Accepted: 19 October 2023

DOI: 10.1111/1471-0528.17704

BJOG An International Journal of Obstetrics and Gynaecology

RESEARCH ARTICLE

Global impacts of COVID-19 pandemic on sexual and reproductive health services: An international comparative study on primary care from the INTRePID Consortium

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Funding information
The Rathlyn Foundation

Abstract

Objective: To understand how the COVID-19 pandemic has impacted sexual and reproductive health (SRH) visits.

Design: An ecological study comparing SRH services volume in different countries before and after the onset of the COVID-19 pandemic.

Setting: Seven countries from the **INT**ernational Conso**R**tium of **P**rimary Care B**I**g **D**ata Researchers (INTRePID) across four continents.

Population: Over 3.8 million SRH visits to primary care physicians in Australia, China, Canada, Norway, Singapore, Sweden and the USA.

Methods: Difference in average SRH monthly visits before and during the pandemic, with negative binomial regression modelling to compare predicted and observed number of visits during the pandemic for SRH visits.

Main outcome measures: Monthly number of visits to primary care physicians from 2018 to 2021.

Results: During the pandemic, the average volume of monthly SRH visits increased in Canada (15.6%, 99% CI 8.1–23.0%) where virtual care was pronounced. China, Singapore, Sweden and the USA experienced a decline (−56.5%, 99% CI −74.5 to −38.5%; −22.7%, 99% CI −38.8 to −6.5%; −19.4%, 99% CI −28.3 to −10.6%; and −22.7%, 99% CI −38.8 to −6.5%, respectively); while Australia and Norway showed insignificant changes (6.5%, 99% CI −0.7 to −13.8% and 1.7%, 99% CI −6.4 to −9.8%). The countries that maintained (Australia, Norway) or surpassed (Canada) pre-pandemic visit rates had the greatest use of virtual care.
Conclusions: In-person SRH visits to primary care decreased during the pandemic. Virtual care seemed to counterbalance that decline. Although cervical cancer screening appeared insensitive to virtual care, strategies such as incorporating self-collected samples for HPV testing may provide a solution in a future pandemic.

KEYWORDS
COVID-19 pandemic, sexual and reproductive health

1 | INTRODUCTION

The coronavirus disease (COVID-19) has caused serious disruption worldwide. Three years into the pandemic, over 750 million cases have been confirmed, resulting in more than 6 million deaths.[1] Health services have been adversely affected, including primary care services. A previous study from the INTernational ConsoRtium of Primary Care BIg Data Researchers (INTRePID), consisting of primary care researchers from 9 different countries, have found a global-wide decrease in in-person primary care visits, with varying degrees of transitioning to virtual care in different countries to compensate for these changes.[2]

Sexual and reproductive health (SRH) services are one of the essential primary care pillars that aim to promote, protect, and maintain the physical, emotional and social well-being of individuals in relation to their SRH needs. These services are designed to provide information, education and counselling to help individuals make informed decisions about their SRH, as well as to prevent and manage conditions that affect the reproductive system.[3] Previous studies have identified SRH services as particularly vulnerable to the pandemic, being severely affected by supply chain issues, clinic closures, movement restrictions and lack of personal protective equipment, staff and policy support.[4,5] However, the quality and quantity of evidence is limited, being comprised largely of surveys and interviews rather than directly assessing actual health service utilisation. Thus far, no international comparative study has been conducted to examine quantitatively the impacts of the COVID-19 pandemic on SRH services.

The COVID-19 pandemic has transformed the delivery of care from in-person to virtual for better allocation of resources and prevention of viral transmission.[6] Despite serving as an efficient communication tool to increase service availability, the application of virtual care in primary healthcare settings still faces several challenges, including safety concerns, limitations on physical examinations and regulatory barriers.[7–9] Understanding the impact of the COVID-19 pandemic on the universal access and utilisation of primary care SRH services may guide policy makers and healthcare providers in emergency preparedness planning and implementation.

Leveraging the established platform of INTRePID formed by global primary care researchers,[10,11] the aim of this study is to compare the number of visits in primary care for SRH before and during the COVID-19 pandemic in seven countries on four continents.

2 | METHODS

2.1 | Data collection

Data from seven INTRePID countries (Australia, Canada, China, Norway, Singapore, Sweden and the USA) were used to summarise the monthly visit volume from January 2018 to December 2021 for SRH services. Data sources from each country varied from large national datasets to regional or health system datasets. While not necessarily fully representative of the entire country population, the data represent typical primary care settings in each country.[12] Data were extracted and aggregated individually in each country before being submitted for comparative analysis centrally. Information on age, sex and ethnicity was not available in the data.

We grouped SRH common reasons for visits into six categories: pregnancy and puerperium; menstrual cycle and menopause-related problems; genitourinary conditions; breast problems; contraception management; and cervical cancer screening (including PAP smear and HPV testing). These are SRH visits commonly seen and managed in primary care under Codes W and X of the International Classification of Primary Care (ICPC)-2 or equivalent codes in the International Classification of Diseases (ICD)-10, SNOMED CT diagnosis coding system, or Ontario Health Insurance Plan (OHIP) diagnosis coding system (Tables S1–S6).

Cervical cancer screening data were not available in China, Singapore or Sweden. In Canada and Norway, where

HPV tests, if done, are typically done on PAP smear samples. Thus, data on cervical cancer screening are equivalent to data on PAP smears. In the USA, cervical cancer screening data included procedure codes for PAP smears, as well as reason for visits codes for HPV screening. If two codes from each category were recorded or billed for the same person within 3 months, only one was counted and the other was removed to prevent duplication for the same visit. Based on the National Cervical Screening Program in Australia, HPV testing with clinician-collected samples replaced traditional PAP smears starting 1 December 2017, and the self-collection of samples for HPV testing was expanded from under-screened or never-screened women[13] to all women aged 25–74 years with a cervix in July 2022.[14] As such, cervical cancer screening data in Australia, for our study period, represents HPV testing and not the traditional PAP smears. Additionally, no contraception services were provided in our sample from China.

To provide context on the role of primary care in the delivery of SRH care, we surveyed our INTRePID primary care physicians on the scope of practice in primary care as it relates to SRH, using a five-point Likert scale similar to that developed by Huston et al.[15]

2.2 | Measurement

The primary outcome measures were monthly number of visits to primary care physicians for total SRH visits and by each of the six SRH categories in each country during the pre-pandemic and pandemic periods. The global pandemic was declared by the World Health Organization (WHO) on 11 March 2020, and a state of emergency was issued within the month by all the included countries except China.[16] We therefore excluded March 2020 from the analysis as a transition period and used April 2020 as the starting data point of the pandemic for these countries. For China, February 2020 was used as the starting data point of the pandemic period, as a state of emergency was declared on 23 January 2020. No transition period was considered for China. As a result, in all countries except China, the pre-pandemic period was defined as January 2018 to February 2020 (26 months), with the pandemic period defined as April 2020 to December 2021 (21 months). For China, these were defined as January 2018 to January 2020 (25 months) and February 2020 to December 2021 (23 months), respectively.

Secondary outcome measures included monthly visits by modality of care (in-person or virtual) for graphical visualisation of the distribution of SRH visits.

2.3 | Statistical analysis

We calculated absolute and relative differences in the mean number of SRH visits to primary care services for each country before and after the onset of the pandemic.

Pre-pandemic monthly visit volume was used to predict monthly visit volume in the pandemic period by fitting a negative binomial regression model to the pre-pandemic data, with time as the main predictor.

To account for potential seasonality or cycle in the data, sine and cosine functions of periods 6 and 12 were included in the regression model. Residuals were modelled using an autoregressive AR (1) process to adjust for serial correlation in the data. On a need basis, dummy variables were used to account for sharp peaks or troughs in specific months for individual countries. Differences between predicted and observed number of visits for each of the SRH categories were calculated for each month of the pandemic period. To correct for multiple comparisons, we reported results at the 99% confidence level and consider $P < 0.01$ statistically significant. As a measure of clinical significance, we calculated percentage change between observed and predicted and used a cut-off of 10% to indicate a relevant change, and changes over 30% were considered substantive according to the clinical judgement of INTRePID primary care physicians. All analyses were conducted with SAS 9.4.

2.4 | Patient and public involvement

Due to the highly technical nature of methodology in this study, neither patients nor the public were involved in the design of the study. However, members of the North American Primary Care Research Group (NAPCRG) Patient and Clinician Engagement group (PaCE), comprised of international community members, patients and practising clinicians, reviewed the paper.[17] PaCE group members confirmed the findings of the study were of public interest and several changes in descriptions and reporting were made to the final paper based on their feedback.

2.5 | Patient consent for publication

Not applicable.

3 | RESULTS

We analysed a total of 3 869 074 visits to primary care physicians for SRH services. Overall, INTRePID countries experienced a drop in the number of monthly visits for SRH services in the first month of the pandemic period, except in China, where the pandemic was declared 2 months earlier. The drop was largest in Singapore and the USA compared with other countries (Figure 1). When comparing pandemic and pre-pandemic periods, the average number of monthly SRH visits increased in Canada. China, Singapore, Sweden and the USA experienced a decrease, and Australia and Norway showed insignificant changes (Table 1).

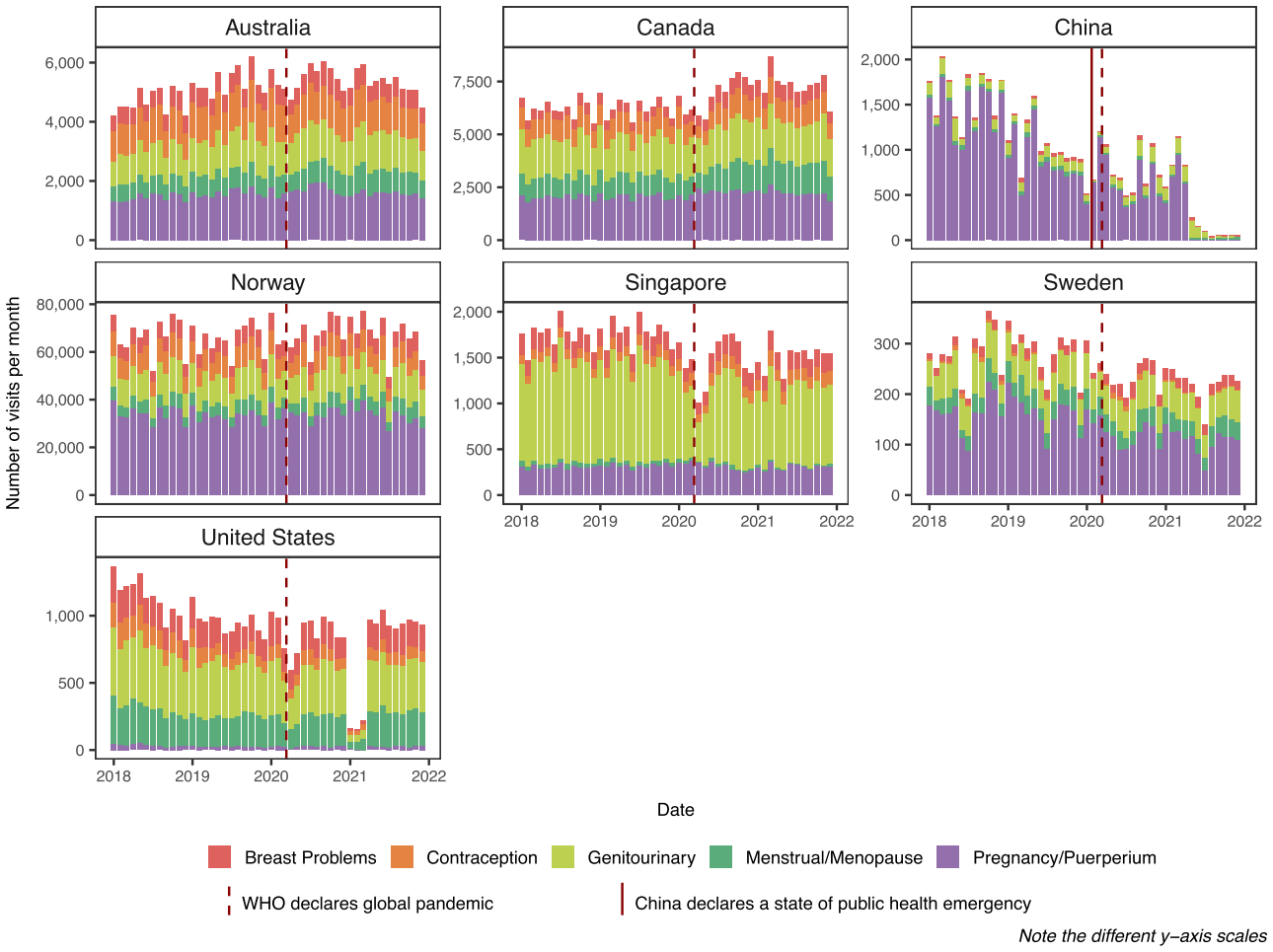

FIGURE 1 Changes in sexual and reproductive health visits to primary care before and during the pandemic by category.

TABLE 1 Difference between pre-pandemic and pandemic total sexual and reproductive health visits in INTRePID countries.

	Pre-pandemic period[a]		Pandemic period[b]		Change in monthly means between pandemic and pre-pandemic periods	
	Total SRH visits	Monthly SRH visits	Total SRH visits	Monthly SRH visits	Absolute mean change	Relative change
Country	*n*	Mean (SD)	*n*	Mean (SD)	*N* (99% CI)	% (99% CI)
Australia	131 264	5049 (525)	112 961	5379 (409)	330 (−20, 681)	6.5 (−0.7, 13.8)
Canada	162 323	6243 (438)	151 502	7214 (693)	971 (523, 1419)	15.6 (8.1, 23.0)
China	32 774	1311 (410)	6507	813 (284)	−741 (−1044, −438)	−56.5 (−74.5, −38.5)
Norway	1 723 823	66 301 (6957)	1 415 573	67 408 (7158)	1107 (−4235, 6450)	1.7% (−6.4, 9.8)
Singapore	45 139	1736 (154)	31 492	1500 (204)	−234 (−408, −61)	−22.7 (−38.8, −6.5)
Sweden	7311	281 (46)	4757	227 (29)	−55 (−83, −26)	−19.4 (−28.3, −10.6)
USA	26 867	1033 (148)	16 781	799 (279)	−234 (−408, −61)	−22.7 (−38.8, −6.5)

[a]The pre-pandemic period was defined as January 2018 to February 2020 (26 months) in all countries except China. For China, it was defined as January 2018 to January 2020 (25 months).

[b]The pandemic period was defined as April 2020 to December 2021 (21 months) in all countries except China. For China, it was defined as February 2020 to December 2021 (23 months).

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3.1 | Changes of visits for six categories of SRH services in INTRePID countries

For each individual SRH service, the patterns varied by different countries and service types. Statistical significance in the differences between observed and predicted volume of visits aligned with a clinically significant difference ≥10%.

For pregnancy and puerperium services (Figure 2A, Table S7), actual services in Australia, Singapore and Sweden tended to be under what were predicted, whereas in Canada, Norway and the USA they were more frequent than predicted based on pre-pandemic service volume. In China, visits dropped significantly from May 2021 to the end of the study period.

Concerning menstrual and menopause problems (Figure 2B, Table S8), Canada and Norway each had an initial drop in April 2020, but all quickly returned to normalcy within a few months. In Canada, the visits rose substantially and stayed higher than predicted from June 2020 to the end of the study period. China and Singapore were the most affected countries where visits were lower than predicted for most of the time during the pandemic period. In Australia, Norway, Sweden and the USA, the decline was only observed in ≤6 months of the 21 pandemic months.

Regarding genitourinary problems (Figure 2C, Table S9), an initial reduction in service volume was seen in all INTRePID countries, but visit volume recovered in Canada, China, Norway, Sweden and the USA. In Australia, it was below what was predicted for most of the pandemic (14/21 months) and in Singapore it did not recover until the second half of 2021. A second drop was observed in the USA between January and March 2021. Contrarily, Canada had a greater number of visits than predicted during 10/21 pandemic months.

For breast problems (Figure 2D, Table S10), visit volume in China was substantially lower than predicted for most of the pandemic period (20/23 months). Australia also experienced a drop during 7 of the 21 pandemic months. Contrarily, in Canada, visits were significantly higher than predicted for the majority of the pandemic period (19/21 months). Norway showed no significant decline, and visits were higher than predicted during 5 of the pandemic months. Despite a few significant drops observed in Singapore, Sweden and the USA, overall, these countries maintained their SRH visit volume at that predicted for the majority of the pandemic period.

Considering contraceptive management services (Figure 2E, Table S11), Australia was the most affected country, where visits remained below that predicted through the entire pandemic period. Canada showed a decline in the first 3 months, but the number of volume visits recovered in the following months. In Norway and Singapore, visits were below that predicted in only 4 of the 21 pandemic months. Conversely, in Sweden and the USA, visits exceeded what was predicted during the pandemic period.

Regarding cervical cancer screening (Figure 2F, Table S12), all INTRePID countries with data for comparison witnessed significant reductions in the number of monthly visits immediately at the onset of the pandemic. Whereas Norway recovered the level of provision of this service 2 months later, it took Canada 5 months to recover, experiencing a second drop in January and February 2021. Cervical cancer screening visits were particularly affected in

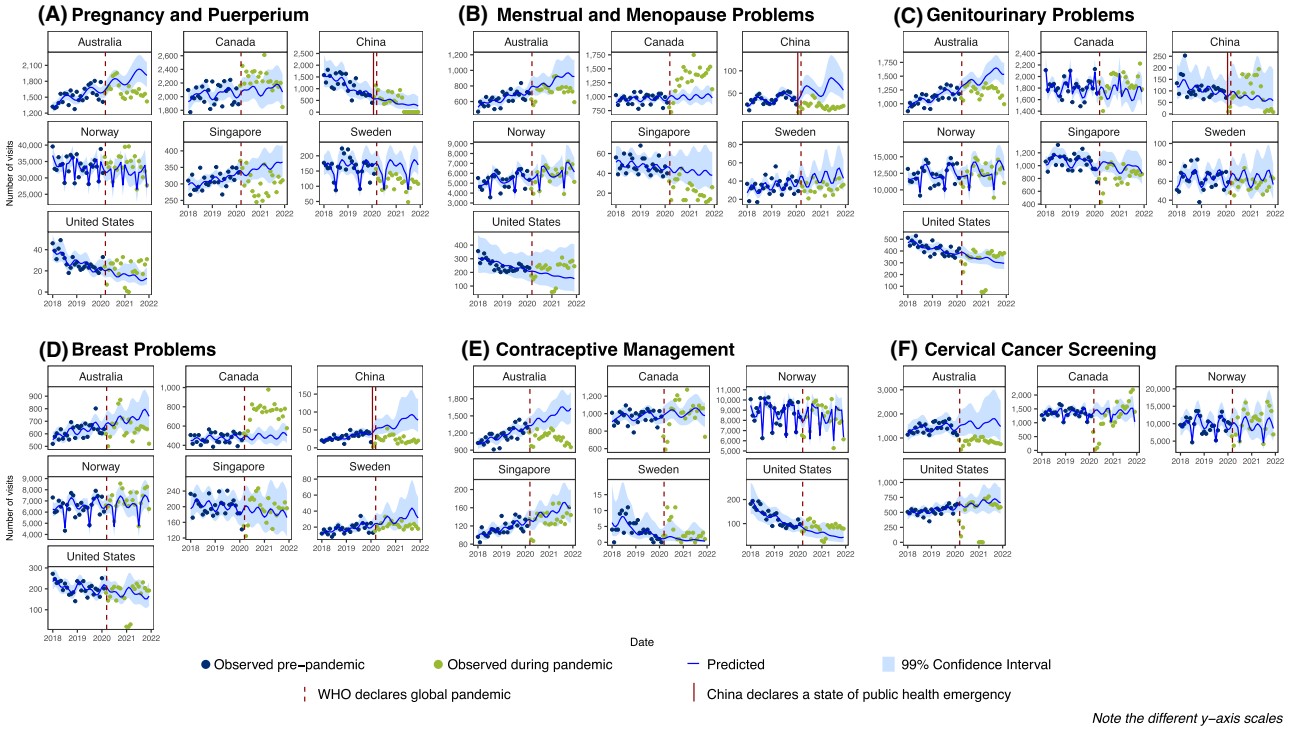

FIGURE 2 Observed and predicted number of visits by month for sexual and reproductive health visits to primary care physicians.

Australia, with a persistent decline throughout 17 of the 21 pandemic months. In the USA, a second drop was observed from January to March 2021, which coincided with a large COVID wave in the USA.

3.2 | The rise of virtual care for SRH services during the COVID-19 pandemic

The utilisation of virtual care in the pandemic period to compensate for the decrease in volume of in-person visits was observed across all countries except China and Singapore, where minimal amounts of virtual care were provided, and across all service types of SRH visits except cervical cancer screening (Figure 3, Figure S1). Among countries without established virtual care in the pre-pandemic period, Canada led in the extent to which virtual care was utilised to maintain the overall service volume, especially for services such as contraception, breast and menstrual problems. For countries with some utilisation of virtual care before the pandemic, such as Norway and Sweden, the extent to which virtual care was utilised was increased across all service types of SRH except cervical cancer screening.

3.3 | The role of primary care in the delivery of sexual reproductive healthcare in INTRePID countries

According to the responses of our INTRePID primary care physicians to the survey regarding the scope of practice in primary care (Table 2, Figure S2), whereas prenatal care is frequently performed by primary care physicians in most countries, deliveries by primary care physicians are not a common practice in Australia, China, Norway, Sweden or Singapore. Contraceptive care management is often provided by family physicians in most countries, while only occasionally in Sweden. A referral to see an obstetrician/gynaecologist is not required in China and the USA but is sometimes required in Sweden.

Although primary care physicians often perform cervical cancer screening in INTRePID countries, only China reported a decrease in the delivery of such service by primary care physicians during the pandemic. The novel cervical cancer self-screening was adopted in Australia during the pandemic, while already in use in Sweden and the USA. Details on the provision of SRH services by family physicians before and during the pandemic are illustrated in Table 2 and Figure S2.

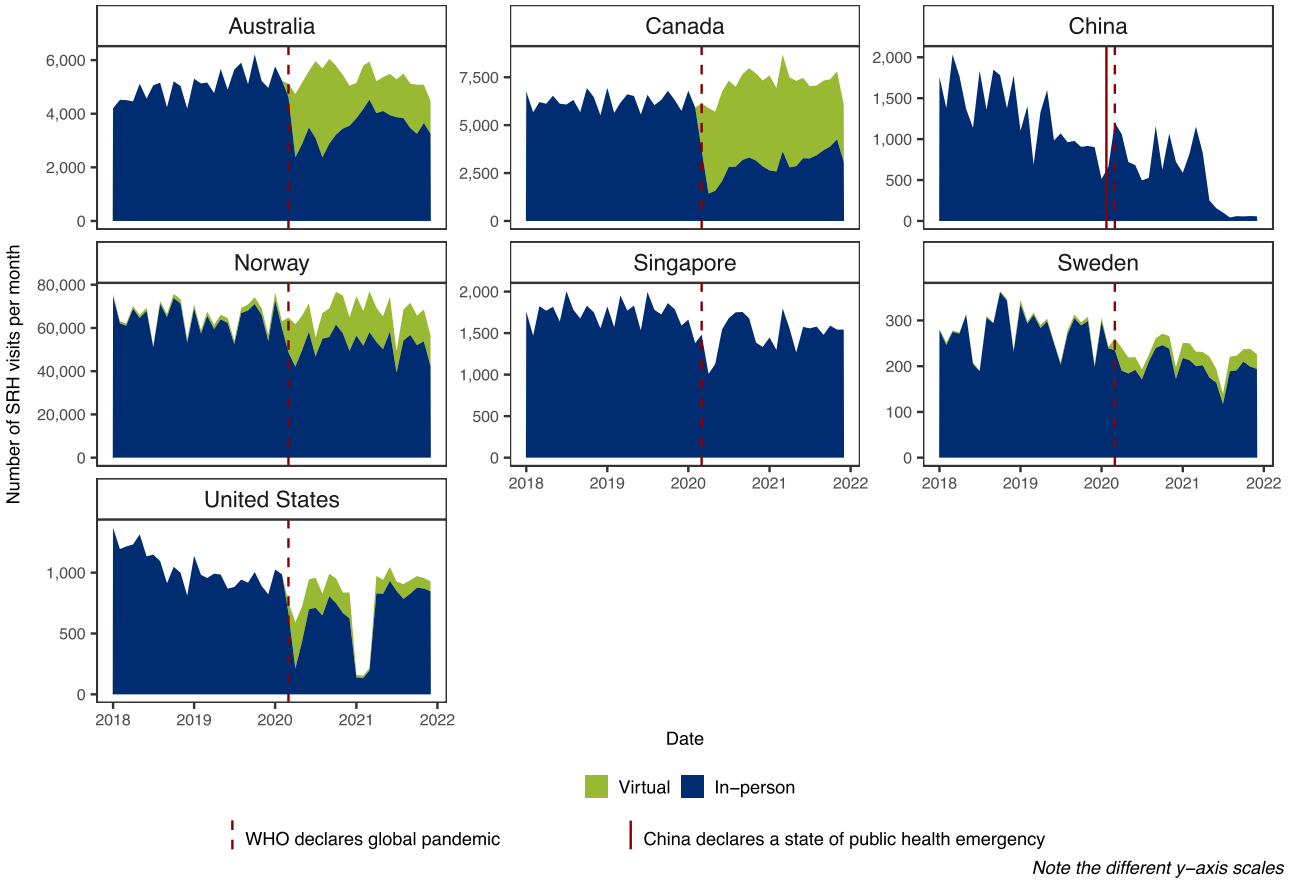

FIGURE 3 Changes in sexual and reproductive health visits to primary care before and during the pandemic by visit modality.

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TABLE 2 Provision of sexual reproductive health services by primary care physicians before and during the pandemic.

Country	Deliveries	Prenatal care	Contraception	Referral to see OB-GYN	PAPs	Cervical cancer self-screening
Australia						
Pre-pandemic	Occasional	Common	Always	Always	Always	Never
Pandemic	Occasional	Common	Always	Always	Always	Sometimes
Canada						
Pre-pandemic	Sometimes	Sometimes	Common	Always	Common	Never
Pandemic	Sometimes	Sometimes	Common	Always	Common	Never
China						
Pre-pandemic	Never	Occasional	Sometimes	Never	Common	Never
Pandemic	Never	Occasional	Sometimes	Never	Sometimes	Never
Norway						
Pre-pandemic	Never	Always	Always	Always	Common	Never
Pandemic	Never	Always	Always	Always	Common	Never
Singapore						
Pre-pandemic	Never	Sometimes	Sometimes	Always	Common	Never
Pandemic	Never	Sometimes	Sometimes	Always	Common	Never
Sweden						
Pre-pandemic	Never	Occasional	Occasional	Sometimes	Common	Sometimes
Pandemic	Never	Occasional	Occasional	Sometimes	Common	Sometimes
USA						
Pre-pandemic	Sometimes	Common	Common	Never	Common	Common
Pandemic	Sometimes	Common	Common	Never	Common	Common

4 | DISCUSSION

4.1 | Main findings

When examining all the SRH services, the initial drop in the number of visits for the first month of the pandemic was a global phenomenon across all INTRePID countries except China. However, different types of SRH services exhibited different levels of vulnerabilities to the pandemic. From our analyses, cervical cancer screening appeared to be the most vulnerable. An instant drop was observed globally, significantly below predicted. It is also the SRH service least amenable to virtual care, as it is likely to require a physical examination and sample collection by the primary care team. However, alternative strategies such as utilisation of self-collected samples for cervical cancer screening have been widely employed in some INTRePID countries, e.g. since July 2022 in Australia, in parts of the USA and in Sweden.[14] Wider adoption of HPV self-screen along with distribution to perform at home may become an important mitigation strategy in future pandemics.

Pregnancy/puerperium and breast services appeared to be the most resilient. For the former, this was most likely due to the urgent nature of the problem and high awareness levels.[18] Also, medical abortion services provided through telemedicine have been shown to be safe and yield satisfactory results.[19,20] For breast problems, however, the resiliency was probably due to the ease of using telemedicine consultation for this complaint.

Notably, changes in menstrual cycle during the pandemic have been observed previously in many studies.[21–23] Although these changes did not translate into an increase in menstrual/menopause-related visits in most of our INTRePID countries, we did observe an increasing trend in USA and in Canada in the second year of the pandemic (Figure 2B), coinciding with the widespread administration of the COVID vaccine. This could be a potential area to explore in the future.

On the other hand, country-specific vulnerabilities existed. Australia and Singapore were the only countries with a significant reduction in genitourinary services. The USA was the only place in our study with a large biphasic dip seen across all SRH service types, in January to March 2021, coinciding with the largest COVID-19 surge up to that time in the country.[24]

4.2 | Interpretation

When comparing with the previous INTRePID data examining the impacts of COVID-19 on primary care visits,[2] we found that Norway was the only country that maintained service volumes for both total family medicine and SRH visits, possibly due to its lowest health containment index score

and pre-existing virtual care system comprised of the most diverse delivery modes remunerated among all INTRePID countries in comparison.[25]

During the pandemic, virtual care was introduced in many places but a number of barriers existed, from lack of access to having a safe environment to discuss sensitive issues such as access to medication and procedures, especially for teenagers.[7–9,26,27] It is difficult to undertake investigations such as pregnancy tests or conduct physical examinations on genitalia virtually.[7] It is also important to examine the legal and regulatory changes required to provide these services.

4.3 | Strengths and limitations

Our study has several strengths. First, we were able to include data from multiple countries spread across different continents. We were able to use local experts to discuss and agree on comparable measures, perform local analyses and provide local context for the interpretation of findings. We were also able to use a large volume of data focused on SRH services around the world to analyse quantitatively the impacts of COVID-19 on SRH services. Taking these points together, this article adds value for clinicians and policymakers by exposing vulnerabilities across different countries and for different service types of SRH which could contribute to emergency preparedness planning in the future.

Simultaneously, there was a large variation in data availability in INTRePID countries. In Norway, we were able to obtain national level data. In several countries we had regional data of varying inclusiveness of a region, and in China we were only able to obtain data from an individual institution, making our data not necessarily representative of the whole country.[2] While we defined visits as those that we could reasonably measure through ICPC-2/ICD-10 or billing data in each country, we acknowledge that this approach might not capture all the activities of the primary care physicians, and in countries that did not allow for remuneration of virtual care, the activity of the primary care physicians might be differentially under-captured here. Also, some codes such as sexually transmitted diseases or HIV were unable to be confined to females only, despite our efforts to remove all clearly male-related SRH codes. Nonetheless, we believe that potential measurement inaccuracies were likely applied similarly within a country throughout both pre-pandemic and pandemic periods. We acknowledge that data provided by each region may not be representative of the whole country's experience. For that reason, it was not our intention to compare data between countries but within each primary care setting within a country before and during the pandemic.

Additionally, some primary care SRH services may not be captured by the data provided by the Consortium. For example, women in the USA, where referrals are not required, tend to go directly to gynaecology for their cervical cancer screening. Also, due to the limitations of using aggregated data, we were only able to provide unadjusted estimates. Moreover, the trends we saw in cervical cancer screening may have been a result of policy changes regarding frequency of screening or modality change to HPV self-screening. Changes in frequency of screening occurred at various times in various countries, although in Canada and the USA the move from annual cervical cancer screening to every 3 years occurred over a decade ago, and in the USA was changed to every 5 years in 2020.[28] We were unable to disentangle changes in PAP smear rates due to frequency or modality policy changes versus changes due to COVID restrictions; however, this may actually have led to the underestimation of the mitigating effects of virtual care on maintaining cervical cancer screening volume during the pandemic period in our study. Also, we were able to take into consideration seasonality and outliers and identify other secular changes such as major policy changes (obstetric and pregnancy-related care moved out of primary care and into the hospital setting in China) and account for them in our analysis models, improving the validity of our results.

Lastly, we want to make clear that the survey results reflect the perception of the INTRePID providers working in each of the regions and do not necessarily represent the experience of all primary care physicians within a specific country.

5 | CONCLUSIONS

This study highlights the impact of the COVID-19 pandemic on in-person primary care visits for SRH and the mitigating effects of virtual care utilisation on the maintenance of overall SRH service volume across the INTRePID countries who adopted it. Some services such as cervical cancer screening appeared more vulnerable to pandemic effects and more insensitive to virtual care. The results indicate that virtual care may provide an option for more effective delivery of SRH services due to its convenience, time and carbon footprint reduction. Further research is warranted on how better to tailor virtual care to specific SRH services, especially for those not sensitive to it, such as combining it with alternative strategies such as self-collected samples for HPV testing.

AUTHOR CONTRIBUTIONS

KP and KT were responsible for the study conception and design, writing and revising the draft, as well as data acquisition, analysis and interpretation. MCL and AO were responsible for study conception and design, data acquisition, analysis, and interpretation, as well as reviewing, commenting and revising the draft. ZL, AL, ZJL, RK, GG and WDP were responsible for data acquisition, analysis and interpretation. CMH, JM, JA, WCWW, CCDR, VB, SF, KW, LHG and JW were responsible for data acquisition, analysis, and interpretation, as well as reviewing, commenting and revising the draft. ANNP is the corresponding author, responsible for study conception and design, data acquisition, analysis and interpretation.

ACKNOWLEDGEMENTS

Thank you to Tao Chen, database manager at University of Toronto, for his assistance with generating the prediction graphs. Karen Tu who holds a Research Scholar Award from the University of Toronto and holds a Chair in Family and Community Medicine Research in Primary Care at UHN. Thank you to the Department of General Practice of the University of Melbourne for facilitating access to de-identified information of the Patron primary care data repository.

FUNDING INFORMATION

This study received funding from the Rathlyn Foundation Primary Care EMR Research and Discovery Fund. The funder had no role in the design and conduct of the study; collection, management, analysis or interpretation of the data; preparation, review or approval of the paper; and decision to submit the paper for publication.

CONFLICT OF INTEREST STATEMENT

Norwegian data were provided from the project from 'COVID-19 outbreak in Norway – Epidemiology, health care utilisation and primary care management – CONOPRI', supported by a grant from the Trond Mohn Foundation (Grant no. TMS2020TMT06). None of the study funding sources played a role in the study design, collection, analysis, interpretation of the data, writing of the report or the decision to submit the paper for publication.

DATA AVAILABILITY STATEMENT

All data are subject to local regulations for data sharing that vary from country to country. Individual level data are not publicly available. The research ethics approval for the use of UTOPIAN data does not permit making the data publicly available. Researchers interested in accessing EMR data from the UTOPIAN Data Safe Haven for research can apply to do so at: https://www.dfcm.utoronto.ca/getting-utopian-support. Analytic code for analysis of the data is also available on request.

ETHICS STATEMENT

This study received ethics approval from the University of Toronto REB #40943.

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REFERENCES

1. World Health Organization. WHO Coronavirus (COVID-19) Dashboard 2023. [cited 2023 Apr 12]. Available from: https://covid19.who.int/
2. Tu K, Sarkadi Kristiansson R, Gronsbell J, de Lusignan S, Flottorp S, Goh LH, et al. Changes in primary care visits arising from the COVID-19 pandemic: an international comparative study by the International Consortium of Primary Care Big Data Researchers (INTRePID). BMJ Open. 2022;12(5):e059130.
3. World Health Organization. Critical considerations and actions for achieving universal access to sexual and reproductive health in the context of universal health coverage through a primary health care approach. Geneva: World Health Organization; 2022.
4. Maier M, Samari G, Ostrowski J, Bencomo C, McGovern T. Scrambling to figure out what to do': a mixed method analysis of COVID-19's impact on sexual and reproductive health and rights in the United States. BMJ Sex Reprod Health. 2021;47(4):e16.
5. Sturgiss E, Dut GM, Matenge S, Desborough J, Hall Dykgraaf S, Mazza D, et al. COVID-19 and access to sexual and reproductive healthcare for young people: an overview of the international literature and policy. Aust J Gen Pract. 2022;51(4):271–7.
6. Shanbehzadeh M, Kazemi-Arpanahi H, Kalkhajeh SG, Basati G. Systematic review on telemedicine platforms in lockdown periods: lessons learned from the COVID-19 pandemic. J Educ Health Promot. 2021;10:211.
7. Barney A, Buckelew S, Mesheriakova V, Raymond-Flesch M. The COVID-19 pandemic and rapid implementation of adolescent and young adult telemedicine: challenges and opportunities for innovation. J Adolesc Health. 2020;67(2):164–71.
8. Lindberg LD, Bell DL, Kantor LM. The sexual and reproductive health of adolescents and young adults during the COVID-19 pandemic. Perspect Sex Reprod Health. 2020;52(2):75–9.
9. Thomson-Glover R, Hamlett H, Weston D, Ashby J. Coronavirus (COVID-19) and young people's sexual health. Sex Transm Infect. 2020;96(7):473–4.
10. Tu K, Ji C, Varner C, Sodhi S, Selby P, Upshur R. University of Toronto Family Medicine Report—stronger together: caring through crisis. Toronto, ON: University of Toronto, Department of Family and Community Medicine; 2021.
11. INTernational ConsoRtium of Primary Care BIg Data Researchers. About Us. [cited 2023 Oct 6]. Available from: https://www.intrepidprimarycare.org/about-us
12. INTernational ConsoRtium of Primary Care BIg Data Researchers. Data sources. [cited 2023 Oct 6]. Available from: https://www.intrepidprimarycare.org/resources
13. Saville M, Hawkes D, McLachlan E, Anderson S, Arabena K. Self-collection for under-screened women in a National Cervical Screening Program: pilot study. Curr Oncol. 2018;25(1):27–32.
14. Australian Government. Medicare item reports 2022. [cited 2023 May 24]. Available from: http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp
15. Huston P, Campbell J, Russell G, Goodyear-Smith F, Phillips RL Jr, van Weel C, et al. COVID-19 and primary care in six countries. BJGP Open. 2020;4(4):bjgpopen20X101128.

16. World Health Organization. Coronavirus disease 2019 (COVID-19): situation report, 51. Geneva: World Health Organization; 2020.
17. Sand J, Felzien M, Haeme R, Tapp H, Derkowski D, Westfall JM. The North American Primary Care Research Group's Patient and Clinician Engagement Program (PaCE): demystifying patient engagement through a Dyad model. Fam Pract. 2017;34(3):285–9.
18. Bayefsky MJ, Bartz D, Watson KL. Abortion during the Covid-19 pandemic—ensuring access to an essential health service. N Engl J Med. 2020;382(19):e47.
19. Endler M, Lavelanet A, Cleeve A, Ganatra B, Gomperts R, Gemzell-Danielsson K. Telemedicine for medical abortion: a systematic review. BJOG. 2019;126(9):1094–102.
20. Meurice ME, Whitehouse KC, Blaylock R, Chang JJ, Lohr PA. Client satisfaction and experience of telemedicine and home use of mifepristone and misoprostol for abortion up to 10 weeks' gestation at British Pregnancy Advisory Service: a cross-sectional evaluation. Contraception. 2021;104(1):61–6.
21. Edelman A, Boniface ER, Benhar E, Han L, Matteson KA, Favaro C, et al. Association between menstrual cycle length and coronavirus disease 2019 (COVID-19) vaccination: a US cohort. Obstet Gynecol. 2022;139(4):481–9.
22. Lebar V, Laganà AS, Chiantera V, Kunič T, Lukanović D. The effect of COVID-19 on the menstrual cycle: a systematic review. J Clin Med. 2022;11(13):3800.
23. Sharp GC, Fraser A, Sawyer G, Kountourides G, Easey KE, Ford G, et al. The COVID-19 pandemic and the menstrual cycle: research gaps and opportunities. Oxford: Oxford University Press; 2022. p. 691–700.
24. Johns Hopkins University & Medicine. United States—COVID-19 overview 2023. [cited 2023 Apr 12]. Available from: https://coronavirus.jhu.edu/region/united-states
25. Hale T, Angrist N, Goldszmidt R, Kira B, Petherick A, Phillips T, et al. A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). Nat Hum Behav. 2021;5(4):529–38.
26. Jabbarpour Y, Jetty A, Westfall M, Westfall J. Not telehealth: which primary care visits need in-person care? J Am Board Fam Med. 2021;34:S162–9.
27. Jetty A, Jabbarpour Y, Westfall M, Kamerow DB, Petterson S, Westfall JM. Capacity of primary care to deliver telehealth in the United States. J Am Board Fam Med. 2021;34:S48–54.
28. Auguste P. Cervical cancer screening: updated guidelines from the American Cancer Society. Am Fam Physician. 2021;104(2):314–5.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Peng K, Tu K, Li Z, Hallinan CM, Laughlin A, Manski-Nankervis J-A, et al. Global impacts of COVID-19 pandemic on sexual and reproductive health services: An international comparative study on primary care from the INTRePID Consortium. BJOG. 2023;00:1–10. https://doi.org/10.1111/1471-0528.17704