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The August 2020 COVID-19 outbreak in Aotearoa, New Zealand: Delayed contact tracing for Pacific people contributes to widening health disparities ☆

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ABSTRACT

Background: After COVID-19 arrived in New Zealand, a national system was developed to improve the efficiency of contact tracing. The first outbreak was followed by a period of 'COVID-19 elimination', until a community outbreak occurred in August 2020. We describe the characteristics of cases and their contacts during this outbreak, focused on the results of contact tracing.

Methods: COVID-19 case data from the national surveillance database were linked to contacts from the national contact tracing database. Demographic and clinical characteristics of cases, number of contacts, and timeliness of contact tracing were analysed by ethnicity.

Findings: Most of the 179 cases were Pacific people (59%) or Māori (25%), living in areas of high socioeconomic deprivation, who had higher rates of comorbidity and accounted for almost all (21/22) hospitalisations, all 8 ICU admissions and all 3 deaths. Only 6% belonged to the European majority ethnic group. Of 2,528 registered contacts, 46% were Pacific, 14% Māori and 19% European. Only contacts that were reached were registered. Overall, 41% of contacts were reached within 4 days of onset of disease of the case, which was significantly lower for Pacific (31%) than for other ethnic groups.

Interpretation: Our findings confirm the greater health burden that ethnic minorities face from COVID-19. The significant delay in the timeliness of care for Pacific people shows that the public health response was inequitable for those at highest risk. Tailored public health responses and better registration of marginalised groups are necessary to provide better access to services and to improve insights for optimal future outbreak management.

Introduction

The first cases of COVID-19 in Aotearoa, New Zealand, were identified in February 2020, linked to a traveller from Italy [1]. The initial public health response included the prohibition of mass gatherings, the restriction of incoming travellers from certain affected countries, and the implementation of home quarantine for all other incoming travellers. On March 19, 2020, the country's borders closed for everyone except citizens and permanent residents. A four-tier alert level system was introduced on 21 March to manage the outbreak within New Zealand, with levels 3 and 4 being forms of lockdown [2]. A full lockdown commenced on 25 March, New Zealand's elimination strategy was published on 7

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April, and from 10 April onwards, all travellers arriving in New Zealand were required to spend 14 days in managed isolation or quarantine facilities (MIQ) [3,4].

Initially, the elimination strategy was successful: the last locally acquired COVID-19 case was notified on 10 May 2020. A total of 1,503 COVID-19 cases had been notified, most of them (69%) were import-related, tending to be younger adults, of New Zealand European (European) ethnicity and living in areas of higher socio-economic status [5].

New Zealand has a diverse ethnic population comprised of a majority European (70%), indigenous Māori (17%), Asian (15%) and Pacific (8%) groups [6]. In the first outbreak, Pacific people and Māori had a lower overall risk of contracting the virus than Europeans but were twice as likely to experience a severe outcome (hospitalisation), even after controlling for age, underlying health conditions and socioeconomic deprivation [7].

During the first outbreak, the New Zealand government recognised that prompt testing and isolation of cases, and early contact tracing followed by quarantine, was key to containing the further spread of COVID-19 [8]. The effectiveness of contact tracing decreases with increasing time from symptom onset of the index case to contacts' quarantine [9].

A national system for coordination of case management and contact tracing did not exist prior to COVID-19. During the first part of 2020, The New Zealand Ministry of Health (MoH) established the COVID-19 National Close Contact Service (NCCS) [10] and developed a national electronic database NCTS (National Contact Tracing Solution) for national coordination of COVID-19 contact tracing [11]. A rapid Audit of Contact Tracing for COVID-19 in April 2020 [12] recommended developing a system to monitor the case isolation and contact tracing and quarantine process from end-to-end. One of the targets was to quarantine 80% of contacts within 96 hours of the onset of disease in a case [12].

A Contact Tracing Assurance Committee (CTAC) was appointed to assure the Government that the audit recommendations had been implemented. The committee observed that the challenges and consequences of an outbreak in Māori and/or Pacific communities should not be underestimated, and that the contact tracing system should more strongly reflect the needs of Māori and Pacific people and other vulnerable groups. The committee recommended using staff and systems within already established Māori and Pacific providers, providing alternative isolation arrangements for people unable to isolate effectively from other household members, and improved engagement through more language options [13].

In August 2020, New Zealand experienced their first community outbreak of COVID-19 since the borders were closed. The first 4 cases were notified on 11 August 2020, a day later the Auckland region moved to Alert level 3, and the rest of New Zealand to Alert level 2 [2]. The last of a total of 179 cases in outbreak had an onset of disease on 11 September. Ten days later, Auckland moved to Alert level 2 and the rest of the country to Alert level 1 [3]. Although the root source of the outbreak was never identified, whole genome sequencing indicated that the outbreak resulted from a single virus introduction [14].

In this study, we analyse and describe the characteristics of the cases in this community outbreak, with a focus on the results of contact tracing and ethnic differences in the public health response.

Methods

Case identification and management

COVID-19 cases were identified and notified through PCR testing only. Upon notification, cases were placed into managed isolation facilities for a minimum of 14 days from the time of symptom onset. Information regarding 'locations of interest' and close contacts was collected, contacts were traced and asked to quarantine as soon as possible until 14 days after the last exposure.

Data sources

All COVID-19 cases are mandatorily notified through regional Public Health Units (PHUs) to the national surveillance system, EpiSurv. Standardised surveillance data [15] is collected by PHU staff. Relevant case investigation data for contact tracing was reported through the National Contract Tracing Solution (NCTS) that allowed PHUs to delegate contact tracing to other PHUs and the NCCS.

We collated data from all locally acquired COVID-19 cases reported in EpiSurv between 7 August 2020 and 31 December 2020. Case data included demographics, New Zealand Index of Deprivation (NZDep) – an area-based measure of socioeconomic deprivation [16], clinical features, risk factors and isolation details. Cases were then linked to their contacts in NCTS, which contained data on all known contacts of cases, including demographics, exposure event, date of first contact with contact tracer and quarantine details.

For cases, self-identified ethnicity data was collected in EpiSurv on the standard case report form, following the MoH Ethnicity Data protocols [17]. For people identifying with multiple ethnic groups, their responses were prioritised to a single response in the following order: Māori, Pacific, European and 'Other'. Ethnicity of the contacts was obtained by linkage to the National Health Index (NHI) dataset and the same prioritisation method was used.

Ethics approval was granted by the University of Auckland Health Research Ethics Committee (AHREC): reference AH22351.

Statistical Analyses

Confirmed cases and their linked contacts were analysed. We examined the demographic characteristics, presenting symptoms, comorbidities, and outcomes (including hospitalisation and death) of cases, as well as the results of contact tracing: number and ethnicity of contacts of cases, demographic characteristics of contacts and likely exposure event for the four main ethnic groups.

The most important indicator, the time from symptom onset in the case until quarantine of the contact, was set at ≥80% within 96 hours. We compared this indicator by ethnic group. Cases who remained asymptomatic were excluded from this analysis. Because the date of quarantine was missing, we used date of first engagement with the contact as a proxy, assuming that contacts were not quarantined before they were traced. To further evaluate the public health response, we also analysed the proportion of cases who were notified within 2 days of onset of disease, and the proportion of contacts who were engaged within 2 days of notification of the case, both by ethnic group. To test for differences in these proportions, as well as to estimate outcome of disease in cases, we used logistic regression models. Additionally, to test for differences in median time from the onset date to contact date, we employed a non-parametric test (i.e., Kruskal Wallis test) due to non-normal data. Data were analysed in R and SPSS (version 28).

Results

Cases

Between 11 August and 24 September 2020, 179 locally acquired cases of COVID-19 were notified, all in the Auckland metropolitan region. Thirty-six cases were asymptomatic at the time of notification, and 18 of these cases developed symptoms soon thereafter, the other 18 cases remained asymptomatic throughout. The first case had an onset date on 31 July, and the last case on 11 September (Figure 1).

Most of the cases were Pacific peoples (59%), followed by Māori (25%), 'Other' (11%) and European (6%) (Table 1). Māori and Pacific cases were younger than European cases. Pacific cases were disproportionately from areas of highest deprivation (48% from 5th quintile, median 4.0). Of the Māori cases, 11% were from the 5th quintile (median

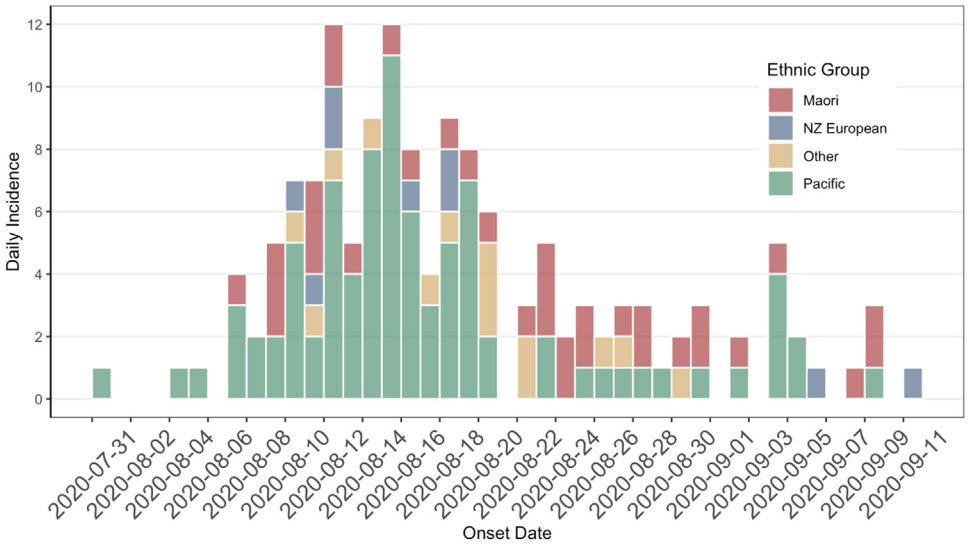

Figure 1. Epidemiological curve by onset date of disease, with all 161 symptomatic confirmed community acquired COVID-19 cases that belong to the 'August 2020' outbreak, by ethnic group.

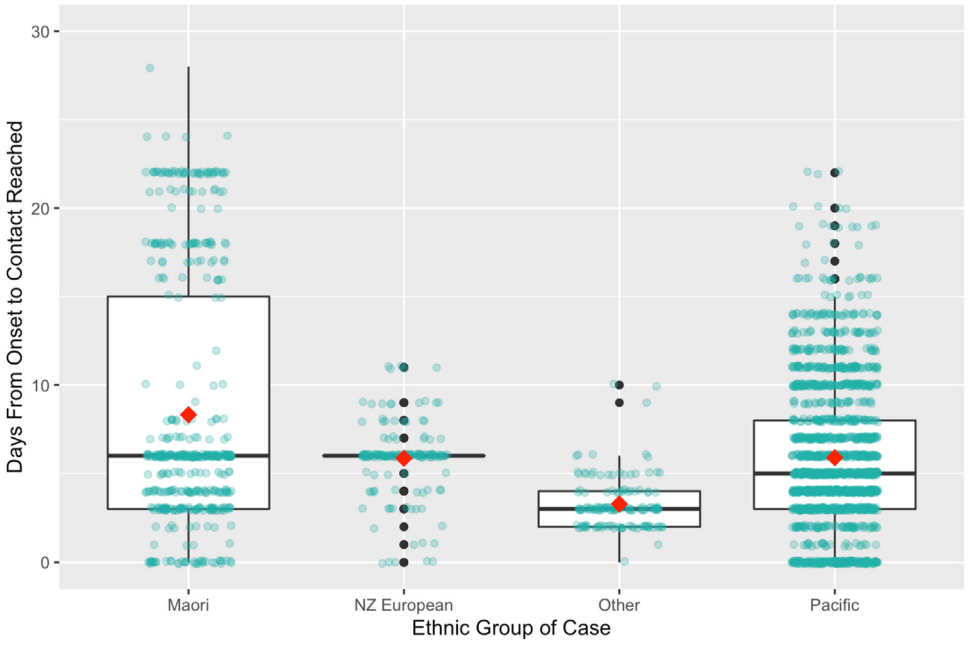

Figure 2. Boxplot with the interval between date of onset of disease of the case and the date the contact was first reached by of all 2,593 contacts that are identified as contacts from the 179 confirmed community cases that belong to the 'August 2020' COVID-19 outbreak in Aotearoa New Zealand, and that were registered in NCTS, by ethnicity. *(Red diamonds are mean number of days.)*

4.0), European 27% (median 2.0) and 'Other' 37% (median 4.0). Almost a third of the cases had at least one comorbidity or other underlying condition, the most common comorbidities being cardiovascular disease (12%) and diabetes (10%). The proportion of cases with comorbidities was highest among Pacific and Māori ethnic groups, despite their younger age profiles.

Hospitalisation was required for 22 (12%) cases, of whom 8 (36%) were admitted to the Intensive Care Unit (ICU) and 3 (14%) died (Table 2). Pacific and Māori cases accounted for almost all (21/22) hospitalisations, all 8 ICU admissions and all 3 deaths. Multivariable analysis indicated that the risk of hospitalisation was significantly increased in older people (p=0.029), those with underlying disease (p<0.001), and in Māori compared to Pacific people (p=0.041).

Contacts

The median number of contacts of all cases, registered in NCTS, was 6 (n=179, range 1-242); Pacific cases had higher median number of contacts (8) than NZ European (4.5) and Māori (4) (Table 1) although this did not reach statistical significance.

Of the 179 cases, 51 had no contacts registered. There were no registered contacts for 26/105 (25%) of Pacific cases, 20/44 (14%) of Māori cases, 2/11 (18%) of European cases and 3/19 (16%) of 'Other' cases. The other 128 cases had at least 1 contact registered in NCTS, with a total of 2,593 contacts. (Table 3)

For the registered contacts, there were significant differences in age group by ethnicity. Of all contacts, the largest proportion (28%) was exposed by 'Other', not specified exposure events, followed by 'Work' (20%), 'School or University' (20%) and 'Household' (17%). More than half (51%) of the Pacific contacts were exposed at 'School/University or Work', whereas most Māori contacts (69%) were exposed by 'Household' or 'Other' contact. A surprisingly large proportion of Pacific (12%) and Māori (19%) contacts were exposed 'in a healthcare facility', which was not further specified.

Similar to the results for cases, the largest proportion of contacts was Pacific (46%), followed by European (19%), and Māori (14%), and other ethnicities accounting for 21%. (Table 4) Cases and contacts tended to have the same ethnicity, with Māori cases having the most diverse ethnic contacts (38% of contacts of Māori cases were Māori) followed by Pacific cases (58% of contacts of Pacific cases were Pacific).

Table 1
Characteristics of all 179 confirmed community acquired COVID-19 cases that belong to the 'August 2020' outbreak, the first outbreak of COVID-19 in New Zealand after the international borders had closed, by ethnic group.

	Pacific Peoples* n=105 (59%)	Māori* n=44 (25%)	NZ European n=11 (6%)	Other n=19 (11%)	Total n=179 (100%)
DHB**					
Auckland	32 (31%)	4 (9%)	2 (18%)	5 (26%)	43 (24%)
Counties	50 (48%)	15 (35%)	3 (27%)	10 (53%)	78 (44%)
Waitemata	23 (22%)	25 (57%)	6 (55%)	4 (21%)	58 (32%)
Age Group					
0-24	40 (38%)	26 (59%)	0	10 (53%)	76 (43%)
25-39	28 (27%)	6 (14%)	4 (36%)	3 (16%)	41 (23%)
40-59	25 (24%)	12 (27%)	5 (46%)	6 (32%)	48 (27%)
60-89	12 (11%)	0	2 (18%)	0	14 (8%)
Sex					
Female	55 (52%)	22 (50%)	7 (64%)	10 (53%)	94 (53%)
Male	50 (48%)	22 (50%)	4 (36%)	9 (47%)	85 (48%)
NZDep quintile***					
1 (least deprived)	5 (5%)	0	4 (36%)	2 (11%)	11 (6%)
2	4 (4%)	3 (7%)	1 (9%)	0	8 (5%)
3	6 (6%)	2 (5%)	0	3 (16%)	11 (6%)
4	35 (33%)	31 (71%)	2 (18%)	7 (37%)	75 (42%)
5 (most deprived)	50 (48%)	5 (11%)	3 (27%)	7 (37%)	65 (36%)
missing	5 (5%)	4 (7%)	1 (9%)	0	9 (5%)
Median number of contacts[$]**	8	4	4.5	6	6
(95% CI) or IQR	(IQR 3-25.8)	(IQR 2-8)	(IQR 3.3-9.5)	(IQR 5-8)	(IQR 3-15.3)
Clinical Characteristics / Underlying Disease					
Any underlying disease	37 (35%)	14 (32%)	2 (18%)	2 (11%)	55 (31%)
Cardiovascular disease	16 (15%)	3 (7%)	1 (9%)	1 (5%)	21 (12%)
Diabetes	12 (11%)	5 (11%)	0	0	17 (9%)
Chronic Lung Disease	2 (2%)	2 (5%)	1 (9%)	1 (5%)	6 (3%)
Neurologic Disease	0	1 (2%)	0	0	1 (1%)
Malignancy	1 (1%)	0	0	0	1 (1%)
Renal Failure	1 (1%)	1 (2%)	0	0	2 (1%)
Liver Disease	0	0	0	0	0
Immune Deficiency	0	0	0	0	0
Pregnancy	2 (2%)	1 (2%)	0	0	3 (2%)
Postpartum	0	0	0	0	0
Other Underlying Disease	21 (20%)	12 (27%)	2 (18%)	1 (5%)	36 (20%)

* Cases who identify with both Māori and Pacific ethnicity are prioritised by the New Zealand Ministry of Health as Māori.
** DHB = District Health Board. These three DHBs comprise the greater Auckland area.
*** NZDep = New Zealand Index of Deprivation.
$ There were no significant differences in median number of contacts between ethnic groups.

Table 2
Outcome of disease in all 179 confirmed community acquired COVID-19 cases that belong to the 'August 2020' outbreak.

	Total n=179	Hospitalised n=22 ((12%)	ICU n=8	Died (n=3)	OR hospitalisation	aOR hospitalisation	p-value aOR
Age Group							
0-24	76 (42%)	1 (1%)	1 (1%)	0	**ref**	**ref**	**0.029**
25-39	41 (23%)	5 (12.2%)	1 (2%)	0	**10.42 (1.2-92.5)**	**13.3 (1.2-150.3)**	
40-59	48 (27%)	12 (25%)	5 (10%)	2	**25.0 (3.1-199.8)**	**26.5 (2.7-262.7)**	
60-89	14 (8%)	4 (29%)	1 (7%)	1	**3.0-295.8)**	**40.8 (2.9-578.1)**	
Sex							
Female	94 (53%)	8 (9%)	2 (2%)	0	**ref**	ref	0.190
Male	85 (47%)	14 (17%)	6 (7%)	3	**2.1 (0.8-5.3)**	2.2 (0.7-7.4)	
Ethnic group*							
Pacific peoples	105 (59%)	11 (11%)	2 (2%)	1	**ref**	**ref**	0.041
Māori	44 (25%)	10 (23%)	6 (14%)	2	**2.5 (1.0-6.4)**	**7.9 (1.9-33.0)**	
NZ European	11 (6%)	1 (9%)	0	0	0.9 (0.1-7.3)	1.0 (0.1-12.0)	
Other	19 (11%)	0	0	0	0		
Diabetes							
Yes	17 (9%)	10 (59%)	5 (29%)	3	17.9 (5.8-55.3)		
No	162 (91%)	12 (7%)	3 (2%)	0	ref		
CVD**							
Yes	21 (12%)	11 (52%)	3 (14%)	3	14.7 (5.1-42.1)		
No	158 (88%)	11 (7%)	5 (3%)	0	ref		
Underlying Disease***							
Yes	55 (31%)	19 (35%)	7 (13%)	3	**21.3 (6.0-76.0)**	**15.7 (3.8-65.4)**	**< 0.001**
No	124 (69%)	3 (2%)	1 (1%)	0	**ref**	**ref**	

* Cases who identify with both Māori and Pacific ethnicity are prioritised by the New Zealand Ministry of Health as Māori.
** Cardiovascular disease.
*** Any underlying disease that are known risk factors for severe outcome of COVID-19.

Table 3
Characteristics of all 2,593 contacts that are identified as contacts from the 179 confirmed community cases that belong to the 'August 2020' COVID-19 outbreak in Aotearoa New Zealand, and that were registered in NCTS.

	Pacific Peoples* n=1,764 (68%)	Māori* n=495 (19%)	NZ European n=185 (7%)	Other n=149 (6%)	Total n=2,593 (100%)
Age Group$					
0-24	857 (49%)	213 (43%)	33 (18%)	80 (54%)	**1,183 (46%)**
25-39	417 (24%)	119 (24%)	69 (38%)	32 (22%)	**637 (25%)**
40-59	321 (18%)	102 (21%)	67 (36%)	29 (20%)	**519 (20%)**
60-89	169 (10%)	61 (12%)	16 (9%)	8 (5%)	**254 (10%)**
Sex					
Female	989 (56%)	274 (55%)	143 (77%)	81 (54%)	**1,487 (57%)**
Male					
Missing	766 (43%)	220 (44%)	42 (23%)	68 (46%)	**1.096 (42%)**
	9 (1%)	1 (0.2%)	0	0	**10 (0.4%)**
Exposure Event**					
Contact location	3 (0.2%)	0	67 (36%)	0	**70 (3%)**
Healthcare facility	211 (12%)	92 (19%)	1 (1%)	1 (1%)	**305 (12%)**
Household	255 (15%)	112 (23%)	21 (11%)	48 (32%)	**436 (17%)**
Public transport	26 (2%)	0	0	0	**26 (1%)**
Other transport	1 (0.1%)	0	0	0	**1 (0%)**
School/University	444 (25%)	58 (12%)	0	0	**502 (20%)**
Work	453 (26%)	6 (1%)	58 (31%)	8 (5%)	**525 (20%)**
Other	371 (21%)	227 (46%)	38 (21%)	92 (62%)	**728 (28%)**

* Cases who identify with both Māori and Pacific ethnicity are prioritised by the New Zealand Ministry of Health as Māori.
** Predefined categories in the National Contact Tracing Solution (NCTS).
$ X^2 <0.0001.

Table 4
Ethnicity of all 2,593 contacts by ethnicity of the 128 confirmed community cases that belong to the 'August 2020' COVID-19 outbreak with contacts registered in NCTS*.

All cases with registered contacts by ethnicity (n=128)	Ethnicity of the contact				Total
	Pacific Peoples* n=1,181 (46%)	Māori* n=360 (14%)	NZ European n=501 (19%)	Other n=551 (21%)	Contacts by ethnicity of case n=2,593 (100%)
Pacific peoples** n=79 (62%)	1,021 **(58%)**	151 (9%)	254 (14%)	338 (19%)	**1,764 (68%)**
Māori**n=24 (19%)	148 (30%)	190 **(38%)**	109 (22%)	48 (10%)	**495 (19%)**
NZ Euro n=9 (7%)	9 (5%)	17 (9%)	110 **(60%)**	49 (27%)	**185 (7%)**
Other n=16 (13%)	3 (2%)	2 (1%)	28 (19%)	116 **(78%)**	**149 (6%)**

* =National Contact Tracing Solution.
** Cases who identify with both Māori and Pacific ethnicity are prioritised by the New Zealand Ministry of Health as Māori.

Table 5
The public health contact tracing response during the August 2020 COVID-19 outbreak in New Zealand, based on the indicators published by the Ministry of Health, analysed by ethnic group of the case.

Ethnicity$ of the case	Engaged contact within 4 days of onset case* 1033/2528 (41%)	OR (95% CI)	Notified within 2 days of onset** 792/2545 (31%)	OR (95% CI)	Engaged contact within 2 days of notification*** 1663/2576 (65%)	OR (95% CI)
NZ European	113/185 (61%)	ref	131/185 (71%)	ref	146/185 (79%)	ref
Māori	282/488 (58%)	0.9 (0.6-1.3)	248/492 (50%)	0.4 (0.3-0.6)	364/491 (74%)	0.4 (0.3-0.6)
Pacific peoples	526/1718 (31%)	0.3 (0.2-0.4)	336/1730 (19%)	0.1 (0.07-0.14)	1012/1752 (58%)	0.1 (0.07-0.14)
Other	112/137 (82%)	2.9 (1.7-4.8)	77/138 (56%)	0.5 (0.3-0.8)	141/148 (95%)	0.5 (0.3-0.8)

* Of all 2.593 contacts, 48 were linked to an asymptomatic case. Of the remaining contacts, 17 did not have a date of contact registered.
** Of all 2,593 contacts, 48 were linked to an asymptomatic case.
*** Of all 2,593 contacts, 17 did not have a date of contact registered.
$ Cases who identify with both Māori and Pacific ethnicity are prioritised by the New Zealand Ministry of Health as Māori.

Public Health response

For 2,528 symptomatic contacts traced in the August 2020 outbreak who had a contact date registered, the interval between onset of disease of the case and the first engagement with the contact was calculated (Table 5). Of these contacts, 135 (5%), linked to 23/120 (19%) of the cases were contacted *before* the onset date of disease of the case, possibly because they were part of a larger outbreak. The overall proportion of contacts that were contacted within 4 days of disease onset of the case was 41% (target > 80%). This proportion was significantly lower for Pacific peoples than for all other ethnicities. Breaking this interval down into two intervals separated by the notification date, the proportion of Pacific people who were notified within 2 days after disease onset as well as the proportion of Pacific contacts who were contacted within 2 days after notification of the case were significantly lower than for all other ethnicities.

Discussion

During the first COVID-19 outbreak in New Zealand, when the international borders were still open, most COVID-19 cases (69%) were imported by younger adults of European ethnicity and of higher socio-economic status. Pacific people were however significantly more likely than all other ethnic groups to have a locally acquired infection [5]. Dur-

ing this second outbreak in August 2020, when the borders were closed, most cases were Pacific (59%) followed by Māori (25%), living in the lowest socio-economic areas, and only 6% of cases were of European ethnicity. All cases were in the Auckland region.

The Auckland metropolitan region is home to approximately 1.6 million people, a third of New Zealand's population. Whilst Auckland is culturally diverse, it is also a city of significant geographic, ethnic, social, and economic disparities [18]. Compared with all other ethnic groups, Pacific people are more likely to live in 'high deprivation' neighbourhoods, have the lowest median incomes, higher unemployment rates, the lowest rates of home ownership and the highest rates of household crowding [19]. A third of the Pacific population are immigrants who were born overseas [6]. These same Pacific communities in South Auckland were most affected by New Zealand's largest measles epidemic in more than two decades that occurred in 2019, just a year earlier [20], and that spilled over to Samoa, resulting in 83 measles-related deaths, mostly among children under 5 years old [21].

The inequitable impact of the COVID pandemic on ethnic minorities became apparent in many countries early in the COVID-19 pandemic: several studies found that ethnic minority groups had a higher COVID-19 infection risk as well as experienced worse outcomes of disease [22]. For this reason, in 2021, the United States Centers for Diseases Control and Prevention (CDC) declared racism a public health crisis [23], acknowledging that the disparities in health outcome that became visible during the COVID-19 pandemic were not a result of COVID-19, but of inequities that have persisted for generations as a result of racism. It has long been known that ethnic minorities in New Zealand, mainly Māori and Pacific peoples, are disproportionally affected by infectious disease outbreaks, and that these disparities are increasing [24]. This August 2020 outbreak confirmed once again that Māori and Pacific communities are disproportionally affected due to structural inequities and institutional racism [7].

The main international airport is in Auckland, as well as 18 of the 32 MIQ facilities that were established for all incoming overseas travellers and all cases and contacts that were unable to isolate at home [18]. Pacific people make up a high proportion of border workers who are more likely to be exposed to incoming travellers, making an undiagnosed Pacific border worker the most likely root source of this outbreak. It was expected that an outbreak disproportionately affecting Pacific people in South Auckland would occur [25].

Delivery of Contact tracing

Of all 179 cases, a total of 2,593 contacts were registered on NCTS. Most contacts (68%) were of Pacific ethnicity, confirming the greatest outbreak potential in this ethnic group. Although Pacific cases reported the most contacts per case, we found no significant difference in number of contacts by ethnicity. Contact tracing programmes however have two major challenges: economic hardship and marginality, and stigma that prevents disclosure and access to a person's social network [26]. Participation in contact tracing of non-English speaking people and those with lower socioeconomic status was found to be lower, but improved after a community-engaged strategy was established addressing the need for culturally competent care and social and material support among socioeconomically disadvantaged and non-English speaking populations [27]. Enhanced contact tracing by making home visits to cases or contacts with missing phone numbers or those who were not reached found a considerable number of contacts that would otherwise have been missed. The authors conclude that these home visits promote equity in the delivery of contact tracing [28].

Interventions that are less effective, or less accessible to lower-status groups, will widen health disparities [26]. Because of the lower socioeconomic status and lower English language proficiency of immigrants, it is likely that the proportion of non-disclosed contacts and contacts who could not be reached is larger for the ethnic minority groups, especially the Pacific population. Because contacts who were identified but not reached for whatever reason (which is common) are not registered in NCTS, possible inequities in the effectiveness of contact tracing among ethnic groups would not be visible.

Of all 179 cases, 51 (28%) had no contacts registered on NCTS. We believe that it is unlikely that so many cases had no contacts at all. One possible reason for this lack of registered contacts could be that within families - or other groups with multiple linked cases outside that group - it is not always clear to which case exactly the contact is linked, and that contacts were therefore arbitrarily linked to a single case in a cluster, leaving the other cases with zero contacts. Another reason could be that contacts were not disclosed, or contacts were identified but could not be reached and therefore were not registered in NCTS.

Limited access to services contributes to the incomplete picture we have about how COVID-19 affects marginalised groups [29]. A tailored public health response for marginalised groups is necessary. Connected contact tracing has the potential to provide access to services and systems that can provide needed services and support.

Timeliness of contact tracing

Robust and timely contact tracing mitigates epidemics and contributes to better outcome of disease, but can – in combination with non-lockdown social distancing – also prevent the need for lockdowns [30]. Robust contact tracing requires equitable participation and delivery for all ethnic groups. Whereas the target set by the Ministry of Health was to quarantine 80% of contacts within 96 hours of the onset of disease in a case, in this outbreak only 41% of contacts were reached within this timeframe. We found that Pacific contacts were contacted significantly later than contacts from other ethnic groups, increasing the risk of spreading the virus in the community. Both intervals between onset of disease and notification of the case, and between notification of the case and first engagement with the contact, were significantly longer for Pacific people. (Table 5). From the data used in this analysis, we cannot determine the reasons for this difference.

This delayed contact tracing adds to well-documented pre-existing health disparities for infectious diseases in Pacific people. Inequitable access to contact tracing in South Auckland was also seen in the measles outbreak in 2019: this outbreak had started in other areas of metropolitan Auckland, and then spread to Pacific communities in South Auckland, that became the epicentre of the outbreak. Before it had reached the most vulnerable Pacific communities in South Auckland, the outbreak management and contact tracing had stopped, because the Public Health Unit had reportedly exhausted its resources [31].

Although CTAC had recommended that the contact tracing system should reflect the needs of Māori and Pacific people and other vulnerable groups more strongly by utilising staff and systems within already established Māori and Pacific providers [13], these recommendations had not been sufficiently implemented. Our research shows that the specific needs for these groups are still underestimated. When large numbers of cases are expected in certain populations, such as Pacific communities in South Auckland, disproportionate numbers of culturally competent contact tracers are needed for these specific groups to achieve equitable health outcomes. Because the preferred language of cases and contacts was not registered in the system, we could not evaluate whether appropriate translation and interpretation support was made available. The lack of this information makes it impossible to better prepare for appropriate language contact tracers in future outbreaks.

Limitations

Data on household characteristics (such as number of household members, multi-generational households) and preferred language is not routinely collected for all notifiable diseases, and these data were missing in the COVID-19 datasets we received. It was not possible with the available data to evaluate how COVID-19 was spread within households, because cases belonging to the same households are not linked. Household contact information is particularly important for Māori and Pacific

ethnic groups, who are more likely to live with large extended families and/or have inter-dependent households, as well as being most vulnerable to the impacts of infectious diseases. Lack of culturally appropriate data makes it impossible to learn and to plan a more appropriate public health response for future outbreaks.

Conclusions

In this relatively small COVID-19 outbreak with only 179 cases, the health system was not able to deliver contact tracing in a timely nor equitable way. The CTAC recommendation that ongoing attention is required for Pacific people and Māori to ensure the contact tracing system was responsive to the specific needs of these groups had not been fully implemented. To our knowledge, the significantly slower public health response for Pacific contacts, as described here, has not been reported before, even though the data was available since the August 2020 outbreak. It is therefore unlikely that adjustments have been made between this outbreak and the later community outbreaks that occurred in New Zealand in 2021. This was a missed opportunity for improvement of the response in subsequent community COVID-19 outbreaks in New Zealand in 2021.

Conflict of interest statement

The authors have declared no conflicts of interest.

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Ethics committee approval

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