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A Scoping Review of International Literature on Patient-Provider Satisfaction with Virtual Prenatal Appointments: Recommendations for Canadian Providers

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ABSTRACT

While Canadian telemedicine has grown in popularity following the COVID-19 pandemic, research on patient and provider satisfaction with these services is scarce, especially in its application in prenatal care delivery. Moreover, majority of existing literature focuses on clinical outcomes when investigating prenatal telemedicine's success, leaving a gap in our understanding of patient-provider satisfaction. Literature examining attitudes towards virtual prenatal appointments consistently notes low satisfaction and rarely offers recommendations to improve care. This review aims to investigate determinants of and barriers to patient-provider satisfaction with virtual prenatal appointments and offer recommendations to improve Canadian satisfaction. Searches were run on PubMed and CINAHL using keywords including "prenatal", "virtual", "satisfaction", and "appointment". The retrieved literature was uploaded and screened in Covidence. In total, 43 papers covering virtual prenatal care in jurisdictions outside of Canada were reviewed for data extraction. The literature was summarized alongside six key themes: logistical barriers, non-logistical barriers, patient-provider communication, appointment types, general benefits of telehealth, and suggestions for improvement. Leading determinants were found to be the level of perceived and actual barriers to utilization, quality of patient-provider communication and relationships, and access to devices and internet connectivity. Recommendations for improving satisfaction with Canadian care include cross-border consultations, use of provider care teams, and improved telehealth management and provider training. The focus on international research enabled us to identify what lessons Canadian practitioners can learn from other countries in the provision of virtual prenatal care. This review also contributes to the scarce Canadian research on satisfaction with virtual prenatal appointments.

Telemedicine is the provision of healthcare through synchronous or asynchronous electronic communication via messaging, videoconferencing, or audio devices [1]. In Canada, virtual care has increased in use since the COVID-19 pandemic, amounting to 71% of Canadian primary care visits within the first four months of the pandemic, but research also noted significant provincial and territorial variation in virtual care [1]. Health Canada's 2022 Virtual Care Policy outlines key telemedicine principles for provincial and territorial governments, including goals to provide high quality, appropriate, and safe care, as well as improve the patient and provider experience of care [2]. The National Guidelines on Family-Centered Maternity and Newborn Care highlight the role of telemedicine in improving patient safety, quality of care, and accessibility for rural and remote citizens [3].

Research has found positive relationships between telehealth and clinical outcomes, service efficiency, patient satisfaction, and service utilization [4]. A 2022 study at St. Michael's Hospital in Toronto found that while patients reported greater overall satisfaction from in-person appointments, virtual appointments resulted in higher satisfaction with convenience, privacy, and access [5]. However, the literature calls for further research into these outcomes [4]. While research on virtual care flourished during the COVID-19 pandemic it may not reflect post-pandemic patient-provider preferences. Overall, limited research discusses telehealth use beyond the pandemic [6], and the scant literature that is available on this topic offers inconsistent findings. These discrepancies often relate to utilization, patient-provider relationships, and patient costs [7]. Previous research frequently omitted routine prenatal care, focusing on mobile applications, remote monitoring, and management of comorbidities such as gestational diabetes [6].

A 2022 review of Canadian telemedicine research found a lack of high-quality literature despite reports that Canadian research has significant influence in the field [6]. Literature infrequently measures patient satisfaction with telehealth, with less than one percent of articles containing it as a keyword [6]. Prenatal telehealth is also overlooked in Canadian research, suggesting a notable knowledge gap [6]. Overall, there is a need for an increased breadth in research on telemedicine, including newly implemented services such as speciality care [4].

Perspectives from international literature can offer important lessons for the Canadian telehealth services and aid in improving Canadian patient and provider satisfaction, as per the national guidelines' goals [5]. The purpose of this review is to synthesize findings from the international literature on patient and provider satisfaction with virtual prenatal care. These findings can be used to determine which practices can be applied in Canada to improve the provision of prenatal telemedicine and facilitate satisfaction with virtual services.

Method

This scoping review was conducted following the methodology outlined by Arksey and O'Malley [8]. The five-step framework beginning with the identification of the research question was followed. First, a general review of current literature was conducted to establish gaps, after which databases were selected and studies were filtered using the criteria outlined below (see Figure 1).

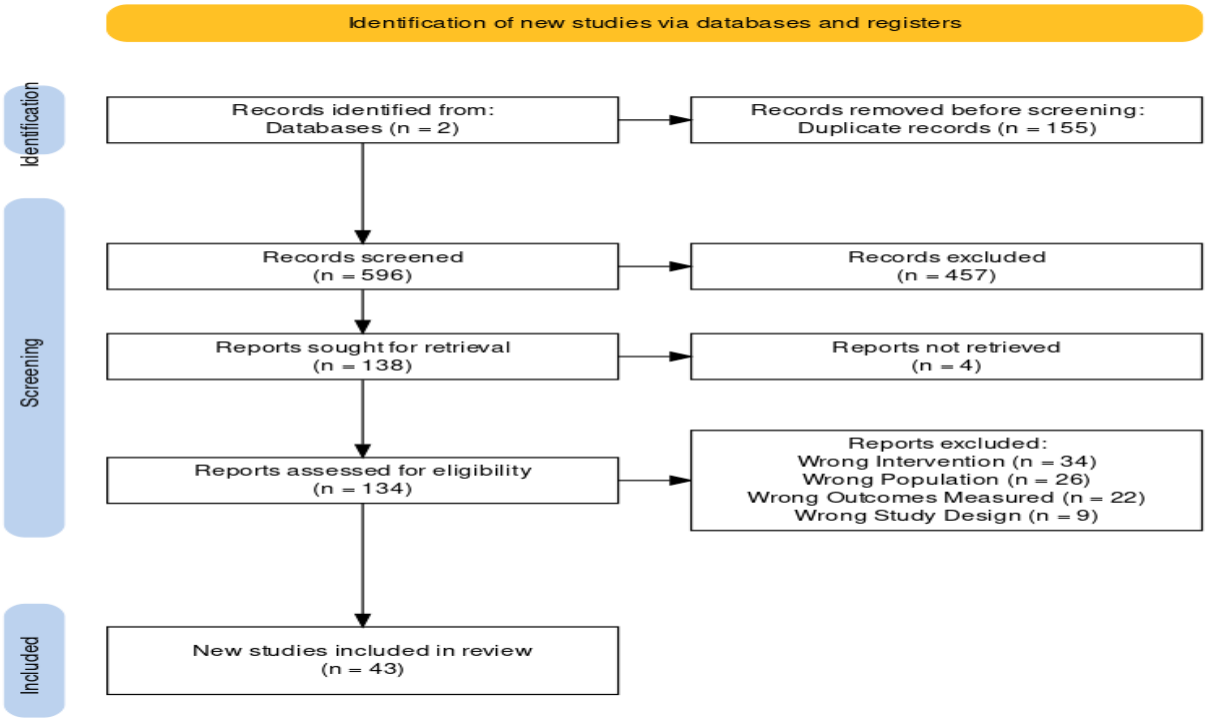
PubMed and CINAHL databases were searched in October 2023 with a string of key terms connected by AND/OR developed with assistance from a research librarian. The following

search string was used on both databases: (pregnancy OR prenatal OR perinatal OR antenatal) AND (telehealth OR virtual OR "video conferencing" OR telemedicine) AND (acceptability OR experience OR interview OR survey OR satisfaction OR perspectives OR questionnaire) AND (appointment OR visit OR consultation OR checkup OR counselling). To ensure applicability due to the ever-changing nature of technology and telemedicine, literature was restricted to publication dates after 2013. The search yielded 751 articles across PubMed (n = 528) and CINAHL (n = 223). Search results were imported into the Covidence program for screening and review; 155 duplicates were removed, and 596 papers were left for screening.

To be included in the review, the papers had to be empirical and focus on prenatal care and patient and/or provider satisfaction. The literature on high-risk pregnancies and comorbidities was excluded as it was hypothesized that the complexity of these treatments requires unique considerations. Similarly, research on obstetric care related to abortions, standard gynecologic care, miscarriages, and maternal mental health was removed from the review. Due to greater use of phone and video appointments in Canada, literature on these appointment styles was included and those on secure messaging or remote monitoring was excluded. With this, papers on mobile applications were excluded if they did not involve video or phone consultations. Since the goal of this review was to explore patient-provider satisfaction, papers containing only medical outcomes were excluded. As per the goal to review international recommendations, studies with primary data collection in Canada were not included. Finally, literature not available in English was excluded.

The PRISMA chart of the review can be seen in Figure 1. The data extraction was done using a Microsoft Excel file, which included information on the year of publication, year of data collection, country, sample, and appointment type. Based on Arksey and O'Malley's methodology to prioritize select aspects of literature, an initial sample of literature was reviewed, and the thematic analysis of the literature was developed based on this initial review [8]. A summary of the literature can be found in Table 1 (See Appendix).

Figure 1. PRISMA Table of literature selection [9].



Results

Study Designs and Demographics

In total, 43 papers were included in this review. The studies were conducted across 12 countries, with majority of research done in the United States (n = 27, 63%), followed by the United Kingdom (n = 3, 7%) and India (n = 3, 7%) (see Figure 2). One study was conducted across world regions, with 64% (n = 675) of participants being from Europe and Central Asia [10]. As seen in Figure 3, 56% (n = 24) of studies used quantitative, 19% (n = 8) used qualitative, and 25% (n = 11) used mixed methods design. Majority of data collection occurred during 2020 (n = 28, 65%) as seen in Figure 4.

Within the analyzed literature 42% (n = 18) used both video and phone appointments, with video technology reported in 26% (n = 11) and phone-based in 16% (n = 7) of papers (see Figure 4). Seven studies (16%) examined synchronous appointments but lacked clarification on how appointments were held. The most represented types of appointment were routine antenatal care (n = 23, 53%), followed by specialist care (n = 7, 16%), and birth preparation classes (n = 2, 5%).

Over half (n = 24, 56%) of the studies focused on patient satisfaction, a quarter (n = 11, 26%) included both patients and providers, and 19% (n = 8) focused solely on providers (see Figure 5). Among the 19 studies investigating provider satisfaction, the most represented providers were physicians (n = 12, 63%), followed by midwives (n = 9, 47%), and nurses (n = 6, 33%). One study explored satisfaction from the perspective of clinic managers.

Figure 2. Literature by country of study.

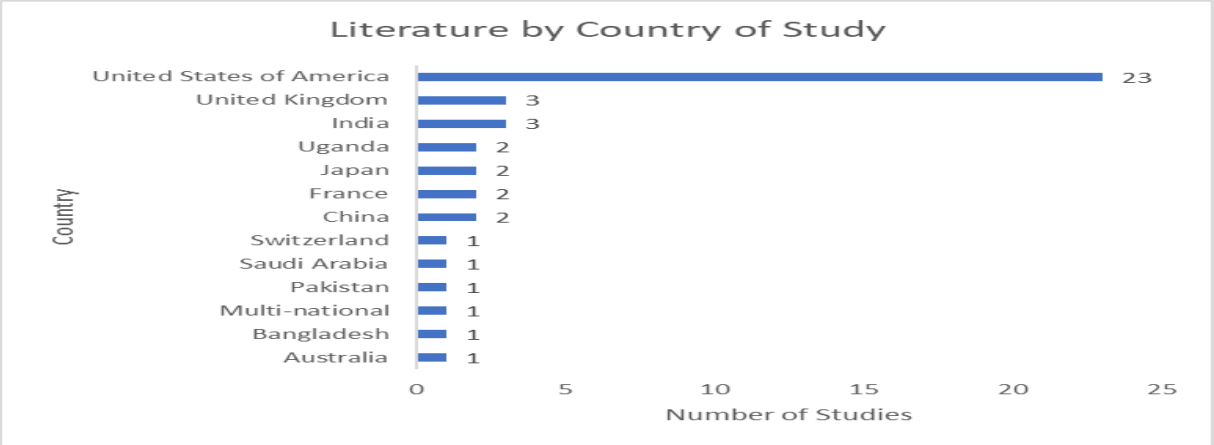


Figure 3. Literature by research method.

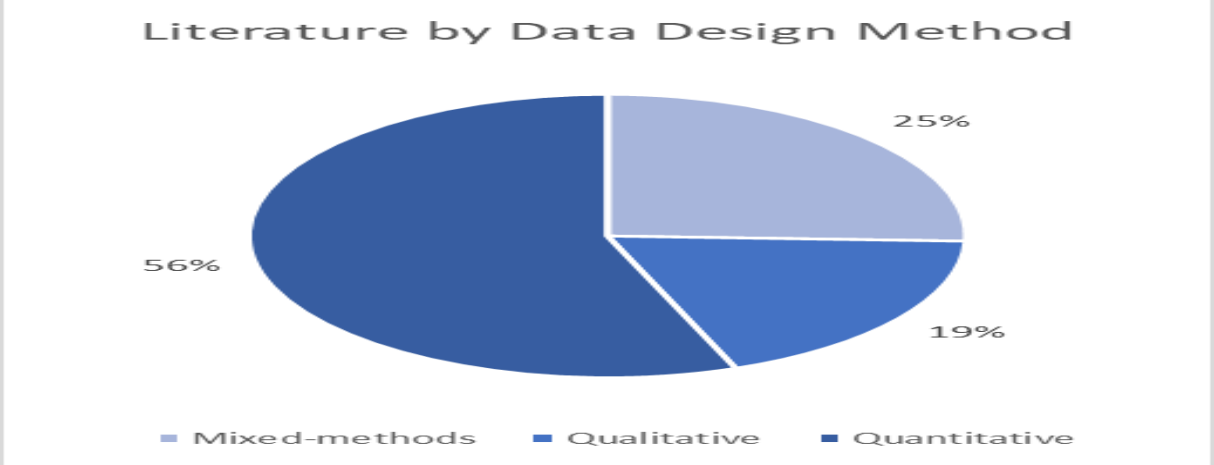


Figure 4. Literature by time of data collection.

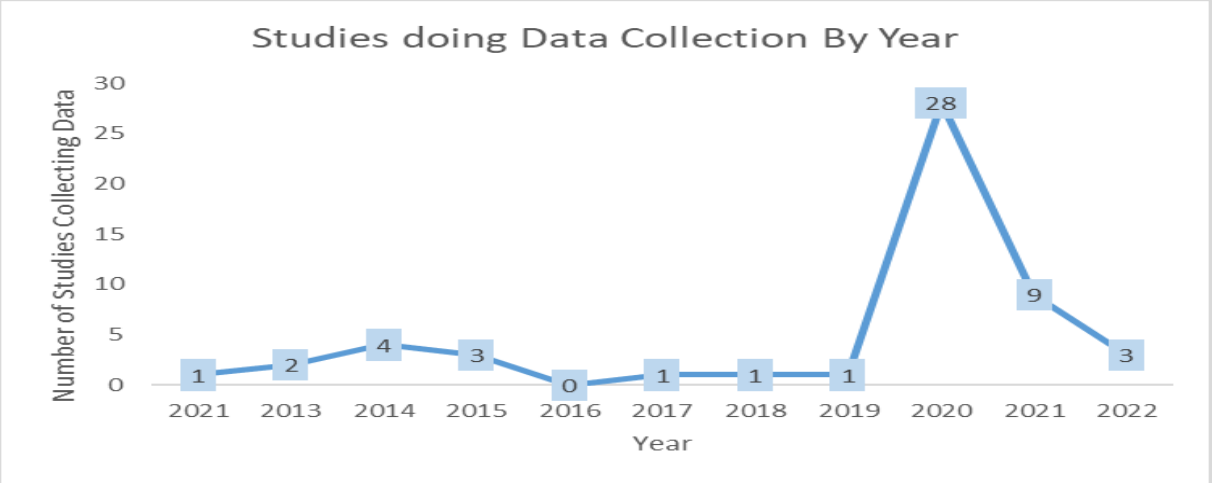


Figure 5. Literature by telehealth modality.

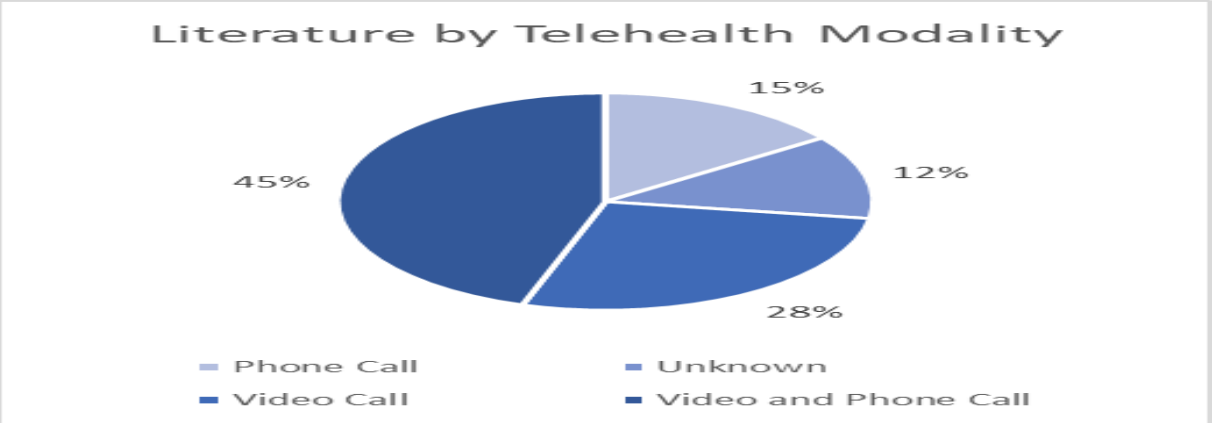
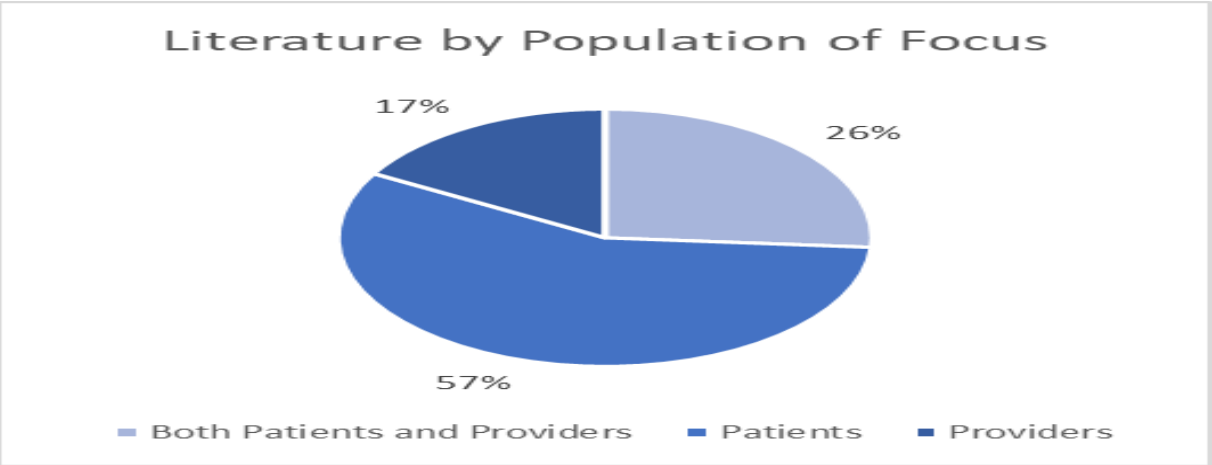


Figure 6. Literature by population of focus.



A summary of the reviewed literature can be found in Table 1 (See Appendix).

Patient and Provider Satisfaction

Fourteen papers (33%) quantitatively identified overall levels of patient and/or provider satisfaction with virtual prenatal care models [11-24]. In three (7%) of these papers less than half of participants reported being satisfied with virtual prenatal care [19, 22, 24]. Contrastingly, in 11 papers (26%) the majority of participants reported being satisfied with this prenatal telehealth [11-18, 20-21, 23]. Most commonly, between 70% to 90% of participants reported positive overall satisfaction (n = 6, 14%) [11-13, 17-18, 21]. In four papers (9%), less than 40% of participants reported being dissatisfied with their virtual prenatal care [13-14, 22, 24]. In total, twelve papers (28%) reported patient willingness to use prenatal telehealth in the future [11-24]. This willingness was often reported by the majority of participants, with less than half of participants being open to future use in two papers (5%) [25-26]. Comparable to overall satisfaction, in most current research between 70% to 90% of participants reporting being open to the use of prenatal telehealth in the future (n = 5, 12%) [12, 27-28, 15, 18].

Reasons for satisfaction were separated into six key themes - logistical barriers, non-logistical barriers, patient-provider communication, differences by appointment type, and benefits of telehealth. Finally, suggestions for the improvement of prenatal telehealth were reported.

Logistical Barriers

A total of 36 papers (84%) were included in this category that focused on barriers impeding patients' or providers' ability to access virtual prenatal appointments. The top cited logistical barriers were related to technology. Literature mentioned internet connection access (n = 11, 26%) [10-13, 29-35], access to the required technology (n = 9, 21%) [11, 31, 12, 13, 32, 35-37] and general technology challenges (n = 9, 21%) [12-13, 30-32, 35, 38-39]. Other barriers included privacy (n = 8, 19%) [33, 35, 38, 40-44], physician reimbursement (n = 4, 9%) [10, 30-31, 35], and language barriers (n = 6, 14%) [10, 13, 31, 33-34, 43]. Patients and providers also noted loss of in-person advantages, such as physical examinations and non-verbal communication (n = 7, 16%) [12, 14, 29, 33, 36, 43-44].

Logistical barriers were also identified in administration domains, such as scheduling and communication (n = 4, 9%) [13, 27, 43, 45], and provider adaptation to telehealth (n = 4, 9%) [13, 27, 43, 45]. Providers also raised concerns regarding increased workload (n = 1, 2%) [46]. Some reported an increase in missed appointments, delays in care, and limited appointment availability (n = 3, 7%) [33, 41, 47]. Medical concerns involved diagnostic inaccuracies (n = 2, 5%) [38, 44], safety of remote monitoring (n = 3, 7%) [10-11, 44], and prescribing medications (n = 1, 2%) [38]. Beyond noting inequity-based barriers (n = 4, 9%) [11, 32, 41, 48], environmental distractions reducing care quality were mentioned in three studies (7%) [36, 40, 43]. Four papers noted no logistical barriers to virtual care (9%) [15, 28, 49, 50].

Non-Logistical Barriers

This theme was used to identify non-physical barriers such as one's comfort navigating the healthcare system and confidence in taking an active role in their care. A total of 20 papers (47%) were included in this thematic category. In 14% (n = 6) of papers, participants disclosed concerns with psychological and emotional wellbeing during virtual care [10, 16, 17, 29, 31]. Health literacy concerns, comfort with asking questions and use of remote monitoring

technology were also discussed (n = 5, 12%) [16, 27, 33, 38, 44]. Digital literacy barriers and lack of knowledge on how to use required technology were highlighted in 7% (n = 3) of studies [10, 18, 31]. Other use-determining variables include education (n = 1, 2%) [41], employment (n = 1, 2%) [18], and ethnicity (n = 1, 2%) [18]. Having previous pregnancies was also related to utilization, due to patient comfort and experience with managing their health while pregnant (n = 2, 5%) [19, 41]. Patients with fewer previous pregnancies frequently reported a desire for traditional pregnancy care with its distinct experiences, such as hearing the heartbeat (n=1, 2%) [19]. Concerns with implementation efforts (n = 1, 2%) [31], patient adaptation (n = 1, 2%) [13], and consistency and accuracy of information shared during appointments (n = 1, 2%) [32] were also noted. This correlates with patient reports of general discomfort (n = 1, 2%) [38] and lack of confidence (n = 1, 2%) [29] in telehealth systems. Contrastingly, two studies reported no negative impacts of health literacy on virtual care utilization during pregnancy (n = 2, 5%) [50-51].

Patient-Provider Communication

Experiences with patient-provider communication were noted in 84% (36) of the studies, involving measures of satisfaction with the relationship shared between patients and providers. Reports were coded into three groups – positive reports, negative reports, and defining variables. The most notable positive report was the ability to establish a personal connection with providers, however, results were inconsistent, with 6 studies (14%) reporting the ability to establish a personal connection [12, 16, 33, 45-46, 50], and 11 (26%) describing care as impersonal [10, 11, 20-21, 25, 32, 36-38, 40, 48]. Positive reports may relate to increased interactions with providers through check in calls (n = 2,5%) [27, 46]. Satisfaction with communication was also inconsistent, with 5 studies (12%) outlining improvements [11,16, 18, 34, 46] and 4 (9%) mentioning errors [10, 20, 37]. Provider attentiveness during appointments was satisfactory in 16% (n = 7) of studies, but in 12% (n = 5) of papers, patients reported feeling rushed or a lack of provider attention during virtual appointments [20, 25, 27, 43, 48]. Compared to one (2%) positive report of patient feelings of reassurance in virtual care [39], two studies (5%) reported negative experiences with physician reassurance [12, 19].

Major factors altering patient-provider relationships were effective communication (n = 3, 7%) [35-36, 41] and non-verbal cues (n = 2, 5%) [36, 40]. Patients reported preference for receiving virtual care from providers they already know (n = 2, 5%) [16, 29]. The importance of a robust relationship (n = 1, 2%) [46] and perceived physician attentiveness during virtual appointments (n = 1, 2%) [27] were also noted. Patients also highlighted the significance of being able to ask questions (n = 1, 2%) [27].

Differences by Appointment Type

A total of 20 papers (47%) reported satisfaction discrepancies between phone, video, and in-person appointments. When comparing telehealth to in-person care, 3 studies (7%) mentioned a preference for in-person [21, 36, 40] and one (2%) noted preference for in-person appointments over video calls [29]. Explanations for in-person preferences were personalized care, confidence in discussing sensitive topics and setting appointment goals (n = 1, 2%) [40]. Another advantage for in-person appointments was better communication (n = 1, 2%) [36]. Two papers (5%) mentioned a general preference for telemedicine [42, 50]. A 2020 study surveying providers found a consensus that providers felt patients see telehealth as an acceptable

alternative to in-person care moving forward (n = 1, 2%) [22]. Comparing forms of telehealth, four studies (9%) showed equal satisfaction with phone and video appointments [32-33, 36, 48] and one paper (2%) reported preferences for video calls [29].

Benefits of Telehealth

The literature included 41 (95%) papers that reported the benefits of telehealth. The most mentioned benefit was reduced travel time, found in 40% (n = 17) of literature [10, 13-14, 19, 21, 28-30, 34-36, 38-40, 48, 50]. Another benefit reported in 37% (n = 16) of the studies was improved access to care for patients living rurally or with reduced mobility [11, 14-16, 28-29, 31, 35-36, 38-40, 45, 47]. Other benefits were protection from COVID-19 (n = 9, 21%) [11, 12, 14, 23, 31-32, 36-37, 48], general convenience (n = 9, 21%) [10, 16, 21, 31, 33, 36, 40, 44, 48], and reduced wait times (n = 10, 23%) [15, 23, 35-36, 38, 43-44, 46, 48-49].

Patient benefits included the ability to have partners and family present at the appointment (n = 4, 9%) [18, 43, 50, 52]. Virtual appointments also improve patient engagement in their care (n = 3, 7%) [11, 42, 46], alignment of care to patient needs (n = 1, 2%) [49], and use of services (n = 3, 7%) [14, 39, 45]. These benefits may be due to increased trust (n = 1, 2%) [33] and comfort in care (n = 2, 5%) [23, 33] expressed by patients. Provider benefits included improved care provision (n = 5, 12%) [14, 24, 31, 36, 50] and deeper provider-provider connections enhancing clinical teamwork (n = 5, 12%) [10, 34, 43, 21, 46]. Literature also mentioned a reduced workload, possibly due to screening to when in-person care is required (n = 4, 9%) [12, 14, 20, 38].

From an administrative standpoint, benefits were cost-effectiveness (n = 7, 16%) [20, 23, 30, 33, 38, 40, 50], appointment efficiency (n = 1, 2%) [33], and emergency preparedness (n = 1, 2%) [34]. Virtual care was also found to have benefits for all parties including ease of communication (n = 4, 9%) [16, 19, 27, 43], scheduling (n = 2, 5%) [10, 12], and appointment flexibility (n = 2, 4%) [33, 42]. Four papers (9%) mentioned an increase in clinical diagnostic and care efficiency [21, 34, 38, 39]. Improved general safety (n = 4, 9%) [21, 18, 38, 40], a reduction in in-person visits, and improved care continuity were also cited (n = 3, 7%) [12-13, 31]. Finally, the ability for consultations across borders was also mentioned to improve access to care in one paper (2%) [38].

Suggestions for Improvement

In total, 86% (n = 37) of the literature included suggestions for improvement of prenatal telehealth that were reported by patients and/or providers. The most cited suggestion was provider training and virtual care management, as identified in 21% (n = 9) of studies [31, 33-35, 37, 40, 46, 15, 24]. In 14% (n = 6) of studies, patients and providers expressed desire for patients to be able to choose their appointment format [11, 21, 25, 28, 29, 43]. Other requests were for a hybrid care model of in-person and virtual appointments throughout the course of prenatal care (n = 2, 5%) [36, 40]. Four studies (9%) mentioned prioritizing continuity of care moving forward [20, 24, 29, 37]. The need for clear liability regulations (n = 1, 2%) [38] may reflect requests for the use of remote monitoring devices (n = 4, 9%) [11, 23, 26, 28], consultation recording [38], automated referrals, and e-prescription services (n = 1, 2%) [23].

Various requests pertained to improved access and availability to care (n = 7, 16%) [10, 16, 25, 32-33, 35, 48] including addressing infrastructural needs (n = 4, 9%) [12-13, 16, 32] and insurance guidelines for coverage and billing (n = 3, 7%) [11, 26, 49]. One paper (2%)

suggested resource assessments at clinics to determine their ability to provide telehealth services [31]. Public health recommendations from 5 papers (12%) focused on patient education through health literacy campaigns and community initiatives [24, 33-35, 40]. Similarly, three papers (7%) desired general technology improvements [16, 24, 28]. Supplementing a call for improved communication (n = 5, 12%) [13, 29, 31, 43, 21], two papers (5%) highlighted the need for sufficient language services [34-35]. Administrative suggestions to change scheduling (n = 4, 9%) [31, 42, 43, 45], customer service (n = 2, 5%) [16, 34], and clinic workflows were also found (n = 1, 2%) [26]. Finally, two studies (5%) advised supplying technology to providers to enable telehealth provision [26, 31].

Discussion

The goal of this paper was to explore patient-provider satisfaction with virtual prenatal appointments to establish recommendations for improving these outcomes in Canada. The results from this review suggest that international populations are satisfied with their current provision of virtual prenatal care. It further found that convenience, accessibility [31], and strong communication and relationships contributed to the overall satisfaction with virtual care for prenatal appointments [16, 19, 27, 43]. Conversely, lack of access to needed technology [11-13, 23-25, 31-32], poor patient-provider communication [35, 36, 41], and poor continuity of care [12-13, 31] were associated with lower satisfaction.

The reviewed international literature may be used to draw some recommendations for the provision of more consistent virtual care in the Canadian context, which points to a lack of consistency in services between providers and jurisdictions. This reflects similarities in experiences with virtual prenatal appointments in Canada and abroad. Akin to Canadian literature, international studies reported benefits of convenience, easy scheduling, and improved accessibility [5, 53]. Areas of concern were connectivity [5, 53] and accessibility of telehealth compatible devices [53]. Reported communication barriers [5, 53] and perceived poor provider attention [53] were also outlined in the literature as key concerns. Comparable findings suggest that implementing global recommendations in Canada may improve satisfaction with care.

Drawing on these findings, several recommendations can be made on how to improve the provision of virtual prenatal care in Canada. Notably, the accessibility of virtual services emerged as one of the key concerns from the literature [53]. This is particularly relevant in the Canadian context where the Canada Health Act serves to establish overarching guidelines for provincial and territorial governing bodies [54]. However, these guidelines vary widely across jurisdictions, altering patients' experiences based on where they live in Canada. One issue affecting systemic accessibility is provincial differences in allowing for out-of-province physicians to provide virtual care [1]. For instance, Nova Scotia allows external clinicians to practice telehealth for its residents and Northwest Territories established temporary allowances during the pandemic [1]. Meanwhile, Quebec requires practicing physicians to be located and licensed in province [1]. No other provinces or territories have policies for these practices [1]. Another accessibility concern pertains to the establishment of private clinics offering telehealth services while charging patients a fee for appointments [1], opposing the Canada Health Act's requirement for reasonable access to health services without financial barriers [54].

The literature also pointed out the importance of addressing communication barriers and weaknesses existing in patient-provider relationships during virtual care [53]. A province-wide British Columbia study on provider experiences with virtual antenatal care found benefits in both access and efficiency, though it also reported issues with connectivity, and concerns about reduced quality of patient-provider connections [53]. Overall, physician satisfaction was concluded as positively associated with prior experience using telehealth services [5].

Provider training/education programs can serve to establish baseline standards of care within telemedicine [15, 24, 31, 33-35, 37, 40, 46]. There are no current reports of Canadian provider education on telemedicine, suggesting that international recommendations for improved management and training of providers are applicable to the Canadian system [15, 24, 31, 33-35, 37, 40, 46]. Establishing this consistency in information may improve provider confidence in administering telemedicine, in turn improving satisfaction. Similarly, patient education programs are recommended [24, 33-35, 40]. Based on Canadian reports of digital [10, 18, 31] and health literacy barriers impacting the adoption of virtual prenatal care [16, 27, 33, 38, 44] education campaigns are advisable. Education should therefore be used to provide all Canadians with equitable access to prenatal virtual care. In addition, educating patients on what to expect when receiving virtual care will improve satisfaction with the care received and enable confident health-decision making [24, 33-35, 40].

In response to calls for improved patient-provider relationships and consistency in care, it is also recommended to establish interdisciplinary care teams that collaborate to provide virtual prenatal care throughout pregnancy [10, 21, 34, 43, 46]. One study in British Columbia noted the advantages of the current tripartite model of care, where individuals work with a care team, explaining the benefits of connections between family physicians/midwives, the patient, and specialists during appointments [53]. Providers expressed positive feedback for the tripartite model's ability to validate care plans rather than rely on patients' recall [53]. This suggests that international findings with reported benefits for continuation of care [12-13, 31], and improved connections between providers [10, 21, 34, 43, 46] are relevant in a Canadian context. As a result, Canadian policy may consider assigning patient care to a multidisciplinary group of providers [46]. These virtual care teams can improve connectivity between both patients and providers, as well as between providers managing a patient's health. In addition, collaboration between providers may promote consistent care strategies and advancements in care.

Finally, the establishment of cross-Canada virtual prenatal care provision may support continuity of care and strong patient-provider relationships [20, 24, 29, 37]. These programs have shown increased access to care, benefitting residents of regions with insufficient prenatal care providers [38]. This structure of care would also allow for patients who have moved within Canada to continue care with their original practitioner across provincial borders. This would improve relationships and satisfaction with care. However, according to the Federation of Medical Regulatory Authorities of Canada, this currently may not be possible [55]. This framework outlines that providers must have a physical clinic or arrangement with a clinic located within reasonable travel of their patients [55]. Further policy guidelines may be required to determine if cross-border care would be an adequate reason for referring a patient to another facility upon requiring/requesting an in-person appointment [55]. Refinement of Canadian federal and provincial/territorial virtual prenatal care policies is needed to assess how implementation may improve access to care.

Limitations

Some limitations of this review include the exclusion of non-English papers given the review's focus on international literature. Additionally, consistent with the scoping review approach, the current review does not include an assessment of the quality of included literature. This can result in conclusions from papers of different quality being weighted equally. The generalizability of the conclusions of this paper is another limitation, as the findings were drawn from various international studies and did not include considerations of the unique context of the health care in which the studies were conducted. Finally, the reviewed literature included papers with various methodologies and sample sizes, and the robustness of the analyses was not reflected in the summary of the findings shared in this review.

Conclusion

Canadian literature suggests that improvements in the provision of antenatal care can increase patient and provider satisfaction. However, a lack of satisfaction-focused literature leaves Canadian policy makers without recommendations from the users of the system. Current international literature on the topic shows general overall satisfaction with virtual prenatal care. As a result, international literature on prenatal telemedicine can be used to draw insights into patient experiences and potential areas for improvement. Policymakers may investigate the implementation of patient and provider education and training on virtual care models, the use of interdisciplinary care teams within telehealth, and cross-border consultations to improve accessibility to and quality of prenatal care, especially in rural and remote communities. Overall, further research is required to determine the true applicability of these findings within Canada and how they may improve prenatal care.

Declarations

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Not applicable.

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Appendix

Table 1. Overview of reviewed literature.

Title	Authors	Country of Study	Year of Data Collection	Method	Data Collection Method	Population	Key Findings
A double-edged sword-telemedicine for maternal care during COVID-19: findings from a global mixed-methods study of healthcare providers.	Galle et al., 2021	Multi-national	2020	Empirical – Mixed-methods	Survey - Online	Providers (n=1060)	Telemedicine was used by over half of providers. Many reported challenges in 5 main themes - infrastructure, monitoring, financial/language barriers, patient-provider relationship, and patient distrust.
Acceptability of virtual prenatal care: thinking beyond the pandemic.	Sullivan et al., 2022	United States of America	2020	Empirical - Quantitative	Feedback form	Patients (n=100)	Virtual prenatal care is acceptable to patients, and the majority would like to incorporate it into future post-pandemic pregnancy care. Preferences differ by race with more White women reporting preference for future use.
Addressing Disparities in Prenatal Care via Telehealth During COVID-19: Prenatal Satisfaction Survey in East Harlem.	Futterman et al., 2021	United States of America	2020	Empirical - Quantitative	Survey - Telephone	Patients (n=104)	Telehealth was useful in achieving comparable patient perceived satisfactory care among Hispanic patients. Telehealth allowed for continued care during the pandemic with no impact on patient satisfaction.
Application of telemedicine video visits in a maternal-fetal medicine practice at the epicenter of the COVID-19 pandemic.	Touzour et al., 2021	United States of America	2020	Empirical - Quantitative	Survey - Online or Telephone	Patients and Providers (n=165)	Majority of patients and providers were satisfied with provision, expressing desire for virtual appointment options in the future. Appointment satisfaction was primarily affected by digital experience, perceived lack of need for physical contact, perceived saved travel time, and access to providers.
Beyond COVID-19: Prospect of telemedicine for obstetrics patients in Pakistan.	Sulaman et al., 2022	Pakistan	2019-2020	Empirical - Quantitative	Survey - phone	Patients (n=132)	Majority intend to use telemedicine in future. Those lacking interest in future use of telemedicine, nearly two-third felt in-person visit was more satisfying, needed physical examination, or experienced long waiting time. Barriers with payment and technology access were also mentioned.

Characteristics of online medical care consultation for pregnant women during the COVID-19 outbreak: cross-sectional study.	Chen et al., 2020	China	2020	Empirical - Quantitative	Survey - Online	Patients (n=2599)	Pregnant women had high levels of satisfaction with online obstetric consultations and deemed it highly acceptable during the COVID-19 pandemic.
Effects of the COVID-19 Pandemic and Telehealth on Antenatal Screening and Services, Including for Mental Health and Domestic Violence: An Australian Mixed-Methods Study.	Henry et al., 2022	Australia	2020 - 2021	Empirical – Mixed-methods	Survey - online Interview - online	Providers (n=126)	Half felt telehealth should continue post-pandemic, but not for all visits. Telehealth was deemed suitable for low-risk and multiparous women and unsuitable for high-risk pregnancy, non-English speaking, and/or mental health/psychosocial/domestic and family violence concerns.
Evaluating the level of patient satisfaction with telehealth antenatal care during the COVID-19 pandemic at King Abdul-Aziz Medical City, Primary Health Care Center, Specialized Polyclinic.	Wali, Alhakami & Alsafari, 2022	Saudi Arabia	2020	Empirical - Quantitative	Survey - Online	Patients (n=279)	High levels of satisfaction were found with antenatal phone clinics during the pandemic. This satisfaction showed differences based on education, occupation, husband's occupation, and other socioeconomic factors.
Evaluation of Telehealth Use in Prenatal Care for Patient and Provider Satisfaction: A Step Toward Reducing Barriers to Care.	Nelson, Gretchen & Holschuh, 2021	United States of America	Unknown	Empirical - Quantitative	Survey - Online	Patients and Providers (n=290)	Positive experience for both patients and providers in telehealth visits for prenatal care. Patients demonstrated the ability to learn new skills through remote monitoring. Patients of diverse backgrounds accepted alternative care settings and trust in providers was kept.
Experiences of using the toll-free telephone line to access maternal and newborn health services in central Uganda: a qualitative study.	Mwase et al., 2020	Uganda	Unknown	Empirical - Qualitative	focus group discussions (FGDs)	Patients and Providers (n=77)	The TFL service faced obstacle of unanswered calls, language differences, poor connectivity/network, and misuse/abuse. Overall, TFL enhanced health worker and community relations and facilitated timely referrals and relaying of health advice.

How midwives implemented teleconsultations during the COVID-19 health crisis: a mixed-methods study.	Rosseau et al., 2022	France	2020	Empirical – Mixed-methods	Survey - online Interviews - online	Providers (n=1513)	Midwives adopted telemedicine for patient access, continuity of care, maintaining professional activity, and infection risk reduction. Majority were satisfied and see teleconsultation as an excellent complementary tool for care and support.
Impact of Telehealth on the Delivery of Prenatal Care During the COVID-19 Pandemic: Mixed Methods Study of the Barriers and Opportunities to Improve Health Care Communication in Discussions About Pregnancy and Prenatal Genetic Testing.	Craighead et al., 2022	United States of America	2021	Empirical – Mixed-methods	Interview - phone Survey - online (after telephone interview was completed)	Patients (n=60)	All women felt very well supported by their provider, however over half were moderately to highly concerned about their child's health. Participants felt in-person visits were more personal and built better patient-provider relationships. They felt they could achieve a greater dialogue and ask more questions regarding time-sensitive information during an in-person visit.
Implementation and Impact of a Maternal-Fetal Medicine Telemedicine Program.	Leighton et al., 2019	United States of America	2012-2015	Empirical - Quantitative	Electronic Health Records	Patients (n=6757)	Telemedicine and in-person patients experienced similar outcomes. Telemedicine may be a suitable option in the future, with majority of patients being satisfied.
Implementing Telehealth in Practice.	American College of Obstetricians and Gynecologists., 2020	United States of America	NA	Non-Empirical	NA	Providers	Effective implementation is recommended through physician technology readiness, resource assessments, legal compliance, and insurance considerations. The American College of Obstetricians and Gynecologists recommends familiarity with telehealth, adherence to licensing, and emphasizing the patient-physician relationship.
Improving prenatal care during lockdown: Comparing telehealth and in-person care for low-risk pregnant women in the	Avercenc et al., 2022	France	2020	Empirical – Mixed-methods	Survey	Patients (n=84)	Telehealth and in-person care appeared to provide equal and good-quality prenatal care during the COVID-19 pandemic regardless of social deprivation or health literacy levels

PROTECT pilot study.							
Increasing the Connectivity and Autonomy of RNs with Low-Risk Obstetric Patients: Findings of a study exploring the use of a new prenatal care model.	Baron et al., 2018	United States of America	2014-2015	Empirical - Qualitative	Interviews - In Person and Focus Groups - Online	Patients and Providers (n=64)	The Connected Care Model results in increased patient satisfaction and improved autonomy for RNs. Results showed improved nurse-patient relationships, and adjustments to the model may improve CNM-patient relationships.
Midwife-led pandemic telemedicine services for maternal health and gender-based violence screening in Bangladesh: an implementation research case study.	Islam et al., 2023	Bangladesh	2021	Empirical – Mixed-methods	Interviews - Phone and Focus Groups - In Person	Patients and Providers (n=18)	Midwife led telemedicine is an effective approach to increasing maternity service utilization and care in low-income settings. There was a significant increase in women receiving routine and emergency maternity care.
Midwives' perception of advantages of health care at a distance during the COVID-19 pandemic in Switzerland.	Gemperle et al., 2022	Switzerland	2020	Empirical - Quantitative	Survey - Online	Providers (n=630)	Midwives saw six main motives for healthcare at a distance. Differences between perceived advantages and disadvantages vary based on age, professional experience, and workplace traits.
Obstetric Teleconsultation by Using Mobile Phone Technology in COVID Pandemic.	Sharma et al., 2023	India	2020	Empirical – Mixed-methods	Survey - Online	Patients and Providers (n=206)	Most of the obstetricians felt that they were able to satisfy the pregnant women and rated the teleconsultation satisfactory. Obstetrics telemedicine found to be beneficial for providing routine care and making specialized care accessible during COVID-19 pandemic.
Outcomes of teleconsultation services and patient satisfaction among pregnant women delivering at a tertiary care center in South India during coronavirus disease 2019 pandemic.	Devi et al., 2022	India	2020	Empirical - Quantitative	Survey - Telephone	Patients (n=355)	Half of patients were satisfied with prenatal telehealth overall, but majority were happy about travel savings. Patients reported some influencing factors related to technology and appointment management.

Outpatient maternity care and telemedicine use perceptions in the COVID-19 pandemic: a 2020 CERA survey.	Foster et al., 2022	United States of America	2020	Empirical - Quantitative	Survey - Online	Providers (n=290)	Anticipated use of telehealth in maternity care was associated with increased clinician satisfaction and perceived patient satisfaction. Clinicians reporting higher levels of use also reported greater satisfaction and perceived patient satisfaction.
Patient and Professional Experiences With Virtual Antenatal Clinics During the COVID-19 Pandemic in a UK Tertiary Obstetric Hospital: Questionnaire Study.	Quinn et al., 2021	UK	2020	Empirical - Quantitative	Patients: Questionnaire - phone Providers: Survey - online	Patients and Providers (n=185)	Most women rated their telehealth experience as good or very good, however just over half prefer in-person appointments. Majority of providers felt telehealth was comparable to or better than in person. Almost all providers felt virtual care should be used long-term.
Patient and provider perspectives of a new prenatal care model introduced in response to the coronavirus disease 2019 pandemic.	Peahl et al., 2021	United States of America	2020	Empirical - Quantitative	Survey - Online	Patients and Providers (n=330)	Most patients and almost all providers reported that virtual visits improved access to care. More than half of respondents believed that virtual visits were safe. Nearly all believed that home blood pressure cuffs were important for virtual visits.
Patient Experience with Telehealth Medicine During the Ongoing COVID-19 Pandemic in New York City.	Aquino et al., 2023	United States of America	2020-2021	Empirical - Quantitative	Survey - Online	Patients (n=483)	Obstetric patients were less likely to feel satisfied with and opt in to telehealth visits when compared with gynecologic patients.
Patient Perception of Telemedicine in Maternal-Fetal Medicine.	Gillenwater et al., 2023	United States of America	2022	Empirical - Quantitaiv e	Survey - Online or Paper	Patients (n=327)	Use of telemedicine is positively perceived and doesn't reduce patient satisfaction. Major factors influencing perceived satisfaction included physician attentiveness and technology comfort.
Patient Satisfaction with Virtual Obstetric Care.	Pflugeisen & Mou, 2017	United States of America	2013-2015	Empirical - Quantitative	Survey - mail	Patients (n=171)	Satisfaction was higher in those receiving virtual care. They were not significantly impacted by using videoconferencing, Doppler, and blood pressure monitoring technology. Virtual care was more favourable among women who already have children over those pregnant for the first time.

Patient Satisfaction with Virtual-Based Prenatal Care: Implications after the COVID-19 Pandemic.	Liu et al., 2021	United States of America	2020	Empirical - Quantitative	Survey - Online	Patients (n=416)	Pregnant women were generally satisfied with virtual prenatal care but would prefer in-person appointments.
Perceptions and Challenges of Telehealth Obstetric Clinics Among Pregnant Women in Hong Kong: Cross-Sectional Questionnaire Study.	Cheung et al., 2023	China	2021-2022	Empirical - Quantitative	Survey - Online or Paper	Patients (n=664)	Participants preferred in person consultations over telehealth. However, they indicated comfort in using telehealth for appointments not requiring physical contact or examination. Improvement of comfort with telehealth could occur through the implementation of stricter laws and guidelines.
Perinatal Telehealth: Meeting Patients Where They Are.	Kissler et al., 2023	United States of America	2021 - 2022	Empirical - Qualitative	Interview - online	Patients and Providers (n=31)	Provides expressed concerns about technology access and equity, but patients reported positive experiences. Tit is important to address disparities, support patients with language barriers and technical limitations, and change policy to support accessibility.
Prenatal telemedicine during COVID-19: patterns of use and barriers to access.	Morgan et al., 2022	United States of America	Unknown	Empirical – Quantitative	Survey - Online	Patients (n=164)	Participants would recommend telemedicine to a friend. However, access to virtual care is not equally distributed. Policymakers and must address issues of access to technology and connectivity to avoid adding to maternal health disparities.
Quality and satisfaction with care following changes to the structure of obstetric care during the COVID-19 pandemic in a safety-net hospital in Georgia: Results from a mixed-methods study.	Stanhope at el., 2022	United States of America	2020-2021	Empirical – Mixed-methods	Survey - Online	Patients (n=67)	Patients reported high quality for both in person and phone-based visits. Provider communication was the main determinant of quality. Participants prefer in-person visits but are willing to do phone visits in the future.
Quality of prenatal and postpartum telehealth visits during COVID-19 and	Marshall et al., 2023	United States of America	2020-2021	Empirical - Quantitative	survey	Patients (n=1047)	Two-thirds expressed a preference for in-person visits in the future. Overall, respondents reported high levels of telehealth quality, and those with better

preferences for future care.							telehealth experiences were more likely to express openness to telehealth in the future.
Rapid introduction of virtual consultation in a hospital-based Consultant-led Antenatal Clinic to minimise exposure of pregnant women to COVID-19.	Tavener et al., 2022	UK	2020	Empirical – Mixed-methods	Patients: Survey - Online Providers: Forums	Patients and Providers	Efficiencies in clinic consultation time were achieved through only using time for result discussion and development of management plans.
Reasons for Not Pursuing Virtual Prenatal Care in 2020 Through 2021 and Policy Implications.	Lee & Manalew, 2023	United States of America	2020-2021	Empirical - Quantitative	Survey - Telephone or Paper	Patients (n=11829)	There are significant differences in barriers to accessing virtual prenatal care related to education and socioeconomic status. This proves exacerbation of current underserved populations.
Satisfaction can co-exist with hesitation: qualitative analysis of acceptability of telemedicine among multi-lingual patients in a safety-net healthcare system during the COVID-19 pandemic.	Nguyen et al., 2022	United States of America	2020	Empirical - Qualitative	Survey - phone Interview - phone	Patients (n=25)	Most participants felt telemedicine visits fulfilled their medical needs and were convenient. However, most still preferred in-person visits, with concern that visits relied on patients' access to telemedicine and ability to manage their own health.
Satisfaction of a new telephone consultation service for prenatal and postnatal health care.	Kobayashi & Sado, 2019	Japan	2017-2018	Empirical - Quantitative	Survey - mail	Patients (n=26)	Over half of participants agreed or strongly agreed with patient-centered care, communication and information, technical quality, efficiency, access, and convenience, and willing to use the service again. This study provided evidence of satisfaction with telephone or social networking service by nurse specialists in Japan.
Society for Maternal-Fetal Medicine Special Statement: Telemedicine in obstetrics-quality and safety considerations.	Healy et al., 2023	United States of America	NA	Non-Empirical	NA	Providers	Telemedicine has benefits but it must be determined how it impacts the quality domains of care.

Statewide assessment of telehealth use for obstetrical care during the COVID-19 pandemic.	Mallampati et al., 2023	United States of America	2020	Empirical - Quantitative	Survey - Online	Providers (n=98)	Increase in use of telehealth with the onset of the pandemic, but this did not vary by location. Providers reported needing help with patient access to telehealth technologies for continued implementation.
Survey of attitudes of individuals who underwent remote prenatal check-ups and consultations in response to the COVID-19 pandemic.	Nakagawa et al., 2021	Japan	2020	Empirical - Qualitative	Survey - mail	Patients (n=64)	Less than half of women felt equal or greater satisfaction with telemedicine. If not for COVID-19, few individuals expressed a desire for telemedicine, with less demand observed among primiparous women than multiparous women. The level of satisfaction was lower for telemedicine than face-to-face consultations.
Telehealth Uptake into Prenatal Care and Provider Attitudes during the COVID-19 Pandemic in New York City: A Quantitative and Qualitative Analysis.	Madden et al., 2020	United States of America	2020	Empirical – Mixed-methods	Survey- Online and Interview - Online	Providers (n=36)	Major factors related to care uptake and satisfaction included operational considerations and patient factors.
Telemedicine for Women's Health During COVID-19 Pandemic in India: A Short Commentary and Important Practice Points for Obstetricians and Gynaecologists.	Bindra, 2020	India	2020	Non-Empirical	(blank)	Patients	Telemedicine was particularly useful for managing non-emergency cases and low-risk pregnancies. A triage pathway was designed to identify urgent and emergent cases and minimize the need for in-person consultations. It also helped reduce the risk of exposure for during the pandemic.
Use of mobile phone consultations during home visits by Community Health Workers for maternal and newborn care: community experiences from Masindi and Kiryandongo districts, Uganda.	Mangwi et al., 2015	Uganda	2013-2014	Empirical - Qualitative	Interviews and Group Discussions	Patients and Providers (n=87)	Home visits and phone consultations improved access to appointments and information, while reducing costs and improving access to referrals. Phone consultations reinforced VHT knowledge and improved their recognition within the community.

Use of Telehealth During the COVID-19 Pandemic Among Practicing Maternal-Fetal Medicine Clinicians.	Guendelman et al., 2023	United States of America	Unknown	Empirical - Quantitative	Survey - Online	Providers (n=373)	There is widespread use of live video obstetric care by MFM clinicians and continued interest in use post- pandemic. Frequent users were more likely to strongly agree that virtual services are excellent and had a more positive attitude towards telehealth.
Virtual prenatal visits associated with high measures of patient experience and satisfaction among average-risk patients: a prospective cohort study.	Bruno et al., 2023	United States of America	2019-2020	Empirical – Mixed-methods	Surveys - Online Interviews - Online	Patients (n=183)	Most agreed that their virtual appointment was as good as in-person and would make another virtual appointment. Data noted ease of access, comparable communication, confidence in care, and positive remote monitoring experiences. Interviews emphasized interspersing telemedicine with in-person prenatal encounters.
Women's experiences of maternity service reconfiguration during the COVID-19 pandemic: A qualitative investigation.	Silverio et al., 2021	UK	2020	Empirical - Qualitative	Interview - online	Patients (n=23)	Women reported mixed views on the reduction in scheduled in-person appointments. Increases in remote care, especially via telephone, was not well endorsed. They reported an under-reliance on healthcare professionals for support, rather turning to family.
The Early Care Model for Initiation of Perinatal Care: "I Actually Felt Listened To".	Augur et al., 2022	United States of America	Unknown	Empirical - Qualitative	Unknown	Patients	The Early Care Model has six key strengths - initiation time, visit format, financial support, options counselling, assessment and referral, and education.