus in pregnancy	O24	2.39	2.14	2.66	4.04	339
Candidiasis	B37	4.72	3.84	5.73	3.88	101
Cerebral infarction	I63	2.28	2.05	2.54	3.82	338
Chronic renal failure	N18	2.49	2.20	2.81	3.75	267

\* Number of hospital discharges for Pacific people.

most common diagnoses, pneumonia, acute bronchiolitis and asthma each resulted in over 2000 admissions during this period. Skin infections, cellulitis, and hyperemesis gravidarum each were a cause of over 1000 admissions.

### Discussion

Our results provide a description of the illnesses causing hospital admissions which most clearly affect Pacific peoples disproportionately compared to the total New Zealand population. Some of these causes of morbidity were consistent with what is already known; however, there were also some unexpected findings. The cut-off of the top 5% was arbitrary, but chosen in order to include only differences which we were confident were not chance findings. Moreover, by taking the top 5% of conditions we satisfy the Bonferroni correction for multiple sampling (to allow for the possibility that some significant results would

treatment, it may be that SDRs for Pacific peoples are higher (or lower) on average, for reasons that are unrelated to levels of morbidity. The most extreme SDRs, however, are likely to indicate conditions within the Pacific community that are associated with the highest levels of excess morbidity. Ethnicity data collection has improved since 1995 and there are changes in how ethnicity data are now collected. However, there are persisting issues with the recording of ethnicity in New Zealand with underenumeration of Maori and Pacific peoples.<sup>7-8</sup> This means the elevated rates observed may be an underestimation. On the other hand, the definition of Pacific ethnicity in the hospitalisation data and the census differ (the former prioritised Pacific, the latter prioritised Maori). This could lead to an overestimation of the elevated rates in Pacific people, but any effect will be very small. Private hospital data were not included. If Pacific peoples use private hospitals less, this may result in an overestimation of the elevated rates. This is likely to be a minor problem for the conditions examined, as most of these are treated in public hospitals for everyone.

## Public hospital discharge data, despite the limitations discussed, are a good measure of morbidity amongst Pacific peoples

occur purely by chance when considering a large number of statistics). A number of conditions which are known to be higher amongst Pacific peoples were below this cut-off.<sup>2</sup> For example, meningococcal infection (SDR 2.11), gastric cancer (SDR 2.98), and tuberculosis (SDR 3.57). Many of the illnesses resulting in admissions for Pacific peoples in this study can either be prevented, their severity reduced, or complications delayed, through effective primary care interventions.

There were some limitations in our study. It was a snapshot of morbidity and does not offer any information about trends over time. ICD discharge diagnosis coding will contain errors, but these could not account for large differences. The results show admissions not people. If Pacific people have a higher number of re-admissions than the total population, this could account for some of the excess. Because of potential differences in knowledge, access to services, and referrals for

The strengths of this study include the large number of admissions, hence the statistical power. Public hospital discharge data, despite the limitations discussed, are a good measure of morbidity amongst Pacific peoples.

Our results, compared to other published data, showed similar or higher excess rates for respiratory diseases, heart failure, rheumatic fever, cerebral infarction (stroke), and diabetes and other related conditions. For instance, the annual hospitalisation rate for pneumonia in Pacific children in Auckland was twice as high, while the national incidence of bronchiectasis was at least 10 times higher compared to Europeans.<sup>9,10</sup> The prevalence of diabetes in the Pacific population, at 23.5%, was higher compared to all other ethnic groups.<sup>11</sup> Pacific mortality from heart failure and stroke was at least double compared to the total population.<sup>2</sup> Cardiomyopathy was six times more common among Pacific peoples in our study, but there appears to be no previous research on this. We found that a whole range of respiratory illnesses were significantly more common among Pacific people. In terms of burden of disease (total numbers), respiratory diseases were the most

important. Many of these illnesses are influenced by socioeconomic and environmental conditions.

We found Pacific peoples were at least six times more likely to have a diagnosis of gout, and four times more likely to have gastric ulcer. Research into the aetiology of gout in Pacific people had identified a potential genetic link, which may act in conjunction with diet and obesity.<sup>12,13</sup> Indigenous Fijians had a higher prevalence of gastric ulcers diagnosed by endoscopic examination than Fijian Indians.<sup>14</sup> Risk factors for gastric ulcers included helicobacter pylori (*H.pylori*) infection, non-steroidal anti-inflammatory drugs and smoking.<sup>15-16</sup> *H.pylori* IgG seropositivity has been shown to be highest in Pacific peoples compared to either Maori or people of European ethnicity.<sup>17</sup> Antibiotic treatment is effective for *H.pylori* eradication.

We found Pacific peoples were at least 1.5 times more likely to have a diagnosis of cellulitis, and five times more likely to have rheumatic fever compared to the total New Zealand population. Cellulitis is caused by either Group A streptococcus or staphylococcus aureus.<sup>18</sup> A complication of Group A streptococcus infection is acute rheumatic fever. Skin infections are more common among Pacific children.<sup>3</sup> High rates of rheumatic fever are linked to socioeconomic conditions, and consistent with previous findings for Maori and Pacific peoples.<sup>2,19</sup> Improved socioeconomic conditions and access to early diagnosis and treatment can reduce the development of complications.

Most pregnant women experience some degree of nausea and vomiting. Previous research based on a review of medical notes found the incidence of hyperemesis gravidarum in Pacific Island women was higher compared to either Maori or Europeans.<sup>20,21</sup> We found Pacific women to be two times more likely to be hospitalised because of hyperemesis gravidarum compared to the total New Zealand population, and this accounted for a high burden of disease (over 1000 admissions in 2.5 years). Recent research showed a consistent association between hyperemesis gravidarum and *H.pylori*, with relief of symptoms after antibiotic treatment for *H.pylori*.<sup>22,23</sup> Given the higher prevalence of *H.pylori* this is a plausible cause of hyperemesis gravidarum among Pacific women,

although psychosocial factors and disorders of thyroid function are also possible causes.<sup>23</sup> We could find no evidence that any clinical trial of treatment of *H.pylori* in women with hyperemesis gravidarum has been undertaken.

*Candida* is a commensal found in the mouth, stool and vagina.<sup>18</sup> Invasive candidiasis is a serious problem in diabetic patients.<sup>24</sup> Our results showed Pacific peoples were nearly five times more likely to be discharged with a diagnosis of candida enteritis and cheilitis, compared to the total New Zealand population. There has been no previous research on ethnic differences in susceptibility to candidiasis in New Zealand. Research is required to find out why Pacific peoples appear to be more susceptible.

The prevalence of SLE is known to vary among people of different ethnic groups.<sup>25-29</sup> A review of medical notes in New Zealand in the 1980s showed a major difference in prevalence when comparing people of European ethnicity and Polynesians.<sup>30</sup> The Polynesian ethnic group included Maori and Pacific peoples. Polynesians were 3.5 times more likely to have SLE compared to the European population in New Zealand. Age standardised comparative mortality rates were also higher. Our findings are similar, with Pacific peoples four times more likely to have SLE compared to the total New Zealand population. It would be helpful to look at Maori and Pacific peoples separately, to provide clarity about morbidity and mortality from SLE in these ethnic groups.

Pterygium is a 'wedge-shaped fibrovascular growth of conjunctiva that extends onto the cornea'.<sup>18</sup> The prevalence is higher in countries nearer the equator, and appears to be associated with sun exposure.<sup>31-32</sup> We did not have information about the country of birth for Pacific peoples in this study. It is possible that the higher prevalence of cases seen is due to Pacific peoples from the Pacific Islands now living in New Zealand. This association does not appear to have been documented previously.

## Conclusion

The established causes of excess morbidity among Pacific people—respiratory and cardio-



vascular diseases, diabetes, gout, skin infections and their associated complications—were all considerably more common discharge diagnoses compared with the total population in this analysis. These disorders are already the focus of attention, and it is important for primary health care professionals to continue working collaboratively with Pacific communities to improve health in these areas.

Other causes of excess morbidity in Pacific peoples are less widely known, or are identified here for the first time. These are cardiomyopathy, SLE, hyperemesis gravidarum, gastric ulcer, candidiasis and pterygium. The clinical implications are that improved knowledge amongst general practitioners of the excess risk of these conditions in Pacific peoples will lead to earlier diagnosis, treatment and improved outcomes. Further research is required to establish the cause of excess hyperemesis gravidarum in the Pacific population and the potential for treatment.

Although a main focus on the broader socioeconomic determinants of health is appropriate in order to improve the health of Pacific peoples, it is important also to attend to specific causes of morbidity where effective interventions are available, and where further research may identify preventive or curative interventions.

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## COMPETING INTERESTS

None declared.