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SHORT COMMUNICATION

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Bowel screening in New Zealand: are men and Pacific peoples being left behind?

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ABSTRACT

Colorectal cancer screening participation is influenced by several factors including ethnicity and gender. Results from the first 6 months of a new screening scheme were examined in the Hawke's Bay region of New Zealand. All residents aged between 60 and 74 years of age who participated in the scheme by returning a faecal immunochemical test kit were included. Participant ethnicity was compared with 2018 Hawke's Bay Census data. Participants who returned a normal (negative), abnormal (positive) and a spoilt kit (defined as being unable to be processed for testing), were collated and compared for gender and ethnicity. A total of 3444 residents participated in the scheme. Overall, participant ethnicity proportions did not represent the Census population for Hawke's Bay District Health Board residents. The proportions of Māori and Pacific peoples participating were lower than expected. The odds of returning a spoilt kit were six times higher ($p = 0.013$) for Pacific peoples and four times higher for men ($p = 0.040$). This short communication suggests that bowel screening programmes in New Zealand need to collate kit return rates and spoilt kits with the numbers of kits that are actually sent out to ensure equity for bowel screening in New Zealand.

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Introduction

Globally, colorectal cancer (CRC) is the third most commonly diagnosed cancer with a mortality rate that is ranked fourth of all cancers (Brenner and Chen 2018). Due to growing and aging populations, it is forecasted that within 20 years new CRC cases will increase by 79% worldwide (Ferlay et al. 2015). New Zealand's CRC incidence is one of the highest in the world (Brenner and Chen 2018) resulting in the second-highest cause of death from cancer nationally for both genders (Keating et al. 2003). Males compared with females have a higher incidence and poorer survival globally and in New Zealand (Yang et al. 2017; Hultcrantz 2021). New Zealand's high mortality rate is directly related

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to delayed diagnosis with 24% of all new CRC cases being metastatic compared with 19% in Australia and 17% in the United Kingdom (Windner et al. 2018).

The 2018 New Zealand census recorded that that 70.2% of people living in New Zealand identify as European followed by Māori (16.5%), Asian (15.1%), Pacific peoples (8.1%), and other ethnicities (2.7%) (NZ.Stat., n.d.). In New Zealand, Māori encounter many barriers to healthcare which result in poor health outcomes compared to Europeans (Chin et al. 2018). This has prompted the implementation of several Māori specific health equity and diversity initiatives, though with questionable effectiveness (Came et al. 2020). The incidence of CRC is lower for Māori, than non-Māori, however, Māori tend to be diagnosed at a younger age and with more advanced disease resulting in poorer health outcomes (Robertson et al. 2017).

Healthcare barriers associated with ethnicity are not unique to New Zealand. Globally, there are many documented barriers for indigenous ethnicities in regards to bowel cancer screening programmes. A recent systematic review (Dressler et al. 2021) reported barriers, facilitators and modifiers to participation in global bowel screening. Themes included religion (believing cancer is the will of God), logistics (not knowing how to conduct the test), and knowledge and awareness (lack of knowledge about the test). This review suggested that to increase participation rates populations need interventions to increase awareness and knowledge of potential health benefits of bowel screening along with increased provision of logistical support.

Better health outcomes with CRC can be achieved by offering effective screening tests, such as the faecal immunochemical test (FIT) kit (Brenner and Chen 2018). The New Zealand pilot for FIT kit screening commenced in 2011 and after review (Health Quality & Safety Commission 2018) an extensive national bowel screening programme (NBSP) was implemented. However, screening in New Zealand, United Kingdom and Australia has established that lower participation rates are seen in certain subgroups of the population due to factors including ethnicity, gender, language barrier and socioeconomic status (Health Quality & Safety Commission 2018). In England, the faecal occult blood test was replaced with the FIT in 2019, and this may have an impact on reducing inequalities (Pelitari et al. 2021). There is a clear ongoing need to regularly examine CRC participation data to access equity. The NBSP for the Hawke's Bay region, in New Zealand began on 9 October 2018. This current study aimed to access the first 6 months of FIT kit participation data for equity, diversity and acceptability in this region.

Materials and methods

This retrospective cross-sectional study was conducted at Hawke's Bay Fallen Soldiers' Memorial Hospital, New Zealand. All Hawke's Bay residents who were eligible (aged between 60 and 74 years) that received and returned a FIT kit and supporting documentation between 9 October 2018 and 9 April 2019, were included. Exclusion criteria for this study were residents who already had a history of bowel cancer or completed an FIT kit outside of the study time frames. Numbers of the total of FIT kit participants who returned a normal (negative), abnormal (positive) and a spoilt FIT kit (defined as being unable to be processed for testing), were collated.

The 2018 New Zealand Census data for Hawke's Bay District Health Board resident ethnicity (NZ.Stat., n.d) was collated and compared with the participant's ethnicity. As

Census data did not allow a direct age comparison with FIT kit participants (60–74 years) two census age grouping were collated: ages 65 and over and 30–64 years of age.

Pearson Chi-square testing was performed to determine how well the FIT Kit Participants generalised to the Hawke's Bay District Health Board resident population for over 65 years of age. Pearson Chi-square was also used to compare the proportions of participants returning normal, abnormal or spoilt kits by ethnicity or gender.

Logistic regression was used to predict a spoilt FIT KIT for participants from age, ethnicity and gender. Logistic regression adjusted odds ratios were generated with IBM SPSS Statistics (Version 25, IBM Corp, www.ibm.com).

Ethical approval was obtained from the Eastern Institute of Technology Research Ethics and Approvals Committee (ref SONHSS19/02), Locality approval was obtained from the Hawke's Bay District Health Board Research Committee (ref 19/06/19).

Results

Between 9 October 2018 and 9 April 2019, a total of 3,444 Hawke's Bay residents aged between 60 and 74 years of age returned a FIT Kit for testing. The ethnic identity proportions of this cohort were compared with New Zealand 2018 census data for Hawke's Bay District Health Board residents, see Table 1.

In order to determine how well the FIT Kit Participants generalised to the Hawke's Bay District Health Board resident population for over 65 years of age, a one-sample chi-square test was conducted. Results indicated that the FIT Kit proportions of participants by ethnicity were significantly different from the Census population (χ^2 (df = 4) = 21.91, $p = 0.0002$). Overall, FIT kit participants did not represent the population aged 65 or over for Hawke's Bay District Health Board residents.

The low number of some categories prevented analysis for differences between ethnicities for the proportions of abnormal (positive) FIT kits. 59 of participants (1.7%) returned a spoilt FIT kit (defined as the clinical laboratory being unable to process the FIT kit for testing). Reasons for spoilt kits included consent forms not being signed or dated, barcodes not being attached to the sample, or specimen collection errors such as an insufficient sample volume for analysis. While Pacific peoples ($n = 20$) represented only 0.6% of the total participants ($n = 3444$) they returned 13.6% ($n = 8$) of all spoilt kits ($n = 59$) (see Table 2).

While more females ($n = 1874$, 54.4%) returned an FIT kit compared with males ($n = 1570$, 45.6%), males were more likely to return a spoilt FIT kit ($n = 35$, 59.9%) compared with females ($n = 24$, 40.7%) ($p = 0.025$, Pearson Chi-Square = 5.028) (see Table 3).

A logistic regression analysis was conducted to predict a spoilt FIT kit using age, ethnicity and gender. A test of the full model against a constant-only model was significant

Table 1. Ethnicity of FIT Kit participants compared with the New Zealand 2018 census data for Hawke's Bay District Health Board residents.

Ethnicity	2018 census (30-64 years of age)	2018 census (65 years or over)	Fit kit participants (aged 60–74)
All	71,799 (100%)	30,384 (100%)	3444 (100%)
European	54,063 (75.3%)	27,033 (89.0%)	3030 (88.0%)
Māori	16,410 (22.9%)	3138 (10.3%)	300 (8.7%)
Asian	3669 (5.1%)	471 (1.6%)	67 (1.9%)
Pacific peoples	3081 (4.3%)	390 (1.3%)	20 (0.6%)
Other ethnicity	1020 (1.4%)	255 (0.8%)	27 (0.8%)

Table 2. Number of normal, abnormal and spoilt FIT kits by ethnicity of FIT Kit participants.

Ethnicity	Total FIT kits received (%)	Normal (negative) FIT Kit (%)	Abnormal (Positive) FIT Kit (%)	Spoilt FIT Kit (%)
All	3444 (100%)	3215 (100%)	170 (100%)	59 (100%)
Asian	67 (1.9%)	61 (1.9%)	3 (1.8%)	3 (5.1%)
European	3030 (88.0%)	2842 (88.4%)	144 (84.7%)	44 (74.7%)
Māori	300 (8.7%)	275 (8.6%)	21 (12.4%)	4 (6.8%)
Pacific peoples	20 (0.6%)	10 (0.3%)	2 (1.2%)	8 (13.6%)
Other	27 (0.8%)	27 (0.8%)	0 (0.0%)	0 (0.0%)

(chi square = 36.292, $p < 0.001$ with df = 6). Nagelkerke's r^2 of 0.067 indicated only a weak relationship. The Wald criterion demonstrated that identifying as Pacific peoples (p = 0.013) and being male gender (p = 0.040) were the only significant factors. The odds ratio for a spoilt kit from Pacific peoples was 6.14 (95% CI 1.45–24.17). The odds ratio for a spoilt kit from men was 4.20 (95% CI 1.03–2.97).

Discussion

This study suggests a bowel screening healthcare barrier may exist for Pacific peoples and men within the Hawke's Bay region in New Zealand. The odds of returning a spoilt FIT kit (defined as being unable to be processed for testing) was six times higher (p = 0.013) for Pacific peoples and four times higher for men (p = 0.040). Additionally, the FIT Kit proportions of participants by ethnicity were significantly different (p = 0.0002) from the Census population. Such findings are important for consideration as New Zealand has one of the highest rates of CRC incidence in the world (Brenner and Chen 2018) which is likely to significantly increase (Ferlay et al. 2015). New Zealand's high mortality rate is directly related to delayed diagnosis (Windner et al. 2018). The proportion of late-stage diagnoses is higher than other countries, and highest in Māori and Pacific peoples who also have the poorest survival outcomes (Firth et al. 2021). In terms of gender, men have a higher incidence and poorer survival (Yang et al. 2017, Hultcrantz 2021). There is a pressing need to ensure bowel screening in New Zealand is equitable.

In contrast with Pacific peoples, Māori are not spoiling a significantly greater number of FIT kits compared to other ethnicities. Previously it was found (Ministry of Health 2018) that Māori was more likely to complete the FIT kit if they had a drop-off location such as community pharmacy, community laboratories or primary healthcare provider. As such, laboratory drop off was also available in the pilot study for Pacific peoples, with the potential to increase FKP rates and allow for a checking service to reduce the number of spoilt kits. However, this drop off option was not available in the Hawke's Bay bowel screening programme.

There are a range of initiatives that are in place in different regions of New Zealand to address the issue of spoilt FIT kits. These include: active follow up phone calls by the

Table 3. Normal, abnormal, spoilt and total FIT kits by gender.

Number	Total FIT kits (%)	Normal FIT kit result (%)	Abnormal (positive) FIT kit result (%)	Spoilt Fit kit (%)
All	3444 (100%)	3215 (100%)	170 (100%)	59 (100%)
Female	1874 (100%)	1779 (55.3%)	71 (41.7%)	24 (40.7%)
Male	1570 (100%)	1436 (44.7%)	99 (58.2%)	35 (59.3%)

National Co-ordination Centre for priority populations that do not return a kit, and a commitment to phone any Māori or Pacific participant returning spoilt kits; establishment of a Pacific Network among DHBs who have implemented the programme (meets twice a year) to share learnings about how to improve participation and reduce spoilt kit rates, potentially associated with language barriers and other factors. A kit re-design project to try and reduce the spoilt kit rate is now a strategy. In one region, participants have the option of an alternative kit drop-off location. Despite these various strategies as outlined above, Pacific peoples and men in Hawke's Bay still demonstrated the most significant proportions of spoilt FIT kits.

Our data is from the initial 6 months of a new bowel screening program in only one region of New Zealand. This is a limitation as the participant numbers our findings are based on for spoilt kits are low. Another limitation is that we compared kit return rates with population census distributions rather than the numbers of kits that were actually sent out. We cannot assume that these two data sources are constant for ethnic identity classification. Also, caution has been recommended (Lepa et al. 2013) concerning the accuracy of identifying Pacific peoples using National Health Index numbers. In spite of these limitations, we suggest our findings are highly important because New Zealand's high mortality rate is directly related to delayed diagnosis (Windner et al. 2018) particularly for Māori and Pacific peoples (Firth et al. 2021). In addition, because men have a higher incidence and poorer survival (Yang et al. 2017, Hultcrantz 2021), a higher rate of spoilt kits in men is a major concern. We suggest a new mandatory data reporting requirement for all bowel screening programmes in New Zealand is required. It should be mandatory to collate and report spoilt kit rates compared with the numbers of kits that are sent out by ethnicity and gender. We suggest this is required to ensure equity for bowel screening in New Zealand. Moreover, we suggest that all screening services worldwide need to mandate to routinely collect ethnicity and gender participation data at regular intervals to ensure health equity and/or provide evidence for where health equity and diversity initiatives are most required.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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