



## **Ethnic differences in Type 2 diabetes care and outcomes in Auckland: a multiethnic community in New Zealand**

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### **Abstract**

**Introduction** In New Zealand, Māori and Pacific (mostly of Samoan, Tongan, Niuean, or Cook Islands origin) people with Type 2 diabetes are more likely to suffer poor outcomes than other New Zealanders. Responsibility for addressing this outcome differential is falling on primary care and general practice in particular. This paper compares the general practice care provided to people with Type 2 diabetes in South and West Auckland, according to ethnicity.

**Method** An external audit of general practice diabetes care is carried out in South and West Auckland by the Diabetes Care Support Service. The results of 5917 routine patient audits carried out in 2003 are included in this study. Number of visits, recording of important information, risk factors, and treatments are compared between different ethnic groups.

**Results** Māori and Pacific people with diabetes who attend a regular GP had a higher average number of consultations than Europeans (5.7, 5.4, and 4.8 visits per year respectively). They were as likely as Europeans to have undergone important regular examinations and investigations. Māori were more likely than Europeans to be on some treatments. However, Māori and Pacific people were more likely to have a range of adverse risk factors for diabetes complications than Europeans. These include being a smoker (35, 18, and 13% respectively), having an HbA1c greater than 8% (50, 56, 23%), and having microalbuminuria (55, 50, 27%).

**Discussion** Although there were no large differences in the process measures of general practice diabetes care provided to different ethnic groups in South and West Auckland, Māori and Pacific people were not achieving the same outcomes of care in terms of risk factors for diabetes complications. Many of these risk factors are influenced by other factors in the wider community; however the New Zealand health system needs to consider how it can better address these differences.

New Zealand has a multiethnic community with 76.9% of the population being European, 14.1% being Māori, 6.2% being Pacific (mostly of Samoan, Tongan, Niuean, or Cook Islands origin), and 6.4% being Asian (mostly Chinese or Indian).<sup>1</sup> The prevalence of known diabetes is higher in non-European populations than New Zealanders of European descent.<sup>2-5</sup>

As in most other parts of the World, the prevalence of Type 2 diabetes in New Zealand is increasing alarmingly. Indeed, the total number of people with Type 2 diabetes is expected to increase by 78% between 1996 and 2011.<sup>6</sup> The increase in numbers of Māori and Pacific people with diabetes is predicted to be even greater (130–150%). There is already a rapid increase in the burden of complications of diabetes including premature renal disease<sup>7</sup> and diabetic foot disease.<sup>8</sup>

Several studies have provided strong evidence that assertive management of Type-2 diabetes leads to reduced microvascular and macrovascular complications and better patient outcomes.<sup>9-11</sup> However, achieving these improved outcomes requires clinical teams to provide thorough and systematic care including strict attention to risk factors such as hyperglycaemia, hypertension and dyslipidaemia, and aggressive drug treatment.

Māori and Pacific people with diabetes have much poorer outcomes than Europeans. For example, although Māori men are 3.5 times more likely to develop diabetes than European men, they are 6.5 times more likely to die of diabetes.<sup>6</sup> Moreover, Māori and Pacific people with diabetes have higher rates of diabetes-related renal, foot, and eye disease complications than Europeans.<sup>4,12</sup>

One possible contributing factor to the high morbidity and mortality amongst Māori and Pacific people with diabetes is different quality of care provided by health services. New Zealand studies in the fields of asthma and cardiac interventions have suggested that Māori and Pacific people do not always receive equal healthcare for equal need.<sup>13-15</sup> In a study in South Auckland of people with diabetes, Māori were most likely to have no ongoing care, while Pacific peoples had comparable access to other New Zealanders.<sup>16</sup>

This cross-sectional study examines the care provided to people with Type 2 diabetes by general practitioners in South and West Auckland participating in the annual clinical audit service provided by the Diabetes Care Support Service (DCSS). The aim of the study is to establish whether there are important differences in care provided to different ethnic groups.

## Methods

Since 1994, the DCSS has carried out audits of the general practice care of patients with diabetes in South and West Auckland. This has been described in a previous publication.<sup>17</sup> South and West Auckland have a predominantly urban population, with a high proportion of Māori and Pacific people, and a large number of lower socioeconomic (poorer) areas.

The DCSS audit is provided free to general practices who wish to participate. Confidentiality between DCSS and the general practice is assured and DCSS never contacts patients directly. Posters informing patients of the purposes of the audit are displayed in all practice waiting rooms, and general practitioners and practice nurses discuss the audit with patients. Patients are free to have their notes excluded from the audit procedure. The North Health Ethics Committee approved the DCSS as an ongoing audit in 1993.

The DCSS's audit nurses visit participating general practitioners and examine the patient notes of all patients who have diabetes. To ensure that no patients with diabetes are missed from the audit, the audit nurses use several ways of searching for patients in addition to using the practice's disease register. For example, they search for patients on oral hypoglycaemic medication, insulin, patient's prescribed capillary glucose testing strips, and patients who have had an abnormal HbA1c result.

Once all patients with diabetes are identified, 111 items of clinical data are collected on each patient. This includes demographic data (e.g. date of birth, sex, ethnic group); anthropometric characteristics (e.g. weight, height); diabetes history (e.g. year of diagnosis, type of diabetes); risk factors for complications (e.g. smoking status, glycaemic control, blood pressure, lipids, foot care, microalbuminuria/proteinuria); treatment (e.g. medication and referrals); and diabetic tissue damage (e.g. blindness or retinopathy, leg amputations, end-stage renal failure [ESRF], myocardial infarction). For most items that reflect routine care, nurses record the most recent measurements that have been made during a 1-year audit period.

All general practitioners in the two districts were invited to participate in the audit. The data in this cross-sectional study covers all audits completed with time periods that finished between 1 January 2003 and 31 December 2003. During this time period, the practice populations of 205 general

practitioners were audited. Although the audit covers both Type 1 and Type 2 diabetes, the results reported here includes only patients identified as having Type 2 diabetes.

All statistical analysis was done using EpiInfo™ Version 3.3 (Centre for Disease Control, 5 August 2004). All tests are two-tailed with  $p < 0.05$  taken as statistically significant. Differences in proportions between populations were tested using Chi-squared tests and ANOVA tests were used for testing for inequalities in population means.

Where significant p-values are recorded, they indicate that there is significant variation between ethnic groups (rather than one ethnic group being compared with another). We used linear and logistic regression to calculate odds ratios with 95% confidence intervals for outcomes in circumstances when we wished to control for age and gender.

A high urinary albumin:creatinine ratio was defined as greater than or equal to 2.5 mg/mmol for men and 3.5 mg/mmol for women.<sup>18</sup> People who were recorded as having abnormal pulses, sensory change, foot deformities, or a history of foot ulcers are classified as having at-risk feet.<sup>18</sup>

## Results

**Completeness of audit**—During the period covered, audit nurses identified 8754 patients with Type 2 diabetes. However, of these, audits could be done on only 5917 patients (67.6% of the total). In 92% of identified patients who were not audited, the reason given for not auditing was patients having moved into or out of the practice during the audit period or being registered with the practice but not seen (Table 1).

**Table 1. Reasons why patients were not audited**

Reason	N	Proportion of all people with Type 2 diabetes identified
Administrative reasons	28	0.30%
Died during audit period	191	2.20%
Registered with practice but not seen in audit period	408	4.70%
Moved out of practice	473	5.40%
New to practice	1724	19.70%
Totally under specialist care	13	0.10%
<b>Total</b>	<b>2837</b>	<b>32.40%</b>

The proportion of identified people who were audited varied by ethnicity (Europeans 70.1%, Other Asians 63.8%, Māori 64.6%, Pacific people 65.6%, Indians 66.9%, Others 70.0%;  $p < 0.001$ ). After adjusting for differences in age and gender between ethnic groups, Māori, Pacific, and Other Asians with Type 2 diabetes were still less likely than Europeans to have an audit completed (all  $p < 0.001$ ).

Table 2 shows that 82.6% of patients identified were Europeans, Māori or Pacific people. European patients were, on average, 10 years older than Māori and Pacific patients and were slightly more likely to be male. Patients had had diabetes for an average of 8 years.

**Number of diabetes consultations**—Audit nurses counted the number of consultations each person had related to their diabetes. This included any GP consultation with a component of diabetes care, and any practice nurse consultation where diabetes education was given. Patients had on average consulted their general practice for diabetes 5 times during the audit year. Māori and Pacific people had the highest mean number of diabetes consultations and Other Asian and Indian people the fewest (Table 3).

**Table 2. Demographic details of the audited patients**

Ethnicity	N	% of total	Mean age at time of audit (SD)	Duration of diabetes in years (SD)	% male
European	2360	39.9%	65.8 (12.3)	8.9 (7.5)	52.9
Māori	898	15.2%	54.1 (12.1)	9.0 (7.2)	47.6
Pacific	1630	27.5%	55.8 (11.8)	7.2 (6.1)	42.6
Other Asian	257	4.3%	58.4 (12.9)	7.2 (5.8)	55.6
Indian	354	6.0%	55.5 (11.9)	8.6 (6.3)	52.0
Other	418	7.1%	62.0 (13.6)	8.1 (6.3)	57.4
<b>Total</b>	<b>5917</b>	<b>100.0%</b>	<b>60.1 (13.3)</b>	<b>8.5 (6.9)</b>	<b>49.5</b>
P value			<0.001	<0.001	<0.001

**Table 3. Mean number of consultations for diabetes in the audit year**

Ethnicity	Mean number of diabetes consultations (SD)
European	4.8 (2.9)
Māori	5.7 (4.1)
Pacific	5.4 (3.5)
Other Asian	4.1 (2.4)
Indian	4.2 (2.5)
Other	4.3 (2.2)
<b>Total</b>	<b>5.0 (3.2)</b>
P value	<0.001

Linear regression analysis was carried out to adjust for differences in age and gender composition between populations. Māori and Pacific people had a higher number of diabetes consultations than Europeans (Māori 1.2 more [95% CI 1.0–1.5], Pacific 0.8 more [95% CI 0.6–1.1] more). Other Asian and Indian people did not have significantly fewer consultations than Europeans in this analysis.

#### **Recording of examinations and investigations and adverse risk factors—**

Recording of significant examinations and investigations in patient notes was incomplete (Table 4). Whereas over 80% of all ethnic groups had a HbA1c, systolic blood pressure and total/HDL cholesterol ratio recorded in their notes, the recording of smoking status, body mass indices (BMIs), foot examinations, and urinary albumin:creatinine ratios was less complete and more variable. There were statistically significant differences in the recording of these latter items between ethnic groups.

Risk factors for macrovascular and microvascular complications are also shown in Table 4. For people who had smoking status recorded, 18% of all people, and 35% of Māori, were smokers. Over 50% of all people audited were obese, and very significant proportions of people had unsatisfactory blood pressure, lipid, and glycaemic control, and high urinary albumin:creatinine ratios.

A higher proportion of Māori and Pacific people had adverse risk factors in many categories. Exceptions were elevated systolic blood pressure and at-risk feet. Adjusting for age and gender using logistic regression showed that Pacific people, but not Māori or Indian, were less likely than Europeans to have a systolic blood pressure above 140 mmHg. Odds ratios for elevated systolic blood pressure were 1.05 (0.87–1.271) for Māori, 0.80 (0.67–0.94) for Pacific, and 0.85 (0.64–1.12) for Indian.

**Table 4. Recording of examinations/investigations and adverse risk factors (percentages with 95% confidence intervals)**

Recorded in notes in audit year	European	Māori	Pacific	Other Asian	Indian	Other	Total	P value
Smoking Status	81.0	84.9	84.2	73.2	77.1	65.1	<b>80.8</b>	0.000
	79.3–82.5	82.3–87.1	82.4–86	67.3–78.5	72.4–81.4	60.3–69.6	<b>79.7–81.8</b>	
BMI	73.7	78.3	82.5	68.1	76.0	62.2	<b>75.9</b>	0.000
	71.9–75.5	75.4–80.9	80.5–84.3	62–73.7	71.2–80.3	57.3–66.8	<b>74.8–77</b>	
HbA1c	88.7	85.6	87.1	87.5	88.7	87.1	<b>87.6</b>	0.243
	87.3–89.9	83.1–87.8	85.3–88.6	82.9–91.3	84.9–91.8	83.4–90.1	<b>86.7–88.4</b>	
Systolic BP	95.0	92.1	93.9	94.6	92.9	93.3	<b>94.0</b>	0.041
	94.1–95.9	90.1–93.7	92.6–95	91–97	89.6–95.3	90.4–95.4	<b>93.4–94.6</b>	
TC:HDL ratio	83.2	82.0	83.4	86.4	83.6	81.6	<b>83.1</b>	0.593
	81.6–84.7	79.3–84.4	81.5–85.2	81.6–90.3	79.3–87.3	77.5–85.1	<b>82.1–84.1</b>	
Foot Examination	59.3	60.5	60.4	49.8	50.8	54.3	<b>58.5</b>	0.000
	57.3–61.3	57.2–63.7	58–62.8	43.5–56.1	45.5–56.2	49.4–59.1	<b>57.2–59.8</b>	
Urinary albumin:creatinine ration	65.6	68.2	74.3	66.5	66.4	59.6	<b>68.0</b>	0.000
	63.6–67.5	65–71.2	72.1–76.4	60.4–72.3	61.2–71.3	54.7–64.3	<b>66.8–69.2</b>	
<b>Adverse risk factors (of those with records)</b>								
Current smokers	13.1	34.9	17.8	17.6	7.7	17.3	<b>18.0</b>	0.000
	11.6–14.7	31.5–38.4	15.9–20	12.4–23.8	4.8–11.5	13–22.3	<b>17–19.2</b>	
BMI>30	46.6	76.0	73.7	12.6	24.9	48.1	<b>56.7</b>	0.000
	44.2–48.9	72.6–79	71.2–76	8–18.4	19.9–30.5	41.9–54.3	<b>55.3–58.2</b>	
HbA1c>8.0	22.7	49.5	55.7	30.2	44.9	25.0	<b>37.6</b>	0.000
	21–24.6	46–53.1	53–58.3	24.3–36.7	39.3–50.6	20.7–29.8	<b>36.2–38.9</b>	
Systolic BP>140 mmHg	32.6	27.6	23.7	28.4	24.0	36.4	<b>29.0</b>	0.000
	30.7–34.6	24.6–30.8	21.6–26	22.8–34.5	19.6–29.1	31.7–41.4	<b>27.8–30.2</b>	
TC:HDL ratio>4.5	27.3	46.3	35.4	33.8	34.8	31.4	<b>33.4</b>	0.000
	25.4–29.3	42.7–50	32.9–38.1	27.6–40.4	29.4–40.5	26.5–36.6	<b>32.1–34.8</b>	
At-risk feet	36.5	33.0	23.2	31.6	24.2	36.8	<b>31.3</b>	0.000
	34.2–38.9	29.4–36.8	20.8–25.7	24.5–39.5	18.7–30.4	30.9–43	<b>29.9–32.7</b>	
High urinary albumin:creatinine ratio	<b>27.4</b>	<b>55.2</b>	<b>50.4</b>	<b>34.4</b>	<b>36.6</b>	<b>24.8</b>	<b>39.3</b>	<b>0.000</b>
	<b>25.4–29.5</b>	<b>51.5–58.8</b>	<b>47.8–53</b>	<b>28.1–41.2</b>	<b>31.1–42.5</b>	<b>20–30.2</b>	<b>37.9–40.7</b>	

**Note:** Significant p-values indicate that there are significant differences between ethnic groups

Pacific people, but not Maori or Indian were less likely to have at-risk feet than Europeans (odds ratios 0.69 [0.57–0.84], 1.21 [0.96–1.51], and 0.76 [0.53–1.10] respectively).

**Pharmacologic management** - 41% of patients were on aspirin and 43% were on statins (Table 5). One-quarter of patients were on diet therapy alone whilst 17% were on insulin, either as a monotherapy or in combination with an oral hypoglycaemic.

**Table 5. The percentages of patients on various therapies (95% confidence intervals)**

Ethnicity	Aspirin	Two or more antihypertensives	Statin	Diet only	Insulin
European	43.9 (41.9–45.9)	42.2 (40.2–44.2)	44.8 (42.8–46.8)	28.8 (27.0–30.7)	16.8 (15.3–18.4)
Māori	42.1 (38.8–45.4)	40.1 (36.9–43.4)	44.0 (40.7–47.3)	23.4 (20.7–26.3)	19.2 (16.7–21.9)
Pacific	37.3 (35–39.7)	26.7 (24.6–29)	39.3 (36.9–41.7)	17.9 (16.0–19.8)	17.9 (16.1–19.9)
Other Asian	31.1 (25.5–37.2)	23.3 (18.3–29)	38.1 (32.2–44.4)	27.2 (21.9–33.1)	8.2 (5.1–12.2)
Indian	40.7 (35.6–46.0)	30.2 (25.5–35.3)	43.8 (38.6–49.1)	19.8 (15.8–24.4)	19.8 (15.8–24.4)
Other	39.5 (34.8–44.4)	36.4 (31.8–41.2)	44.3 (39.5–49.2)	28.5 (24.2–33.1)	16.0 (12.7–20.0)
<b>Total</b>	<b>40.7 (39.5–42.0)</b>	<b>35.7 (34.5–36.9)</b>	<b>42.8 (41.5–44.0)</b>	<b>24.3 (23.2–25.4)</b>	<b>17.2 (16.3–18.2)</b>
P value	0.000	0.000	0.009	0.000	0.001

**Note:** Significant p values indicate that there are significant differences between ethnic groups.

Table 6 shows the odds ratios for patients being on different therapies according to their ethnic group. Logistic regression was used to adjust for age and gender differences between groups. Māori are more likely to be on Aspirin and 2 or more antihypertensives than Europeans. Pacific people and Other Asians are less likely to be on 2 or more antihypertensives and Pacific people were less likely to be on statins than Europeans. Europeans were more likely to be on diet only therapy for glycaemic control than Māori, Pacific people, or Indians.

**Table 6. Odds ratios for patient being on different therapies, adjusted for age and gender (95% confidence intervals)**

Ethnicity	Aspirin	Two or more antihypertensives	Statin	Diet only	Insulin
European	1.00	1.00	1.00	1.00	1.00
Māori	1.49 (1.25–1.76)	1.54 (1.30–1.83)	1.05 (0.89–1.24)	0.79 (0.66–0.95)	1.16 (0.94–1.43)
Pacific	1.14 (0.99–1.31)	0.76 (0.65–0.87)	0.86 (0.75–0.99)	0.56 (0.47–0.65)	1.07 (0.89–1.27)
Other Asian	0.74 (0.56–0.99)	0.55 (0.40–0.74)	0.79 (0.61–1.03)	0.96 (0.72–1.28)	0.44 (0.28–0.70)
Indian	1.31 (1.03–1.66)	0.91 (0.71–1.17)	1.03 (0.82–1.29)	0.64 (0.48–0.84)	1.21 (0.91–1.61)
Other	0.94 (0.76–1.18)	0.90 (0.72–1.13)	1.00 (0.81–1.23)	1.01 (0.80–1.27)	0.95 (0.71–1.26)

## Discussion

This study provides a description of the care provided and outcomes achieved for 5917 patients of different ethnicities attending South and West Auckland general practices. The population studied is similar in age and duration of diabetes to a large

community survey of diabetes that was undertaken in South Auckland, thus suggesting it is representative of the general population.<sup>12</sup> Important information is provided about access to care, quality of care, and outcomes of care for these ethnic groups.

Māori and Pacific people (that were audited) visit their general practice at a rate that is greater than other ethnic groups. This finding is consistent with information from the general population which showed that Māori and Pacific people had a higher mean number of visits to GPs than Europeans,<sup>19</sup> and it is reassuring given the known higher health needs of people with diabetes from these two ethnic groups.<sup>4,20</sup>

It is also pleasing that general practice teams seem to perform important examinations and investigations on Māori and Pacific patients as frequently as they do on Europeans.

In contrast, Other Asian people (i.e. non-Indian Asians) do seem less likely to have some results recorded such as smoking status, BMI, and foot examinations. Whilst it is not possible from our results to say why this is, it may be due to cultural and/or language barriers or because Other Asians are perceived by GPs as a relatively low-risk group. We feel that recording of this information, whilst it could be improved, is well done. They compare with similar New Zealand audits previously reported<sup>21,22</sup> and with a recent British study.<sup>23</sup> For example, HbA1c was recorded in 88% of patients in this audit, in 90% of patients in Otago,<sup>21</sup> 84% in North Canterbury,<sup>22</sup> and 92% in United Kingdom.<sup>23</sup> Similarly, foot examinations were recorded in 60% of patients in this audit, in 36% of patients in Otago, and 76% in North Canterbury, whilst foot pulses were checked in 53% of patients in United Kingdom.

There are large ethnic differences in risk factors for microvascular and macrovascular disease, with Māori and Pacific people being more likely to be at high risk in every category except for blood pressure measurements. Māori had very high rates of smoking as is seen in the general population.<sup>19</sup> Māori and Pacific patients are much more likely to be obese than Europeans whilst Indian and Other Asian people are less likely to be so.

Again, these differences mirror the general population differences, although the rates of obesity for all ethnic groups in this study of people with diabetes are markedly higher than in equivalent groups in a general population survey.<sup>19</sup> Māori and Pacific (and to a lesser extent Indian) people are also more likely to have high HbA1cs, cholesterols, and microalbuminuria. These large differences in risk factors are of great concern and undoubtedly contribute to poor outcomes. How much they can be attributed to medical care or to social, economic, and cultural differences between groups is uncertain however.

Just over 40% of patients were on statins and aspirin. Given that New Zealand guidelines recommend that most people with diabetes who are at high risk of cardiovascular disease (CVD) should be on these medications,<sup>18</sup> there is room to increase the use of these medications.

More Māori were being treated with aspirin and two or more antihypertensives than European people (after controlling for age and gender). This is likely to be appropriate, since Māori are known to be at higher risk of serious complications of diabetes and high proportions of Māori had poor risk factors.

Pacific people are less likely to be on two or more antihypertensives than Europeans but they are also less likely to have raised blood pressure. However, the fact that they are also less likely to be on statins (despite being more likely to have elevated TC:HDL ratios) is concerning.

The major limitation of this paper is that it only provides information on a proportion of patients with Type 2 diabetes; those that have ongoing regular care in a general practice. It is known that around 6% of people with diabetes in South Auckland do not have ongoing care<sup>16</sup> and that Māori are more likely to be in this group.

It is also noteworthy that people with diabetes from some ethnic groups were more likely to not be included in this study because they were not audited. The main reasons for not being audited were moving into or out of the practice or being lost to follow-up. It seems likely that these groups are less likely to have good continuity of care and may therefore be at greater risk of adverse outcomes.

Another limitation of this study is that statistical analysis was done assuming random sampling of individuals whereas in fact the sampling of individuals has been achieved through obtaining clusters of patients at the level of the general practice. This means that the p values and confidence intervals given are over precise although the fact that over 200 general practitioners patient were audited reduces this limitation.

A more significant limitation is that these GPs were not a random sample of the GPs in South and West Auckland but were instead those that self-selected themselves by agreeing to be audited. We have no way of knowing whether the care they provide is different from those GPs who did not participate, but it may be that GPs who are interested in participating in a quality process may provide better care than those that do not. Since many GPs have participated for some years we believe that the audit would have helped them achieve better standards of care than non-participating GPs. A further limit on generalising from this study is that care provided in West and South Auckland may not reflect care provided in other parts of New Zealand.

A difficulty in assessing care is that intensity of care and prescribing should be based upon clinical need. For example, it is known that Māori and Pacific people with diabetes have worse outcomes than European people with diabetes. It would therefore be appropriate if Māori and Pacific with diabetes were provided with a higher intensity of care to Europeans with diabetes. These differences in clinical need between ethnic groups are very difficult to take into account fully and it is therefore difficult to say whether a particular intensity of care for an ethnic group is appropriate or not.

In summary, most people who access their general practice team regularly for management of their diabetes seem to be receiving methodical review. There is some evidence that Māori patients are receiving more assertive care, which is appropriate to their risk. However, Māori and Pacific people with diabetes are not achieving the outcomes in risk factor management that other groups (particularly Europeans) are. There will be many reasons for this, some of which are outside the control of general practice teams. However, these risk factors will be contributing significantly to the poor long-term outcomes Māori and Pacific people with diabetes face.

Medical management with well-proven therapies is one important way that these poor outcomes need to be addressed. The challenge for primary care and the New Zealand

health system is to ensure that all people with diabetes, particularly those groups who currently have poor outcomes, are appropriately supported to more aggressively manage their condition. Whilst national programmes such as *Care Plus* and *Get Checked* and local initiatives such as Counties-Manukau's *Chronic Care Management Programme* will no doubt assist, there is clearly an urgent need for the health sector to address these issues.

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