

Teleclinics for the management of diabetes in pregnancy during COVID-19 —maternal satisfaction and pregnancy outcomes

Asha Shashikumar, Karaponi Okesene-Gafa, Te Hao Apaapa-Timu, Jessica Wilson, Charlotte Oyston

ABSTRACT

AIMS: Diabetes in pregnancy (DiP) rates are increasing worldwide. Pasifika, Indian and Māori peoples have high rates of DiP any improvements in clinical care may be beneficial for these populations. During COVID-19 lockdowns, the DiP service in Counties Manukau Health (CMH) South Auckland switched from face-to-face appointments to teleclinics. This study aims to: determine satisfaction of pregnant people with teleclinics for DiP; compare clinical outcomes and attendance for those receiving care through teleclinics versus standard care; and compare rates of clinic attendance between face-to-face and teleclinic appointments.

METHODS: A standardised questionnaire was completed by those who had attended a teleclinic. The primary outcome was a high score (4–5/5) for satisfaction and future use. A separate, retrospective study of clinical outcomes, and the number of appointments scheduled/attended were compared between all DiP patients who were scheduled an appointment during lockdown, and all of those who were scheduled appointments the year prior.

RESULTS: Of the thirty-five participants who completed the survey (response rate 37%), 89% scored the clinic highly for satisfaction and future use. There were 179 patients scheduled to clinic during the period where teleclinics were the default model of care, and 187 patients scheduled to clinic the year prior. No differences in clinical outcomes were observed. Those receiving care during lockdown were offered more appointments, although attendance rates did not differ.

CONCLUSION: Teleclinics for DiP are acceptable to the people we surveyed, but should be developed further so they better support the needs of those using them.

Diabetes in pregnancy (DiP) describes both gestational (GDM; glucose intolerance first recognised in pregnancy), or pre-existing (type I or II) diabetes. There is a dose-dependent relationship between blood glucose levels and adverse pregnancy outcomes.¹ Accessing timely treatment to normalise blood glucose levels reduces harm to both mothers and babies.^{2–5}

There are increasing rates of DiP internationally.⁶ Within our own service, between 2006 and 2019, rates of GDM have increased from 2.7% to 12.4% of deliveries. With limited resources, there is increasing need to provide efficient, cost-effective care. Telehealth (the use of mobile phones, Bluetooth, web-based systems, email or apps) may provide a way of increasing the capacity of the existing workforce. In CMH South Auckland, telephone clinics were instituted as the default model of DiP care during COVID-19 Level 4 lockdowns.

Evidence suggests telehealth may produce clinical outcomes that are as good as standard care for

DiP, however many studies use platforms for contact and remote monitoring that are not available in Aotearoa. Furthermore, most studies have been performed in East Asia, where different physical and social barriers to accessing antenatal care exist.⁷ DiP disproportionately affects Māori, Pasifika, and Indian ethnicities who also experience high rates of adverse pregnancy outcomes. While research suggests that telehealth may reduce access barriers to care for those with less access to the social determinants of health, there is also a concern that widespread telehealth implementation may increase health disparities due to the lack of in-person interaction, a valued interface for some patients.⁸ There are also technical barriers such as lack of access to internet connection or device unavailability.⁸

We leveraged the situation created by the emergency implementation of teleclinics to provide DiP care during the COVID-19 pandemic to assess the perception of usefulness of teleclinics and the potential impact on pregnancy outcomes and attendance.

Aims

The specific aims of the study were to:

1. Assess consumer's perception of the usefulness, interaction quality and satisfaction with the DiP teleclinics between 25 March to 27 April 2020.
2. Compare the incidence of
 - pre-identified core clinical outcomes⁹ relating to DiP, and
 - attendance rates amongst those who received care in the period where teleclinics were provided, compared to a year earlier.

Additionally, we planned to describe outcomes for people of all ethnicities, as well as by ethnicity for Māori, Pasifika, non-Māori and non-Pasifika.

Methods

Ethical approval was obtained from the Health and Disability Commission Ethics Committee (20/NTB/122/AM02). Locality approval was obtained, and the study registered with the CMH research office (1246).

Description of usual care vs teleclinics during COVID-19 lockdown

Screening and diagnosis for GDM is as per the Aotearoa Ministry of Health Guidelines.¹⁰ Individuals with DiP are referred to a multidisciplinary team (MDT) clinic where care is provided by dietitians, endocrinologists, midwives and obstetricians. DiP clinic visits are scheduled at least every 4 weeks. Fetal growth scans are requested at 28 and 36 weeks' gestation, with additional scans for obstetric indications. Between visits, ongoing support is provided by specialised diabetes midwives who adjust glycaemic medications in consultation with the endocrinologist. Most people under the care of the DiP clinic also continue their routine antenatal visits with their lead maternity carer.

Between 24 March 2020 to 27 April 2020, phone call consultations (teleclinics) became the default model of care, unless the person had type I diabetes, or additional comorbidities necessitating in-person assessment. Patients were asked to send testing records by email or text message prior to the appointment. Ultrasound scans and blood tests were available through the usual providers. Patients were scheduled for appointments and telephoned by clinicians at a prearranged time to discuss results and review management. Diabetes midwives provided ongoing support via email, text, and phone calls.

Figure 1: Modified Telehealth Usability Questionnaire (TUQ) used in this study.

<p>Usefulness:</p> <ol style="list-style-type: none"> 1. The telephone clinic improved my access to healthcare 2. The telephone clinic saved me time travelling to hospital or specialist clinic 3. The telephone clinic provided for my healthcare needs. <p>Interaction quality:</p> <ol style="list-style-type: none"> 4. I could easily talk to the doctor 5. I could hear the doctor clearly. 6. I felt I was able to express myself effectively <p>Satisfaction and future use</p> <ol style="list-style-type: none"> 7. I felt comfortable communicating with the doctor 8. The telephone clinic is an acceptable way to receive diabetes in pregnancy care 9. I would use the telephone clinic again if it were offered 10. Overall I was satisfied with the telephone clinic system <p>Birth experience</p> <ol style="list-style-type: none"> 11. The telephone clinic helped me feel prepared for birth in hospital

Statements are listed in the order asked on the questionnaire. All questions are answered using a 5-point Likert scale: 1 – strongly disagree, through to 5 – strongly agree. The headings indicate different domains; answers to questions within the domain were averaged for each individual to obtain a domain score.

Part 1: Survey of usefulness, interaction quality and satisfaction with teleclinics

Questionnaire modification and development

The Telehealth Usability Questionnaire is a standardised questionnaire used in health research and determined to be a highly valid, reliable, and with good internal consistency as a tool.¹¹ The original questionnaire consisted of 21 questions each with a five-point Likert scale response. We made minor modifications to use in our setting (see supplementary material). The final questionnaire used in this study is summarised in Figure 1. A free-text box was available at the end of the survey for women to enter any feedback.

Inclusion and exclusion criteria, and recruitment

Patients 16 years or over, who had at least one teleclinic for DiP care during the COVID-19 lockdown were asked if they would participate. Those who required use of a translator were excluded. Interested eligible women were contacted by a person not involved in their care. Those who agreed to take part were sent a link to the participant information sheet and electronic consent form (Qualtrics). Following consent, the questionnaire could be completed electronically (Qualtrics), or verbally (by telephone with a research assistant). Ethnicity, type of diabetes and diabetes treatment were recorded for each respondent according to protocols for the health sector.¹⁶ Level 1 categories of prioritised ethnicity were altered to separate, and prioritise, “Indian” above “Other Asian”.

Analysis

The scores of individual questions within each domain were averaged to provide a domain score. Scores for each question and domain were reported with summary statistics. The primary outcome of interest was an average score of 4–5 in the “satisfaction and future use domain”, indicating that the participant was highly satisfied with the teleclinic experience. We calculated that to determine an average score of 4 or more, with 10% precision, we required a sample size of at least 30 participants. Free-text responses were collated and coded using an inductive, data-driven approach. Codes were then organised into potential themes, and candidate themes were reviewed and refined.

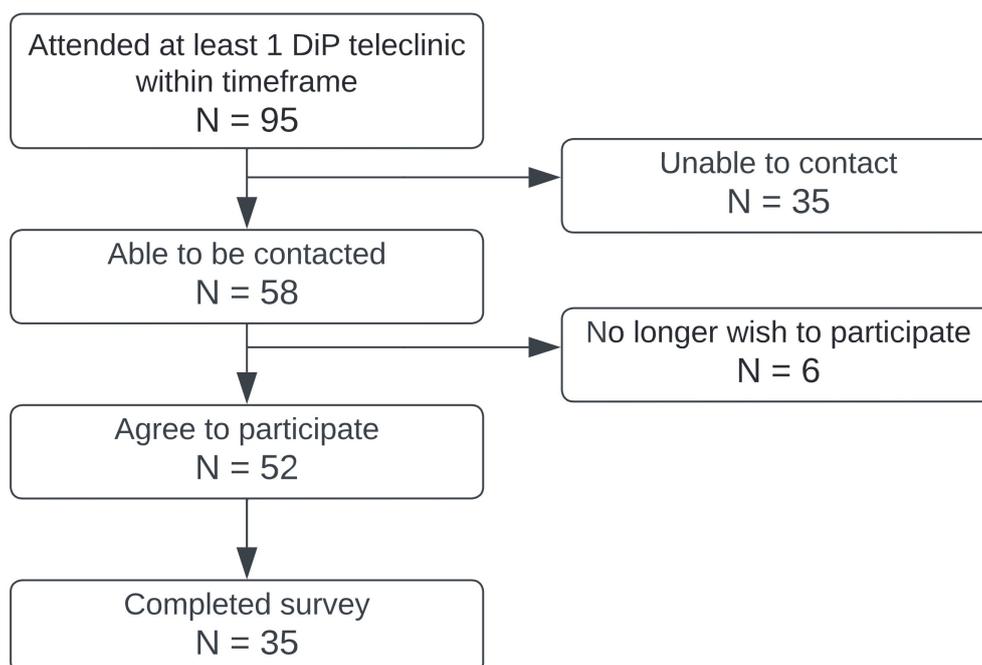
Part 2: Describe and compare clinical pregnancy outcomes and clinic attendance

This was a retrospective observational study quantifying and comparing outcomes in two cohorts of women with singleton pregnancies and DiP, who delivered after 20 weeks’ gestation. The first cohort (teleclinic) included those scheduled to attend a DiP clinic when teleclinics were the default model of care 31 March 2020 to 12 May 2020). While the majority of patients in this cohort were scheduled teleclinic appointments (including those surveyed in aim 1), this group also included a much smaller number of women who attended face-to-face clinics. The second cohort (pre-teleclinic) included those scheduled to attend any DiP clinic over the same period the year prior (31 March 2019 to 12 May 2019) and were solely scheduled face-to-face.

The clinical outcomes of interest were: hypertension (chronic, gestational, preeclampsia), mode of birth (spontaneous vaginal, instrumental vaginal, caesarean), birth outcome (liveborn, stillborn, neonatal death), birthweight (grams), customised birthweight >90th centile, neonatal intensive care admission, neonatal hypoglycaemia. These were used as they are the core outcomes that should be reported for studies on the treatment of gestational diabetes.⁹ We recognised that the study was underpowered to look at rare clinical outcomes; however, it is important to describe clinical outcomes to identify potential impact.

Demographic and outcome data were provided via HealthAlliance. Where data could not be obtained through clinical coding, electronic maternity records were reviewed. The electronic clinical record was reviewed for each woman and the total number of hospital-based appointments offered and attended were counted. Appointments with different team members (e.g., endocrinologists, dieticians, obstetricians) occur in the same session in standard care, and these were counted as a single appointment. Where these appointments with different providers occurred as separate telephone calls they were counted separately for teleclinics, unless they occurred at the same time/day as a single call.

Demographic data and rates of each observed outcome were presented as summary statistics for each study cohort. Categorical variables are expressed as n (%) and continuous variables mean ± standard deviation or median (IQ range). Student’s t-test or Mann–Whitney test were used to compare continuous variables between the two groups,

Figure 2: Study involvement for people who underwent teleclinic consultation for DiP.**Table 1:** Demographic characteristics of participants who completed modified teleclinic usability survey.

Maternal characteristic	n (%) total n=35
Ethnicity	
Māori	3 (9)
Pasifika peoples	9 (26)
Indian	16 (46)
Asian	5 (14)
NZ European/Other	2 (6)
Diabetes type	
Type 1	0 (0)
Type 2	4 (11)
Gestational	31 (89)
Diabetes treatment at birth	
Diet only	10 (29)
Metformin only	12 (34)
Insulin only	6 (17)
Metformin and Insulin	7 (20)

Table 2: Summary of free-text feedback.

Comfort and convenience of consultation method
<p>Respondents referred to being able to remain in the comfort of their homes while speaking to their doctor, which put them at ease during DiP follow-up.</p> <p>“I didn’t have to leave the comfort of my home to discuss my health”.</p> <p>“On phone calls, the doctors were comfortable and understanding to talk to”.</p> <p>Respondents expressed the monetary burden associated with travelling to and from face-to-face appointments was relieved through the utilisation of teleclinics.</p> <p>“[I] saved a lot of gas and money travelling to and from all [my] appointments”.</p>
Care not at the expected standard
<p>Respondents expressed concern about reduced and slower follow up contact, and less support than initially expected.</p> <p>“Someone would contact [me] via phone on a certain date and it didn’t happen”. “Wasn’t enough follow-up”.</p> <p>“Wasn’t much speed regarding help to get [my] blood sugar levels down”.</p> <p>A respondent described having to “make the initial contact” to understand how the blood glucose monitor and insulin pen were used. She used the descriptor of having “resorted to putting all my questions in an email” because she felt that direct contact was not being made appropriately.</p> <p>One respondent said that to some, it may feel like the “phone call is their only choice” to access advice even though it may not be what they anticipate their care to look like in pregnancy.</p> <p>Another said that being taught how to use insulin medication via a YouTube video was:</p> <p>“not my ideal way to be shown”.</p>

and the Chi-squared test to compare categorical variables between two groups; $p < 0.05$ denoted statistical significance.

Results

Part 1: survey

Study involvement is summarised in Figure 2. The total number of participants approached (94) differs from the total number of participants attending clinics in Part 2 (below), as recruitment to the survey was started mid-way through the lockdown period. Of those who agreed to participate at the follow-up phone call our response rate was 67%. All respondents completed by Qualtrics. The characteristics of these respondents are described in Table 1.

The primary outcome (a score of 4 or more in the satisfaction domain) was observed in 89% of participants. Participants rated the teleclinic scores highly in every domain with median scores of 5, correlating to the response of “strongly agree”. Due to the low numbers of women completing the survey, we were not able to analyse by ethnic-

ity as planned. A breakdown of scores given by Māori vs non-Māori is provided in the supplementary material (Appendix 2). A summary of survey responses for Māori vs non-Māori is shown in the supplementary material (Appendix 2), for which there are no differences between the two groups of women. The distribution of score responses from participants for each question, stratified by ethnicity, is included as supplementary material (see Figure S1). We summarised the free text responses into two themes: the comfort and convenience of the consultation method, and that care via teleclinics did not reach the level expected. These are summarised in Table 2.

Part 2: Describe and compare clinical pregnancy outcomes and attendance rates

Between 31 March 20 to 12 May 2020, 179 people had a DiP appointment (telephone *or* face-to-face), and 187 had an appointment (face-to-face only) during the same period the year prior. Baseline characteristics (ethnicity, BMI, parity and treatment type) did not differ between the two time periods (supplementary Table S3). Pasifika peoples (37–45%),

Table 3: Pregnancy, birth, and neonatal outcomes for people who received DiP care in the period where teleclinics were offered, compared to those who received care in the same period the year earlier.

Delivery year		
Outcomes	Pre-teleclinic (2019) n=187	Teleclinic (2020) n=179
Hypertension^a (n, %)	8 (4%)	4 (2%)
Mode of birth (n, %)		
Vaginal	81 (43%)	83 (46%)
Emergency Caesarean	66 (35%)	60 (34%)
Elective Caesarean	24 (13%)	28 (16%)
Assisted vaginal	16 (9%)	8 (4%)
Stillbirth or neonatal death (n, %)	4 (2%)	3 (2%)
Preterm birth (<37 weeks) ^b	24 (13%)	23 (13%)
Gestation at birth (weeks mean ± sd)	37.3 ± (1.8)	37.4 ± (1.4)
Neonatal outcomes^b		
Birthweight (g, mean ± sd)	3389 ± 677	3342 ± 646
Birthweight ≥90th centile ^c (n, %)	47 (26%)	39 (23%)
Neonatal unit admission (n, %)	35 (19%)	37 (21%)
Hypoglycaemia (n, %)	58 (31%)	51 (29%)

^ahypertension includes chronic, gestational and pre-eclampsia. ^b Livebirths only. ^c Birthweight centile customised for maternal height, weight, parity and ethnicity.

Indian (20–30%) and Māori (11–15%) were the most represented ethnic groups. More than two-thirds were from the highest deprivation quintiles, and over half had GDM. A comparison of outcomes for the two time periods is shown in Table 3. Birth outcomes were similar between the two groups. A summary of birth outcomes for Māori vs non-Māori is shown in the supplementary material (Table S4).

Those having care in the period where teleclinics were offered more appointments scheduled than those women the year prior (median (IQ range) of 5 (4–8) appointments compared to 4 (3–7) appointments) ($p < 0.0001$). Non-attendance (either total, or as a proportion of scheduled clinics did not change between the two time periods.

Discussion

With the growing number of pregnancies affected by diabetes, improving access to care is critical for improving health outcomes and achieving health equity for populations underserved by the health system. It is important to determine whether new approaches are acceptable, accessible and provide health benefits for all consumers. We report that in our multi-ethnic population, teleclinics have been an acceptable means of providing care during COVID-19 lockdowns. Most (89%) of our participants were highly satisfied with the clinics, similar to the response seen in other countries.¹² As the first study of teleclinics for obstetric care in Aotearoa, this survey has enabled some insight into the perceived benefits

of teleclinics to our unique population. Participants reported financial and time-saving benefits of not having to travel, as well as physical convenience and comfort of having care provided by telephone. It is possible that these benefits may be more pronounced in a lockdown setting, where people are at home and have more flexibility around attending telephone appointments. Studies outside of the pandemic have also observed high maternal satisfaction and lower pregnancy-related stress with virtual consultations.^{12,13}

Attendance rates at both telephone and face-to-face clinics are a surrogate marker for acceptability and access to care. Teleclinics could potentially increase non-attendance rates where there is limited access to phone, time or space for health consultations, or a preference for face-to-face contact. Although we did not observe a difference in attendance rates, we found more appointments were offered during the period where teleclinics were running. This could be due to appointments with different clinicians being spread over days, or it taking longer to communicate the same information in the absence of non-verbal communication. We did not collect information about duration of consultation, and it is not possible to know from our study about the relative inefficiencies and efficiencies of teleclinics vs standard care, or a preference for having appointments spread out over time. For teleclinics to become a viable option, care, scheduling should be streamlined to minimise any unnecessary appointments.

Some participants rated teleclinics poorly, describing poor quality and speed of information exchange. These concerns appeared to relate to the use of technology for communicating information outside of the consultation. Telemedicine encompassing data transmission, review, analysis and feedback may be time-consuming for providers. While timely communication has the potential to reduce anxiety, if individuals perceive delays or inadequate information they may feel unsupported. Further investigation is required as to how services should be resourced and/or how technology can be used in our population in a way that not only improves health outcomes, but also enables individuals to feel supported and that their concerns are being heard. It may be helpful to develop electronic (email or app-based) communication tools to specifically support the clinic so that there is one easy path for submitting blood sugar results, and non-urgent queries, while allowing patients to see when their results have been received, and receive updates. This would require extra resources to develop and maintain, but if minor queries are addressed

between visits, then clinics can remain focussed on obstetric and diabetic concerns.

It is clear from this study that replacing standard care with teleclinics for DiP will not be appropriate or acceptable for every consultation. Having a choice on type of clinic is important, and there may be elements of care (learning about equipment use or conveying complex information) that are better provided in person. If other providers are considering phone-based clinics, we suggest maintaining flexibility and giving patients the options of what they would prefer for each appointment, and providing a point of contact between visits (such as email or phone). A hybrid model of care has been suggested in other studies where individuals have a preference to have a combination of in-person and telehealth visits.^{12,14}

Clinical pregnancy outcomes relating to DiP

We did not expect to see significant changes in pregnancy birth events between the pre-teleclinic and teleclinic eras, given the small timeframe that teleclinics were the predominant means of care. However, given that the way in which care was provided changed dramatically we believe it is important to report rates of clinical outcomes in case this change had an unexpectedly significant impact on outcomes. Other small studies of DiP teleclinics have not seen significant changes to rates of birth outcomes when teleclinics are offered.¹² Existing meta-analyses have demonstrated improved maternal glycaemic control,^{7,15} pregnancy, and neonatal outcomes.⁷ Outcomes also between those receiving telehealth consultations versus the standard model of care were not significantly altered or worsened.¹⁶

Limitations

The main limitation of our study is the small sample size. For the survey, we attempted to contact every patient who indicated they would participate, however over one-third of patients were unable to be contacted at follow-up, and a further third did not complete the questionnaire. As follow-up contact was made by phone, this may bias the findings of the study towards the views of those who are more likely to favour or feel comfortable with telephone use in a health setting. It has been noted that Māori and Pasifika peoples value face-to-face contact to facilitate better conversation outcomes,¹⁷ which may also affect the quality of responses obtained in the survey. Due to low numbers, the study was underpowered to report scores by ethnicity. Despite the small number surveyed, we believe that our find-

ings are useful and representative—the demographic representation is similar to those who attend our DiP clinics, and a range of positive and negative perceptions of care received was also evident within the individual responses. Our findings may not be generalisable to those who have type I diabetes, complex comorbidities and those who are not comfortable/able to have consultations in English, as these patients were seen face-to-face. This research also used the unique circumstance of lockdown in a global pandemic, and it is unknown whether this context may have influenced how teleclinics were perceived. Also, teleclinics may be perceived differently when work and family responsibilities change back to “normal” outside of lockdown. Further research is needed outside of the pandemic setting to determine if maternal satisfaction and birth outcomes remain unaffected. This study has led to the undertaking of further consumer-focussed

research to find out specifically what parts of care should be face-to-face, and what could continue via telephone to better inform our own service.

Conclusion

The rapid switch to teleclinics for DiP antenatal care provoked by the COVID-19 lockdowns has provided an opportunity to assess an alternative means of providing DiP care. Most patients surveyed reported high levels of overall satisfaction, and pregnancy outcomes appeared to be unchanged. Providing care via teleclinic resulted in more scheduled appointments. However, some women experienced delays in response to their need for information. These areas should be addressed before a wider implementation of teleclinics for DiP especially for Māori, Pasifika and Indian women with high inequities in health outcomes.

COMPETING INTERESTS

Nil.

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AUTHOR INFORMATION

Asha Shashikumar: Year 6 Medical Student,

Department of Obstetrics and Gynaecology, The University of Auckland, New Zealand.

Karaponi Okesene-Gafa: Obstetrician, Women's Health, Middlemore Hospital, Counties Manukau Health; Senior lecturer, Department of Obstetrics and Gynaecology, The University of Auckland, New Zealand.

Te Hao Apaapa-Timu: Māori Research advisor, Counties Manukau; Ko Awatea, Middlemore Hospital, Counties Manukau Health, New Zealand.

Jessica Wilson: Data analyst, Department of Paediatrics: Child and Youth Health, The University of Auckland, New Zealand.

Charlotte Oyston: Obstetrician, Women's Health, Middlemore Hospital, Counties Manukau Health; Senior lecturer, Department of Obstetrics and Gynaecology, The University of Auckland, New Zealand.

CORRESPONDING AUTHOR

Dr Charlotte Oyston: Senior Lecturer, Department of O&G, Faculty of Medicine and Health Sciences, University of Auckland, Private Bag 92019 Auckland Mail Centre Auckland 1142 New Zealand.
E: c.oyston@auckland.ac.nz

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Appendices

Appendix 1: Modification of the TUQ.

Questions specific to videoconferencing or computer technology use (which we did not use) were removed. We replaced the word “telehealth system” with “teleclinic”, and the word “clinician” was replaced with “doctor”. Following feedback from consumers, health professionals and Māori and Pasifika reviewers, we added two further questions: “I could understand the language used by the doctor” (this was included as part of the interaction quality domain), and “the teleclinic helped me feel prepared for birth in hospital” (new category—birth experience). This second question was added as it was recognised that discussion around labour and birth interventions that are more common in women with diabetes (such as induction of labour) may be more limited when not performed face-to-face.

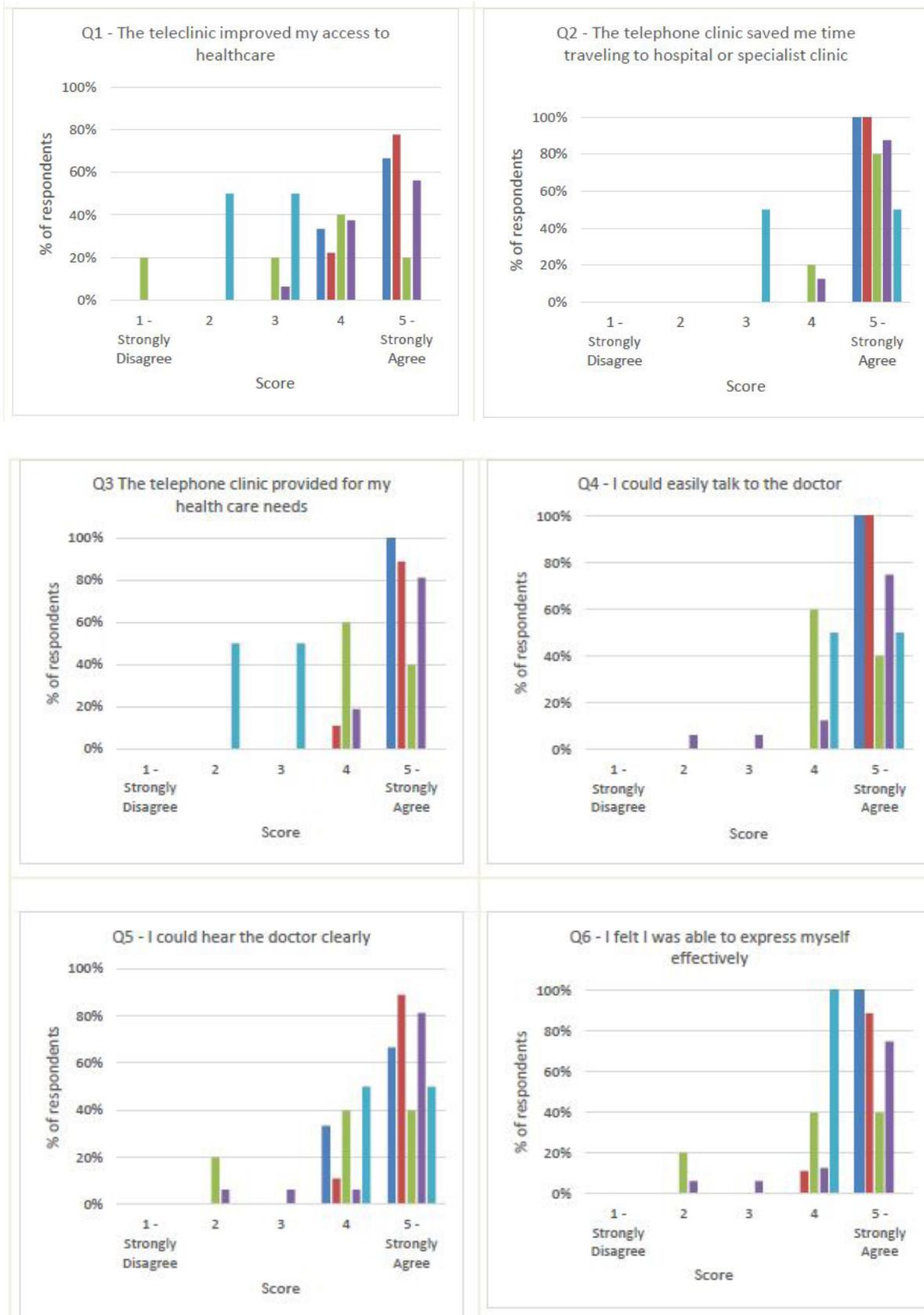
Appendix 2: Proportion of women with primary outcome—Māori and non-Māori.

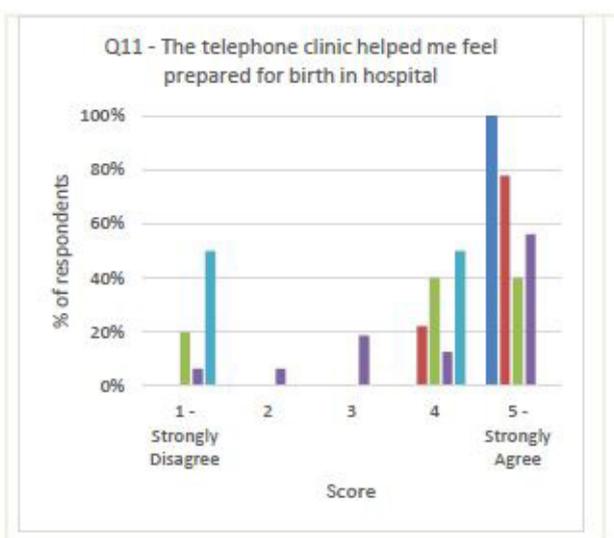
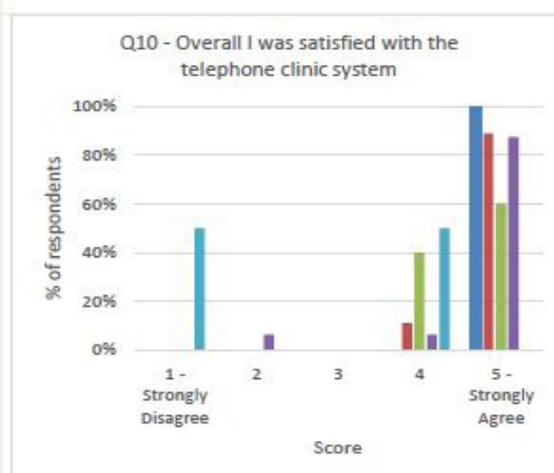
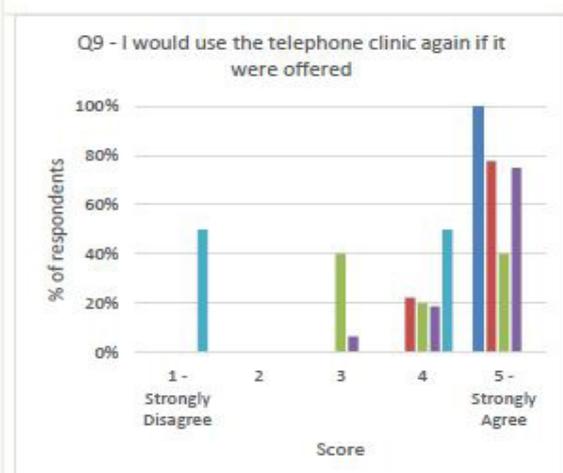
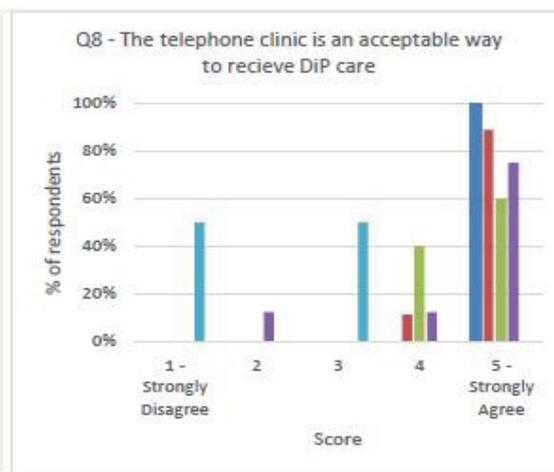
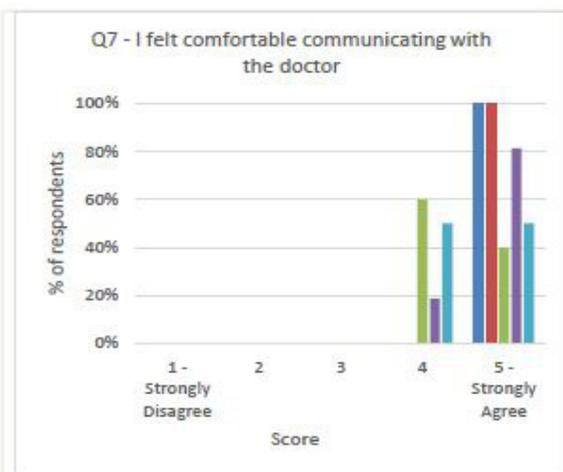
Domain	% Women with average score ≥ 4	
	Māori N=3	non-Māori N=32
Usefulness	100	88
Interaction quality	100	91
Satisfaction and future use	100	88
Birth experience	100	81

Appendix 3: Average survey response per domain—Māori and non-Māori.

Domain/Question	Median score	
	Māori	non-Māori
Usefulness		
Q1	5	5
Q2	5	5
Q3	5	5
Average for domain	5	5
Interaction quality		
Q4	5	5
Q5	5	5
Q6	5	5
Average for domain	5	5
Satisfaction for domain		
Q7	5	5
Q8	5	5
Q9	5	5
Q10	5	5
Average for domain	5	5
Birth experience		
Q11	5	5
Average for domain	5	5

Appendix 4: Survey responses per question of women’s perception of teleclinics for DiP care by ethnicity.





Key	Ethnicity	n=35
	Māori	3
	Pasifika peoples	9
	Asian	5
	Indian	16
	NZ European	2

Appendix 5: Maternal characteristics of women delivering in 2019 vs 2020.

Delivery year			
Maternal characteristics	Pre-teleclinic era n=187	Teleclinic era n=179	P
Maternal age (years, mean \pm sd)	32.3 \pm 5.3	32.1 \pm 5	0.61
Ethnicity (n, %)			
Māori	21 (11%)	27 (15%)	0.19
Pasifika peoples	85 (45%)	66 (37%)	
Indian	38 (20%)	54 (30%)	
Asian	16 (9%)	12 (7%)	
NZ European	24 (13%)	18 (10%)	
Other	3 (2%)	2 (1%)	
Parity (n, %)			
0	69 (37%)	50 (28%)	0.08
1	49 (26%)	64 (36%)	
2+	69 (37%)	65 (36%)	
BMI (kgm ⁻² mean \pm sd)	33.8 \pm 9.1	33.3 \pm 8	0.64
Deprivation quintile 9 or 10 (n, %)			
Yes	120 (64%)	130 (73%)	0.36
No	67 (36%)	49 (27%)	
Type of diabetes (n, %)			
GDM	111 (59%)	116 (65%)	0.55
Type 1	8 (4%)	6 (3%)	
Type 2	68 (36%)	57 (32%)	
Diabetes treatment (n, %)			
Diet	44 (24%)	35 (20%)	0.72
Metformin	47 (25%)	44 (25%)	
Insulin	29 (16%)	34 (19%)	
Metformin and insulin	67 (36%)	66 (37%)	
Pre-existing hypertension (n, %)	6 (3%)	4 (2%)	

Appendix 6: Core outcomes for Māori and non-Māori.

Pre-teleclinic (2019)			Teleclinic (2020)	
Outcomes	Māori n=21	non- Māori n=166	Māori n=27	non-Mā n=152
Hypertension (n, %)	1 (5%)	7 (4%)	0 (0%)	4 (3%)
Mode of birth (n, %)				
Vaginal	11 (52%)	70 (42%)	15 (56%)	68 (45%)
Emergency Caesarean	6 (29%)	60 (36%)	8 (30%)	52 (34%)
Elective Caesarean	3 (14%)	21 (13%)	3 (11%)	25 (16%)
Assisted vaginal	1 (5%)	15 (9%)	1 (4%)	7 (5%)
Stillbirth or neonatal death (n, %)	0 (0%)	4 (2.4%)	1 (4%)	2 (1%)
Preterm birth (<37 weeks ^a) b	3 (14%)	21 (13%)	3 (12%)	20 (13%)
Gestation at birth (weeks mean±sd)	37.3±1.5	37.3±1.8	37.5±1.5	37.4±1.
Neonatal outcomes^b				
Birthweight (g, mean±sd)	3536±521	3370±694	3439±448	3325±6
Birthweight ≥90th centile (n, %)	4 (19%)	43 (27%)	8 (31%)	31 (21%)
Neonatal unit admission (n, %)	7 (33%)	28 (17%)	5 (19%)	32 (21%)
Hypoglycaemia (n, %)	11 (52%)	47 (29%)	6 (23%)	45 (30%)