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Closing the equity gap in colorectal cancer screening for migrant communities: a qualitative study of first-generation Middle Eastern migrants in Australia and the case for an adaptive screening architecture

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Abstract

Background

Migrant and ethnic minority populations participate in organised colorectal cancer (CRC) screening programmes at consistently lower rates than host populations across high-income countries. Prior qualitative research has identified barriers spanning cultural beliefs, health literacy, and system access, but these have predominantly been examined as discrete, domain-specific factors, with little focus on how these barriers co-occur and interact. First-generation Middle Eastern migrants are particularly under-screened and remain largely absent from qualitative research on screening engagement. This study explored factors influencing CRC screening participation among first-generation Middle Eastern migrants in Australia, using inductive thematic analysis to examine how barriers are experienced within this community.

Methods

A qualitative study using semi-structured interviews with nineteen first-generation Middle Eastern migrants aged 50–74 years, eligible for Australia's National Bowel Cancer Screening Program (NBCSP), was conducted in New South Wales between August 2023 and August 2024. Participants were recruited through community organisations. Data were analysed using inductive thematic analysis following Braun and Clarke, supplemented by participant-level barrier matrix mapping.

Results

Of the 19 participants: 12 had never completed screening, 5 had completed at least one kit but not their most recent, and 2 completed their screening consistently. Despite high rates of non-participation, most reported openness to future screening. Four themes shaped participation: psycho-socio-cultural attitudes towards cancer and risk; socially mediated health information and trust; health system access and engagement; and modality-specific barriers related to the faecal immunochemical test (FIT) process. Barriers co-occurred and interacted across domains within individual accounts, and barrier configurations varied markedly across participants: no two participants presented the same barrier combination. Screening readiness was context-dependent, with cycles of intention and deferral shaped by life circumstances and programme timing.

Conclusions

Our findings show that barriers to colorectal cancer screening among first-generation Middle Eastern migrants co-occur, differ across individuals, and shift over time. This heterogeneity argues against uniform targeted interventions and for an adaptive screening architecture – flexible in modality, timing,

engagement, and educational framing – that delivers equity of opportunity rather than equality of offering.

Background

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and the second leading cause of cancer-related death worldwide [1]. Early detection through population-based screening substantially improves survival: five-year relative survival approaches 99% for localised disease but falls below 15% for advanced stages [2, 3]. Organised screening programmes using faecal immunochemical testing (FIT) have been implemented across high-income countries, including Australia, the United Kingdom, the Netherlands, and several other European nations, with participation targets typically set between 65% and 80% to maximise population benefit [4–7].

Despite established programme infrastructure, participation remains unevenly distributed. Migrant and ethnic minority populations consistently screen at lower rates than host populations across multiple national programmes [8–10]. In Australia, where the National Bowel Cancer Screening Program (NBCSP) has offered biennial FIT to adults aged 50–74 years through a home-based postal model - with eligibility extended from 1 July 2024 to allow adults aged 45–49 to request their first kit - overall participation was 41.7% in 2022–2023 [11, 12], well below the national target, and is significantly lower among culturally and linguistically diverse migrant communities [13–15]. Within these communities, first-generation Middle Eastern migrants represent a particularly under-screened group [14, 16–19] yet remain largely absent from qualitative research on screening engagement [20, 21].

A substantial body of qualitative research has examined barriers to CRC screening among migrant and ethnic minority populations internationally, identifying important factors such as limited health literacy, symptom-led risk appraisal, cancer fatalism and stigma, reliance on clinician endorsement, and modality-specific aversions [8, 22–28]. These barriers have typically been organised into discrete domains – cultural beliefs, health system access, individual psycho-social factors – and treated as independent factors amenable to separate interventions [24, 29]. Less attention has been given to how barriers interact or co-occur within individual experience, how the profile of barriers varies across individuals within the same community, or whether screening readiness is stable or responsive to changing life circumstances [30, 31]. These questions have direct implications for intervention design: if barrier experience is heterogeneous within a community rather than shared across it, then the expectation that identifying barriers within a defined population enables the design of uniform targeted interventions may itself warrant examination [17, 30, 32].

This study explored factors influencing CRC screening participation among first-generation Middle Eastern migrants in Australia. Australia's NBCSP - a nationally organised, FIT-based programme delivered through a home-based postal model on a fixed biennial schedule [11, 31, 33] - exemplifies the uniform screening delivery architecture common to organised programmes internationally. Using inductive thematic analysis, we examined what barriers and influences participants reported, and how these were

experienced and configured within individual accounts. The findings suggest that closing participation disparities cannot be addressed solely through improved outreach within the existing delivery model. Instead, we propose an adaptive screening architecture: a delivery strategy in which core programme components - modality, timing, engagement channel, and educational framing - are combined and adjusted to accommodate individual barrier configurations. We position this as a shift from equality of offering toward equity of opportunity.

Methods

Study design

We conducted a qualitative study using semi-structured interviews and inductive thematic analysis [34], informed by a pragmatic, applied qualitative orientation. The study aimed to identify participant-reported influences on CRC screening engagement without applying a pre-specified explanatory framework.

Setting and context

The study was conducted in New South Wales, Australia, between August 2023 and August 2024 within the context of Australia's publicly funded NBCSP. During most of the study period, the NBCSP offered biennial FIT screening to adults aged 50–74 years through a home-based postal model, with kits completed independently and returned by post without direct clinical involvement. From 1 July 2024, the starting age for the programme was lowered to 45 years; adults aged 45–49 years could request their first FIT kit, while adults aged 50–74 years continued to receive kits biennially through the mail [11]. Participants were recruited through Sydney-based cultural and religious community organisations serving Middle Eastern migrant communities.

Participants and recruitment

Eligible participants were aged 50–74 years at study commencement, born overseas, self-identified as Middle Eastern, able to communicate in English, and willing to participate in an online interview. Eligibility criteria reflected the NBCSP age range in effect at the time of study commencement; the subsequent lowering of the starting age to 45 years (from 1 July 2024) did not alter the recruitment criteria. Recruitment was conducted on a rolling basis through posters displayed at participating Sydney-based cultural and religious community organisations. Interested individuals contacted the research team directly using the details provided on the study materials. All eligible volunteers who responded were included. Written informed consent was obtained before participation.

Nineteen participants were recruited, with variation in age, sex, country of birth, screening history, and length of residence in Australia. Recruitment and analysis proceeded iteratively rather than to a predetermined sample size. Sample size was guided by the concept of information power, which

considers the study aim, sample specificity, quality of dialogue, and analytic strategy [35]. Several factors supported adequacy at this sample size: the study aim was narrow and applied; the sample was highly specific to the target population; interviews achieved substantial dialogue quality, with most lasting 40 minutes or longer and generating detailed accounts of screening decision-making; and the inductive analytic strategy drew on cross-case comparison rather than requiring saturation of a pre-specified theoretical framework [35]. The research team judged that 19 interviews provided sufficient informational richness and thematic depth to address the study aims. No participants declined or withdrew from the study.

Data collection

Interviews were conducted by the first author, a male MD/PhD candidate of Middle Eastern background with formal qualitative research training in interview-based methods and thematic analysis, and no prior relationship with participants. A semi-structured interview guide (Supplementary file 1) was developed from relevant literature and expert consultation and explored views and experiences relating to bowel cancer screening, health service engagement, and interactions with the NBCSP invitation and FIT kit process. Two early interviews were used to pilot the guide; no substantive changes were made, and these interviews were retained in the final analysis.

One-to-one interviews were conducted in English via online video call and ranged from 20 to 70 minutes (mean 40 minutes). No non-participants were present during interviews, and repeat interviews were not conducted. Although the guide was used consistently across interviews, participants were able to elaborate on issues they considered important before returning to the core topics. Audio recordings were transcribed verbatim using OpenAI Whisper (V2) [36] and manually checked against the recordings for accuracy. Participants received a copy of their transcript within five days for factual review; no substantive amendments were requested. The analytic record comprised audio recordings, verified transcripts, and ongoing analytic discussion. No formal observational field notes were recorded.

Data analysis

Data were analysed using inductive thematic analysis following Braun and Clarke [34]. Transcripts were managed in Microsoft Word and Excel, and analysis began alongside data collection and proceeded iteratively. Two researchers coded all transcripts in parallel using open coding to identify barriers, influences, and decision-making factors related to screening participation described in participants' accounts. After the first eight to ten interviews, an initial working coding framework was developed and then iteratively refined as subsequent transcripts were analysed. Candidate subthemes and broader themes were generated through comparison and grouping of codes across transcripts and were refined through team discussion. Divergent interpretations were explored through discussion and joint re-reading of transcripts, with the aim of refining and deepening interpretation rather than establishing formal coding agreement. No inter-coder reliability statistics were calculated. Later interviews yielded refinements to existing subthemes, but no substantively new barrier concepts or thematic domains

emerged, supporting the judgement that the sample provided sufficient thematic depth for the study aims.

After development of the final themes, subthemes, and barrier concepts, we undertook a secondary participant-level matrix mapping step to examine how specific barriers were distributed across the sample. Matrix rows represented participants and columns represented individual barrier concepts derived from the final coding framework. For each participant, a barrier was coded as present when the transcript contained either an explicit statement or a clear contextual account indicating that the barrier contributed to non-participation, delay, reluctance, or difficulty engaging with screening. Repeated references to the same barrier within a participant's interview were counted once at participant level only. Matrix coding used binary presence/absence values and was based on the participant's account as a whole rather than isolated quotations. Initial matrix mapping was undertaken by the first author and reviewed by a second researcher against the original transcripts to ensure that barrier assignment remained grounded in the full narrative context; uncertainties were resolved through discussion and return to transcript context. The matrix was used descriptively to examine participant-level heterogeneity, summarise the distribution and frequency of barriers across the sample, and identify where barriers from different thematic domains co-occurred within the same participant account. Absence of a barrier in the matrix indicates that it was not identified in that participant's interview rather than definitive absence from that participant's lived experience. Co-occurrence was treated as an analytic aid for interpretation rather than as evidence of statistical association or causal interaction.

In addition, close reading of participants' retrospective accounts was used to examine how reported openness to screening shifted according to explanation, circumstances, and timing. These temporal interpretations were derived from narrative reading of participant accounts rather than from matrix mapping.

Researcher reflexivity and rigour

The interviewer's shared Middle Eastern background was a deliberate methodological consideration intended to facilitate trust and disclosure on culturally sensitive topics, including cancer stigma, fatalism, and aversion to stool handling. At the same time, cultural proximity carried a risk of assumed shared understanding and under-probing of responses that appeared self-evident. To mitigate this, the interviewer used reflective prompts during interviews to encourage participants to elaborate on meanings and experiences that might otherwise have remained implicit. A second clinician-researcher, who was also a first-generation migrant to Australia, of South Asian background, contributed an additional analytic perspective during coding and interpretation, while maintaining sensitivity to migration and cultural context.

A key reflexive observation concerned the team's prior assumptions about the data. The research team initially anticipated finding a relatively shared set of barriers experienced within this participant group, expecting that individuals from the same cultural background would describe similar barriers to screening. This expectation was progressively challenged during analysis as significant within-group

variation became apparent and emerged as an explicit focus of interpretation, resulting in the formation of the participant-level barrier matrix map.

Analytic rigour was supported through iterative recruitment and analysis, parallel coding followed by collaborative interpretation, and maintenance of an audit trail linking transcript excerpts to codes, subthemes, themes, and participant-level matrix mapping. Participants were invited to review transcripts for factual accuracy but were not asked to comment on the analytic interpretation. Detailed reporting of participant characteristics and study context was provided to support assessment of transferability. Reporting followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist [37] (Supplementary file 2).

Ethics approval

Ethical approval

was obtained from the University of Tasmania Human Research Ethics Committee (reference H0027982). All participants provided written informed consent. De-identified transcripts were stored securely on password-protected servers, with access restricted to the research team.

Results

Participant characteristics

Nineteen first-generation Middle Eastern migrants participated. Sociodemographic characteristics are presented in Table 1. The median age was 59 years (IQR 53–63; range 50–74). Most were male (11/19; 58%) and of Lebanese origin (14/19; 74%). The median age at migration was 22 years (IQR 16–26; range 1–38).

Table 1
Sociodemographic characteristics of participants (N = 19)

Characteristic	n	%	Median (range)
Age (years)			**59 (50–74)**
50–54	5	26.3	
55–64	10	52.6	
65–74	4	21.1	
Sex			
Male	11	57.9	
Female	8	42.1	
Country of origin			
Lebanon	14	73.7	
Other (Palestine, Iraq, Iran)	5	26.3	
Age at migration (years)			**22 (1–38)**
Childhood/adolescence (< 18 years)	8	42.1	
Early adulthood (18–30 years)	8	42.1	
Mature adulthood (> 30 years)	3	15.8	
Occupational category			
Professional and managerial	5	26.3	
Administrative and sales	5	26.3	
Trades, technical and small business	3	15.8	
Community, care and home duties	3	15.8	
Retired or not currently working	3	15.8	

Table 2 presents screening behaviour and self-reported future engagement intention across three participation groups: those who had never completed screening, those with incomplete participation (completed at least one kit in a previous round but not the most recent), and those with consistent participation. Overall, 17 of the 19 participants (89%) were not participating in the current round of the screening programme. Twelve participants (63%) had never completed a screening kit. Within this group, four had never opened the kit, two had opened it but did not read the materials, and six read the materials but chose not to proceed with testing. Five participants (26%) had completed at least one kit in

a previous round but did not complete the most recent kit received. Two participants (11%) had completed all kits received.

Despite high rates of non-participation, most participants reported openness to future screening. Among the 12 who had never screened, eight expressed openness to future screening, two were unsure, and two were not open. Similarly, four of five participants with incomplete participation expressed openness to future screening. These self-reported intentions, elicited during the interview, indicate that most non-participating participants did not describe a firm decision against screening - a pattern examined further in the thematic findings below.

Table 2

NBCSP screening behaviour and future engagement intention (N = 19). NBCSP, National Bowel Cancer Screening Program. Subcategory percentages marked are within the never-screened group (n = 12). Incomplete screening participation: completed one or more screening kits but chose not to complete the most recent kit delivered. Consistent screening participation: completed all kits received. Future screening engagement intention was self-reported at time of interview.

Screening group / kit interaction	n	%	Open to future screening	Unsure about future screening	Not open to future screening
Never screened	**12**	**63.2**	**8**	**2**	**2**
Received kit; never opened	4	33.3	2	1	1
Opened kit; did not read materials	2	16.7	1	1	0
Read materials; did not proceed with testing	6	50.0	5	0	1
Incomplete screening participation	**5**	**26.3**	**4**	**1**	**0**
Consistent screening participation	**2**	**10.5**	**2**	**0**	**0**

Thematic findings

Analysis identified four themes shaping screening participation (Table 3): psycho-socio-cultural attitudes towards cancer and risk; socially mediated health information and trust; health system access and engagement; and modality-specific barriers related to the FIT kit process. Each theme is presented below, followed by a cross-cutting analysis of how barriers co-occurred across domains and varied across individuals within the sample.

Table 3

Themes and sub-themes. Themes and sub-themes represent analytic categories derived from thematic analysis of participant interviews; concepts are the emergent ideas that verbatim quotes were categorised under.

Theme	Concepts
Theme 1. Psycho-socio-cultural attitudes shape perceptions of bowel cancer screening	
Sub-theme 1.1. Perceptions of risk shape screening decisions	● Lack of symptoms leads to low perceived risk and reduced motivation for screening ● Screening is viewed in response to illness, rather than for prevention ● Family history shapes perceptions of risk
Sub-theme 1.2. Fear and uncertainty drive avoidance	● Fear of diagnosis and anticipated bad news drives avoidance ● Avoidance is a mechanism for emotional protection ● Understanding the “why” reduces fear and uncertainty
Sub-theme 1.3. Cultural and personal narratives shape engagement	● Cancer is taboo or shameful, limiting open discussion ● Fatalistic beliefs reduce perceived value of prevention ● Personal stories shape fear, urgency, and motivation ● Migration history shapes screening views
Sub-theme 1.4. Life pressures postpone screening	● Work and caregiving compete with preventive care ● Ongoing health burden reduces capacity for self-care
Theme 2. Healthcare information: sources, trust, and information flow	
Sub-theme 2.1. Socially mediated information pathways	● GPs are the preferred source for screening advice ● Preference for doctors from the same community ● Family relationships strongly influence health decisions ● Community leaders are a trusted source for health advocacy ● Online searching favours official sources, but can amplify anxiety
Sub-theme 2.2. Visibility and framing of screening communication	● Screening remains unspoken in GP encounters

Theme	Concepts
Theme 1. Psycho-socio-cultural attitudes shape perceptions of bowel cancer screening	
	● Reminders and prompts improve uptake once willingness exists ● The language used to explain screening affects engagement
Theme 3. Healthcare system: access, affordability, and availability	
Sub-theme 3.1. Time and access friction deprioritise prevention	● Symptom-driven care sidelines preventive screening ● Time-pressured consultations limit discussion ● Difficulty obtaining GP appointments and long wait times ● Access to multi-lingual support services is highly regarded ● Convenience is important within busy schedules
Sub-theme 3.2. Care progression depends on self-advocacy and financial resources	● Dismissal in care undermines trust ● Self-advocacy compensates for system neglect ● Government-led programs signal care and legitimacy ● Perceived delays in public care favours private services ● Financial constraints affect willingness to engage with healthcare
Theme 4. Screening modality: process, usability, and acceptability of the FIT kit	
Sub-theme 4.1. Low-touch delivery and the autonomy-reassurance trade-off	● Postal delivery reduced perceived seriousness; unsolicited mail resembled scams ● Home testing offered privacy and reduced embarrassment ● Autonomy meant kits could be forgotten or deferred without prompting ● Some preferred clinic-based testing for supervision and reassurance
Sub-theme 4.2. Process burden and usability barriers	● Clear instructions supported some; mismatches led to abandonment ● Multiple steps required sustained effort across several days ● Family support could scaffold understanding or lead to discarding

Theme	Concepts
Theme 1. Psycho-socio-cultural attitudes shape perceptions of bowel cancer screening	
	● Sample return and post-test communication introduce uncertainty ● Timing bowel movements with sampling disrupts routines and creates friction ● Completion requires readiness and follow-through over multiple days
Sub-theme 4.3. Stool handling creates embodied avoidance	● Stool collection is experienced as unpleasant, vulgar, or culturally uncomfortable ● Stool-sampling discomfort can be overcome, when motivation to screen is activated ● The provided collection instruments can be confusing, difficult, or off-putting
Sub-theme 4.4. Preferences for simpler, routine-integrated alternatives	● Time-minimising, integrated, and low-planning models are preferred ● Alternative modalities are evaluated through comfort, ease, invasiveness, and perceived benefit

Theme 1. Psycho-socio-cultural attitudes shape perceptions of bowel cancer screening

Sub-theme 1.1. Perceptions of risk shape screening decisions

Risk appraisal was symptom-led. Feeling well reduced perceived vulnerability and urgency, and screening was often framed as something to do when unwell rather than for prevention.

"I'm really, really sick. I think that'll be the only push to, like, oh, damn. I gotta do it." [P13]

Family history and ageing influenced perceived susceptibility but did not reliably prompt action. Some anchored risk to heredity or to a sense of being too young or healthy to be vulnerable and acted on these appraisals by disregarding the kit.

"It's amazing, I'm now 62, but at 50, you think, yeah, I'm still invincible… Especially when there is no history in the family as well. So yeah, I just ripped it." [P8]

Sub-theme 1.2. Fear and uncertainty drive avoidance

Fear of diagnosis and uncertainty about consequences contributed to avoidance. Waiting for results was experienced as distressing, making screening feel psychologically risky.

“Definitely. What if something comes back positive? What am I going to do?” [P2]

“Because I don’t wanna know… I don’t wanna wait for the result [and] live under stress.” [P17]

For some, avoidance was a deliberate strategy for emotional self-protection.

“I’m afraid of the unknown… ignorance is bliss… I knew what it was for, and I didn’t want to take any part of it.” [P10]

Sub-theme 1.3. Cultural and personal narratives shape engagement

Cancer was described by some as taboo and was avoided in open discussion. Fatalistic beliefs reduced the perceived value of prevention.

“She won’t say he got cancer… won’t even say the name.” [P17]

“If we’re gonna die, we’re gonna die.” [P13]

Personal stories could shape emotional readiness, with encounters of others experiencing late-stage disease shifting attitudes toward prevention.

“I knew I was a bit lazy at the beginning… it was just forgetting, not caring enough initially… but then a friend of mine who’s had a [colostomy] bag, had that just sitting under his shirt… So that sort of went, you know what, if it’s early, it’ll be treatable.” [P2]

Migration history also shaped expectations about whether preventive screening should occur before symptoms.

“But in my country… there is nothing for you before you’re getting sick… maybe the Australian plan is much wiser… before you get sick.” [P12]

Sub-theme 1.4. Life pressures postpone screening

Competing responsibilities displaced prevention even when screening was valued. Work and caregiving responsibilities reduced capacity, while cumulative stress and health burdens diminished readiness.

“My time now… it’s been divided because I look after my wife with Alzheimer’s” [P4]

“It’s just that being too busy in life… you say oh, tomorrow, oh, tomorrow.” [P13]

Many described an intention to screen, followed by repeated deferral, especially when the kit entered the home.

“I got the kit… put it in the drawer, I’ll do it tomorrow… And not knowing what or how, you’re sort of put off by it.” [P2]

Theme 2. Healthcare information: sources, trust, and information flow

Sub-theme 2.1. Socially mediated information pathways

Health decisions were relational. GPs were preferred sources of advice and reassurance, often with strong deference to clinician guidance.

“The most [trusted health source] would be the GP… I have a lot of faith and trust in what advice he gives.” [P2]

Cultural familiarity and transnational networks also shaped trust. Some maintained health connections with clinicians in their country of origin alongside their Australian GP.

“If I wake up and I feel that I have a headache, I send them [overseas doctors] SMS with WhatsApp. I mean, even after years of being here, the first thing is with them… And then I go to the GP. But still, I have a very good connection with [doctors] overseas.” [P12]

Family members interpreted information and reinforced screening importance, while community leaders were seen as credible advocates who could mobilise engagement within the community.

“Look, I tend to stick to what my wife says… Yeah, that’s my main source.” [P3]

“My daughter told me, when they sent the mail to you, it’s important, you have to look at it because they didn’t send it for playing with you.” [P18]

“If the Sheikh [community leader] is there, well, you know it must be something important… He’s a representative of the people and put on a pedestal because he’s a trustworthy person in the community that we can go to, to ask questions, to chat to, to get advice from. So, I think that anything that he would say would influence people” [P5]

Online searching was common but could amplify anxiety.

“I never advise anyone to look online… it gives you more stress and anxiety.” [P10]

Sub-theme 2.2. Visibility and framing of screening communication

Screening was often absent from routine consultations, reflecting missed opportunities for endorsement and explanation, with some participants noting this as a systemic gap.

“When I hit 50, I can’t remember any GP [asking]… even now, none of them ask… have you ever been screened?” [P7]

Some participants deliberately avoided raising screening with their GP, anticipating they would be told to participate.

“I didn’t [speak to the GP] because I’m sure he will convince me and say do it. So that’s why I didn’t tell him.” [P17]

Clearer understanding of the purpose of screening could reduce uncertainty and shift willingness. Participants preferred explanations that made the screening benefits concrete, particularly when framed in terms of early detection, staging, and outcomes.

“The way you said it: stage one, stage two, stage three, and with percentages. I think there is a point there.” [P7]

“You know, when I know why. Yeah. Now I wanna, I feel I wanna do it.” [P11]

“If someone had explained this to me, I would definitely participate.” [P19]

Prompts and reminders could trigger action once willingness existed.

“They persist sending messages… so I think okay I’ll just better go.” [P5]

Theme 3. Healthcare system: access, affordability, and availability

Sub-theme 3.1. Time and access friction deprioritise prevention

Primary care engagement was commonly symptom driven. Appointment delays and time-pressured consultations reduced opportunities to discuss prevention, and some participants described self-censoring preventive concerns due to perceived GP workload.

“I’ll see the doctor when I’m in pain… that’s about it.” [P1]

“It’s hard to get an appointment… I’ll probably have to book 10 days in advance.” [P7]

“Sometimes you find, yeah, he gives you time, but sometimes like if he’s in a hurry… We just ignore [asking] things, maybe because we feel like we ask too many questions and he is busy.” [P6]

Convenience features such as telehealth were valued as they reduced friction within busy schedules.

“The good thing about now contacting a doctor… is you can have a phone call. This is perfect.” [P15]

Sub-theme 3.2. Care progression depends on self-advocacy and financial resources

Some described dismissal and concerns about clinician competence, intensifying the need to self-advocate for investigations, follow-up, and reassurance.

“But when you go to the doctor, they don’t give you a chance to talk.” [P9]

“You have to really seek this support… You have to search for it yourself.” [P4]

Views on system support were mixed. Government-led care signalled support for some, while financial constraints and perceived public-sector delays - often operating together - influenced service choices for others.

“They [government] actually care because they’re sending this out.” [P2]

“Even in an emergency… if you don’t have money… no one will look after you.” [P11]

“Some people are telling me that it could be up to six months to go to see a specialist… People, they’re going somewhere else to be treated, they’re travelling somewhere else… And the price just to see a specialist… you need to have a budget for it.” [P15]

Theme 4. Screening modality: process, usability, and acceptability of the FIT kit

Sub-theme 4.1. Low-touch delivery and the autonomy-reassurance trade-off

Postal delivery sometimes reduced perceived seriousness and resembled unsolicited or suspicious mail.

“If it comes by the post, we don’t think it’s something urgent… you feel like scammers.” [P11]

Home testing was valued for privacy, yet autonomy enabled easy deferral or discarding of the screening kit in the absence of external prompts or clinical follow-up.

“At least you’re in the privacy of your own home.” [P2]

“I forgot about it in the fridge for a while… So, I just threw it out and didn’t send it in.” [P13]

Some preferred clinic-based testing for supervision and reassurance.

“I would prefer to go to a doctor… there’s someone there looking after me.” [P4]

Sub-theme 4.2. Process burden and usability barriers

Instruction clarity varied. Some found the kit straightforward, while others described mismatches between guidance and experience that led to abandonment.

“The instructions are pretty crystal clear… There are pictures and everything.” [P2]

“I tried but it didn’t work, so I just chucked it in the bin.” [P5]

Beyond comprehension, the kit demanded multiple steps and often multi-day follow-through, increasing planning burden. Sample return and post-test communication introduced further uncertainty.

“You gotta do the test kit, then you gotta pack it, and then you gotta go mail it… There’s multiple steps. Then when you send it out, you’re sitting there and you wait. I didn’t even get a response from the second one that I sent.” [P13]

“Sometimes you find it so difficult to repeat the action the next day.” [P14]

Sub-theme 4.3. Stool handling creates embodied avoidance

Stool handling was described as unpleasant or culturally uncomfortable.

“That turns me off… vulgar… really aggressive to pick up the stool.” [P4]

Collection instruments were described as confusing or off-putting.

“It’s the syringe… it did not work.” [P5]

Some overcame discomfort once motivation was activated.

“Do I really want to do this? And then got over that… Once I decided, I said I’m going to do it.” [P2]

Sub-theme 4.4. Preferences for simpler, routine-integrated alternatives

Participants preferred options that reduced time, planning, and contact with stool, and that integrated into existing healthcare routines, such as regular blood tests.

“Because I’m doing a blood test anyway… Combined with the normal blood test… you just give it to the same lab.” [P7]

Some drew direct comparisons to other screening programs they found more accessible.

“Like with the breast screening they have a van locally and you make an appointment… something like that would be very convenient.” [P5]

Alternative modalities were judged by comfort, ease, invasiveness, and perceived benefit; less invasive and passive concepts generated interest.

“If it was less invasive, I may have accepted it a lot more.” [P10]

“[Smart toilet paper] that’s interesting… rather than having to do that.” [P2]

“I think I’d like that instead [the capsule]. Yeah, absolutely.” [P3]

Barrier co-occurrence and variation across participants

The participant-barrier matrix (Fig. 1) shows the individual barriers identified in each participant’s account, organised by thematic domain. Most participants described barriers spanning at least two thematic domains, and several described barriers across all four. The most frequently identified individual barriers were (a) no GP endorsement (n = 11), (b) limited programme knowledge (n = 10), and (c) low perceived importance of the postal kit (n = 9); the full distribution is shown in Fig. 1. In several accounts, participants linked barriers from different domains within a single narrative of non-participation - for example, low perceived importance of the postal kit combined with competing life demands to produce repeated deferral rather than a single decision not to screen.

Barrier configurations also varied markedly across individuals. No two participants across the sample presented the same combination of identified barriers, despite the sample being relatively culturally homogeneous, with most participants sharing Lebanese origin. Four participants (P1, P3, P9, P14) had barriers confined to a single thematic domain, though the specific barriers and domains differed across them (Theme 1, 3, or 4); P3 was the only never-screened participant among them. One participant (P12) reported no identified barriers. The remaining participants described multi-domain profiles spanning psycho-socio-cultural beliefs, information and trust, practical engagement barriers, and FIT-specific process burdens. Participants differed not only in the number of barriers they described, but in the domains affected and the conditions under which screening became actionable. Screening non-participation was therefore not reducible to a single dominant barrier pattern but reflected substantial participant-level heterogeneity in both barrier burden and composition.

Discussion

This study explored factors influencing CRC screening participation among first-generation Middle Eastern migrants in Australia, a population that screens at substantially lower rates than both the general population and other migrant groups [8, 14, 16, 17], yet remains largely absent from qualitative research on screening engagement. The individual barriers reported here (symptom-led risk appraisal, cancer fatalism and stigma, reliance on clinician endorsement, stool handling aversion, and competing life pressures) are well documented across migrant and ethnic minority populations internationally [8, 22–28, 32, 38]. The contribution of this study lies in three observations about how barriers configure within and across individuals, and shift over time (Fig. 2): (1) the specific combination of barriers shaping an individual’s non-participation - what we term their barrier configuration - varied markedly across individuals within a single cultural sub-group; (2) barriers consistently co-occurred across thematic domains within individual accounts; and (3) screening readiness was described as context-dependent and episodic rather than stable.

Barrier configurations varied across individuals within the same community

The participant-barrier matrix revealed substantial variation in barrier profiles across the sample. Participants differed in how many barriers they reported, which thematic domains featured in their accounts, and the conditions under which screening would become actionable. This variation was present within a demographically narrow sample in which participants shared a common cultural background, were predominantly from a single country of origin, resided in the same city, and were eligible for the same screening programme. While no two participants presented the same barrier combination, the heterogeneity observed was not simply a function of combinatorial possibility across 24 binary barrier concepts; it was evident in the range of barrier burden, from single-domain profiles to dense configurations spanning all four themes, and in the qualitatively distinct circumstances under which participants described screening as actionable.

Two cases illustrate the programmatic relevance of this variation. One participant (P6) expressed willingness to be screened readily if a blood test integrated into routine pathology were available but would not complete the FIT kit under any circumstances. By contrast, another participant (P2) who had completed the FIT previously with no modality-related difficulty described their barrier as entirely temporal. These represent qualitatively different barrier configurations that would require different programmatic responses, and they cannot be resolved by a single intervention targeting the most prevalent barrier in the group.

This heterogeneity challenges a common assumption in the screening disparities literature: that identifying barriers within a defined population enables the design of targeted interventions for that group [8, 29, 30, 39]. Treating a migrant community as homogeneous in its screening barriers may obscure individual variation shaped by distinct migration histories, health system encounters, and personal dispositions [30, 31]. If heterogeneity of this magnitude were present within our narrow sample, it is reasonable to expect at least comparable variation within broader and more diverse migrant populations. The relevant question may therefore be less *“what barriers does this community face?”* than *“how do those barriers combine differently across individuals, and what does that variation mean for intervention design?”*

Barriers co-occurred across domains and were described as interacting

Among the 12 participants who had never screened, only one (P3) had barriers confined to a single thematic domain. For the remaining 11, screening non-participation reflected barriers operating simultaneously across psycho-socio-cultural, informational, health system, and modality-specific domains. Addressing a barrier in one domain while leaving others intact may therefore be insufficient to shift the outcome: improving kit instructions, for example, would not resolve stool handling aversion or fear of diagnosis operating together within the same individual’s account [32, 40].

Several participants described co-occurring barriers not merely as coexisting but as interacting and compounding one another. For P10, low perceived need made it easier to defer screening, and the kit then failed at the point of attempted use. For P6, time pressure and the multi-step process burden were described as tightly connected, producing repeated postponement rather than a single decision not to screen. Whether these interactions operate through specific causal mechanisms cannot be established from qualitative data and would require investigation beyond the scope of this study. However, the consistency of these linked accounts across participants suggests that the relationship between co-occurring barriers warrants further examination. [41, 42].

Screening readiness shifted with circumstances and timing

Many participants described their readiness to screen as context-dependent and episodic, rather than a stable disposition. Repeated cycles of intention and deferral were common: the FIT kit entered the home, was set aside under competing pressures, and expired or was discarded without clinical follow-up. For some, readiness was reactivated by a triggering event such as a friend's diagnosis, only to be displaced again by competing demands.

This pattern was illustrated by the five participants with incomplete screening participation, each of whom had completed at least one FIT in a previous round but chose not to participate in their most recent screening kit invitation. Renewed disengagement was driven by a reduced perceived urgency following a prior negative result, competing life demands, and dissatisfaction with the stool-based process. P12's account was distinct: she described willingness to screen and had no barriers identified in her account, but missed the most recent round because she was moving house when the kit arrived and had no prompt from the programme to re-engage once her circumstances changed. Prior completion did not establish ongoing engagement; repeat-round participation remained vulnerable both to context-dependent shifts in readiness and to purely logistical disruptions that the fixed-schedule model could not accommodate.

The NBCSP, like most organised screening programmes, delivers a single invitation on a fixed schedule with a finite completion window [11]. If an individual's readiness does not coincide with that window, the opportunity passes, and the programme has no mechanism to re-engage at the moment readiness returns [19, 43]. Participants' accounts suggest that the consequence is not permanent refusal but a structural mismatch: people who described willingness to screen under the right circumstances did not screen because the programme was not available when they were ready. These observations are drawn from retrospective accounts rather than longitudinal observation, and whether readiness fluctuates in the manner described would require prospective investigation across multiple screening rounds to establish. The distinction between barriers shaping first-time non-participation and those driving repeat-round disengagement has received limited attention in the screening literature and warrants dedicated investigation [19, 23, 43, 44].

Implications for screening programme design: From uniform delivery to an adaptive screening architecture

Together, these findings suggest that the persistence of screening inequities among migrant populations may not only reflect a failure of communication or outreach but a limitation of the uniform delivery model itself. Current efforts to address disparities have focused on two broad strategies. The first targets the message: adapting communication through multilingual materials, community outreach, and translated instructions, while leaving the delivery pathway unchanged [15, 33, 45]. The second, increasingly framed as precision screening, targets the recipient: using individual risk profiles to calibrate when and how intensively a person should be screened [46]. Both strategies represent important advances. However, neither addresses a problem that our findings foreground: even with an accurately stratified risk profile and a perfectly communicated invitation, an individual who faces a specific configuration of co-occurring barriers across multiple domains may still be unable to engage with the screening pathway as delivered [30, 31].

We propose the concept of an adaptive screening architecture: a delivery strategy in which the core components of a screening programme - modality, timing, engagement channel, and educational framing - are not fixed but can be combined and adjusted to accommodate individual barrier configurations. Precision screening identifies the right people to screen by stratifying risk based on demographic, clinical, genetic, behavioural, or biological factors [46]. An adaptive screening architecture addresses how to reach them, by adapting delivery to the barriers, readiness, access constraints, and life circumstances that determine whether eligible individuals actually participate [30, 31]. The goal is equity of opportunity rather than equality of offering: ensuring that differences in modality preference, timing constraints, language, and health literacy do not determine whether an individual engages with screening, so that the decision of whether to screen reflects individual choice rather than a structural mismatch (Fig. 3).

The principle that screening delivery should adapt to the individual is already gaining traction at the level of modality. The American Cancer Society's 2026 updated guideline now includes blood-based CRC screening as a non-preferred option for individuals who decline or do not complete preferred stool-based testing or colonoscopy, reflecting the pragmatic principle that the most diagnostically preferred test may not be the most effective option for a person who will not complete it. [47]. Our findings suggest that this same logic extends beyond modality to every component of the delivery pathway. For participants in this study, barriers were not confined to the test itself: they spanned informational access, trust, timing, competing demands, and the engagement channel through which the invitation arrived. An adaptive architecture would therefore need to operate across these dimensions simultaneously - for example, embedding a screening prompt within a chronic disease review for someone who will not act on a postal invitation, or re-engaging at the moment readiness returns rather than waiting for the next fixed cycle [26, 48–50]. Individually, any one of these adaptations is unlikely to substantially shift participation, precisely because barrier configurations are individually composed: addressing modality alone will not resolve the

barriers of someone whose non-participation is shaped by fear, competing demands, and absent GP endorsement [30, 32]. The defining feature of an adaptive architecture is the capacity to combine adaptations in response to individual needs [48].

The participants in this study were not disengaged from healthcare; most were actively accessing primary care and managing ongoing health concerns. Their non-participation was specific to screening. An adaptive strategy is designed for precisely this profile: individuals who are reachable within the health system but for whom the fixed screening pathway does not align with their circumstances [48]. For those not engaging with the health system at all, adaptive programme delivery alone would be insufficient without other strategies to facilitate health system contact.

Any move towards adaptive screening delivery would need to be designed with equity safeguards. Realising such a strategy at population scale would require digital infrastructure capable of integrating individual-level data across primary care, pathology, and screening programmes - an implementation challenge that warrants dedicated investigation alongside questions of feasibility, equity implications, and effectiveness across diverse programme contexts [48, 51]. The populations most in need of adaptive pathways are often those least represented in the data systems that would inform them [51, 52].

Strengths and limitations

Sample and study design

This study contributes in-depth qualitative evidence from an under-studied population, with detailed data on how barriers co-occur across thematic domains, vary across individuals within the same community, and shift with life circumstances over time. The interviewer's shared Middle Eastern background may have facilitated disclosure on culturally sensitive topics including cancer stigma, fatalism, and stool handling aversion.

Participants were recruited through community organisations in New South Wales and were required to communicate in English, potentially excluding individuals for whom language itself constitutes a major barrier. The sample was predominantly Lebanese, and barrier configurations may differ among other Middle Eastern sub-groups. The recruitment strategy relied on posters displayed at community settings and did not restrict participation based on healthcare engagement. However, individuals fully disengaged from these community settings or who are disengaged with healthcare are less likely to encounter recruitment materials or self-select into interview-based health research. Reflecting this, most participants in our sample were actively engaged with primary care while not participating in screening. Findings should therefore be interpreted with recognition that the experiences of those fully disengaged from the healthcare system may be underrepresented.

As a qualitative study with 19 participants, findings are not intended to be statistically representative and transferability to other contexts requires empirical investigation. Self-reported screening history was not

verified against programme records. The temporal dimension of barrier operation was derived from retrospective accounts in cross-sectional interviews rather than from longitudinal observation and should be interpreted accordingly.

Participant-barrier matrix

The participant-barrier matrix provided a structured empirical basis for the co-occurrence and heterogeneity observations that extends beyond narrative description alone. This approach may be transferable to other screening contexts where within-group variation warrants examination. However, binary presence/absence coding does not capture the relative importance or severity of each barrier for a given individual. Co-occurrence in the matrix indicates that barriers were present within the same participant's account but does not establish that they interacted causally; the linked narratives described in the discussion are interpretive and would require future mixed-methods or longitudinal investigation to confirm. The matrix also reflects what participants reported during a single interview - barriers not raised are recorded as absent rather than definitively not experienced. The extent to which these patterns hold across other communities, screening modalities, and national programme contexts - and whether adaptive screening architectures can feasibly accommodate them - are questions for future research.

Conclusions

Among first-generation Middle Eastern migrants in Australia, screening non-participation reflected individually configured barrier combinations that co-occurred across domains, varied markedly across individuals, and shifted with circumstances over time. These patterns suggest that variation within communities may be as consequential for screening programme design as variation between them, and that pursuing equity of opportunity rather than equality of offering may require moving beyond the uniform delivery model toward an adaptive screening architecture - one capable of accommodating individual barrier configurations through flexibility in modality, timing, engagement, and educational framing pathways. Whether such architectures can be equitably implemented at population scale to reduce participation disparities remains an open question warranting investigation across diverse programme contexts.

Abbreviations

CALD
Culturally and linguistically diverse
COREQ
Consolidated Criteria for Reporting Qualitative Research
CRC
Colorectal cancer
FIT
Faecal immunochemical test
GP

General practitioner
IQR
Interquartile range
NBCSP
National Bowel Cancer Screening Program

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the University of Tasmania Human Research Ethics Committee (reference H0027982). All participants provided written informed consent.

Consent for publication

Not applicable

Availability of data and materials

The de-identified data analysed during the current study are not publicly available due to the qualitative nature of the data and the potential for participant identification from interview transcripts. Reasonable requests for access may be directed to the corresponding author and will be considered subject to ethical review and participant consent.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SA contributed to conceptualization, methodology, formal analysis, investigation, data curation, writing – original draft, writing – review and editing, and project administration. VM contributed to formal analysis, validation, and writing – review and editing. MCW contributed to supervision and writing – review and editing. KCY contributed to supervision, writing – review and editing, and project administration.

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Figures

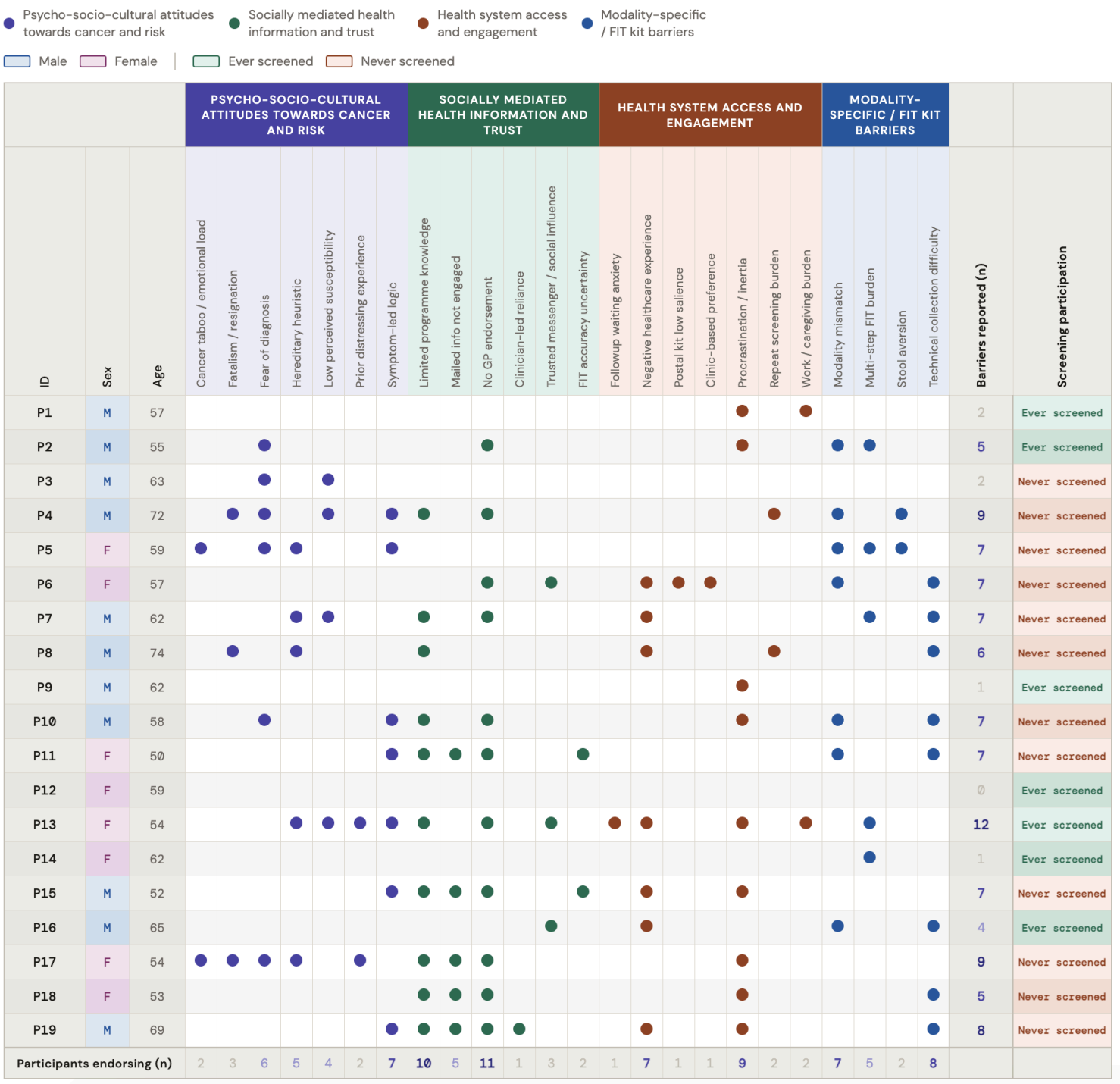


Figure 1

Participant–barrier matrix mapping individual barriers identified across four thematic domains (n = 19). Participants were recruited from Arabic-speaking and other Middle Eastern communities in Australia. Each filled circle indicates that a barrier was identified in that participant's account during thematic analysis. Barriers are organised into four thematic domains: psycho-socio-cultural attitudes towards cancer and risk (purple); socially mediated health information and trust (green); health system access and engagement (orange); and modality-specific barriers related to the FIT kit process (blue). Sex is indicated by cell shading (blue, male; pink, female). Screening participation is shown in the rightmost

column (green, has previously screened at least once; orange, never screened). Participants endorsing (n) (bottom row) indicates the number of participants who endorsed each barrier. Barriers reported (n) (far right column) indicates the total number of distinct barriers identified per participant.

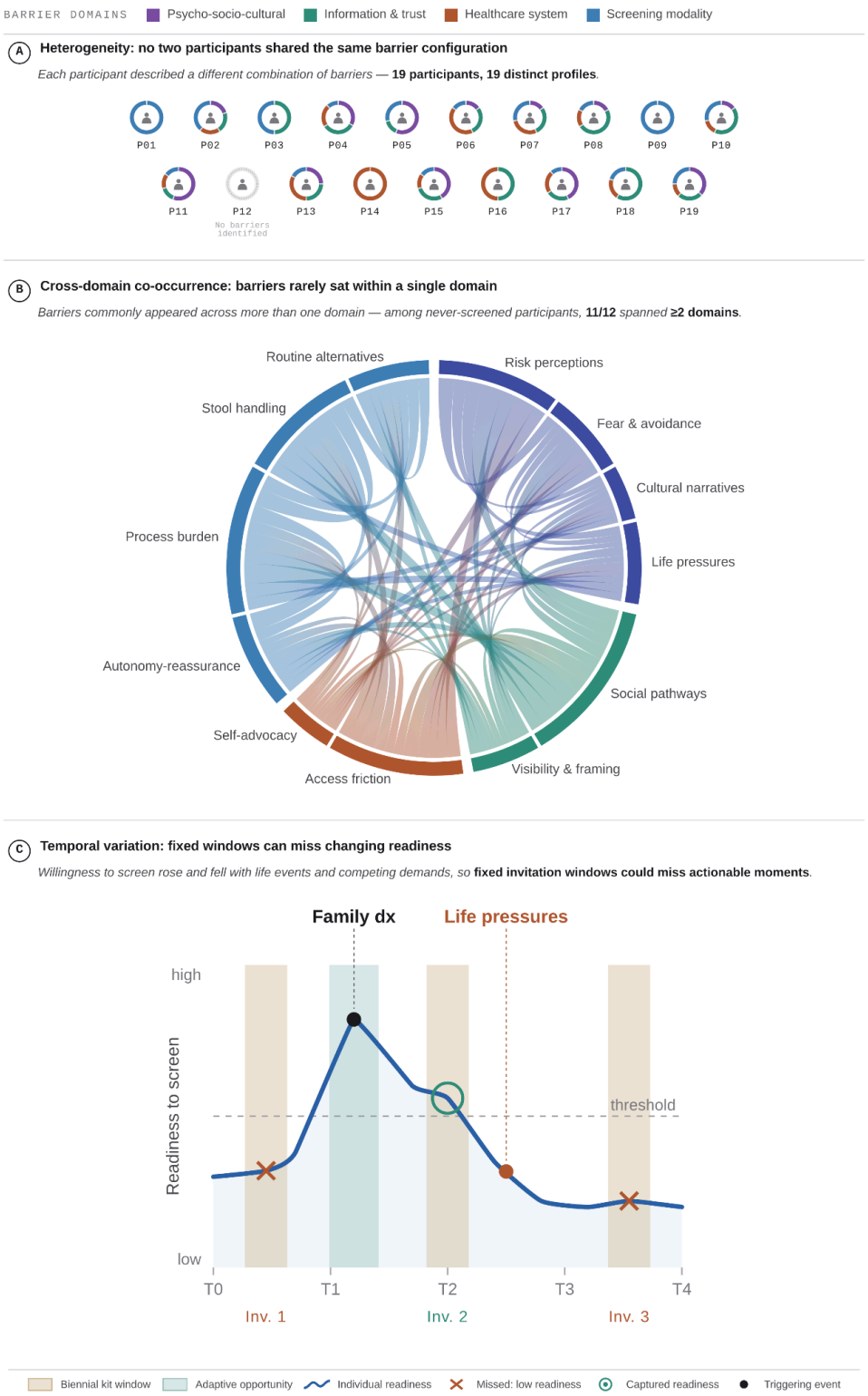


Figure 2

Three empirical patterns challenging assumptions underlying uniform screening delivery. (A) Heterogeneity: each ring summarises one participant's barrier profile across four thematic domains, with segments proportional to the number of barriers identified within each domain relative to that participant's total. P12 (dashed ring) had no barriers identified during analysis. (B) Cross-domain co-occurrence: chord diagram of barrier sub-themes co-occurring within individual accounts. Outer arc segments represent sub-themes, grouped and colour-coded by domain; arc width reflects each sub-theme's relative prominence across the sample. Ribbons connect co-occurring sub-themes. (C) Temporal variation: conceptual illustration of how individual screening readiness may fluctuate relative to fixed biennial invitation windows (tan bands). The teal band represents a potential adaptive engagement opportunity; crosses mark windows that coincided with low readiness ("missed"), and the target ring marks a window aligned with sufficient readiness ("captured"). The readiness curve and events are illustrative, derived from thematic patterns rather than longitudinal measurement. Domain colours in panels A and B: psycho-socio-cultural (purple), information and trust (green), healthcare system and engagement (orange), screening modality (blue).

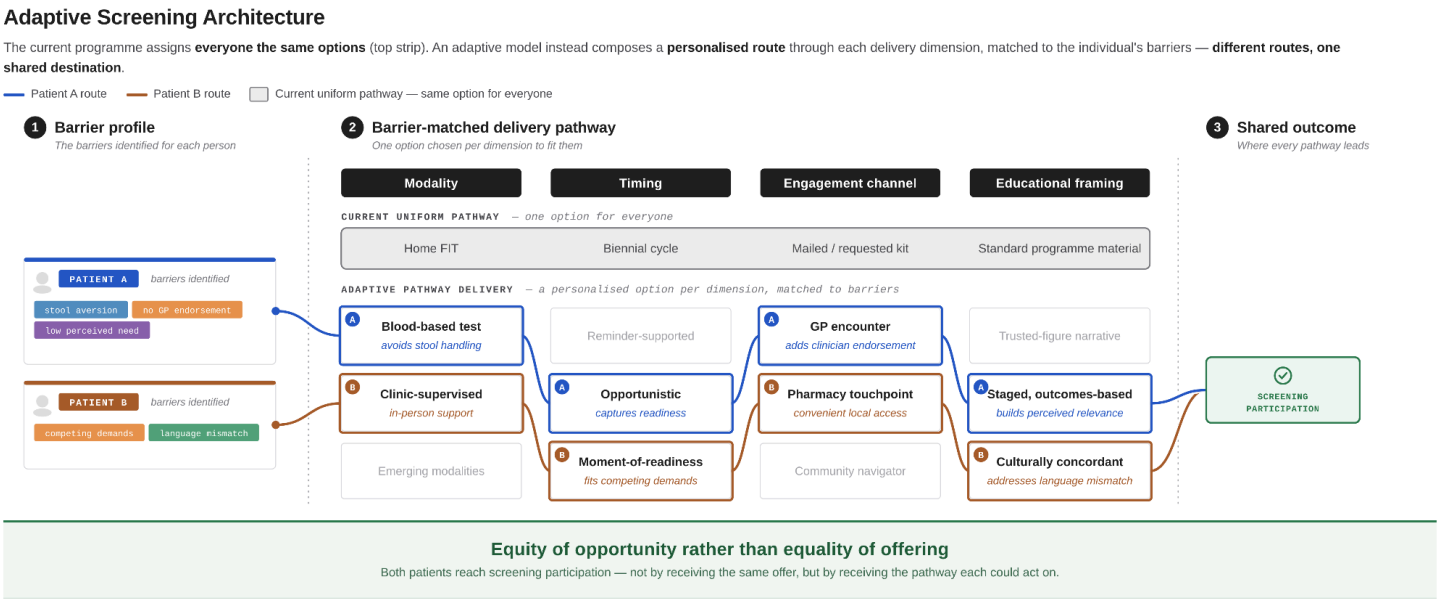


Figure 3

Adaptive screening architecture. Four programme dimensions (modality, timing, engagement channel, and educational framing) each expose multiple options; an individualised pathway is composed by selecting the option per dimension that best addresses the individual's barrier configuration. The current uniform model is shown for comparison (top). Patient A (stool aversion, absent GP endorsement, low perceived need) is routed to a blood-based test offered opportunistically at a GP encounter with staged outcomes-based framing. Patient B (competing demands, language mismatch) is routed to clinic-supervised collection at a moment of readiness through a pharmacy touchpoint with culturally concordant framing. Barrier domain colours follow Figure 1 (purple, psycho-socio-cultural; green, information and trust; orange, healthcare system; blue, screening modality).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementaryfile1InterviewGuide.pdf
- Supplementaryfile2COREQchecklist.pdf