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RURAL INFLUENCES ON MATERNITY CARE: INSIGHTS FROM TARANAKI AND WHANGANUI, AOTEAROA NEW ZEALAND

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Preface

This study explores how rurality shapes maternity care in the Taranaki and Whanganui districts of Aotearoa New Zealand, with a particular focus on Māori and Pacific hapū māmā | pregnant women. Using the Geographic Classification for Health (GCH), it combines workforce perspectives with 2022 birth registration and service use data to understand how geography, service design, and cultural context influence access, delivery, and outcomes across urban and rural areas. The study aims to inform the development of integrated, culturally responsive, and sustainable maternity care models that address inequities and strengthen rural health systems.

The research was undertaken outside the structure of a university research programme, which brought unique challenges and opportunities. Without the infrastructure, administrative systems, or readily available academic research resources that a university environment provides, the iterative learning journey required building research knowledge from within the Health and Research Collaborative team and drawing on the strengths of each member. Navigating ethics approval processes, designing the survey, discussing robust methodologies and appropriate data analysis approaches; and most memorably, debating the varying definitions of research, demanded persistence, adaptability, and a commitment to learning at each step of the research process.

Interpreting statistical outputs required sourcing expertise, building collaborations, and seeking guidance from networks willing to share their time and knowledge. This process not only deepened my understanding of mixed-methods research and academic research, but also reinforced the importance of relationships, resourcefulness, and perseverance in rural health research. While challenging, these circumstances fostered a strong sense of ownership over the work and a deep appreciation for the collaborative spirit of those who contributed their expertise and lived experience to the study.

This research would not have been possible without the generosity, commitment, and support of many individuals and organisations. I gratefully acknowledge the funding support provided by the Royal New Zealand College of General Practitioner Research and Education Committee (REC).

Research and Professional Support
I extend my sincere thanks to the Health and Research Collaborative in Whanganui - Dr John McMenamin, Katie McMenamin, Jonelle Russell, and Debra Smith - for their significant contributions towards shaping and advancing this research. Their encouragement, expertise, and willingness to walk alongside this project from its earliest stages provided both practical and intellectual guidance. I also acknowledge the contributions of key members of HNZ - Te Whatu Ora Sector Operations Team who supported data sharing, and the Rural Faculty, University of Otago and Massey University whose professional insight and collegiality strengthened the rigour and relevance of this research.

Participant Contributions
My heartfelt appreciation goes to the midwives, general practitioners, nurses, rural hospital doctors, and primary care leaders across Taranaki and Whanganui who took the time to share their experiences, perspectives, and solutions. Your openness and dedication to improving maternity care for hapū māmā and their whānau form the heart of this study. I am especially grateful to those working in the most rural and remote areas, who often contributed in the midst of heavy workloads and on-call demands.

Community and Cultural Guidance
I acknowledge the wisdom and guidance of local Hauora Māori providers and Iwi health organisations who contributed to the survey design and ensured cultural appropriateness. Your perspectives enriched the study and reinforced the importance of Kaupapa Māori approaches in shaping equitable maternity care.

Personal Thanks
Finally, I wish to thank my family, friends, and colleagues for their unwavering support and patience. Your encouragement during the long hours of data analysis, writing, and revision made this journey possible.

To all who contributed - through expertise, insight, or encouragement - this work is as much yours as it is mine.

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Executive Summary

This quality improvement report, Rural Influences on Maternity Care: Insights from Taranaki and Whanganui, Aotearoa New Zealand presents a comprehensive mixed-methods analysis of how rurality shapes maternity care access, delivery, and outcomes across the Taranaki and Whanganui districts. Using the Geographic Classification for Health (GCH) to distinguish between urban (U2) and rural (R1, R2, R3) settings, the study integrates workforce perspectives with quantitative analysis of 2022 birth data to explore the intersecting impacts of geography, ethnicity, service design, and socio-economic deprivation. Particular focus is given to Māori and Pacific hapū māmā, who are disproportionately represented in higher deprivation communities and more rural areas.

Context and Rationale

Maternal health inequities in Aotearoa New Zealand reflect the cumulative influence of rurality, socio-economic deprivation, and ethnicity. Māori and Pacific women experience higher rates of perinatal morbidity, lower engagement with early antenatal care in some contexts, and persistent inequities in access to culturally responsive services. Rural communities face additional structural challenges including distance from services, workforce shortages, reduced diagnostic availability, and limited transport infrastructure.

The introduction of the GCH classification provides a healthcare-focused rural-urban lens that enables more accurate identification of service inequities. Within Taranaki and Whanganui, a significant proportion of Māori reside in areas of high socio-economic deprivation, and rurality increases the likelihood of living in NZDep Quintile 5 areas. These structural determinants shape maternity care experiences and outcomes.

Study Design

This study employed a descriptive mixed-methods design consisting of:

1. A qualitative and quantitative survey of 19 maternity workforce participants across U2, R1, and R2/R3 settings, including midwives, GPs, rural hospital doctors, nurses, and clinical leaders.
2. Quantitative analysis of 2022 routinely collected birth data (n = 2,278) provided by Health New Zealand – Te Whatu Ora, examining birth location, LMC registration timing, gestational age, birth weight, and smoking status by ethnicity and rurality.

The integration of workforce insight and administrative data provides a system-level understanding of how rural maternity care functions in practice.

Key Findings

1. Rurality Shapes Access to Core Services

Distance to diagnostic services, birthing units, and specialist care increases substantially with rurality. Women in R2/R3 areas may travel up to 160km for secondary services and over 300km for tertiary services. Travel times can exceed three to four hours. Ultrasound services in rural hospitals were frequently described as unreliable due to workforce constraints and scheduling inconsistencies. Laboratory access varied by locality and funding arrangements, with some rural practices providing funded on-site phlebotomy while others required women to travel or pay fees.

Transport barriers compound these challenges. Public transport options are minimal or absent in most rural areas, and ambulance availability is limited, with extended response times in remote communities. These structural constraints disproportionately affect women with limited financial resources, unstable employment, or childcare responsibilities.

2. The Cost of Rurality is Multi-Dimensional

The “cost of rurality” extends beyond travel. Direct costs include private ultrasound co-payments, laboratory fees in some practices, fuel, accommodation, and childcare. Indirect costs include lost income, time away from work, and administrative complexity when claiming travel assistance.

The psycho-emotional cost is borne heavily by the rural workforce. Midwives described 24/7 on-call expectations, invisible administrative and compliance work, advocacy efforts to coordinate appointments, and working in clinical “grey areas” where they carry responsibility for risk in under-resourced environments. This hidden workload threatens workforce sustainability and contributes to burnout.

3. Primary Birthing Units are Valued but Vulnerable

Primary birthing units in rural areas were consistently described as essential community assets. Benefits include:

- Reduced travel burden
- Greater whānau presence and support
- Lower intervention rates for low-risk pregnancies
- Strengthened relational continuity

Quantitative data indicate that women in R2/R3 areas are significantly more likely to birth in local primary centres. This pattern is particularly evident for Māori and Pacific women residing in these areas.

However, declining birth numbers, workforce shortages, and limited postnatal bed availability threaten the sustainability of these units. Staffing gaps restrict 24/7 service coverage, reduce opportunities for midwives to maintain competencies, and increase pressure on remaining staff.

4. Strong Relational Models in Remote Areas

One of the most striking findings is that the most rural communities (R2/R3) often demonstrate the strongest relational integration across services. Co-location of midwives, primary care teams, rural hospital services, and iwi or Hauora Māori providers fosters:

- Immediate collegial consultation
- Warm handovers
- Coordinated high-risk management
- Improved enrolment and continuity

Participants described corridor conversations, shared clinical decision-making, and collaborative maternal mental health support as key enablers of safe care. These relationship-based systems contrast with more fragmented service models reported in U2 and R1 settings, where siloed practice and weak collaboration between LMCs and primary care were more common.

5. Navigating a Fragmented System

Despite strengths in some rural settings, the overall maternity system is frequently fragmented. Women are often directed to independently “find a midwife,” with inconsistent integration between primary care, LMCs, secondary services, and kaupapa Māori providers. Data-sharing limitations, boundary restrictions between Health NZ districts, and funding constraints exacerbate fragmentation.

Knowledge of how to navigate the system becomes a protective factor. Women and providers familiar with cross-boundary referral processes are better able to reduce travel burden. However, reliance on informal advocacy risks inequity, favouring those with stronger voices or system literacy.

Tools such as Best Start GEN2040 are inconsistently used, and shared early pregnancy assessment between primary care and midwives is variable. Missed opportunities for first-trimester screening were noted, particularly where funding models disincentivise early engagement.

6. Cultural Responsiveness and System Misalignment

Kaupapa Māori models, including Te Whare Piringa and hapū wānanga initiatives, were highly valued for their whānau-centred, holistic, and culturally grounded approaches. These services integrate mental health, addiction support, and social services within a supportive community environment.

However, participants identified misalignment between these models and Western biomedical systems. Differences in referral processes, data-sharing protocols, and funding structures limit integration. While co-location opportunities are emerging, systemic alignment remains incomplete.

Pacific-specific antenatal education and culturally tailored services were notably absent across the districts, representing a significant service gap.

Quantitative Highlights

In 2022, 2,278 births were recorded across Taranaki and Whanganui, with no maternal deaths reported.

Key associations include:

- A significant relationship between ethnicity and rurality, with higher proportions of Māori and Pacific births occurring in the most rural areas (R2/R3).
- Women in R2/R3 areas were significantly more likely to birth in primary centres.
- For Māori and Pacific women, there was a significant relationship between rurality and timing of LMC registration, though effect sizes were small.
- First-trimester registration was proportionally higher in rural areas compared with U2 for both Māori/Pacific and non-Māori/non-Pacific groups.
- Fourth-trimester registration was proportionally higher in R2/R3 compared with U2.

While statistical effect sizes were small, the patterns reinforce that geography and ethnicity intersect to influence service utilisation and engagement.

System Strengths

- Strong relational networks in remote communities
- Co-located models enabling integrated care
- High valuation of primary birthing units
- Dedicated rural workforce willing to advocate beyond contractual boundaries
- Emerging integration with iwi and Hauora Māori providers

These strengths reflect community resilience and relational capital within rural health systems.

System Risks

- Ongoing midwifery workforce shortages
- Sustainability risks for primary birthing units
- Inconsistent diagnostic reliability in rural hospitals
- Transport and travel inequities
- Funding and regulatory barriers limiting nurse practitioner and midwife authority
- Fragmented data systems and poor cross-boundary coordination
- Limited Pacific-focused services
- Psycho-emotional strain on rural providers

Without structural reform, these pressures risk widening inequities and undermining workforce retention.

Implications for Policy and Practice

The findings point to several priority actions:

Implications for Policy and Practice

The findings point to several priority actions:

1. **Scale the Strengths of Co-located, Integrated Maternity Service Models**
   Reframe high-performing rural maternity services as scalable models of care for urban areas.
2. **Improve Geographic Access to Diagnostics**
   Strengthen reliability and workforce support for rural ultrasound and laboratory services.
3. **Sustain Rural Maternity Workforce and Services**
   Review funding models under the Primary Maternity Services Notice to recognise invisible rural workload and support skill maintenance.
4. **Enhance Integration Across Care Continuum**
   Strengthen shared care arrangements between LMCs, primary care, rural hospitals, and secondary services.
5. **Strengthen Kaupapa Māori Integration**
   Align referral pathways and data-sharing processes to enable seamless collaboration between mainstream and iwi-led services.
6. **Improve Data Systems**
   Develop interoperable maternity data systems to support continuity from early pregnancy through postnatal transfer.
7. **Reconsider Regulatory Barriers**
   Address limitations preventing nurse practitioners and midwives from ordering diagnostics or facilitating travel assistance under Section 88.
8. **Leverage Telehealth Strategically**
   Reinstate and expand specialist telehealth consultations, particularly where LMC participation can enhance safety and reduce travel burden.

Conclusion

Rurality profoundly shapes maternity care in Taranaki and Whanganui. While geographic isolation creates structural barriers - including travel burden, diagnostic unreliability, workforce strain, and financial cost - remote communities also demonstrate powerful relational strengths. Co-located services, collegial collaboration, and kaupapa Māori approaches provide promising models of integrated, culturally responsive care.

The intersection of rurality, deprivation, and ethnicity means that Māori and Pacific hapū māmā are disproportionately affected by systemic barriers. Although statistical associations in 2022 data were modest, qualitative insights reveal significant lived impacts and workforce pressures that threaten long-term sustainability.

Addressing rural maternity inequities requires structural reform, not solely local adaptation. Sustainable funding, regulatory change, improved diagnostic access, strengthened integration, and culturally grounded models of care are essential. The evidence presented in this report provides a foundation for policy, service redesign, and future research aimed at strengthening rural maternity systems across Aotearoa New Zealand.

Introduction:

Rurality intersects Socio-economic Deprivation

Maternal health disparities remain a significant global public health issue, heavily shaped by geographic, socioeconomic and ethnic inequalities - often compounded by discrimination within the healthcare system, barriers to access, and the influence of social determinants of health. (Abdul et al., 2024).

An association between rurality and poorer health outcomes, including higher mortality rates, have been identified in some high-income countries with low population densities, including Aotearoa New Zealand (NZ) (Cross et al., 2021; Australian Institute of Health and Welfare, 2022; Nixon et al., 2023; Subedi et al., 2019). Importantly, these disparities are not evenly distributed, and appear more pronounced among rural Māori populations (Ministry of Health, 2012; Nixon et al., 2023).

Previous research on rurality in NZ has employed a range of definitions across different contexts, making it challenging to compare and interpret rural data consistently (Fearnley et al., 2016; Whitehead, et al., 2023). In August 2022, a novel rural-urban classification, the Geographic Classification for Health (GCH), tailored for healthcare research and policy was released in NZ (Whitehead et al., 2022b). This classification system includes two urban categories: major urban centres (U1) and regional cities (U2), along with three rural categories (R1, R2 and R3) that indicate progressively greater levels of rurality and remoteness.

In rural areas, the unequal distribution of key social determinants of health (SDH) is likely amplified by the challenges posed by geographic isolation. The study by Whitehead et al., (2023) highlights the presence of socio-economic and related disparities across the rural-urban continuum of NZ. The study found that residents in the most urban areas (U1) were more likely to live in wealthier, less socio-economically deprived areas compared to those in less urban (U2) and rural areas (R1–R3). As rurality increased, a greater proportion of residents lived in areas with the most socio-economic deprivation - New Zealand Deprivation Quintile 5 (NZDepQ5).

Ethnic disparities are also evident in the socio-economic gradient between rural and urban areas (Whitehead et al., 2023). Compared to non-Māori, a larger percentage of Māori reside in regions with high socio-economic deprivation across each GCH category. Furthermore, as areas become more rural - from U1 to R3 - there is a corresponding rise in the proportion of Māori living in areas of significant socio-economic disadvantage. This intersection is likely to result in inequitable health outcomes for rural Māori, a pattern also documented in other research (Crengle et al., 2022).

Comparing the resident population of Health New Zealand (HNZ) areas of Taranaki and Whanganui, Whitehead et al., (2023) found that 67% and 70% of the total populations respectively are concentrated in the urban area - identified as U2 by the GCH - and a higher proportion of the population living in NZDepQ5 were Māori (23% in Taranaki and 45% in Whanganui) compared with non-Māori living in NZDepQ5 (10% in Taranaki and 28% in Whanganui; Whitehead et al., 2023).

In the Taranaki and Whanganui areas, fewer Māori residing in U2 live in the wealthiest areas (i.e. areas of low socio-economic deprivation). In Taranaki, this accounts for 12% of Māori compared with 27% of non-Māori, while in Whanganui the figures are 5% and 15%respectively. In line with national data, as rurality increases across the Taranaki and Whanganui HNZ areas, from U2 through to R3, an increasing proportion of Māori are found to live in areas of high socio-economic deprivation (Whitehead et al., 2023). Notably, a relatively high proportion of Māori in Taranaki were residing in NZDepQ5 in R1 compared to Whanganui rural areas.

These geographic and socioeconomic inequities influence overall health outcomes and are also likely to be reflected in women's experiences of maternity care.

Midwifery Care in Aotearoa New Zealand

Nearly 30 years ago, New Zealand implemented its distinctive midwifery-led continuity model of maternity care (Dawson et al, 2019). This model empowers women to choose their Lead Maternity Carer (LMC) who may be a Midwife or Obstetrician. LMCs provide care to hapū māmā/pregnant women and their pēpi/babies from early pregnancy, labour and birth, and up to six weeks postpartum (Grigg &

Tracy, 2013; Hendry, 2009). Of note, in comparison to many other countries, the majority of women (95.4% in 2018) in NZ who are registered with an LMC choose a midwife (MoH, 2020b).

Midwives in NZ have the option to work in a range of environments, with some choosing to hold multiple roles across different settings. Lead Maternity Carer (LMC) midwives operating in the community typically work independently or participate in an on-call model within a group practice based in the community. Within their professional scope, they are self-employed and contracted to the Ministry of Health through Section 88 of the New Zealand Public Health and Disability Act 2000. This is the central legislation governing primary maternity services. Section 88 establishes the referral protocols. These protocols enable community-based, case-loading midwives to collaborate with specialists when risk factors are identified, or if complications occur during pregnancy, labour, or the postnatal period. This supports defined referral pathways and promotes a shared-care approach, with primary care midwives generally continuing to deliver midwifery services (Grigg & Tracy, 2013; Hendry, 2009; Midwifery Council, 2024). In addition, midwives may choose to work in primary birthing units, which support women with lower-risk pregnancies, or within a secondary or tertiary level hospitals.

Maternity care is provided at no cost to all women who are residents of NZ, irrespective of whether they require primary, secondary or tertiary maternity services. However, this universal entitlement does not eliminate inequities as some women opt for a private obstetrician at their own expense while others struggle to access a LMC (Dawson et al., 2019). The midwifery partnership model works towards continuity of care and aims to reduce maternal health inequities (Vedam et al., 2018; McRae et al., 2018). Despite ongoing efforts to improve services, significant disparities persist in maternal health outcomes, in how care is delivered, and in the experiences of māmā/mothers within the New Zealand health system (Dawson et al., 2019; Adcock et al., 2019).

Significant barriers to equitable maternity care have been well documented (Dawson et al., 2019; Priday et al., 2021; Neeley et al., 2022; Dawson et al., 2022). Evidence shows that limited access to healthcare, lower quality of care, and the failure of services to improve outcomes contribute to significant health disparities, particularly in rural communities (Ministry of Health, 2023) and among Māori women (HDSR, 2022).

One key issue is geographical access, which is often influenced by a woman's place of residence (Dawson et al., 2019). Pregnancy-related care is more challenging for those living further away from urban areas - where birthing facilities, specialist health services, and resources are typically concentrated.

Insights from a local Iwi-based initiative - the Hapū Māmā Village - (Healthy Families Whanganui, Rangitīkei, Ruapehu, 2023) demonstrated that 22% of pēpi born in Whanganui are from rural areas of the Whanganui district: Waimarino-Ruapehu, South Taranaki and Rangatikei. However, only 3% of rural māmā are birthing in their rural community (Healthy Families Whanganui, Rangitīkei, Ruapehu, 2023).

The widespread closure of rural maternity facilities across NZ has inevitably led to an increase in distance required by women living in rural areas to reach any birthing centre (Beere & Brabyn, 2006). Research examining the use of New Zealand's remaining primary birthing units indicates that many rural women elect to give birth in larger hospitals with secondary-level services. This choice is often driven by the desire to access advanced interventions, such as epidural anaesthesia, and to minimise the likelihood of transfer during labour (Grigg et al., 2015; Patterson et al., 2011; Dawson, 2015; Grigg et al., 2014). Although maternity care is promoted as 'free', giving birth away from home often incurs additional costs. For women in rural areas, this burden is compounded when pregnancy-related complications require travel to major centres for specialist antenatal consultations, as outlined in the New Zealand guidelines (MoH, 2012).

In addition to geographical access, Penchansky and Thomas (1981), highlighted the need to include the broader concepts of availability, accessibility, acceptability, approachability, affordability and accommodation. Systemic and policy-level factors contributing to workforce deficits mean that women have a limited pool of midwives to choose from. In certain regions, securing a LMC can be challenging or even impossible (Cox & Smythe, 2011; Young, 2011). Consequently, this limits women's ability to choose their preferred maternity care provider. In 2020/21, 30% of midwifery roles were unfilled in the Whanganui district with a total of 37 midwives working in various roles at varying capacity. Of these, only eight identified as Māori (Healthy Families Whanganui, Rangitīkei, Ruapehu, 2023). Despite Māori accounting for nearly half of all births each year, the majority of wāhine/women who participated in the

Hapū Māmā Village reported that the maternal-infant health system did not respond to their cultural needs (Healthy Families Whanganui, Rangitīkei, Ruapehu, 2023).

Choice of LMC is a core concept of acceptability and therefore access (Penchansky & Thomas, 1981) and the ability to choose a midwife is associated with more optimal outcomes. Therefore, when women have limited choice around who will lead their maternity care, particularly vulnerable māmā for whom trust is essential, there is the potential for poorer health outcomes for both māmā and pēpi (Hatheral et al., 2016; Ryan et al., 2017; Ratima & Crengle, 2013). When combined with ongoing midwifery workforce shortages, this often results in delayed booking for antenatal care. In some cases, it may also mean fewer women registering with a midwife at all - a recognised risk factor for poor outcomes, especially among already at-risk populations, who face a heightened risk of stillbirth or neonatal death (Perinatal & Maternal Mortality Review Committee [PMMRC], 2018).

While maternal mortality is relatively infrequent (Ministry of Health 2014, 2020a), Māori women experience higher rates of mortality compared to New Zealanders of European descent (Crengle et al., 2022). Māori and Pacific populations also experience a higher rate of perinatal morbidity, including preterm births, low birth weight, and adverse maternal health outcomes (i.e., poor access to antenatal care), particularly in rural areas (Carson et al., 2018; Lawton et al., 2014; MacDonald, Geller & Lawton, 2016). Perinatal-related mortality rates have not changed for Māori and Pacific infants in fifteen years (PMMRC, sixteenth annual report, 2021). Moreover, Māori and Pacific babies continue to have consistently higher rates of Sudden Unexplained Death in Infancy (SUDI) compared to non-Māori and non-Pacific infants (Te Werohau Evaluation Unit, 2022).

Research examining the disparities between rural and urban areas have highlighted lower participation rates in general health screening in rural communities (Cameron et al., 2012; Obertova et al., 2016), increased strain on the health workforce (Hider et al., 2007), and reduced geographic access to preventative services (Whitehead et al., 2022a). The effects of living in highly deprived areas on screening uptake have also been documented, particularly among women under 30 years. This disparity is especially evident in prenatal screening, where Māori and Pacific women are significantly less likely to engage (Payne et al., 2017).

Access to early and appropriate antenatal care is crucial for reducing the risks associated with prematurity, impaired foetal growth and other complications of pregnancy (Dixon et al., 2014). This care focuses on prenatal assessment, health education, vaccinations, and identifying lifestyle risk factors, such as smoking, alcohol use, poor nutrition, and pregnancy-related conditions to support the health of both mother and baby (EBCOG Scientific Committee 2015; Hawaikirangi, L., 2021) Although the rates of smoking while pregnant are declining in NZ, Māori mothers remain over-represented, with Whanganui having the highest maternal smoking rates in 2021 at 14.4% (Smokefree Aotearoa New Zealand 2021).

While medical care during pregnancy is essential, addressing psychosocial aspects - such as maternal stress, depression, and anxiety - is equally important, as these can impact both maternal health and child development. Mental health issues are a major contributor to maternal mortality, with suicide being the leading cause in NZ (Tupara et al., 2020; PMMRC, 2017). Intimate partner violence (IPV) during pregnancy is also a significant concern, particularly when combined with high stress levels. These issues disproportionately affect different ethnic groups in NZ. For example, Māori women account for 60% of maternal suicides, with a rate 3.41 times higher than that of European women. IPV is more common among Māori women living with partners and is associated with elevated levels of stress. Among Pacific women, longer residence in NZ raises IPV risk, although strong family cohesion offers protection. Of women who report experiencing physical conflict with a partner during pregnancy, one third are Pacific women and one in five are Māori women. In comparison, for women who identify as European, this drops to one in twenty (Bird et al., 2021).

The literature suggests that maternal health disparities in NZ are shaped by the combined effects of rurality, socioeconomic deprivation, and ethnicity, with Māori and Pacific women experiencing disproportionate inequities. These findings point to the need for research that focuses on understanding and addressing maternity care inequities, particularly in rural and high-deprivation areas.

Aim:

To explore the attributes of rurality, as defined by the GCH, that may influence maternity care across urban and rural areas of Taranaki and Whanganui, with a focus on Māori and Pacific Peoples. It is hypothesised that disparities in maternity service delivery are more prevalent for women living in the most rural areas (e.g. R2/R3) leading to poorer maternity care outcomes.

The objectives seek to examine access to maternity services, including diagnostics and workforce availability; to assess associations between rurality, ethnicity and service utilisation; and to identify system strengths and gaps influencing care delivery.

Methods:

A comprehensive search strategy was undertaken to identify relevant literature on rural maternity care in NZ, with a focus on the Taranaki and Whanganui districts. Electronic databases, including PubMed, Google Scholar and Web of Science were systematically searched using MeSH terms and free-text keywords, such as, [pregnancy, rural, maternity care, primary midwifery services, geographical classification for health (GCH); Aotearoa New Zealand, maternal health outcomes, access]. Grey literature was also accessed including Ministry of Health (MoH) and Health New Zealand (HNZ) reports, and local professional body publications.

This study employed a mixed-methods descriptive design, integrating quantitative health data with qualitative survey responses from the maternal healthcare workforce. The research was conducted across the Taranaki and Whanganui districts of NZ.

Study Design

The research consists of two parts:

1. **Quantitative and Qualitative Survey**: A descriptive survey of healthcare professionals combining fixed-response items with free-text responses.
2. **Quantitative Analysis**: A retrospective snapshot of maternal health indicators across Taranaki and Whanganui for the year 2022 using routinely collected administrative data.

Part 1: Survey Data Collection and Analysis

Participants

Participants include healthcare workforce professionals who currently provide pregnancy or pregnancy-related care. Initial participants were recruited through previously established relationships and professional networks of the primary investigator. Following this, a snowball sampling approach was used, whereby participants who had taken part were invited to refer others within their networks who met the study criteria. Demographic data of participants was collected, including age, gender, ethnicity, and professional role, and their GCH area of expertise.

Data Collection

Data were collected using a survey design, informed by the literature, the research team, and input from local Hauora Māori providers to ensure relevance and cultural appropriateness. The survey comprised a total of 21 questions, which included both closed- and open-ended questions. The survey questions were designed to collect information across six main areas:

- Proximity to birthing units, hospitals, diagnostics, and emergency services
- Availability and access to LMCs and primary care
- Maternal mental health support
- After-hours or drop-in services
- Culturally responsive care
- Evidence of integrated or co-located services

A summary sheet describing the study and consent form (Appendix 1) with the survey questions (Appendix 2) was emailed to willing participants. A follow-up offer was extended to discuss the survey responses in-person with the primary investigator to clarify quantitative responses, such as, travel distances and to elaborate on free-text items.

Data Analysis

Each respondent was assigned a numerical identifier (e.g., Participant 1, 2…) to ensure anonymity. Anonymised responses and survey data were collated and entered into an Excel (Microsoft Corporation, Redmond, WA, US) spreadsheet. Participant demographics, professional roles, and geographic areas of expertise were summarised or tabulated. Service locations were mapped geographically to illustrate access variability (Figure 1).

Open-ended responses were presented as direct quotes before being coded and collated. Three researchers independently reviewed and thematically analysed the data using Braun and Clarke's (2006) reflexive thematic analysis approach. Following individual analyses, the researchers met to compare interpretations, discuss areas of divergence, and agree on a final set of themes and sub-themes. Any differences were resolved through discussion to ensure a shared understanding of the findings.

Part 2: Quantitative Data Collection and Analysis

Quantitative data was provided by via HNZ - Te Whatu Ora Sector Operations Team, who provided an extract of de-identified data from a range of sources. These sources included the 'Report on Maternity' (MAT) web tool from the National Maternity Collection and 'LMC claims' data. The National Maternity Collection integrates health information from two sources to provide statistical, demographic and clinical information about people giving birth and live-born babies in NZ. The MAT contains data on the primary maternity services provided (Rippon & Woon, 2023).

The overall data set pertained to the period 1 January 2022 to 31 December 2022 and was selected to cover claims after the implementation of the Primary Maternity Services Notice 2021, to avoid analysis over the COVID-19 pandemic period, and due to claims for more recent months in 2023 were unlikely to be complete.

The data extracted includes the following items:

- Total number of births
- Type of birthing unit (Primary, Secondary, and Tertiary)
- Lead Maternity Carer (LMC) registration
- Maternal mortality
- Birth weight
- Gestational age
- Smoking status at LMC registration and at two weeks postpartum

Data is categorised and combined by region of residence. Taranaki data were defined by the locality boundaries of the Iwi Māori Partnership Boards (IMPB), Te Punanga Ora, and Whanganui data are defined by Te Matuku, across areas of Whanganui. The data is classified by location of residence, using the GCH, and by self-identified ethnicity (Māori, Pacific Peoples, and Other ethnicities).

Data Analysis

For all subgroup data analyses, the denominator is defined as the total number of births by women within that subgroup - by GCH area or by ethnicity group. Within each outcome variable, the numerator is represented in each of the following categories:

- Birth location (rural hospital/primary birthing unit, local base hospital, all other locations)
- Trimester of registration with LMC (1^{st}, 2^{nd}, 3^{rd}, 4^{th})
- Birth weight (<2500g and ≥2500g)

- Gestation week at birth (<37 weeks and ≥37 weeks)
- Smoking status at LMC registration
- Smoking status at 2 weeks post-partum

Analysis of the data using chi-square (χ^2) tests of independence were carried out (α = 0.01) to check for association between the number of births by Māori and Pacific Peoples, non-Māori and Pacific Peoples and rurality (U2, R1 and R2+R3).

Statistical significance was tested with a threshold of $p < 0.01$ to account for multiple comparisons. The threshold for significance was reduced to <0.01 due to multiple comparisons between multiple subgroups to reduce the likelihood of a type 1 error (i.e. a false positive result, where an effect is found when none exists).

Where significance was found, Cramer's V was applied to assess the strength of association. (0 = weak association to 1 = strong association).

Ethics approval was sought through the Health and Disability Ethics Committee (HDEC) and was deemed out of scope as the only consenting participants are healthcare workers: Review Reference 2024 EXP 20851. Informed consent was gained from all participants.

Results: Survey

DEMOGRAPHICS AND DISTANCE TO SERVICES

Of the twenty-four participants who were asked to participate, nineteen completed the survey and all accepted the opportunity to meet with the primary investigator to discuss the questions in more depth. Participants' professional roles included Primary Care Clinical Services Managers (26%), GPs/Rural Hospital Doctors (37%), Nurses (16%) and Midwives (21%).

Sixteen participants identified as female and three as male. Nine participants identified as New Zealand European five as Māori, four as Māori/NZE, and one as Other. The age distribution ranged from 31 to over 65 years: 31-35 years (2), 36-40 years (6), 41-45 years (4), 46-50 years (2), 51-55 years (1), 56-60 years (1), 61-65 years (1), > 65 years (2). Five participants reflected the U2 areas, 5 reflected the R1 areas and 9 reflected R2/R3 areas (Table1).

Geographical access, defined as the distance to clinical care settings and services, was estimated by each respondent founded on local knowledge. These estimates were then averaged to provide an overall measure of distance for each of the geographical areas (U2, R1, and R2/R3). Given the small numbers of pregnant women in the R2 and R3 areas, information from these areas was combined (Table 1 & 2).

	U2	R1	R2/R3
Gender			
Female	4	4	8
Male	1	1	1
Ethnicity			
NZE	1	1	5
Māori	1	2	2
Pasifika	0	0	0
Māori/NZE	3	2	1
Other			1

Table 1. Participant Demographic Data

	U2	R1	R2/R3
Average Distance to Services			
Distance to reliable ultrasound Time	0 to 40km 0 to 30mins	36km to 130km 30mins - 2 hours	60km to 160km 30mins - 2hrs40mins
Distance to funded laboratory services Time	0 to 40km 0 to 30mins	0 to 50km 0 to 1hr	0 to 72km 0 to 1 hr 20mins
Distance to primary birthing unit Time	n/a n/a	20 to 60km 20 to 40mins	0 to 60km 0 to 1hr
Distance to secondary birthing unit and secondary specialist services Time	0 to 40km 0 to 30mins	36km to 130km 30mins to 2hrs	60km to 160km 30mins to 2hrs40mins
Distance to tertiary birth unit (Wellington or Waikato) Time	180 to 260km upto 3 hours max	150 to 300km 3 to 4 hours max	200 to 330km 3 to 4.5 hours max

Table 2. Distance to Services

Distances to diagnostic services, laboratories, and birthing centres varied according to rurality, with additional variation between geographic boundaries (Figure 1). For example, although Waitōtora and Waverley are geographically closer to Whanganui-based services, they are located within the Taranaki boundary.

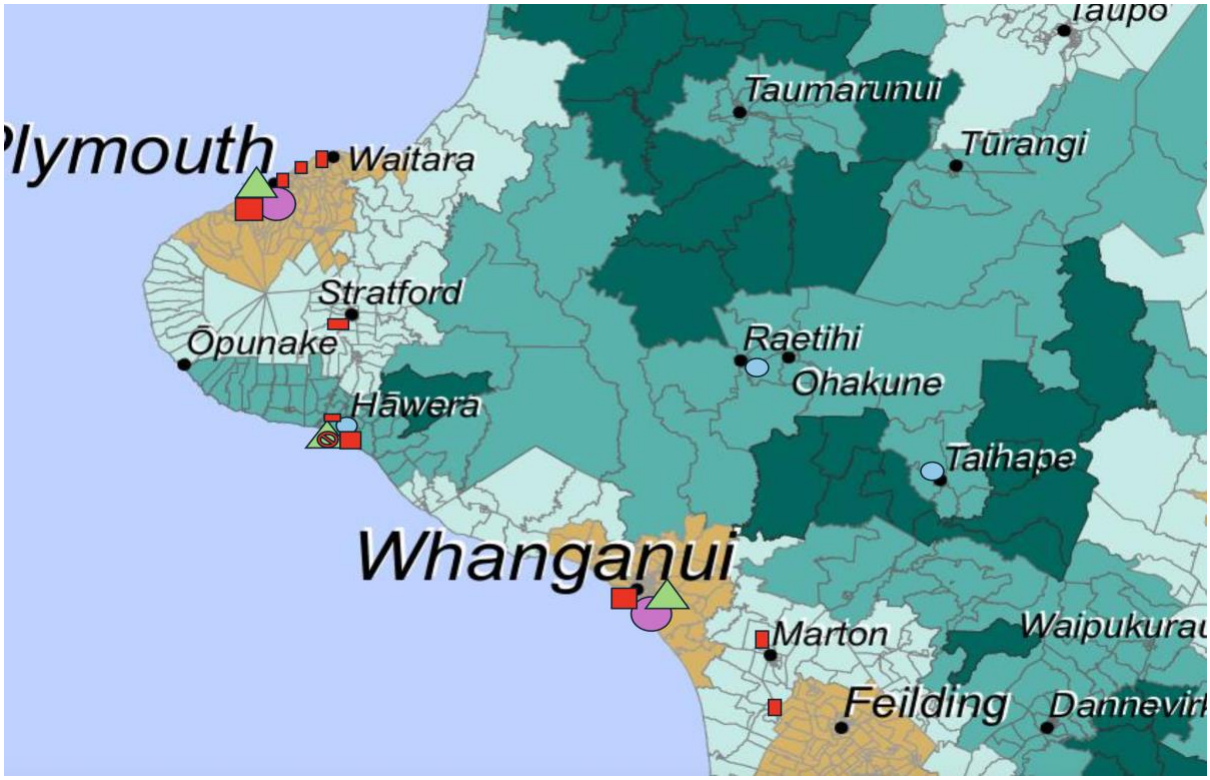
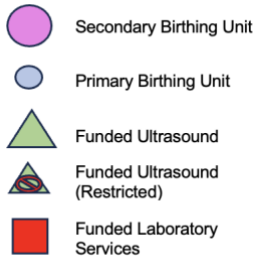


Figure 1. Map of diagnostic services, laboratories and birthing centres.



QUALITATIVE FINDINGS

Five main themes were identified; 1) Accessibility and Availability of Services; 2) The Power of Relationships; 3) Navigating the Fragmented System; 4) Flexible Services; 5) The Cost of Rurality. Illustrative participant quotes are presented.

ACCESSIBILITY AND AVAILABILITY of SERVICES

Geographical Distance to Services (Table 1) and Reliability of Services

Birthing Units

In NZ, a primary birthing unit is a community-based, midwifery-led facility for women with low-risk pregnancies, emphasising birth with minimal intervention. They do not have on-site obstetricians or anaesthetists, but transfer pathways are available if higher-level care is needed. Primary birthing units offer important benefits for low-risk pregnancies by providing care closer to home. This reduces the burden of long-distance travel, limits childcare challenges and costs for women with other children, and enables whānau and community support during labour and the postnatal period.

"...barriers to maternity care are overcome by having access to our primary unit...we dread to think what would happen for māmā in our community if it closed." P17

"...primary maternity facilities offer choice...and there is evidence that suggests that less medical intervention happens for those low-risk pregnancies compared to if the same women deliver in hospitals." P5

The challenges for primary birthing units include the number of women birthing at these facilities that affects funding, viability of service, and competency of midwifery skills during labour and birth.

"...lots of māmā are birthing at base hospitals due to increase in high-risk pregnancies or complications during pregnancy limiting the numbers of births and competencies for rural midwives to easily maintain skills." P11

"...the challenge with co-location of the primary birthing unit in a rural hospital or where there are doctors around... without rural generalist skills...is the misconception and false sense of security for some whānau that the range of skills of the workforce covers obstetrics." P6

Postnatal stay options in primary birthing units are becoming increasingly limited. In primary birthing centres, restrictions on inpatient beds - arising from workforce or service limitations - creates challenges and workarounds (e.g., early discharge or use of alternative facilities) for supporting māmā who birth overnight and wish to remain longer. Workforce shortages, at times, restrict the availability of birthing opportunities for some māmā.

"...when māmā are tired after labour and wish to sleep in the 'unit' until the morning, we (midwives) often stay to accommodate their request although postnatal inpatient maternity beds are not accessible...it's just another grey area for us as rural midwives." P16

"...although there is always a midwife on-call, if a woman presents in labour, the limitations for staying post-natally in the primary unit is more frequent these days as the unit is not always staffed 24/7 due to lack of midwife availability...there are some opportunities if there were some RNs (registered nurses) willing to support." P11

"...our unit is staffed by locum midwives at the weekends...so we cannot offer primary birthing services...māmā unfortunately have to birth at the city hospital...but we are excited that this will improve very soon." P17

Ultrasound (US) Services

As shown in Table 2, urban areas have shorter travel distances and times to ultrasound services compared with rural areas. Additionally, the availability of services is closely linked to proximity.

"...extreme rural boundaries can make for a long one way trip...for some women this can be up to 3 hours just for a scan....and depending on if the road is open...there is a massive gap in accessing ultrasound in this area." P12

"...there are lots of DNAs (non-attendance) for diagnostics, especially serial scans for IUGR (growth monitoring)...it doesn't help that Whanganui radiology decline scans for people living in Patea (Taranaki HNZ boundary) despite Whanganui being a closer location." P11

"...there's always the potential of being stuck behind a tractor...and if you're too late for that appointment in the city...well..." P5

Although ultrasound services are promoted as being available, in practice, they are often unreliable and inconsistent, creating barriers to accessibility, availability and co-ordinated care.

"...the ultrasound service at Hāwera Hospital is very unreliable and causes more barriers for people...some women ask for a scan closer to home....despite the request for the scan to occur in Hāwera, the appointment is often arranged for Taranaki Base hospital...apparently it is due to workforce availability...but I suspect it is prioritisation of the urban service over our rural service." P6

"...there are no private options and the only option is the public hospital service at Hāwera Hospital that is very unreliable." P11

"...the only reliable US is in the main centres (U2), where there are both public and private options. Women and LMCs often request for ultrasound in the city to avoid delays or disappointment when expecting a scan closer to home does not eventuate." P5

Laboratory Services

Access to laboratory services varies across GCH areas (Figure 1) and are influenced by whether individual general practices regard phlebotomy as a funded component of routine primary care, or a separate, user-pays service. While many U2 and R1 practices charge a fee for blood collection, despite some patients needing to travel long distances - up to 50km or around one hour - to a funded laboratory, all R2/R3 practices either provide funded blood collection services on site for enrolled patients or are located close to a funded laboratory.

"...some rural places have funded labs in that area but others need to travel to have bloods taken for free." P2

"...we don't ever charge our rural māmā for bloods...and it is good practice for our midwives and nurses to keep up their skills." P19

Transport

Although not always reliable, urban areas generally provide better transport options for planned appointments - such as access to city bus services - than rural areas. In many R2/R3 locations, for example, public transport is either unavailable or so limited that it provides little practical support for accessing health services.

"...there is a bus service to meet the connector bus to the hospital but it is not part of a regular schedule, takes time to organise, coordinate and has some stigma around its use for māmā." P11

"...yes, there is one public bus that travels to Whanganui Hospital once a month on a Friday...and no, it is not funded". P15

"...Hato Hone St. John has a shuttle service but [it] may not work out with timing of bus services and the appointment time." P13

In general, urban areas have more ambulance resources available for transporting women in labour than rural areas. However, across both urban and rural settings, there is limited awareness of the number of ambulances in service or the skill level of their crews. Participants also note a perceived disconnect between ambulance services, primary care teams, and LMCs, despite the most remote areas having only one or two ambulances available.

"…ambulances are becoming more and more limited and the workforce is currently reduced to 50%...the skill level is pretty basic at times." P15

"…there is no ambulance based in this rural area and the response time is dependent on availability from other areas…we can often wait between 40 minutes to an hour in an emergency." P2

"...we don't really know the St. John's team as much as we should...they are not really connected to us although this is changing through Manaaki Hauora initiatives that are moving to integrating rural ambulance staff with the primary care teams." P13

Midwives

The challenges discussed above are further compounded by pressures within the midwifery workforce. Across NZ, midwifery services face ongoing strain, with shortages in both staffing numbers and skill coverage affecting the viability of primary birthing units and the continuity of care. Inadequate staffing reduces opportunities for women to give birth locally and makes it more difficult for rural midwives to maintain key clinical skills and provide consistent postnatal support. Midwife shortages also limit the availability and choice of LMCs. For some women, this means relying on hospital clinics with inconsistent access, while others are unable, or choose not, to register with an LMC at all (Healthy Families Whanganui, Rangitīkei, Ruapehu, 2023; Rippon & Woon, 2023) with Māori and Pacific women, in particular, facing the greatest barriers to access.

"…[I] have heard their [midwife] availability is very limited." P3

"…[I'm] not sure how many midwives are around this area and their availability varies…choice of midwife is also a big problem." P1

"…[One of the] weaknesses of the midwife service is the ongoing intermittent workforce shortages that will continue to impact sufficient LMC coverage leading to more burnout…midwives also seem to move in and out of the hospital as an alternative to community LMC work…the hospital midwives also provide an antenatal clinic that picks up women who cannot find a midwife but the availability of this clinic can also be limited at times." P4

"…unsure how many (midwives) but lots of women in my community are choosing not to register with an LMC at all." P7

In summary, the first major theme identified was the accessibility and availability of maternity services, which were strongly influenced by geographical distance (Table 1) and the reliability of services. These factors shaped women's ability to access birthing units, ultrasound and laboratory services, transport to appointments, and their choice of LMC.

THE POWER OF RELATIONSHIPS

The second theme identifies the importance of relationships. Strong collegial networks and co-located services - situated within the same facility or site - were described as critical in reducing service fragmentation, supporting coordination of care, and helping address inequities in access.

Strength of Co-location of Services and Collegiality

Findings from the surveys highlighted the value of co-locating health services, particularly in rural communities where resources were noted to be less available and accessible to māmā. In these rural areas, where many people know one another, co-location creates spaces for providers to work side by side and build strong, trusting relationships. This closeness means that collaboration happens naturally - whether through formal referrals, warm handovers, or the everyday contact that comes with sharing the same space. Participants note that the ability to seek quick second opinions, draw on collegial support, and operate under a shared framework makes it easier to coordinate care and ultimately supported better outcomes for hapū māmā and their whānau, including in high-risk situations.

Examples of this include rural birthing services co-located with primary care practices, where midwives and GPs can readily consult and support one another, or primary maternity units based alongside emergency departments in rural hospitals. In these settings, the ability to share knowledge, skills, and immediate support not only benefits clinical practice but also provides reassurance to women and their families that care is well connected. Co-location, therefore, is seen to act as both a practical and relational enabler, helping to sustain rural maternity services that might otherwise struggle in isolation.

"...there is a strong relationship between the primary care team and the midwives, especially for māmā with complex needs...the corridor conversations with GPs, without having to book māmā in for an appointment...there is immediate access to a second opinion when there is something medical...and the warm hand over after the 6 weeks postnatal...yeah, the collegial support is amazing." P17

"...even though we are independent midwives, we are practicing under the umbrella of primary care services, and so our thinking is connected with primary care." P16

"…the primary care team would assist linking with a midwife from the hospital, especially if there are complex social needs or high risk clinical issues." P5

"...there is collegiality in our co-located model for sure...it's a...I'll scratch your back, you scratch mine kind of situation, for example, if a woman presents in labour to ED, the midwives would always come ...and when there's a neonatal emergency in the maternity unit, the ED team immediately assist with treatment and organising the heli[copter]." P6

In the most rural areas (R2/R3), collegiality, connected teams, and strong relationships are particularly evident. These connections support enrolment in primary care services, facilitate links with local hospital midwives when LMC availability is limited, and helps prioritise access to additional services such as maternal mental health, social services, or Iwi health providers. The inter-disciplinary approach between LMCs, primary care, and rural hospital services is reported to be stronger and more visible in R2/R3 than in R1 and U2.

"...HIPs [Health Improvement Practitioners] and health coaches in our rural general practice do a lot...they are well utilised for maternal mental health in partnership with us [midwives]. I seem to refer less to secondary care since before they [HIPs] were here...māmā were often 'declined' anyway for not meeting the severity criteria....and if they were accepted, there were often DNAs...now we all work collaboratively as a team and care for māmā closer to home." P17

"...working in close partnership with our iwi health service is important in supporting social and Whānau Ora for māmā to reach their goals through pregnancy and for their pēpi...the opportunity coming up for the whole team - primary care team, midwives and iwi health services - to be located in the same hospital building will strengthen relationships even more."P19

"…Manaaki Hauora team-based IDTs (inter-disciplinary teams) within primary care has helped support māmā with complex health and social needs…and there are opportunities to develop integration of services further." P14

Conversely, the absence of strong relationships is most apparent in U2 and R1 areas, where a common theme is the lack of collaboration or 'warm handover' between LMCs and primary care services. While the most rural areas (R2/R3) still have room for improvement, U2 and R1 areas consistently highlight a lack of partnership-based or shared care approaches between providers.

"...we have no relationship with the midwives and the midwives have no relationship with us... absolutely no collaboration at any point through the pregnancy journey." P8

"…there is threat of continued fragmentation of LMCs from primary care and lack of access to GPs with many people not even knowing who they are enrolled with, if anyone." P4

"...there are opportunities to improve connecting up across primary-secondary-tertiary services...and better relationships with some of the midwives in our rural community." P6

While co-location is often described as beneficial, participants also highlight that it creates challenges when roles and responsibilities are unclear, particularly in facilities where maternity units share space with rural emergency departments.

"...having a rural ED in the same building as a maternity unit means that sometimes there are challenges with 'ownership' of providing care...not a great experience sometimes when the woman is stuck in the middle...some women have expressed feeling discrimination because of being pregnant." P11

In the most connected rural settings, trusted relationships between providers create a foundation for seamless, coordinated care. Where these bonds are weaker, as seen in many R1 and urban areas, women face a more fragmented system.

NAVIGATING THE FRAGMENTED SYSTEM

To navigate this fragmented system, both providers and māmā often rely on their own knowledge of how services operated locally, as well as personal networks to fill gaps. Participants describe how mismatches between what the system offered and what women actually needed left many whānau dependent on informal workarounds, advocacy, or persistence to access care. These gaps and misalignments highlight the difficulty of moving through a system that is not always designed with rural or Māori realities in mind.

Knowledge of the system

Advocacy for rural hapū māmā is often demonstrated in the coordination of ultrasound diagnostics and specialist secondary care for those living near HNZ boundaries, where crossing into a neighbouring district was sometimes the closer option. For example, hapū māmā living in Waverley or Pātea - within the Taranaki HNZ area - might face travel times of up to two hours for a scan, whereas referral into the Whanganui HNZ area could reduce the journey to around 30 to 45 minutes. When the rural health workforce is stable and familiar with the local context, they are able to advocate for cross-boundary referrals to reduce these barriers. In some cases, local communities also draw on shared knowledge and word-of-mouth to self-advocate and better navigate the health system.

"...patients who know the system ask to have their scan request out of the local HNZ area to guarantee a service closest to their home...this takes some extra work to write a 'special request letter' to the radiology service across the boundary...if a locum GP is working in the practice, they would not necessarily think to ask about the location of ultrasound services and generally would complete the usual referral form in the practice management system that automatically directs to the allocated HNZ radiology service at the base hospitals." P12

"...Whanganui radiology department push back on requests from the Taranaki area, even though māmā are much closer, and without appreciating the barriers." P2

"...the base hospitals seem to have no consideration of prioritising rural women needing to access secondary care services, such as ultrasound and secondary specialist appointments - transport barriers, communication e.g. phone access if needing to confirm or change appointments, travel costs, organising childcare and time off work. For example, they [the base hospital] need to be more considerate of booking 0900 appointments for women living 1.5 hours away." P11

While knowing how to navigate the system was generally seen to be beneficial, it was also recognised that knowledge of the system and the ability to self-advocate, in the absence of consistent processes, may inadvertently create inequities and elitism.

"Access to maternal counselling is there only if you have the loudest voice...otherwise services are limited...there is a huge need...and many women are missing out." P11

Advocacy for Coordinated Care

The need for systems knowledge and advocacy - either self-advocacy or advocacy on behalf - is not the only recognised gap in the system. Many participants highlight the lack of collaboration between midwives and primary care teams, alongside limited integration across primary, secondary and tertiary services. Instead, services are often described as operating in silos. Barriers, such as, absent relationships, limited data sharing, restricted funding models, and differences between facility types are mentioned. Participants' accounts provide clear examples of how these gaps play out in practice, shaping the care available to hapū māmā and their whānau.

"...the system is fragmented despite us being small and rural...primary care clinicians and LMCs are still working in silos most of the time." P11

"…there is patchy evidence of LMC and primary care collaboration and the communication is improving but systems do not integrate and information is easily lost or difficult to find…one of the biggest challenges is seamless transfer of shared data from LMC to primary care at the 4-6 week postnatal period." P14

"…there is no co-location and no collaboration in this area [R1]. There are lots of barriers from limited notes from the hospital and LMCs, no warm handovers back to primary care. If labs or scans are done across the HNZ boundary, we cannot access them easily and if done privately, it can be a time-consuming admin task to retrieve them. There are delays in receiving letters from specialists too…the list goes on." P12

"…women are directed to the 'find your midwife website'…they have to navigate the system for themselves…and some people don't have the internet or a phone." P10

"…there are lots of women with no LMC that are turning up late in their pregnancy or with complications." P6

In the most rural areas of Whanganui and Taranaki (R2/R3), the maternity care workforce highlights their role in advocating for hapū māmā to help coordinate care and minimise barriers such as travel costs, travel time, time off work, and arranging childcare. This strengths-based approach includes proactive measures such as contacting secondary service booking offices to align appointments - such as ultrasound and obstetric consultations - on the same day, particularly when long travel distances were involved.

"...the booking office at the base hospital and I are on a first name basis now and they are starting to understand that if a māmā lives in this rural area, they need their scan and appointment on the same day and at reasonable time of day if they are going to make it at all" P19

"...advocating for co-ordinated appointments by calling base hospitals may take more time and responsibility for us as rural midwives than perhaps a midwife in the city may have as part of their employment contract...it is what we do in rural because if we don't, we know our rural māmā might not go and are likely to miss out on important care" P19

"…it has taken years of advocacy for the specialist teams to understand our rural context and now the relationship with the obstetricians is great." P17

Gaps in the system

The use of Best Start GEN2040 or similar early pregnancy assessment tools, designed to support multi-disciplinary care and collaboration, is inconsistent. Missed opportunities for first-trimester screening are frequently reported, reflecting limited shared care between primary care and midwives - even for women with high-risk pregnancies. Notably, collaboration is stronger in some R2/R3 areas where services and workforce are co-located, enabling better integration of care.

"…we do not use the Best Start Tool...in this rural community women know how to access an LMC and midwives use a different data entry system…however, we do try to complete the first assessment as early as possible and there is a strong relationship with the primary care team and obstetricians if any risks or concerns come up." P15

"…as funding for LMCs starts towards the end of the first trimester, there are lots of missed screening interventions, such as smoking and alcohol and drugs identification…I would love to be the GP that shared care in partnership with a midwife…to care for a woman through her whole pregnancy – prenatally, antenatally and postnatally…why does that not happen?..." P10

"…we do not use a form or tool for pregnancy assessment in primary care…usually we just order the bloods and ultrasound, prescribe folic acid and iodine and advise to find a midwife." P11

"…in the city practices, if Best Start is completed, there is usually no warm handover to midwives and if midwives complete the first assessment in the midwife system, there is no warm handover to primary care, even in high-risk situations." P1

"...mental health concerns are picked up through the Best Start tool and because it is in primary care, a warm handover can occur to the HIP." P14

Across all GCH areas, participants reflect on the decline in GP obstetric skills, reduced shared care arrangements, and siloed models that limit capacity and capability within maternity services. Suggested potential opportunities for improvement include strengthening collaboration between midwives and clinicians through co-location, as well as building closer partnerships with iwi and Hauora Māori providers to support workforce development and service integration.

"…no, I would not confidently call on any of the doctors to support complications in labour…but they are pretty handy when it comes to dealing a neonatal emergency." P11

"...we are it...technically, I guess I could call them [GPs] in but they would have to be guided by us [midwives] and most of clinicians live out of town anyway." P15

"…most local older GPs will have 'retired' their obstetric skills as a result of the LMC model…however, the increasing complexity and lack of shared care arrangements with GPs is a weakness in the system that is leading to more referrals to secondary services…for things that primary care could potentially manage…" P4

"…15 years ago or so, some midwives worked within General Practice…they were RNs and when the LMC model changed the relationship and knowledge of primary care supporting māmā changed." P14

"…there is opportunity for LMCs and primary care teams work together better through co-located models of care... which now has several midwives working there and access to other social services." P1

"…there are many more opportunities in rural to integrate…especially opportunities to align primary care and Iwi and Hauora Māori providers." P4

FLEXIBLE SERVICES

Opportunism and Process Workarounds

Participants described multiple opportunistic workarounds to overcome the system-level restrictions and funding rules that impede timely pregnancy care. This is particularly evident in rural settings, where workforce are more likely to go 'over and above' to support rural māmā. Under Section 88, regulatory definitions of 'specialists' exclude nurse practitioners and midwives from ordering key diagnostics or

authorising travel assistance. This creates inequities, as women may face private costs or delays in access, with rural māmā disproportionately affected. In practice, participants highlight how midwives and other providers are often forced to advocate and find workarounds to reduce these barriers.

"…there is good uptake of registration with LMCs in our rural community compared to other areas perhaps…it is unusual for us not to know of all the pregnant women at any given time…there was one time I followed a heavily pregnant lady around the supermarket as I did not know her only to realise that they were visiting from France and only passing through!" P6

"…there is always someone on-call by the phone and women know they can visit the unit and receive care when it is staffed." P16

"…although home visits are becoming less and less…there are times when women refuse to come into town due to no transport options or due to childcare…but it is dependent on risk and midwife availability…often antenatal care happens when our paths cross in the supermarket carpark." P11

"...there are massive barriers. Nurse Practitioners are not seen as specialists and cannot order ultrasounds for māmā under section 88....this creates barriers for māmā when there are no GPs available in the practice, as māmā would have to pay for the scan and also restricts obstetrician claiming for services....ultimately, this causes unnecessarily delay in pregnancy care for māmā." P9

"...midwives do not qualify as 'specialists' and therefore cannot order some scans and cannot support travel assistance to appointments...there are lots of hoop jumping to advocate for māmā, particularly for travel assistance once referred to secondary specialist services, which is a huge barrier." P18

"...if the rural midwives do not refer for the scan early, then the women will not get in...but we are going outside our contractual funding boundaries by arranging scans without the specialist letter to support vouchers for travel assistance." P17

'Drop-in' pregnancy-specific services and after-hours services are rare, especially in R1, although rural R2/R3 maintained 24/7 on-call midwives and drop-in services when midwives are available. In some U2 areas, community integration spaces, such as, Hapū Māmā Village and Te Whare Piringa are identified as strengths. These initiatives bring together multiple services - including stop-smoking support, healthy homes programmes, immunisations, and mental health services - providing more co-ordinated and accessible care for hapū māmā and their whānau. Iwi and Hauora Māori services are identified as providing the strongest support for education, mental health, and alcohol and drug services across all GCH areas, though only some are well integrated with primary care.

"...there is always someone on-call...and our rural māmā know we [midwives] are at the end of the phone 24/7...and we would not expect them to travel to ED without an assessment first." P16

"...there are no specific maternal mental health services in primary care in this area. There are HIPs and health coaches in most practices now but their skills and knowledge of pregnancy related mental health is variable." P8

];

Antenatal education is generally described as poorly promoted, with inconsistent quality and a complete absence of Pacific Peoples-specific options. Kaupapa Māori approaches, such as hapū wānanga and wahakura wānanga delivered in collaboration with mental health and addictions services, were highlighted as valuable; however, participants noted that access to these services in the rural areas remained variable.

"...the Rūnanga offers peer support and education but they are not well integrated with the general practice." P9

"...yes, there are Māori focused antenatal services but I could not say exactly who runs them or where they are based...I would have to find out through the internet." P6

"…I think there are hapū wānanga and wahakura around this area but I would not know how to refer women." P10

System Mismatch

The findings highlight a fundamental misalignment between kaupapa Māori approaches to maternity care and the Western medical models that form the foundation of most primary and secondary services in the districts. Te Whare Piringa in Whanganui, designed by Māori māmā for Māori mama, is frequently highlighted as an example of a service that reflects Māori values, whānau-centred care, and holistic support. The development has strengthened continuity of care by integrating access to Hauora Māori, mental health, and alcohol and drug services.

However, participants reported ongoing challenges in connecting Te Whare Piringa with mainstream primary care and antenatal services. Differences in process - such as flexible, whānau-led care compared with structured, referral-based systems - were seen to limit collaboration. While nursing support for Best Start and early pregnancy assessments has been co-located on site, the absence of a fully embedded wrap-around team (e.g., HIPs, health coaches) risks fragmenting care. Barriers to information-sharing and limited data access were reported to further hinder coordination,

A "one-stop shop" model is seen as a potential way to improve accessibility and by reducing the number of separate appointments for māmā, although acknowledgement of resourcing and system-level alignment would be critical for its success.

"...the Te Whare Piringa development offers growing continuity of care and collaboration across primary and antenatal care with access to Hauora Māori services including mental health services and alcohol and drug services. P14

"…the challenge here is that the services are separate to primary care but could be more connected…part of the challenge is access between primary care and Te Whare Piringa as they [Te Whare Piringa] do not want formal referrals…but that is how primary care operates currently." P14

"…there are opportunities for more collaboration between our teams and services but needs better data-sharing and access to information." P1

"…primary care processes and whānau-led approaches sometimes do not align. By providing a nurse from the general practice to support low numbers of drop-ins and for low-risk māmā at Te Whare Piringa currently impacts on the general primary care workforce shortages." P14

"…it is good to consider a one-stop shop concept in an urban co-located facility with a range of supports and services accessible…it could reduce the number of appointments needed for care…especially for those with transport challenges…but it may be resource intensive and complex to set-up and sustain especially in the current political climate." P4

Telehealth

Participants were asked to share their views on the role of telehealth in pregnancy care. While telehealth has become an important option for primary care, rural respondents explained that whānau most often used services such as Practice Plus or Ka Ora for non-pregnancy needs, like respiratory illnesses or common childhood conditions. Confidence in using these services for maternity care is low, with concerns that virtual consultations may miss important aspects of in-person assessment and delay early risk detection. Despite this, some participants recognise the value of telehealth for specific situations, such as termination of pregnancy assessments, where it could improve access and reduce delays.

"...I know of 10 unwanted pregnancies continuing due to access issues...the strengths in the telehealth service is that it reaches the rurals." P10

Telehealth is also seen as a potential solution for after-hours gaps, though participants note its limitations in acute or urgent situations where māmā still need to travel long distances to access emergency or urgent care.

"...after-hours, if the midwife is not available, māmā travel to the ED or urgent care centre and for some in this area that could be between 25 minutes to an hour away on the road...I doubt that Ka Ora or Healthline would be of use in these situations." P8

Across all GCH areas, participants observed that secondary specialist telehealth services, which previously had been available during the COVID-19 pandemic, are no longer offered. Many saw this as a missed opportunity to include the LMC midwife in the specialist consultation, particularly when supporting rural māmā.

"....specialists often offer a phone-call instead if māmā cannot attend in-person…we could assist with a video consult with the specialist and māmā to assist with the physical check – especially for those short follow-up appointments." P16

"...there are opportunities for virtual appointments with secondary care specialists and obstetricians...they proved they could do it during COVID." P11

THE COST of RURALITY

Participants highlight the cumulative effect of direct and indirect costs on early pregnancy care in rural areas. Many women face out-of-pocket expenses for scans and blood tests when local private services are the only option, while limited travel assistance often makes accessing funded providers difficult. For those required to travel, additional costs are incurred through transport, childcare, and time away from work. These financial pressures also extend to the rural workforce, where sustaining maternity services can be challenging under the current funding and resource models. In particular, the cost of rurality includes travel burden, access to public versus private services, and the psycho-emotional cost for rural midwives.

Travel Burden

Participants describe travel for early pregnancy care as a major burden for rural women and while some support is available, it is often limited.

"...living rurally means māmā have to either travel to funded services or pay part-charges for private scans closer to home with no travel assistance that is compounded by time off work, childcare and transport" (P2).

"...vouchers for petrol can be given by the LMC but are limited and they are used up fast" (P15)

"...women can claim back travel if [they] meet certain criteria but there is an onerous administration process and most people don't bother in the end" (P12).

These insights highlight how the cost, complexity, and practicalities of travel remain a significant barrier to equitable maternity care.

Public versus Private Services

Participants highlight inconsistencies in costs between public and private services, with many women facing surcharges for private ultrasound scans, particularly if the location of private services are in closer proximity than funded options. In R2/R3 areas, some midwives report taking bloods themselves so women were not charged, whereas in areas of R1 and U2, general practices may charge for this service, leading to increased travel burden to source funded public laboratory services.

"...there is no cost to our rural māmā for bloods and our midwives usually take them as part of the service…however, there is additional cost or responsibility to our primary care service to support this service" (P16)

Psycho-emotional cost for rural midwives

The cost of rurality is not only financial for māmā and their whānau but also carries a significant psycho-emotional toll for rural midwives. Participants describe how midwives in rural areas are often on-call 24/7, working in isolation, and expected to "go above and beyond" to advocate for māmā and keep services running. This invisible workload extends well beyond direct clinical care, encompassing the

management of facilities, maintaining stocks, conducting emergency checks, and navigating compliance requirements or even transporting women themselves when ambulances are unavailable.

"...it's not just about the numbers of births...there is invisible work that rural midwives and the rural maternity service provides...we are constantly working to reduce barriers for our women" (P17).

Midwives also describe working in "grey areas," where māmā decline secondary care input, leaving them to carry risks that the wider system does not adequately share.

"…there are a number of māmā who decline secondary care input and [it] puts pressure on rural midwives to support that choice" (P16).

"...*when it comes to labour and birth...and if any complications...then yep, we are it"* (P18)—

These system gaps not only intensify midwives' workload and stress but also leave rural women more vulnerable, with their safety and choices shaped by the limited resources available. The burden of risk is therefore unevenly distributed, with midwives left to bridge gaps in the system while māmā face persistent inequities in access and outcomes.

SUMMARY OF QUALITATIVE FINDINGS

Rurality strongly shapes the maternity care landscape in Taranaki and Whanganui, bringing both benefits and constraints based on geographic location. The most remote areas (R2/R3) face long travel times to diagnostic and birthing facilities, scarce public transport, inconsistent service reliability, and restrictive regulatory frameworks. These factors require rural providers to adopt flexible, opportunistic, and advocacy-driven approaches to coordinate care.

Primary birthing units are valued for their proximity, reduced intervention rates, and the ability to include whānau support. However, they face sustainability risks due to declining birth numbers, workforce shortages, and limited postnatal stay options. Access to diagnostics - particularly ultrasound - is reported as unreliable in rural areas, with few or no private alternatives. Laboratory access and transport varies, with some rural communities benefitting from funded on-site services, while others face long travel and out-of-pocket costs. Across all rural areas, participants describe little or no public transport and fewer ambulances, alongside persistent midwife shortages. Telehealth is viewed as an opportunity for secondary specialist consultations to reduce travel burden.

Strong inter-disciplinary relationships between primary care, LMCs, Iwi and Hauora Māori providers, and social services are most evident in R2/R3 areas, in contrast with the siloed and fragmented systems described in U2 and R1. Navigating care often relies on local knowledge, advocacy, and personal relationships rather than consistent system processes - creating inequities, with those less familiar with the systems at risk of missing out. Tools such as Best Start GEN2040 are inconsistently used, and access to antenatal education remained variable, with no Pacific-specific provision.

The costs of rurality are experienced in multiple ways. For hapū māmā, direct costs include travel, childcare, and lost income, while for rural midwives the psycho-emotional costs of being on call 24/7, carrying risk in under-resourced environments, and undertaking "invisible work" to sustain services are emphasised. These pressures raise significant concerns about the sustainability of both the workforce and the services they support.

Culturally appropriate, Kaupapa Māori and community-based services - such as drop-in hubs offering holistic, whānau-centred care - are seen as highly valuable. However, participants note misalignment between these models and Western biomedical processes, with limited data-sharing, referral pathways, ad systemic support. Access to integrated, co-located services is uneven across regions, with R1]

Results: Quantitative

The qualitative findings highlight challenges and strengths across maternity care in rural and urban areas. The following quantitative results provide further context, illustrating how rurality, ethnicity, and service distribution shape patterns of care and outcomes in the Taranaki and Whanganui districts. Appendix 4 contains all contingency tables and statistical analysis.

Firstly, no maternal mortaity cases were reported in 2022 across the Taranaki and Whanganui regions and there were 2278 births recorded.

Across all GCH areas, non-Māori and non-Pacific Peoples accounted for the majority of births (Figure 2). However, the data show a clear relationship between ethnicity and rurality. The proportion of Māori and Pacific births was significantly higher in the most rural areas (R2/R3; combined due to low number of cases) as compared to either U2 or R1 across Taranaki and Whanganui localities.

Chi square testing (χ^2 (2, N = 2222) = 15.73, p <.001) indicates that there is a significant relationship between ethnicty and rurality, although the effect size is small (Cramer's V = 0.084).

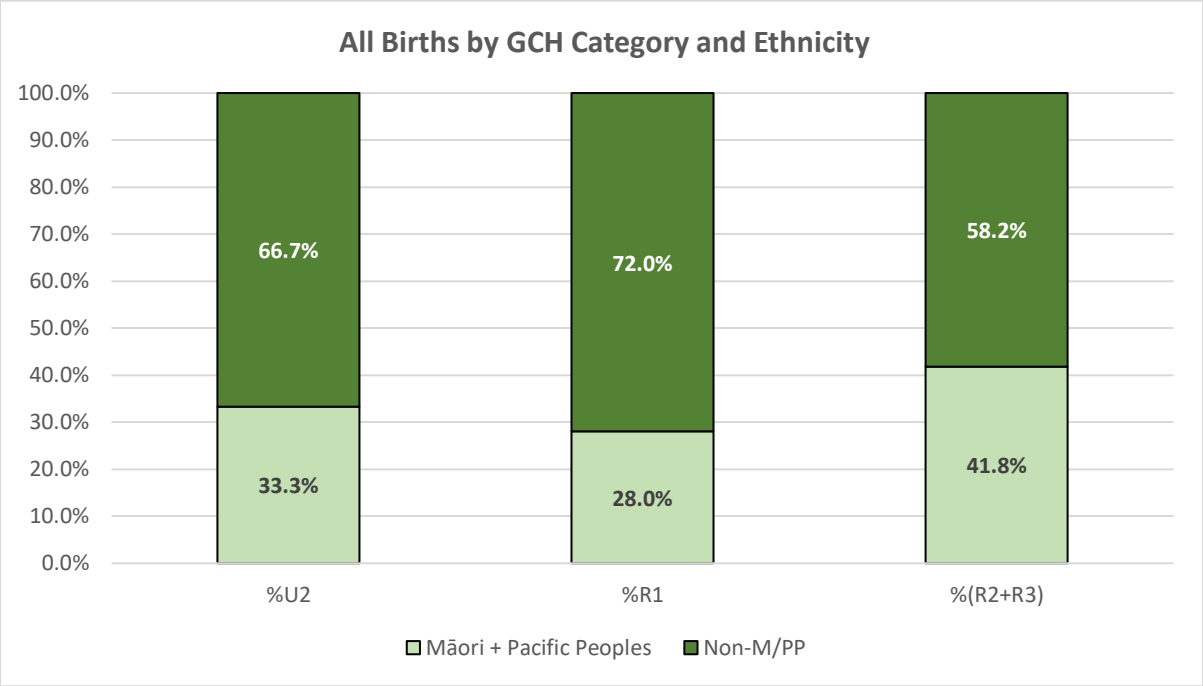


Figure 2. The Proportion of All Births in Taranaki and Whanganui by GCH Category and by Ethnicity

For both Māori and Pacific Peoples and non-Māori and non-Pacific Peoples, most births occurred in a Local Base Hospital. However, amongst those living in the most rural areas (R2/R3), a significantly higher proportion gave birth in a Local Primary Birthing Centre compared with women in R1 across Taranaki and Whanganui localities combined.

Figure 3 shows the proportion of birth centre services utilised by GCH category and ethnicity. Local primary birthing centres include Hāwera Hospital in the Taranaki district; and Taihape Health Ltd and Waimarino Health Cantre in the Whanganui district. Secondary Birthing Centres or Local Base Hospitals include Taranaki Base Hospital, Whanganui and Palmerrston North hospitals. All 'Other ' birthing centres include all other NZ birthing locations including Tertiary Birthing Centres.

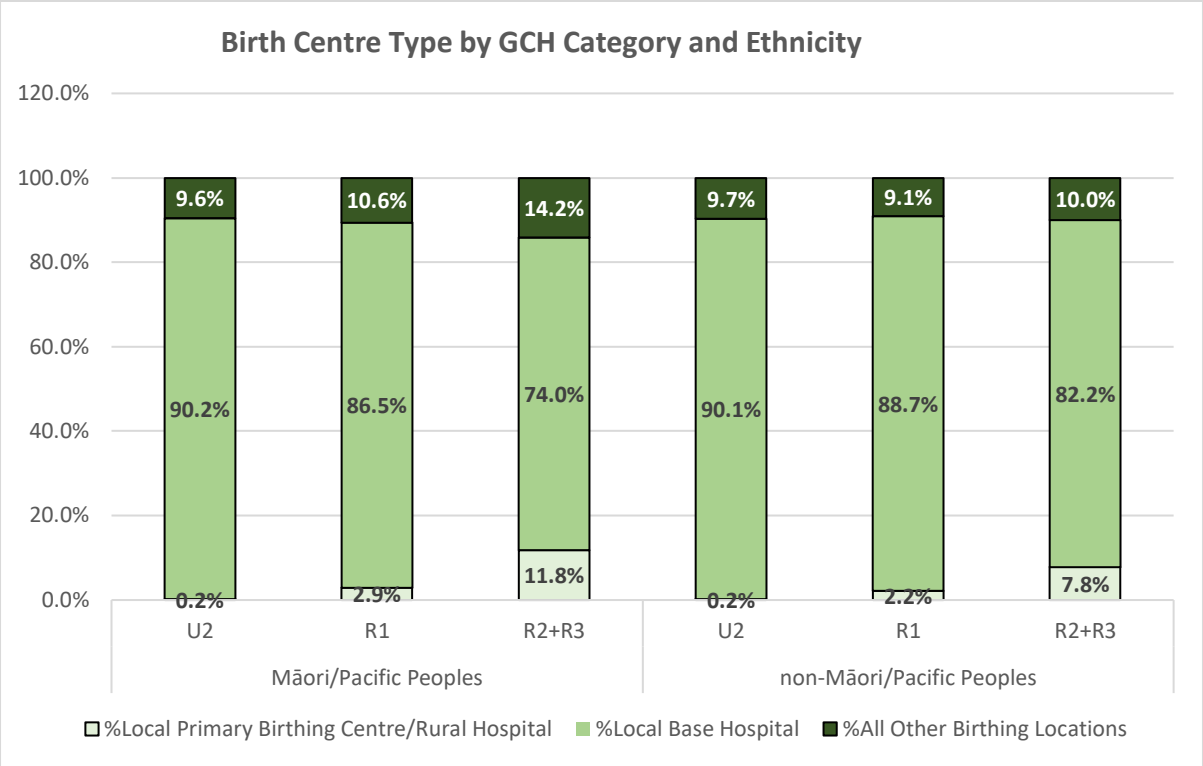


Figure 3. The Proportion of Babies Born at each Birth Centre Type by GCH Category and Ethnicity

Statistical analysis of the data concerning birth centre type, ethnicty and GCH category using chi square testing for proportional differences reveal the following:

- When primary birthing centres and other birthing centres are considered independently, there is no significant relationship between ethnicity and rurality.
- However, when base hospital birthing centres are considered independently, there is a significant relationship between ethnicity and rurality ($\chi 2$ (2, N = 1823) = 9.27, p =.01.) although the effect size is small (Cramer's V_1 = 0.071).
- When considering ethnicity independently, there is a significant relationship between birthing facility and rurality for Māori and Pacific Peoples, ($\chi 2$ (4, N = 689) = 53.42, p <.001) (Cramer's V = 0.197) and also for non-Māori and Non-Pacific Peoples, ($\chi 2$ (4, N = 1381) = 60.47, p <.001) (Cramer's V = 0.148) though the effect size of these differences is relatively small.
- When considering rurality independently, there is no significant difference between ethnicity and birthing facility for either U2, R1 or R2/R3 combined.

Overall, these findings regarding birth centre type, ethnicty and GCH category suggest two things. First, all hapū māmā (regardless of ethnicity) who reside in R2/R3 areas are more likely to give birth in local primary birthing centres. Second, this effect is hightened even further for hapū māmā who are Māori and Pacific, with increased likelihood of those in R2/R3 giving birth at either local primary birthing units or at other locations (e.g. tertiary birthing centre or out of region) than the local base hospitals.

Figure 4 highlights the pattern of LMC registration across GCH categories, and statistical analysis suggests there are ethnic differences in such registration as a factor of rurality.

The significant difference appeared in the proportion of Māori and Pacific Peoples registering with an LMC in the first trimester where engagement was lowest. Interestingly, the proportion of LMC registrations in the first trimester appears highest in the rural areas compared to urban areas for both Māori and Pacific Peoples and non-Māori and Pacific Peoples. Conversely, although not significant, the proportion of 4th trimester registrations is approximately three times higher for Māori and Pacific Peoples in rural areas of R2/3 as complared to U2. There are also significantly more registrations in the third trimester in U2 for Māori and Pacific Peoples versus other areas.

[1] Cramer's V reflects the strength of relationship between two categorical variables and is measured on a scale from 0 to 1. Scores from 0 to 0.1 are considered negligible, from 0.11-0.30 are weak, from 0.31-0.50 are moderate, and from 0.51 upward are strong.

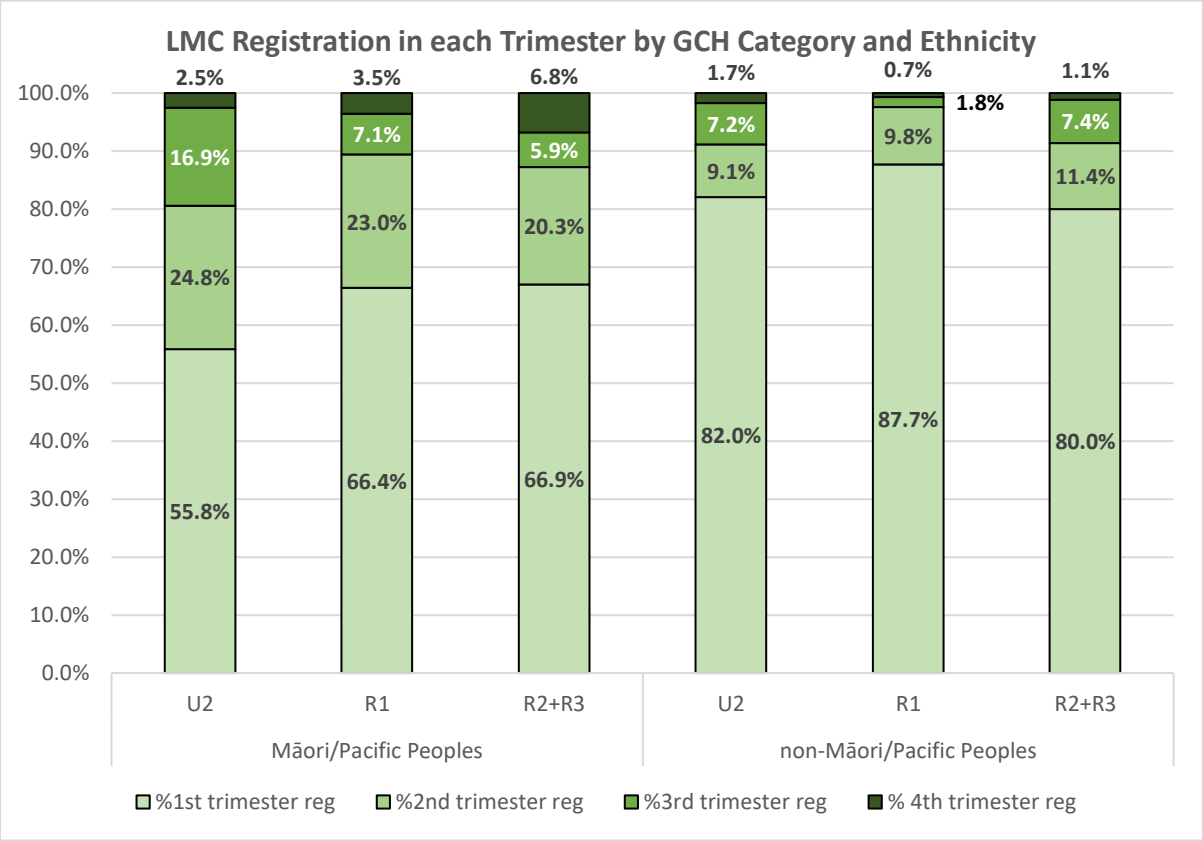


Figure 4. The Proportion of Women Registering with a LMC in each Trimester by GCH and Ethnicity

Statistical analysis of the data concerning LMC registration, ethnicty and GCH category revealed the following:

- The proportion of non-Māori and non-Pacific People registering with an LMC across rurality indicates there was no significant difference in engagement
- When Māori and Pacific Peoples are considered independently, there is a significant relationship between rurality and LMC Registration trimester ($\chi 2$ (6, N = 711) = 21.56, p =.001.) although the effect size is small (Cramer's V = 0.123).
- When LMC registrations in the 1st trimester are considered independently, there is a significant relationship between ethnicity and rurality ($\chi 2$ (2, N = 1597) = 12.87, p = .002) although the effect size is small (Cramer's V = 0.090).
- When LMC registrations in each trimester are considered independently, there is no significant relationship between ethnicity and rurality in either the 2nd, the 3rd or the 4th trimester.
- When non-Māori and Pacific Peoples are considered independently, there is no significant relationship between rurality and LMC registration trimester.

The pattern of LMC registration for Māori and Pacific Peoples is significantly different to the pattern from non-Māori and non-Pacific Peoples within each and across all GCH areas. Specifically:

- When U2 rurality is considered independently, there is a significant relationship between ethnicity and LMC registration trimester ($\chi 2$ (3, N = 1437) = 114.63, p < .001) although the effect size is small (Cramer's V = 0.282).
- When R1 rurality is considered independently, there is a significant relationship between ethnicity and LMC registration trimester ($\chi 2$ (3, N = 398) = 26.23, p < .001) although the effect size is small (Cramer's V = 0.257).
- When R2/R3 rurality is considered independently, there is a significant relationship between ethnicity and LMC registration trimester ($\chi 2$ (3, N = 293) = 12.13, p = .007) although the effect size is small (Cramer's V = 0.203).

Figure 5 illustrates the proportion of babies born at term above and below 2500g in each GCH category and by ethnicity. Statistcal analysis of this data suggests that:

- When Māori and Pacific Peoples births and non-Māori and non-Pacific Peoples births are considered independently, there is no relationship between rurality and low birth weight.
- When GCH categories are considered independently, there is no significant difference in low birth weight across ethnicity for either U2, R1, or R2/R3 combined.

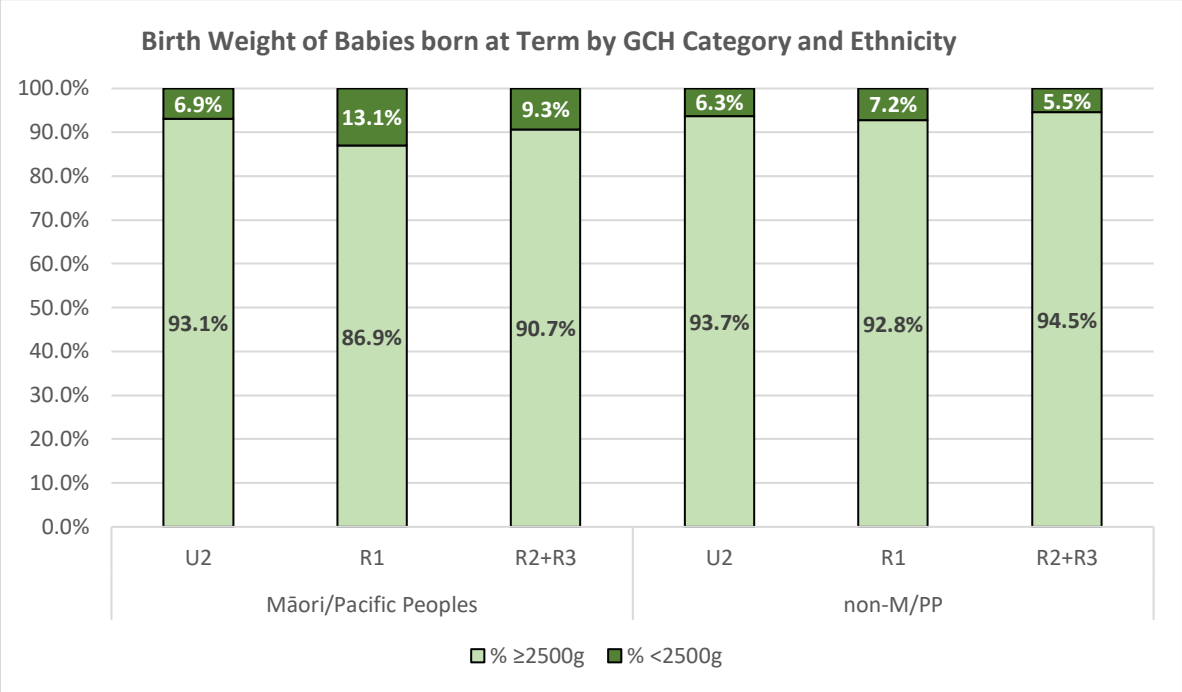


Figure 5. The Proportion of Babies Born at Term with Birth Weights < 2500g by GCH Category and Ethnicity

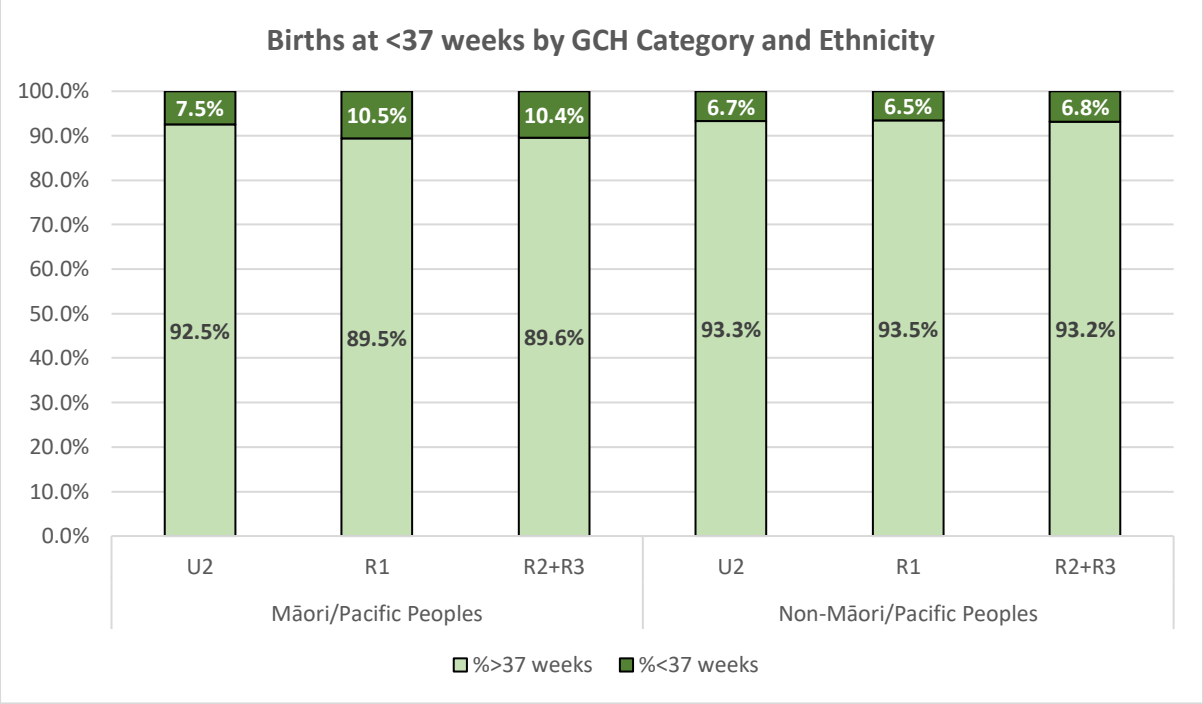


Figure 6. The Proportion of Babies Born at < 37 weeks by GCH Category and Ethnicity

Figure 6 illustrates the proportion of births delivered pre-term (<37 weeks) by GCH category and by ethnicity. Statistical analysis indicate that there there is no relationship between rurality and gestation either overall or for both ethnic groups analysed independently.

Figure 7 illustrates the proportion of hapū māmā (pregnant women) who are smoking at the point of registration with an LMC by GCH category and by ethnicity. Statistical analysis of this data suggests:

- There is no relationship between rurality and māmā smoking at LMC registration either for Māori and Pacific Peoples independently or for non-Māori and non-Pacific Peoples independently. This indicates that the proportion of hapū māmā who smoke in each ethnic group does not significantly differ across rural and urban areas.
- However, Māori and Pacific Peoples are significantly more likely to be smoking at LMC registration than non-Māori and non-Pacific Peoples across every GCH category. When comparing GCH categories independently, Māori and Pacific Peoples are significantly more likely to be smoking in U2 settings ($\chi 2$ (1, N = 1485) = 86.54, p < .001; Cramer's V = 0.241), in R1 settings ($\chi 2$ (1, N = 407) = 29.34, p < .001; Cramer's V = 0.269) and R2/R3 settings ($\chi 2$ (1, N = 330) = 13.05, p < .001; Cramer's V = 0.199).

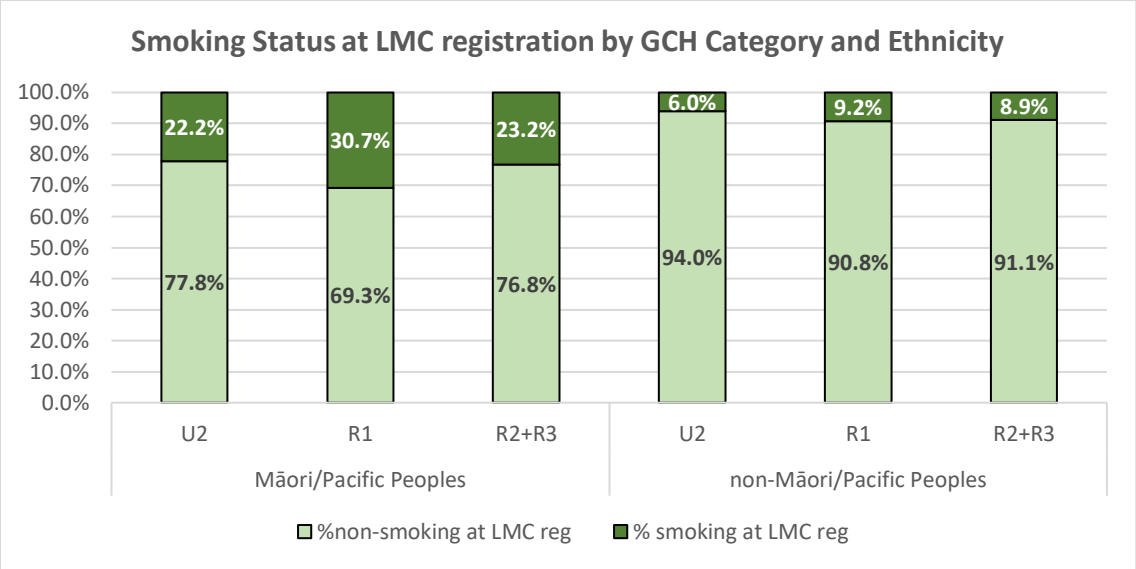


Figure 7. The Proportion of Women Smoking at LMC Registration by GCH Category and Ethnicity

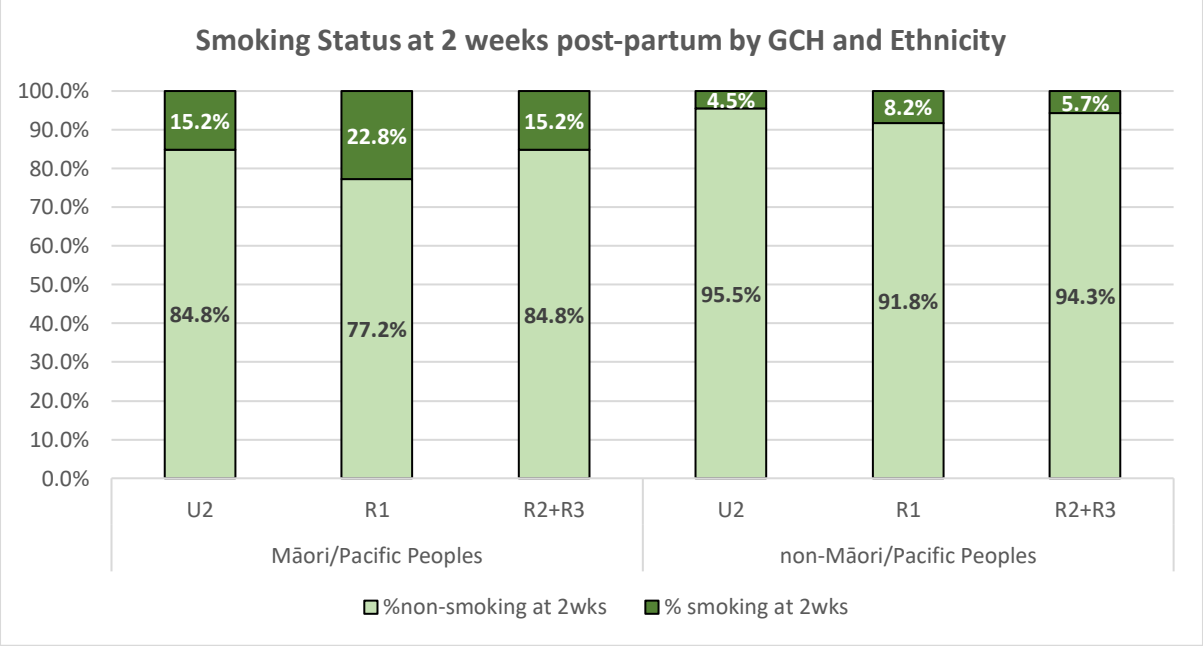


Figure 8. The Proportion of Women Smoking at LMC Registration by GCH Category and Ethnicity

Figure 8 illustrates the proportion of hapū māmā who are smoking at 2 weeks post-partum (after birth) by ethnicity and GCH category. Statistical analysis of this data suggests:

- As is the case for smoking at time of LMC registration, the proportion of hapū māmā who are smoking at 2 weeks post-partum in each ethnic group did not differ significantly across GCH categories.
- However, Māori and Pacific Peoples māmā are significantly more likely to be smoking at 2 weeks post-partum than non-Māori and non-Pacific Peoples in every GCH area. Specifically, when comparing GCH areas independently, Māori and Pacific Peoples are significantly more likely to be smoking at 2 weeks post-partum in U2 settings ($\chi 2$ (1, N = 1485) = 49.98, p < .001; Cramer's V = 0.183), in R1 settings ($\chi 2$ (1, N = 407) = 16.27, p < .001; Cramer's V = 0.200), and in R2/R3 settings ($\chi 2$ (1, N = 330) = 8.26, p < .001; Cramer's V = 0.241).

SUMMARY OF QUANTITATIVE FINDINGS

Analysis of birth data across Taranaki and Whanganui localities reveals an association between ethnicity, rurality, and several maternal health indicators. While non-Māori and non-Pacific Peoples account for the majority of births overall, the proportion of Māori and Pacific births is significantly higher in more rural areas (R2/R3) compared to the least rural (R1) (Figure 2).

For both Māori and Pacific Peoples and non-Māori and non-Pacific groups, Figure 3 shows that most births occurred in local base hospitals. However, māmā residing in the most rural areas (R2/R3) were significantly more likely to birth in local primary birthing units compared to those in R1.

For Māori and Pacific Peoples, Figure 4 demonstrates significant variation in LMC registration patterns across GCH categories. The most prominent disparity is the markedly lower proportion of first trimester registrations compared with non-Māori and non-Pacific Peoples. Within the first trimester data, an additional pattern is observed whereby women residing in rural areas engage with an LMC earlier than those in U2 areas.

Although not statistically significant, fourth trimester registrations - the time after birth - are approximately three times higher in rural R2/R3 areas than in U2, and third trimester registrations are disproportionately higher in U2. In contrast, LMC registration timing does not vary significantly by rurality for non-Māori and non-Pacific Peoples. This effect is accentuated for Māori and Pacific Peoples.

For both Māori and Pacific Peoples and non-Māori and non-Pacific Peoples cohorts, no significant relationship is found between rurality and low birth weight or gestational age (Figures 5 & 6). However, Māori and Pacific māmā were consistently more likely to smoke at the time of LMC registration and at two weeks post-partum across all GCH areas, despite rurality not being a contributing factor in either group independently (Figures 7 & 8).

Discussion:

Key Principle Findings

This mixed methods descriptive study combines workforce perspectives of the attributes of maternity care across rural and urban areas of Taranaki and Whanganui. Five core themes or principles findings emerged within the survey in part 1. These include ***1. Accessibility and Availability of Services; 2. Relationships; 3. Fragmented Systems; 4. Flexible Services; and 5. Cost of Rurality***. Part 2 also demonstrates how rurality intersects with ethnicity across several maternal health indicators.

Quantitative analysis confirms a significant association between ethnicity and rurality, with Māori and Pacific births in 2022 disproportionally concentrated in the most rural and socio-economically deprived areas (R2/R3). Applying the GCH in this study clarifies how rurality and deprivation intersect reflects previously documented patterns that the most rural GCH areas (R2/R3) have higher concentrations of socio-economic deprivation, with Māori over-represented in rural populations. (Whitehead, J., et al., 2023; HDSR, 2020) These inequities are particularly pronounced in the Taranaki and Whanganui birth datasets.

Consistent with prior research on rural health access disparities (Dawson et al., 2019; Whitehead et al., 2022a; Whitehead et al., 2023), the findings illustrate how geographic distance compounds **accessibility and availability of services** through extended travel times to diagnostics and laboratory services and birthing units, alongside limited or non-existent public transport. Across all GCH areas,

service reliability emerged as important as distance in determining access. Ultrasound provision was a consistent challenge, with inflexible public services, cross-boundary referral refusals, and no local private options forcing some women to travel over two hours for ultrasound diagnostics. Rural realities such as seasonal road closures and slow-moving agricultural vehicles often compounds delays.

In contrast, one of the strongest patterns in the datasets emerge as distinctive advantages seen in rural maternity services - in the most rural areas (R2/R3) - that demonstrate strength in co-located services and connected workforce through **powerful relationships.** Co-location enables stronger integration between LMCs, primary care teams, and Iwi and Hauora Māori providers, improving continuity for māmā with complex needs and fostering collegial knowledge sharing. In practice, rural midwives frequently adapt to **navigate the fragmented system**. Participants describe leveraging local relationships to coordinate multiple appointments, displaying advocacy to improve access, offering opportunistic consultations, facilitating transport, maintaining 24/7 on-call cover, and managing facilities. Combined with strong local relationships and community-led solutions, the **flexible services**, displayed in R2/R3 that put community and whānau at the core of service provision contribute to the strengths of rural maternity service models of care.

These findings echo those of Blattner, K., et al., (2024), who emphasise the critical importance of rural context in shaping effective health service delivery. In both settings, high-performing rural models in R2/R3 areas - characterised by integrated services, strong Iwi partnerships, trusted local workforce, and culturally anchored care - are able to overcome the compounded challenges of distance, workforce shortages, and limited infrastructure.

Although most births across Taranaki and Whanganui occur in local base hospitals, primary birthing units emerge as critical rural assets for māmā living in R2/R3 areas, particularly for Māori and Pacific women. This finding reinforces the survey insights where participants highlight that the primary birthing facilities offer care closer to home, reducing travel costs, and enabling whānau support. Participants describe these facilities as particularly valued in the context of rising living costs and suggest improved outcomes for māmā with low-risk pregnancies. These findings are supported in the study by Grigg et al., (2017) who reported that māmā giving birth in midwife-led primary birthing units experience reduced intervention rates and complications, and better breastfeeding success. However, their sustainability in NZ is fragile, challenged by low birth volumes, reduced skill maintenance opportunities for midwives, staff shortages and restricted post-natal stay options. The cascade effect of reduced primary birthing services on local ambulance services must also be recognised as an unintended consequence of any reduction in rural primary maternity services and where workforce shortages and service pressure are already evident, particularly in rural areas of Taranaki and Whanganui.

Surprisingly, the major themes of this study emerge to shine a more positive light for R2/R3 providers of maternity services than participants of R1 areas - still rural by classification but closer to urban areas - that often experience the “worst of both worlds". Maternity care in R1 is frequently **fragmented**. There is. no benefit from proximity of diagnostic and laboratory services, primary birthing units or the breadth of urban specialist services. Services lack the deep integration and show minimal collaboration and continuity of care between LMCs and primary care, fewer warm handovers, and limited after-hours or drop-in options compared to workforce in R2/R3 areas. Women in R1 areas must rely on EDs or urgent care centres, or pre-booked appointments. Therefore without the infrastructure or tightly knit provider relationships of more remote communities, R1 areas appear more vulnerable to service gaps and inequities.

Additionally, participants in U2 areas, while geographically close to secondary care, demonstrate disadvantage but for different reasons - proximity without integration. In general, women in U2 are physically close to services but currently still experience disjointed care and missed opportunities for continuity - services sit side-by-side but often operate in silos, with separate systems, differing referral expectations, and limited cross-service communication. Many respondents praise integrated community and innovative spaces, such *as* Te Whare Piringa*,* however, barriers are also identified including service separation from primary care, differing referral expectations, and the mismatch between primary care processes and whānau-led approaches. There is risk that system misalignment between mainstream structured referral processes and Māori-led flexible care approaches may further fragment care and contribute to persistent inequities. Although these spaces are available and continuing to grow, their distribution across the districts remain uneven, and Pacific-specific services remain absent. Te Whare Piringa demonstrates the potential of integrated, whānau-centred care, but also reveals tensions between Māori-led flexible approaches and mainstream structured referral systems.

There is a gap in the system with significant smoking rates and variability in the data for LMC registration for Māori and Pacific Peoples. Higher rates of smoking in pregnancy are shown in this study for Māori and Pacific Peoples across all GCH areas that aligns with data in the literature (Smokefree Aotearoa New Zealand 2021), highlighting the persistent inequities and the need for culturally tailored interventions. Variability in LMC registration patterns observed in this study is also noted with national and regional analyses of Primary Maternity Services claims, which highlights gaps in access to care. Sapere (Rippon & Woon, 2023) reported that in 2022, nearly 5,000 women (8.5% of all births) were unable to access a LMC during pregnancy. Of these, around 3.1% appeared to have had no primary antenatal care at all, while others were instead supported by HNZ community midwifery teams.

In Taranaki and Whanganui, Māori and Pacific Peoples clearly have lower engagement with maternity services reflected in the significantly lower rates of first trimester LMC registration across all GCH areas and a higher proportion of late (third and fourth trimester) registrations observed in R2/R3 compared with non-Māori and non-Pacific Peoples. However, an unexpected finding shows slightly more positive engagement with LMCs in the first trimester across rural areas compared with U2 for both Māori and Pacific Peoples and non-Māori and Pacific Peoples. This results supports the strengths of R2/R3 rural maternity models of care shown in Taranaki and Whanganui.

Mental health support was also patchy, with LMCs often left to fill service gaps without adequate social worker or social services connections. Knowledge and navigation of maternal mental health services in both districts is limited or absent, however, participants in this study suggest there is a huge need to support māmā. It reflects the gap in the system across all GCH areas. Rural integrated teams in R2/R3 show better local co-ordination to support mental wellbeing between HIPs, health coaches, LMCs and Iwi providers than U2 or R1.

However, the R2/R3 service provision for maternity services is not completely favourable - t**he cost of rurality** is evident for midwives in R2/R3, especially workforce shortages with some communities reliant on a small team of midwives covering extensive on-call duties and facility management responsibilities. Many also take on additional responsibilities, such as, transporting women when ambulances are unavailable or supporting māmā who decline secondary input, which intensifies workload and risk. While these practices help some hapū māmā access care, they rely heavily on individual good will, raising concerns about long-term sustainability.

Qualitative findings highlight the **cost of rurality** for māmā and whānau, that supports earlier work (Dawson et al., 2019) on the cumulative impact of indirect costs - fuel, childcare and lost income due to time off work - especially where there are long travel times and scarce public transport, and which further restrict equitable access to maternity care. Travel subsidies or petrol vouchers are available but are undermined by restrictive criteria and administrative burden. Telehealth is viewed by rural participants as a useful way to bridge geographic gaps, particularly for secondary care specialist follow-up and when a midwife is present for the consultation. While the COVID-19 pandemic showed that virtual specialist care was feasible, these services have not been sustained, leaving ongoing travel and cost burdens for rural māmā.

Overall, this study is the first of its kind to spotlight Taranaki and Whanganui maternity service delivery and attributes of maternity care specifically across GCH areas. It highlights a critical contrast: while R2/R3 communities contend with extreme distance to services - such as, funded laboratories, ultrasound diagnostics - and strain on the rural workforce, their integrated and relationship-based models confer protective benefits absent in R1 areas. Addressing the vulnerabilities of R1 and U2, while scaling the strengths of R2/R3 offers a clear pathway to improving equity and resilience in rural maternity care.

Novel findings in this study include the strengths-based rural maternity services and workforce of R2/R3 that demonstrate high levels of collaboration, collegiality and connectedness across LMC, primary and secondary care. In addition, slightly better engagement with LMCs in the first trimester in the rural areas compared with U2 areas, especially for Māori and Pacific women, is a notable and novel insight.

Strengths of the Study

The study applies the GCH framework to both the quantitative and qualitative datasets, providing a more precise and context-specific analysis of rurality in NZ than previous rural-urban definitions. This approach ensures that findings are relevant to current rural healthcare research and that may more accurately inform healthcare policy and planning for rural communities. Also, by disaggregating data -

by GCH and ethnicity - further exposed inequities, therefore supporting targeted, equity-focused recommendations.

Another strength of the study is the breadth of participants, who represented a wide range of professional roles and contributed local knowledge of geography, transport routes, and infrastructure. This added depth and accuracy to the geographical access data based. By combining quantitative maternal health indicators, including LMC registration patterns with qualitative insights from the maternal health workforce, the study not only identifies disparities but also explores their underlying causes. For example, differences in ultrasound and laboratory and specialist access could be better understood when considered alongside the workforce perspectives on system navigation and service gaps.

Together, these complementary approaches enable a more holistic understanding of maternity care in rural settings and allowed for the development of recommendations that are both evidence-based and grounded in lived realities - outcomes unlikely to be achieved through a single data source alone.

Limitations of the Study

This study uses a mixed methods descriptive design, combining a retrospective quantitative analysis of 2022 maternity service data with a qualitative survey of the maternal health workforce. While both components address similar overarching research aims, they are largely conducted and analysed as parallel strands, with integration occurring mainly during the final interpretation. As discussed by Plano Clark (2019), meaningful mixed methods integration benefits from early and explicit planning of shared constructs, alignment of data sources, and identification of predetermined points of integration throughout the study. The absence of fully embedded integration strategies - such as iterative linking of findings during analysis, use of joint displays, or co-development of quantitative and qualitative instruments - may have limited the depth of synthesis between datasets. As a result, opportunities to generate more nuanced, multi-layered insights into how rurality influences maternity service access, workforce capacity, and maternal health outcomes may have been reduced.

This study has some limitations that should be considered when interpreting the findings. The survey sample was relatively small (n=19) and recruited largely through professional networks, which may limit representativeness and introduce selection bias. While participants included a range of professional roles, the perspectives of certain groups - such as Māori midwives and Pacific providers - may not be fully captured, with none of the participants identifying as Pacific Peoples. The results therefore reflect workforce perspectives and may not reflect or encompass the full range of whānau experiences and priorities.

Data constraints may also limit completeness. The number of births dataset when disaggregated by GCH category showed 56 births (out of 2278) with no domicile code and therefore could not be linked to a meshblock to determine their GCH classification. The reasons for this are undetermined and would require more detailed investigation of the dataset sources. However, given the relatively small number, this is unlikely to have meaningful impact on the overall results or statistical analysis.

Key outcomes, such as maternal mental health, IPV and cultural safety were not captured quantitatively, and some variables - such as, smoking status, and timing of LMC registration - may be under-reported due reliance on the accuracy of collection and coding of the existing data. This was in contrast to the qualitative findings in this study, where it was raised that there is a significant need for services to support these concerns.

The statistical analysis is based on a one-year snapshot (2022) which limits the ability to examine temporal changes or establish causal relationships between rurality, ethnicity and maternity care outcomes. In some subgroup analyses, small sample sizes - particularly for Māori and Pacific Peoples within R2 and R3 areas may have limited statistical power and contribute to non-significant results despite observable patterns. To address these limitations and protect confidentiality in the most remote areas, the difficult decision was made to combine Māori and Pacific Peoples data, as well as to merge Taranaki and Whanganui data. Additionally, due to low numbers, R2 and R3 areas were grouped together in the analysis, potentially obscuring differences between the most remote rural communities.

The generalisability and reproducibility of the results may be limited, as the study focuses on the specific contexts of Taranaki and Whanganui localities, which likely differ from other regions in geography, service models, workforce distribution, and population demographics.

New Research

This is the first study to apply the GCH framework specifically to maternity care in Taranaki and Whanganui, linking geographical access to key services - including laboratories, diagnostic imaging and birthing units - across both urban and rural areas.

Although previous studies suggest the most rural communities experience the greatest disadvantage, novel findings in this study include the strengths-based R2/R3 rural maternity services and workforce that demonstrate high levels of collaboration, collegiality and connectedness across LMC, primary and secondary care. In addition, rural communities of Taranaki and Whanganui have slightly better engagement with LMC registration in the first trimester than U2 areas, rejects the proposed hypothesis of this study that disparities in maternity service delivery are more prevalent for women living in the most rural areas.

This study indicates that hapū māmā living in R1 areas of Taranaki and Whanganui may face the 'worst of both worlds'. These communities experience the same barriers as more remote rural areas - such as long travel distances, limited transport, and workforce shortages - yet miss out on the compensating strengths seen in R2/R3, such as co-located services, strong inter-disciplinary relationships, funded phlebotomy services, and proactive care coordination.

Rather than viewing rural maternity services as needing to reflect urban models, these findings suggest that aspects of high-performing rural services - such as co-location, continuity of care, and strong interdisciplinary relationships - could in fact be scalable and adapted to strengthen maternity care in urban areas.

Recommendations for Policy Makers:

1. Scale the Strengths of R2/R3 Maternity Service Models

Rather than positioning rural maternity service models as aspiring to urban maternity service models, the findings of this research suggest reframing high-performing rural maternity services as scalable models of care for urban areas. Rural maternity services in R2/R3 of Taranaki and Whanganui demonstrate adaptable, relationship-based, and culturally responsive approaches that address geographic, financial, and systemic barriers. Key enablers include co-location of maternity and primary care, strong inter-professional relationships, integrated inter-disciplinary teams with local Iwi partnerships, flexible appointment co-ordination, community-led transport solutions, and targeted workforce development and support.

At the same time, tailored strategies are needed for R1 areas, which the study identifies as experiencing the “worst of both worlds.” Despite being rural, these communities lack many of the compensating strengths seen in R2/R3, such as co-located services or integrated, team-based care. Focused investment in workforce, integrated service design, and after-hours options could help address the unique inequities faced by women in these localities.

2. Improve Geographical Access to Ultrasound and Laboratory Services and Other Antenatal Services

Expand reliable ultrasound and laboratory services in rural areas and co-ordinate appointments to minimise travel. Provide access to portable ultrasound machines, supporting midwives to gain ultrasound training and accreditation, and establish collegial relationships with radiologists to provide clinical oversight. In September 2023, Te Tatau o te Whare Kahu | Midwifery Council endorsed the opportunity for midwives holding current practising certificates to perform ultrasound specific to early pregnancy, if an endorsed education course has been completed and midwives remain engaged in a credentialling programme (Te Tatau o te Whare Kahu, 2023). However, progress has been hindered by lack of NZ based training pathways and limited by the Primary Maternity Services Notice 2021 claiming criteria.

Pilot mobile maternity and diagnostic services, such as, ultrasound, laboratory and antenatal and maternal mental health clinic services to rural areas on a scheduled basis. In addition, invest in Point of Care Testing (POCT) options to reduce the need for travel and transfer by enhancing clinical outcomes through timely intervention. These services would be most valuable in areas of Taihape and Raetīhi where there are no funded laboratory services within reasonable travel distances, shown visually in Figure 1. POCT services could integrate with community hubs or Iwi health services to maximise uptake to reduce disparities.

Formalise cross-district referral protocols for diagnostics, specialist appointments and antenatal care, drawing on evidence in this study of travel time savings when crossing HNZ boundaries. This should include shared booking systems and inter-district agreements at a policy level, alongside local service processes that streamline referrals and reduce administrative pushback. Together, these changes would minimise delays and improve timely, equitable access to care for rural māmā.

3. Sustain Rural Maternity Services: Review the Primary Maternity Services Notice 2021 and Address Rural Midwife Shortages

Protect and invest in rural birthing facilities through stable funding models that account for lower birth volumes, provide ongoing skill maintenance opportunities, and enable flexible workforce arrangements. Recruitment and retention strategies should provide ongoing skill maintenance opportunities, enable flexible workforce arrangements, and ensure adequate remuneration that recognises the additional advocacy and time required to support māmā living rurally.

At the same time, practical and accessible travel support must be strengthened. Amend Section 88, Primary Maternity Notice 2021 and related health policies to remove barriers that currently prevent rural midwives and nurse practitioners from facilitating access to diagnostics and to travel assistance. Eligibility criteria for travel subsidies should be simplified and administrative requirements reduced, ensuring support is timely, consistent, and equitable for rural communities.

For māmā referred to urban centres for specialist ultrasonography, travel subsidies should also recognise midwives as key providers, enabling them to authorise travel assistance and ensure support is support is accessible when needed.

4. Integrate Culturally Appropriate Services into Mainstream Healthcare

Ensure sustained funding for kaupapa Māori antenatal programmes across all regions and invest in the development of Pacific-specific services to address current inequities. Expand culturally safe drop-in centres, such as, Te Whare Piringa as exemplars of whānau-centred care. Prioritise integration of primary care with community-based services to strengthen collaboration, enable better information-sharing, and improve identification of risk and vulnerability, ensuring earlier and more equitable access to social and health supports.

Although there is clear intention and willingness, mainstream structured systems - such as rigid appointment schedules and impersonal referral processes - require meaningful change if the overall service delivery is to better align. Adapting these systems appears more challenging in urban areas than in rural settings, despite efforts to do so.

5. Strengthen Early Engagement and Collaboration between LMCs, Primary Care and Secondary Care

The current model of care - where a single LMC provides continuity of care across pregnancy, labour, birth, and the early postnatal period - may warrant review to better reflect the realities of rural maternity care. Findings from this study suggest that the most rural areas, where collegiality and team-based approaches are strongest, could serve as exemplars of more collaborative models that improve outcomes for māmā and their pēpi.

HNZ and policymakers should invest in initiatives that increase first trimester LMC registration, with a particular focus on Māori and Pacific women in rural areas (R2/R3). This reflects the findings that Māori and Pacific Peoples face lower rates of early engagement and greater barriers to accessing care. Opportunities should also be explored for employment of midwives within primary care teams, drawing on the collegial, team-based approaches evident in R2/R3, to strengthen early risk identification and improve continuity of care.

6. Strengthen Data Systems for Continuity of Care and Evaluate Telehealth's Role

Develop shared digital maternity records that are accessible across LMC, primary care, Iwi providers, and secondary services to support warm handovers and minimise information gaps. Telehealth should complement (rather than replace) in-person midwifery care, but reinstating and expanding virtual specialist consultations - trialled during COVID-19 - could reduce travel and costs for rural māmā. Ensuring rural midwife participation in these consults, alongside improved digital access for rural communities, would make telehealth particularly valuable for short follow-up appointments or for communicating completion of care from specialist services.

These insights directly align with the *New Zealand Rural Health Strategy* (2023), which calls for sustained investment, rural governance representation, and service models designed for rural realities - supporting the case for scaling successful R2/R3 maternity approaches and targeted strategies for R1.

Other Opportunities

Building on the strengths of rural integrated services identified in this study, there is potential to expand capacity and capability through inter-disciplinary teams to address gaps in maternal health, promote earlier LMC registration, and provide timely intervention and education for high-risk hapū māmā. One opportunity is the introduction of dedicated rural maternity navigation roles to co-ordinate appointments, support travel subsidy applications, and guide whānau through health and social services. While this work already occurs where Hauora Māori services are well connected with primary care teams - and where kaiāwhina provide navigation support across a range of health and social services - prioritising navigation roles specifically for early pregnancy and maternity care, in partnership with LMCs embedded in primary care, could help reduce missed care opportunities and improve equitable access in rural communities.

Future Research

Further research is needed to better understand the variation and reasoning for poor engagement with LMCs across GCH areas at a national level. This should examine factors such as personal choice versus midwife availability, the influence of midwife preference, and the role of rurality in shaping these decisions, as well as the impact of these factors on birth outcomes. National and regional comparisons, specifically first trimester LMC registration rates across rural and urban settings, could provide valuable insights into geographic variability of access to early maternity care.

In addition, investigation into gaps in maternal mental health services is also needed - particularly the barriers and enablers for earlier identification and management in rural areas - with specific attention to the experiences of Māori and Pacific women.

Finally, comparative studies of rural maternity units - exploring the strengths of rural maternity services, especially in R2/R3 areas, where primary care services or rural hospital services are connected with primary maternity services and birthing facilities, and where there are differences in service delivery, workforce and employment models, and funding sources - could help identify scalable examples of effective rural maternity care.

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APPENDIX 1: RESEARCH SUMMARY AND CONSENT FORM

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HARC
Health and Research Collaborative

18/10/2024

Research Summary and Consent to participate in this study

Title of Study: *What attributes of rural primary and community care influence maternal health outcomes in Aotearoa New Zealand?*

Background: Health inequities exist within NZ's healthcare system with some evidence that people living in rural areas of NZ experiencing poorer health outcomes when compared to those living in urban regions. There have been no NZ studies that have identified specific characteristics of rural primary and community pregnancy and maternity care.

Aim: We propose there are disparities in health outcomes for pregnant women in rural compared to urban areas of Whanganui, that may also be accentuated for Māori.

Participants: Workforce only e.g. Midwives, Secondary Care Services, Primary Care Services - practice managers and clinicians, Iwi Health Services, NGOs involved with Maternity Care, St. John Ambulance Services.

What is involved?

- You will be asked to participate in a survey or a series of interview questions to explore the features of pregnancy and maternity care.
- Key concepts and ideas, assets or opportunities of services or teamwork captured from the survey will be identified. This forms the basis of the study analysis.

Confidentiality

- All data and information generated throughout this study will be anonymous, de-identified and stored securely.
- Personal identifying information of participants will be minimised, or consent obtained if any possible identification highlighted during the study.

I agree to have my written notes included in the research, for the written narrative.

HARC
Health and Research Collaborative

I agree to be identified by my professional role in this research, I understand that this may make me personally identifiable by profession to those undertaking the research, but that I will not be named in any research reports.

I voluntarily agree to participate in this research.

Signed _____

Date _____

Disclaimer:
I also work in a Clinical Director role for the Whanganui Regional Health Network.

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APPENDIX 2: SURVEY

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HARC
Health and Research Collaborative

Research Survey

Title of Study: *What attributes of rural primary and community care influence maternal health outcomes in Aotearoa New Zealand?*

Participant's professional Role: _____

Participants age (yrs): <26 26-30 31-35 36-40 41-45 46-50 51-55 56-60 61-65 >65
Please circle or highlight

Participants gender: _____ **Participants ethnicity:** __ _____

Practice	**Practice Name: STRHGP**	**Comments: Strengths, Challenges, Opportunities. Other Comments.**
Rurality of pracitce location	e.g. U2/R1/R2/R3	
Km and travel time to ultrasound diagnostics		
Km and travel timeand/or time to laboratory services		
Km and travel time to primary birthing facility		
Km and travel time to secondary birthing unit		

Km and travel time to tertiary birthing unit		
Emergency transport availability e.g. no. of ambulances resourced to area		
Skillset of emergency transport workforce e.g. ICP, EMT		
Air ambulance usage during labour		
Midwife Availability		
Clinician-led antenatal care e.g. LMC or obstetric experience e.g. diploma		
Km and travel time to specialist appointment		
Evidence of use of 'Best Start Māmā' advanced tools (or first pregnancy assessment tools)		
After-hours options for pregnancy and maternity care		

e: admin@harc.org.nz | 190 Wicksteed Street, Whanganui 4501 www.harc.org.nz

Evidence of telehealth or virtual services to access pregancy primary or secondary care		
Evidence of drop-in clinics or home visits		
Evidence of maternal mental health services: primary and secondary		
Evidence of Māori focussed antenatal/pregnancy and parenting education/ whakakura/ wānanga available? Distance to – etc		
Evidence of Pasifika focussed antenatal/parenting and pregnancy education available? Distance to – etc		
Evidence of Other antenatal / pregnancy education available. Distance to – etc		
Evidence of co-located and integrated models of care		

HARC
Health and Research Collaborative

e: admin@harc.org.nz | 190 Wicksteed Street, Whanganui 4501 www.harc.org.nz

APPENDIX 3: HDEC Letter

Tēnā koe Emma

Study title: What attributes of rural primary and community care influence maternal health outcomes in Aotearoa New Zealand?

Your study will not require submission to HDEC, as on the basis of the information you have submitted, it does not appear to be within the scope of HDEC review. This scope is described in section three of the Standard Operating Procedures for Health and Disability Ethics Committees.

After manual assessment by the HDEC advisors, this was determined to be Quality Improvement-related activity. The Data Management Plan and other documentation makes it hard to determine the reach of the research, but the only consenting participants are healthcare providers which is out of scope for HDEC. It is unclear what patient data is being used, and if identifiable patient health information is accessed for quality-improvement related activities, then this is still out of scope for HDEC.

As your study is an Audit or quality improvement related activity it does not require HDEC review as it does not involve the use, collection, or storage of human tissue without consent (paragraph 30 of the Standard Operating Procedures for Health and Disability Ethics Committees).

Please note, your locality may have additional ethical review policies, please check with your locality. **If your study involves a Te Whatu Ora locality, you must contact the local research office before you begin. If your study involves a university or polytechnic, you must contact its institutional ethics committee before you begin.**

If you consider that our advice on your project being out of scope is incorrect please contact us as soon as possible giving reasons for this.

This letter does not constitute ethical approval or endorsement for the activity described in your application, but may be used as evidence that HDEC review is not required for it.

Further information and assistance

Please contact the HDECs Secretariat at hdecs@health.govt.nz or visit our website at www.ethics.health.govt.nz for more information, as well as our General FAQ and Ethics RM FAQ.

Please don't hesitate to contact the HDEC secretariat for further information.

Yours sincerely,

Courtney Parnell

Health and Disability Ethics Committees

hdecs@health.govt.nz

Encl: Appendix A: documents submitted

Appendix A: Documents submitted

Document Type	File Name	Date	Version
Scientific Peer Review	REC ltr Dr Emma Davey		

Document Type	File Name	Date	Version
PIS/CF	Consent form for participants - research project		
Data Management Plan	Digital Data Management Policy		
CV for Coordinating Investigator	Curriculum vitae - 2024		
Protocol	RNZCGP funding Research Protocol		

S1 - value	S2. HumanGamete - value	Screen.StudyType - value	Screen.ActiveParticipants - value	Screen.VulnerableParticipants - value
Yes	No	Observational Study	Consumers of health or disability support services e.g. hospital or community patients, health and disability service users	None of the above

Screen.IdentifiedDisclosure - value	Screen.IdentifiedHealthInfo - value	Screen.ConsentHealthInfo - value	Screen.UseofTissue - value	Screen.TissueUseWithoutConsent - value
No, identifiers will be attached and the data will be deidentified by the research team	Yes	No, participants have not consented to this	No	

Screen.TissueConsent - value	Screen.TissueExemption - value	Screen.TissueFUR - value	Screen.Features.FullPathway - value	Screen.ClassIDevice - value
			None of the above	No

Screen.MastersExempt - value	Screen.Guthrie - value	Screen.Disclaimer - value
No	No	Yes

APPENDIX 4: Contingency Tables and Statistical Analysis

Figure 2. Proportions of All Births by GCH Category and Ethnicity

Contingency Tables

Ethnicity	Rurality			Total
	U2	R1	R2+R3	
Māori/Pacific Peoples	495	114	138	747
non-Māori/Pacific Peoples	990	293	192	1475
Total	1485	407	330	2222

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	15.733	2	< .001
N	2222		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.084

[a] Phi coefficient is only available for 2 by 2 contingency Tables

Figure 3. Proportion of Babies Born at each Birth Centre Type by GCH Category and Ethnicity

Primary Birthing Centre

Contingency Tables

Ethnicity	GCH			Total
	U2	R1	R2+R3	
M/PP	1	3	15	19
non-M/PP	1	6	14	21
Total	2	9	29	40

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.937	2	0.626
N	40		

Note. Continuity correction is available only for 2x2 tables.

Secondary Birthing Centre / Base Hospital

Contingency Tables

Ethnicity	GCH			Total
	U2	R1	R2+R3	
M/PP	413	90	94	597
non-M/PP	834	244	148	1226
Total	1247	334	242	1823

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	9.265	2	0.010
N	1823		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.071

[a] Phi coefficient is only available for 2 by 2 contingency Tables

Other Birthing Centre

Contingency Tables

Ethnicity	GCH			Total
	U2	R1	R2+R3	
M/PP	44	11	18	73
non-M/PP	91	25	18	134
Total	135	36	36	207

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	4.196	2	0.123
N	207		

Note. Continuity correction is available only for 2x2 tables.

Māori and Pacific Peoples Birthing Centre Type across GCH

Contingency Tables

GCH	Birthing Facility			Total
	Base Hospital	Other Location	Primary/Rural hospital	
U2	413	44	1	458
R1	90	11	3	104
R2+R3	94	18	15	127
Total	597	73	19	689

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	53.416	4	< .001
N	689		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Phi-coefficient	NaN
Cramer's V	0.197

[a] Phi coefficient is only available for 2 by 2 contingency Tables

Non-Māori and Non-Pacific Peoples Birthing Centre Type across GCH

Contingency Tables

GCH	Birthing Facility			Total
	Base Hospital	Other Location	Primary/Rural hospital	
R1	244	25	6	275
R2+R3	148	18	14	180
U2	834	91	1	926
Total	1226	134	21	1381

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	60.469	4	< .001
N	1381		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Phi-coefficient	NaN
Cramer's V	0.148

[a] Phi coefficient is only available for 2 by 2 contingency Tables

U2 only

Contingency Tables

Ethnicity	Birthing Facility			Total
	All Other Locations	Local Base Hospital	Local Primary Combined	
M/PP	44	413	1	458
non-M/PP	91	834	1	926
Total	135	1247	2	1384

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.274	2	0.872
N	1384		

Note. Continuity correction is available only for 2x2 tables.

R1 only

Contingency Tables

Ethnicity	Birthing Facility			Total
	All Other Locations	Local Base Hospital	Local Primary Combined	
M/PP	11	90	3	104
non-M/PP	25	244	6	275
Total	36	334	9	379

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.373	2	0.830
N	379		

Note. Continuity correction is available only for 2x2 tables.

R2/R3 only

Contingency Tables

Ethnicity	Birthing Facility			Total
	All Other Locations	Local Base Hospital	Local Primary Combined	
M/PP	18	94	15	127
non-M/PP	18	148	14	180
Total	36	242	29	307

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	3.024	2	0.220
N	307		

Note. Continuity correction is available only for 2x2 tables.

Figure 4. The Proportion of Women Registering with a LMC in each Trimester by GCH and Ethnicity

Māori and Pacific Peoples time of registration with an LMC per Trimester by GCH

Contingency Tables

LMC Reg Rurality	LMC Registration Trimester 1st	2nd	3rd	4th	Total
U2	268	119	81	12	480
R1	75	26	8	4	113
R2+R3	79	24	7	8	118
Total	422	169	96	24	711

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	21.564	6	0.001
N	711		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.123

Non-Māori and Non-Pacific Peoples time of registration with an LMC per Trimester by GCH

Contingency Tables

LMC Reg Rurality	LMC Registration Trimester 1st	2nd	3rd	4th	Total
R1	250	28	5	2	285
R2+R3	140	20	13	2	175
U2	785	87	69	16	957
Total	1175	135	87	20	1417

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	14.698	6	0.023
N	1417		

Note. Continuity correction is available only for 2x2 tables.

Figure 4: First trimester Registration with an LMC by GCH and Ethnicity

Contingency Tables

Ethnicity	rurality			Total
	U2	R1	R2+R3	
Māori/Pacific Peoples	268	75	79	422
non-Māori/Pacific Peoples	785	250	140	1175
Total	1053	325	219	1597

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	12.873	2	0.002
N	1597		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.090

Comparison of Māori and Pacific Peoples with non-Māori and non-Pacific Peoples LMC Registration living in U2

Contingency Tables

Ethnicity	LMC Registration Trimester				Total
	1st Trimester	2nd Trimester	3rd Trimester	4th Trimester	
Māori/Pacific Peoples	268	119	81	12	480
non-Māori/Pacific Peoples	785	87	69	16	957
Total	1053	206	150	28	1437

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	114.633	3	< .001
N	1437		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value
Cramer's V	0.282

Comparison of Māori and Pacific Peoples with non-Māori and non-Pacific Peoples LMC Registration living in R1

Contingency Tables

	LMC Registration Trimester				
Ethnicity	1st Trimester	2nd Trimester	3rd Trimester	4th Trimester	Total
Māori/Pacific Peoples	75	26	8	4	113
non-Māori/Pacific Peoples	250	28	5	2	285
Total	325	54	13	6	398

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	26.231	3	< .001
N	398		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.257

Comparison of Māori and Pacific Peoples with non-Māori and non-Pacific Peoples LMC Registration living in R2/R3

Contingency Tables

	LMC Registration Trimester				
Ethnicity	1st Trimester	2nd Trimester	3rd Trimester	4th Trimester	Total
Māori/Pacific Peoples	79	24	7	8	118
non-Māori/Pacific Peoples	140	20	13	2	175
Total	219	44	20	10	293

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	12.125	3	0.007
N	293		

Note. Continuity correction is available only for 2x2 tables.

Nominal

	Value[a]
Cramer's V	0.203

Figure 5. Proportion of Births < 2500g by GCH and Ethnicity

Māori and Pacific Peoples Birth Weight and Rurality

Contingency Tables

Rurality	Birth Weight <2500g	Birth Weight ≥2500g	Total
U2	32	432	464
R1	14	93	107
R2+R3	12	117	129
Total	58	642	700

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	4.596	2	0.100
N	700		

Note. Continuity correction is available only for 2x2 tables.

Non-Māori and Non-Pacific Peoples Birth Weight and Rurality

Contingency Tables

Rurality	Birth Weight <2500g	Birth Weight ≥2500g	Total
U2	59	877	936
R1	20	258	278
R2+R3	10	173	183
Total	89	1308	1397

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.575	2	0.750
N	1397		

Note. Continuity correction is available only for 2x2 tables.

Birth Weight for Māori and Pacific Peoples vs Non-Māori and Non-Pacific Peoples living in U2 using Numbers

Contingency Tables

Ethnicity	Birth Weight <2500g	Birth Weight ≥2500g	Total
Māori/Pacific Peoples	32	432	464
non-Māori/Pacific Peoples	59	877	936
Total	91	1309	1400

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.180	1	0.672
N	1400		

Birth Weight for Māori and Pacific Peoples vs Non-Māori and Non-Pacific Peoples living in R1 using Numbers

Contingency Tables

Ethnicity	Birth Weight <2500g	Birth Weight ≥2500g	Total
Māori/Pacific Peoples	14	93	107
non-Māori/Pacific Peoples	20	258	278
Total	34	351	385

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	3.329	1	0.068
N	385		

Birth Weight for Māori and Pacific Peoples vs Non-Māori and Non-Pacific Peoples living in R2/R3 using Numbers

Contingency Tables

Ethnicity	Birth Weight <2500g	Birth Weight ≥2500g	Total
Māori/Pacific Peoples	12	117	129
non-Māori/Pacific Peoples	10	173	183
Total	22	290	312

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	1.700	1	0.192
N	312		

Figure 6. Proportion of Births of Gestation <37 weeks by GCH area and Ethnicity

Māori and Pacific Peoples Gestation Week and Rurality

Contingency Tables

Rurality	Gestation Week <37 wks	Gestation Week >37 wks	Total
U2	37	457	494
R1	12	102	114
R2+R3	14	120	134
Total	63	679	742

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	1.905	2	0.386
N	742		

Note. Continuity correction is available only for 2x2 tables.

Non-Māori and Non-Pacific Peoples Gestation Week and Rurality

Contingency Tables

Rurality	Gestation Week		Total
	<37 wks	>37 wks	
U2	66	923	989
R1	19	274	293
R2+R3	13	177	190
Total	98	1374	1472

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.025	2	0.988
N	1472		

Note. Continuity correction is available only for 2x2 tables.

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Gestation week U2

Contingency Tables

Ethnicity	Gestation Week		Total
	<37 weeks	≥37 weeks	
Māori/Pacific Peoples	37	457	494
non-Māori/Pacific Peoples	66	923	989
Total	103	1380	1483

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	0.340	1	0.560
N	1483		

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Gestation week R1

Contingency Tables

Ethnicity	Gestation Week		Total
	<37 weeks	≥37 weeks	
Māori/Pacific Peoples	12	102	114
non-Māori/Pacific Peoples	19	274	293
Total	31	376	407

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	1.905	1	0.167
N	407		

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Gestation week R2/R3

Contingency Tables

Ethnicity	Gestation Week <37 weeks	Gestation Week ≥37 weeks	Total
Māori/Pacific Peoples	14	120	134
non-Māori/Pacific Peoples	13	177	190
Total	27	297	324

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	1.337	1	0.247
N	324		

Figure 7. Smoking status at LMC registration by GCH and Ethnicity

Māori and Pacific Peoples Smoking Status at LMC Registration and Rurality

Contingency Tables

Rurality	Smoking Status Non-smoking	Smoking	Total
U2	385	110	495
R1	79	35	114
R2+R3	106	32	138
Total	570	177	747

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	3.709	2	0.157
N	747		

Note. Continuity correction is available only for 2x2 tables.

Non-Māori and Non-Pacific People Smoking Status at LMC Registration and Rurality

Contingency Tables

Rurality	Smoking Status Non-smoking	Smoking	Total
U2	931	59	990
R1	266	27	293
R2+R3	175	17	192
Total	1372	103	1475

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	4.879	2	0.087
N	1475		

Note. Continuity correction is available only for 2x2 tables.

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking Status at LMC U2

Contingency Tables

Ethnicity	Smoking Status		Total
	Non-smoking	Smoking	
Māori/Pacific Peoples	385	110	495
non-Māori/Pacific Peoples	931	59	990
Total	1316	169	1485

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	86.538	1	< .001
N	1485		

Nominal

	Value
Cramer's V	0.241

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking Status at LMC R1

Contingency Tables

Ethnicity	Smoking Status		Total
	Non-smoking	Smoking	
Māori/Pacific Peoples	79	35	114
non-Māori/Pacific Peoples	266	27	293
Total	345	62	407

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	29.342	1	< .001
N	407		

Nominal

	Value
Cramer's V	0.269

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking Status at LMC R2/R3

Contingency Tables

Ethnicity	Smoking Status		Total
	Non-smoking	Smoking	
Māori/Pacific Peoples	106	32	138
non-Māori/Pacific Peoples	175	17	192
Total	281	49	330

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	13.048	1	< .001
N	330		

Nominal

	Value
Cramer's V	0.199

Figure 8. Smoking Status at 2 weeks post-partum by GCH and Ethnicity

Māori and Pacific Peoples Smoking Status at 2wks Post-Partum and Rurality

Contingency Tables

Rurality	Smoking Status		Total
	Non-smoking	Smoking	
U2	420	75	495
R1	88	26	114
R2+R3	117	21	138
Total	625	122	747

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	4.128	2	0.127
N	747		

Note. Continuity correction is available only for 2x2 tables.

Non-Māori and Non-Pacific People Smoking Status at 2wks Post-Partum and Rurality

Contingency Tables

	Smoking Status		
Rurality	Non-smoking	Smoking	Total
U2	945	45	990
R1	269	24	293
R2+R3	181	11	192
Total	1395	80	1475

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	5.898	2	0.052
N	1475		

Note. Continuity correction is available only for 2x2 tables.

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking 2wks Post-Partum U2

Contingency Tables

	Smoking Status		
Ethnicity	Non-smoking	Smoking	Total
Māori/Pacific Peoples	420	75	495
non-Māori/Pacific Peoples	945	45	990
Total	1365	120	1485

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	49.976	1	< .001
N	1485		

Nominal

	Value
Cramer's V	0.183

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking 2wks Post-Partum R1

Contingency Tables

Ethnicity	Smoking Status		Total
	Non-smoking	Smoking	
Māori/Pacific Peoples	88	26	114
non-Māori/Pacific Peoples	269	24	293
Total	357	50	407

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	16.270	1	< .001
N	407		

Nominal

	Value
Cramer's V	0.200

Māori and Pacific Peoples vs non-Māori and Non-Pacific Peoples Smoking 2wks Post-Partum R2/R3

Contingency Tables

Ethnicity	Smoking Status		Total
	Non-smoking	Smoking	
Māori/Pacific Peoples	117	21	138
non-Māori/Pacific Peoples	181	11	192
Total	298	32	330

Note. Each cell displays the observed counts

Chi-Squared Tests

	Value	df	p
X^2	8.255	1	0.004
N	330		

Nominal

	Value
Cramer's V	0.2410