BMJ Open

Maternal health and Indigenous traditional midwives in southern Mexico: contextualisation of a scoping review

Iván Sarmiento [1,2] Sergio Paredes-Solís [3] Anna Dion [1] Hilah Silver [1] Emily Vargas [4] Paloma Cruz,[2] Juan Pimentel [1,5] Germán Zuluaga [2] Anne Cockcroft [1] Neil Andersson [1,3]

Correspondence to
Dr Iván Sarmiento;
ivan.sarmiento@mail.mcgill.ca

ABSTRACT

Objectives Collate published evidence of factors that affect maternal health in Indigenous communities and contextualise the findings with stakeholder perspectives in the Mexican State of Guerrero.

Design Scoping review and stakeholder fuzzy cognitive mapping.

Inclusion and exclusion The scoping review included empirical studies (quantitative, qualitative or mixed methods) that addressed maternal health issues among Indigenous communities in the Americas and reported on the role or influence of traditional midwives before June 2020. The contextualisation drew on two previous studies of traditional midwife and researcher perspectives in southern Mexico.

Results The initial search identified 4461 references. Of 87 selected studies, 63 came from Guatemala and Mexico. Three small randomised trials involved traditional midwives. One addressed the practice of traditional midwifery. With diverse approaches to cultural differences, the studies used contrasting definitions of traditional midwives. A fuzzy cognitive map graphically summarised the influences identified in the scoping review. When we compared the literature's map with those from 29 traditional midwives in Guerrero and eight international researchers, the three sources coincided in the importance of self-care practices, rituals and traditional midwifery. The primary concern reflected in the scoping review was access to Western healthcare, followed by maternal health outcomes. For traditional midwives, the availability of hospital or health centre in the community was less relevant and had negative effects on other protective influences, while researchers conditioned its importance to its levels of cultural safety. Traditional midwives highlighted the role of violence against women, male involvement and traditional diseases.

Conclusions The literature and stakeholder maps showed maternal health resulting from complex interacting factors in which promotion of cultural practices was compatible with a protective effect on Indigenous maternal health. Future research challenges include traditional concepts of diseases and the impact on maternal health of gender norms, self-care practices and authentic traditional midwifery.

Strengths and limitations of this study

► Contextualising published evidence with stakeholder perspectives added value in understanding influences on maternal health in Indigenous communities.

► Fuzzy cognitive mapping contrasted and combined knowledges in a transparent and traceable way.

► An adaptation of Harris' discourse analysis synthesised quantitative, qualitative and mixed study results into a unified soft model.

► The weights of the relationships in the final maps are best interpreted as grades of consensus about influence, not as pooled estimates of impact.

► Additional discussion with other groups of local stakeholders is still relevant and necessary.

INTRODUCTION

Modern perinatal care aims to ensure that all women give birth in a safe environment. This is especially relevant for people living at the periphery of the health system where risks are usually higher.[1] Cultural differences matter. What constitutes a safe environment in one culture might be inappropriate or unacceptable in another.[2 3] Community engagement can help service delivery to adjust to specific cultural and local conditions, thus increasing universal access to safe birth.[4]

In Latin America, failure to incorporate cultural dimensions in delivery of perinatal care has generated resistance to health services among Indigenous peoples.[5] Despite political recognition of Indigenous traditions, there is a high level of mistrust between Western health services and Indigenous traditional healthcare. This mistrust reduces the effective access of Indigenous women to Western healthcare.[6]

There is little published evidence on the impact of traditional healthcare practices, including traditional midwifery. Their formal

BMJ

evaluation faces methodological challenges,[7] including scarcity of epidemiological evidence on traditional practices in their own right, small size and remoteness of many Indigenous groups, and lack of understanding about the roles of different traditional practitioners. Systematic reviews of available literature, none of which were conducted by Indigenous researchers, suggest improvements in maternal and child health outcomes from interventions that involved Western retraining of traditional midwives.[8–13] Kruske's 2004 review recognises, however, that retraining traditional midwives ignores their social and cultural role and assumes local knowledge is a barrier to improving maternal health.[14]

International recommendations in the last two decades emphasise increasing access to Western healthcare.[15] This ignores traditional skills and practices, to promote a new cadre of younger literate women trained in limited aspects of Western perinatal care.[15 16] This training, often centralised and away from Indigenous communities, neglects historical, economic, geographical and sociocultural factors and the diversity of stakeholders in Indigenous communities.[4] The consequence for many Indigenous women is accentuation of their already limited access to services[17] and, since the trainees do not have the skills to deal with obstetric crises, poor health outcomes.[14]

Rationale and objectives

This study was part of a larger initiative on the role of traditional midwifery in safe birth. The first of its two objectives was to collate and assess published evidence that identifies influences, including traditional midwives, on maternal health in Indigenous communities in the Americas. The second objective was to contextualise the literature with local perspectives and experience, by combining a scoping review with stakeholder cognitive mapping.

METHODS

A conventional scoping review identified influences on maternal health in Indigenous communities in the Americas in the published and grey literature.[18] Fuzzy cognitive mapping (FCM) portrayed the literature findings in a graphic format that could also portray knowledges from other sources.[19] Each fuzzy cognitive map, from the literature or authored by the stakeholders, represents presumed causal relationships. Each concept is a node linked with arrows (edges) to its outcomes or consequences.[20] Each relationship in the map receives a weight to indicate the strength of the influence that each node exerts on another. The cause-weighted arrow-outcome set summarises each causal statement, which together make up a complex knowledge network. The simplicity of each set allows juxtaposition of different knowledge sources in a comparable format.

We used graph theory and fuzzy logic rules to summarise the maps.[21] Developed in the late 20th century, fuzzy logic deals with statements that incorporate degrees of certainty (fuzziness) instead of crisp distinctions between, in this case, causes or no causes of an outcome.[22] This allowed us to estimate the influence of each node on other nodes throughout the map,[23] effectively turning it into a knowledge network in a sharable format with other knowledge networks.

We contrasted the scoping review map with stakeholder perspectives to make sense of published evidence in the experience of local stakeholders.[24] The shared FCM format highlights similarities and differences between maps and the eventual combination of the resulting knowledge networks.

The scoping review

The scoping review[25] followed Arksey and O'Malley's methodological framework[26] and the updated guidelines by Peters et al.[18] The reporting follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews Checklist. The review sought to answer the question: What factors, including the role and influence of traditional midwives, promote or reduce maternal health in Indigenous settings in the Americas and what is the relative weight of their influence?

Eligibility criteria

We included empirical studies on maternal health, which reported on the role or influence of traditional midwives and were conducted in Indigenous communities in the Americas. This geographical restriction was intended to limit the heterogeneity of cultural practices in other continents. The published protocol contains a detailed description of eligibility criteria.[25] We did not limit publication dates, and we included studies in any of the main languages spoken in the Americas (English, Spanish, French or Portuguese). The review excluded theoretical models or editorials that did not report empirical findings and ethnographies that did not report maternal health outcomes.

Information sources

Supported by a librarian specialised in Indigenous health, in June 2020, we searched Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, Latin American and Caribbean Health Sciences Literature (LILACS), Medline, Embase and Google Scholar databases. We used Google to search for unpublished studies. The search strategy accompanies the protocol.[25] To identify additional unpublished reports, we used the Canadian Agency for Drugs and Technologies for Health procedure. A librarian based in Colombia extended the search strategy to include other 15 databases specific to research in Latin America (CEPAL, Repositorio FLACSO, BVS, BVS MTCI, PAHO, PAHO IRIS, Red de repositorios latinoamericanos, La referencia Dialnet, Redalyc, BDCOL, Biblioteca digital Bogotá, CLACSO, BRISA, WHO, WHO IRIS). Hand-searching of the references in the included documents identified additional studies.

Study selection and data extraction

Using EndNote V.X9.0[27] and Rayyan,[28] we eliminated duplicates through screening article titles and abstracts. Three independent reviewers (IS, EV and PC) identified eligible studies and extracted data using predesigned instruments. After an initial selection, we reviewed full-texts for eligibility and hand-searched the reference lists to identify additional documents. Before starting data extraction, IS, EV and JP finalised the extraction instrument in two rounds using a random sample of five references each time. The instrument collected information about each study (year, authors, design, country, language and participants), the maternal health outcome reported, characteristics of traditional midwives involved and approach to cultural differences. The second part of the instrument listed all influences on maternal health and their relationships. A 3-column edge list listed: initiating factor, landing factor and sign of the relationship (-1 or +1) with one row for each relationship. If the study reported that an increment of one factor increased another factor, the relationship was positive (+1); if it decreased the second factor, it was negative (−1). If the study reported additional influences between factors, we documented them using the same format. For quantitative studies, we included relationships that were supported by effect estimates or higher proportions of the outcomes among exposed (significant at the 5% level). For qualitative studies, we included relationships indicated by a statement supported by quotes or reported direct observations that suggested the increment of one factor could lead to an increment (positive relationship) or reduction (negative relationship) of the landing factor. We assessed the quality of aspects of included studies using the Mixed Methods Appraisal Tool (MMAT).[29] Because the revised MMAT tool does not generate quality measures for each study, we did not incorporate its results into the analysis of the maps described below but followed the recommendation of describing the results of each criterion.

Data mapping

We used FCM to portray influences mentioned in the literature as an edge list with the origin and landing concepts in the first two columns and the weight of the relationship in the third column, as described above. We created an edge list for each included study and, using an algorithm developed by Šajna[30] in CIETmap V.2.2,[31] calculated the fuzzy transitive closure to identify the influence of each node on other nodes when taking into account all the relationships mentioned in the study.[30] An operator-independent procedure inspired by Harris' original discourse analysis[32] used the relative frequency of each relationship (node, arrow, node) across all the transitive closure maps to calculate its weight.[33] Because this step occurs after calculating transitive closure, the relative frequency incorporates both the relationships reported in the articles and those identified with the algorithm. In this application of Harris' discourse analysis, the

relative frequency of a relationship between two nodes is taken to reflect the function of the initial node in the map, in a similar way that linguists can identify the function of a word in the structure of a text. In FCM, the structural function of the node is causality. The initial node often influences the occurrence of the landing node according to the sources of the map. Viewing the literature in the scoping review as analogous to a text in an exercise on linguistic meaning, a relationship present across multiple articles in the literature would thus be stronger than a relationship identified in fewer articles. Causal interpretation of the relationships in the map is restricted to the set of data from which the relative frequency was derived, and they are not exhaustive proof of causality.

Two researchers (IS and PC) inductively classified the factors emerging from the scoping review into categories in reiterative rounds,[34] and then condensed the factor level relationships into a category level map to facilitate visualisation and interpretation.[33]

We used degree centrality measures in the free software yEd to further characterise the role of each factor.[35] Outdegree centrality calculated the total influence each node has in the system, the sum of the absolute values of the weights for each node's outgoing edges. Indegree centrality indicated the total influence that each node receives using the same calculation with the incoming relationships.

Contextualising the evidence from the scoping review

The contextualisation of available evidence combined three sources of information—traditional midwives,[36] intercultural researchers working on perinatal care[33] and the available literature—to identify the influences on maternal health in Indigenous communities in southern Mexico. Traditional midwives contributed a cultural perspective grounded in Guerrero local conditions, and intercultural researchers shared their understanding of the issues, based on their years of bridging the relationships between Western institutions and Indigenous communities in their international work in America, Africa and Asia.

Dion's Weight of Evidence is a procedure for stakeholders to interpret, expand on and prioritise findings from evidence syntheses.[24] We adapted this method by summarising the scoping review evidence as a fuzzy cognitive map with operator-independent weights based on Harris' discourse analysis. As described elsewhere, traditional midwives and intercultural researchers generated cognitive maps of their knowledge of factors affecting maternal health in Indigenous communities.[33 36] The production and analysis of stakeholder maps preceded (and were published before) this review, intended as an independent basis for contextualisation of the literature on safe birth and a contribution in its own right to the understanding of how change might be promoted in Indigenous communities in Guerrero. The FCM of

the literature review reflected empirical results of the selected studies without reference to the stakeholder maps. We compared the literature with stakeholder knowledge using a pattern matching table to identify agreement and differences across knowledge sources. This arranges each map as a column and the factors or categories in each map that influence the outcome as rows. The factors or categories in the same row indicate patterns of agreement across knowledge sources.

Patient and public involvement

The study is part of a participatory research programme involving stakeholders in Guerrero. The scoping review was part of a bigger process to bridge Indigenous and Western perspectives through intercultural dialogue.[37] We contextualised the findings from the scoping review using stakeholder perspectives already gathered in independent exercises in which participants had full control and authorship of the maps. The present review compares patterns between different perspectives. In a subsequent step in the larger project, the literature review and stakeholder maps will provide the substrate for intercultural dialogue engaging traditional midwives, health service providers and researchers. That dialogue will clarify what traditional midwives and their communities require of the services to ensure their cultural safety, and how to implement it.

RESULTS
Scoping review

Figure 1 provides an overview of the selection process for the scoping review. We examined 107 full texts and retained 87 documents, including 62 published papers, 15 book chapters, 7 dissertations and 3 reports between 1989 and 2020 (see online supplemental file 1). Some 61% (53/87) of documents were published in the last 10 years. The documents used English (60% or 52/87), Spanish (38% or 33/87) and Portuguese (2% or 2/87). Most studies were conducted in Mexico (38% or 33/87) and Guatemala (35% or 30/87), followed by Perú (7% or 6/87) and Ecuador (7% or 6/87). One multicounty study included contiguous communities in Mexico and Guatemala. Some 67% (58/87) were qualitative studies (mostly interviews, focus group discussions and observations), followed by 20% (17/87) quantitative and 14% (12/87) mixed methods. Cross-sectional surveys were the most common quantitative design. Three non-randomised studies used a pretest–posttest design to measure changes after training activities. Three pilot studies randomised an intervention to test the involvement of traditional midwives as facilitators of women groups,[38] the use of mHealth technologies to encourage referrals,[39] or support for traditional midwifery.[40]

Following MMAT criteria,[29] our main concern about the qualitative studies was the soundness of data collection methods and the level at which the interpretation of the results was substantiated by data. The quantitative
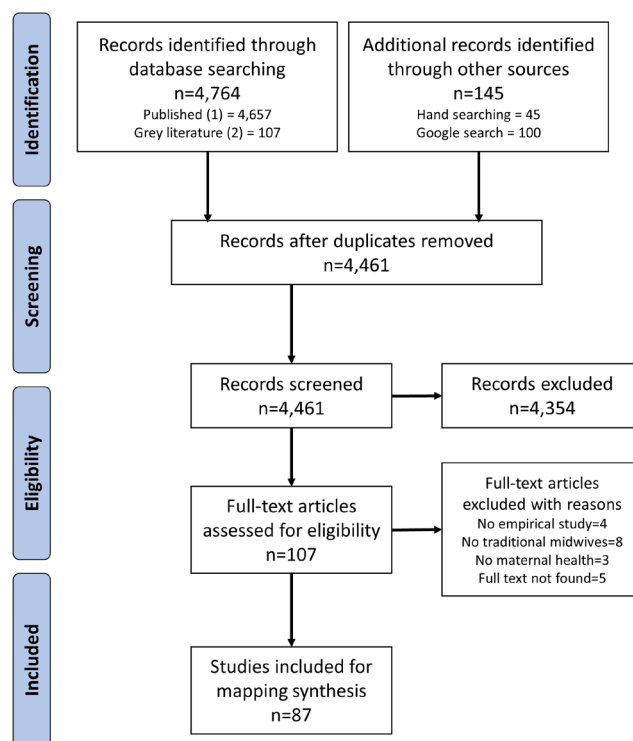

Figure 1 Flow diagram of the selection of sources of evidence (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews). (1) CINAHL, Scopus, LILACS, Medline, Embase, Google Scholar. (2) CEPAL, Repositorio FLACSO, BVS, BVS MTCI, PAHO, PAHO IRIS, Red de repositorios latinoamericanos, La referencia Dialnet, Redalyc, BDCOL, Biblioteca digital Bogotá, CLACSO, BRISA, WHO, WHO IRIS.

randomised controlled trials were non-blinded due to the participation of communities in the interventions. Few quantitative studies clarified whether their samples were representative of the target population. The main limitation of mixed methods studies was quality, particularly of quantitative components, and integration of the different components in answer to the research question.

The studies addressed maternal health in different ways (online supplemental file 1), describing the practices of traditional midwifery or self-care customs, training programmes for traditional midwives, barriers and facilitators of access to Western healthcare versus traditional services, or tensions in the interface of Indigenous communities and healthcare services. Four references reported on programmes exclusively focused on supporting traditional midwifery.[40–43]

Few studies were explicit about how they approached cultural differences, and studies used different terminology and different interpretations of the same terminology. The terms included anthropologic or ethnographic, intercultural, integration of traditional midwives and strengthening of cultural traditions. The term intercultural, for example, was used to describe Western services adapted to cultural conditions of users,[44] integration of traditional practices in Western settings,[45 46]

programmes offering training,[46] programmes valuing and recognising cultural diversity,[47] or hybrid scenarios for the practice of traditional birthing,[48] among others.

Only one qualitative study focused specifically on traditional disease entities ('isihuayo' or 'caída de matriz' (fallen womb) and 'necaxantle' or 'sobreparto' (postpartum illness)),[49] and eight studies mentioned traditional diseases.[50–59] The aetiology, symptoms and treatment of these illnesses were rooted in the cosmovision of Indigenous groups and have been described as a result of imbalances of bodily and social equilibrium.[49] Some of them included imbalances of corporal humours (cold and hot or humid and dry),[53] others would include displacement of organs or parts of the body as described by Indigenous concepts of anatomy,[49] negative effects of environmental conditions,[56 58] postpartum complications of the mother,[51] among others. Six studies (7%) reported specifically on health outcomes such as maternal mortality, childbirth complications, perineal trauma and postpartum infection. Almost all (80/87) focused on aspects of childbearing management and mothers' experiences during the perinatal period. Most of these studies described traditional practices, explored barriers or facilitators for access to Western healthcare (for complications or routine), or described the quality of Western or traditional services (online supplemental file 1).

Studies in Canada,[60] the USA,[61] Chile[55] and Western Mexico[62] reported on memories of traditional birth practices no longer in use. In Perú and Chile, traditional midwives reported persecution by police due to their practice.[55 59] During the selection of articles, it was evident that some Indigenous groups have transitioned to mestizo traditions, which made it difficult to establish if traditional midwives identified as Indigenous.[63–65]

Characteristics of participating traditional midwives varied widely between studies. One set of studies referred to older women and men linked with traditional culture, with almost no access to Western school, exclusively speakers of Indigenous language and who combine their work with other subsistence activities. This type of midwife was characterised by a vocation to serve their community, often responding to a divine call or inspiration, and recognition by their communities. They usually offered additional services as healers (*curanderos*) for children and other family members.[46 49 57 59 66–68] The second set of studies referred to midwives similar to Western-trained birth attendants.[25 69] This included younger Indigenous women, sometimes family of older traditional midwives, who were fluent in Spanish and received external training in the use of Western techniques. This type of midwifery was typically more welcome at the healthcare facilities and closer to Western worldviews.[70] In some communities in Chile, Brazil and Mexico, the role of traditional midwives was less institutionalised because Indigenous women would give birth alone or with the support of their families, and traditional midwives would be those who know how to help in case of complications.[55 62 71] The diversity of what could be considered traditional midwifery has

generated several classifications,[40 72] although few of the selected studies used these classifications. Some 17 of the 87 studies report no details about their participants, most of them simply reporting that their participants were traditional midwives from an Indigenous community.

Influences on maternal health in the scoping review

The 87 studies identified between 2 and 33 factors, and between 1 and 39 relationships between those factors. Together the studies identified 264 unique factors, which we grouped into 20 categories, linked by 1538 relationships after transitive closure. Table 1 shows a description of each category, and online supplemental file 2 shows the references for each of the maps that mentioned factors in these categories.

Based on discourse analysis weighting, using relative frequency of relationships, figure 2 shows the 10 presumed most influential positive and negative relationships at the category level (online supplemental file 3). The categories with more and stronger outgoing relationships (higher outdegree centrality) were the practice of traditional midwifery, culturally unsafe care and material poverty and marginalisation of remote communities. The main outcomes explored in the literature, as indicated by a higher indegree centrality, were access to Western healthcare, followed by maternal health outcomes and practice of traditional midwifery. The three categories in the map with the strongest influences on maternal health outcomes included the positive effects of self-care practices and practice of traditional midwifery followed by the negative effects of disempowered communities, families or women.

The traditional midwifery category had a self pointing arrow denoting reinforcing cycles defined by a commitment to their patients (community members), mentorship of apprentices and family heritage. The increasing age of traditional midwives had both positive and negative effects on their role: it impeded elderly traditional midwives from continuing their practice (negative) and brought more knowledge and esteem as they accumulated experience (positive). The spiritual dimension of traditional midwifery was reflected in mystic experiences signalling their professional call or providing spiritual/divine help during their practice. The influence of traditional midwifery was decreased by culturally unsafe care and by programmes focused on training and supplies.

The strongest outgoing arrows of traditional midwifery indicated the most frequently reported positive effects on maternal health through adequate management of childbirth (even of some complicated cases) and the control of traditional diseases. Two additional arrows indicated positive effects of traditional midwives on cultural continuity and promotion of self-care practices, which in turn had the strongest positive effect on maternal health. More traditional care in the communities increased the sense of confidence and agency of mothers and levels of family and community involvement (decreased disempowerment). Both cultural continuity and disempowerment

Table 1 Categories that emerged from the factors in the maps

Category	Description
1. Positive maternal health outcomes	This category included reduced maternal mortality and pregnancy, childbirth or postpartum complications, such as bleeding, breech presentation, preeclampsia, eclampsia, premature rupture of membranes, prolonged labour, infections, perineal tear and so on. This category also included prevention or control of traditional diseases, such as coldness, 'matriz caída' (fallen womb), 'sobreparto' (postpartum illness), 'antojo' (craving) and so on. Other factors described mental health in terms of self-esteem and well-being of the mothers.
2. Adequate nutrition	Most of the studies that reported the importance of adequate mother nutrition did not offer additional details. Two studies mentioned increased intake of fish, vegetables or meat products during pregnancy. This category is different from dietary restrictions that are part of self-care practices.
3. Woman's comorbidities or physical weakness (before pregnancy)	Reports of women's weakness or poor health conditions that did not depend on the pregnancy, such as a history of hypertensive disorders, prior caesarean section and complications of other procedures.
4. Abortion and contraception	Use of modern (condoms, pills, etc.) or traditional methods (plants or massage of the umbilical cord) of family planning and pregnancy interruption.
5. Health of children and other family members	Positive infant health conditions such as treated diarrhoea or respiratory infections. This category included the cure or prevention of multiple traditional diseases such as 'empacho' (gastrointestinal malaise), 'susto' (fright), 'mal de ojo' (evil eye) or the treatment of muscle-related or bone-related conditions with 'sobadas' (massages).
6. Casual/family/no childbirth attendant	Childbirths in company of family (husband, mother-in-law, grandmother) or neighbours. This category could have overlap with traditional midwives who are family of the mother. This also included childbirths without any company.
7. Access to Western healthcare	This corresponds with the ideal scenario in which Western health services are available, affordable and accessible, with adequate infrastructure, supplies and personnel (enough providers and low turnover). Women go to these services for antenatal care, routine care or in case of complications. This category included institutional childbirths and postpartum institutional care.
8. Traditional midwives refer patients to Western care	Traditional midwives advise mothers to visit Western healthcare services for complications or routine care.
9. Culturally sensitive maternal health programmes	Initiatives to adequate Western services to the cultural context of Indigenous groups but retaining the prominence of Western ways. This category included bringing traditional midwives to participate in institutional childbirths (mostly as an auxiliary, companion or translator), having translators, institutionalising vertical childbirths, offering Indigenous-led community centres to support mothers while they access institutional childbirths ('casas de la mujer indígena' or maternity houses), birthing facilities next to hospitals, allowing women to use their traditional clothes during childbirth, promoting circles of women, using mHealth technologies and so on. One study reported the use of alternative/complementary therapies as part of these adaptations.[46]
10. Culturally unsafe care	At an individual level, it was expressed as racism in health institutions against Indigenous groups, lack of commitment of health providers, negative attitudes towards traditional midwifery and bad treatment of patients, family or traditional midwives at healthcare facilities. This also included lack of training of Western personnel on how to relate with other cultures, preference of colonial languages and Western worldviews and disdain for Indigenous culture. In culturally unsafe care, patients had negative experiences or perceived risks of mistreatment, feared unnecessary c-section, episiotomy, surgery or sterilisation. At the system level, this category included political or religious discrimination, lack of policies promoting intercultural care, implementation of policies that do not recognise the intercultural context or advise against Indigenous traditions and programmes that use culturally inadequate communication strategies. In Mexico, cash transfers were widely used to condition women's institutional childbirths.[87]

Continued

Table 1 Continued

Category	Description
11. Disempowered communities, families or women	Communities divided by political or religious conflicts and without agency to act on healthcare services. Families could not contest the restrictions of Western providers to participate in childbirth, or they, and the mothers, were not aware of their rights. In Guatemala, Perú and México, limited access to birth certificates was an important barrier for traditional births.[46 59 68 88] Negative gender norms (machismo) reduced women's autonomy for decision making and increased violence against them. Indigenous women had strong feelings of modesty and shame during their interaction with Western practitioners.
12. Programmes focused on training and supplies	Short courses offered by public authorities or non-governmental organisations (NGOs) focused on training traditional midwives on Western contents and bringing them supplies (kits) to put in practice these contents. There was a variety of formats for these courses, and some of them used translators, radio, visual aids and so on, to communicate contents across cultural differences.
13. Cultural continuity	Groups that maintain traditional culture and knowledge use their traditional languages and respect traditional medicine, including traditional midwives. Cultural practices usually decreased with proximity to urban centres where these groups assimilated more mestizo identities. Cultural continuity included transmission of Indigenous practices and customs across younger generations.
14. Practice/persistence of traditional midwifery	Traditional midwives were available and supported women during pregnancy, childbirth and the postpartum period, or even beyond. They had recognition from their communities and could be organised to support their practice (associations). In the main text we describe the wide variation of participating traditional midwives.
15. Self-care practices	These included a wide range of cultural prescriptions for the prevention or early management of diseases. Mothers and their families would have the main responsibility to put these prescriptions into practice. These prescriptions involved many aspects of everyday life such as sexual behaviour, reduction of heavy work, dietary restrictions, spiritual routines or rituals, use of medicinal plants, preparation for childbirth and so on. Particularly relevant was the care of the hot and cold balance of mothers' bodies.
16. Interest of traditional midwives in training or new roles	Traditional midwives expressed their interest in new roles (doulas, trainers of Western midwives, HIV prevention) or in participating in courses.
17. Material poverty and marginalisation	Most Indigenous groups included in the studies lived in communities with poor quality infrastructure (roads or institutional services) and lacked communication means. Transportation was a major challenge for these communities both in terms of availability and costs. In these communities, low income and food insecurity was a concern.
18. Positive experience with home childbirth	Mother's feelings of comfort, confidence and security. They described positive aspects of having company of their family, drinking teas or practising rituals. Mothers also valued the intimacy of their homes and not being exposed to unknown practitioners, particularly men.
19. Spiritual/divine help	Traditional midwives reported spiritual experiences as the origin of their practice, in the form of dreams or revelations. The spiritual dimension was also a source of help for the health of their patients either during routine care or in case of an emergency. Prayer was the main mechanism that traditional midwives used to obtain divine help.
20. External advocates and NGOs promoting maternal and reproductive health	Usually, international organisations or groups of professionals from bigger cities supporting Indigenous communities in the implementation of programmes or advocacy of their rights. External aiders could work individually or in association with local authorities.

reduced access to Western care. Cultural continuity reflected in Indigenous people preferring traditional care (midwives or other traditional practitioners) and avoiding Western health services. Disempowerment was reflected in mothers not deciding about their care or having their decisions overruled by husbands or mothers-in-law.

Culturally unsafe care also showed reinforcing dynamics through the accumulation of negative experiences, fear and lack of trust among Indigenous mothers and community members. Programmes that had a more sensitive approach to cultural differences contributed to a decrease in culturally unsafe attitudes, particularly among care providers, and thus allowed for increased use of Western care. Lack of community trust in Western health personnel was an important barrier to accessing institutional care, either because women did not go or because traditional midwives did not advise their patients to visit Western providers.

Material poverty and marginalisation often reduced access to Western healthcare due to the geographical distance, poor-quality infrastructure, or lack of resources or transport to reach the services.
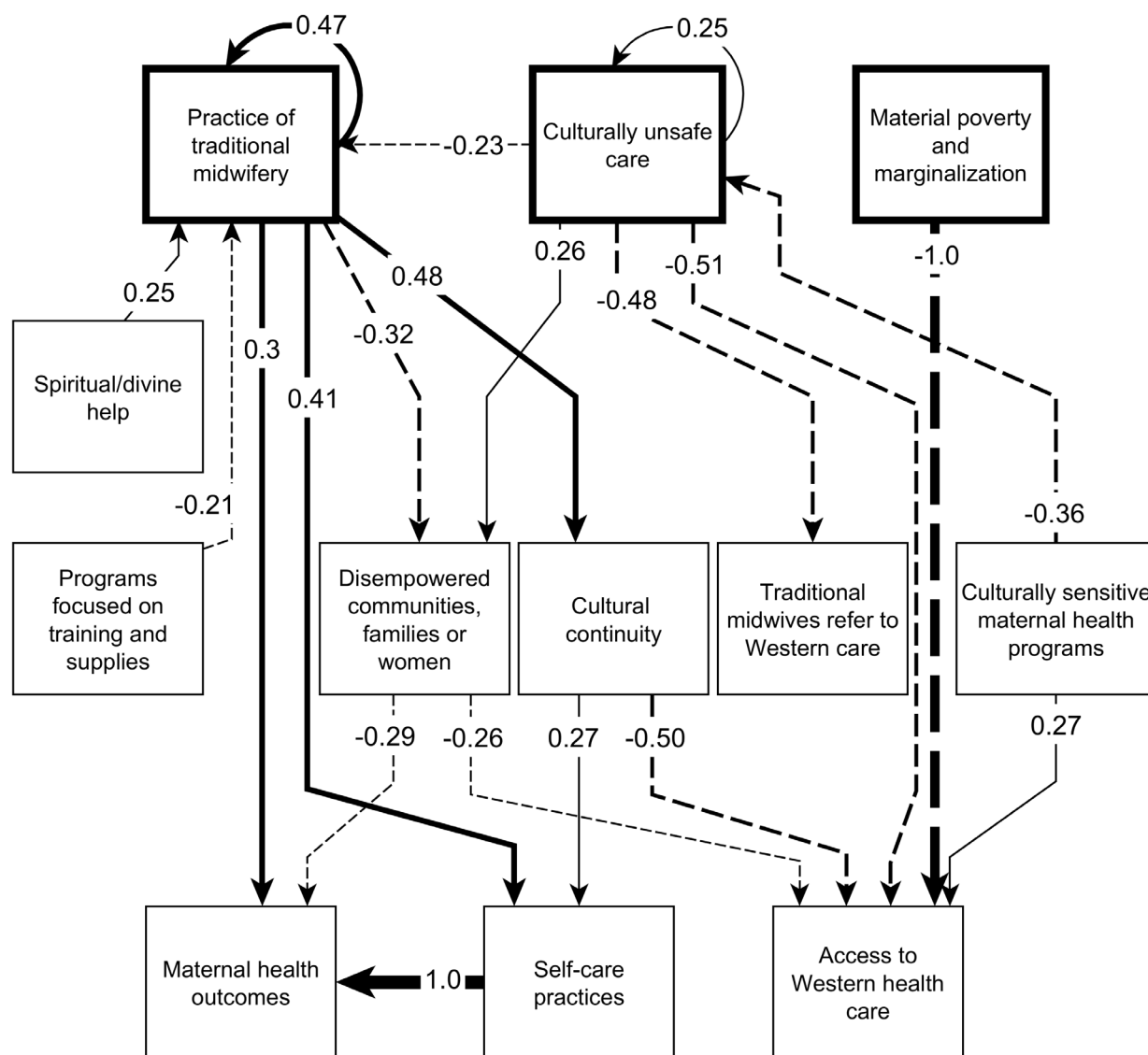
Figure 2 Fuzzy cognitive map of the most influential categories identified in the scoping review. To simplify the graph, we only included the 10 strongest positive and negative relationships. Online supplemental file 3 contains all the relationships on the map. Solid lines represent positive relationships and dashed lines negative ones. The numbers on the edges represent the cumulative influence of one category on another, where 1 is the strongest influence on the map. The three boxes with ticker lines also had the highest outdegree centrality or influence in the whole system.

Contextualisation of the scoping review with stakeholder perspectives

We compared the results of the scoping review with the final category maps from two previously reported studies that used FCM to describe stakeholder perspectives of factors affecting maternal health in Indigenous communities. A study in the south of Guerrero included 29 Indigenous traditional midwives from the *Me'phaa* (Tlapaneco) and *Nancue ñomndaa* (Amuzgo) groups.[36] These women and two men had de facto recognition as midwives in their communities, based on their decades of service and traditional knowledge. Most used only Indigenous languages and the mapping session relied on trained intercultural brokers for translation. Traditional midwives drew their maps in group sessions, building one map of protective factors and another of risk factors.[40] The second study of

stakeholder perspectives summarised the views of eight intercultural researchers (three women and five men) with extensive experience in culturally safe health promotion (Mexico, Guatemala, Colombia, Canada, Nigeria, Botswana). All researchers had also contributed to the project that supported Indigenous traditional midwives (above), but none participated in the mapping sessions with the midwives. Researchers created individual maps with protective and risk factors on the same map.[33] The maps from these two sources are available in online supplemental file 4.

Table 2 shows the pattern matching table to compare the three categories of factors with the strongest influence on maternal health in the maps from each of the three sources. A pattern identified across all the maps was the positive effect of self-care practices, rituals and traditional

Table 2 Pattern matching table to compare the maps from three different sources about factors influencing positive maternal health

Literature	Traditional midwives From the map of risks*	Traditional midwives From the map of protectors	Researchers	Pattern
Self-care practices (1)	The woman follows self-care practices (1)	The woman follows protective rituals (3)	Cultural continuity (1)	Pattern 1
The practice of traditional midwifery (2)		The woman has the support of a traditional midwife or healer (2)		
Empowerment of communities, families or women (3)*	The woman does not suffer violence (3)	The woman has a loving and caring husband (1)	Physical and emotional safety of women (3)	Pattern 2
			Culturally safe healthcare (2)	Pattern 3
			Culturally safe environment (3)*	
	No traditional diseases (2)†			Pattern 4

The numbers in parenthesis indicate the relative position of the category in the map (1) strongest influence, (2) second strongest influence, (3) third strongest influence.
*These categories appeared as risk factors in the maps. For comparison purposes, we adjusted the description in this table as the absence of the opposite of the risk factor to describe it in terms of protection.
†This category came from the self-pointing loop in maternal health.

midwifery. In the stakeholder and literature maps, these categories had reinforcing relationships between them.

In another pattern across all the maps, traditional midwives stressed the importance of reducing violence against women and promoting a supportive role for male partners, in their words: 'a loving, working and caring husband'. Researchers mentioned a broader category that included the reduction of violence and other aspects of women's well-being. In the literature review, the concern about control of gender violence and women's disempowerment was part of a broader category that included family and community empowerment. Traditional midwives mentioned their role in counselling partners to increase male engagement and reduce violence against mothers. The literature map (figure 2) indicated that traditional midwifery could reduce disempowerment of communities, families or women, while culturally unsafe care would increase disempowerment.

The concern about culturally unsafe healthcare and, in general, a culturally unsafe institutional environment for Indigenous communities was prominent among intercultural researchers. Traditional midwives expressed a similar concern when they described the influence of hospital in the community on maternal health (map 2 in online supplemental file 4). Although, in their view, it had a modest protective effect, the maps also showed the presence of hospital reducing other protective factors. The literature also highlighted the negative impact of culturally unsafe care (online supplemental file 3), but its effect was stronger in reducing access to Western healthcare than in reducing maternal health. In contrast with the literature's main concern to increase access to

Western health services, having a hospital in the community was not a priority for traditional midwives (map 2 online supplemental file 4), and researchers conditioned the importance of accessible health facilities to their level of cultural safety (map 3 online supplemental file 4).

Finally, in the maps from traditional midwives, the control of traditional diseases as positive for maternal health was prominent. The literature review also mentioned the importance of traditional diseases (table 1) but with a lower level of influence.

DISCUSSION

The contextualisation of the scoping review with the perspectives of traditional midwives and intercultural researchers indicated that all three knowledge sources considered self-care practices, rituals and traditional midwifery as strong positive influences on maternal health in Indigenous communities. In the scoping review, access to Western healthcare was the primary outcome studied, followed by maternal health outcomes. For traditional midwives, a community-based hospital was less important and intercultural researchers conditioned its importance by its level of cultural safety. For traditional midwives, male support was the strongest protective factor; the researchers and the literature included male support in a category that comprised other aspects of women's well-being and empowerment. Control of traditional diseases was important for midwives but less so in the literature.

The scoping review reveals an underdeveloped literature, with little quantitative evidence on traditional midwifery practices and their associated outcomes. Three

small randomised trials involved traditional midwives, but only one tested the impact of their traditional practice. The studies had diverse approaches to cultural differences, ranging from assimilation of Indigenous cultures into Western ways to recognition of diversity and codesign of interventions. The studies used a range of definitions of traditional midwifery.

Most studies in the scoping review came from two countries (Guatemala and Mexico). They were published in English, a language not spoken widely in any of the countries reporting traditional midwifery. We expect research in a language not accessible to communities or traditional midwives will reflect a cultural bias that favours Western over Indigenous perspectives. The long history of colonisation underwrites a similar bias in research on Indigenous groups, who in turn have become increasingly vocal about decolonising methodologies.[73] The bias understates community strengths and resources, diminished as these might be after centuries of colonisation, to focus on damage and deficit. Overcoming this emphasis on community weaknesses requires explicit theories from Indigenous perspectives.[74] FCM provides a language to share and to examine these theories.

Several literature reviews have explored the impact of programmes involving traditional midwives (Indigenous and non-Indigenous) in maternal health.[8 9 11–14 75] All explored strategies to assimilate Indigenous communities into the Western health system. We restricted our review to Indigenous communities and traditions, thus focusing on the scope of their work and their knowledge, resources and technologies.

Our study offers a soft model that surfaces different potential starting points for interventions to improve maternal health. Previous work in Africa has shown that involving local perspectives can help to develop culturally respectful interventions for the promotion of reproductive health.[76 77] The literature map suggested that Western research has focused on understanding access to biomedical healthcare services as an outcome, as indicated by a higher indegree centrality in the map. Disrespect for Indigenous groups (cultural unsafety) and harsher material conditions accumulated to hinder Indigenous women's access to Western services and affected other factors in the literature map. Lack of understanding of the needs and practices of Indigenous communities and not viewing cultural practices, including traditional midwifery, as a community strength, may limit the access of Indigenous communities to biomedical services (particularly if they require emergency obstetric care). A 2014 systematic global mapping[78] and a 2016 systematic review[79] explored interventions to address cultural factors that prevent access to Western maternity care. The reviews found that culturally congruent interventions can positively impact professional care, although few studies have measured impact in low-income and middle-income countries.

Contextualising this literature, both with local knowledge and international research expertise in culturally safe care, showed contrasting priorities in both promotion of Western healthcare and the role of traditional diseases. Although the literature recognises the existence of traditional concepts of diseases, more research is needed to understand them and their impact in terms of maternal health. The three sources coincided in suggesting that Indigenous communities could contribute knowledge, skills and resources to promote maternal health (e.g. self-care practices, rituals and traditional healers). The impact of traditional practices on maternal health outcomes remains a research priority. Communities with stronger traditions could be better positioned to protect the health of their mothers. Traditional healers in South America[80] and Indigenous communities in Canada[81] have suggested that cultural continuity has a positive effect on the health of Indigenous groups. Actions that promote ownership and sustained participation of Indigenous communities have shown positive changes in prenatal and child health outcomes in Canada.[82] A further challenge will be to define and measure Indigenous cultural continuity and to establish its impact on healthy motherhood.

Particularly in Mexico, violence against Indigenous women is recognised as a risk factor for maternal and infant death with a structural dimension rooted in colonial history.[83 84] There is a paucity of research on the potential contribution of traditional midwives in reducing violence against women. In Guerrero, Mexico and Africa, traditional midwives advise men and could engage them in providing support and an enabling environment for mothers.[36 85] Research on this topic could include discussing ways to improve the male role drawing on cultural strengths.

Strengths and limitations

Our application of Harris' discourse analysis permitted the incorporation of qualitative and quantitative data on causal relationships from the studies in the scoping review, without depending on empirical measurement, mathematical transformations or researcher assumptions. The weights of the relationships in the operator-independent maps are best interpreted as grades of consensus about influence, not as pooled estimates of impact.[18 24] Harris' discourse analysis is more informative in maps of categories of factors.[33] These categories imply higher levels of abstraction with necessary losses in granularity for factor-level inference.[86] The stakeholder maps that we compared with the scoping review came from two specific groups purposively selected, and future research with other stakeholder groups could offer additional perspectives.

CONCLUSIONS

The literature and stakeholder maps showed maternal health in Indigenous communities resulting from complex interacting factors. The FCM provided a practical way to compare and combine different sources of knowledge in a transparent and traceable way. The three

knowledge sources agreed that traditional practices could have positive effects on the health of mothers, highlighting the need for additional research on this topic.

Author affiliations
[1]Department of Family Medicine, McGill University, Montreal, Québec, Canada
[2]Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia
[3]Centro de Investigación de Enfermedades Tropicales - CIET, Universidad Autónoma de Guerrero, Acapulco, Guerrero, Mexico
[4]Unidad de Posgrados e Investigación, Universidad Autónoma de Yucatán, Merida, Yucatán, México
[5]Facultad de Medicina, Universidad de La Sabana, Chia, Colombia

Twitter Anna Dion @Anna_Dion and Juan Pimentel @juanppimentel

ORCID iDs
Iván Sarmiento http://orcid.org/0000-0003-2871-1464
Sergio Paredes-Solís http://orcid.org/0000-0002-3015-3038
Anna Dion http://orcid.org/0000-0003-2122-222X
Hilah Silver http://orcid.org/0000-0001-9281-6805
Emily Vargas http://orcid.org/0000-0002-4477-4572
Juan Pimentel http://orcid.org/0000-0002-6842-3064
Germán Zuluaga http://orcid.org/0000-0001-5715-9133
Anne Cockcroft http://orcid.org/0000-0002-1558-1106
Neil Andersson http://orcid.org/0000-0002-5220-2136

REFERENCES
1. Koblinsky M, Moyer CA, Calvert C, *et al*. Quality maternity care for every woman, everywhere: a call to action. *Lancet* 2016;388:2307–20.
2. Chalmers B. Cultural issues in perinatal care. *Birth* 2013;40:217–9.
3. Jordan B. *Birth in four cultures: a crosscultural investigation of childbirth in Yucatan, Holland, Sweden, and the United States*. 4th edn. Long Grove, IL: Waveland Press, 1993.
4. Kennedy HP, Cheyney M, Dahlen HG, *et al*. Asking different questions: a call to action for research to improve the quality of care for every woman, every child. *Birth* 2018;45:222–31.
5. United Nations (Department of Economic and Social Affairs). *Permanent Forum on Indigenous Issues. State of the World's indigenous peoples*. New York: United Nations, 2014. http://www.un.org/esa/socdev/unpfii/documents/2015/sowip2volume-ac.pdf
6. Bohren MA, Hunter EC, Munthe-Kaas HM, *et al*. Facilitators and barriers to facility-based delivery in low- and middle-income countries: a qualitative evidence synthesis. *Reprod Health* 2014;11:71.
7. World Health Organization. *General guidelines for methodologies on research and evaluation of traditional medicine*. Geneva, Switzerland, 2000. http://apps.who.int/medicinedocs/en/d/Jwhozip42e/
8. Sibley LM, Sipe TA, Barry D. Traditional birth attendant training for improving health behaviours and pregnancy outcomes. *Cochrane Database Syst Rev* 2012:CD005460.
9. Byrne A, Morgan A. How the integration of traditional birth attendants with formal health systems can increase skilled birth attendance. *Int J Gynaecol Obstet* 2011;115:127–34.
10. Kidney E, Winter HR, Khan KS, *et al*. Systematic review of effect of community-level interventions to reduce maternal mortality. *BMC Pregnancy Childbirth* 2009;9:2.
11. Wilson A, Gallos ID, Plana N. Effectiveness of strategies incorporating training and support of traditional birth attendants on perinatal and maternal mortality: meta-analysis. *BMJ Br Med J* 2012;344:16.
12. Lassi ZS, Das JK, Salam RA, *et al*. Evidence from community level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reprod Health* 2014;11:S2.
13. Darmstadt GL, Lee ACC, Cousens S, *et al*. 60 million non-facility births: who can deliver in community settings to reduce intrapartum-related deaths? *Int J Gynaecol Obstet* 2009;107:S89–112.
14. Kruske S, Barclay L. Effect of shifting policies on traditional birth attendant training. *J Midwifery Womens Health* 2004;49:306–11.
15. World Health Organization. *Making pregnancy safer: the critical role of the skilled attendant. A joint statement by WHO, ICM and FIGO*. Geneva, 2004. http://whqlibdoc.who.int/publications/2004/9241591692.pdf
16. World Health Organization. *WHO recommendations on maternal health: guidelines Approved by the who guidelines review Committee*. Geneva, 2017. http://who.int/tb/features_archive/factsheet_xpert.pdf
17. Jones E, Lattof SR, Coast E. Interventions to provide culturally-appropriate maternity care services: factors affecting implementation. *BMC Pregnancy Childbirth* 2017;17:267.
18. Peters MDJ, Marnie C, Tricco AC, *et al*. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth* 2020;18:2119–26.
19. Giles BG, Findlay CS, Haas G, *et al*. Integrating conventional science and aboriginal perspectives on diabetes using fuzzy cognitive maps. *Soc Sci Med* 2007;64:562–76.
20. Andersson N, Silver H. Fuzzy cognitive mapping: an old tool with new uses in nursing research. *J Adv Nurs* 2019;75:3823–30.
21. Özesmi U, Özesmi SL. Ecological models based on people's knowledge: a multi-step fuzzy cognitive mapping approach. *Ecol Modell* 2004;176:43–64.
22. Kosko B. *Fuzzy thinking: the new science of fuzzy logic*. New York, NY: Hyperion, 1994. https://books.google.ca/books?id=wIKRGQAACAAJ
23. Kosko B. Fuzzy cognitive maps. *Int J Man Mach Stud* 1986;24:65–75.

24 Dion A, Carini-Gutierrez A, Jimenez V. Weight of evidence: participatory methods and bayesian updating to contextualize evidence synthesis in stakeholders' knowledge. *J Mix Methods Res* 2021.

25 Sarmiento I, Paredes-Solís S, Morris M, *et al*. Factors influencing maternal health in indigenous communities with presence of traditional midwifery in the Americas: protocol for a scoping review. *BMJ Open* 2020;10:e037922.

26 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.

27 Clarivate analytics. endnote X9. Available: https://endnote.com/ [Accessed 22 Sep 2018].

28 Ouzzani M, Hammady H, Fedorowicz Z, *et al*. Rayyan—a web and mobile app for systematic reviews. *Syst Rev* 2016;5:1–10.

29 Hong QN, Gonzalez-Reyes A, Pluye P. Improving the usefulness of a tool for appraising the quality of qualitative, quantitative and mixed methods studies, the mixed methods appraisal tool (MMAT). *J Eval Clin Pract* 2018;24:459–67.

30 Niesink P, Poulin K, Šajna M. Computing transitive closure of bipolar weighted digraphs. *Discrete Appl Math* 2013;161:217–43.

31 Andersson N, Mitchell S. Epidemiological geomatics in evaluation of mine risk education in Afghanistan: introducing population weighted raster maps. *Int J Health Geogr* 2006;5:1.

32 Harris ZS. Discourse analysis. *Language* 1952;28:1.

33 Sarmiento I, Cockcroft A, Dion A. Combining conceptual frameworks on maternal health in indigenous communities - Fuzzy cognitive mapping using participant and operator-independent weighting. *Field Methods* 2022;34.

34 Saldaña J. *The coding manual for qualitative researchers*. Los Angeles, CA: Sage Publications Inc, 2016. https://www.sagepub.com/sites/default/files/upm-binaries/24614_01_Saldana_Ch_01.pdf

35 Gray S, Zanre E, Gray SRJ. Fuzzy cognitive maps as representations of mental models and group beliefs. In: Papageorgiou EI, ed. *Fuzzy cognitive maps for applied sciences and engineering*. Berlin: Springer, 2014: 29–48.

36 Sarmiento I, Paredes-Solís S, Loutfi D, *et al*. Fuzzy cognitive mapping and soft models of indigenous knowledge on maternal health in Guerrero, Mexico. *BMC Med Res Methodol* 2020;20:125.

37 Sarmiento I, Zuluaga G, Paredes-Solís S, *et al*. Bridging Western and Indigenous knowledge through intercultural dialogue: lessons from participatory research in Mexico. *BMJ Glob Health* 2020;5:e002488.

38 Chomat AM, Menchú AI, Andersson N, *et al*. Women's circles as a culturally safe psychosocial intervention in Guatemalan indigenous communities: a community-led pilot randomised trial. *BMC Womens Health* 2019;19:53.

39 Martinez B, Ixen EC, Hall-Clifford R, *et al*. mHealth intervention to improve the continuum of maternal and perinatal care in rural Guatemala: a pragmatic, randomized controlled feasibility trial. *Reprod Health* 2018;15:120.

40 Sarmiento I, Paredes-Solís S, Andersson N, *et al*. Safe birth and cultural safety in southern Mexico: study protocol for a randomised controlled trial. *Trials* 2018;19:354.

41 Paredes-Solís S, de Jesús-García A, Valtierra-Gil G. Percepción de los cambios producidos por la enseñanza de parteras tradicionales experimentadas de Xochistlahuaca, Guerrero. In: Freyermuth G, Vega M, Tinoco A, eds. *Los caminos para parir en México en el siglo XXI: experiencias de investigación, vinculación, formación y comunicación*. Ciudad de México, 2018: 194–203.

42 Icó M, Daniels S. Parteras Mayas tradicionales cuidando La salud de las mujeres, 2020. Available: https://www.culturalsurvival.org/news/parteras-mayas-tradicionales-cuidando-la-salud-de-las-mujeres [Accessed 18 Mar 2020].

43 Ministério da Saúde. Secretaria de Atenção Saúde. *Parto e nascimento domiciliar assistidos por parteiras tradicionais : o Programa Trabalhando com Parteiras Tradicionais e experiências exemplares*. Brasilia, BA, 2012.

44 Friesen L, Mazariegos C, Barrera A. Atención del parto y del puerperio inmediato con pertinencia intercultural. *Rev Méd* 2017;156:67–70.

45 Gallegos CA, Waters WF, Kuhlmann AS. Discourse versus practice: are traditional practices and beliefs in pregnancy and childbirth included or excluded in the Ecuadorian health care system? *Int Health* 2017;9:105–11.

46 Mignone J, Bartlett J, O'Neil J, *et al*. Best practices in intercultural health: five case studies in Latin America. *J Ethnobiol Ethnomed* 2007;3:31.

47 Rangel Flores YY, Hernández Ibarra LE, González Acevedo CE. Agenciamientos y resistencias en el cuidado obstétrico comunitario tras la capacitación institucional. *Index de Enfermería* 2017;26:250–4 http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1132-12962017000300003&nrm=iso

48 Tucker K, Ochoa H, Garcia R, *et al*. The acceptability and feasibility of an intercultural birth center in the highlands of Chiapas, Mexico. *BMC Pregnancy Childbirth* 2013;13:94.

49 Smith-Oka V. An analysis of two indigenous reproductive health illnesses in a Nahua community in Veracruz, Mexico. *J Ethnobiol Ethnomed* 2012;8:33.

50 Anderson BA, Anderson EN, Franklin T, *et al*. Pathways of decision making among Yucatan Mayan traditional birth attendants. *J Midwifery Womens Health* 2004;49:312–9.

51 Ordinola Ramírez CM. Creencias y costumbres de madres y parteras para La atención del embarazo, parto y puerperio en el Distrito de Huancas (Chachapoyas, Perú). *Arnaldoa* 2019;26.

52 Dias-Scopel RP, Scopel D. Quiénes son Las parteras munduruku? Pluralismo médico y autoatención en el parto domiciliario entre indígenas en Amazonas, Brasil. *Desacatos* 2018:16–33.

53 Bayles B. Metaphors to cure by: Tojolab'al Maya midwifery and cognition. *Anthropol Med* 2008;15:227–38.

54 Lopez J. El fin de las comadronas tradicionales en el oriente de Guatemala. In: Fernandez-Juarez G, Gonzalez-Gonzalez I, García-Ortiz P, eds. *La diversidad frente al espejo. Salud, interculturalidad y contexto migratorio*, 2008: 101–12.

55 Salazar A. *El oficio de la puñeñelchefe: Memorias del parto en Los relatos de tres mujeres mapuche de la comunidad Curaco Ranquil*, 2012.

56 Pérez-Pérez G, Godínez-Rodríguez M. Costumbres y prácticas ancestrales en el cuidado de la mujer tseltal embarazada. *Metas Enferm* 2019;22:49–55.

57 Castañeda Camey X, García Barrios C, Romero Guerrero X, *et al*. Traditional birth attendants in Mexico: advantages and inadequacies of care for normal deliveries. *Soc Sci Med* 1996;43:199–207.

58 Pelcastre B, Villegas N, De León V, *et al*. Embarazo, parto y puerperio: creencias y prácticas de parteras en San Luis Potosí, México. *Rev Esc Enferm USP* 2005;39:375–82.

59 Velarde L. 'Las parteras sí saben, son importantes, solo que están olvidadas.' Situación actual de las parteras en los Andes del sur del Perú (Ayacucho) 2007.

60 Pauktuutit Inuit Women's Association of Canada. Pauktuutit special report Inuit midwifery, 1995. *Suvaguuq* 1995;10.

61 Kirsis LK. 'She taught us how to be': the cultural construction of birth and midwifery among the Koyukon Athabaskans of Interior Alaska. *Arctic Anthropol* 1996;33:62–76.

62 Gil-Veloz G. Partería entre las mujeres rarámuri y wixaritari. In: Freyermuth G, Vega M, Tinoco A, *et al.*, eds. *Los caminos para parir en México en El siglo XXI: experiencias de investigación, vinculación, formación y comunicación*. Ciudad de México, 2018: 40–7.

63 Cardoso MA de S, Nascimento R. O DOM E a dádiva entre parteiras do Amapá: uma abordagem etnográfica. *Saúde e Soc* 2019;28:235–49.

64 Gonzalez-Liendo M. *Las parteras tradicionales como parte del sistema de salud pública intercultural de Bolivia*, 2010.

65 Hilgert NI, Gil GE. Reproductive medicine in northwest Argentina: traditional and institutional systems. *J Ethnobiol Ethnomed* 2007;3:19.

66 Walsh LV. Beliefs and rituals in traditional birth attendant practice in Guatemala. *J Transcult Nurs* 2006;17–148–54.

67 Rodríguez-Flores L, Oviedo-Bautista S. Propuesta para la inclusión de las parteras tradicionales en el primer nivel de atención: el caso de Atoyac de Álvarez, Guerrero. In: Freyermuth G, Vega M, Tinoco A, *et al*, eds. *Los caminos para parir en México en el siglo XXI: experiencias de investigación, vinculación, formación y comunicación*. Ciudad de México, M, 2018: 116–23.

68 Rivas R. At highest risk: maternal health in the high Peruvian Andes. *MIDIRS Midwifery Dig* 2006;16:46–50.

69 Castañeda-Camey X. [Pregnancy, labor, and puerperium: concepts and practices of midwives in the state of Morelos]. *Salud Publica Mex* 1992;34:528–32.

70 Chary A, Díaz AK, Henderson B, *et al*. The changing role of Indigenous lay midwives in Guatemala: new frameworks for analysis. *Midwifery* 2013;29:852–8.

71 Gusman CR, Rodrigues DA, Villela WV. Paradoxos do programa de parteiras tradicionais no contexto das mulheres Krahô. *Cien Saude Colet* 2019;24:2627–36.

72 Castañeda-Camey X. Embarazo, parto y puerperio: conceptos y prácticas de las parteras en el estado de Morelos. *Salud Publica Mex* 1992;34:528–32.

73 Smith LT. *Decolonizing methodologies: research and Indigenous peoples*. 2nd edn. London: Zed Books, 2012.

74 Tuck E. Re-visioning action: participatory action research and Indigenous theories of change. *Urban Rev* 2009;41:47–65.

75 Miller T, Smith H. Establishing partnership with traditional birth attendants for improved maternal and newborn health: a review

of factors influencing implementation. *BMC Pregnancy Childbirth* 2017;17:1–10.

76 Sarmiento I, Ansari U, Omer K, *et al*. Causes of short birth interval (kunika) in Bauchi state, Nigeria: systematizing local knowledge with fuzzy cognitive mapping. *Reprod Health* 2021;18

77 Belaid L, Atim P, Atim E, *et al*. Communities and service providers address access to perinatal care in postconflict Northern Uganda: socialising evidence for participatory action. *Fam Med Community Health* 2021;9:e000610.

78 Coast E, Jones E, Portela A, *et al*. Maternity care services and culture: a systematic global mapping of interventions. *PLoS One* 2014;9:e108130.

79 Coast E, Jones E, Lattof SR, *et al*. Effectiveness of interventions to provide culturally appropriate maternity care in increasing uptake of skilled maternity care: a systematic review. *Health Policy Plan* 2016;31:1479–91.

80 UMIYAC: Unión de Médicos Indígenas Yageceros de la Amazonía Colombiana. *The beliefs of the elders, code of ethics for Indigenous medicine of the Colombian Amazon*. Colombia: Amazon Conservation Team, 2000. https://www.bialabate.net/wp-content/uploads/2008/08/code_of_ethics_umiyac.pdf

81 Mcivor O. Language and culture as protective factors for at-risk communities. *J Aborig Heal* 2009;5:6–25.

82 Smylie J, Kirst M, McShane K, *et al*. Understanding the role of Indigenous community participation in Indigenous prenatal and Infant-Toddler health promotion programs in Canada: a realist review. *Soc Sci Med* 2016;150:128–43.

83 Freyermuth-Enciso G, Argüello-Avendaño H. La muerte prematura de mujeres en Los Altos de Chiapas. un análisis desde La violencia. *Rev Pueblos y Front Digit* 2011;6:181–216.

84 Gamlin JB. 'You see, we women, we can't talk, we can't have an opinion…'. The coloniality of gender and childbirth practices in Indigenous Wixárika families. *Soc Sci Med* 2020;252:10.1016/j.socscimed.2020.112912:112912.

85 Turinawe EB, Rwemisisi JT, Musinguzi LK, *et al*. Traditional birth attendants (TBAs) as potential agents in promoting male involvement in maternity preparedness: insights from a rural community in Uganda. *Reprod Health* 2016;13:24.

86 Harary F, Norman RZ, Cartwright D. *Structural models: an introduction to the theory of directed graphs*. New York, SE: Wiley, 1965.

87 Sosa-Rubí SG, Walker D, Serván E, *et al*. Learning effect of a conditional cash transfer programme on poor rural women's selection of delivery care in Mexico. *Health Policy Plan* 2011;26:496–507.

88 Vega RA. Racial i(nter)dentification: the racialization of maternal health through the Oportunidades program and in government clinics in México. *Salud Colect* 2017;13:489.