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E Puapinga Katoa Te Nio Tamariki: A multi-stakeholder roadmap for oral health of mothers and children in the Cook Islands

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Abstract

Background and objectives: Maternal and child oral health is a priority in the Cook Islands. This community case study examines the 'E Puapinga Katoa Te Nio Tamariki' multi-stakeholder program initiative using shared governance, design, and resource integration to strengthen early oral health within primary care. *Methods:* A participatory, multi-stakeholder design approach was implemented across Rarotonga and the outer islands of Atiu, Aitutaki, Mauke, Mitiaro, and Mangaia. Te Marae Ora (TMO), Ministry of Health, Cook Islands, worked with private partners and donor agencies. The programme followed four phases: (1) planning and stakeholder engagement; (2) programme development and resource creation; (3) implementation; and (4) monitoring and evaluation, refined through iterative Plan–Do–Study–Act cycles. *Results:* In Phase 1, stakeholders established governance structures, clarified roles, developed oral health care pathways, and identified unmet treatment needs and service gaps. In Phase 2, culturally grounded interventions were designed through community consultations and cross-sector partnerships. In Phase 3, ten integrated oral health and nutrition workshops were delivered, screening 49 pregnant women and 299 children aged 0 to 36 months. In Phase 4, monitoring systems were strengthened through community engagement, incorporating locally relevant indicators. *Conclusion:* Integrating oral health into primary care through shared governance and design offers a feasible, contextually appropriate model for improving oral health in early childhood in the Cook Islands and resource-constrained settings. This approach helped address constraints related to workforce capacity, geographic access, and cultural relevance that would be difficult to resolve under conventional service delivery models.

Introduction

Oral health is an essential component of overall health and well-being; it begins with maternal oral health during pregnancy, influencing both maternal and child health outcomes. Maternal oral health serves as a critical point for breaking intergenerational cycles of oral disease. Beyond biological connections, maternal oral health knowledge influences children's diets and home oral hygiene practices. Supportive, culturally-safe family-centred and integrated primary care approaches can empower mothers to make healthier choices for themselves and their young children (Lee *et al.*, 2024). However, many pregnant women and new mothers encounter demographic, socioeconomic, psychological, and behavioural barriers to timely oral healthcare (Amin *and* ElSalhy, 2014).

The recent World Health Organization (WHO) Global Oral Health Status Report highlights that the burden of oral diseases now exceeds all major non-communicable diseases (NCDs) (WHO, 2022a). It affects nearly half the world's population, with disproportionate impacts in low- and middle-income countries (WHO, 2022a). In response, the WHO Global Oral Health Action Plan calls for integration of oral health into primary healthcare, national policies, and universal health coverage (WHO, 2022b). Locally designed and integrated models are increasingly recognised as essential for small island states, providing the rationale for the development of the 'E Puapinga Katoa Te Nio Tamariki' programme in the Cook Islands (Skivington *et al.*, 2021; WHO, 2022b). This is particularly relevant for the Western Pacific Region (WPR), where marked disparities across Pacific Island Countries and territories persists and health workforce shortages necessitate innovative, integrated primary oral health models to address substantial unmet dental needs (WHO, 2022a).

Many oral health interventions are developed within large, well-resourced health systems and subsequently transferred to small island contexts with limited adaptation. In small island states, such externally derived models may be inefficient or poorly aligned with local governance structures, workforce realities, and cultural practices (Skivington *et al.*, 2021; WHO, 2022a). The 'E Puapinga Katoa Te Nio Tamariki' programme was developed in direct response to this design gap, using participatory governance and locally grounded implementation to ensure feasibility, acceptability, and sustainability (Sanders and Stappers, 2008; Damschroder *et al.*, 2009).

Oral health policy landscape in the Cook Islands

In 2023, the World Federation of Public Health Associations (WFPHA) launched its Global Maternal and Child Oral Health Initiative, with support from over 50 public health

organisations, including Te Marae Ora (TMO) of the Cook Islands (Lee *et al.*, 2024). The initiative emphasises the need for healthcare systems that promote good oral hygiene, healthy diets, and access to essential oral health services for mothers and children. In response, TMO has implemented significant programmes to improve oral health across the Cook Islands. The Cook Islands are a self-governing nation in free association with Aotearoa New Zealand, made up of 15 islands and atolls spread over just under 2 million km² in the Polynesian region of the Pacific Ocean. It is divided into two groups: Southern and Northern (Cook Islands Ministry of Finance and Economic Management, 2021). In 2021, the resident population was 15,040, with 77% identifying as Cook Island Māori. Most people live in Rarotonga, the centre of commerce and government. There are 1,344 children under 6 years old, of whom 66.7% reside in Rarotonga (Cook Islands Ministry of Finance and Economic Management, 2021). Family structures in the Cook Islands reflect traditional Polynesian culture, with extended family networks playing a vital role. Grandparents, uncles, aunts, and cousins provide caregiving, economic support, and socialisation. Women, particularly mothers and grandmothers, have significant authority and play key roles in preserving cultural traditions. The culture values collective well-being, with families collaborating through food sharing, childcare, and financial support.

TMO is the primary healthcare provider in the Cook Islands, responsible for national health policies and the delivery of primary care, dental care, public health, and hospital care services. TMO's vision is for all Cook Islands residents to live healthy lives and achieve their aspirations (TMO, 2025a). Recent strategies, especially the *'Ara-Tango Anga'anga', Cook Islands National Health Strategic Plan 2023-2027*, prioritise integrating oral health into existing health frameworks (TMO, 2023a). TMO is also committed to building a '*Resilient Pacific'* by 2030, by enhancing health from conception through early childhood. Guided by the '*Te Kupenga'* care model, TMO's approach addresses the NCD cycle by emphasising maternal health and the vital 'First 1000 Days' of a child's life, and targeting issues such as smoking, obesity, and oral health challenges in young populations. Maternal and child oral health key result areas align with TMO *Ara-Tango Anga'anga*, Cook Islands National Health Strategic Plan, 2023-2027, as illustrated in Figure 1 (TMO, 2023a).

The Te Kupenga Model is TMO's foundation model of healthcare (TMO, 2024a). Launched in March 2024, the National Healthcare Reorientation Plan 2024+ builds on the Te Kupenga Model, strongly emphasising child health, aspiring to a 'disease-free' status, and encouraging early prevention strategies for maternal and child health (TMO, 2024a). The plan is woven into the Healthy Cook Islands 2030+ initiative (OPM, 2020a; UNESCAP, 2024) using the 'Kopu Tangata Akatakapatoa' method to empower families to collectively adopt healthier lifestyles. It centres on partnerships for maternal and child oral health. A notable component, 'E Puapinga Katoa Te Nio Tamariki,' delivers community-driven prevention and early intervention through primary healthcare. A key goal is establishing a comprehensive policy for maternal and child oral health in collaboration with key stakeholders. The programme integrates oral health screening, education, referral pathways and maternal oral health care within primary health care settings, while reinforcing health knowledge and positive practices at school and household levels. Complementary primary care initiatives targeting children include the Baby Friendly Hospital Initiative (TMO, 2024b), Rheumatic Heart Disease screening, initiatives to increase physical activity to address the growing burden of childhood obesity (Haxton, 2024), and promotion of safe drinking water, including the distribution of water bottles to school-aged children. For children, the focus is on reducing early childhood

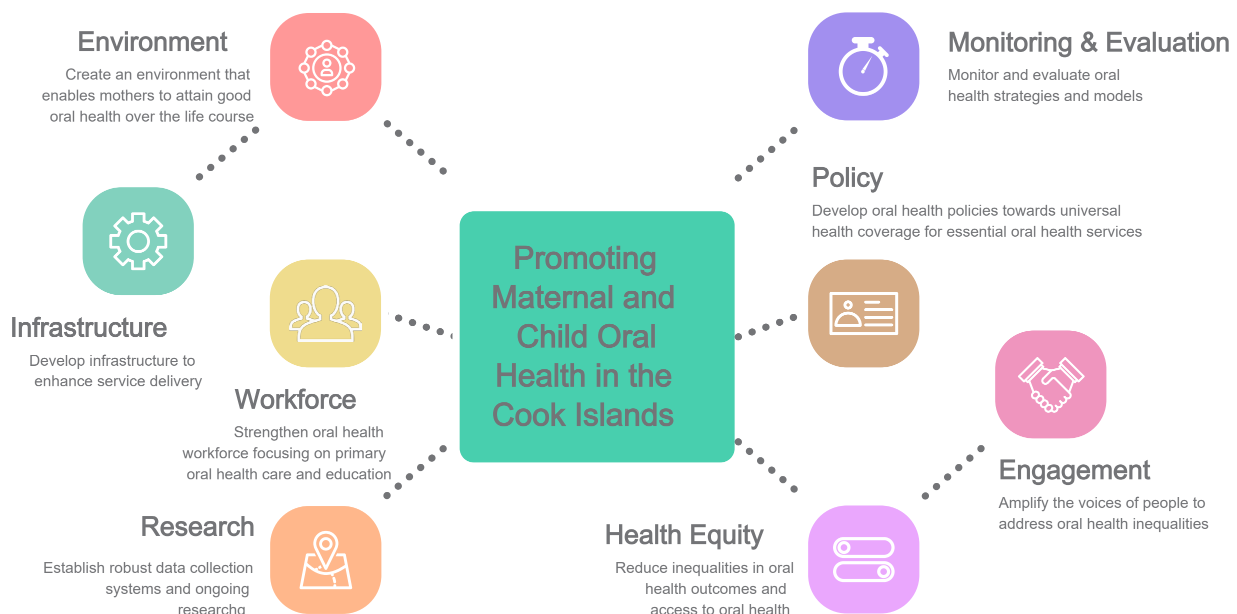

Figure 1. Maternal and child oral health key result areas based on the TMO Ara-Tango 'aniconic (Cook Islands National Health Strategic Plan 2023-2027)

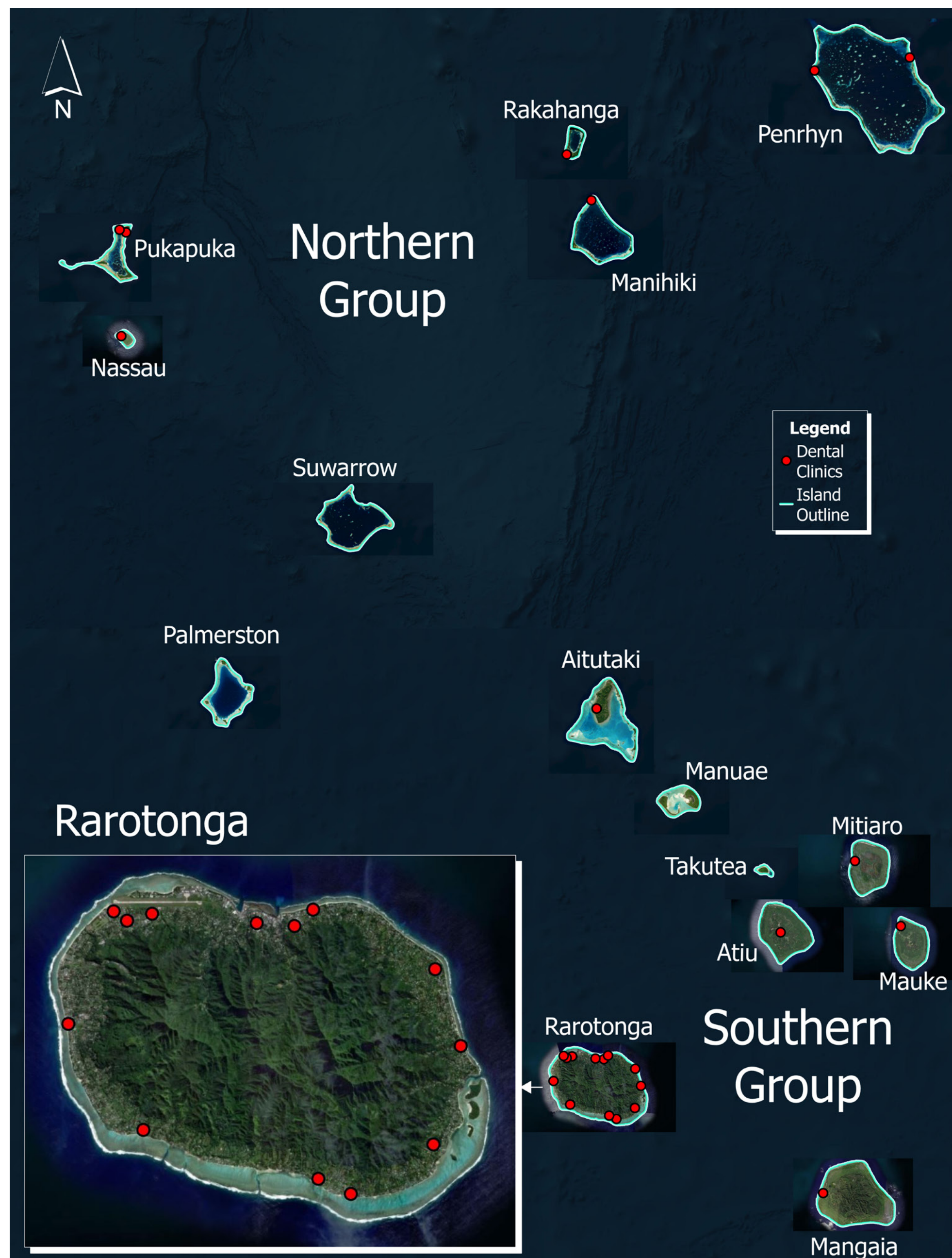

Figure 2. Geographical distribution of dental clinics in the Cook Islands

caries (ECC) and aims to have half the child population caries-free by 2030 (TMO, 2024c, 2024d).

Child oral health in the Cook Islands

There is a lack of published literature on feeding practices, insufficient oral health research, and no regular national oral health surveys of children in early childhood in the Pacific region. According to the WHO Oral Health Country Profile for the Cook Islands, nearly half (45.1%) of children aged one to nine years have untreated dental caries in their primary teeth, while one in three (33.4%) children aged five years or older have untreated dental caries (WHO, 2022c). The Cook Islands have about three dentists per 10,000 people across 26 dental clinics. Figure 2 shows the geographical distribution of these clinics. The Northern Group islands are the farthest from Rarotonga and face challenges from adverse weather and limited transportation. All islands have full-time dental therapists, except Manihiki, Rakahanga, and Mauke. The oral health workforce includes six dentists, 14 dental therapists, and four dental assistants. Countries in the WPR face unique logistical, geographical, governance, and financial challenges in healthcare delivery.

The service data from Are Maki (Rarotonga Hospital) shows a high demand for dental general anaesthesia, averaging approximately four children treated each week. Given late presentations and patients' young age, most treatments are surgical, with 8–10 teeth extractions per child, some requiring up to 14 teeth removed or even full-mouth clearance. ECC prevalence is high in most of the islands; 100% in the outer islands, known as Pa Enua—Atiu, Mauke, and Mitiaro; 73% in Mangaia, 77% in Rarotonga, and 47% in Aitutaki, where many of the children 's teeth were considered non-restorable (Lal-Kumar & Williams, unpublished report 2024).

The 'E Puapinga Katoa Te Nio Tamariki' programme

The Healthy Islands Initiative, originally envisioned in 1995, and reaffirmed in 2015, by Pacific Island Countries, provides a strategic framework for addressing health challenges in the Western Pacific Region (WHO, 2015). In the Cook Islands, oral health has been integrated into the national public health agenda through the Healthy Islands Framework (WHO, 2024). Central to this approach is the 'E Puapinga Katoa Te Nio Tamariki' programme, a design initiative that leverages cross-sector collaboration among health sector actors, private partners, and regional donor agencies. Partner roles, governance, and resource-sharing mechanisms and strategies are developed and embedded within existing primary care structures. The initiative places a strong emphasis on capacity building, ensuring that training, tools, and knowledge are delivered at the community level. These strategies aim to make oral health services accessible, culturally appropriate, and sustainable. This approach aligns with national and regional commitments to integrated primary health care, cross-sector partnership, and community-level capacity building, as articulated in the National Healthcare Reorientation Plan 2024+, Healthy Cook Islands 2030+, and global primary health care and oral health partnership frameworks (OPM, 2020b; TMO, 2024a; WHO, 2022d; King's College London, 2021).

This paper aimed to document the programme development process. It presents a community case study outlining the multi-stakeholder roadmap of the 'E Puapinga Katoa Te Nio Tamariki' programme for improving oral health outcomes in the Cook Islands. It examines the importance of renewing the focus on oral health in Small Island States in the Western Pacific Region and highlights how integrating oral health into maternal and child health systems can be transformative.

Methods

Overall programme framework and governance structure

The 'E Puapinga Katoa Te Nio Tamariki' programme lies within TMO Healthy Islands 2030+ framework and contributes to the National Health Reorientation Plan 2024+. It is supported by a letter of commitment signed by the Ora'anga Tumanava Taskforce on each island (TMO, 2025b). The terms of reference and roles for the NCD Taskforce are detailed in *Ngaki'anga Kapiti Ora'anga Meitaki: The Cook Islands Strategic Action Plan to Prevent and Control Non-Communicable Diseases 2021–2025* (TMO, 2021). Programme development was data-driven and targeted Cook Islands Māori pregnant women, infants, and young children across Rarotonga and the outer islands of Atiu, Aitutaki, Mauke, Mitiaro, and Mangaia. Written informed consent was obtained from mothers and caregivers for the oral health screening of participating children. The initiative followed four key phases: (1) planning and stakeholder engagement; (2) programme development and resource creation; (3) implementation; and (4) monitoring and evaluation. The programme was iteratively developed, piloted, and refined via Plan-Do-Study-Act (PDSA) cycles, integrating screening, education, and referral services into primary care. Quantitative data from screenings and attendance, alongside qualitative feedback, were analysed using descriptive and thematic methods to inform adaptation and scaling. The TMO, private partners, and regional donor agencies collaboratively designed care pathways, agreed on governance and resource-sharing arrangements, and identified key integration points with primary healthcare, following best practice (Sanders and Stappers, 2008).

The participatory design approach was intentionally selected to mitigate anticipated constraints, including workforce shortages, inter-island service fragmentation, and low uptake of externally designed interventions, consistent with guidance on the development and implementation of complex interventions in resource-constrained settings (Skivington *et al.*, 2021; Damschroder *et al.*, 2009).

Phase 1 – Planning and stakeholder engagement

A situational analysis of maternal and child oral health and the service context was conducted in Rarotonga and the Pa Enua (Lal-Kumar & Lee, unpublished report 2023). Workshops with clinicians, community leaders, and caregivers were held to identify unmet treatment needs and service gaps, to prioritise local needs such as feeding practices and oral hygiene knowledge, and to develop a programme theory and logic model consistent with the Medical Research Council (MRC) framework for complex interventions (Skivington *et al.*, 2021). This phase clarified the respective roles of government, clinical services, and community organisations and informed the overarching roadmap for integrating oral health into primary care.

The key stakeholders included TMO (Ministry of Health), BSP Financial Group, UNICEF Pacific, WHO Western Pacific Region, NUI Community Antenatal Education Service, and the Cook Islands Child Welfare Association. Between May and August 2022, UNICEF convened virtual meetings via Zoom (with minutes shared), followed by an in-country visit in June 2023 involving UNICEF (Aotearoa and Australia) and Rotary. UNICEF funded the workshops, oral health screenings, and hygiene kit distributions.

Phase 2 – Programme development and resource creation

In Phase 2, stakeholders created a package of feasible, primary care, appropriate components tailored to small-island settings guided by the Consolidated Framework for Implementation Research (CFIR) (Damschroder *et al.*, 2009). The team developed simple antenatal and early childhood oral health screening tools; referral protocols linking primary care, dental services, community support; and family-centred education materials to strengthen maternal oral health knowledge and home practices. The integrated package comprised antenatal oral health screening and referral, oral health education for mothers and caregivers, family-centred counselling on feeding and oral hygiene, and early identification and preventive support for young children. Materials and tools were reviewed for cultural relevance, feasibility, and acceptability through iterative feedback from health workers.

As part of this phase, the team also planned an integrated nutrition and oral health workshop. These workshops addressed maternal nutrition and infant and child feeding, aligned with WHO (2023), UNICEF (2020), and the Pacific Community (2021) guidelines. The target audience for the Maternal and Child Nutrition Workshops included pregnant women, public health nurses, midwives,

early childhood education centre teachers, leaders, and members of Paunu (Cook Islands Child Welfare Association). Workshop objectives were to: a) promote exclusive breastfeeding for the first six months; b) raise awareness about proper weaning methods; c) help communities create age-appropriate, healthy recipes using local foods; d) offer technical support for healthy meal planning and portion control; e) encourage the development and use of a healthy plate composed of local foods; f) provide digital, age-appropriate recipes for the Pa Enua community using available foods; g) promote the 'lift the lip' oral health practice; h) empower communities to schedule routine oral health check-ups; and i) build community capacity in oral hygiene throughout life.

Phase 3 – Implementation

A pilot implementation was undertaken in Rarotonga before expansion to the Southern Group islands. This phase involved upskilling dental therapists and primary care staff, integrating oral health screening and education into antenatal and primary care contacts, and delivering community-based oral health and nutrition workshops. Iterative Plan–Do–Study–Act (PDSA) cycles (Taylor *et al.*, 2014) were used to refine workshop content, screening processes, and referral pathways before and during rollout to the Pa Enua.

Phase 4 – Monitoring and evaluation

The monitoring and evaluation plans for 'E Puapinga Katoa Te Nio Tamariki' are embedded in the overarching monitoring and evaluation framework for Healthy Cook Islands 2030+. Monitoring uses clearly defined indicators to track activities, coverage, and outcomes across Rarotonga and the Pa Enua islands (TMO, 2024d).

Annual programme monitoring reports on the number of integrative workshops held and participation by young mothers, parents, and caregivers, using oral health and midwifery/nursing records. Annual screening data records the number of children aged 0–5 years and antenatal mothers screened by oral health staff, supporting early detection and prevention (TMO, 2024d).

Biennial school-based monitoring through the Early Childhood Centres screening programme measures the number of children screened, percentage coverage per school, and the proportion of cavity-free children. Additional annual indicators track oral health promotion, including the number of ECEs participating in toothbrushing programmes and those implementing healthy canteen or lunch policies (TMO, 2024c, d).

The evaluation plan adopts a mixed-methods, outcomes-focused approach to assess the programme's impact on feeding and oral hygiene practices in early childhood. Quantitative indicators will be tracked using both existing and newly developed data sources, including routine screening reports and standardised breastfeeding status templates. These data will monitor changes in breastfeeding initiation, exclusivity, and duration, as well as cavity-free status and reductions in caries experience from a 2023 baseline (TMO, 2024d).

Data collection and analysis methods

For oral health screening, only active (untreated) caries lesions were recorded, while previously treated teeth (fillings and extractions) were documented separately. Children were categorised as "cavity-free" or "caries-present" according to the presence or absence of visible dental caries lesions or cavitation (King's College London, 2021; Fejerskov, 2007). During screening, feeding histories were collected for children aged 0–3 years. These histories were aligned with infant and young child feeding guidelines from WHO, UNICEF, and the Pacific Community (WHO, 2023; UNICEF, 2020; Pacific Community, 2021), including exclusive breastfeeding for the first 6 months, timely introduction of complementary foods at 6 months, and continued breastfeeding to 2 years. Feedback from communities and health workers was incorporated into ongoing adaptations of programme delivery and informed planning for future scale-up.

Between August, 2024 and March 2025 (Phase 3 implementation), quantitative data were collected across Rarotonga and the Southern Group islands of Atiu, Mauke, Mitiaro, Mangaia, and Aitutaki. Data sources comprised programme registers documenting attendance at oral health and nutrition workshops, clinical screening records for pregnant women and children aged 0–36 months, and routine service data on screening coverage and referrals.

Qualitative data were collected through facilitated group discussions with workshop participants, including pregnant women, mothers, and caregivers of young children, public health nurses, midwives, ECE teachers, and Paunu members. Discussions were facilitated by the dental team following each workshop session, using open-ended prompts that explored: current feeding and oral hygiene practices; barriers to following recommended guidelines; knowledge of traditional foods and preparation methods; and suggestions for programme improvement. The responses were documented by note-taking and were synthesised thematically.

Quantitative data, including numbers of pregnant mothers, infants, and children screened, workshop attendance, cavity-free versus caries-present status, and feeding indicators, were analysed using descriptive methods to summarise patterns across islands and caregiver groups. Qualitative notes from group discussions were analysed thematically using a rapid, iterative approach. Emerging themes were used to refine workshop content, health education materials, and implementation strategies, and to inform decisions about further scale-up of the programme.

Results

The results are presented to illustrate how the programme design addressed anticipated constraints through governance, capacity building, and culturally grounded delivery. Specifically, we report the findings from the roadmap and multi-sectoral approach phases, and outline the outcomes of the four phases of programme development. Findings from the screening and workshops will be reported in a subsequent paper.

Phase 1: Planning and stakeholder engagement

A needs assessment and situational analysis (Lal-Kumar and Lee, 2023), based on clinical and community observations

in Rarotonga, identified significant unmet dental treatment needs among pregnant women, as well as severe, untreated dental disease in young children. Gaps in feeding and oral hygiene knowledge highlighted the need to improve health literacy through a life-course prevention approach.

Building on these findings, a range of stakeholders were engaged in the planning process. Hygiene packs were proposed for distribution to pregnant women and children aged 0–3 years as a preventive support. Nutrition-integrated oral health workshops were designed for parents and caregivers of 0–3-year-olds, pregnant women, public health nurses, midwives, teachers in early childhood education centres, and Paunu (Cook Islands Child Welfare Association) leaders and members.

From 2023 to 2025, a formal partnership was established with BSP and TMO to plan the refurbishment of three paediatric clinics across Rarotonga, Atiu, and Mangaia. Regular coordination meetings and shared documentation supported joint decision-making. Governance measures were agreed to clarify objectives, roles, and cooperation arrangements, ensuring effective collaboration and accountability (TMO, 2023b).

Stakeholder engagement also focused on workforce development. A five-day capacity-building workshop, ‘Healthy Islands 2030+: Towards a Cavity-Free Future for the Tamariki (Children), Cook Islands: Staff Capacity Building’ (FDI, 2024), was planned for the Cook Islands’ dental therapists, with support from the World Dental Development Fund, FDI, and the World Dental Congress. Organised by a paediatric dentist in collaboration with TMO’s senior oral health staff, the workshop, held in March 2025, was designed to strengthen clinical skills and align service delivery with best-practice guidance for children and adolescents.

Phase 2: Programme development and resource creation

The Secretary of Health, Paediatric Dentist, Dental Therapists, and UNICEF Pacific Health and Nutrition Specialist, together designed the programme delivery and implementation. An integrated nutrition oral health workshop was developed, featuring a presentation on infant feeding guidelines and a hands-on activity in which participants created meal plans for children aged 6–36 months.

Planning focused on the Southern Group of the Cook Islands. In partnership with the Ministry of Health teams in Rarotonga and the Pa Enua (outer islands), a detailed plan was created for workshops and oral health screenings. The planning group included dental therapists, midwives, charge nurses, public health nurses, and Paunu presidents and members. The Secretary of Health secured the necessary approvals from the Island Council and Lord Mayor, under the Healthy Islands 2030+ framework (OPM, 2020a; UNESCAP, 2024), which also supports the ‘E Puapinga Katoa Te Nio Tamariki’ programme.

To promote positive feeding and oral hygiene practices among pregnant women and young children, culturally tailored health promotion materials, such as posters, pocket cards, and digital resources, were developed to enhance health literacy and address misconceptions. A local painter was commissioned to create illustrations of a pregnant Polynesian woman and a breastfeeding mother, which were subsequently digitised.

Culturally rich health communication materials have been shown to enhance health literacy by increasing message comprehension, relevance, and recall, particularly in communities where oral traditions, visual storytelling, and collective learning are central (de Wit *et al.*, 2018; Smith and Pérez, 2020). The use of painting depicting a pregnant Polynesian woman and a breastfeeding mother was carefully chosen for this purpose. Such approaches also contribute to cultural safety by acknowledging identity, lived experience, and local knowledge systems, thereby fostering trust in health messaging and service providers (Dudley *et al.*, 2018; Watt and Sheiham, 2012). Trust and recognition are critical mechanisms for behaviour change in maternal and child health contexts, influencing caregivers’ willingness to engage with preventive guidance, adopt recommended feeding practices, and participate in ongoing care (Rollins *et al.*, 2016; Victora *et al.*, 2016). The TMO communications officer collaborated with the oral health team to develop these materials, drawing on behaviour-change theory. The resources were piloted with community health workers and mothers attending antenatal clinics in Rarotonga and were revised based on feedback.

Two lead dental therapists assembled oral health kits, including mother and child toothbrushes, fluoride toothpaste, a soft facecloth for erupting teeth, and an information card for distribution at the oral health nutrition workshops. Screening assessment forms were digitised in the Ministry’s Patient Information System (MedTech Evolution), and personal data devices (PDAs) were introduced to streamline data entry and support timely analysis.

Phase 3: Implementation

The Southern Group’s implementation phase lasted from August 2024 to March 2025, during which programme awareness was promoted via social media, local TV, and radio. The implementation phase consisted of maternal and child nutrition workshops, maternal and child oral health screening, the establishment of paediatric oral health facilities.

Maternal and child nutrition workshops

During the Healthy Islands 2030+ initiative (OPM, 2020a; UNESCAP, 2024), ten workshops were held, attended by 226 participants. Sessions were delivered by a paediatric dentist and two dental therapists, with plans for dental therapists to lead future sessions in public health settings, in line with the WHO Global Oral Health Action Plan. Each workshop began with a brief presentation on dietary, feeding, and oral health practices, followed by hands-on group meal planning using locally sourced foods for children in four age groups: 6–12 months, 12–24 months, 3–5 years, and school-aged children.

The elders on the islands demonstrated extensive knowledge of traditional foods, while younger mothers often relied on processed foods. Many participants, however, expressed a strong interest in reviving Cook Island Māori diets. On one island, a cooking demonstration featured songs and stories that celebrated traditional methods of

preparing meals. There are plans to collaborate on analysing qualitative findings and to adapt community resources based on these insights.

The Paunu network facilitated outreach and ongoing data collection. The opportunity to engage closely with the communities and the Kumiti Paunu yielded rich intergenerational knowledge about local foods and traditional meals, along with a deeper understanding of the challenges created by the growing availability of processed foods. Qualitative narratives from quotes and group discussions were triangulated with screening data. For example, a grandmother who joined a nutrition-integrated workshop on Aitutaki shared: *"I don't want my moko (grandchild) to have diabetes or wear false teeth early in life like me".*

Elders and caregivers voiced a strong desire to break the cycles of oral disease and NCDs among tamariki (children), sharing concrete examples and personal experiences that highlighted barriers such as cost, availability, and unreliable information. A grandmother who attended the integrated nutrition workshop on the island of Mitiaro stated, *"I am just sadly watching my grandchildren eating unhealthy food and am not able to do much about it."*

The discussions on oral hygiene practices covered several key topics: the accessibility of toothbrushes and toothpaste at home, the use of fluoridated toothpaste, when children should start brushing, and the role of parental supervision. Most participants reported that toothbrushes and fluoride toothpastes were generally available on most islands. However, some participants experienced supply shortages due to delays in inter-island transport and expressed a desire for a broader selection of toothbrushes and toothpaste in local stores, such as softer or harder bristles, products for different age groups, and various flavours. There was a noticeable gap in knowledge regarding the correct age for children to start brushing, the importance of brushing before bed, and the necessity for parental supervision. Both parents, caregivers, and teachers at the workshops observed that there is a lack of consistent school-based toothbrushing programmes.

Maternal and child oral health screening

Screening sessions were conducted with 49 antenatal mothers and 299 children aged 0 to 36 months, as shown in Table 1. Histories indicated that many did not adhere to feeding guidelines, which include recommendations for exclusive breastfeeding up to six months, timely introduction of complementary foods, and continued breastfeeding up to two years (WHO, 2023; UNICEF,2020; Pacific Community, 2021), placing numerous infants at medium to high risk for ECC. Visual oral examinations for the 0–36-month group were performed under natural light, with the mother and examiner seated and the child's head resting in the examiner's lap.

Establishment of paediatric oral health facilities

By the end of 2026, three paediatric-capable clinics will be operational: a children's cubicle in Rarotonga (established in 2023), a child-friendly clinic in Atiu (2024), and a refurbished clinic in Mangaia (2026), developed under the BSP–TMO joint agreement (TMO, 2023b). This expansion will improve access to preventive and early care for mothers and children throughout the Southern Group. The refurbished clinics feature child-centred paediatric dental spaces, including soothing, nature-inspired colour palettes, child-friendly artwork, and locally authored storybooks that promote reading instead of screen time. Additional comfort and safety upgrades include new air-conditioning, concealed cabinetry to support infection control, and a ceiling-mounted television to help distract children during procedures.

Staff capacity-building workshop

The staff capacity-building workshop 'Healthy Islands 2030+: Towards a Cavity-Free Future for the Tamariki (Children), Cook Islands' was held in Rarotonga, Cook Islands, 10-14 March 2025, for all the dental therapists working in the Southern Group of the Cook Islands. The workshop's primary objective was to update and standardise the knowledge and skills of dental therapists delivering screening programmes across 29 schools in the Cook Islands, with a focus on clinical practice, preventive care, and community outreach. The workshop was delivered by local senior staff from Oral Health Services and the TMO, led by the paediatric dentist.

Participants were introduced to two key documents: School Oral Health Services Guidance (TMO, 2024c) and 'E Puapinga Katoa Te Nio Tamarki' Guidance (TMO,2024d). Developed in alignment with the National Health Reorientation Plan 2020–2024 (TMO, 2024a). These resources outline oral health services for pregnant women, infants, and children in early childhood and school-age, using a life-course approach.

The guidance documents promote a risk-based model of care focused on early intervention and prevention. They emphasise tailored care plans and the use of motivational interviewing techniques to encourage behaviour change, including reduced sugar intake and improved oral hygiene at home and at school. The initiative also seeks to strengthen oral health advocacy and literacy within communities, highlighting healthy feeding practices, early oral hygiene, and regular dental visits. Together, these efforts aim to

Table 1. Maternal and Child Oral Health Screening, Southern Group, Cook Islands

	Southern Group Islands						Total
	Mangaia	Mitiaro	Mauke	Aitutaki	Atiu	Rarotonga	
Ante-natal mothers	3	0	2	12	3	29	49
6-12 months	3	3	4	26	11	91	138
12-24 months	11	1	2	14	3	47	78
24-36 months	1	0	0	20	32	30	83
Total	15	4	6	60	46	168	299

build a culture of proactive oral health management among children and families in the Cook Islands.

The workshop's practical, evidence-based design fostered collaboration and peer learning. The participants engaged in a range of teaching and learning strategies, such as problem-solving and case-based learning, helping dental therapists grow as problem-solvers, lifelong learners, critical thinkers, and reflective practitioners. The workshop also highlighted the importance of sustainable dentistry and technological innovation.

Phase 4: Monitoring and evaluation

The findings from the initial rollout phase of 2023-2024 showed that establishing community-owned baselines and practical indicators, such as exclusive breastfeeding rates up to six months, timing of complementary feeding, sugary drink consumption frequency, local food use, and home oral hygiene, strengthened monitoring and evaluation.

Contextual risks identified by communities included financial strain on grandparents, rising food costs and limited access, dry weather spells on Atiu, and crop losses from wild pigs. Monitoring of these signals can support adaptive management approaches, including targeted messaging, resource allocation, and programme scheduling. Additionally, they are linked to programme metrics, including workshop attendance, knowledge assessments before and after sessions, screening results (including cavity-free and ECC risk rates), and referral pathways.

Timely improvements were made possible through iterative feedback after each island visit, offering the Secretary of Health and Island Council Executives credible, locally informed evidence to refine policies and services. The Secretary of Health, together with the Ora'anga Tumanava Taskforce (TMO, 2021), leads health programme planning and implementation across the Cook Islands (TMO, 2025b).

Discussion

The programme's multi-phase development provides insights into the practical challenges and opportunities of implementing an integrated maternal and child oral health initiative in the Cook Islands. This strategy aligns with WHO recommendations for primary oral health workforce development (WHO, 2022a). A major achievement was engaging multiple stakeholders, including government agencies, NGOs, and community organisations in the Cook Islands, to foster cross-sectoral collaboration, essential for tackling complex health issues such as ECC and nutrition-related NCDs. Integrated partnerships have previously demonstrated their effectiveness in addressing these challenges (Panigrahi, 2024; Balasooriyan *et al.*, 2022). The embedding of essential oral health services within primary health care, supported by both dental professionals (dentists, dental therapists) and non-dental health professionals (doctors, nurses, midwives), as well as non-health sectors (education, social services), has demonstrated effectiveness in addressing complex health challenges in other settings (Prasad *et al.*, 2019).

The phased approach enabled careful planning, targeted resource creation, and health workforce capacity building, as seen in the upskilling of the dental therapists in the Cook Islands, an investment likely to yield sustainable improvements (Friedman *and* Mathu-Muju, 2014) in maternal and child oral health. The programme innovatively aimed to strengthen the workforce and overcome geographical barriers (Birch *et al.*, 2021). The programme employed a train-the-trainer model, whereby dental therapists received intensive training to independently deliver the 'E Puapinga Katoa Te Nio Tamariki' programme on their respective islands. Training extended to community workers, teachers, and healthcare professionals (Foo *et al.*, 2021). Integrating oral health into midwifery services expands access by leveraging current healthcare structures while addressing persistent maternal oral health needs (George et al., 2019). This multi-level capacity building ensures programme sustainability and establishes an ongoing network to promote oral health at the community level, directly addressing the crucial workforce shortage in the Cook Islands and the wider Western Pacific Region (WHO, 2022a).

Culturally-tailored resources, such as illustrated health promotion materials and local meal-planning workshops, were vital for community engagement (Smith and Pérez, 2020). The adaptability of these resources is particularly important where traditional knowledge must be reconciled with modern health practices. Clinic upgrades and the creation of child-friendly dental spaces addressed the need for welcoming preventive care environments. A focus on infection control and patient distraction strategies (such as ceiling-mounted TVs) contributed to positive care experiences. Screening outcomes revealed ongoing gaps in feeding and oral hygiene knowledge (Dye *and* Thornton-Evans, 2010; Hooley *et al.*, 2012), as well as inconsistent adherence to WHO and UNICEF feeding guidelines (Rollins *et al.*, 2016; Victora *et al.*, 2016). This highlights the need for continued health literacy efforts, particularly through practical demonstrations and community workshops (de Wit *et al.*, 2018). The persistence of untreated dental disease and high ECC risk emphasises the need for early intervention, especially during early childhood, along with efforts to promote exclusive breastfeeding and timely complementary feeding (Lal-Kumar *et al.*, 2025). Accessibility and supply issues, worsened by inter-island transport delays, impacted consistent use of oral care products, underlining the need for a wider product range to accommodate family preferences.

Workshop feedback identified gaps in awareness on oral hygiene best-practice and highlighted the need for consistent school-based programmes. School-based tooth brushing programmes have demonstrated effectiveness in reducing dental caries and establishing lifelong preventive habits (Petersen and Ogawa, 2016; Cooper *et al.*, 2013). Parental and teacher engagement is critical for establishing these preventive behaviours. Socioeconomic and environmental challenges, such as increased food costs, supply limitations, and climate variability, compounded difficulties for caregivers striving to maintain consistent health-promoting practices. Community-identified risks and iterative programme refinements highlight the importance of adaptive management, local data ownership, and responsive policymaking. The results reinforce that multi-level, community-engaged strategies are needed to address

health inequities. Ongoing programme monitoring with strong local involvement enables timely adaptations of resources and education. Similar community initiatives have been reported in the literature (Watt and Sheiham, 2012; Harris *et al.*, 2012). Expanding training and empowering local dental therapists and community leaders will further ensure sustainability. Future initiatives should focus on increasing the availability and variety of oral hygiene products for all age groups (Schluter *et al.*, 2016), strengthening family (Dudley *et al.*, 2018; Lawrence *et al.*, 2017) and teacher oral health education, and developing robust school-based brushing programmes (Marinho *et al.*, 2013; Jackson *et al.*, 2020).

The findings of community-based screenings prompted the development of the 'E Puapinga Katoa Te Nio Tamariki' programme. It was designed and implemented when the Southern Group's Healthy Cook Islands 2030+ campaign gained traction. The methodological constraints of data collection have been reinforced after its delivery in the Southern Group of Islands. In addition, frameworks for monitoring and evaluating the programme have been designed for review, follow-up, and execution in the Northern Group of Islands. The fact that the community case study design lacked control groups limited the ability to draw causal inferences. There is also potential for selection bias in workshop participation, as individuals who choose to attend may differ systematically from those who do not. Finally, data collection procedures were inconsistent across islands, which may affect the comparability and reliability of findings.

Continuing to integrate traditional food knowledge while promoting evidence-based nutrition is crucial for addressing children's food challenges. This complements UNICEF's 2025 Child Nutrition Report, which advocates for improved food environments that support healthy choices (UNICEF, 2025). The Cook Islands introduced a sugar-sweetened beverage tax in 2014, aligning with evidence demonstrating the effectiveness of fiscal policies in reducing consumption of unhealthy products (Teng *et al.*, 2019; Colchero *et al.*, 2016). Another significant step is the restriction of marketing sugary drinks and unhealthy foods at points of sale for infants and children, which was gazetted in December 2025 (Cook Islands Government, 2025) and will be implemented by June 2026 (Cook Islands News, 2025). Research from multiple countries demonstrates that restricting food and beverage marketing to children reduces exposure and can influence consumption patterns (Sadeghirad *et al.*, 2016; WHO, 2010). Collectively, these actions aim to reduce dental caries and obesity rates among children. Addressing socioeconomic and logistical barriers through policy advocacy and partnerships is recommended. Integrated policy frameworks incorporating oral health into maternal and child health strategies have proven effective in various settings, including Brazil's Family Health Strategy and Sri Lanka's primary care integration model (Moysés *et al.*, 2012; Perera and Ekanayake, 2008). Supporting traditional practices appropriate for Small Island States is essential (Lal-Kumar *et al.*, 2025).

Figure 3 presents recommendations from this study based on the primary oral health needs of mothers and children, and potential solutions. Capacity building in health research is crucial for generating evidence to inform intervention and policy development. Addressing gaps in research capacity is essential for strengthening health research and systems in the Pacific, particularly in the context of workforce shortages worsened by skilled migration (WHO, 2009; Yamamoto *et al.*, 2012).

While the specific governance arrangements, cultural imagery, and community structures of the Cook Islands are context specific, the underlying principles of shared governance, participatory design, and integration of oral health into primary care are transferable to other small island and resource constrained settings (Skivington *et al.*, 2021; Prasad *et al.*, 2019; WHO, 2022a). These principles provide a practical framework for adaptation rather than replication.

In summary, the phased approach and robust community partnerships laid a strong foundation for improving maternal and child oral health in the Cook Islands. By prioritising cultural relevance, adaptive management, and capacity building, the programme serves as a model for regional health development.

Figure 3. Recommendations for oral health promotion among mothers and children in the Cook Islands.

Conclusions

The 'E Puapinga Katoa Te Nio Tamariki' used a multi-partner design approach to integrate maternal and child oral health services into primary care. This phased approach, prioritises cultural relevance, community engagement, and workforce capacity building, provides a practical roadmap for addressing oral health challenges in Small Island Developing States. Future efforts should formalise cross-sector governance, assess cost-effectiveness, and standardise training curricula to ensure sustainability. With ongoing partnerships and policy coherence, this model can inform regional health development across the Western Pacific.

Author contributions

Conception or design of the work: SLK, HL, BW, MT
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Data analysis: SLK, HL, ZM, SZ
Data interpretation: all authors
Drafting the article: SLK, HL
Critical Revision of the article: SLK, HL, SZ, ZM
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Conflict of interest

The authors declare no conflicts of interest.

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