

The impact of disasters on contraception in OECD member countries: a scoping review

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Shortened running title: The impact of disasters on contraception: A scoping review

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Abstract

Background

Review evidence is lacking about how contraception is affected by severe social disruption, such as that caused by the COVID-19 pandemic. Such information is needed to inform policies and understanding of how to maintain and improve contraceptive services during such periods.

Objectives

To undertake a scoping review of the impact of natural and man-made disasters on contraception in OECD member countries.

Search Strategy

Manual searches and systematic searches in six electronic databases were conducted with no language restrictions.

Data collection and analysis

All articles were screened by at least two researchers independently. A data extraction sheet was developed, and relevant data retrieved. A thematic analysis was used to synthesise the extracted data.

Main results

110 articles were included. The majority focused on the Zika virus outbreak (n=49) and the COVID-19 pandemic (n=28), and originated from the Americas (n=88). Four key themes were identified: importance of contraception during disasters, impact of disasters on contraceptive behaviour, barriers to contraception during disasters and ways of improving uptake of contraception during disasters. Despite efforts to increase access to contraception including by transforming ways of delivery, barriers to uptake meant that unmet need persisted.

Conclusions

To prevent adverse health outcomes and reduce health costs as a result of failure to have access to contraception during disasters, there is a need to intensify efforts to remove barriers to uptake. This should include increasing access and information on methods of contraception and their side effects (e.g. menstrual suppression) and making contraception freely available.

Keywords

Contraception, COVID-19, disaster(s), OECD countries, Zika, ZKV

Tweetable Abstract

Ongoing access to contraception support and contraceptive methods is crucial to meet health needs during disasters.

Introduction

Major disasters, such as earthquakes, hurricanes, floods and epidemics cause significant disruption to society. While placing considerable pressure on public health, community and hospital services, sexual and reproductive health services are also likely to be strained ¹. For example, with reduced access to family planning advice and supplies, unplanned pregnancies may increase ².

It is recognised that in the aftermath of a disaster, women are more likely to experience detrimental physical and psychological health effects than men ^{3,4}. In relation to reproductive health, disasters are associated with increased rates of early pregnancy loss, stillbirth and premature birth, together with increased birth rates ⁵⁻⁹. In the aftermath of a disaster, women are also more prone to intimate partner violence and sexual abuse/harassment ¹⁰.

Hence, in disaster response planning it is important to consider the need to mitigate the impact on women's reproductive health, including maintaining their access to and use of contraception. Until now, a comprehensive review of the impact of major disasters on contraception is lacking.

The objective of this scoping review was to explore the impact of disasters on provision and use of contraception in high-income countries, and to contribute to shaping policies that proactively address reproductive health issues at times of disaster. Although the impact on women's physical and mental health who live through a disaster in low- and middle-income is likely to be much greater than for women in high-income countries, many of the barriers will be pre-existing and differ to high income countries. The review was undertaken during the COVID-19 pandemic, and we approached it from the perspective of discovering what was known about ways of maintaining access to contraception in high-income countries and preventing the health burden shift towards abortion and pregnancy care ¹¹.

Methods

The scoping review followed the PRISMA-ScR checklist ¹² (see Supplementary File 1). Its design was informed by Arksey and O'Malley's framework ¹³ and the Joanna Briggs Institute Reviewers' Manual ¹⁴.

Inclusion and Exclusion Criteria

All types of evidence providing insight into the impact of disasters on contraception were included. The type of disasters considered for this review were informed by Shaluf et al ¹⁵. Both natural disasters and man-made disasters were considered where at least one of the following points were met:

- (a) Disruption of freedom of movement
- (b) Disruption of distribution and delivery of resources and services/sources of income

The contraceptive methods considered in this review were informed by previous definitions of modern contraception^{16,17}. Contraceptive methods which cannot be delivered by healthcare professionals and sterilisation which occurs as a consequence of a medical procedure were excluded from this review.

To inform policy and research in the UK and countries with similar economic backgrounds, literature pertaining to Organisation for Economic Co-Operation and Development (OECD) member countries was used^{18,19}. All settings in which contraceptive methods are available with or without prescription were included.

Table 1 provides an overview of all inclusion and exclusion criteria.

Search Strategy

Medline, Embase, Web of Science, Scopus, Cinahl and the Cochrane Library were searched without language restrictions for relevant literature. The search strategy was based on the Population, Concept and Context (PCC) strategy²⁰ and compiled by BF in collaboration with SH, JG and a specialist librarian (SJ). The choice of databases and search terms was informed by previous reviews in the area of sexual and reproductive health^{18,21} and adapted for each database by mapping keywords relating to 'contraception' and 'disaster' (see Appendix S1). Articles were also searched manually by all authors and reference lists of all included references were screened for potentially relevant references.

Since the field of contraception is changing over time with contraceptive methods becoming more effective²², only literature published after January 2010 was included to ensure findings could inform current practice. An initial search was conducted in June 2020 and secondary search in December 2020.

Selection of studies

All references identified were deduplicated in Endnote X9. In a first stage, the titles and abstracts were screened against the inclusion criteria by two researchers independently (BF and SH or JG), with discrepancies resolved through discussion with another reviewer (SH or JG). In a second stage, the full texts of all potentially relevant articles were retrieved and dual-screened against the inclusion criteria by two researchers independently (BF and SH or JG). Discrepancies were discussed and if a consensus was not reached a third author was consulted. A reason to exclude a reference was recorded at this stage.

Data extraction

A data extraction form was developed by BF and piloted on a five randomly selected references (see Appendix S2).

Data synthesis

Thematic analysis can be used to synthesise qualitative and quantitative evidence²³ and was conducted on this data by JG based on the three steps outlined by Thomas and Harden (2008)²⁴. In the first step, JG coded the extracted data inductively according to its meaning and content line-by-line. In a second step, JG organised all codes into 'descriptive' themes. In collaboration with SH, and in a third step underlying analytical themes were identified.

Results

Literature Search

In total, 110 articles were included in this scoping review. A overview of the search results is provided in Figure 1.

Description of included articles

Most of the articles included related to the Zika virus (44.5%, 49/110) and the COVID-19 pandemic (25.5%, 28/110) and originated from the Americas (80%, 88/110). Less than 50% of articles were original research articles (46.4%, 51/110). Of these, most were cross-sectional studies (64.7%, 33/51). Table 2 provides an overview of the included articles.

Key themes

Four overarching themes were identified (see Figure 2).

Importance of contraception during disasters

Nine articles gave insight into the importance of contraception during disasters^{25–33}. During the Zika epidemic, contraception was crucial to reduce Zika-related microcephaly^{26,27,34} and related healthcare costs²⁷. During the COVID-19 pandemic, access to contraception was deemed as particularly important because the impact of COVID-19 on maternal and fetal well-being were not clearly understood²⁸, and because women's plans for pregnancy may alter depending on personal experience, financial and/or medical concerns²⁹. For deployed servicewomen, contraception was important not only to prevent pregnancy but also for menstrual suppression or regulation^{30–33}.

Ways of improving uptake of contraception during disasters

Three subthemes relating to the impact of disasters on actions relating to uptake of contraception were identified: 'Communication with the public'; 'Access to contraception'; and 'Provision of contraception'.

Communication with the public

Twelve articles gave insight into communication with the public during disasters^{35–46}. Health communication campaigns spread through billboards, the radio, newspaper adverts, and social media and sexual education programs were used by health providers to provide information on how the Zika virus spreads^{27,40,41,43–45}. However, message content for the public on the modes of transmission of Zika and recommendations to use condoms in Zika-affected areas was found to not be strong enough^{45,46}. During the COVID-19 pandemic, the WHO recommended providing more information about contraception and available services through pharmacies and online platforms³⁷. Some health providers who had to close provided information on their doors on where to access emergency contraception⁴⁷.

Access to contraception

Thirty-one articles considered access to contraception during disasters ^{11,26,29,33,37,47-72}.

During the Zika virus epidemic, strategies to increase access to contraception included: the removal of financial barriers to services ^{41,59}, training of healthcare staff on reversible methods of contraception ⁶⁰ and the distribution of condoms ²⁶.

However, since some people perceived condoms as burdensome ^{61,62} and as the choice not to use male condoms may not be a shared decision ⁶³, access to a broad range of contraceptive services, including long-acting reversible contraception (LARC) ^{26,41,64} was also considered important to prevent Zika-related adverse pregnancy and birth outcomes ⁶⁵.

During the COVID-19 pandemic, strategies to promote access included: providing postpartum and post-abortion contraception ^{37,66,67}; offering LARC and permanent contraception where possible ³⁷; increasing prescription-free provision of contraception ^{11,29,47}; and providing advanced prescriptions ⁴⁷, automatic extension and refill of prescriptions ^{37,68}. To increase access to contraception for servicewomen during deployment, contraception was provided for free or low cost ³³.

Provision of contraception

Sixteen articles provided insight into the provision of contraception during disasters

^{11,28,31,37,38,47,66,68,73-80}.

Servicewomen reported being able to obtain oral contraception refills through mailorder and local treatment facilities during deployment ³¹. During the COVID-19 pandemic, some health providers closed ^{68,73,80}, and in-person visits were mainly used for contraceptive service users attending for LARCs ^{74,75} under special measures (e.g., screening people for COVID-19 symptoms, wearing PPE, cleaning rooms after each visit). While access to discontinuation services (e.g. removal of IUDs and implants) was recommended to be delayed as much as possible ^{37,68,76}, insertion of IUDs, contraceptive implants and permanent contraception continued in many but not all areas ³⁷. Curb-side administration for contraceptive injection and pickup of condoms were considered or used in some areas ^{38,66}. Telehealth (use of phone and video consultations) was used to counsel, prescribe and refill prescriptions for contraception, to manage complications related to contraception and to triage patients for in-person visits required for the insertion of LARC ^{11,28,37,47,68,74,75,77,78,81} and had several advantages (e.g. convenience, increased access, reduced exposure to COVID-19) but also some disadvantages (e.g. quality of communication, technological issues, difficulties picking up on safeguarding issues, domestic abuse, teenage pregnancy) ^{11,74}.

Barriers to uptake of contraception during disasters

Twenty-eight articles gave insight into barriers to contraception during disasters

^{26,31,33,47,65,76,77,82-102}.

Barriers included policies (e.g. inconsistent refill policies on contraception across different states in the US; pharmacists' and American employers "right to decline to cover contraceptives if doing so violates their religious beliefs or moral convictions"; insurance companies denying coverage for contraception) ^{76,85,86} and institutional or cultural obstacles (e.g. education sectors and Catholic church preventing education on condom usage) ⁸⁷.

Fear of contracting COVID-19 when accessing contraceptive services ⁷⁷ and lack of safety travelling to health facilities in areas of armed conflicts ⁸⁸ were further barriers to contraception. For resettled refugee women, barriers to contraception included religious beliefs, war trauma and sexual violence ⁸⁹ but also having to travel a long distance for contraception services ⁹⁹.

Being less informed about HIV-, and Zika-related adverse outcomes were further barriers to contraception ^{65,90–93}. For sex workers in areas of socio-political unrest such as the Colombian conflict, the costs of condoms and being able to charge more for condom-less sex were further barriers to use of contraception ⁸⁷.

Closure of health providers, limited access and not having the ability to pay for contraceptive services were further barriers identified during disasters such as the COVID-19 pandemic and the Zika virus outbreak in the Americas and Great Britain ^{26,77,94–96}. Supply shortages due to pandemic-related closure of contraception manufacturers were also barriers to contraception ^{47,97}.

During the COVID-19 pandemic, one in three women in the US reported trouble getting their usual birth control ⁷⁷ due to cancellation or delay of appointments, and some groups (e.g. Black, Hispanic, LGBTQ women, lower-income women, immigrants) were more likely to experience barriers than other groups (e.g. White people, straight people, high-income women) ^{77,88,98}.

In one study from the US, the majority of servicewomen reported that they were unable to obtain prescription oral contraceptive pills because of medical advice that contraception would not be needed during basic training ³³. Lack of availability of female providers, limit to contraception type and inadequate counselling and lack of confidentiality when obtaining contraception were identified as further potential barriers ^{31,33}.

Impact of disasters on contraceptive behaviour

Two subthemes relating to the impact of disaster on contraceptive usage were identified: 'Demand and usage of contraception' and 'Contraceptive choice'.

Demand and usage of contraception

Nineteen articles considered how demand for contraception changed ^{27,43,77,103–118}. There was conflicting evidence on whether the Zika outbreak led to increased demand for contraception ^{27,43,108}. Similarly, while some women reported that they wanted to delay childbearing during the COVID-19 pandemic and considered use of LARC, others did not change their views ⁷⁷. However, contraceptive usage during the ongoing COVID-19 pandemic appears to differ amongst married and cohabiting women and non-cohabiting and single women ¹¹¹. While married and cohabiting women appear to be more likely to continue their contraception, non-cohabiting and single women were more likely to discontinue contraception ¹¹¹. While some non-cohabiting and single women who stopped their contraception followed social distancing, others continued their sexual activity, infringed social distancing rules and had unplanned pregnancies ¹¹¹. Lack of data on uptake of contraception amongst the population prior to armed conflicts makes it difficult to evaluate any change in demand ¹⁰⁹.

However, evidence suggests that uptake of contraception appeared to decline¹⁰⁹ in armed conflicts and after being displaced to another country¹¹⁰.

Contraceptive choice

Twenty-one articles gave insight into contraceptive choice^{30,33,38,47,60,61,77,111,119–131}. A number of commonly used hormonal contraceptives (e.g. ring, patch, emergency contraception, IUD) were reported to be absent from the military formulary in the US³³, limiting the choice of contraceptive options for servicewomen.

LARC

Women who followed stay-at home guidance or were self-isolating during the COVID-19 pandemic, considered longer-term supply of contraception or access to LARCs important^{47,77}. More women chose the LARC method during to the Zika virus outbreak compared to prior^{60,122,123}. While LARC did not always achieve menstrual suppression, it made the bleeding lighter and more manageable³⁰. Evidence suggests that LARCs are underutilised by servicewomen, particularly during deployment¹²⁹.

Hormonal contraception

While some evidence suggests that the uptake of hormonal contraception did not increase during the Zika outbreak, there is mixed evidence on whether hormonal contraception uptake increased during the COVID-19 pandemic^{124,125}. There is evidence to suggest that the uptake of emergency contraception in clinics increased during the COVID-19 pandemic³⁸.

Servicewomen in some studies experienced difficulties in adherence to oral contraception (e.g., because of working and travelling in different time zones and long workdays)^{30,33} and contraceptive injection in austere field environment (e.g. because of the need be stored at a certain temperature)³⁰. Servicewomen require contraception that does not increase their risk of genitourinary tract bacteria and yeast infections and does not increase the risk of venous thromboembolism (e.g.due to decreased mobility when traveling)³⁰.

Condoms

Some evidence suggests that condom use in Zika affected areas was relatively low¹²⁶ but in two studies including women, it was found that women who received counselling to use condoms to prevent Zika were more likely to use them^{61,127}.

Condom use increased at the beginning of the COVID-19 pandemic but then decreased¹³². No change in condom use in men who have sex with men during the COVID-19 pandemic was found¹²⁸.

Discussion

Main findings

The scoping review considered 110 articles, of which the majority focused on the Zika virus outbreak and COVID-19. There is a lack of evidence on the impact of major natural events such as major earthquakes, floods and hurricanes, that cause significant destruction and displacement of people, on contraception. Further, research on the impact of disasters is largely limited to literature from the Americas.

The evidence included in this review confirmed that contraception is highly important during disasters. It is needed to reduce adverse health outcomes (e.g. Zika-related microcephaly births) and associated health care costs but also to ensure that contraceptive needs are met during disasters which may cause people to delay family planning due to financial or medical concerns. For deployed servicewomen contraception is particularly important for menstrual suppression.

The review found a range of actions relating to contraception that have been deployed to mitigate the effects of disasters. These include government efforts to communicate with the public (e.g. through health campaigns), increased access to contraception (e.g. through the distribution of condoms, removal of financial barriers) and transforming the delivery of contraception (e.g. through telehealth, drive-throughs, curbside administration).

Further, the review provided insights into the impact of recent disasters on contraceptive behaviour. There was mixed evidence on whether disasters increase the need for contraception, with differing changes in contraceptive behaviour depending on an individual's personal situation and relationship status. Lack of data on demand prior to the disaster was identified as a problem to evaluating changes in contraception usage.

Finally, the review highlighted various barriers to the availability of contraception during disasters. These included: closure of health providers; lack of safety travelling to health facilities; policies and institutional organisations; lack of ability to afford contraception; health providers' unwillingness to provide contraception; lack of knowledge about adverse outcomes of infectious diseases; and supply shortages. People from more disadvantaged socio-demographic and economic backgrounds (such as Black, Hispanic, LGBTQ women, lower-income women, immigrants) were shown to be more likely to experience barriers to contraception, suggesting widening inequalities in access to contraception during disasters.

Strengths and Limitations

A strength of our review is that key research gaps were identified. For example, we found that research on contraceptive uptake before, during and after disasters is needed to understand changes in contraceptive uptake. Further, more research outside the Americas and research on disasters other than COVID-19 and Zika are needed to gain a better understanding on how different types of disasters impact contraception provision and access.

A limitation is that we restricted inclusion to OECD member countries, limiting the generalisability of our results to lower-and middle income countries. We acknowledge that it is also difficult to compare the impact of disasters on contraception within OECD member countries since healthcare systems largely differ and hence, the impact of disasters on contraception may vary from country to country. However, our scoping review provides a comprehensive overview of the available evidence on the impact of disasters on contraception in OECD member countries and identified factors that can contribute and inhibit access to contraception during disasters. Hence, the information provided in this review provides valuable information for those delivering and planning contraceptive services.

Interpretation

The review highlighted that a lack of evidence on the uptake of contraception in times of disaster but also in non-disaster period makes it difficult to assess how disasters affect the demand for, and uptake of, contraception. In the UK, the All-Party Parliamentary Group (APPG) on Sexual and Reproductive Health ¹³³ has recognised that unless the uptake of contraception in different settings (including family planning clinics, general practices and pharmacies) is reported on a regular basis it is not possible to evaluate how uptake varies as a consequence of a disaster. Collecting such information is needed to better understand and plan for contraceptive needs at times of disaster.

The review identified that servicewomen deployed in areas of disaster had a high desire for menstrual suppression and for managing menstrual symptoms. Menstruating is likely to cause women to need to use the bathroom more and this is inconvenient for female healthcare staff working on COVID-19 wards as personal protective equipment has to be doffed and donned for every visit to the bathroom ¹³⁴. While no evidence on this exists to date, it is possible that menstrual suppression is also desirable among healthcare and other essential workers. Future work should consider whether healthcare staff, and particularly those working at the frontline of the current COVID-19 pandemic, have an interest in using contraception for menstrual suppression.

It is well recognised that there are inequalities in access to contraception ^{135–137}, and these are likely to be exacerbated during disasters. There is evidence to suggest that removing barriers to cost, access and knowledge can contribute to removing disparities in access to contraception ¹³⁸, and in line with this, our review found that women who received advice on the importance of using contraception to prevent adverse health outcomes were more likely to adhere to contraceptive usage.

The use of telehealth has increased substantially during the COVID-19 pandemic ¹³⁹, including in contraception counselling. The scoping review highlighted advantages and disadvantages of using telehealth for contraception. While it may improve access for some, those without internet or telephone may be excluded and it may become harder to identify people at risk of abuse and neglect ¹⁴⁰.

Conclusions

This scoping review is the first to synthesise evidence on the impact of disasters on the provision and use of contraception. The evidence reviewed highlights the importance of research and policy focusing on removing barriers to contraception at times of extreme social disruption, addressing inequalities in contraceptive access and on providing contraception choice. Side effects which may be viewed as beneficial, such as suppression of menstruation, should be highlighted to service users, particularly those in frontline roles. Telehealth could be of benefit, but its limitations acknowledged in order not to exacerbate the inequalities. To increase the uptake of contraception during disasters, we recommend intensification of efforts to increase information on the availability of contraception and making it available free of cost to the service user. Finally, the effect of lockdown rules, such as those during COVID-19, being tightened and released may affect the need and access to contraception, but more data on the uptake of contraception is needed to fully understand how contraceptive behaviour changes during and after such changes.

Disclosure of Interest

None.

Contribution to authorship

SH, JD, SS and DB had the idea for this scoping review. BF compiled the literature search in collaboration with SH, JG and SJ. BF conducted the literature search. BF, SH and JG screened the articles for their titles and abstracts and their full texts. BF extracted all data from the articles. JG conducted the analysis and wrote the discussion in collaboration with SH. JG led the write up of the scoping review. JD, DB, SS and BF reviewed the draft and provided feedback for improvement.

Details of ethics approval

Not required.

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Supporting Information

Supplementary File 1 PRISMA-ScR Checklist

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Table 1 Inclusion and Exclusion Criteria for scoping review

Inclusion and Exclusion Criteria	
<i>Type of disaster</i>	
Inclusion	<p>The following types of disasters were included where they caused (a) disruption of freedom of movement, and/or (b) disruption and delivery of resources/ services/sources of income:</p> <ul style="list-style-type: none"> • Natural (physical) disasters: earthquakes, tsunamis, hurricanes, volcanic eruptions, tropical storms, floods, acute disease outbreaks (e.g. pandemics and epidemics), cyclones, typhoons, drought, famine, fires, wildfires • Man-made disasters: non-conventional wars (nuclear, chemical, biological), conventional wars (wars, civil unrest, civil conflict, armed conflicts), radioactive hazard release; technological disasters (e.g. pollution; explosions)
Exclusion	<ul style="list-style-type: none"> • HIV/AIDS epidemic (where no disruption of one of the above criteria listed under a or b was caused) • Political changes (not leading to civil/armed conflicts and no disruption of one of the above criteria listed under a or b was caused)
<i>Type of contraception</i>	
Inclusion	<ul style="list-style-type: none"> • Hormonal contraception, long-acting reversible contraceptives, injectable contraceptives, contraceptive vaginal rings, contraceptive patches, barrier contraception, spermicide, intentional sterilisation
Exclusion	<ul style="list-style-type: none"> • Behavioural contraception (e.g. lactational amenorrhoea method, fertility awareness method, withdrawal method, abstinence method) • Sterilisation as consequence of a medical procedure e.g. bilateral salpingectomy for pathology
<i>Types of Articles</i>	
Inclusion	<ul style="list-style-type: none"> • Primary research studies (qualitative, quantitative and mixed methods studies); any type of literature reviews <ul style="list-style-type: none"> • Grey literature and dissertation theses • Abstract-only articles, conference abstracts, or proceedings published healthcare guidelines <ul style="list-style-type: none"> • Correspondence, viewpoints
<i>Settings</i>	
Inclusion	<ul style="list-style-type: none"> • Evidence from OECD member countries on all settings in which contraception is available with or without prescription • Evidence on military personnel from OECD member countries when deployed in areas of disasters in and outside OECD member countries

Table 2 Description of included articles

Description of included articles
Breakdown of included articles by disaster
Zika virus (n=49) COVID-19 (n=28) Wars and civil unrests (n=16) Refugee crises (n=11) Earthquakes (n=3) Hurricane Ike (n=1) Disaster preparedness (n=1) HIV epidemic (n=1)
Breakdown of included articles by study design
Original research studies (n=51) Literature Reviews (n=29) Correspondences (n=11) Viewpoints (n=7) Commentaries (n=4) Guidelines/policies (n=3) Reports (n=3) Study protocols (n=2)
Breakdown of included articles by continent/region/country
North America (n=72) South America (n=16) Europe (n=10) Asia (n=6) Oceania (n=2) Turkey (n=4)
Breakdown of included articles by year of publication
2010 (n=3) 2011 (n=3) 2013 (n=2) 2014 (n=1) 2015 (n=3) 2016 (n=14) 2017 (n=22) 2018 (n=16) 2019 (n=9) 2020 (n=37)

Appendix

Appendix S1: Search Strategy for Medline (OvidSP)

1 ((developed adj countr*) or (industrialised adj countr*) or (post-industrial adj countr*) or Australia* or Austria* or Belgi* or Canad* or Chile* or Colombia* or Czech* or Denmark or Danish or Estonia* or Finland or Finn* or France or French or German* or Greece or Greek or Hungar* or Iceland* or Ireland or Irish or Israel* or Ital* or Japan* or Latvia* or Lithuania* or Luxembourg* or Mexic* or Netherlands or Dutch or (New adj Zealand*) or Norw* or Poland or Polish or Portug* or Slovakia* or Slovenia* or (South adj Korea*) or Spain or Spanish or Sweden or Swedish or Switzerland or Swiss or Turkey or Turkish or (United adj Kingdom) or British or England or English or Wales or Welsh or Scotland or Scottish or (United adj States) or American).mp. or exp "Developed Countries"/ or exp "Organisation for Economic Co-Operation and Development"/ or exp Australia/ or exp Belgium/ or exp Canada/ or exp Chile/ or exp Colombia/ or exp "Czech Republic"/ or exp Denmark/ or exp Estonia/ or exp Finland/ or exp France/ or exp Germany/ or exp Greece/ or exp Hungary/ or exp Iceland/ or exp Ireland/ or exp Israel/ or exp Italy/ or exp Japan/ or exp Latvia/ or exp Lithuania/ or exp Luxembourg/ or exp Mexico/ or exp Netherlands/ or exp "New Zealand"/ or exp Norway/ or exp Poland/ or exp Slovakia/ or exp Slovenia/ or exp "South Korea"/ or exp Spain/ or exp Sweden/ or exp Switzerland/ or exp Turkey/ or exp "United Kingdom"/ or exp "United States"/ (5596802)

2 (contracepti* or (family adj planning) or ((contracepti* or sexual or reproductive) adj2 health) or ((birth or fertility) adj control) or (planned adj parenthood) or ((safe or unsafe or protected or unprotected) adj sex) or ((unprotected or protected or safe or unsafe) adj intercourse) or depoprovera or depo-provera or noristerat or implanon or Norplant or (intrauterine adj device*) or (intrauterine adj system*) or coil or diaphragm or (cervical adj cap*) or spermicid* or condom or femidom or (barrier adj method) or (morning adj after) or levonorgestrel or (Yuzpe adj regimen) or (vaginal adj ring*) or Progering or Annovering or Nuva-ring or ((reproductive or male or female or transluminal or chemical or pharmacological or tubal or sexual) adj sterili?ation) or (tubal adj ligation) or salpingectomy or tubectomy or vasoligation or vasectomy or (spermatic adj cord adj resection) or essure or (vas-occlusive adj (plug* or contracepti*)) or vasalgel or (intravasal adj (thread* or device*))).mp. or exp Contraception/ or exp "Contraception, Barrier"/ or exp "Contraception, Postcoital"/ or exp "Contraception, Immunologic"/ or exp "Hormonal Contraception"/ or exp "Contraceptive Agents"/ or exp Condoms/ or exp "Condoms, Female"/ or exp "Contraceptive Devices"/ or exp "Sterilization, Reproductive"/ or exp "Sterilization, Tubal"/ or exp Vasectomy/ (278415)

3 (pandemic* or epidemic* or outbreak* or ebola* or coronavir* or zika* or disaster* or (natural adj disaster*) or (earthquake* or flood* or tsunami*) or ((tropical adj storm*) or hurricane* or tornado* or cyclone* or typhoon*) or (drought* or famine* or shortage*) or (fire* or wildfire*) or ((anthropogenic or man-made) adj disaster*) or (hazard adj release*) or (nuclear adj incident*) or (oil adj spill*) or (war or wars or wartime or (civil adj war*) or conflict*) or (civil adj (unrest or conflict*)) or ((internal or domestic) adj conflict*) or (sectarian adj violence)).mp. or exp Disasters/ or exp "Natural Disasters"/ or exp "Disaster Planning"/ or exp Emergencies/ or exp "Disease Outbreaks"/ or exp Pandemics/ or exp Epidemics/ or exp Fires/ or exp Wildfires/ or exp Accidents/ or exp "Biohazard Release"/ or

exp "Occupational Accidents"/ or exp "Chemical Hazard Release"/ or exp "Radioactive Hazard Release"/ or exp "Environmental Pollution"/ or exp Biofouling/ or exp "Air Pollution"/ or exp "Food Contamination"/ or exp "Water Pollution"/ or exp "Equipment Contamination"/ or exp Explosions/ or exp "Warfare and Armed Conflicts"/ or exp "Civil Disorders"/ or exp "Disaster Medicine"/ or exp "Disaster Victims"/ (1362723)
4 (prescrib* or prescription* or delivery or provision or provid* or dispens* or distribut* or access).mp. or exp "Delivery of Health Care"/ or exp Prescriptions/ or exp "Nonprescription Drugs"/ or exp "Health Services Accessibility"/ (5647077)
5 1 and 2 and 3 and 4 (2436)
6 limit 5 to last 10 years (661)

Appendix S2: Data extraction form

Adapted for vertical presentation from spreadsheet.

- Citation details
- Type of evidence source
- Country(/ies) assessed
- Population(s) and sample size(s)
- Type(s) of disaster(s)
- Clinical setting(s) assessed
- Type(s) of contraception assessed
- Type(s) of delivery assessed
- Outcome(s) assessed
- Intervention(s) implemented
- Results/conclusions