

Non-attendance at an out-patient otolaryngology and head and neck clinic in New Zealand: impact of coronavirus disease 2019, and demographic, clinical and environmental factors

Main Article

Dr J White takes responsibility for the integrity of the content of the paper

Cite this article: Ahmadi O, Maher W, White J. Non-attendance at an out-patient otolaryngology and head and neck clinic in New Zealand: impact of coronavirus disease 2019, and demographic, clinical and environmental factors. *J Laryngol Otol* 2021; **135**:533–538. <https://doi.org/10.1017/S0022215121001092>

Accepted: 2 March 2021
First published online: 14 May 2021

Key words:

Appointments And Schedules;
Patient Non-Attendance;
Health Services Accessibility; COVID-19

Author for correspondence:

Dr Julian White, Department of Otolaryngology and Head and Neck Surgery, Waikato Hospital, 183 Pembroke St, Hamilton 3204, New Zealand
E-mail: Julian.White@waikatodhb.health.nz
Fax: +64 (7) 839 8681

O Ahmadi, W Maher and J White

Department of Otolaryngology and Head and Neck Surgery, Waikato Hospital, Hamilton, New Zealand

Abstract

Background. Fear of contracting coronavirus disease 2019 may be the latest addition to the barriers to clinic attendance. This study aimed to examine the impact of coronavirus disease 2019 and other variables on non-attendance rate at an out-patient clinic.

Methods. Clinic attendance at the Department of Otolaryngology and Head and Neck Surgery, Waikato Hospital, New Zealand, was assessed. For each appointment, the impact of coronavirus disease 2019 and other variables on non-attendance rate were analysed.

Results. In total, 1963 appointments were scheduled, with 194 non-attendances (9.9 per cent). Patients who had their appointments confirmed beforehand were 10.0 times more likely to attend their appointment. Sex, socioeconomic status, ethnicity and age were found to impact non-attendance rate.

Conclusion. In New Zealand, coronavirus disease 2019 does not appear to be a barrier to out-patient clinic appointment attendance. The patient's age, sex, ethnicity, socioeconomic status and prior appointment confirmation were found to influence clinic attendance.

Introduction

Out-patient specialist appointment non-attendance represents a significant problem for health systems that are often resource-restrained. It is estimated that approximately 23 per cent of appointments in primary care or specialist clinics are not attended, although significant variations exist.¹ Missed appointments remain unfilled, and often further appointments are required, which frequently represents additional costs to the health system. In addition, there is an association between non-attendance and subsequent visits to the emergency department and hospitalisation, both of which represent considerable additional costs.² Non-attendance could also result in an interruption to the continuity of care and has been shown to lead to poor health outcomes.³ In the New Zealand context, Māori patients (the indigenous people of New Zealand) often have poorer health outcomes, and non-attendance may further compound the health inequalities experienced.

In 2020, we also faced the coronavirus disease 2019 (Covid-19) pandemic, which has had a significant impact on healthcare delivery and on our social behaviour.⁴ In addition to the challenges that the health system faces associated with this pandemic, Covid-19 may also represent a new barrier for patients attending out-patient clinics.⁵

As part of New Zealand's national response to the pandemic, a stringent lockdown and Covid-19 alert levels (ranging from 1 to 4) were introduced.^{6,7} During alert levels 3 and 4, almost all elective out-patient face-to-face clinic appointments were cancelled. At alert levels 1 and 2, most out-patient clinics were scheduled as normal, with additional personal protective equipment for staff, social distancing of patients in the waiting area and screening of patients in the waiting room (using a short survey and temperature assessment). However, the impact of Covid-19 on out-patient clinic non-attendance rate in New Zealand remains unknown.

This study aimed to examine the non-attendance rate at an otolaryngology and head and neck out-patient clinic, and assess the impact of Covid-19, and environmental, demographic and clinical factors on non-attendance rate.

Materials and methods

The out-patient clinic appointment schedule for 18 May to 26 June 2020 at the Department of Otolaryngology and Head and Neck Surgery, Waikato Hospital, Hamilton, New Zealand, was retrieved. The first three weeks of this time corresponded to New Zealand Covid-19 alert level 2 and the last three weeks corresponded to alert level 1. In order to assess the impact of Covid-19 on non-attendance rate, the out-patient clinic appointment schedule at the same clinic in a similar period (20 May to 28 June) in

2019 was also retrieved. Ethical approval from appropriate local and national bodies were sought; however, given the nature of this study, it was advised that ethical approval was not required.

For each appointment date, the following environmental variables were retrieved from Meteorological Services of New Zealand Ltd (MetService.com): the average, minimum and maximum temperatures, and the weather. The weather was defined as clear (≤ 5 oktas), cloud (> 5 oktas) and rain (any rainfall). For weather information, the data between 0600 and 1600 hours were used; it was assumed that these times are likely to have an impact on attendance (the last clinic appointment of the day is scheduled at 1600 hours).

For each appointment, the following data were recorded: the day of the week (Monday to Friday) and time of day (am or pm) of the clinic session; the Covid-19 alert level; the nature of the appointment (follow-up or new); and the clinic type (otology, rhinology, head and neck, paediatrics, acute and nurse clinics).

For each patient, the following information was obtained: age, sex and ethnicity; whether the appointment was confirmed a week prior via telephone call, text message or an e-mail; and the New Zealand Deprivation Index 2006 ('NZDep06') values. The New Zealand Deprivation Index is a validated indirect measure of socioeconomic status based on a defined geographical unit, with a scale ranging from 1 (least deprived) to 10 (most deprived).⁸ Based on the patient's address, the distance of travel (in kilometres) and time of travel (driving) were also established using Google Maps. For patients who did not attend, the number of previous non-attendances to the same clinic was also recorded.

Univariate analysis was undertaken to examine the impact of the recorded variables on attendance using the student's *t*-test, Mann-Whitney U test and chi-square test as appropriate. A logistic regression model was created, with attendance as the dependent variable and other variables as the independent variables. Independent variables were defined as those that showed a statistically significant relationship with attendance on univariate analysis. Statistical analysis was carried out using SPSS Statistics software, version 25 (IBM, New York, USA). Statistical significance was defined as $p < 0.05$.

Results

In total, 1963 appointments were scheduled from 20 May to 28 June 2019 ($n = 875$) and from 18 May to 26 June 2020 ($n = 1088$). Overall, 1769 appointments (90.1 per cent) were attended, while 194 (9.9 per cent) were not, as summarised in Table 1. There was a bimodal age distribution, as illustrated in Figure 1.

Table 1 summarises the univariate analysis of the impact of different variables on attendance. We found the rate of non-attendance to be slightly higher in year 2020 (10.7 per cent) compared to year 2019 (8.9 per cent); however, this was not statistically significant ($p = 0.223$). Similarly, when non-attendance rate in Covid-19 alert level 1 (10.2 per cent) and alert level 2 (11.2 per cent) were compared to the pre-Covid-19 period (8.9 per cent), there was no statistically significant difference.

Variables that had a statistically significant impact on attendance according to the univariate analysis were: clinic type; patient age, sex and ethnicity; travel time and travel distance; New Zealand Deprivation Index; and whether the clinic appointment was confirmed beforehand or not. The day of the week, weather and temperature on the day of the clinic

appointment (mean, maximum and minimum), time of the clinic session, and nature of the appointment had no statistically significant effects on attendance based on univariate analysis.

Amongst those patients who did not attend their clinic appointment, the median number of previous non-attendances to the same clinic was 0 (range, 0–8), with 58.8 per cent of patients having no previous non-attendances, as illustrated in Figure 2.

A logistic regression model was constructed (Table 2), with clinic type, patient sex, age and ethnicity, travel distance, New Zealand Deprivation Index, and confirmed appointment as covariates. This model explained 29.5 per cent (Nagelkerke's R^2) of the variance in attendance events and correctly classified 90.4 per cent of cases. Patients whose appointments were confirmed were 10.0 times more likely to attend their clinic appointment (95 per cent confidence interval (CI) = 6.69–15.05, $p < 0.001$). Female patients were less likely to attend their clinic appointment (odds ratio = 1.62, 95 per cent CI = 1.16–2.26, $p = 0.004$). Māori patients were 1.95 times more likely not to attend their clinic appointment compared to New Zealand Europeans (95 per cent CI = 1.35–2.82, $p < 0.001$). There was a 2 per cent decline in the rate of non-attendance for every year advancement in a patient's age. Finally, those from areas of lower deprivation had a lower rate of non-attendance (odds ratio = 0.68, 95 per cent CI = 0.47–0.99, $p = 0.047$).

Discussion

This study examined the impact of multiple demographic, clinical and environmental factors, including Covid-19, on out-patient otolaryngology and head and neck clinic attendance in New Zealand. Examination of 1963 out-patient clinic appointments revealed an overall non-attendance rate of 9.9 per cent, at an estimated immediate cost of NZ\$ 66 500 (based on a unit price of \$389 for new appointments and \$306 for follow-up appointments). Coronavirus disease 2019 had no statistically significant impact on the rate of non-attendance. The factor that had the strongest independent impact on non-attendance rate was appointment confirmation in the week prior to the clinic session. Other variables with an independent impact on non-attendance were age, sex, ethnicity and New Zealand Deprivation Index.

A study of 264 patients from Derby, UK, examining attendance rate at an out-patient ophthalmology clinic between 27 April and 1 May 2020, found a non-attendance rate of 46 per cent.⁵ A telephone survey of those who did not attend revealed that 85 per cent identified the fear of contracting Covid-19 as the reason for non-attendance. In New Zealand, the national response to Covid-19 has led to a relatively small number of positive cases, with low mortality, and it achieved initial elimination of Covid-19.⁶ This may have reduced the level of patient fear of contracting Covid-19 associated with attending their out-patient clinic appointment. If the experience of other clinics and hospitals in New Zealand supports our findings, then this further lends support for the New Zealand national response to Covid-19.

Clinic appointment confirmation, in form of a text message, e-mail or telephone call, was found to have the strongest impact on attendance rate, with a nearly 10-fold decrease in non-attendance rate. This is likely to be an underestimate of the true impact, as in this study the group with 'unknown' clinic appointment confirmation may have also included patients who had their appointment confirmed but this was

Table 1. Univariate analysis findings*

Parameter	All patients	Attended	Did not attend	<i>p</i> -value
Total (<i>n</i> (%))	1963 (100)	1769 (90.1)	194 (9.9)	
Year (<i>n</i> (%))				
– 2019	875 (44.6)	797 (91.1)	78 (8.9)	0.223
– 2020	1088 (55.4)	972 (89.3)	116 (10.7)	
Day of week (<i>n</i> (%))				
– Monday	268 (13.7)	235 (87.7)	33 (12.3)	0.126
– Tuesday	437 (22.3)	394 (90.2)	43 (9.8)	0.568
– Wednesday	371 (18.9)	330 (88.9)	41 (11.1)	0.292
– Thursday	473 (24.1)	432 (91.3)	41 (8.7)	Ref
– Friday	414 (21.1)	378 (91.3)	36 (8.7)	1.000
Appointment time of day (<i>n</i> (%))				
– am	1090 (55.5)	988 (90.6)	102 (9.4)	0.403
– pm	873 (44.5)	781 (89.5)	92 (10.5)	
Weather (<i>n</i> (%))				
– Clear	444 (22.6)	405 (91.2)	39 (8.8)	Ref
– Cloud	840 (42.8)	747 (88.9)	93 (11.1)	0.210
– Rain	679 (34.6)	617 (90.9)	62 (9.1)	0.915
Temperature (mean ± SD; °C)*	11.6 ± 2.52	11.5 ± 2.53	11.7 ± 2.48	0.616
Covid-19 alert level (<i>n</i> (%))				
– Pre-Covid-19	875 (44.6)	797 (91.1)	78 (8.9)	Ref
– 1	568 (28.9)	510 (89.8)	58 (10.2)	0.408
– 2	520 (26.5)	462 (88.8)	58 (11.2)	0.191
Nature of appointment (<i>n</i> (%))				
– New	882 (44.9)	796 (90.2)	86 (9.8)	0.879
– Follow-up	1081 (55.1)	973 (90.0)	108 (10.0)	
Clinic type (<i>n</i> (%))				
– Head & neck	537 (27.4)	490 (91.2)	47 (8.8)	Ref
– Otology	521 (26.5)	453 (86.9)	68 (13.1)	0.029
– Rhinology	228 (11.6)	197 (86.4)	31 (13.6)	0.05
– Paediatrics	296 (15.1)	263 (88.9)	33 (11.1)	0.27
– Acute clinic	325 (16.6)	311 (95.7)	14 (4.3)	0.014
– Nurse clinic	56 (2.9)	55 (98.2)	1 (1.8)	0.073
Sex (<i>n</i> (%))				
– Male	1034 (52.7)	947 (91.6)	87 (8.4)	0.023
– Female	929 (47.3)	822 (88.5)	107 (11.5)	
Age group (years) (<i>n</i> (%))				
– <15	636 (32.4)	558 (87.7)	78 (12.3)	<0.001
– 15–44	464 (23.6)	391 (84.3)	73 (15.7)	<0.001
– 45–64	430 (21.9)	398 (92.6)	32 (7.4)	0.005
– 65–74	236 (12.0)	229 (97.0)	7 (3.0)	0.761
– 75+	197 (10.0)	193 (98.0)	4 (2.0)	Ref
Ethnicity group (<i>n</i> (%))				
– New Zealand European	1011 (51.5)	940 (93.0)	71 (7.0)	Ref
– Māori	559 (28.5)	461 (82.5)	98 (17.5)	<0.001
– Other European	155 (7.9)	152 (98.1)	3 (1.9)	0.012
– Pacific people	58 (3.0)	45 (77.6)	13 (22.4)	<0.001

(Continued)

Table 1. (Continued.)

Parameter	All patients	Attended	Did not attend	p-value
- Other	180 (9.2)	171 (95.0)	9 (5.0)	0.418
Travel distance (mean \pm SD; km)	44.4 \pm 72.68	44.3 \pm 66.61	45.49 \pm 114.24	0.035
New Zealand Deprivation Index value (n (%)) [†]				
- ≤ 5	680 (34.6)	633 (93.1)	47 (6.9)	0.001
- ≥ 6	1233 (62.8)	1090 (88.4)	143 (11.6)	
Appointment confirmed? (n (%))				
- Yes	1193 (90.8)	1161 (97.3)	32 (2.7)	<0.001
- Unknown	770 (39.2)	608 (79.0)	162 (21.0)	

*Regarding the impact of coronavirus disease 2019, and clinical, demographic and environmental variables, on out-patient clinic attendance. [†]Excluding 50 unknown responses. Ref = reference; SD = standard deviation

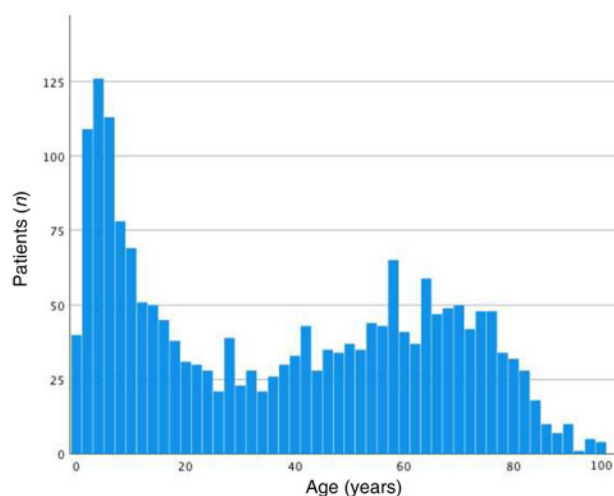


Fig. 1. Histogram illustrating age distribution of the study sample ($n = 1963$).

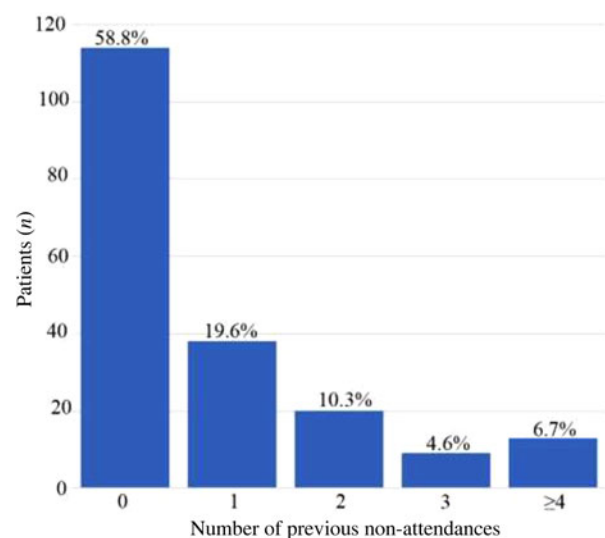


Fig. 2. Bar graph illustrating the number of previous non-attendances amongst patients who did not attend their out-patient clinic appointment ($n = 194$).

not recorded as such. In a study of 13 505 clinic appointments, Parikh *et al.* showed that reminders in the week prior to the clinic appointment resulted in a significant decrease in non-attendance rate.⁹ They found that a telephone reminder by a staff member was more effective at reducing non-attendance rate than an automated appointment reminder, but both of these were superior to no reminder (13.6 per cent vs 17.3 per cent vs 23.1, respectively; $p < 0.01$). Clinic appointment reminders are likely to achieve a lower non-attendance rate by: reminding patients who would have otherwise forgotten their appointment, and by allowing patients who would have liked to 'cancel' or 'reschedule' their appointment to do so.

Younger age was found to be associated with a higher non-attendance rate, with a 2 per cent decrease in the rate of non-attendance with every year of age advancement. An inverse correlation between advancing age and rate of non-attendance has previously been reported.^{1,10} We also found that female sex was an independent risk factor for non-attendance (odds ratio = 1.62, 95 per cent CI = 1.164–2.261, $p = 0.004$). This finding is in contrast to previous studies which found that men were more likely to not attend.^{10–13} A similar relationship, however, was reported amongst adults visiting an otolaryngology clinic in Israel.¹⁴ Here, the authors proposed that the study location was a confounding factor, as care of a family is, in Israel, traditionally the responsibility of women. The finding of the current study, which is also set in an otolaryngology and head and neck clinic, raises the

possibility that there may be another reason for higher non-attendance amongst women. Further investigation will be required to establish the underlying reason for this finding.

Ethnicity was independently associated with non-attendance rate, with Pacific people having the highest odds ratio for non-attendance (odds ratio = 2.72, 95 per cent CI = 1.28–5.75, $p = 0.009$). However, the number of Pacific people in this study was relatively small ($n = 58$). Māori patients also had a higher rate of non-attendance than New Zealand Europeans. Interestingly, the 'other' ethnicities, a combination of other minority ethnicities in New Zealand, were most likely to attend their clinic appointment (Table 2). Our findings confirm those of Milne and colleagues' study of rheumatology clinic appointment attendance in New Zealand.¹⁵ Here, they also showed higher odds ratios of non-attendance for Māori and Pacific people when compared to New Zealand Europeans, while 'other' ethnicities had a lower rate of non-attendance. One theory is cultural barriers and, for Pacific people, language barriers.¹⁶ However, the 'other' ethnicities, who may also face cultural and language barriers, had the lowest rate of non-attendance.

Another potential barrier to attendance amongst Māori and Pacific people is the cost, particularly in the primary care setting where the fees are only partially funded.¹⁶ Māori patients are more likely to experience higher levels of deprivation, as illustrated in Figure 3. Unlike primary care, specialist clinics

Table 2. Summary of logistic regression model findings*

Parameter	B [†]	Odds ratio	95% confidence interval		p-value
			Lower	Upper	
Clinic type					
- Otology		Reference			0.187
- Rhinology	0.24	1.27	0.756	2.125	0.368
- Head & neck	0.14	1.15	0.727	1.816	0.553
- Paediatrics	0.10	1.10	0.668	1.812	0.709
- Acute clinic	-0.60	0.55	0.290	1.043	0.067
- Nurse clinic	-1.17	0.31	0.040	2.393	0.261
Sex (female)	0.48	1.62	1.164	2.261	0.004
Age (years)	-0.02	0.98	0.973	0.987	<0.001
Ethnicity					
- New Zealand European		Reference			<0.001
- Māori	0.67	1.95	1.347	2.816	<0.001
- Pacific people	1.00	2.72	1.283	5.751	0.009
- Other	-0.95	0.39	0.202	0.744	0.004
Travel distance (km)	0.00	1.00	0.998	1.002	0.866
New Zealand Deprivation Index >5	0.38	1.46	1.005	2.120	0.047
Appointment confirmed	2.31	10.03	6.686	15.047	<0.001
Constant	-3.28	0.04			<0.001

*Regarding the impact of clinical, demographic and environmental variables on out-patient clinic attendance. [†]Unstandardised co-efficients

are completely funded publicly and are therefore free of charge for New Zealanders. However, there are other associated costs with attending a clinic, such as transport, parking, time off work (and potential loss of income) and a potential need for childcare arrangements. More in-depth examination is required to ascertain the underlying reason for higher non-attendance rate amongst Māori and Pacific people.

The New Zealand Deprivation Index was also found to be an independent variable affecting attendance rate, with those with a score of more than 5 being 1.5 times more likely not to attend than those with a score of 5 or less (odds ratio = 1.46, 95 per cent CI = 1.01–2.12, $p = 0.047$). In this study, the New Zealand Deprivation Index score was used as a surrogate of socioeconomic status. The impact of socioeconomic status on clinic attendance has been reported previously.^{17,18} In addition to the direct cost of clinic appointment attendance, socioeconomic status is also a potential risk factor for low health literacy, which is associated with adverse health-related behaviours.¹⁹ In a review examining the role of health literacy as a mediator between socioeconomic status and health disparities, Stormacq *et al.* argued that addressing 'upstream' determinants of socioeconomic status may be difficult and it may be easier to address the 'midstream' health literacy. This approach requires health services to increase or consider people's low health literacy, in order to reduce the impact of the 'upstream' socioeconomic status on 'downstream' health disparities.¹⁹

One strategy for reducing non-attendance rate is open appointments, where patients contact the clinic to schedule an appointment at a time of their convenience.² However, this strategy is likely to disadvantage those with low health literacy, as this approach requires that the patient understand their health needs to initiate the next appointment. This may be challenging for a person with a low level of health

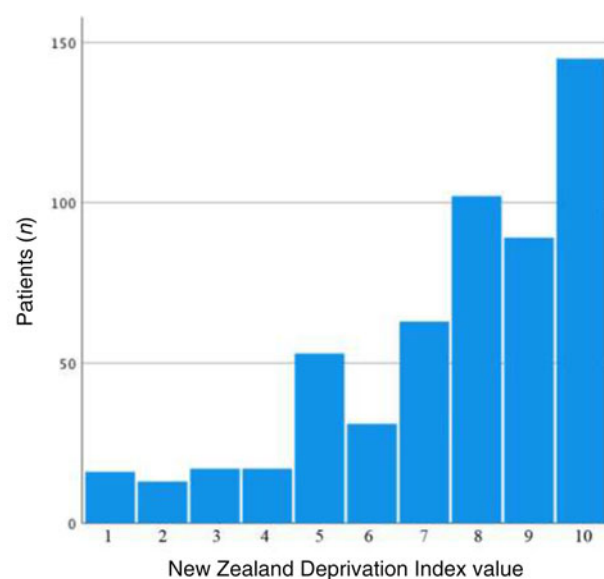


Fig. 3. Bar graph illustrating the distribution of New Zealand Deprivation Index values amongst Māori patients included in the study sample ($n = 559$).

literacy. Hwang *et al.* have suggested that non-attendance may be used as a surrogate for psychosocial complexity, and can be employed to identify 'high-risk' individuals who may benefit from additional support.³

This study had a number of limitations. It relied on demographic, social, environmental and clinical information that is analysed retrospectively. In this study, the New Zealand Deprivation Index was used as a surrogate of the socioeconomic status of individual patients. However, this index applies to defined geographical units rather than individual people.

Attendance at an otolaryngology and head and neck clinic was examined, and therefore the findings should be applied to other clinics with caution. Finally, clinic appointment confirmation data were not well documented. This has led to the ‘unknown’ category also containing those whose appointment was confirmed but this information was not recorded, as well as those whose appointment was not confirmed.

- Out-patient clinic non-attendance represents a significant cost to health systems and leads to poor health outcomes
- Many factors influence non-attendance, with the latest potential barrier being coronavirus disease 2019 (Covid-19)
- This study is the first to examine the impact of Covid-19 on clinic attendance in New Zealand
- The Covid-19 pandemic did not affect non-attendance rate at an out-patient clinic in New Zealand; this may be due to elimination of community transmission
- Confirmation that a patient will attend their clinic session in the week prior to the appointment reduced non-attendance 10-fold
- Patient’s age, sex, ethnicity and socioeconomic status, and clinic appointment confirmation, were independent factors influencing clinic attendance

In conclusion, we have reported a non-attendance rate at an otolaryngology and head and neck clinic in New Zealand of nearly 10 per cent, with Covid-19 having no impact on this rate. Patient’s age, sex, ethnicity and socioeconomic status, and clinic appointment confirmation, were found to be independent factors influencing clinic attendance. Further studies should examine the impact of Covid-19 on out-patient clinic attendance, particularly in the New Zealand setting, to confirm our findings. More targeted studies, directed at those groups with higher rates of non-attendance, may help our understanding of the reasons for non-attendance. This information could help reduce non-attendance, which would benefit the health system and improve the health outcomes for patients.

Acknowledgement. The authors wish to thank Neal Osborne at Meteorological Services of New Zealand Ltd for his assistance with retrieving weather information for this study.

Competing interests. None declared

References

- 1 Dantas LF, Fleck JL, Cyrino Oliveira FL, Hamacher S. No-shows in appointment scheduling - a systematic literature review. *Health Policy* 2018;**122**:412–21
- 2 Nuti LA, Lawley M, Turkcan A, Tian Z, Zhang L, Chang K *et al.* No-shows to primary care appointments: subsequent acute care utilization among diabetic patients. *BMC Health Serv Res* 2012;**12**:304
- 3 Hwang AS, Atlas SJ, Cronin P, Ashburner JM, Shah SJ, He W *et al.* Appointment “no-shows” are an independent predictor of subsequent quality of care and resource utilization outcomes. *J Gen Intern Med* 2015;**30**:1426–33
- 4 Choi JY. COVID-19 in South Korea. *Postgrad Med J* 2020;**96**:399–402
- 5 Fung THM, Kuet ML, Patel MK, Puri P. Addressing COVID-19 fear to improve clinic attendance for patients with wet age-related macular degeneration. *Acta Ophthalmol* 2021;**99**:e285
- 6 Jefferies S, French N, Gilkison C, Graham G, Hope V, Marshall J *et al.* COVID-19 in New Zealand and the impact of the national response: a descriptive epidemiological study. *Lancet Public Health* 2020;**5**:e612–23
- 7 New Zealand COVID-19 alert levels summary. In: <https://covid19.govt.nz/assets/resources/tables/COVID-19-alert-levels-summary.pdf> [22 November 2020]
- 8 NZDep2006 Index of Deprivation. In: <https://www.otago.ac.nz/wellington/otago020348.pdf> [20 November 2020]
- 9 Parikh A, Gupta K, Wilson AC, Fields K, Cosgrove NM, Kostis JB. The effectiveness of outpatient appointment reminder systems in reducing no-show rates. *Am J Med* 2010;**123**:542–8
- 10 Torres O, Rothberg MB, Garb J, Ogunneye O, Onyema J, Higgins T. Risk factor model to predict a missed clinic appointment in an urban, academic, and underserved setting. *Popul Health Manag* 2015;**18**:131–6
- 11 Zailinawati AH, Ng CJ, Nik-Sherina H. Why do patients with chronic illnesses fail to keep their appointments? A telephone interview. *Asia Pac J Public Health* 2006;**18**:10–15
- 12 Machado AT, Werneck MA, Lucas SD, Abreu MH. Who did not appear? First dental visit absences in secondary care in a major Brazilian city: a cross-sectional study. *Cien Saude Colet* 2015;**20**:289–98
- 13 Dickey W, Morrow JI. Can outpatient non-attendance be predicted from the referral letter? An audit of default at neurology clinics. *J R Soc Med* 1991;**84**:662–3
- 14 Cohen AD, Kaplan DM, Kraus M, Rubinshtein E, Vardy DA. Nonattendance of adult otolaryngology patients for scheduled appointments. *J Laryngol Otol* 2007;**121**:258–61
- 15 Milne V, Kearns R, Harrison A. Patient age, ethnicity and waiting times determine the likelihood of non-attendance at a first specialist rheumatology assessment. *Int J Rheum Dis* 2014;**17**:19–25
- 16 Maniapoto T, Gribben B. Establishing a Maori case management clinic. *N Z Med J* 2003;**116**:U328
- 17 Miller AJ, Chae E, Peterson E, Ko AB. Predictors of repeated “no-showing” to clinic appointments. *Am J Otolaryngol* 2015;**36**:411–14
- 18 Neal RD, Lawlor DA, Allgar V, Colledge M, Ali S, Hassey A *et al.* Missed appointments in general practice: retrospective data analysis from four practices. *Br J Gen Pract* 2001;**51**:830–2
- 19 Stormacq C, Van den Broucke S, Wosinski J. Does health literacy mediate the relationship between socioeconomic status and health disparities? Integrative review. *Health Promot Int* 2019;**34**:e1–17