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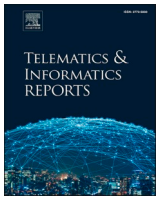

Leveraging AI and technology for holistic asthma management in the Pasifika community

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ABSTRACT

Asthma is a major health concern for Pasifika in New Zealand (NZ). This study explores the perspectives of Pasifika in NZ regarding the use of technology and Artificial Intelligence (AI) for asthma management. This study employed a qualitative research design, using purposive sampling to recruit eighteen Pasifika participants diagnosed with asthma. Data were analyzed using a general inductive approach. Six core themes were identified: (1) Awareness of AI; (2) Potential of AI; (3) Concerns of AI; (4) Digital divide in age groups; (5) General asthma management; and (6) Future design considerations. A holistic framework is postulated to enhance Pasifika asthma care using technology and AI. This study contributes to the sparse literature on Pasifika perspectives regarding AI-driven asthma management. Effective implementation requires ensuring accuracy, protecting privacy, improving access, and supporting families to confidently manage asthma. A balanced approach integrating technology with personal management is the key to effective asthma management.

1. Introduction

Asthma is a long-term condition affecting the respiratory system, due to persistent inflammation in the airways and episodes of airway narrowing [1]. In 2019, asthma affected an estimated 262 million people globally and contributed to approximately 455,000 deaths [2]. Consequently, achieving effective asthma management is essential. However, in New Zealand (NZ), asthma control remains inadequate, with the rate of exacerbations rising by one-third over the past decade [3]. Asthma represents a major public health issue in NZ, with around 615,000 individuals estimated to be affected nationwide [4]. In this paper, we also refer to the Pacific Islander (PI) Community as *Pasifika,* another term used to identify this community. Asthma has a greater impact on Māori[1] and Pasifika, who face higher rates of severe symptoms and less effective disease management [3,5,6]. Notably, in NZ, Pasifika face significantly higher asthma mortality rates than the non-Pasifika population [5]. Among adults aged 15 to 49, Pasifika also experience asthma hospital admissions at nearly three times the rate of other ethnic groups [5].

A significant challenge in asthma management is the delayed recognition of worsening symptoms, often resulting in late detection of potential exacerbations [7]. The adoption of digital technologies and Artificial Intelligence (AI) offers the potential to facilitate early identification of worsening asthma and enhance self-management practices [8,9]. Digital interventions increasingly support asthma self-management, such as smart peak flow meters and inhalers integrated with apps to automate monitoring and encourage correct use via audiovisual reminders [10]. These technologies monitor treatment impact, improve patient-provider communication, and generate data to

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[1] Māori are the Indigenous Polynesian people of NZ.

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support clinical interactions [11,12]. Such digital tools can help patients prevent or lessen the impact of asthma exacerbations.

Despite the rapid expansion of digital health solutions for asthma management, their integration into routine clinical practice remains limited [8], with even fewer investigations focusing on the impact of these technologies in different ethnic groups. Limited uptake of technologies in routine care may result from difficulties consumers and providers face in processing and evaluating numerous technologically complex options [13]. An observational study conducted in Portugal [14] found that, among 336 participants, only 3 % actively used an asthma app to monitor their condition and support inhaler adherence. Issues such as data accuracy, the need for user training, and challenges with integrating new technologies into existing patient management systems can hinder implementation [15]. Furthermore, concerns regarding data privacy and security also present significant barriers to adoption [8]. Additional obstacles include low levels of eHealth literacy, concerns about cost-effectiveness, technical infrastructure limitations, and gaps in policy and regulatory frameworks [15]. Identifying factors that enhance engagement with digital health solutions is critical to developing tools supporting asthma management in standard care [12].

Despite advancements in asthma treatments and intensified public health initiatives in NZ, asthma exacerbations have continued to rise over the past decade, highlighting ongoing challenges in effective disease control [3,5]. Proper management remains essential to reducing asthma-related deaths, hospitalizations, and flare-ups.

Emerging digital health solutions, particularly those powered by AI, offer promising tools to enhance asthma outcomes. These technologies can support earlier detection of acute events and facilitate improved self-management [12]. AI-based predictive models analyze large health datasets to forecast exacerbation risks, enabling timely interventions that may prevent unnecessary hospital admissions [16–18]. While AI offers potential in healthcare, it raises equity concerns due to the underrepresentation of groups like Pasifika in NZ, potentially leading to biased predictions and worsening health disparities [19,20]. A prior study on Māori views of AI for asthma prediction emphasized the need for culturally, socially, and linguistically responsive systems to ensure trust and engagement [21]. Whether similar perspectives are seen in PI populations remains to be explored.

With the growing integration of AI in healthcare and future advancements in asthma treatments, it is essential to examine end users' perspectives directly using these advancements. Therefore, a qualitative study is suitable to discover the challenges and opportunities that Pasifika foresee AI and technology could solve towards their asthma management. This research aims to explore the attitudes of asthmatic Pacific adults living in NZ towards using digital technologies and AI.

The paper is organized as follows. The *methods* section covers participant recruitment, interviews, ethical considerations, and data analysis. The *results* section presents participants' demographics and key themes identified. Subsequently, a design framework is postulated. The *discussion* interprets findings about existing literature, highlighting implications for culturally responsive interventions and reflecting on the study's methodological strengths and limitations. Finally, the *conclusion* summarizes the main findings and offers recommendations for future research.

2. Methods

2.1. Participants recruitment

Recruitment for this study was conducted through the research team's professional, research and personal networks at Auckland University of Technology, University of Auckland, Moana Connect[2] and Asthma NZ.[3] Flyers were distributed within these networks, including email lists and social media platforms like Facebook and Instagram. Pasifika adults diagnosed with asthma, residing in Auckland, NZ, were recruited following the purposive sampling strategy. We used Pasifika researchers AMI, a registered nurse and KP, from Moana Connect, along with AFM, a clinical nurse and researcher, to connect with Pasifika participants. The interviewing team has the skills and ability to speak a range of Pacific languages such as Vagahau Niue, Gagana Samoa, and Lea Faka-Tonga, which supported the effective conduct of the interviews.

Participants were invited to contact the research team via email or phone. Participation was voluntary, with interviews scheduled online or in person at convenient times and locations. Potential participants received an information sheet to ensure understanding of the study. Contact details were obtained from consenting participants, and language preferences were considered to align them with appropriate interviewers. Eligibility required participants to identify as PI, be 18 or older, have been diagnosed with asthma, provide informed consent, and agree to recording or note-taking, with optional family involvement. This purposive and culturally grounded sampling strategy was employed to recruit participants with experience of asthma. This approach was adopted to maximize the depth, relevance and to ensure credibility of the data, rather than to achieve statistical representativeness, which was not the objective of this work. In this study, representation is understood analytically, meaning that the results reflect a variety of perceptions and experiences within the participant group, rather than offering population-level generalization. It should be noted that for this study we did not consider the level of digital literacy of the participants as the goal is to explore the perceptions of them in using AI and technology for asthma care.

2.2. Interview process

The Pasifika researchers (KP, AMI and AFM) conducted the interviews using a semi-structured interview guide (Appendix A). It was developed by referring to earlier studies that explored Māori perceptions towards the use of AI and technology for asthma attack risk prediction [21], Māori experiences and perspectives on antibiotic use for upper respiratory tract symptoms [22], as well as their views on brain health [23]. It should be highlighted that referring to the previous studies in preparation for this interview guide was solely for the purpose of comparison of the findings.

The interview guide included six structured sections with open-ended questions. The first introduced the study's purpose, followed by basic engagement questions. The second explored participants' asthma experiences to gather detailed narratives. The third identified asthma triggers relevant to Pasifika, to support culturally appropriate risk models. The final sections examined Pasifika perspectives on applying AI and technology for asthma prediction. The use of a semi-structured interview guide strengthened the credibility by ensuring consistency across interviews, allowing flexibility to explore deeply into participants' experiences. Interviews lasted between 60 and 90 min, and no repeat sessions were necessary. The study aimed to recruit at least 20 participants to achieve sufficient data depth and thematic saturation, consistent with qualitative research standards for interview-based studies [24]. During data collection and analysis, saturation was assessed iteratively, and recruitment was ceased after 18 interviews, as

[2] Moana Connect, a Pasifika-led organization based in Auckland, dedicated to elevating experiences of Pasifika families through research, learning, and community.

[3] Asthma NZ, a non-profit health organization supporting individuals with asthma and chronic obstructive pulmonary disease (COPD) through education, clinical support, and advocacy.

thematic saturation was reached and no significant new themes emerged.

Participants could respond in English or their preferred Pacific language; some interviews, though in English, often included Pacific terms. They could invite a caregiver or primary carer if desired. Interviews were held at convenient locations or online via videoconference when illness, time constraints, travel, or weather prevented in-person meetings.

2.3. Ethical considerations

Participants provided written consent before the interviews, while verbal consent was obtained in advance for those interviewed online. All interviews were audio-recorded with participants' agreement. The data were stored securely on a password-protected server managed by one of the researchers' institutions. The study received ethical approval from the Auckland Health Research Ethics Committee in NZ (reference number AH25484).

2.4. Data analysis

All interviews were transcribed, with those conducted in a Pacific language transcribed in their original language. To mitigate any translational fidelity, the transcripts in the Pacific language were transcribed and validated by two researchers (AMI, AFM) who are fluent in English and the Pacific language. To ensure accuracy, transcripts were manually reviewed through repeated listening to the audio recordings by three researchers (AMI, KP, AFM). Anonymity was preserved by assigning each transcript a unique participant identifier. Data analysis followed a general inductive approach led by three Pasifika researchers (AMI, KP, AFM), allowing themes to be derived directly from data. The research team engaged in multiple discussions to review the coded data, explore interpretations, and reach agreement on the final themes. Manual coding was employed to identify recurrent themes and meaningful patterns through a detailed examination of the content [25]. Accordingly, initial coding was conducted independently by three researchers. Through structured team discussions, the initial codes were then iteratively compared, refined, and grouped into categories, which formed the basis for the development of the themes. Any interpretive discrepancies were resolved through collaborative discussions and mutual consensus within the team, ensuring that the final themes reflected both the data and the cultural context. The investigator-triangulation approach, in which multiple researchers independently performed different tasks and then discussed them with the team, enhanced the intercoder reliability and the trustworthiness of the interpretations and findings. To maintain reflexivity, ongoing discussions were held that integrated cultural and professional perspectives. These discussions helped the team to reflect on how their assumptions and positions could influence the interpretation of data and encouraged them to consider alternative ways of understanding the data. The methodology followed in the study is graphically represented in Fig. 1.

3. Results

3.1. Participant demographic overview

A total of 18 participants were involved in the study. These included 16 individual interviews and one conducted with a pair of participants, each lasting between 60 and 90 min. Participant demographics are outlined in Table 1. The majority were female (61 %) and aged between 25 and 44 years (56 %). Pasifika is a vast community involving many regions, languages and communities. We tried to appreciate this diversity by sampling individuals from a variety of Pacific ethnic backgrounds, with some identifying with more than one ethnicity. It should be noted that the presence of higher proportion (67 %) of Samoan among the participants because the Pasifika community in Auckland is having a skewed populations with a majority of Samoan (49 %) [26]. While most participants were born in NZ (61 %), 39 % were born and raised in the Pacific Islands. Most participants (72 %) had been diagnosed with asthma during childhood, while the remaining 28 % were

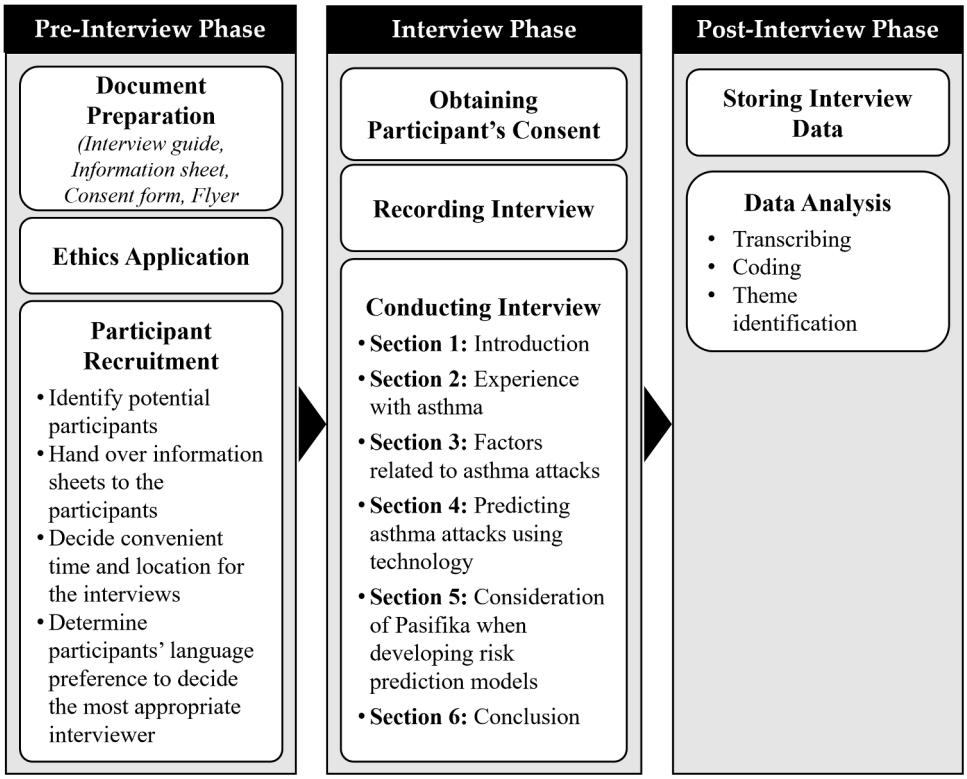

Fig. 1. Methodology of exploring Pasifika perceptions on using AI and technology for asthma attack risk prediction.

Table 1
Summary of the demographic profiles of the interview participants.

Patient Characteristic	Frequency: $N = 18$ (100 %)
Gender	
Female	11 (61 %)
Male	7 (39 %)
Age	
18–24	2 (11 %)
25–34	5 (28 %)
35–44	5 (28 %)
45–54	2 (11 %)
55–64	3 (17 %)
65–74	1 (6 %)
Place of birth	
New-Zealand born	11 (61 %)
Pacific Island-born	7 (39 %)
Asthma diagnosis	
Childhood-onset	13 (72 %)
Adult onset	5 (28 %)
Ethnicity*	
Samoan	12 (67 %)
Niuean	6 (33 %)
Fijian	2 (11 %)
Māori	1 (6 %)
Cook Islands Māori	1 (6 %)
Tongan	1 (6 %)

* Participants were able to select more than one response.

diagnosed in adulthood.

3.2. Themes

Participants shared a range of view on the use of AI and technology in asthma care, with some highlighting its benefits, while others expressed hesitation, ambivalence, or resistance. Fig. 2 visually represents the inductive analytical process, illustrating how codes were grouped into the six key themes as: (1) Awareness of AI; (2) Potential of AI; (3) Concerns of AI; (4) Digital divide in age groups; (5) General asthma management; and (6) Future design considerations. The subsequent sections outline the key themes identified, supported by representative quotations from the interview transcripts.

3.2.1. Theme 1: awareness of AI

Individual participants reported differing levels of awareness and understanding of AI. For many, their familiarity was shaped indirectly through media exposure and public discourse. In several cases, participants' knowledge was influenced by observing how others discussed or interacted with AI. Overall, their awareness tended to be generic rather than specific, with limited understanding of how AI might be applied specifically in health care settings. This ambivalence reflected a limited understanding of how AI and technology might be applied specifically within healthcare settings.

> *"Just stuff that you hear in the media about AI. It does seem like it has a lot of information to the point where it can be quite scary if used in the wrong way." (35-year-old Samoan/Niuean female)*

> *"I know that there is like a lot of potential to use it. I know people use it for like assignments or ChatGPT and like I use it sometimes for photo editing. So, I think it is a really smart, underused technology." (26-year-old Samoan female)*

Most participants viewed the use of AI for health management as a relatively new and unfamiliar concept within health care. While initial responses varied, some participants expressed openness to incorporating AI into asthma care. They indicated a willingness to consider such technologies, notably if they demonstrated clear benefits to their health and well-being. Several participants described themselves as open but not confident, reflecting limited knowledge of AI in healthcare.

> *"AI, I am aware of. I work in a technology company. So, nothing new. But AI and health, I don't know much about it, and where it's being used at the moment or how it's being used. My thoughts on it, to be fair, I'm all for it, because I have asthma." (35-year-old Niuena female)*

> *"I'm aware of AI…I wouldn't say my knowledge is that good in with like health tech, but like, I'm open to it. It's not something I'm against." (27-year-old Samoan/Niuean male)*

These insights illustrate a clear theme: while general awareness of AI exists among most of the participants, detailed understanding, particularly about health care applications, remains limited. The theme underscores that perceptions of AI are often shaped more by indirect exposure than by direct experience or formal knowledge. Nonetheless, not all participants showed an openness to its use in asthma care, especially when potential benefits were apparent. This suggests an important opportunity for targeted education and culturally relevant engagement to build trust and understanding around AI in Pasifika health contexts.

3.2.2. Theme 2: potential of AI

Many of the participants highlighted the potential of AI to aid asthma management, especially through timely alerts that signal early signs of an exacerbation. These notifications were seen as helpful for taking prompt action, making informed care decisions, and possibly reducing the severity of upcoming asthma attacks.

> *"I guess it will help with the prevention as well, like you can identify when an attack is coming and pretty much shut it down then and there." (30-year-old Samoan male)*

> *"I think that'd be so helpful, so you can like, especially if you have anxiety around your asthma, it would be helpful to prepare yourself so that you know when you're going to have it." (19-year-old Niuean female)*

Another advantage identified by some participants was integrating technology into asthma management, which could streamline the process of organizing and managing asthma-related information. This integration was seen as beneficial for supporting self-monitoring and reducing reliance on manual symptoms and medication tracking.

> *"It'll make data collection easier. I feel, yeah, it'll make data collection easier." (35-year-old Niuean female)*

> *"I think for myself, if I could see that information, and have access to it, I think that'd be a lot easier for me. I mean, I don't have to record it." (32-year-old Niuean female)*

One participant emphasized that this approach could strengthen support networks within Pasifika families by promoting a collective response to asthma management. The notion that all family members could be informed and ready to respond to asthma-related risks, especially for elderly relatives, underscores the value of shared responsibility within Pasifika families.

> *"It would serve as a support mechanism not only for me as a patient, grandchildren and caregiver. In our aiga (family), if grandmother is an asthmatic person, then everyone will learn how to use this device so that grandma is warned. So that the family is warned that this could happen for their grandmother, and it could be a family tool…everyone is supporting each other because that's how our Pasifika families are, supporting everyone." (60-year-old Samoan female)*

3.2.3. Theme 3: concerns of AI

While many participants expressed some interest in using AI, some of them raised several concerns, reflecting ambivalent attitudes towards AI and technology. A key worry was that excessive reliance on digital tools might diminish individuals' self-awareness and reduce their motivation to actively monitor and manage their asthma symptoms independently.

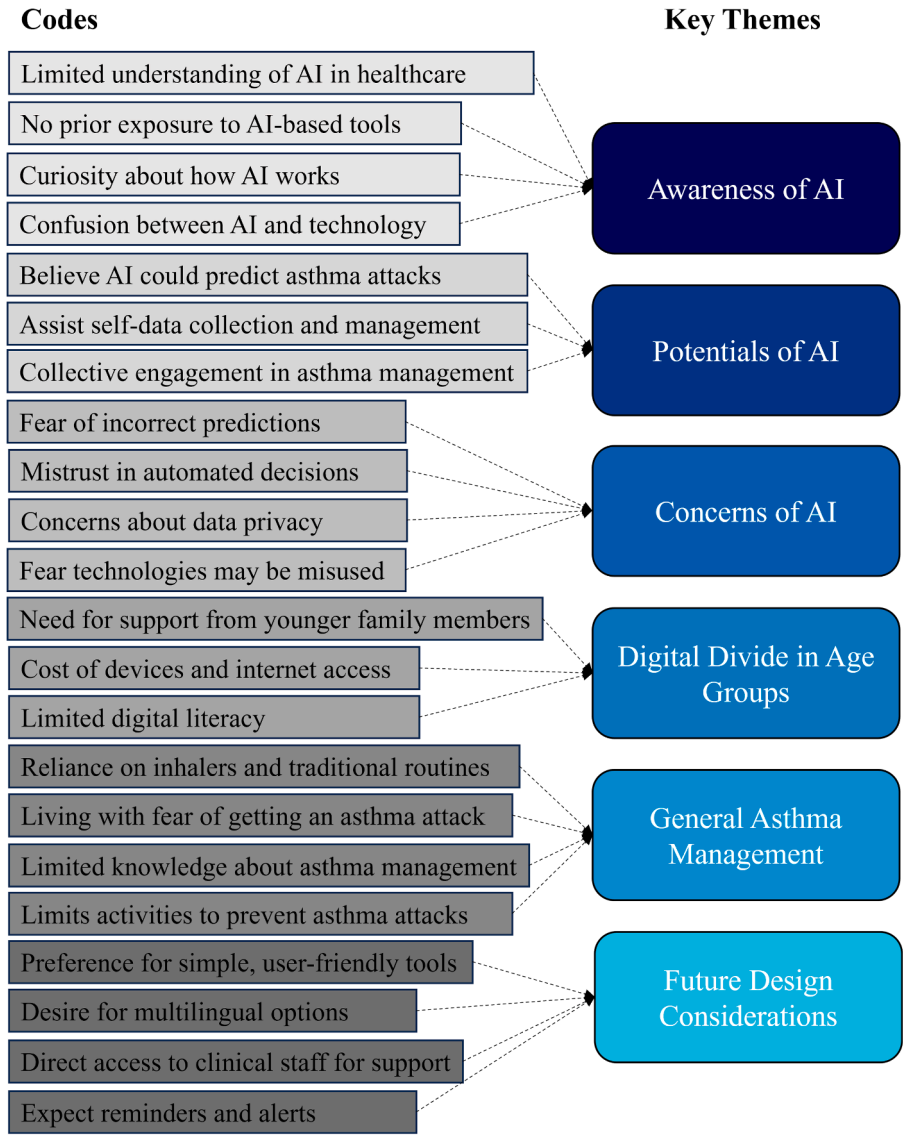

Fig. 2. Key qualitative themes generated from codes relating to the perceptions of PIs towards using AI and technology for asthma attack prediction.

"The disadvantage of this is dependence; instead of trying to manage your asthma yourself, you rely on AI. Too lazy because you know the device has the control." (44-year-old Tongan female)

"If I've got a tool that I can use to tell me when something's going to happen, does that then mean I'm not even going to care about all the other risk factors or try and manage my own conditions because I'm so reliant on this tool?" (34-year-old Samoan female)

Several participants raised concerns about the accuracy of these tools, especially given the differences in asthma history, ethnicity, and overall health among individuals. Many highlighted the need for risk prediction models to incorporate diverse health backgrounds and personalized medical information.

"If you're using someone's symptoms, that of a mild asthmatic person, would it really help someone who was severely asthmatic? I think for my own asthma, I prefer it to be personalized to me, just because it's much different." (19-year-old Niuean female)

"You would need to look at my ethnicity because mine would not be the same as the Saiga (Chinese) person…the personal information that you would need from each person would need to be thorough and customized, so that we don't fall in a generic pool." (35-year-old Samoan female)

While many participants recognized the importance of a personalized approach using individual health data, some participants highlighted the necessity for strong security and confidentiality. They stressed the need for robust privacy protections and increased control over access to their health information.

"One of the fears is sometimes when information is collected it can be used elsewhere. So, for example, if our information has been collected by, say, MSD or work and income, and then suddenly ping, someone else knows about what you're going through…where's that information going to and who has access to it? I think is more the concern." (34-year-old Samoan female)

"My biggest concern is who else has access to this information that I do not know of? Like, my privacy…how am I *reassured that this information is stayed or kept within or shared with people that I know or am I going to be asked for permission." (32-year-old Niuean female)*

These concerns highlight the participants' need for a balance between the potential benefits of AI-based solutions and the protection of their privacy. Ensuring secure and controlled access to personal health data is essential for building trust and encouraging the use of AI-based technologies to manage diseases.

3.2.4. Theme 4: digital divide in age groups

Some participants highlighted that while younger individuals, primarily 'Gen Z' and younger 'Millennials', were generally more tech-savvy and had a greater awareness of AI, older adults, including those from 'Gen X' and 'Baby Boomer' generations, often found it challenging to navigate modern interfaces and adapt to new digital devices. This generational gap in familiarity with technology was seen as a significant barrier to the widespread adoption of AI tools.

"You'll have people who understand how to use technology, like the young people, but as you go up there, older elders aren't completely aware of how to use technology." (19-year-old Niuean female)

"I feel for the older ones who aren't quite sure what AI is…I know 40-year-olds that don't even know how to use a phone…I feel like that's something that needs to be factored in as well…if it's something to do with AI, that's another thing that they have to try and learn on top of just learning the simple basics of technology." (35-year-old Samoan/Niuean female)

Not all participants were confident in using AI and technology. Some participants expressed the challenge of engaging older generations with new technology, particularly those in the 'Baby Boomer' and older 'Gen X' cohorts. One participant noted that individuals in these age groups, often less interested in digital tools, would benefit from simple, intuitive solutions and require minimal technical knowledge. These older users frequently rely on younger family members, typically 'Gen Z' or 'Millennials', to help them set up basic devices, underlining the importance of user-friendly design.

"If I think from my grandparents or my in-law's perspective, they're not really interested in tech stuff and all that…trying to appeal to them will be really useful and making it easier because they don't really you know, they still get us to come set up the Chromecast for them." (26-year-old Samoan female)

Another concern raised was the cost and accessibility of digital tools. A participant emphasized that requiring Wi-Fi or paid subscriptions would create a significant barrier, especially for individuals with limited financial resources. This issue could affect users across all age groups, but is particularly challenging for those on fixed incomes, such as older adults.

"If we had to always be connected to Wi Fi or had to have a subscription… no way I'll be subscribing." (34-year-old Samoan female)

These insights underscore the importance of designing digital health tools that are not only affordable and accessible but also tailored to the diverse capabilities and needs of different generations. Considering the financial and technological limitations faced by 'Gen X', 'Baby Boomers', and even some 'Millennials', ensuring equitable access and broader adoption is essential.

3.2.5. Theme 5: general asthma management

Several participants reflected on managing asthma from childhood into adulthood, emphasizing key strategies that supported their asthma control. These included keeping multiple inhalers at home, ensuring timely prescription refills, and maintaining regular communication with healthcare providers.

"I'm managing it better because my GP is here. So now I'm on regular Symbicort which I just started this year whereas last year I was on salbutamol which wasn't really being managed well and then prednisone here and there." (26-year-old Samoan female)

"I do have my Symbicort as a part of my 3-month prescriptions…I keep one in every room, I keep one in my car and in my purse as well. The doctors always happy to provide when I do ask that I need it, given my history with asthma, so they're quite helpful as well." (35-year-old Samoan/Niuean female)

Some participants expressed frustration with the ongoing challenges of living with asthma, particularly the stress and restrictions it imposed on daily life. They highlighted the constant need to stay alert, such as being aware of their surroundings to avoid triggers and ensuring they had their inhaler nearby. For some, this heightened awareness impacted their ability to fully engage in activities, such as sports, and was a constant reminder of the limitations that asthma placed on their lives.

"I'm always watching out for myself, I'm always aware of and try and check my surroundings, making it is safe for me and that it is ok for me to be there, so that I get to enjoy whatever or wherever I am at making sure I get to go home and not having an attack when I get home,that I come back home and that I'm ok." (46-year-old Samoan female)

"It has affected my life in terms of being unable to play sports, and I'm always constantly thinking about my inhaler. Thinking, I'll always need it with me. I use my inhaler quite often as I need it quite a bit." (21-year-old Samoan male)

"You stop yourself from doing a lot of things, because you, I guess, you're scared that…you'll have an asthma attack, so you lay back on a lot of stuff like running, just like heavy or maybe like sports. For me, it was sports." (19-year-old Niuean female)

While family members with asthma, including parents and siblings, were influential in shaping participants' awareness and understanding of the condition, several participants felt that further education on asthma management was necessary.

"Still a lot of PIs are still living with asthma, and like I said, the education around asthma is not high." (30-year-old Samoan male)

This underscores the importance of providing comprehensive asthma education to individuals and their families. By enhancing knowledge and awareness, it may be possible to improve asthma management and ensure that those affected are better equipped to handle the condition.

3.2.6. Theme 6: future design considerations

Most of the participants highlighted the need for an AI tool that is simple, affordable, and accessible. A clear and straightforward interface with minimal navigation was essential to ensure usability across different age groups. Some participants also recommended including bilingual functionality to support individuals from diverse linguistic backgrounds.

"Making it accessible like making it easy to understand, not too many buttons, yes, just simple." (19-year-old Niuean female)

"Thinking of mum and dad it needs to be bilingual; it would be nice to be in their preferred language. If in English, it should be basic or there's room for them to information if they need it or unsure." (35-year-old Samoan female)

"For people who are not really IT savvy, it needs to be very simple at the touch of the button and as simple as possible or something I could speak to. Voice activating one with a rapid response." (46-year-old Samoan female)

A small number of participants emphasized the importance of ensuring direct access to a clinician for support, particularly for addressing queries and receiving timely advice on asthma management. This access would allow individuals to seek guidance from healthcare professionals as needed, promoting a more responsive and personalized approach to care.

"For other people, direct access to a clinician for advice and support with queries." (35-year-old Samoan female)

While AI offers valuable opportunities for enhancing asthma management, others emphasized the importance of maintaining in-person interactions as a fundamental way to build and sustain meaningful connections with healthcare providers.

"Naturally, we are, we've always been a face-to-face type of people where we need that connection." (34-year-old Samoan female)

AI offers substantial potential to enhance asthma management, but in-person interactions are crucial for building meaningful connections between patients and healthcare providers.

4. Holistic framework for culturally responsive, AI-enabled asthma care in Pasifika communities

Drawing from the findings of this study, we postulated a holistic framework based on the themes found, aiming at supporting the effective and culturally appropriate integration of AI and digital technologies into asthma care within Pasifika communities. The framework, generated as a descriptive synthesis of perceptions, reflects a need to enhance community readiness and confidence in using these tools and ensure that their design and implementation align with the lived experiences, values, and health priorities of PIs. Informed by our qualitative analysis, the proposed framework, presented in Fig. 3. It consists of two interrelated layers. The outer layer, represented by a triangle, emphasizes the foundational role of public awareness, while the inner layer outlines key considerations for the design of AI and technology-based systems. The following sections provide a detailed discussion of each layer.

4.1. Public awareness

Asthma management among Pasifika relies not only on pharmacological treatment but also on culturally grounded trust, shared understanding, and systems that reflect communal values and lived experiences [27]. The outer ring of the proposed framework outlines three interconnected pathways to raise public awareness: asthma education, AI literacy in healthcare, and psychological support. Effective communication to the public by the government, including the healthcare and technical workforce, can stimulate their understanding and acceptance of AI solutions [28]. In the context of Pasifika communities, public awareness is a collective and relational process rather than an individual one. The awareness should be carried out through families, church groups and community networks, where trust is developed through interpersonal connections and shared life-experiences. This approach would also minimize the digital divide in age groups. By prioritizing community-informed awareness, this framework ensures that asthma care technologies can be made not only accessible but also deeply relevant to Pasifika families, fostering equitable adoption through culturally safe implementation. The following subsections elaborate on each of these pathways.

4.1.1. Asthma education management

Some participants raised a lack of knowledge about asthma and its management, which is supported by the findings in another study [29]. Effective asthma care for Pasifika communities must begin by meeting people where they usually gather, not just in clinics, but in homes, churches, and community spaces where health conversations naturally unfold. Instead of relying on medical jargon, education should flow through trusted channels. These ethnic groups place a high value on the participation of their elderly members in guiding, advising, and accepting things [21]. Hence, various strategies could be implemented to spread asthma education and its management effectively. For example, a Pasifika elder explaining inhaler use during family gatherings, youth leaders discussing asthma triggers at sports practices, or community nurses using visual aids that reflect Pasifika art and storytelling traditions. These approaches effectively transfer relevant health tips to individuals and families with a culturally grounded understanding, ultimately improving the quality of people's lives [30].

4.1.2. Psychological impact of asthma

For many asthmatic Pasifika individuals, the constant worry about potential attacks can overshadow daily life, which could lead to avoiding sports and physical activities like exercising. This fear limits activities unnecessarily, creating anxiety about asthma, which is burdensome. Catastrophic thinking related to asthma influences the way patients perceive their symptoms; strangely, during periods *without exacerbations,* there was still increased symptom reporting [31]. Adequate support focuses on rebuilding confidence through culturally grounded approaches, like community-designed workshops that pair breathing techniques with traditional dance, or peer discussions that normalize

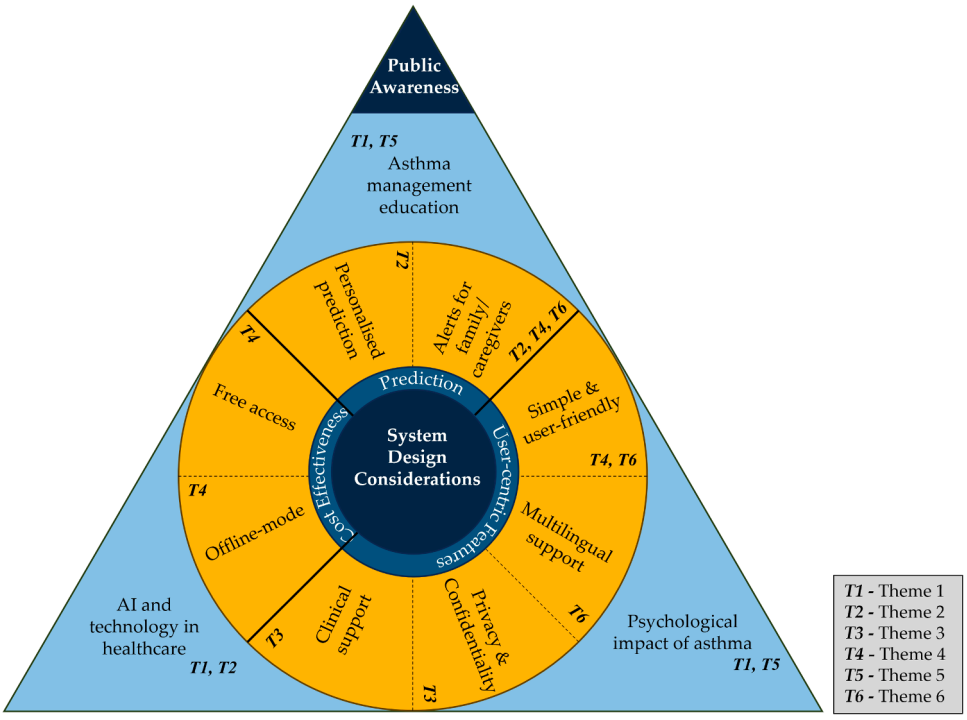

Fig. 3. Holistic framework for AI and technology for Pasifika asthma care.

managing flare-ups during activities. The goal is not to eliminate caution but to restore balance, where asthma is managed with awareness rather than fear, allowing for a satisfying, active life.

4.1.3. AI and technology in healthcare

Introducing AI-driven healthcare requires more than technical explanations. It demands building trust in how algorithms serve collective well-being [21,32]. Framing AI as a service or an assistant rather than a surveillance tool can ease adoption. For instance, showing how prediction models alert families to high-risk days based on local pollution data and other asthma-related factors could instill confidence. Community sessions could be held to demonstrate AI's role through tangible scenarios that apply to everyday situations. By communicating this information supported by clinical and technical expertise, the technology achieves transparency, enhancing trust in these technological solutions. Likewise, it can be aligned with the Pasifika worldviews. It highlights the importance of collective well-being, rather than focusing only on individuals. As a result, the awareness of AI and technologies could often be shaped through family, church and community networks while building trust [33].

4.2. Design requirements

The inner layer in Fig. 3 shows the design requirements that could be considered in developing AI and technological solutions to predict the risk of asthma attacks, which targets Pasifika communities explicitly. The layer has three main directions: prediction, user-centric features and cost-effectiveness, which need to be focused on by the designers and developers of these solutions. The following sections will discuss each of these directions.

4.2.1. Prediction

A major concern raised by participants was the importance of using their own data for predictions, rather than relying on data from others. Individuals were concerned about making personal predictions based on external data, emphasizing the need for personalized predictions tailored to their health information, achievable with current AI algorithms [34]. There are several AI algorithms that can be used to develop these prediction models, such as logistic regression, random forest, gradient boosting machines, support vector machines, and neural networks, which can be developed mainly based on tabular data, including hospital, climate, and socio-demographic data [16,35,36]. Additionally, deep learning algorithms, such as convolutional neural networks, long short-term memory algorithms, can be utilized to construct models on other formats of data, voice (patients' speeches, breathing sounds) [37,38] and images (CT scans, X-rays, thermal images) [36,39,40]. However, these models are developed especially for asthma detection rather than risk prediction.

Further, participants emphasized the importance of delivering risk alerts to the patient's device and the devices of family members or caregivers. This again highlights a key concept in Pasifika worldview, where health and wellbeing should be a collective responsibility. As a community, they described that critical health events should be managed with the involvement and support of family networks. It reflects the Pasifika values of mutual support, relational accountability and collective protection [33]. Hence, it is important to allow risk alerts on multiple devices in future solutions with the necessary consents, privacy and security controls.

4.2.2. User-centric features

The framework incorporates several key user-centric features to ensure the tool meets the real-world needs of its intended users. Simplicity and user-friendliness are prioritized, recognizing that individuals may have different levels of comfort with technology. Multilingual support is also included to make the system accessible to speakers of diverse languages within the community. Including culturally relevant visuals and narrative components will enhance the usability. Privacy and confidentiality are given careful attention, with measures in place to ensure users' personal health information remains secure and protected. Finally, the framework proposes including clinical support features, offering users the opportunity to contact a healthcare professional to seek advice or assistance whenever deemed necessary. These elements aim to create a supportive, trustworthy, and accessible user experience.

4.2.3. Cost-effectiveness

Cost-effectiveness is a critical dimension incorporated into the proposed framework. Participants expressed concerns regarding the potential financial burden of using such systems, particularly the implications of subscription fees and the requirement for continuous Internet connectivity. In response, two specific features were proposed: offline-mode functionality and free access. Offline functionality allows users to operate the system without persistent internet access, reducing associated data costs. Ensuring free access was also deemed essential to eliminate financial barriers and promote equitable use. Together, these measures aim to enhance the system's affordability and long-term sustainability for users regardless of socioeconomic background.

5. Discussion

This study represents one of the earliest efforts in NZ to explore Pasifika communities' perspectives on the use of digital technologies and AI in managing asthma and predicting asthma exacerbations. One key factor identified in the study was that some participants might not have enough knowledge about asthma and its management. Though some individuals have had asthma for many years, they might still have inadequate knowledge about asthma as a condition and its management options [41]. Public awareness improves asthma management [30]. To overcome this limitation, conducting public awareness programs and workshops can help.

While AI in healthcare is advancing rapidly globally [42–44] and in NZ [45], its recognition and understanding among Pasifika communities remain limited. Participants' awareness of AI and its potential uses in healthcare varied. Although some had limited knowledge, there was overall openness to adopting AI solutions that could support Pasifika communities and improve asthma management. A study conducted in China with older adults in a local Chinese community center to explore the attitudes of AI-driven health technologies showed that they had limited understanding about these AI solutions [46], which echoes our findings with PIs. Another study conducted among older adults in Toronto, Canada, with asthma and chronic obstructive pulmonary disease, found similar findings to the current study: mobile health applications do support their disease care, while there is a tension between perceived benefits and discomfort with using technology [47]. Because asthma disproportionately affects PIs in NZ, targeted interventions are needed to address the unique challenges they face in managing the condition [3,48]. The proposed descriptive framework covers all these key concerns, which can be used in future strategic approaches to enhance asthma management in different communities. As the framework is informed by the descriptive synthesis of perspectives on AI technologies, it is primarily designed to guide culturally responsive digital engagement and implementation strategies rather than technical AI system development or high-level algorithmic management.

Some of the participants in this study expressed concerns about data privacy and the use of personal health information in AI development. A recent NZ study found that patients generally accepted their data being used for AI in healthcare, provided key conditions were met, such as secure storage, effective de-identification, and protections against harm. Strong governance, rigorous testing, and clinician oversight were regarded as essential to ensure safety [49]. Similarly, Māori communities have previously highlighted the need for more information about AI and technology, and a need to address trust issues related to the use of

technology [21]. Ensuring that all users are adequately informed is crucial in the development of such applications, particularly for minority ethnic groups who often encounter barriers in technological literacy and limited access to relevant information [50]. Multiple international studies emphasize the importance of addressing algorithmic biases and the careful integration of AI tools within clinical settings [20,51,52]. Respecting the cultural values and data sovereignty of diverse ethnic communities is essential, alongside ensuring strong protections in the collection, storage, and use of personal health data as AI technologies continue to evolve [53,54]. The importance of data privacy and security is also reported in the study, which employed a patient and public involvement approach in the United Kingdom and engaged adults with asthma in shaping the design of future AI-supported self-management solutions [55].

It is crucial to understand that AI's benefits in healthcare may not be equally accessible to all communities, which could increase existing health disparities among underserved groups [51]. The study concludes that health equity should be a concern in ensuring these solutions do not disadvantage certain groups [55]. Several factors contribute to digital exclusion, including cultural differences like ethnicity, language, and religion; disabilities such as vision or hearing impairments; low levels of education; older age (over 65 years); living in rural or disadvantaged areas; and socioeconomic challenges like low income and unemployment [56]. A study conducted in the United Kingdom found that older age, lower socioeconomic status, disability, limited education, and unstable housing are significant factors linked to internet non-use [57]. Another study found that a widely used healthcare algorithm in the United States underestimated the needs of Black patients by using healthcare spending as a proxy for health status. Because Black patients often had lower healthcare costs due to unequal access, the algorithm introduced racial bias, underscoring the need for fairness and transparency in clinical AI tools [58]. Although access to the internet and digital technologies has improved in some places, many Pasifika communities still face obstacles such as limited access to devices, poor internet connection, and low digital skills [59,60]. To ensure fair access and prevent widening health inequalities, AI-based health solutions need to address these barriers [54,60,61].

Many participants in this study said that asthma affects more than just their physical health; it also disrupts daily activities like sports, leisure, and spending time with family. These social and environmental challenges add to the emotional burden of asthma, including worries about attacks and fear of triggers. Such concerns often cause people to avoid certain activities, limiting their participation in everyday life [62,63]. Managing asthma can be especially difficult for those with severe symptoms; even with medication, the condition still impacts their quality of life [62].

A key consideration is to leverage AI and technology to empower individuals and families to confidently monitor symptoms, enabling asthma management while staying actively engaged in their daily lives. Our proposed framework incorporates the learnings from this research to design impactful solutions. AI has the potential to enhance healthcare services equitably; however, a carefully considered strategy is essential to prevent the exclusion of any population group from the advancements of digital health [64].

Recommendations made by our Pasifika participants included: simplicity; cultural integration of Pacific languages; personalization; and direct access to clinicians. Notably, maintaining in-person interactions with health professionals to complement a digital approach was also emphasized. A health professional highlighted the importance of incorporating multiple language options into digital health systems [65], emphasizing that for individuals from culturally and linguistically diverse backgrounds, language barriers can limit effective technology use [65,66]. Also, in a previous study conducted within the Māori community, the authors found that the potential users preferred multiple languages in these technological solutions [21].

Overall, the findings of the study align with sociotechnical analyses of digital health that use AI and technology. It emphasizes that adoption, non-adoption, and abandonment are influenced by how technology-based solutions interact with users, culture, and wider social contexts [67].This research contributes to a better understanding of how AI and digital technologies can support asthma care in Pasifika communities. By highlighting the importance of cultural relevance and equity, based on the descriptive synthesis of perceptions, it offers a foundation for developing future health interventions that are both innovative and appropriate for the needs of PIs.

This study offers several notable strengths. First, to the best of our knowledge, it is one of the first qualitative studies to explore attitudes toward AI and digital technology for asthma management within Pasifika communities. By employing a qualitative design, the study captured rich, nuanced insights into culturally embedded experiences, perceptions, and concerns that quantitative methods would likely miss. Including participants across a wide age range, from tech-savvy youth to older adults with limited digital literacy, provided a broad spectrum of perspectives on the challenges and opportunities associated with AI in healthcare. Notably, the study was conducted in a multilingual setting, allowing participants to express their views in their preferred language, contributing to a more authentic and culturally grounded understanding of the issues. Drawing from the thematic analysis, the study proposes a holistic framework, a descriptive synthesis of perceptions, to inform the development of culturally appropriate AI and technology-based interventions. This framework offers a strategic foundation for designing tools that support asthma self-management and foster digital inclusion and health empowerment among ethnically diverse populations. Ultimately, these contributions may help enhance the overall quality of life for asthmatic Pasifika individuals.

However, despite the strengths of this study, several limitations must be acknowledged. First, the study focused on the perceptions of Pasifika communities regarding AI and digital health tools but did not involve the testing or implementation of actual technological interventions. As a result, the practical usability, cultural appropriateness, and effectiveness of AI-driven solutions for asthma management remain unassessed. Additionally, while grounded in qualitative insights, the proposed framework was informed by hypothetical scenarios and not co-designed with participants or validated through participatory processes, limiting its immediate applicability in practice. The study did not undertake cross-comparative analysis with international Pasifika populations, which could provide a broader contextual understanding and reveal unique or shared challenges in digital health adoption. Also, given the qualitative, exploratory nature of this study, findings are interpreted as descriptive and illustrative. Further, the study did not compare competing explanatory theories or establish causal relationships. Rather, it takes an interpretive approach and offers a descriptive synthesis of perceptions that are grounded in empirical evidence. Finally, the research was limited to Pasifika adults residing in Auckland. Although thematic saturation was reached, the relatively small sample size restricts the generalizability of the findings to broader Pasifika communities across NZ and beyond. Not all Pasifika sub-ethnic groups were adequately represented in the study, and while there were one or two participants from specific sub-groups, their limited numbers were insufficient to fully consider the diverse cultural distinctions that could influence perceptions of AI and technology.

6. Conclusion

This study expands the limited research on perceptions of AI use for asthma management and exacerbation prediction within Pasifika communities. The findings indicate that, although Pasifika communities are generally open to AI-based asthma tools, their widespread acceptance will depend on addressing concerns related to accuracy, data privacy, and accessibility, while ensuring the solution is personalized. A key focus will be improving public awareness of asthma and ways to manage it culturally appropriately. Before introducing technological solutions,

the potential users must be made aware of the usefulness of those tools for their disease management. By adhering to these steps, it would be possible to develop solutions that equip individuals and families with the confidence to monitor symptoms and effectively manage asthma, thereby enabling them to maintain an active lifestyle. A practical approach to asthma management across diverse communities and age groups involves balancing technological solutions with personalized care and respecting cultural values and contexts. Given the qualitative and exploratory nature of the study, the findings are intended to inform and guide future theory-driven and co-design research, rather than to provide direct recommendations for policy or system-wide implementations. Additional studies are required to explore user experiences with AI tools, incorporating interviews conducted before and after use to evaluate changes in attitudes over time among Pasifika communities and other ethnic groups. Future work can focus on developing a theoretically innovative or prescriptively authoritative model. Furthermore, future research could build on these findings through validation studies, expanded participant recruitment, methodological triangulation and triangulation with complementary data sources to strengthen analytical and theoretical contributions.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used OpenAI's ChatGPT (GPT-4o, June 2025 version) to do language editing. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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CRediT authorship contribution statement

Farhaan Mirza: Writing – review & editing, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Widana Kankanamge Darsha Jayamini:** Writing – review & editing, Writing – original draft, Visualization, Resources, Methodology, Formal analysis, Conceptualization. **Raymond Lutui:** Resources, Project administration, Funding acquisition, Conceptualization. **Kalesita Pole:** Writing – original draft, Resources, Investigation, Formal analysis, Data curation. **Amio Matenga-Ikihele:** Writing – review & editing, Writing – original draft, Resources, Investigation, Formal analysis, Data curation. **Arieta Fa'apesolo Mu'aulama:** Writing – review & editing, Resources, Investigation, Formal analysis, Data curation. **Amy Hai Yan Chan:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Patient Interview Guidelines

The following open-ended questions will be posed to the study participants under each section.

1 Introduction

Introduce the interviewer, study purpose, and rights while going through the information sheet and the consent form.

Asthma attacks affect many people in New Zealand. We are looking at ways to improve asthma care by being able to predict asthma attacks before they happen so that we can keep people well and out of the hospital. One way to do this is to use technology.

The study aims to explore your thoughts and feelings about the use of technology in asthma, and if there are any specific risk factors for attacks in the Pasifika that we should think about.

Firstly:

Tell me about you (pepeha)

2 Experience with Asthma

We will start by talking about your experience with Asthma.

How do you feel about living with Asthma? How has it affected your life?

For instance, how often do you take medications (such as inhalers)? How often do you go to meet GPs or go to the hospital for asthma?

3 Factors related to Asthma attacks

Let us talk about the things related to attacks

What happens when you have an attack?
What do you do when you have an attack?
How do you feel?
What triggers an asthma attack for you?

For instance: Pollen, Temperature, Wind, Pets, Stress
Have you tried avoiding those triggers, and what have you experienced in doing that?
Were you able to avoid them, or was there anything that prevented you from doing that?

4 Predicting asthma attacks using technology

One way of predicting asthma attacks is to use technology such as smart devices to monitor asthma (e.g., smart inhalers) and to use artificial intelligence to predict when an attack may happen.

What do you think about using AI and technology to help manage your asthma?

Are you aware of what AI is? What do you know about AI and its use in healthcare? What do you think of it?

How would you feel if AI were used to help predict when your next attack might happen?
What may be pros/cons for you?
What factors should be considered when using technology such as AI in Pasifika asthma patients?

Why do you think those factors need to be considered?
What may stop you from using technology? What may help?

5 Considerations for Pasifika when developing risk prediction models

What factors should be considered when developing risk prediction models for asthma attacks?

How do you think Pasifika culture and beliefs may be recognized and incorporated when considering risk prediction for asthma attacks?

6. Conclusion

Is there anything else you would like to tell me that you think would help us in using AI to predict asthma attacks in Pasifika patients? Will I be able to contact you later in case I have additional questions?

Data availability

The datasets generated during and/or analyzed during this study are not publicly available due to participants not consenting to the sharing of data beyond the research team.

References

[1] J.W. Mims, "Asthma: definitions and pathophysiology." pp. S2–S6.
[2] World Health Organization, Asthma, 2024, 24 February, https://www.who.int/news-room/fact-sheets/detail/asthma.
[3] A.H.Y. Chan, A. Tomlin, K. Beyene, J. Harrison, Asthma exacerbations in New Zealand 2010-2019: a national population-based study, Respir. Med. 217 (2023) 107365.
[4] Asthma and Respiratory Foundation NZ, Key statistics, 2025. https://www.asthmafoundation.org.nz/research/key-statistics.
[5] L. Telfar-Barnard, J. Zhang, The Impact of Respiratory Disease in New Zealand: 2023 Update, University of Otago, 2024.
[6] E. Davidson, A. Sheikh, Tackling ethnic variations in asthma outcomes in New Zealand's Māori and Pacific children will need a long-term strategy, Prim. Care Respir. J. 22 (3) (2013) 269–270, 2013/09/01.
[7] M.L. Levy, R. Winter, Asthma deaths: what now? Thorax. 70 (3) (2015) 209–210.
[8] J.F. van Boven, D. Drummond, A.H. Chan, M. Hew, C.Y. Hui, I. Adejumo, I. Cano, K. Hansen, V. Poberezhets, R.W. Costello, ERS "CONNECT" Clinical Research Collaboration–moving multiple digital innovations towards connected respiratory care: addressing the over-arching challenges of whole systems implementation, Eur. Respir. J. 62 (5) (2023).
[9] A.H.Y. Chan, B. Te Ao, C. Baggott, A. Cavadino, A.A. Eikholt, M. Harwood, J. Hikaka, D. Gibbs, M. Hudson, F. Mirza, DIGIPREDICT: physiological, behavioural and environmental predictors of asthma attacks—A prospective observational study using digital markers and artificial intelligence—Study protocol, BMJ Open Respir. Res. 11 (1) (2024).
[10] A.H. Chan, A.W. Stewart, J. Harrison, C.A. Camargo, P.N. Black, E.A. Mitchell, The effect of an electronic monitoring device with audiovisual reminder function on adherence to inhaled corticosteroids and school attendance in children with asthma: a randomised controlled trial, Lancet Respir. Med. 3 (3) (2015) 210–219.
[11] A.H.Y. Chan, H.K. Reddel, A. Apter, M. Eakin, K. Riekert, J.M. Foster, Adherence monitoring and e-health: how clinicians and researchers can use technology to promote inhaler adherence for asthma, J. Allergy Clin. Immunol.: Pract. 1 (5) (2013) 446–454.
[12] A.H.Y. Chan, D. Drummond, S. Ramakrishnan, J.F. van Boven, P.G. Gibson, D. Thomas, Digitally mapping the asthma journey—From diagnosis to remission, EClinicalMedicine (2025).
[13] S. Bosnic-Anticevich, N.D. Bakerly, H. Chrystyn, M. Hew, J. van der Palen, Advancing digital solutions to overcome longstanding barriers in asthma and COPD management, Patient Prefer Adheren. 17 (2023) 259–272.
[14] C. Jácome, R. Almeida, A. Pereira, L. Araújo, M. Correia, M. Pereira, M. Couto, C. Lopes, C.C. Loureiro, M. Catarata, Asthma app use and interest among patients with Asthma: a multicenter study, J. Investig. Allergol. Clin. Immunol. 30 (2) (2020) 137–140.
[15] H. Pinnock, C.Y. Hui, J.F. van Boven, Implementation of digital home monitoring and management of respiratory disease, Curr. Opin. Pulm. Med. 29 (4) (2023) 302–312.
[16] N.A. Molfino, G. Turcatel, D. Riskin, Machine learning approaches to predict asthma exacerbations: a narrative review, Adv. Ther. 41 (2) (2024) 534–552.
[17] O. Grana-Castro, E. Izquierdo, A. Pinas-Mesa, E. Menasalvas, T. Chivato-Perez, Assessing the impact of new technologies on managing chronic Respiratory diseases, J. Clin. Med. 13 (22) (Nov 16, 2024).
[18] W.K.D. Jayamini, F. Mirza, A. Naeem, A.H.Y. Chan, A. Tomlin, H. Tibble, K. Beyene, Predicting the risk of asthma attacks in New Zealand using machine learning, in: 58th Hawaii International Conference on System Sciences, Hawaii, USA, 2025, pp. 3731–3741.
[19] K. Witkowski, R. Okhai, S.R. Neely, Public perceptions of artificial intelligence in healthcare: ethical concerns and opportunities for patient-centered care, BMC Med. Ethics 25 (1) (Jun 22, 2024) 74.
[20] C.A. Fazakarley, M. Breen, B. Thompson, P. Leeson, V. Williamson, Beliefs, experiences and concerns of using artificial intelligence in healthcare: a qualitative synthesis, Digit. Health 10 (2024) 20552076241230075. Jan-Dec.
[21] W.K.D. Jayamini, F. Mirza, M.C. Bidois-Putt, M.A. Naeem, A.H.Y. Chan, Perceptions toward using artificial intelligence and technology for asthma attack risk prediction: qualitative exploration of Maori views, JMIR Form. Res. 8 (Oct 30, 2024) e59811.
[22] K. Hika, M. Harwood, S. Ritchie, A.H.Y. Chan, Maori experiences and beliefs about antibiotics and antimicrobial resistance for acute upper Respiratory tract symptoms: a qualitative study, Antibiotics 11 (6) (2022) 714.
[23] R.L. Beard, D.J. Fetterman, B. Wu, L. Bryant, The two voices of Alzheimer's: attitudes toward brain health by diagnosed individuals and support persons, Gerontologist 49 (S1) (2009) S40–S49.
[24] J.M. Morse, Determining sample size, Qual. Health Res. 10 (1) (2000) 3–5, 2000/01/01.
[25] B.E. Njee, N.V. Pemunta, V. Nimar, M.A. Fubah, A.C. Tanywe, P. Bulage, T. O. Bosire, N.N.B. Tram, C.N. Angwe, Perceptions and experiences of nondiabetic Cameroonian immigrants in Minnesota on access to affordable, culturally adapted healthcare services, BMC Health Serv. Res. 25 (1) (2025) 640, 2025/05/02.
[26] Social and Economic Research and Evaluation, 2023 Census Results Pacific Peoples in Auckland, Auckland Council, 2024.
[27] J. Fia'Ali'i, M. Law, C. O'Donovan, J.R. Skinner, E. Broadbent, Perspectives and experiences of Māori and Pasifika peoples living with cardiac inherited disease: a qualitative study, Psychol. Health 39 (6) (2024) 728–748.
[28] J. Gerrard, R. Benson, E. Brown, C. Varughese, Capturing the Benefits of AI in Healthcare For Aotearoa New Zealand-Full report, Office of the Prime Minister's Chief Science Advisor, 2023.
[29] C. Baggott, A. Chan, S. Hurford, J. Fingleton, R. Beasley, M. Harwood, H.K. Reddel, W.M.M. Levack, Patient preferences for asthma management: a qualitative study, BMJ Open. 10 (8) (2020) e037491.
[30] B. Saini, K. LeMay, L. Emmerton, I. Krass, L. Smith, S. Bosnic-Anticevich, K. Stewart, D. Burton, C. Armour, Asthma disease management-Australian pharmacists' interventions improve patients' asthma knowledge and this is sustained, Patient Educ. Couns. 83 (3) (2011) 295–302. Jun.
[31] S. De Peuter, V. Lemaigre, I. Van Diest, O. Van den Bergh, Illness-specific catastrophic thinking and overperception in asthma, Health Psychol. 27 (1) (2008) 93–99. Jan.
[32] H.S.J. Chew, P. Achananuparp, Perceptions and needs of artificial intelligence in health care to increase adoption: scoping review, J. Med. Internet Res. 24 (1) (2022) e32939.
[33] M.A. Teariki, E. Leau, Understanding Pacific worldviews: principles and connections for research, Kōtuitui: N. Z. J. Soc. Sci. Online 19 (2) (2024) 132–151.
[34] N. Rane, S. Choudhary, and J. Rane, "Towards autonomous healthcare: integrating artificial intelligence (AI) for personalized medicine and disease prediction," *Available at SSRN 4637894*, 2023.
[35] W.K.D. Jayamini, F. Mirza, M.Asif Naeem, A.H.Y. Chan, Investigating machine learning techniques for predicting risk of asthma exacerbations: a systematic review, J. Med. Syst. 48 (1) (2024) 49, 2024/05/13.
[36] A. Kaplan, H. Cao, J.M. FitzGerald, N. Iannotti, E. Yang, J.W.H. Kocks, K. Kostikas, D. Price, H.K. Reddel, I. Tsiligianni, C.F. Vogelmeier, P. Pfister, P. Mastoridis, Artificial intelligence/machine learning in respiratory medicine and potential role in asthma and COPD diagnosis, J. Allergy Clin. Immunol. 9 (6) (2021) 2255–2261.
[37] M.-H. Chen, G. Lee, and L.-P. Hung, "AI-driven data analysis for asthma risk prediction." p. 774.
[38] M.Z. Alam, A. Simonetti, R. Billantino, N. Tayler, C. Grainge, P. Siribaddana, S. R. Nouraei, J. Batchelor, M.S. Rahman, E.V. Mancuzo, Predicting pulmonary function from the analysis of voice: a machine learning approach, medRxiv. (2021).
[39] A. Hamza, Y. Himeur, A. Amira, and A. Oulefki, "Prediction asthma attacks through AI-powered thermal imaging analysis breath patterns." pp. 82–86.
[40] R.H. Abiyev, M.K.S. Ma'aitah, Deep convolutional neural networks for chest diseases detection, J. Heal. Eng. 2018 (2018) 4168538.
[41] S. Alyas, R. Hussain, B.F. Ababneh, S.C. Ong, Z.-U.-D. Babar, Knowledge, perceptions, facilitators, and barriers towards asthma self-management among patients: a systematic review of the literature. Expl. Res. Clin. Soc. Pharm., 2024 100558.
[42] N. Kalra, P. Verma, S. Verma, Advancements in AI based healthcare techniques with FOCUS ON diagnostic techniques, Comput. Biol. Med. 179 (2024) 108917.
[43] A. Bohr, K. Memarzadeh, The rise of artificial intelligence in healthcare applications. Artificial Intelligence in Healthcare, Elsevier, 2020, pp. 25–60.
[44] Z. Zhang, Y. Genc, D. Wang, M.E. Ahsen, X. Fan, Effect of AI explanations on human perceptions of patient-facing AI-powered healthcare systems, J. Med. Syst. 45 (6) (2021) 64.
[45] R. Whittaker, R. Dobson, C. Jin, R. Style, P. Jayathissa, K. Hiini, K. Ross, K. Kawamura, P. Muir, W. A. G. G. M. A. A. D. F. E. B. J. L. J. A. P. B. S. P. S. 1 Miles W. 1, An example of governance for AI in health services from Aotearoa New Zealand, NPJ Digit. Med. 6 (1) (2023) 164.
[46] A.K.C. Wong, J.H.T. Lee, Y. Zhao, Q. Lu, S. Yang, V.C.C. Hui, Exploring older adults' Perspectives and acceptance of AI-driven health technologies: qualitative study, JMIR. Aging 8 (2025) e66778.
[47] A. Kouri, S. Gupta, S.E. Straus, J.E.M. Sale, Exploring the perspectives and experiences of older adults with asthma and chronic obstructive pulmonary disease

toward mobile health: qualitative study, J. Med. Internet Res. 25 (2023) e45955, 2023/8/22.
[48] A. Matenga-Ikihele, J. Fa'alili-Fidow, D. Tiakia, D. Gentles, J. Natua, G. Malungahu, B. Tatafu, R. Roodhouse-Hill, R. Tuesday, M. Ngawati, M. Lyndon, Respiratory research with Maori and Pacific children living in Aotearoa, New Zealand: a systematic review and narrative synthesis, J. Prim. Health Care 17 (1) (2025) 63–82. Mar.
[49] R. Dobson, R. Whittaker, What do health service users think about the use of their data for AI development? Stud. Health Technol Inf. 310 (Jan 25, 2024) 1156–1160.
[50] N.P. Gordon, M.C. Hornbrook, Differences in access to and preferences for using patient portals and other eHealth technologies based on race, ethnicity, and age: a database and survey study of seniors in a large health plan, J. Med. Internet Res. 18 (3) (2016) e50.
[51] B.L. Green, A. Murphy, E. Robinson, Accelerating health disparities research with artificial intelligence, Front. Digit Health 6 (2024) 1330160.
[52] M. Chustecki, Benefits and risks of AI in health care: narrative review, Interact. J. Med. Res. 13 (Nov 18, 2024) e53616.
[53] L. Jones, K. Jacklin, M.E. O'Connell, Development and use of health-related technologies in indigenous communities: critical review, J. Med. Internet Res. 19 (7) (2017) e256, 2017/07/20.
[54] Moana Research, Pac. Data Sovereignty Netw.- Consult. Doc. (2021).
[55] C.Y. Hui, A.V. Shenton, C. Martin, D. Weatherill, D. Moylan, M. Hayes, L.G. Rienda, E. Kinley, S. Eck, H. Pinnock, Patient and public involvement workshop to shape artificial intelligence-supported connected asthma self-management research, PLOS Digit. Health 3 (5) (2024) e0000521.
[56] S. Wilson, C. Tolley, R. Mc Ardle, L. Lawson, E. Beswick, N. Hassan, R. Slight, S. Slight, Recommendations to advance digital health equity: a systematic review of qualitative studies, NPJ Digit. Med. 7 (1) (Jun 29, 2024) 173.
[57] A. Ueno, C. Dennis, G.A. Dafoulas, Digital exclusion and relative digital deprivation: exploring factors and moderators of internet non-use in the UK, Technol. Forecast. Soc. Change 197 (2023) 122935, 2023/12/01/.
[58] Z. Obermeyer, B. Powers, C. Vogeli, S. Mullainathan, Dissecting racial bias in an algorithm used to manage the health of populations, Science 366 (6464) (2019) 447–453.
[59] A.A.A. Matenga-Ikihele Te Whanau, F. Fa'alau, R. Dobson, J. Fa'alili-Fidow, M. Roberts, S. Taufa, R. Tuesday, R. Whitakker, J. McCool, Navigating digital inclusion and the digital va among Niue mamatua through the provision of mobile phones during COVID-19, AlterN. (Nga. Pae. Maramatanga (Organ.)) 19 (1) (2023) 145–154. Mar.
[60] Department of Internal Affairs, The Digital Inclusion Blueprint, Te Mahere Mō Te Whakaurunga Matihiko, Department of Internal Affairs, NZ, 2019.
[61] S.A. Saeed, R.M. Masters, Disparities in health care and the digital divide, Curr. Psychiatry Rep. 23 (9) (Jul 23, 2021) 61.
[62] V.M. McDonald, S.A. Hiles, K.A. Jones, V.L. Clark, J. Yorke, Health-related quality of life burden in severe asthma, Med. J. Aust. 209 (S2) (Jul 16, 2018) S28–S33.
[63] S. Stanescu, S.E. Kirby, M. Thomas, L. Yardley, B. Ainsworth, A systematic review of psychological, physical health factors, and quality of life in adult asthma, NPJ. Prim. Care Respir. Med. 29 (1) (Oct 21, 2019) 37.
[64] Y. Xie, K.P. Fadahunsi, C. Kelleher, D.M. Tarn, A. Grace, O.D. J, Towards an inclusive digital health ecosystem, Bull. World Health Organ. 103 (2) (Feb 1, 2025) 170–173.
[65] E. Wikaire, M. Harwood, K. Wikaire-Mackey, S. Crengle, R. Brown, A. Anderson, R. Jansen, R. Keenan, Reducing healthcare inequities for Māori using telehealth during COVID-19, N. Z. Med. J. 135 (1552) (2022) 112–117.
[66] J.-A.P. Hughson, J.O. Daly, R. Woodward-Kron, J. Hajek, D. Story, The rise of pregnancy apps and the implications for culturally and linguistically diverse women: narrative review, JMIR MHealth UHealth 6 (11) (2018) e189.
[67] T. Greenhalgh, J. Wherton, C. Papoutsi, J. Lynch, G. Hughes, S. Hinder, N. Fahy, R. Procter, S. Shaw, Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies, J. Med. Internet Res. 19 (11) (2017) e8775.