Chapter 3.11.

Journey towards piloting a *Helicobacter pylori* screen-and-treat programme to address gastric cancer inequities in Aotearoa New Zealand

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Summary

- The epidemiology of *H. pylori* infection in Aotearoa New Zealand is characterized by stark ethnic differences in prevalence of *H. pylori* infection and its sequelae, with higher prevalence of *H. pylori* infection and gastric cancer incidence and higher rates of hospitalization for peptic ulcer in Māori people, Pacific people, and Asian people than in European people.
- Māori people and Pacific people are currently less likely to be tested for *H. pylori* than European people, despite the higher risk of infection in these populations.
- A screen-and-treat approach targeted to a high-risk population is more cost-effective than implementing this approach in a low-risk population. Further cost–effectiveness modelling could support the evaluation of more specific targeting, choice of test, and choice of treatment where input data allow.
- Current research into the stratification of the prevalence of *H. pylori* infection in the community by ethnicity, the feasibility of a screen-and-treat strategy, and the level of treatment resistance in New Zealand is expected to support the design of a future screen-and-treat pilot programme.
- This chapter highlights some of the remaining questions that need to be addressed to support the development and implementation of a screen-and-treat pilot programme in New Zealand.

3.11.1 *H. pylori* infection and gastric cancer epidemiology

H. pylori *infection*

The epidemiology of *H. pylori* infection in Aotearoa New Zealand is characterized by stark ethnic differences in prevalence. In the asymptomatic population, the rate of seropositivity in Pacific people is 3 times that in European people, and the rate of seropositivity in Māori people (the Indigenous population) is twice that in European people, based on available studies from before 2000 [1]. Positivity rates from routine *H. pylori* testing also consistently follow this pattern. For example, in one largely primary care study, in 2013–2018, positivity rates were 38% in Pacific people, 21% in Māori people, and 8% in European people. Positivity rates were also high in Asian people (28%, which includes both East Asian and South Asian ethnicities) and Middle Eastern, Latin American, or African people (48%). The rates of testing for *H. pylori* were lowest in Māori people and Pacific people [2]. Table 3.11.1 summarizes the consistent pattern of ethnic inequities.

Table 3.11.1. Summary of ethnic inequities in *H. pylori* infection and its sequelae in Aotearoa New Zealand

Characteristic	Population			
	Māori	Pacific	Asian	European
Population size in 2023	887 493	442 632	861 576	3 383 742
H. pylori testing rates (per 1000 person-years), Auckland/Northland	6.4	7.2	20.8	11.8
Asymptomatic: relative rates of *H. pylori* seropositivity (before 2000)	1.9	3.4	–	1.0 (ref)
Symptomatic: *H. pylori* positivity rate (%)				
Auckland/Northland, 2015–2018	22	37	26	13
Canterbury, 2013–2018	21	38	28	8
Peptic ulcer hospitalization rate (per 100 000 person-years), 2015–2018[a]	51	63	22	15
Gastric cancer incidence rate (per 100 000 person-years), 2017–2021[b]	11.1	13.9	5.5	4.1
Gastric cancer mortality rate (per 100 000 person-years), 2017–2021[b]	7.4	8.5	3.0	2.6

[a] Age-standardized to the Māori census population in 2001.
[b] Age-standardized to the WHO world standard population.
Source: Compiled from McDonald et al. (2015) [1], Kubovy and Barclay (2022) [2], Hildred (2024) [3], and Teng et al. (2025) [4].

Sequelae

The age-standardized rates of gastric cancer in the New Zealand population are low in the international context. In 2015–2019, the rates were 8 per 100 000 person-years in males and 4 per 100 000 person-years in females, when age-standardized to the World Health Organization (WHO) world standard population [5]. The equivalent crude rate was 11 per 100 000 person-years in males and 6 per 100 000 person-years in females, with an overall rate of 8.5 per 100 000 person-years in 2015–2019 [5].

However, there are stark ethnic differences in gastric cancer incidence and mortality. The rates of gastric cancer in Māori people and Pacific people are 2.5–6.3 times those in European/Other people [6]; the rates in Asian people are somewhere in between [3]. In 2017–2021, gastric cancer incidence rates (per 100 000 person-years) were 15 in males and 8 in females in Māori people, 17 in males and 11 in females in Pacific people, and 8 in males and 4 in females in Asian people, compared with 6 in males and 3 in females in European/Other people, when age-standardized to the WHO world standard population (Fig. 3.11.1) [7]. Also, Māori people with gastric cancer are more likely than non-Māori people to have non-cardia gastric cancer [8] (about 80% vs 50%, if overlapping and undefined types of gastric cancer are excluded) [9] and diffuse-type gastric cancer [8].

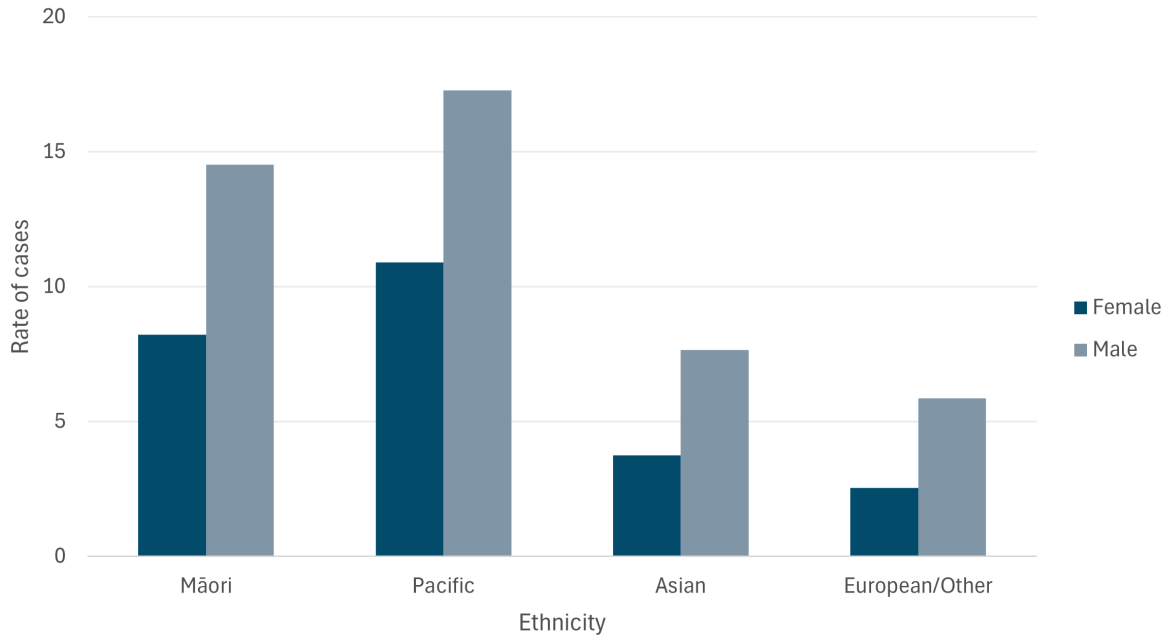

Fig. 3.11.1. Rate of gastric cancer registrations in 2017–2021 by ethnicity. Rate is per 100 000 person-years and is age-standardized to the WHO world standard population. Compiled from Te Whatu Ora/Health New Zealand (2024) [7].

In addition, rates of gastric cancer incidence and mortality are significantly higher in groups with the lowest socioeconomic positions. For example, in 2006–2011, in the lowest versus the highest equivalized household income quintile, the difference in gastric cancer incidence was 1.62 (95% confidence interval [CI], 1.03–2.56) in men and 1.81 (95% CI, 1.00–3.29) in women [10]. In 2017–2021, gastric cancer incidence rates (per 1000 000 person-years) were 10 in males and 6 in females living in areas with the highest levels of deprivation, compared with 6 in males and 3 in females living in areas with the lowest levels of deprivation (Fig. 3.11.2) [7].

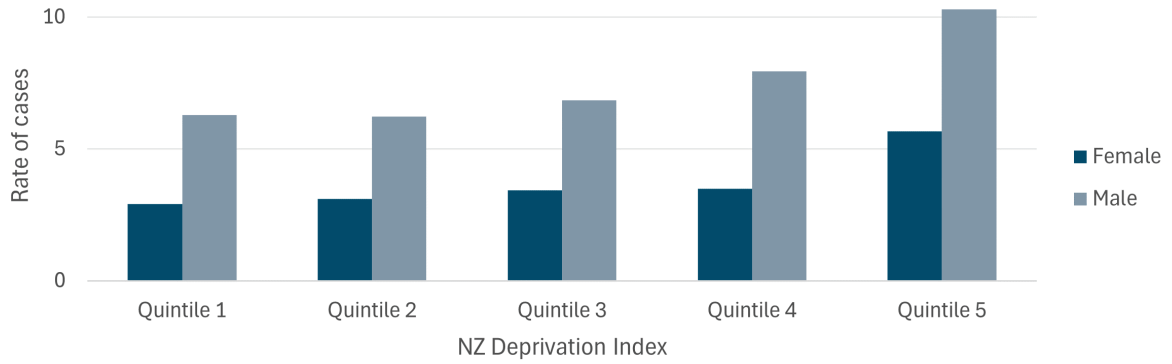

Fig. 3.11.2. Rate of gastric cancer registrations in 2017–2021 by New Zealand Deprivation Index quintiles. Rate is per 100 000 person-years and is age-standardized to the WHO world standard population. Compiled from Te Whatu Ora/Health New Zealand (2024) [7].

The incidence of peptic ulcers also varies by ethnicity. In 2015–2018, age-standardized rates of hospital admission for peptic ulcer in New Zealand (per 100 000 person-years) were 3.5 times as high in Māori people (50.8; 95% CI, 47.5–54.4) and 4.3 times as high in Pacific people (63.1; 95% CI, 57.9–68.6) as in European people (14.6; 95% CI, 13.8–15.4), and the admission rates in Asian people were intermediate (21.8; 95% CI, 19.7–24.1), when age-standardized to the Māori census population in 2001 [3].

Differential rates of *H. pylori* infection are the largest contributor to inequities in gastric cancer incidence in New Zealand [11], and this is probably also the case for peptic ulcers. The screen-and-treat approach for *H. pylori* is expected to be a useful tool to address existing gastric cancer inequities by ethnicity, and possibly also for groups with low socioeconomic position.

Gastric cancer risk factors

In addition to chronic *H. pylori* infection, other risk factors for gastric cancer in New Zealand are strongly patterned by ethnicity and socioeconomic position. For example, the population prevalence of smoking, obesity, and hazardous drinking is examined by the New Zealand Health Survey [12]. In 2022–2023, the percentage of adults who smoked every day was 17% in Māori people, 6% in Pacific people, 6% in European/Other people, and 3% in Asian people. The rates of obesity in adults were 67% in Pacific people, 48% in Māori people, 32% in European/Other people, and 14% in Asian people. The rates of hazardous drinking in adults were 25% in Māori people, 22% in Pacific people, 17% in European/Other people, and 5% in Asian people. These risk factors were also more common in adults living in areas with the highest levels of deprivation (unadjusted for ethnicity).

Hereditary risk

Higher rates of gastric cancer incidence in Māori people, particularly in younger age groups, have also been thought to be caused by an increased propensity towards mutation of the *CDH1* gene in particular family groups. A study has estimated that 6% of advanced gastric cancers in Māori people have a *CDH1* mutation [13], with higher rates found in younger age groups and for diffuse-type cancers. The rate of this mutation among European people in New Zealand with gastric cancer is less clear.

The impact of inherited genetic mutations appears to be particularly compounded by the presence of chronic *H. pylori* infection. Recent evidence from Japan shows an interaction between nine germline pathological variants and *H. pylori* infection. The lifetime risk of gastric cancer was strongly elevated in people with both *H. pylori* infection and one of these pathological variants (45% lifetime risk), compared with < 5% lifetime risk in people with no *H. pylori* infection and with one of these variants and 14.4% lifetime risk in people with *H. pylori* infection and none of these variants [14].

3.11.2 Inequities in current practice

Testing

In current primary care practice in New Zealand, the funded test for active *H. pylori* infection is the stool antigen test (SAT). The SAT is recommended in patients who present with one of the following risk factors [15]: history of peptic ulcer, family history of

gastric cancer, or dyspepsia and one of the following factors: aged ≥ 60 years; Māori, Pacific, Asian, or African ethnicity; or originating from an area with high (> 30%) prevalence of *H. pylori* infection (e.g. South Auckland, Porirua, East Cape; low- and middle-income countries, including in Asia). Urea breath tests are not publicly funded and are rarely used [2]. Serology is still widely used to test or screen for *H. pylori* and was more commonly used than the SAT until the end of 2018 [2].

Despite the higher prevalence of *H. pylori* infection in Māori, Pacific, Asian, and Middle Eastern, Latin American, or African people and the availability of ethnicity-specific guidelines, the rates of testing remain disproportionately low for Māori people and Pacific people [2–4], compared with testing rates for European people (who have low prevalence of *H. pylori* infection) [3]. In general, Māori people and Pacific people experience several barriers to primary care access and have the highest levels of unmet health-care needs [16]. Access to primary care in New Zealand usually requires co-payments (which differ between health-care providers), and funding for primary care has been found to have embedded historical inequity; unmet needs have been ignored, and services for Māori people have been systematically underfunded [17]. These underserved ethnic groups have the highest rates of gastric cancer incidence and are expected to gain the most (per-person) benefit from an *H. pylori* screen-and-treat approach, particularly if it is introduced with an equity focus [9].

Gastroscopy

Guidelines in New Zealand recommend referral for gastroscopy [15], for example when *H. pylori* treatment has failed, in people with persistent symptoms despite treatment, or in people with risk factors such as a first presentation of dyspepsia at age ≥50 years (or age ≥40 years in at-risk ethnic groups), a family history of gastric cancer onset at age < 50 years, severe or persistent dyspepsia despite treatment, previous peptic ulcer disease, coughing spells, or nocturnal aspiration. Despite the availability of ethnicity-specific guidelines, there are greater ethnic disparities in the rates of gastroscopy testing (e.g. in the use of rapid urease tests) than in primary care testing for *H. pylori* infection, suggesting even greater barriers to access to secondary care for Māori people and Pacific people compared with European people [2, 4]. These referral criteria do not guarantee access to gastroscopy, which varies geographically.

Treatment

Current treatment guidelines in New Zealand recommend triple therapy for 7–14 days with a proton pump inhibitor, amoxicillin, and clarithromycin (OAC) as a first-line treatment, with metronidazole as a potential substitute for either antibiotic [18]. Quadruple therapy is recommended as a second-line treatment in cases of eradication failure and comprises 2 weeks of a proton pump inhibitor, bismuth, tetracycline, and metronidazole [18]. This advice varies from the Maastricht VI/Florence Consensus report, which recommends first-line treatment with 14 days of bismuth-containing quadruple therapy in areas where clarithromycin resistance is > 15% (or unknown) and susceptibility testing is not available [19]. However, there is an urgent need to further investigate primary clarithromycin resistance rates, including by ethnicity [20].

Updated local information about clarithromycin and antibiotic resistance rates and *H. pylori* eradication rates would make a valuable contribution to the case for revising treatment guidelines in New Zealand [21]. This is particularly important given the increase in clarithromycin resistance globally. There is likely to be increasing resistance to first-line *H. pylori* treatment in New Zealand. In 2012, a small study (n = 73) in an area of New Zealand with a relatively high level of deprivation, in patients with positive gastroscopy specimens, reported 49% metronidazole resistance and 16% clarithromycin resistance [22] and 35% eradication failure of first-line treatment (OAC) in Māori people, Pacific people, and Asian people. A 2021 meta-analysis investigated antibiotic resistance of *H. pylori* in Australia and New Zealand [21] and reported a doubling of primary resistance to clarithromycin, to 16% (95% CI, 11–22%), after 2000 compared with before 2000.

Increasing antibiotic resistance and poor eradication rates make it vital to improve retesting with the SAT, i.e. 4–6 weeks after completion of treatment [20] in line with international guidelines [19]. Retesting is not in the current treatment guidelines in New Zealand, and its use remains low [4]. Retesting enables the use of second-line therapy to improve eradication rates and also could improve the usefulness of laboratory data for monitoring eradication rates. The guidelines for *H. pylori* treatment in New Zealand need to be revised and updated, and work on this is ongoing.

Ethnicity data quality

Accurate ethnicity data are crucial for equitable health care, and for targeted participation in a screen-and-treat strategy, but Māori people are undercounted in health data [23]. Improved protocols are needed for consistent, accurate ethnicity data collection.

3.11.3 Cost–utility modelling for population and targeted screen-and-treat approaches

Cost–utility modelling was applied to the New Zealand setting, using *H. pylori* infection and gastric cancer epidemiology data from 2011 [9]. An important contribution of this work is a comparison of the cost–effectiveness of *H. pylori* screen-and-treat approaches between Māori people (who have a moderate risk of gastric cancer) and the remaining population (who have low rates of gastric cancer on average; this remaining population also includes groups with a high risk of gastric cancer, such as Pacific people, who are likely to be a small proportion overall). The following model inputs were applied at different rates for Māori people and non-Māori people: (i) proportion of gastric cancer that is non-cardia gastric cancer, (ii) coverage of testing, (iii) eradication rate of triple therapy, and (iv) *H. pylori* seroprevalence. Two *H. pylori* screen-and-treat scenarios were evaluated based on the diagnostic test used: one analysis used serology (primary analysis), and the other used the SAT. The most relevant SAT results are reported here, given that serology is not recommended for diagnosing infection.

The SAT scenario cost NZ$ 369 million and resulted in 15 300 quality-adjusted life years (QALYs) gained in men and women aged 25–69 years, with lifetime follow-up. This resulted in an incremental cost–effectiveness ratio (ICER) of NZ$ 29 000 per QALY gained. If Māori people alone were targeted, the cost would be NZ$ 49 million and 4200 QALYs would be gained, which equates to a better-value ICER of NZ$ 13 700 per QALY gained.

The *H. pylori* screen-and-treat programme in the whole population had 4 times the absolute health gain (i.e. clinical effectiveness, QALYs) compared with targeting Māori people alone, but at more than 7 times the cost. However, the cost for targeting Māori people may be more than double if a programme were to include other known high-risk groups. The QALYs gained by Māori people were even greater in equity analyses in which life expectancy was set to the same level as that of non-Māori people [9]. The

greater cost–effectiveness in Māori people is likely to be similar in other groups with high rates of *H. pylori* infection and gastric cancer in New Zealand.

Although the modelled programme in the whole population was cost-effective, it was more cost-effective with a targeted approach for Māori people (Fig. 3.11.3) [9]. This supports the recommendation that high-risk groups would be a useful priority for implementation of this programme.

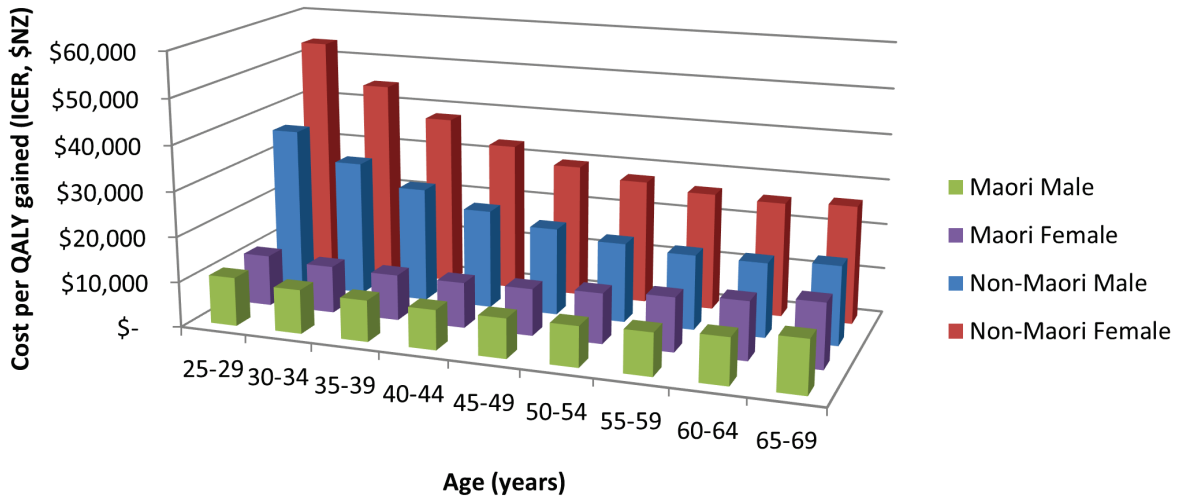

Fig. 3.11.3. Modelled cost–effectiveness of an *H. pylori* screen-and-treat programme in New Zealand in 2011 by ethnicity, sex, and age. ICER, incremental cost–effectiveness ratio; QALY, quality-adjusted life year. Reproduced from Teng et al. (2017) [9].

Further cost–effectiveness modelling would be useful to assess the costs and benefits of targeting additional high-risk groups and the impact of different testing and treatment modalities, such as the use of different types of tests, different treatment choices, and the inclusion of gastroscopy for participants who have clinical indicators of potential gastric cancer. This is possible as more precise model inputs become available, for example better estimates of *H. pylori* prevalence and eradication rates.

3.11.4 Prevention approaches being investigated

The New Zealand Cancer Action Plan 2019–2029 sets out a plan to develop a strategy to address *H. pylori* infection in priority populations [24]. Gastric cancer is one of the top 10 contributors to the life expectancy gap for both Māori people and Pacific people in New Zealand (compared with European people), and thus is a priority in the public health system.

Several research streams were in the field in mid-2024, with the aim of informing the future implementation of an *H. pylori* screen-and-treat pilot or programme. These studies are investigating (i) community estimates of *H. pylori* prevalence and a subsequent management pathway, in the *H. pylori* in Aotearoa New Zealand (ENIGMA) Study; (ii) a family-based index-case method focused on Indigenous people, recruiting participants for an *H. pylori* screen-and-treat study (Puku Ora Feasibility Study); and (iii) *H. pylori* antibiotic resistance rates using the polymerase chain reaction (PCR) for genetic markers and culture.

H. pylori *in Aotearoa New Zealand (ENIGMA) Study*

The objectives of the *H. pylori* in Aotearoa New Zealand (ENIGMA) Study are outlined in Box 3.11.1. In summary, the study's main objective is to investigate the ethnicity-specific distribution of *H. pylori* infection in New Zealand (using biological specimens), the risk factors for *H. pylori* infection (using survey data), and the overlap of *H. pylori* infection with risk factors for gastric cancer, along with testing markers of antibiotic resistance, and the effectiveness and acceptability of *H. pylori* case management. The study started recruiting in early 2024 and plans to report initial results in 2025.

Box 3.11.1. Objectives of the *H. pylori* in Aotearoa New Zealand (ENIGMA) Study

Primary objective

1. Measure the age-specific prevalence of *H. pylori* infection overall and among Māori people, Pacific people, and non-Māori, non-Pacific people in New Zealand, including by sex.

Secondary objectives

2. Examine potential risk factors for *H. pylori* infection for the total study population and by population subgroup, including their prevalence and distribution.
3. Measure the prevalence of potential co-factors, including virulence factors, that may be important in the pathogenesis of gastric cancer by *H. pylori* infection status.
4. Measure the prevalence of clarithromycin and antibiotic resistance by PCR from stool (faecal) samples.
5. Investigate the feasibility, acceptability, and costs of different *H. pylori* tests in the New Zealand setting.
6. Examine the acceptability, feasibility, and effectiveness of positive case management.

The study uses a cross-sectional survey design with a general community sample coverage, with participants selected by secondary sampling from past respondents to the New Zealand Health Survey. The aim was to include 1188 participants with equal numbers of Māori people, Pacific people, and people from the remaining European/Other groups, and equal numbers of people across 10-year age groups. Participants aged 12–69 years with no history of gastric cancer were eligible.

Participation involves responding to a survey by telephone, having a blood test at a local laboratory, and the option of submitting a stool sample (which has the added benefit of investigating a diagnosis of *H. pylori* infection). In the early stages of the study, about one third of participants were opting in for stool testing.

Any participant with a positive serology test result is followed up with an SAT sent to their home address (if the participant had not already opted in for this test). Participants collect the stool sample at home and submit it on the same day to a local community laboratory, where it is frozen. The sample is kept chilled for transportation to a centralized location for testing. Participants are asked to wait 15 days after the completion of any course of antibiotics or proton pump inhibitors (if appropriate) before they do the SAT.

For participants with a positive SAT result, case management is organized by a research nurse, who contacts participants by telephone to share the results, ask about the relevant medical history, and arrange treatment. A gastroenterologist writes the prescriptions, which are then sent to a local pharmacy. The participants collect the treatment, and the research nurse follows up to find out whether participants received the medication and have completed the treatment course. Retesting with the SAT is done to assess eradication at 6 weeks after completion of treatment. A holistic approach to case management has been taken and is carried out via a Māori health provider. This treatment pathway will be assessed by investigating rates of treatment, treatment completion, retesting, and eradication failure. Measures of acceptability and any barriers reported by participants will be assessed.

The key outcome measures from the study will be ethnicity-specific rates of participation, testing, *H. pylori* prevalence, treatment completion, and eradication, prevalence of clarithromycin resistance genes, and virulence factors.

The goal is for the findings to be generalizable nationally, but challenges to this include uncontactable participants, the geographical coverage of laboratory services relative to the population, and the low numbers of Pacific people in the primary sampling frame, which will necessitate additional recruitment pathways.

Puku Ora Feasibility Study

The Puku Ora Feasibility Study aims to take a Kaupapa Māori, holistic, strength-based approach to test the feasibility of an approach that addresses the health inequities between Māori people and non-Māori people in New Zealand in gastric cancer and colorectal cancer. A combined screening approach is used to screen and treat for *H. pylori* infection and to screen for colorectal cancer using a single stool sample, in a

Māori-specific context for people aged 45–60 years. Education and encouragement are given to promote participation in the National Bowel Screening Programme, for those who are not already participating. Participants older than 60 years and adults younger than 45 years are tested for *H. pylori* infection only. In mid-2024, this study was in its recruitment phase.

Antibiotic resistance studies

Several studies in New Zealand are investigating *H. pylori* antibiotic resistance in different clinical contexts, including the *H. pylori* in Aotearoa New Zealand (ENIGMA) Study. Rates of *H. pylori* antibiotic resistance in positive gastroscopy isolates are being investigated in the Wellington region. The study is recruiting symptomatic patients undergoing gastroscopy who have had a positive rapid urease test result. The aim of this study is to inform more precise treatment choice to improve eradication rates. Recruitment was completed in 2024, and DNA extraction and clarithromycin resistance gene testing have been done. The participants are being followed up to assess treatment completion and success of eradication. Similar methods are being applied to people with positive SAT results. Another study is investigating *H. pylori* antibiotic resistance in a similar clinical setting in Auckland.

3.11.5 Future directions

The following list provides some of the information needs and outstanding questions that would help to support the implementation of a screen-and-treat pilot or programme in New Zealand [20]. Chapter 4 gives further explanation about the needs and readiness in New Zealand.

Targeting:

1. Consensus on whether to aim for an untargeted population programme or focus on targeting high-risk groups. Targeting decisions could be informed by analysis of *H. pylori* prevalence and peptic ulcer and gastric cancer rates by age, sex, and ethnicity, including subgroups (e.g. East Asian and South Asian people), socioeconomic position, country of birth, family history, and other potentially relevant factors.
2. Consider expanding screen-and-treat processes to household members of positive cases detected through the initial inclusion criteria.

Testing:

3. Consensus on choice of diagnostic test (balancing ethnicity-specific acceptability, capacity of the health system, and costs), for example the SAT, serology then the SAT, or either with the urea breath test instead of the SAT. Consider where and how these tests will be done.
4. Determine the rates of reinfection in New Zealand and whether subsequent follow-up testing is needed.
5. Examine the acceptability of *H. pylori* screen-and-treat strategies for Māori people and Pacific people, and which methods of engagement would improve awareness and participation.

Treatment:

6. Up-to-date *H. pylori* treatment resistance information for current and alternative first-line and second-line therapies to inform improved national treatment guidelines:
    a. choice of first-line therapy (considering increasing resistance rates);
    b. introducing retesting as standard practice.
7. Develop a plan for assessing who is at high risk and should be referred for gastroscopy for diagnosis of gastric cancer. Will blood markers of gastric cancer risk be used? What are the service impacts of this for diagnosis of cancer?

Programme:

8. Cost–effectiveness analysis of different targeting, testing, treatment, and combination screening approaches.
9. Information on the pros and cons of delivering treatment and retesting via primary care or other more centralized or telehealth processes.
10. Development of an equitable process for invitation to screening, participation, and follow-up for treatment.
11. Consider how the screen-and-treat approach will be integrated with other screening programmes, for example in primary care like the cardiovascular risk

assessment, or combined with national-level colorectal cancer screening, lung cancer screening, or hepatitis screening.

12. Ongoing input from experts in Māori and Pacific health, migrant health, gastroenterology, primary health care, public health, microbiology, health service improvement, and epidemiology to support the development of a screen-and-treat model for New Zealand.

13. Commitment from funders and the public health system to introduce a pilot of the approach, with ongoing feedback informing improvements. This includes developing information technology to generate a system to provide a register, produce invitations, make bookings, carry out recall, and monitor outcomes.

New Zealand is well placed to make progress in addressing gastric cancer inequities, and an *H. pylori* screen-and-treat approach presents itself as a key tool. An equity approach to implementation will be key for reversing higher rates of gastric cancer in Māori people, Pacific people, and other high-risk groups. The next step is for funders and the public health system to invest in scaling up and piloting a risk-based target population *H. pylori* screen-and-treat strategy.

Useful research to support the next step includes investigation of sociodemographic risk factors to consider for risk-based targeting, sensitivity and specificity of testing approaches in New Zealand, which testing approach has the highest uptake by ethnicity, *H. pylori* eradication and resistance rates by ethnicity, and cost–effectiveness analysis of selected screen-and-treat approaches.

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