



## ORIGINAL RESEARCH

Examining emergency department inequities:  
Descriptive analysis of national data (2006–2012)Elana CURTIS,<sup>1</sup> Sarah-Jane PAINE,<sup>1</sup> Yannan JIANG,<sup>2</sup> Peter JONES ,<sup>3</sup> Inia TOMASH,<sup>4,5</sup> Inia RAUMATI,<sup>6</sup> Olivia HEALEY  and Papaarangi REID<sup>1</sup>

<sup>1</sup>Te Kupenga Hauora Māori, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand, <sup>2</sup>Department of Statistics, Faculty of Science, The University of Auckland, Auckland, New Zealand, <sup>3</sup>Department of Surgery, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand, <sup>4</sup>Emergency Medicine Research, Auckland City Hospital, Auckland, New Zealand, <sup>5</sup>Emergency Department, Middlemore Hospital, Auckland, New Zealand, and <sup>6</sup>Emergency Department, Auckland City Hospital, Auckland, New Zealand

## Abstract

**Objective:** Internationally, Indigenous and minoritised ethnic groups experience longer wait times, differential pain management and less evaluation and treatment for acute conditions within emergency medicine care. Examining ED Inequities (EEDI) aims to investigate whether inequities between Māori and non-Māori exist within EDs in Aotearoa New Zealand (NZ). This article presents the descriptive findings for the present study.

**Methods:** A retrospective observational study framed from a Kaupapa Māori positioning, EEDI uses secondary data from emergency medicine admissions into 18/20 District Health Boards in NZ between 2006 and 2012. Data sources include variables from the Shorter Stays in ED National Research Project database and comorbidity data from NZ's National Minimum Dataset. The key predictor of interest is patient ethnicity with descriptive variables,

including sex, age group, area deprivation, mode of presentation, referral method, Australasian Triage Scale and trauma status.

**Results:** There were a total of 5 972 102 ED events (1 168 944 Māori, 4 803 158 non-Māori). We found an increasing proportion of ED events per year, with a higher proportion of Māori from younger age groups and areas of high deprivation compared to non-Māori events. Māori also had a higher proportion of self-referral and were triaged to be seen within a longer time frame compared to non-Māori.

**Conclusion:** Our findings show that there are different patterns of ED usage when comparing Māori and non-Māori events. The next level of analysis of the EEDI dataset will be to examine whether there are any associations between ethnicity and ED outcomes for Māori and non-Māori patients.

**Key words:** *emergency medicine, ethnicity, indigenous, inequity.*

## Key findings

- This is the first study to document different patterns of ED usage between Māori and non-Māori within NZ.
- We found different ED usage by ethnicity at almost every level of deprivation with Māori living in the most deprived decile being twice as likely to have used an ED as non-Māori from the same decile.
- The next level of analysis will be to examine whether there are any associations between ethnicity and ED outcomes for Māori and non-Māori patients.

## Introduction

Indigenous health inequities persist worldwide and can be seen within multiple indicators including morbidity, mortality and healthcare access and quality.<sup>1</sup> Healthcare delivered within the ED context is an area of increased focus for research into Indigenous and ethnic 'minority' health given evidence of longer wait times, differential pain management and less evaluation and treatment for acute conditions.<sup>2–5</sup> Provider bias is likely to contribute to ethnic health inequities and may be more common in ED contexts where healthcare is often time-pressured, complex, brief and demanding.<sup>6</sup> The role of the health provider and the healthcare system associated with

Correspondence: Associate Professor Elana Curtis, Te Kupenga Hauora Māori, Faculty of Medical and Health Sciences, The University of Auckland, Auckland 1072, New Zealand. Email: e.curtis@auckland.ac.nz

Elana Curtis, MD, FNZCPHM, Associate Professor; Sarah-Jane Paine, PhD, Senior Lecturer; Yannan Jiang, PhD, Senior Research Fellow; Peter Jones, PhD, FACEM, Associate Professor; Inia Tomash, MBChB, FACEM, Emergency Physician; Inia Raumati, MBChB, Emergency Medicine Consultant; Olivia Healey, MPH, Research Assistant; Papaarangi Reid, DipComHealth, FNZCPHM, Professor.

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**TABLE 1.** Socio-demographic characteristics of Māori and non-Māori for all ED events, 2006–2012†

Descriptive variables	Māori events ( <i>n</i> = 1 168 944)		Non-Māori events ( <i>n</i> = 4 803 158)	
	<i>n</i>	%	<i>n</i>	%
Year	1 168 944	100	4 803 158	100
2006	126 795	10.8	557 387	11.6
2007	149 282	12.8	613 196	12.8
2008	161 113	13.8	656 045	13.7
2009	173 497	14.8	699 333	14.6
2010	181 554	15.5	736 115	15.3
2011	186 522	16.0	760 687	15.8
2012	190 181	16.3	780 395	16.2
Gender				
Female	581 071	49.7	2 328 737	48.5
Male	587 856	50.3	2 474 258	51.5
Age group				
00–04	206 533	17.7	501 426	10.4
05–09	77 088	6.6	211 684	4.4
10–14	74 930	6.4	223 959	4.7
15–24	236 008	20.2	707 701	14.7
25–34	155 538	13.3	524 385	10.9
35–44	130 957	11.2	513 632	10.7
45–54	115 493	9.9	493 176	10.3
55–64	82 260	7.0	462 819	9.6
65–74	56 618	4.8	437 918	9.1
≥75	33 510	2.9	726 416	15.1
NZDep06 Index				
1	16 787	1.4	292 887	6.2
2	28 681	2.5	369 713	7.8
3	32 086	2.8	354 698	7.5
4	45 241	3.9	385 840	8.1
5	61 783	5.3	442 299	9.3
6	83 873	7.2	469 455	9.9
7	120 775	10.4	554 974	11.7
8	176 925	15.2	664 449	14.0
9	246 390	21.1	648 197	13.7
10	352 720	30.3	563 532	11.9
Region				
Northern	355 541	30.4	1 757 450	36.6
Midland	473 954	40.5	1 113 054	23.2
Central	289 849	24.8	1 361 488	28.3
Southern	49 600	4.2	571 166	11.9

emergency medicine delivery is now being questioned.

Within an Australasian context, there is growing recognition that health equity for Indigenous peoples within emergency medicine is yet to be realised. In response, the Australasian College for Emergency Medicine has recently released two reports outlining their intention to deliver healthcare that is culturally safe and aligned to health equity for Indigenous Aboriginal, Torres Strait Island and Māori peoples.<sup>7,8</sup> In order to monitor health equity, it is imperative that EDs collect high-quality ethnicity data and investigate whether clinically important inequities exist between Indigenous and non-Indigenous peoples.<sup>9</sup>

The Examining ED Inequities (EEDI) is a Health Research Council of New Zealand (NZ)-funded research project investigating ED inequities within patient and system-centred markers of care, as well as mortality between Māori and non-Māori.<sup>2</sup> EEDI represents the largest and most comprehensive and robust ED administrative database currently available within Aotearoa NZ. The purpose of this article is to present the descriptive variables identified within the EEDI dataset.

## Methods

EEDI is a Māori-led research study that incorporates a Kaupapa Māori Research positioning that places Māori at the centre of enquiry in order to make a positive difference to Māori communities. EEDI is a retrospective observational study that utilises data representing all ED admissions into 18/20 District Health Boards in NZ between 2006 and 2012. Data sources include the Shorter Stays in ED National Research Project and the National Minimum Dataset (the national collection of public and private hospital discharge and clinical coded information) for clinical information related to each event (e.g. primary and secondary diagnoses, procedures).<sup>10</sup> An EEDI Advisory Group consisting of emergency medicine clinicians, Māori health experts and senior statistical advisors oversee the

TABLE 1. Continued

Descriptive variables	Māori events ( <i>n</i> = 1 168 944)		Non-Māori events ( <i>n</i> = 4 803 158)	
	<i>n</i>	%	<i>n</i>	%
District Health Boards				
Auckland	72 242	6.2	562 852	11.7
Bay of Plenty	122 925	10.5	296 634	6.2
Canterbury	41 826	3.6	507 231	10.6
Capital and Coast	33 485	2.9	271 188	5.6
Counties Manukau	125 199	10.7	493 404	10.3
Hawke's Bay	64 913	5.6	182 264	3.8
Hutt	61 341	5.2	223 562	4.7
Lakes	102 134	8.7	158 209	3.3
Midcentral	45 542	3.9	215 094	4.5
Nelson Marlborough	26 797	2.3	263 915	5.5
Northland	90 630	7.8	162 625	3.4
Tairāwhiti	59 255	5.1	58 953	1.2
Taranaki	55 826	4.8	227 594	4.7
Waikato	133 814	11.4	371 664	7.7
Wairarapa	23 566	2.0	105 363	2.2
Waitematā	67 470	5.8	538 569	11.2
West Coast	7774	0.7	63 935	1.3
Whanganui	34 205	2.9	100 102	2.1

†There were missing data for gender (Māori, *n* = 17; non-Māori, *n* = 163), age (Māori, *n* = 9; non-Māori, *n* = 42) and NZDep06 Index (Māori, *n* = 3683; non-Māori, *n* = 57 114).

project. Ethical approval was obtained from the NZ Health and Disability Ethics Committee (HDEC 17/NTB/185).

Key variables of interest include patient-centred markers of care, system-centred markers of care and mortality. The key predictor variable is prioritised patient ethnicity (classified as Māori, Pacific, Asian, Other and European) and presented as Māori compared to non-Māori (Pacific, Asian, Other and European combined). Other variables available in the Shorter Stays in ED National Research Project dataset include sex (male, female), age group (years), area deprivation (NZ Deprivation Index [NZDep] 2006 in deciles from 1 = least deprived to 10 = most deprived<sup>11</sup>), mode of presentation

(ambulance, self, other, unknown), referral methods (self, health provider, unknown), triage category (immediate, 10, 30, 60, 120 min) and trauma (yes/no). A full description of the study positioning and methods used for EEDI is available online.<sup>2</sup>

## Results

There were a total of 5 972 102 ED events (1 168 944 Māori and 4 803 158 non-Māori) available for EEDI analysis between 2006 and 2012 (Table 1).

The proportion of ED events per year have increased over time for both Māori (10.8% to 16.3%, 2006–2012) and non-Māori (11.6% to 16.2%, 2006–2012). The gender

profile associated with all ED events was similar for Māori and non-Māori (i.e. 49.7% and 48.5% female, respectively).

A higher proportion of Māori ED events were seen within the younger age groups compared to non-Māori, particularly those aged 0–4 years (i.e. 17.7% *vs* 10.4%, respectively) and 15–24 years (i.e. 20.2% *vs* 14.7%, respectively). In contrast, 15.1% of non-Māori ED events were in those aged ≥75 years *versus* 2.9% of Māori ED events.

The NZDep profile differs between Māori and non-Māori ED events. A total of 66.7% of all Māori ED events were from the three most deprived deciles compared to 39.6% of non-Māori ED events. The highest proportion of Māori ED events (30.3%) were from decile 10 and the highest proportion of non-Māori ED events from decile 8 (14.0%). The lowest proportion of ED events for both Māori and non-Māori were from decile 1 (1.4% and 6.2%, respectively).

The highest proportion of Māori ED events came from the Midland and Northern regions (40.5% and 30.4%, respectively). The highest proportion of non-Māori events came from the Northern and Central regions (36.6% and 28.3%, respectively). See Figure 1 for a map of District Health Boards within NZ.

The highest proportion of Māori ED events came from Waikato (11.5%), Counties Manukau (10.7%) and Bay of Plenty (10.5%) District Health Boards. The highest proportion of non-Māori ED events came from Auckland (11.7%), Waitematā (11.2%) and Canterbury (10.6%) District Health Boards (Table 2).

Table 3 presents ED arrival mode, referral type, triage category and trauma. Non-Māori ED events had a higher proportion of arrival into ED through ambulance, police or helicopter compared to Māori ED events (26.6% *vs* 18.7%, respectively). A total of 63.5% of Māori ED events arrived via self-presentation compared to 57.6% of non-Māori ED events.

Māori ED events had a higher proportion of self-referral compared to non-Māori ED events (77.2% *vs*

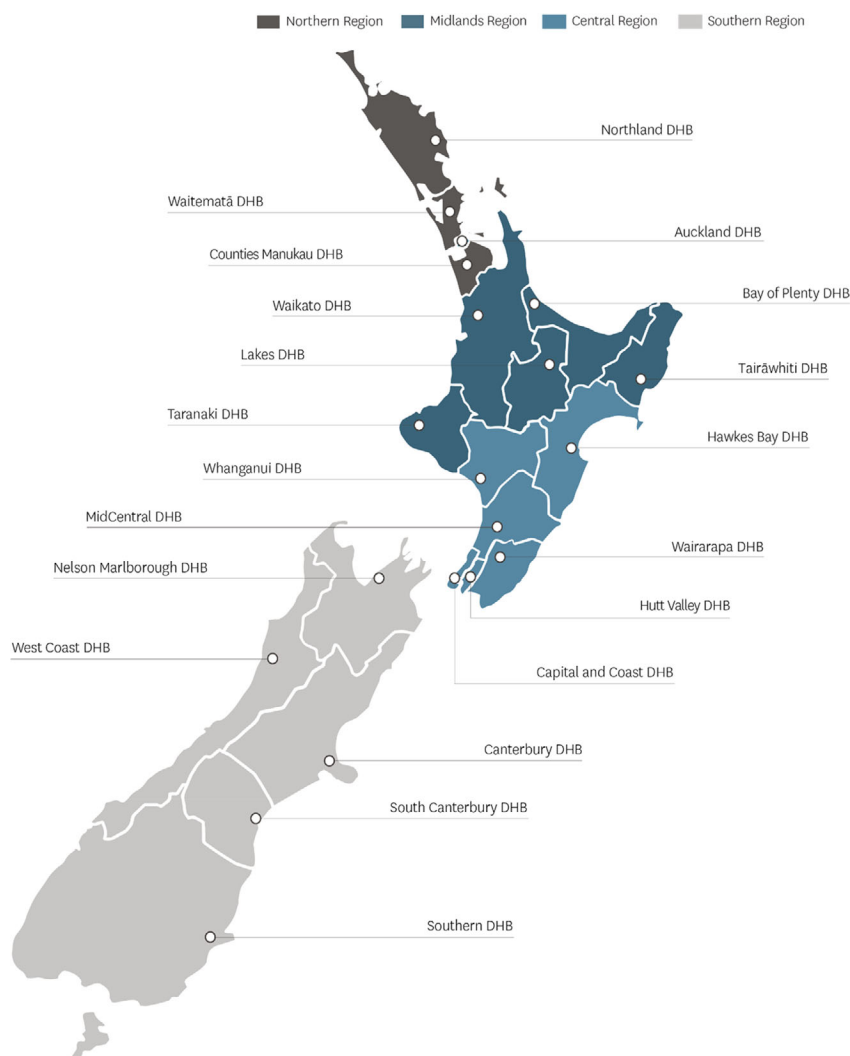


Figure 1. District Health Boards, New Zealand.

70.6%, respectively). Non-Māori ED events had a higher proportion of Other Health Professional referral compared to Māori ED events (13.0% vs 8.1%, respectively).

A higher proportion of Māori ED events were triaged to be seen within a longer time frame compared to non-Māori ED events, that is 120 min (13.6% vs 10.6%, respectively) and 60 min (41.8% vs 39.0%, respectively). A higher proportion of non-Māori ED events were triaged to be seen within 10 min compared to Māori ED events (10.1% vs 8.1%, respectively).

The proportion of Māori ED events categorised as trauma was only slightly higher than non-Māori ED events (28.5% vs 27.3%).

## Discussion

This is the first study to document different patterns of ED usage between Māori and non-Māori within NZ. We found an increasing proportion of ED events per year, with a higher proportion of Māori from younger age groups and areas of high deprivation compared to non-Māori events. Māori also had a higher proportion of self-referral and were triaged to be seen within a longer time frame compared to non-Māori.

As expected, given population differences in age structure,<sup>9,12</sup> there is a greater proportion of Māori ED events from younger age groups compared to non-Māori ED events.

Our use of the NZDep Index has identified three important patterns in ED usage in NZ. First, we have observed a 'social gradient',<sup>13</sup> in ED events, whereby the proportion of ED visits increases as the level of socioeconomic deprivation increases (Fig. 2). A common-sense explanation of this might include the ED being used as a source of primary care for those who experience cost and transport barriers to accessing general practitioner services in the community. However, for this to be true in the EEDI study then we would have expected Māori and non-Māori ED usage to be the same at every level of deprivation, which was not the case. Instead, we have shown different ED usage by ethnicity at almost every level of deprivation, with Māori in decile 10 more than twice as likely to have used the ED between 2006 and 2012 as non-Māori from the same decile. This leads to the second observation, which was that the socioeconomic gradient in ED events appears to be steeper for Māori than it is for non-Māori. This phenomenon is called the 'gradient gap',<sup>14</sup> which describes the way in which ethnicity and socioeconomic position appear to compound risk for Māori. Although the exact causes of these observations cannot be determined from this analysis, taken together they suggest that differences in ED usage between Māori and non-Māori reflect ethnic inequities in healthcare access and quality as well as inequities in illness, accidents and injuries, all of which are considered to be because of colonisation and racism.<sup>15</sup>

We also note that Jones and Thornton<sup>16</sup> conducted a systematic review on whether cost was driving primary care patients to NZ's EDs and found that cost was a factor for only a small minority of ED patients in NZ. Their findings suggest that patients believed that the ED was the right place for them at that time because of appropriateness and availability.<sup>16</sup> It is not clear from our data whether these presentations are 'appropriate' for ED assessment or not as we do not have associated clinical information for the ED events. Furthermore, debate exists



TABLE 2. Māori and non-Māori all ED events, 2006–2012

District Health Boards	ED visits in study period (2006–2012)			
	Māori ( <i>n</i> = 1 168 944)		Non-Māori ( <i>n</i> = 4 803 158)	
	<i>n</i>	%	<i>n</i>	%
Auckland	72 242	6.2	562 852	11.7
Bay of Plenty	122 925	10.5	296 634	6.2
Canterbury	41 826	3.6	507 231	10.6
Capital and Coast	33 485	2.9	271 188	5.6
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Whanganui	34 205	2.9	100 102	2.1

around whether there are appropriate or inappropriate ED presentations with patient-centred views promoting the concept that ED presentations are appropriate for a particular patient, with a particular problem at a particular time.<sup>16</sup>

In our study, Māori ED events were triaged to be seen within a longer time frame than non-Māori ED events. We are unable to clarify whether the triaging applied to Māori and non-Māori ED events is appropriate given the lack of clinically specific data for each ED event. However, international evidence has documented ethnic bias in triage assessments and prioritisation<sup>17,18</sup> and within triage categorisation and basic cardiovascular testing.<sup>19</sup> There is limited research exploring ethnic triage inequities within a NZ context. However, research undertaken

by Prisk *et al.*<sup>20</sup> within one NZ ED found that they could not predict the triage category from patient factors that included ethnicity. Further research is needed to clarify whether bias may be occurring within the triage processes used within NZ EDs.

We acknowledge that this article presents only descriptive data. An additional article is planned that will present age-standardised incidence data and regression modelling for the EEDI dataset.

## Conclusion

Access to timely, high-quality ED care is an important component of healthcare delivery, particularly for those with high healthcare need and for those who may be living in areas of high deprivation. The full EEDI project represents

the largest, most comprehensive investigation of ED outcomes by ethnicity to date in NZ. This article presents the descriptive variables identified within the EEDI dataset and shows that there are different patterns of ED usage when comparing Māori and non-Māori ED events. In particular, we found different ED usage by ethnicity at almost every level of deprivation with Māori living in the most deprived decile being twice as likely to have used an ED as non-Māori from the same decile. The next level of analysis of the EEDI dataset will be to examine whether there are any associations between ethnicity and ED outcomes for Māori and non-Māori patients. Investing to this level of analysis is necessary if we are to identify and monitor ethnic inequities within ED care in NZ.

## Acknowledgements

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## Author contributions

EC – principle investigator for the EEDI project; led the writing of the manuscript. SJP – named investigator for the EEDI project; contributed to the drafting of this manuscript. YJ – named investigator for the EEDI project; contributed to the drafting of this manuscript. PJ – named investigator for the EEDI project; contributed to the drafting of this manuscript. IR – previous Research Assistant for the EEDI project; contributed to the drafting of this manuscript. IT – named investigator for the EEDI project; contributed to the drafting of this manuscript. OH – Research Assistant for the EEDI project; contributed to

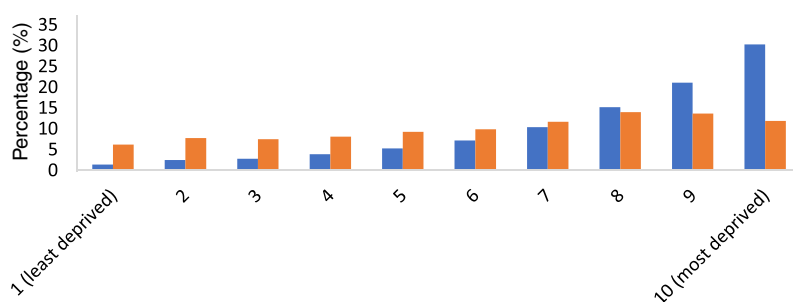
**TABLE 3.** Characteristics of presentation to ED by Māori and non-Māori, 2006–2012†

Descriptive variables	Māori events ( <i>n</i> = 1 168 944)		Non-Māori events ( <i>n</i> = 4 803 158)	
	<i>n</i>	%	<i>n</i>	%
Total	1 168 944	100	4 803 158	100
ED arrival mode				
Self-presentation	684 766	63.5	2 674 220	57.6
Ambulance, police, helicopter	201 837	18.7	1 234 151	26.6
Other	191 711	17.8	732 162	15.8
Referral type				
Self-referral	821 269	77.2	3 106 067	70.6
Accident clinic	12 857	1.2	70 617	1.6
General practitioner	119 054	11.2	569 601	12.9
Other health professional	86 093	8.1	570 787	13.0
Hospital transfer	24 185	2.3	83 062	1.9
Triage category				
Immediate	7556	0.6	31 105	0.6
10-min	94 757	8.1	484 830	10.1
30-min	417 719	35.8	1 900 348	39.6
60-min	488 187	41.8	1 871 216	39.0
120-min	158 689	13.6	506 721	10.6
Trauma				
Yes	333 116	28.5	1 310 571	27.3
No	833 843	71.5	3 484 822	72.7

†There were missing data for ED arrival mode (Māori, *n* = 90 630; non-Māori, *n* = 162 625), referral type (Māori, *n* = 105 486; non-Māori, *n* = 403 024), triage category (Māori, *n* = 2036; non-Māori, *n* = 8938) and trauma (Māori, *n* = 1985; non-Māori, *n* = 7765).

the drafting of this manuscript. PR – named investigator for the EEDI project; contributed to the

drafting of this manuscript. All authors have read and approved the final manuscript.



**Figure 2.** NZDep06 profile for Māori and non-Māori all ED events, 2006–2012. (■) Māori; (■) non-Māori.

### Competing interests

PJ is a section editor for *Emergency Medicine Australasia*.

### Data availability statement

Research data are not shared.

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