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Abstract

Quantitative evidence suggests that ethnic disparities in maternal health care use are substantial in Western China, but the reasons for these remain under-researched. We undertook a systematic review of English and Chinese databases between Jan 1, 1990 and Feb 23, 2018 to synthesise qualitative evidence on barriers faced by ethnic minority women in accessing maternal health care in Western China. Four English and six Chinese language studies across eight provinces of Western China and thirteen ethnic minority groups were included. We adapted the "Three Delays" framework and used thematic synthesis to categorise findings into six themes. Studies reported that ethnic minority women commonly held traditional beliefs and had lower levels of education, which limited their willingness to use maternal health services. Despite the existence of different financial protection schemes for services related to delivery care, hospital birth was still too costly for some rural households, and some women faced difficulties navigating reimbursement procedures. Women who lived remotely were less likely to go to hospital in advance of labour because of difficulties in arranging accommodation; they often only sought care if pregnancies were complicated. Poor quality of care in health facilities, particularly misunderstandings between doctors and patients due to language barriers or differences in socio-economic status, and clinical practices that conflicted with local fears and traditional customs, were reported. The overall evidence is weak however: authors treated different ethnicities as if they belonged to one homogeneous group and half of the studies failed in methodological rigour. The current evidence base is very limited and poor in quality, so much more research elucidating the nature of 'ethnicity' as a set of barriers to maternal health care access is needed. Addressing the multiple barriers associated with ethnicity will require multi-faceted solutions that adequately reflect the specific local context.

Introduction

China has made impressive progress in maternal survival in recent decades. Between 1990 and 2015 maternal mortality fell from 114.2 to 17.7 maternal deaths per 100 000 livebirths, and China is one of the few countries to have achieved the fifth Millennium Development Goal (GBD 2015 Maternal Mortality Collaborators 2016). Substantial disparities remain, however, especially in Western China (Gao *et al.* 2017; Liang *et al.* 2019) where large numbers of ethnic minorities live. In the 2010 census 80 million people in Western China were reported to belong to dozens of ethnic minority groups, including the Zhuang (16 million), Uyghur (10 million), Yi (8 million), Hui (7 million), Miao (6 million) and Tibetan (6 million) (National Bureau of Statistics 2012). The Chinese government has designated regions with large numbers of ethnic minorities as "autonomous" at a collective level, giving them the right to self-government including special legislative power and extra financial support from central government for poverty alleviation and infrastructure construction. Fertility controls have been less stringent for people living in autonomous regions and many ethnic minority couples were allowed a second or third child under the one child policy (Hesketh et al. 2005). However, ethnic minorities continue to suffer higher maternal mortality than the Han majority population (Du *et al*. 2015; Gao *et al*. 2017; Huang *et al*. 2017); in specific ethnic minority groups such as the

Tibetan, Moinba, Tajik, Kirgiz, Kazak, Lisu, Uygur, Yi and Hui, the ratio is three to seven times as high (Feng *et al*. 2011; Liang *et al.* 2019).

Access to maternal health care, including adequate antenatal care and skilled birth attendance in a functioning health care facility is needed to make pregnancy and delivery safe (UNFPA 2011). A recent systematic review of quantitative studies found that ethnic minority women in Western China were less likely than their Han counterparts to use antenatal care or give birth in a health facility (Huang *et al.* 2017); however, the reasons why ethnic minority women lag behind are not well understood. The international literature suggests two main reasons why ethnic minorities may have differential access to health services: (1) intrinsic or personal factors including particular cultural beliefs, competence in language and socioeconomic status, and (2) extrinsic or organisational factors focusing on service provision and geographical location (Szczepura 2005). Ethnic minorities are clearly not homogeneous (Hall and Patrinos 2012). In Western China, ethnic minorities such as the Miao, Yi or Tibetan are poorer and less educated than the Han majority and typically live in mountainous areas far away from health facilities (Hannum and Wang 2010; Wang and Pan 2016; National Bureau of Statistics 2017). Groups such as the Hui on the other hand are more urbanised and their income and education levels are not dissimilar to that of the Han (Hannum and Wang 2010; National Bureau of Statistics 2017). Few studies have taken into account the variation in socio-economic characteristics between ethnic groups, or explored the reasons underlying ethnic disparities in health care use. Factors such as social norms and perceived quality of care may be important determinants of care-seeking (Griffiths and Stephenson 2001; Kyomuhendo 2003), but are not easily measured in surveys and are rarely considered in quantitative studies. Based on quantitative evidence alone it may be difficult to understand the factors underlying ethnic disadvantage in maternal health and health care use.

This systematic review aims to synthesise qualitative evidence on the barriers faced by ethnic minority women in accessing maternal health care in Western China. We focus on Western China because nearly three-quarters (71·4%) of all ethnic minorities in China live there and because the region performs poorly in the equality of maternal health in comparison with Eastern and Central China (Gao *et al*. 2017; Liang *et al.* 2019). The results reported here complement a previous systematic review on quantitative studies examining disparities in access to maternal health care in Western China (Huang *et al.* 2017).

Methods

Search strategy and selection criteria

Our search strategy has been reported previously (Huang *et al.* 2017). We searched the International Prospective Register of Systematic Reviews (PROSPERO) to identify available or ongoing systematic reviews. We also searched English (Embase, Medline, Web of Science) and Chinese (CNKI, VIP, Wanfang) databases to identify all relevant articles published between Jan 1, 1990 and Feb 23, 2018, updating the previous review which covered Jan 1, 1990 to Nov 9, 2016. Our search used a combination of key concepts for "health care utilisation", "ethnic minorities", and "Western China" (see appendix 1 for the full search strategy and search terms). Studies were eligible for inclusion if they used qualitative research

methods, including individual interviews, focus group discussions, observation, or document review to explore the barriers to accessing maternal health care among ethnic minority women in any of the 12 provinces of Western China (Tibet, Qinghai, Xinjiang, Gansu, Shaan'xi, Sichuan, Guizhou, Guangxi, Yunnan, Chongqing, Ningxia, and Inner Mongolia). The review was limited to work published from 1990 onwards to coincide with the Millennium Development Goals. The reference lists of included studies were searched for further relevant publications. All papers identified via database searching were exported into EndNote 8.2 and duplicate references removed.

Study selection and data extraction

Titles and abstracts of all publications identified in the search were reviewed by four authors. The senior author made a final decision whenever there was disagreement in terms of inclusion. Studies matching inclusion criteria were read in-depth and data were extracted on author, publication year, data collection year, study setting, sample details, data collection methods, data analysis methods, and main findings.

Data synthesis

Thematic synthesis (Thomas *et al.* 2008; Ring *et al*. 2011) was used to summarise barriers to maternal health care use. The "Three Delays" framework (Thaddeus and Maine 1994) which has been used extensively in low income countries to conceptualise determinants of uptake of maternal health care (Sibiyaa *et al.* 2018; Mgawadere *et al.* 2017) was adapted for the Chinese context. The original framework grouped determinants under three main themes: sociocultural factors, accessibility of facilities, and quality of care. We further subdivided the themes into sociocultural status and perceived benefits/risks of care-seeking, financial and geographic accessibility, and institutional capacity and patient satisfaction, providing a more detailed assessment of factors affecting maternal health care utilisation (Figure 1). We added the determinant "access to insurance" under "financial affordability" because China has extensive social protection mechanisms which help to overcome financial barriers. We also changed the determinant "illegal abortion" into "birth control policy and unapproved pregnancy" based on China's family planning policy. We deleted the "hard currency problems" described in the original framework because most essential drugs and medical supplies are provided by the domestic market in China, thus not requiring imports from foreign countries.

Quality appraisal

The quality of each study was assessed based on the Critical Appraisal Skills Program (CASP) Qualitative Research Checklist (Critical Appraisal Skills Programme 2017). Studies were assessed against eight domains: study setting, research design, participant details, sample recruitment, data collection, relationship between researcher and participants, ethical issues, and data analysis. The detailed criteria for judging whether the studies satisfied the quality criteria - and were assigned a "yes" - are listed in table 1. Each domain counted as 1 point if it was awarded a "yes". Studies were then rated by an overall score of "high", "moderate" or "low" quality if they met 8-7, 6-5 or 4-0 of the criteria, respectively. No study was excluded based on the result of the quality assessment.

Results

Included studies

Figure 2 shows the number of qualitative study papers included at each stage of the search process. The initial search yielded 4082 English papers and 4335 Chinese papers after removing duplicates. The screening of titles and abstracts retained 131 English and 158 Chinese papers eligible for full text review. Four English and six Chinese language papers were included in this review (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013; Yang *et al.* 2013).

Table 2 summarises each study against the eight quality domains described above. The ten qualitative studies were conducted across eight provinces of Western China (Yunnan (n=3), Sichuan (n=3), Tibet (n=2), Chongqing (n=1), Guizhou (n=1), Qinghai (n=1), Xinjiang (n=1), and Gansu (n=1)) and nine focused on remote rural populations. Nearly all (9/10) used a case study approach. The participants covered thirteen ethnic minorities (Yi (n=5), Miao (n=4), Tibetan (n=3), Dai (n=2), Mong (n=2), Lisu (n=1), Tujia (n=1), Dong (n=1), Hui (n=1), Jingpo (n=1), De'ang (n=1), Uygur (n=1), and Yugur (n=1)) and five studies included respondents of Han ethnicity. Participants included women, women's relatives, health care providers, administrators, and community-based traditional birth attendants and healers, with total sample sizes ranging from 38 to 572.

Quality of included studies

All studies provided a clear description of the study setting (10/10), research design (10/10) and participant details (9/10). But only six studies reported information on how the participants were recruited (five by purposeful sampling and one by convenience sampling). Data were mainly collected through individual interviews (9/10) and focus group discussions (4/10). But most studies (8/10) did not report the language used during interview or how responses were recorded. Just two studies gave a full account of how data were collected. Only three studies stated the nature of the relationship between the researchers and participants, but two were rated as poor quality because they did not state whether the translator was from the local health system or they stated that the interviewer was a local obstetrician who could have been biased in ascertaining barriers to care (Letts *et al.* 2007). Only three studies reported the process by which ethical permission was sought and five studies provided information on data analyses (four by thematic analysis). In the overall quality assessment, only one English language study was awarded a high quality score; four (three English and one Chinese language) studies were rated as moderate quality and five Chinese language studies were rated as low quality.

Barriers to accessing maternal health care

The summary of barriers to the utilisation of maternal health care identified among ethnic minority women are listed in table 3 (see appendix 2 for the full findings from each study included). The number of studies contributing to each barrier, and the date, ethnic and geographical variation of those studies are also listed in table 3.

1. Sociocultural factors

1.1. Sociocultural status

Eight studies reported that the sociocultural status of the woman or the household presented a barrier to care seeking. Six studies suggested that local beliefs and fears may make women suspicious of delivering in health facilities. Fear of attacks by spirits and exposure to pollution (e.g. blood) reportedly prevented Tibetan, Yi and Miao pregnant women from going to or staying in hospital (Adams *et al.* 2005, Tian *et al.* 2007; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012). Among the Dai, pregnancy is regarded as "dirty" and there are taboos against pregnant women, which make women feel shy and embarrassed about their pregnancy (Tian *et al.* 2007; Wen *et al.* 2011). Moreover, if any disease is detected during reproductive examinations, women may interpret these as an antenatal taboo that causes miscarriages, fetal malformation and fetal ill-health (Tian *et al.* 2007; Wang *et al.* 2012; Zhang *et al.* 2012). Yi and Lisu women in rural Yunnan and Yugur women in Gansu, on the other hand, were commonly advised by older family members that "childbearing is a natural thing", "it is just like going to the toilet", and "there is no need to go to hospital" (Tian *et al.* 2007; Zhang *et al.* 2012).

Women's low education (n=5), restricted mobility (n=3), and limited decision making power (n=1) were also reported as preventing pregnant women from seeking care. Five studies reported that the low education of ethnic minority women may prevent them from reading health-related information from public media and from interacting with formal services outside the home environment, which further limits their receptivity to health services (Wong *et al.* 1995; Tian *et al.* 2007; Wen *et al.* 2011; Wang and Zhang 2012; Nie 2013). Three studies reported that because rural women have a heavy workload during pregnancy and up to delivery (through working in the field, raising animals or doing housework) they have little time to rest or to think about seeking health care (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). One study in Yunnan (Tian *et al.* 2007) suggested that decisions regarding where and when to seek care were mostly made by male family members because women were not financially independent.

1.2. Perceived benefits/risks of care-seeking

Nine studies reported that in some poor remote ethnic minority communities, women and their family do not perceive the benefits to seek maternal health care. Most ethnic minority women interviewed did not think of childbirth as dangerous, and recognition of the need for maternal health care was generally low (Wong *et al.* 1995; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013; Yang *et al.* 2013). Studies from Yunnan and Sichuan reported that many women still rely on informal assistance for childbirth at home (Wong *et al.* 1995; Harris *et al.* 2010), and that they did not feel the need for skilled birth attendants or for a hospital delivery (Harris *et al.* 2010). One study reported that Yi women may hide themselves in their house to avoid revealing an unapproved pregnancy to hospital staff. Unapproved pregnancies are those that exceed the number of pregnancies allowed within the Chinese family planning policy and women may avoid seeking care because of penalties they may face for care seeking (Harris *et al.* 2010).

2. Perceived/actual accessibility

2.1. Financial Affordability

Seven studies reported that hospital birth was too costly for rural households, thereby preventing women from seeking birth in hospital (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.*2010; Zhou *et al.* 2005; Wang and Zhang 2012; Yang *et al.* 2013). One author suggested that economic barriers to accessing maternal health care have decreased among ethnic minorities because of widespread availability of hospital subsidies for birth and access to medical insurance among rural women (Wen *et al.* 2011). Even though many women and their families may have joined these existing financial protection schemes, however, they may still feel lost and confused about how to get the reimbursement (Harris *et al.* 2010; Wang and Zhang 2012). Harris *et al.* (2010) reported that existing financial protection schemes only reimburse the most common treatments and the real costs of hospital birth may far exceed the amount reimbursed. Costs also include transportation and accommodation fees for the woman and their accompanying family members, especially for those living far away and coming to hospital before their labour starts (Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wang and Zhang 2012; Yang *et al.* 2013). Tibetan and Yi women reported that the hospital may require upfront payment upon arrival in the hospital, which makes women reluctant to accept facility birth, even if the insurance may reimburse them later (Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Wang and Zhang 2012; Yang *et al.* 2013). Lastly, births not approved within the birth control policy are not reimbursed, and the costs associated with hospital birth may be unaffordable (Yang *et al.* 2013).

2.2. Geographic Accessibility

Eight studies reported difficulties in travelling to health facilities (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wang and Zhang 2012; Zhang *et al.* 2012; Yang *et al.* 2013). For some rural women from Yunnan, Sichuan and Xinjiang, care seeking is difficult because they live too far away and the road conditions are bad (Wong *et al.* 1995; Wang and Zhang 2012; Zhang *et al.* 2012). Women living in remote villages reported difficulty in going to hospital before the start of their labour because of challenges in arranging accommodation (Harris *et al.* 2010; Wang and Zhang 2012). Women may only seek care when pregnancies are complicated, and some women reported that the experience of pain and bleeding on poor quality roads was worse than the pain associated with labour and delivery (Adams *et al.* 2005). Long-distance transportation by foot, horse, or car is not only time consuming but also quite tough, and carries the risk of delivering on the road (Adams *et al.* 2005; Zhou *et al.* 2005). Local drivers may refuse to take women to hospital because of the taboos against blood or pregnant women among three ethnic minorities (Tibetan, Dai and Yi) (Adams *et al.* 2005; Tian *et al.* 2007; Wen *et al.* 2011; Wang and Zhang 2012). Most women who live in very remote villages do not attend antenatal care and so do not have a birth plan which includes where to give birth or whom to contact (Yang *et al.* 2013).

3. Perceived/actual quality of care

3.1. Institutional Capacity

Eight studies reported poor quality of care in primary and secondary level health facilities (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005;

Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013). Shortage of health workers, drugs or equipment, as well as inadequate clinical and administrative management were described in a number of studies; and were either reported by health care users and health workers (n=4), observed by researchers (n=1), or revealed through an audit of facility records (n=4). Four studies reported that rural maternal health workers may not be qualified because they only receive limited training in obstetric care, with minimal training in emergency obstetric care (Adams *et al.* 2005; Zhou *et al.* 2005; Wang and Zhang 2012; Nie 2013). In some hospitals health workers may be unable to perform services because they lack medical equipment and supplies (e.g. blood transfusion) (Adams *et al.* 2005; Zhou *et al.* 2005; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013). One study reported that Yi women complained about the lack of pain relief during labour in health facilities, so that there was no discernible difference between giving birth at home or in hospital (Harris *et al.* 2010). Women doubted the skills and capacities of the caregivers in health facilities, particularly those at village and township level (Harris *et al.* 2010; Zhang *et al.* 2012). One study reported issues including the lack of female doctors, female leaders and managers in the health system, and the lack of women's voice in maternal health policy design and implementation (Tian *et al.* 2007).

3.2. Patient Satisfaction

Nine studies reported on patient satisfaction with services. Disappointment with prior health service experiences resulted in Tibetan women reporting little confidence in western medicine (Adams *et al.* 2005) and Yi women reporting distrust of local facilities (Harris *et al.* 2010). Ethnic minority women and health workers may not understand each other, partly because of the language barrier but also because of the difference in their education and social status (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). Ethnic minority women complained that they were treated with discrimination and injustice at public hospitals because of their religious and cultural backgrounds (Adams *et al.* 2005; Tian *et al.* 2007). They described being reluctant to go to health facilities because of fears of being bullied or looked down upon. For example, one woman in rural Yunnan recalled being scolded by doctors because her labour started at night (Wong *et al.* 1995).

Eight studies reported that the cultural inappropriateness of clinical practices causes women discomfort and embarrassment. Ethnic minority women expressed reluctance to talk about reproduction or sexuality in public places (e.g. hospital) because this could incur jealousy from others, which in turn would make them more vulnerable to miscarriage or a difficult delivery, or transform a male neonate into a female (Adams *et al.* 2005; Tian *et al.* 2007). Most women from ethnic groups reported being averse to undergoing a reproductive examination by a male health worker (Wong *et al.* 1995; Tian *et al.* 2007; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012). Facility birthing practices were thought to conflict with local customs and habits. For example, many Tibetan, Yi and Dai women complained they would prefer the traditional birth position (semi-sitting), handling of placenta (buried close to couple's house) and newborn feeding (with special diet), which were not available in hospitals (Adams *et al.* 2005; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012). Ethnic minorities like Tibetan, Yi, Lisu and Dai may prefer a culture of silence and are anxious when

talking about complications (Adams *et al.* 2005; Tian *et al.* 2007). Some women criticised current health promotion campaigns because they ignored their natural shyness of reproductive examinations and fear of diseases (Zhang *et al.* 2012). But other women preferred to learn knowledge through watching videos in groups rather than reading leaflets alone (Wang and Zhang 2012; Nie 2013).

Discussion

This systematic review found ten qualitative papers covering a period during which China made substantial progress in maternal health. The barriers in accessing maternal health care in Western China were grouped into three main themes: sociocultural factors, accessibility of facilities, and quality of care by using "Three Delays" analytic framework. While the rigorous methods including quality assessment and thematic analysis were used to synthesise qualitative evidence, the current evidence base is limited and poor in quality. ~~We found that ethnic minority women faced a range of cultural, financial, geographical and institutional barriers in accessing maternal health care in Western China (Table 3).~~

The ethnic minority women included in this review mostly lived in remote, mountainous areas of Western China, far away from China's urban developments and modern health care facilities. We found that ~~ethnic minority women~~they faced a range of cultural, financial, geographical and institutional barriers in accessing maternal health care ~~in Western China~~ (Table 3).

Traditional beliefs and social norms continue to influence the decision to seek care during pregnancy and childbirth. The saying that childbirth is a natural practice not requiring any formal medical care commonly exists among ethnic minorities such as Tibetans, Miao, Tujia and Yi (Zhou *et al.* 2005; Adams et al. 2005; Tian *et al.* 2007) and they may consider any intervention during pregnancy taboo. Similar taboos have been reported in remote areas in rural Nepal and Sudan (Mesko *et al.* 2003; Serizawa *et al.* 2014). Ethnic minority populations in Western China continue to have lower literacy rates than their Han counterparts, particularly among women (Rong and Shi 2001; Hannum and Wang 2006). In Guizhou, for example, one of the poorest provinces in China with large numbers of ethnic minorities, 23% of women were illiterate in 2012, compared to 8% of men (National Bureau of Statistics 2012). Low levels of education have consistently been associated with low use of maternal health care in low and middle income countries (Bell *et al.* 2003). Relatively small gains in knowledge of the risks associated with pregnancy and childbirth may be sufficient to encourage women to seek care from a health facility (Stekelenburg *et al.* 2004; Gage 2007). Concomitant with remoteness, poverty and low levels of education, ethnic minority women have limited autonomy, mobility and decision-making power (Furuta and Salway 2006). Women shoulder the agricultural work in the field, raise the animals, do the housework and raise the children, with little respite from these tasks even close to the time of delivery. Seeking care outside the house requires permission from the husband or other male family members. Such social norms and practices, reported elsewhere in Africa and Asia, hinder women from accessing maternal health care (Thaddeus and Maine 1994; Furuta and Salway 2006). Chinese women's social status has risen steadily over the past decade, their personal rights and those of their employment, education

and medical welfare were all well ensured by Chinese government, but some women, especially those in poor areas, were still less educated and put up with worse medical facilities and their interests and rights in family and marriage were seriously violated (The State Council Information Office of the People's Republic of China. 2015).

Despite China's substantial efforts to make maternal and child health care affordable, costs of care remain a barrier to care seeking for ethnic minorities (Raven *et al*. 2008; Long *et al*. 2010). The safe motherhood programme (direct subsidy of hospital birth for rural women), introduced in 2000 to all provinces of Western China, and the new cooperative insurance scheme, introduced to all rural residents in 2003, have substantially reduced financial barriers to rural populations (Ministry of Health *et al*. 2003; Feng *et al.* 2010; You *et al.* 2014; You *et al.* 2016). However, ethnic minority women who speak a different language and receive little education may fail to navigate the reimbursement system and get money back because of complicated procedures or obscure policies (Adams *et al.* 2005; Harris *et al.* 2010; Wang and Zhang 2012), and some women may not have the cash to make the prepayment before reimbursement (Adams *et al.* 2005; Tian *et al.* 2007; Yang *et al.* 2013). Complicated deliveries requiring additional care and incurring extra costs are not fully covered by current financial protection schemes (Harris *et al.* 2010), and excessive out-of-pocket payments for complicated deliveries may cause further financial distress to rural households.

As part of its poverty alleviation plan, the Chinese Government has aimed at extending its road network to all villages, but some ethnic minority groups are scattered in mountainous areas with difficult terrain and poor road access (Wang and Pan 2016). Women who live far away are likely to seek care late or when the delivery is complicated (Griffiths and Stephenson 2001; Duong *et al.* 2004; D'Ambruoso *et al.* 2005). Ethnic minority women may find it difficult to make a birth plan because they are unclear about their due date (Harris *et al.* 2010), and it may be difficult to arrange accommodation close to hospital before their due date (Harris *et al.* 2010; Wang and Zhang 2012; Yang *et al.* 2013).

Perceived quality of care is an important determinant of health service use. The bad reputation of poorly staffed or equipped facilities can be a disincentive to seeking care and inadequate institutional capacity is an actual obstacle to receiving care after arriving at a health facility (Gabrysch and Campbell 2009). Both women and health workers complained about the lack of health workers, especially female health workers, equipment and medical supplies in health facilities (Adams *et al.* 2005; Tian *et al.* 2007; Wang and Zhang 2012), consistent with findings detected by field observation (Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Zhang *et al.* 2012; Nie 2013). There are averagely 0.03 midwives per 1000 population in China which is extremely low compared with the numbers in high-income countries and China's peers in Asia, mainly because no independent education system and no professional rank in hospitals for midwives have been provided in China since the late 1960s (Liang *et al.* 2019). Women may refuse to undergo antenatal care or childbirth with male doctors, for example they experience discomfort and embarrassment when male doctors ask about their reproductive history or assess fetal growth by measuring fundal height and abdomen circumference. The absence of pain relief in health facilities adversely affected women's experience of care (Zhou

et al. 2005; Harris *et al.* 2010). Women also complained about discrimination against ethnic minorities and misunderstandings caused by language barriers or social class differences between doctors and their patients (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). Similar findings have been reported in Tanzania, Uganda and India, where village women have reported rude, arrogant and neglectful behaviour at health facilities (Griffiths and Stephenson 2001; Kymnugendo 2003; Mrisho *et al.* 2007).

The response to ethnic minority health inequalities needs to be multi-faceted and solutions need to be developed to meet the local context. Further work can be done in at least three ways. First, health education, the most common method for increasing health knowledge and changing health behaviours, should be strengthened, attaching importance to women's health, and focusing on the pregnant women and their family members. The intervention needs to address core gender inequalities and women need to be empowered. Household-based participatory approaches, which help in developing behavioral health interventions backed and promoted by both household leaders and women, and conducted in partnership with family members, should be considered (Bogart and Uyeda 2009; Glandon *et al.* 2017). Such approaches should pay attention to ethnic minority women's preferences, and should be based on a solid understanding of the local culture. In view of ethnic minorities' difficulties to navigate the reimbursement system, health promotion campaigns should also incorporate specific knowledge ~~on~~ of all financial protection schemes including insurance reimbursement, the transportation subsidy, and any special schemes for the poor. For example, the "One-stop Service" policy which allows patients to claim and get reimbursements from where they seek care would simplify reimbursement procedure for those who pay their insurance premium in one place but seek health care in another (National Health and Family Planning Commission-Public Health Division 2016). The "Targeted Poverty Alleviation" programme has launched a zero deposit/prepayment strategy since 2016 to increase accessibility to local health care among families officially registered as poor (National Health and Family Planning Commission-Finance Division 2016). The awareness of these ongoing financing policies would be a way to increase the health care utilisation among ethnic minorities.

Second, helping women develop a birth plan during antenatal visits to arrange money and transportation in advance is necessary to reduce the risks and pains posed to women by travelling many kilometres in labour. Maternity waiting homes, where pregnant women can await their delivery, should be given more attention. As an option in the WHO Safe Motherhood Programme, maternity waiting homes have become an increasingly popular strategy to "bridge the geographical gap" in obstetric care in developing countries (WHO 1996; Starrs 1997). Some studies reported that the use of maternity waiting homes had the potential to increase the use of skilled birth attendants and reduce perinatal mortality in rural areas with low geographic access to hospitals (Chandramohan *et al.* 1995; van Lonkhuijzen *et al.* 2003; Lori *et al.* 2013; Buser and Lori 2017). In China, maternity waiting homes have been incorporated into regular maternity services in Maternal and Child Health hospitals (Gao *et al.* 2017), but their use has not been evaluated, and it is uncertain whether women in remote areas access them. Similarly, hospital waiting areas for children who accompany pregnant women and don't have any other caretaker should be considered when designing the obstetric

department because these additional people swell the cost of childbirth at facility (Foster 1977). Strengthening the connections between health workers and traditional birth attendants may also reduce delays in receiving emergency care (Bhutta *et al.* 2008; Ekman *et al.* 2008). Jiang *et al.* (2016) reported a successful intervention in rural Guangxi, China, where traditional birth attendants acted as the link between women and the health system and promoted perinatal care and facility-based delivery.

Third, increasing the number of well-educated and highly-trained midwives will be an important factor in improving access to and quality of maternal health care, especially in rural areas. Otherwise, some health workers see local fears or customs as insignificant and spend little time thinking about how to solve the conflicts between clinical practice and these beliefs which may cause women's discomfort and embarrassment. Most women noted that there could be benefits from providers being sensitive to the cultural beliefs of rural women (Adams *et al.* 2005). For example, if the staff at facilities made sure to clean up blood quickly, the healthcare experience of the mother could be better because of their taboos about blood (Adams *et al.* 2005). If women's specific requirements around delivery position, handling of the placenta and newborn feeding can be considered and integrated into clinical practices, it may increase service use among women who have these needs and improve patient satisfaction (Harris *et al.* 2010).

It is noteworthy ~~that the~~to balance between protecting ethnic minority autonomy on the one hand and ensuring that ethnic minorities are not left behind on the other (King *et al*. 2009). The interventions, such as sending ethnic minority people to school, building roads or moving them to more accessible places often profoundly change traditional norms and community attitudes which have the potential to impact negatively on social, emotional, cultural and spiritual well-being (Brant 1982). The autonomy is closely linked with self-esteem and the earning of respect. The low levels of autonomy and low self-esteem are likely to be related to worse health (Durie *et al*. 2009). To protect ethnical autonomy and maintain cultural heritage while modernising ethnic minorities' norms and behaviours, Chinese Government has designated "autonomous regions" for ethnic minorities, giving them the right to self-government. In the autonomous regions, children are taught in their local language in the public school, women are allowed to have a second or third child under the one child policy, the traditional holiday and traditional costume are kept, etc.. Adapting interventions for local culture's values and identity can improve the connection with the target community and increase the chances for success of the intervention (and its community impact). ~~But m~~More discussion is needed in global papers to minimise the negative impact associated with interventions within the arena of indigenous health and get a balancing act.

While this systematic review used rigorous methods to examine the barriers to care seeking for ethnic minority women in Western China, caution is required in generalising the findings, for the following reasons. First, the ten qualitative studies matching our inclusion criteria only covered 13 of the 55 ethnic groups in China. The Zhuang for example, the dominant ethnic minority group in Western China, were not covered by this review. Nearly all studies had purposely selected populations in very remote rural areas, and it may be difficult to separate

ethnicity per se from poverty, low literacy, and long distances to urban centres. Not all ethnic minorities in China live in remote areas (Hannum and Wang 2010; National Bureau of Statistics 2017). As part of a "Targeted Poverty Alleviation" programme, local governments help to relocate people closer to town to improve their standard of living. It would be interesting to examine barriers to care seeking among these more urbanised groups to see if ethnic disparities persist after adjustment for geographical, financial and even institutional factors. Second, half of the studies were rated as poor quality because they did not report how participants were selected, how the interview or group discussions were conducted, how the response data were recorded, and how the data were analysed. This makes it difficult to assess bias in the process of data collection and analysis, particularly whether the interviewers or those analysing the data were independent when making inferences. We chose not to exclude these studies because we wanted to highlight the gaps in the evidence base, particularly for Chinese language papers. Third, while we tried to report findings from individual ethnicities, six papers combined ethnic groups as if they were all homogeneous when we know that not to be the case. This may mask possible variations for each individual ethnic group or province. Fourth, intersectionality is increasingly recognised as a valuable approach for understanding inequalities, especially how different characteristics may interact to increase one's exposure to risk (Larson et al. 2016). However, most papers included in this review tended to list contributing factors, without explaining how they interact or which are the most important. Only one paper attempted to weigh the relative importance of barriers to accessing maternal health care (Yang *et al.* 2013), and found that the top three factors affecting the use of maternal care are geographic accessibility, financial affordability and perceived benefits/risks of care-seeking. Health workers regarded institutional capacity as more important to improve utilisation than women did. Fifth, half of the studies included in this review did not separate antenatal care from delivery care, and we were unable to compare the barriers for specific services. Some reasons for low uptake of antenatal care may overlap with those for facility delivery, for example conflict between local beliefs and clinical practice, and poor quality of care. Others, for example lack of money or distance may affect antenatal care much less since antenatal care is generally delivered in township hospitals free of charge and closer to the woman's home, and unlike for delivery care, women are better able to prepare for their visit and choose a convenient time to receive care.

Conclusions

The reasons behind low uptake of maternal health services among ethnic minority women are multifactorial. Strong traditional beliefs, low levels of education, poverty and living far away from the qualified health facilities may all decrease maternal health care utilisation. These factors are more likely to exist among ethnic minority women. At the same time, poor quality of care, lack of communication between doctors and their patients, and conflicts between clinical practices and local traditions also prevent women from seeking care. We identify potential for improving utilisation through strengthening community health promotion campaigns, helping women develop a birth plan, building maternity waiting homes, and delivering quality care. Half of the studies included in this review were classified as having low methodological rigour. There is a lack of research that highlights the heterogeneity in cultural practices and socioeconomic conditions between individual ethnic groups and

explains how these characteristics interact with local health system and lead to ethnic minority health differentials in China. Further efforts to improve the quality of research are needed to be useful for decision makers.

Declaration of interests

We declare no competing interests.

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Barriers to accessing maternal health care among ethnic minority women in Western China: a qualitative evidence synthesis

Abstract

Quantitative evidence suggests that ethnic disparities in maternal health care use are substantial in Western China, but the reasons for these remain under-researched. We undertook a systematic review of English and Chinese databases between Jan 1, 1990 and Feb 23, 2018 to synthesise qualitative evidence on barriers faced by ethnic minority women in accessing maternal health care in Western China. Four English and six Chinese language studies across eight provinces of Western China and thirteen ethnic minority groups were included. We adapted the "Three Delays" framework and used thematic synthesis to categorise findings into six themes. Studies reported that ethnic minority women commonly held traditional beliefs and had lower levels of education, which limited their willingness to use maternal health services. Despite the existence of different financial protection schemes for services related to delivery care, hospital birth was still too costly for some rural households, and some women faced difficulties navigating reimbursement procedures. Women who lived remotely were less likely to go to hospital in advance of labour because of difficulties in arranging accommodation; they often only sought care if pregnancies were complicated. Poor quality of care in health facilities, particularly misunderstandings between doctors and patients due to language barriers or differences in socio-economic status, and clinical practices that conflicted with local fears and traditional customs, were reported. The overall evidence is weak however: authors treated different ethnicities as if they belonged to one homogeneous group and half of the studies failed in methodological rigour. The current evidence base is very limited and poor in quality, so much more research elucidating the nature of 'ethnicity' as a set of barriers to maternal health care access is needed. Addressing the multiple barriers associated with ethnicity will require multi-faceted solutions that adequately reflect the specific local context.

Introduction

China has made impressive progress in maternal survival in recent decades. Between 1990 and 2015 maternal mortality fell from 114.2 to 17.7 maternal deaths per 100 000 livebirths, and China is one of the few countries to have achieved the fifth Millennium Development Goal (GBD 2015 Maternal Mortality Collaborators 2016). Substantial disparities remain, however, especially in Western China (Gao *et al.* 2017; Liang *et al.* 2019) where large numbers of ethnic minorities live. In the 2010 census 80 million people in Western China were reported to belong to dozens of ethnic minority groups, including the Zhuang (16 million), Uyghur (10 million), Yi (8 million), Hui (7 million), Miao (6 million) and Tibetan (6 million) (National Bureau of Statistics 2012). The Chinese government has designated regions with large numbers of ethnic minorities as "autonomous" at a collective level, giving them the right to self-government including special legislative power and extra financial support from central government for poverty alleviation and infrastructure construction. Fertility controls have been less stringent for people living in autonomous regions and many ethnic minority couples were allowed a second or third child under the one child policy (Hesketh et al. 2005). However, ethnic minorities continue to suffer higher maternal mortality than the Han majority population (Du *et al*. 2015; Gao *et al*. 2017; Huang *et al*. 2017); in specific ethnic minority groups such as the

Tibetan, Moinba, Tajik, Kirgiz, Kazak, Lisu, Uygur, Yi and Hui, the ratio is three to seven times as high (Feng *et al*. 2011; Liang *et al.* 2019).

Access to maternal health care, including adequate antenatal care and skilled birth attendance in a functioning health care facility is needed to make pregnancy and delivery safe (UNFPA 2011). A recent systematic review of quantitative studies found that ethnic minority women in Western China were less likely than their Han counterparts to use antenatal care or give birth in a health facility (Huang *et al.* 2017); however, the reasons why ethnic minority women lag behind are not well understood. The international literature suggests two main reasons why ethnic minorities may have differential access to health services: (1) intrinsic or personal factors including particular cultural beliefs, competence in language and socioeconomic status, and (2) extrinsic or organisational factors focusing on service provision and geographical location (Szczepura 2005). Ethnic minorities are clearly not homogeneous (Hall and Patrinos 2012). In Western China, ethnic minorities such as the Miao, Yi or Tibetan are poorer and less educated than the Han majority and typically live in mountainous areas far away from health facilities (Hannum and Wang 2010; Wang and Pan 2016; National Bureau of Statistics 2017). Groups such as the Hui on the other hand are more urbanised and their income and education levels are not dissimilar to that of the Han (Hannum and Wang 2010; National Bureau of Statistics 2017). Few studies have taken into account the variation in socio-economic characteristics between ethnic groups, or explored the reasons underlying ethnic disparities in health care use. Factors such as social norms and perceived quality of care may be important determinants of care-seeking (Griffiths and Stephenson 2001; Kyomuhendo 2003), but are not easily measured in surveys and are rarely considered in quantitative studies. Based on quantitative evidence alone it may be difficult to understand the factors underlying ethnic disadvantage in maternal health and health care use.

This systematic review aims to synthesise qualitative evidence on the barriers faced by ethnic minority women in accessing maternal health care in Western China. We focus on Western China because nearly three-quarters (71·4%) of all ethnic minorities in China live there and because the region performs poorly in the equality of maternal health in comparison with Eastern and Central China (Gao *et al*. 2017; Liang *et al.* 2019). The results reported here complement a previous systematic review on quantitative studies examining disparities in access to maternal health care in Western China (Huang *et al.* 2017).

Methods

Search strategy and selection criteria

Our search strategy has been reported previously (Huang *et al.* 2017). We searched the International Prospective Register of Systematic Reviews (PROSPERO) to identify available or ongoing systematic reviews. We also searched English (Embase, Medline, Web of Science) and Chinese (CNKI, VIP, Wanfang) databases to identify all relevant articles published between Jan 1, 1990 and Feb 23, 2018, updating the previous review which covered Jan 1, 1990 to Nov 9, 2016. Our search used a combination of key concepts for "health care utilisation", "ethnic minorities", and "Western China" (see appendix 1 for the full search strategy and search terms). Studies were eligible for inclusion if they used qualitative research

methods, including individual interviews, focus group discussions, observation, or document review to explore the barriers to accessing maternal health care among ethnic minority women in any of the 12 provinces of Western China (Tibet, Qinghai, Xinjiang, Gansu, Shaan'xi, Sichuan, Guizhou, Guangxi, Yunnan, Chongqing, Ningxia, and Inner Mongolia). The review was limited to work published from 1990 onwards to coincide with the Millennium Development Goals. The reference lists of included studies were searched for further relevant publications. All papers identified via database searching were exported into EndNote 8.2 and duplicate references removed.

Study selection and data extraction

Titles and abstracts of all publications identified in the search were reviewed by four authors. The senior author made a final decision whenever there was disagreement in terms of inclusion. Studies matching inclusion criteria were read in-depth and data were extracted on author, publication year, data collection year, study setting, sample details, data collection methods, data analysis methods, and main findings.

Data synthesis

Thematic synthesis (Thomas *et al.* 2008; Ring *et al*. 2011) was used to summarise barriers to maternal health care use. The "Three Delays" framework (Thaddeus and Maine 1994) which has been used extensively in low income countries to conceptualise determinants of uptake of maternal health care (Sibiyaa *et al.* 2018; Mgawadere *et al.* 2017) was adapted for the Chinese context. The original framework grouped determinants under three main themes: sociocultural factors, accessibility of facilities, and quality of care. We further subdivided the themes into sociocultural status and perceived benefits/risks of care-seeking, financial and geographic accessibility, and institutional capacity and patient satisfaction, providing a more detailed assessment of factors affecting maternal health care utilisation (Figure 1). We added the determinant "access to insurance" under "financial affordability" because China has extensive social protection mechanisms which help to overcome financial barriers. We also changed the determinant "illegal abortion" into "birth control policy and unapproved pregnancy" based on China's family planning policy. We deleted the "hard currency problems" described in the original framework because most essential drugs and medical supplies are provided by the domestic market in China, thus not requiring imports from foreign countries.

Quality appraisal

The quality of each study was assessed based on the Critical Appraisal Skills Program (CASP) Qualitative Research Checklist (Critical Appraisal Skills Programme 2017). Studies were assessed against eight domains: study setting, research design, participant details, sample recruitment, data collection, relationship between researcher and participants, ethical issues, and data analysis. The detailed criteria for judging whether the studies satisfied the quality criteria - and were assigned a "yes" - are listed in table 1. Each domain counted as 1 point if it was awarded a "yes". Studies were then rated by an overall score of "high", "moderate" or "low" quality if they met 8-7, 6-5 or 4-0 of the criteria, respectively. No study was excluded based on the result of the quality assessment.

Results

Included studies

Figure 2 shows the number of qualitative study papers included at each stage of the search process. The initial search yielded 4082 English papers and 4335 Chinese papers after removing duplicates. The screening of titles and abstracts retained 131 English and 158 Chinese papers eligible for full text review. Four English and six Chinese language papers were included in this review (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013; Yang *et al.* 2013).

Table 2 summarises each study against the eight quality domains described above. The ten qualitative studies were conducted across eight provinces of Western China (Yunnan (n=3), Sichuan (n=3), Tibet (n=2), Chongqing (n=1), Guizhou (n=1), Qinghai (n=1), Xinjiang (n=1), and Gansu (n=1)) and nine focused on remote rural populations. Nearly all (9/10) used a case study approach. The participants covered thirteen ethnic minorities (Yi (n=5), Miao (n=4), Tibetan (n=3), Dai (n=2), Mong (n=2), Lisu (n=1), Tujia (n=1), Dong (n=1), Hui (n=1), Jingpo (n=1), De'ang (n=1), Uygur (n=1), and Yugur (n=1)) and five studies included respondents of Han ethnicity. Participants included women, women's relatives, health care providers, administrators, and community-based traditional birth attendants and healers, with total sample sizes ranging from 38 to 572.

Quality of included studies

All studies provided a clear description of the study setting (10/10), research design (10/10) and participant details (9/10). But only six studies reported information on how the participants were recruited (five by purposeful sampling and one by convenience sampling). Data were mainly collected through individual interviews (9/10) and focus group discussions (4/10). But most studies (8/10) did not report the language used during interview or how responses were recorded. Just two studies gave a full account of how data were collected. Only three studies stated the nature of the relationship between the researchers and participants, but two were rated as poor quality because they did not state whether the translator was from the local health system or they stated that the interviewer was a local obstetrician who could have been biased in ascertaining barriers to care (Letts *et al.* 2007). Only three studies reported the process by which ethical permission was sought and five studies provided information on data analyses (four by thematic analysis). In the overall quality assessment, only one English language study was awarded a high quality score; four (three English and one Chinese language) studies were rated as moderate quality and five Chinese language studies were rated as low quality.

Barriers to accessing maternal health care

The summary of barriers to the utilisation of maternal health care identified among ethnic minority women are listed in table 3 (see appendix 2 for the full findings from each study included). The number of studies contributing to each barrier, and the date, ethnic and geographical variation of those studies are also listed in table 3.

1. Sociocultural factors

1.1. Sociocultural status

Eight studies reported that the sociocultural status of the woman or the household presented a barrier to care seeking. Six studies suggested that local beliefs and fears may make women suspicious of delivering in health facilities. Fear of attacks by spirits and exposure to pollution (e.g. blood) reportedly prevented Tibetan, Yi and Miao pregnant women from going to or staying in hospital (Adams *et al.* 2005, Tian *et al.* 2007; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012). Among the Dai, pregnancy is regarded as "dirty" and there are taboos against pregnant women, which make women feel shy and embarrassed about their pregnancy (Tian *et al.* 2007; Wen *et al.* 2011). Moreover, if any disease is detected during reproductive examinations, women may interpret these as an antenatal taboo that causes miscarriages, fetal malformation and fetal ill-health (Tian *et al.* 2007; Wang *et al.* 2012; Zhang *et al.* 2012). Yi and Lisu women in rural Yunnan and Yugur women in Gansu, on the other hand, were commonly advised by older family members that "childbearing is a natural thing", "it is just like going to the toilet", and "there is no need to go to hospital" (Tian *et al.* 2007; Zhang *et al.* 2012).

Women's low education (n=5), restricted mobility (n=3), and limited decision making power (n=1) were also reported as preventing pregnant women from seeking care. Five studies reported that the low education of ethnic minority women may prevent them from reading health-related information from public media and from interacting with formal services outside the home environment, which further limits their receptivity to health services (Wong *et al.* 1995; Tian *et al.* 2007; Wen *et al.* 2011; Wang and Zhang 2012; Nie 2013). Three studies reported that because rural women have a heavy workload during pregnancy and up to delivery (through working in the field, raising animals or doing housework) they have little time to rest or to think about seeking health care (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). One study in Yunnan (Tian *et al.* 2007) suggested that decisions regarding where and when to seek care were mostly made by male family members because women were not financially independent.

1.2. Perceived benefits/risks of care-seeking

Nine studies reported that in some poor remote ethnic minority communities, women and their family do not perceive the benefits to seek maternal health care. Most ethnic minority women interviewed did not think of childbirth as dangerous, and recognition of the need for maternal health care was generally low (Wong *et al.* 1995; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013; Yang *et al.* 2013). Studies from Yunnan and Sichuan reported that many women still rely on informal assistance for childbirth at home (Wong *et al.* 1995; Harris *et al.* 2010), and that they did not feel the need for skilled birth attendants or for a hospital delivery (Harris *et al.* 2010). One study reported that Yi women may hide themselves in their house to avoid revealing an unapproved pregnancy to hospital staff. Unapproved pregnancies are those that exceed the number of pregnancies allowed within the Chinese family planning policy and women may avoid seeking care because of penalties they may face for care seeking (Harris *et al.* 2010).

2. Perceived/actual accessibility

2.1. Financial Affordability

Seven studies reported that hospital birth was too costly for rural households, thereby preventing women from seeking birth in hospital (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.*2010; Zhou *et al.* 2005; Wang and Zhang 2012; Yang *et al.* 2013). One author suggested that economic barriers to accessing maternal health care have decreased among ethnic minorities because of widespread availability of hospital subsidies for birth and access to medical insurance among rural women (Wen *et al.* 2011). Even though many women and their families may have joined these existing financial protection schemes, however, they may still feel lost and confused about how to get the reimbursement (Harris *et al.* 2010; Wang and Zhang 2012). Harris *et al.* (2010) reported that existing financial protection schemes only reimburse the most common treatments and the real costs of hospital birth may far exceed the amount reimbursed. Costs also include transportation and accommodation fees for the woman and their accompanying family members, especially for those living far away and coming to hospital before their labour starts (Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wang and Zhang 2012; Yang *et al.* 2013). Tibetan and Yi women reported that the hospital may require upfront payment upon arrival in the hospital, which makes women reluctant to accept facility birth, even if the insurance may reimburse them later (Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Wang and Zhang 2012; Yang *et al.* 2013). Lastly, births not approved within the birth control policy are not reimbursed, and the costs associated with hospital birth may be unaffordable (Yang *et al.* 2013).

2.2. Geographic Accessibility

Eight studies reported difficulties in travelling to health facilities (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Wang and Zhang 2012; Zhang *et al.* 2012; Yang *et al.* 2013). For some rural women from Yunnan, Sichuan and Xinjiang, care seeking is difficult because they live too far away and the road conditions are bad (Wong *et al.* 1995; Wang and Zhang 2012; Zhang *et al.* 2012). Women living in remote villages reported difficulty in going to hospital before the start of their labour because of challenges in arranging accommodation (Harris *et al.* 2010; Wang and Zhang 2012). Women may only seek care when pregnancies are complicated, and some women reported that the experience of pain and bleeding on poor quality roads was worse than the pain associated with labour and delivery (Adams *et al.* 2005). Long-distance transportation by foot, horse, or car is not only time consuming but also quite tough, and carries the risk of delivering on the road (Adams *et al.* 2005; Zhou *et al.* 2005). Local drivers may refuse to take women to hospital because of the taboos against blood or pregnant women among three ethnic minorities (Tibetan, Dai and Yi) (Adams *et al.* 2005; Tian *et al.* 2007; Wen *et al.* 2011; Wang and Zhang 2012). Most women who live in very remote villages do not attend antenatal care and so do not have a birth plan which includes where to give birth or whom to contact (Yang *et al.* 2013).

3. Perceived/actual quality of care

3.1. Institutional Capacity

Eight studies reported poor quality of care in primary and secondary level health facilities (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005;

Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013). Shortage of health workers, drugs or equipment, as well as inadequate clinical and administrative management were described in a number of studies; and were either reported by health care users and health workers (n=4), observed by researchers (n=1), or revealed through an audit of facility records (n=4). Four studies reported that rural maternal health workers may not be qualified because they only receive limited training in obstetric care, with minimal training in emergency obstetric care (Adams *et al.* 2005; Zhou *et al.* 2005; Wang and Zhang 2012; Nie 2013). In some hospitals health workers may be unable to perform services because they lack medical equipment and supplies (e.g. blood transfusion) (Adams *et al.* 2005; Zhou *et al.* 2005; Wang and Zhang 2012; Zhang *et al.* 2012; Nie 2013). One study reported that Yi women complained about the lack of pain relief during labour in health facilities, so that there was no discernible difference between giving birth at home or in hospital (Harris *et al.* 2010). Women doubted the skills and capacities of the caregivers in health facilities, particularly those at village and township level (Harris *et al.* 2010; Zhang *et al.* 2012). One study reported issues including the lack of female doctors, female leaders and managers in the health system, and the lack of women's voice in maternal health policy design and implementation (Tian *et al.* 2007).

3.2. Patient Satisfaction

Nine studies reported on patient satisfaction with services. Disappointment with prior health service experiences resulted in Tibetan women reporting little confidence in western medicine (Adams *et al.* 2005) and Yi women reporting distrust of local facilities (Harris *et al.* 2010). Ethnic minority women and health workers may not understand each other, partly because of the language barrier but also because of the difference in their education and social status (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). Ethnic minority women complained that they were treated with discrimination and injustice at public hospitals because of their religious and cultural backgrounds (Adams *et al.* 2005; Tian *et al.* 2007). They described being reluctant to go to health facilities because of fears of being bullied or looked down upon. For example, one woman in rural Yunnan recalled being scolded by doctors because her labour started at night (Wong *et al.* 1995).

Eight studies reported that the cultural inappropriateness of clinical practices causes women discomfort and embarrassment. Ethnic minority women expressed reluctance to talk about reproduction or sexuality in public places (e.g. hospital) because this could incur jealousy from others, which in turn would make them more vulnerable to miscarriage or a difficult delivery, or transform a male neonate into a female (Adams *et al.* 2005; Tian *et al.* 2007). Most women from ethnic groups reported being averse to undergoing a reproductive examination by a male health worker (Wong *et al.* 1995; Tian *et al.* 2007; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012; Zhang *et al.* 2012). Facility birthing practices were thought to conflict with local customs and habits. For example, many Tibetan, Yi and Dai women complained they would prefer the traditional birth position (semi-sitting), handling of placenta (buried close to couple's house) and newborn feeding (with special diet), which were not available in hospitals (Adams *et al.* 2005; Harris *et al.* 2010; Wen *et al.* 2011; Wang and Zhang 2012). Ethnic minorities like Tibetan, Yi, Lisu and Dai may prefer a culture of silence and are anxious when

talking about complications (Adams *et al.* 2005; Tian *et al.* 2007). Some women criticised current health promotion campaigns because they ignored their natural shyness of reproductive examinations and fear of diseases (Zhang *et al.* 2012). But other women preferred to learn knowledge through watching videos in groups rather than reading leaflets alone (Wang and Zhang 2012; Nie 2013).

Discussion

This systematic review found ten qualitative papers covering a period during which China made substantial progress in maternal health. The barriers in accessing maternal health care in Western China were grouped into three main themes: sociocultural factors, accessibility of facilities, and quality of care by using "Three Delays" analytic framework. While the rigorous methods including quality assessment and thematic analysis were used to synthesise qualitative evidence, the current evidence base is limited and poor in quality.

The ethnic minority women included in this review mostly lived in remote, mountainous areas of Western China, far away from China's urban developments and modern health care facilities. We found that they faced a range of cultural, financial, geographical and institutional barriers in accessing maternal health care (Table 3).

Traditional beliefs and social norms continue to influence the decision to seek care during pregnancy and childbirth. The saying that childbirth is a natural practice not requiring any formal medical care commonly exists among ethnic minorities such as Tibetans, Miao, Tujia and Yi (Zhou *et al.* 2005; Adams et al. 2005; Tian *et al.* 2007) and they may consider any intervention during pregnancy taboo. Similar taboos have been reported in remote areas in rural Nepal and Sudan (Mesko *et al.* 2003; Serizawa *et al.* 2014). Ethnic minority populations in Western China continue to have lower literacy rates than their Han counterparts, particularly among women (Rong and Shi 2001; Hannum and Wang 2006). In Guizhou, for example, one of the poorest provinces in China with large numbers of ethnic minorities, 23% of women were illiterate in 2012, compared to 8% of men (National Bureau of Statistics 2012). Low levels of education have consistently been associated with low use of maternal health care in low and middle income countries (Bell *et al.* 2003). Relatively small gains in knowledge of the risks associated with pregnancy and childbirth may be sufficient to encourage women to seek care from a health facility (Stekelenburg *et al.* 2004; Gage 2007). Concomitant with remoteness, poverty and low levels of education, ethnic minority women have limited autonomy, mobility and decision-making power (Furuta and Salway 2006). Women shoulder the agricultural work in the field, raise the animals, do the housework and raise the children, with little respite from these tasks even close to the time of delivery. Seeking care outside the house requires permission from the husband or other male family members. Such social norms and practices, reported elsewhere in Africa and Asia, hinder women from accessing maternal health care (Thaddeus and Maine 1994; Furuta and Salway 2006). Chinese women's social status has risen steadily over the past decade, their personal rights and those of their employment, education and medical welfare were all well ensured by Chinese government, but some women, especially those in poor areas, were still less educated and put up with worse medical facilities

and their interests and rights in family and marriage were seriously violated (The State Council Information Office of the People's Republic of China. 2015).

Despite China's substantial efforts to make maternal and child health care affordable, costs of care remain a barrier to care seeking for ethnic minorities (Raven *et al*. 2008; Long *et al*. 2010). The safe motherhood programme (direct subsidy of hospital birth for rural women), introduced in 2000 to all provinces of Western China, and the new cooperative insurance scheme, introduced to all rural residents in 2003, have substantially reduced financial barriers to rural populations (Ministry of Health *et al*. 2003; Feng *et al.* 2010; You *et al.* 2014; You *et al.* 2016). However, ethnic minority women who speak a different language and receive little education may fail to navigate the reimbursement system and get money back because of complicated procedures or obscure policies (Adams *et al.* 2005; Harris *et al.* 2010; Wang and Zhang 2012), and some women may not have the cash to make the prepayment before reimbursement (Adams *et al.* 2005; Tian *et al.* 2007; Yang *et al.* 2013). Complicated deliveries requiring additional care and incurring extra costs are not fully covered by current financial protection schemes (Harris *et al.* 2010), and excessive out-of-pocket payments for complicated deliveries may cause further financial distress to rural households.

As part of its poverty alleviation plan, the Chinese Government has aimed at extending its road network to all villages, but some ethnic minority groups are scattered in mountainous areas with difficult terrain and poor road access (Wang and Pan 2016). Women who live far away are likely to seek care late or when the delivery is complicated (Griffiths and Stephenson 2001; Duong *et al.* 2004; D'Ambruoso *et al.* 2005). Ethnic minority women may find it difficult to make a birth plan because they are unclear about their due date (Harris *et al.* 2010), and it may be difficult to arrange accommodation close to hospital before their due date (Harris *et al.* 2010; Wang and Zhang 2012; Yang *et al.* 2013).

Perceived quality of care is an important determinant of health service use. The bad reputation of poorly staffed or equipped facilities can be a disincentive to seeking care and inadequate institutional capacity is an actual obstacle to receiving care after arriving at a health facility (Gabrysch and Campbell 2009). Both women and health workers complained about the lack of health workers, especially female health workers, equipment and medical supplies in health facilities (Adams *et al.* 2005; Tian *et al.* 2007; Wang and Zhang 2012), consistent with findings detected by field observation (Tian *et al.* 2007; Harris *et al.* 2010; Zhou *et al.* 2005; Zhang *et al.* 2012; Nie 2013). There are averagely 0.03 midwives per 1000 population in China which is extremely low compared with the numbers in high-income countries and China's peers in Asia, mainly because no independent education system and no professional rank in hospitals for midwives have been provided in China since the late 1960s (Liang *et al.* 2019). Women may refuse to undergo antenatal care or childbirth with male doctors, for example they experience discomfort and embarrassment when male doctors ask about their reproductive history or assess fetal growth by measuring fundal height and abdomen circumference. The absence of pain relief in health facilities adversely affected women's experience of care (Zhou *et al.* 2005; Harris *et al.* 2010). Women also complained about discrimination against ethnic minorities and misunderstandings caused by language barriers or social class differences

between doctors and their patients (Wong *et al.* 1995; Adams *et al.* 2005; Tian *et al.* 2007). Similar findings have been reported in Tanzania, Uganda and India, where village women have reported rude, arrogant and neglectful behaviour at health facilities (Griffiths and Stephenson 2001; Kymnugendo 2003; Mrisho *et al.* 2007).

The response to ethnic minority health inequalities needs to be multi-faceted and solutions need to be developed to meet the local context. Further work can be done in at least three ways. First, health education, the most common method for increasing health knowledge and changing health behaviours, should be strengthened, attaching importance to women's health, and focusing on the pregnant women and their family members. The intervention needs to address core gender inequalities and women need to be empowered. Household-based participatory approaches, which help in developing behavioral health interventions backed and promoted by both household leaders and women, and conducted in partnership with family members, should be considered (Bogart and Uyeda 2009; Glandon *et al*. 2017). Such approaches should pay attention to ethnic minority women's preferences, and should be based on a solid understanding of the local culture. In view of ethnic minorities' difficulties to navigate the reimbursement system, health promotion campaigns should also incorporate specific knowledge of all financial protection schemes including insurance reimbursement, the transportation subsidy, and any special schemes for the poor. For example, the "One-stop Service" policy which allows patients to claim and get reimbursements from where they seek care would simplify reimbursement procedure for those who pay their insurance premium in one place but seek health care in another (National Health and Family Planning Commission-Public Health Division 2016). The "Targeted Poverty Alleviation" programme has launched a zero deposit/prepayment strategy since 2016 to increase accessibility to local health care among families officially registered as poor (National Health and Family Planning Commission-Finance Division 2016). The awareness of these ongoing financing policies would be a way to increase the health care utilisation among ethnic minorities.

Second, helping women develop a birth plan during antenatal visits to arrange money and transportation in advance is necessary to reduce the risks and pains posed to women by travelling many kilometres in labour. Maternity waiting homes, where pregnant women can await their delivery, should be given more attention. As an option in the WHO Safe Motherhood Programme, maternity waiting homes have become an increasingly popular strategy to "bridge the geographical gap" in obstetric care in developing countries (WHO 1996; Starrs 1997). Some studies reported that the use of maternity waiting homes had the potential to increase the use of skilled birth attendants and reduce perinatal mortality in rural areas with low geographic access to hospitals (Chandramohan *et al*. 1995; van Lonkhuijzen *et al*. 2003; Lori *et al.* 2013; Buser and Lori 2017). In China, maternity waiting homes have been incorporated into regular maternity services in Maternal and Child Health hospitals (Gao *et al.* 2017), but their use has not been evaluated, and it is uncertain whether women in remote areas access them. Similarly, hospital waiting areas for children who accompany pregnant women and don't have any other caretaker should be considered when designing the obstetric department because these additional people swell the cost of childbirth at facility (Foster 1977). Strengthening the connections between health workers and traditional birth attendants may also

reduce delays in receiving emergency care (Bhutta *et al.* 2008; Ekman *et al.* 2008). Jiang *et al.* (2016) reported a successful intervention in rural Guangxi, China, where traditional birth attendants acted as the link between women and the health system and promoted perinatal care and facility-based delivery.

Third, increasing the number of well-educated and highly-trained midwives will be an important factor in improving access to and quality of maternal health care, especially in rural areas. Otherwise, some health workers see local fears or customs as insignificant and spend little time thinking about how to solve the conflicts between clinical practice and these beliefs which may cause women's discomfort and embarrassment. Most women noted that there could be benefits from providers being sensitive to the cultural beliefs of rural women (Adams *et al.* 2005). For example, if the staff at facilities made sure to clean up blood quickly, the healthcare experience of the mother could be better because of their taboos about blood (Adams *et al.* 2005). If women's specific requirements around delivery position, handling of the placenta and newborn feeding can be considered and integrated into clinical practices, it may increase service use among women who have these needs and improve patient satisfaction (Harris *et al.* 2010).

It is noteworthy to balance between protecting ethnic minority autonomy on the one hand and ensuring that ethnic minorities are not left behind on the other (King *et al*. 2009). The interventions, such as sending ethnic minority people to school, building roads or moving them to more accessible places often profoundly change traditional norms and community attitudes which have the potential to impact negatively on social, emotional, cultural and spiritual well-being (Brant 1982). The autonomy is closely linked with self-esteem and the earning of respect. The low levels of autonomy and low self-esteem are likely to be related to worse health (Durie *et al*. 2009). To protect ethnical autonomy and maintain cultural heritage while modernising ethnic minorities' norms and behaviours, Chinese Government has designated "autonomous regions" for ethnic minorities, giving them the right to self-government. In the autonomous regions, children are taught in their local language in the public school, women are allowed to have a second or third child under the one child policy, the traditional holiday and traditional costume are kept, etc.. Adapting interventions for local culture's values and identity can improve the connection with the target community and increase the chances for success of the intervention (and its community impact). More discussion is needed in global papers to minimise the negative impact associated with interventions within the arena of indigenous health and get a balancing act.

While this systematic review used rigorous methods to examine the barriers to care seeking for ethnic minority women in Western China, caution is required in generalising the findings, for the following reasons. First, the ten qualitative studies matching our inclusion criteria only covered 13 of the 55 ethnic groups in China. The Zhuang for example, the dominant ethnic minority group in Western China, were not covered by this review. Nearly all studies had purposely selected populations in very remote rural areas, and it may be difficult to separate ethnicity per se from poverty, low literacy, and long distances to urban centres. Not all ethnic minorities in China live in remote areas (Hannum and Wang 2010; National Bureau of

Statistics 2017). As part of a "Targeted Poverty Alleviation" programme, local governments help to relocate people closer to town to improve their standard of living. It would be interesting to examine barriers to care seeking among these more urbanised groups to see if ethnic disparities persist after adjustment for geographical, financial and even institutional factors. Second, half of the studies were rated as poor quality because they did not report how participants were selected, how the interview or group discussions were conducted, how the response data were recorded, and how the data were analysed. This makes it difficult to assess bias in the process of data collection and analysis, particularly whether the interviewers or those analysing the data were independent when making inferences. We chose not to exclude these studies because we wanted to highlight the gaps in the evidence base, particularly for Chinese language papers. Third, while we tried to report findings from individual ethnicities, six papers combined ethnic groups as if they were all homogeneous when we know that not to be the case. This may mask possible variations for each individual ethnic group or province. Fourth, intersectionality is increasingly recognised as a valuable approach for understanding inequalities, especially how different characteristics may interact to increase one's exposure to risk (Larson et al. 2016). However, most papers included in this review tended to list contributing factors, without explaining how they interact or which are the most important. Only one paper attempted to weigh the relative importance of barriers to accessing maternal health care (Yang *et al.* 2013), and found that the top three factors affecting the use of maternal care are geographic accessibility, financial affordability and perceived benefits/risks of care-seeking. Health workers regarded institutional capacity as more important to improve utilisation than women did. Fifth, half of the studies included in this review did not separate antenatal care from delivery care, and we were unable to compare the barriers for specific services. Some reasons for low uptake of antenatal care may overlap with those for facility delivery, for example conflict between local beliefs and clinical practice, and poor quality of care. Others, for example lack of money or distance may affect antenatal care much less since antenatal care is generally delivered in township hospitals free of charge and closer to the woman's home, and unlike for delivery care, women are better able to prepare for their visit and choose a convenient time to receive care.

Conclusions

The reasons behind low uptake of maternal health services among ethnic minority women are multifactorial. Strong traditional beliefs, low levels of education, poverty and living far away from the qualified health facilities may all decrease maternal health care utilisation. These factors are more likely to exist among ethnic minority women. At the same time, poor quality of care, lack of communication between doctors and their patients, and conflicts between clinical practices and local traditions also prevent women from seeking care. We identify potential for improving utilisation through strengthening community health promotion campaigns, helping women develop a birth plan, building maternity waiting homes, and delivering quality care. Half of the studies included in this review were classified as having low methodological rigour. There is a lack of research that highlights the heterogeneity in cultural practices and socioeconomic conditions between individual ethnic groups and explains how these characteristics interact with local health system and lead to ethnic

minority health differentials in China. Further efforts to improve the quality of research are needed to be useful for decision makers.

Declaration of interests

We declare no competing interests.

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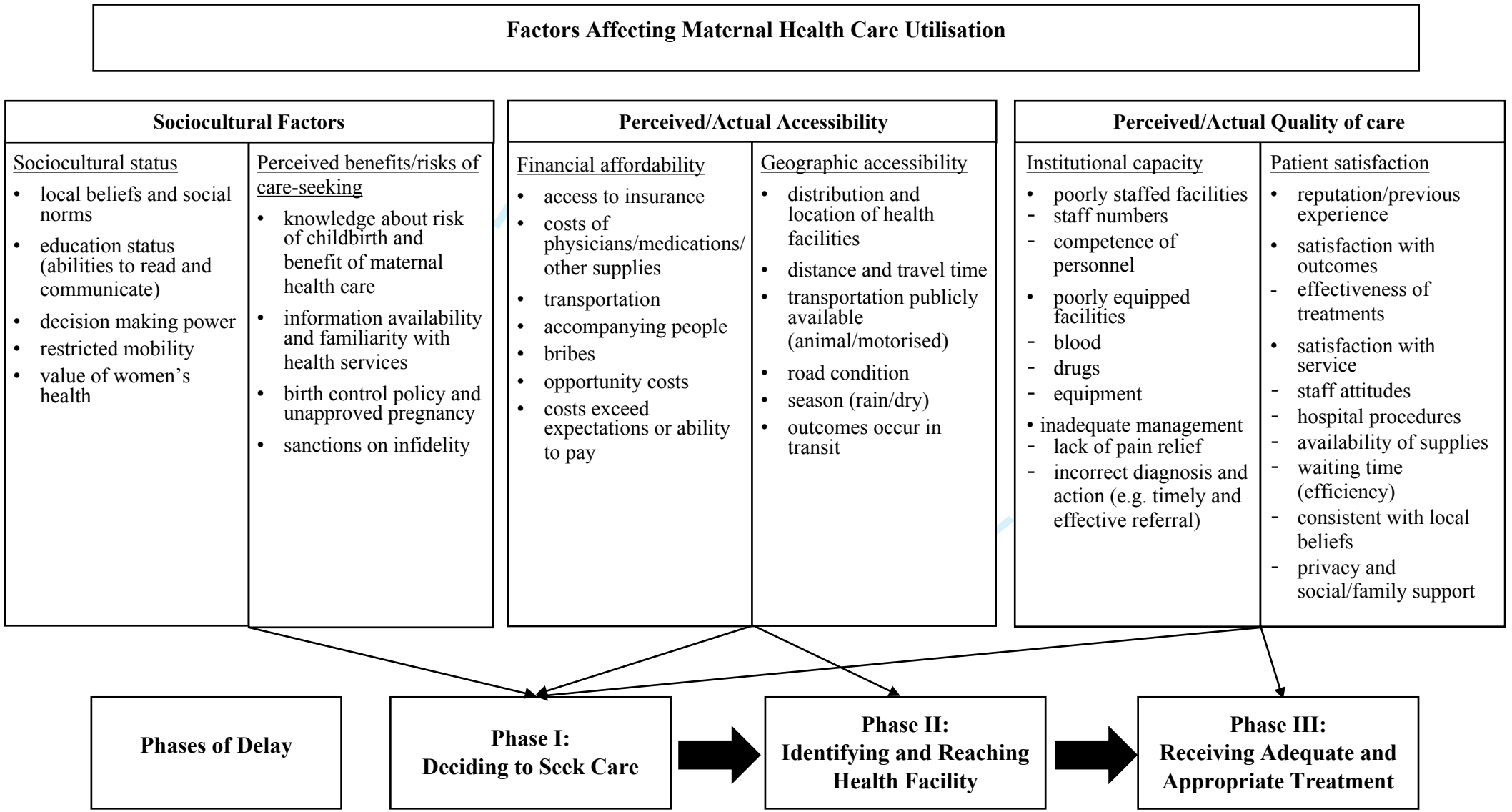

Figure 1. Adapted from the conceptual framework "three phases of delay affecting maternal health care utilisation" (Thaddeus and Maine 1994)

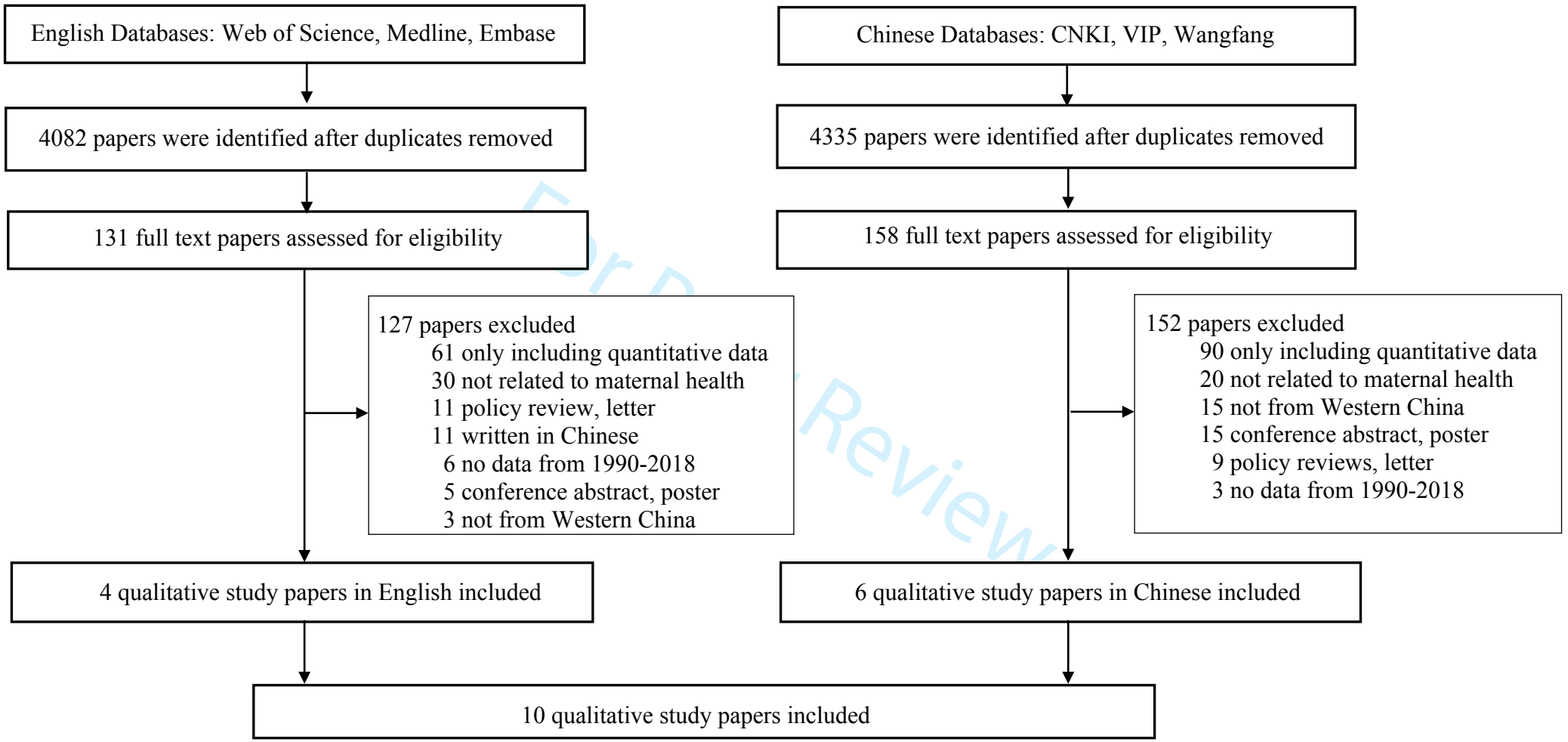

Figure 2. Flow chart of qualitative study papers search and selection for inclusion in the systematic review

Table 1 Criteria for quality appraisal of qualitative researches (adapted from Critical Appraisal Skills Program (CASP) Qualitative Research Checklist)

Quality domains	Under following conditions a "yes" can be given
Study setting	If there is a clear statement of the study setting of the research
Research design	If qualitative research is the right methodology for addressing the research goal (e.g. did authors seek to interpret or illuminate the subjective experiences and opinions of research participants?)
Participant details	If authors explained who the research participants were and if the sample size is clear
Sample recruitment	If authors explained how the research participants were selected (sampling method)
Data collection	If it is clear how data were collected (e.g. interview or focus group) and if authors have made these data collection methods explicit (e.g. how interviews were conducted, how responses data were recorded, was a topic guide used, or which language was used?)
Relationship between researcher and participants	If authors critically examined their own role, potential bias and influence during formulation of the research questions and data collection, including sample recruitment and choice of location
Ethical issues	If an approval has been sought from the ethics committee and if there are sufficient details of whether ethical standards were maintained (e.g. informed consent or confidentiality)
Data analysis	If data analysis process is clearly described (e.g. was the thematic analysis used, were sufficient data presented to support the findings, or how the data presented were selected from the original sample?)

Table 2 Summary of the studies included in the qualitative review and their quality based on the criteria adapted from Critical Appraisal Skills Program (CASP) Qualitative Research Checklist

Reference	Study setting	Research design	Participant details	Sample recruitment	Data collection	Relationship between researcher and participants	Ethical issues	Data analysis
Wong et al., 1995 (E)	•2 rural counties in Yunnan Province •One mountainous county with poor roads and one poor county on a broad plain, high maternal mortality	•Case study •3 villages in two counties, villages matched on contextual factors	•169 women (including Han, Yi, Miao) categorised into four age groups (teens, 18-29, 30-49 and 50 and above)	•Purposeful sampling: women represent range of age, ethnicity and educational level •Women were identified and recruited by county officials.	•Focus group discussions with open-ended questions •Use of discussion guides •Each focus group was conducted by one facilitator, with a recorder. •Unclear which language was used in group discussions	•Group discussion facilitators were recruited at provincial level. •Women were recruited and gathered in villages. •Separate room with chairs and refreshments was arranged, without the presence of health system cadres.	•Ethics approval process not reported •A small payment to compensate women's loss of one day's labor in the fields	•Field notes were organised at the end of each day. •Data analysis process not reported
Moderate Quality	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*No*	*No*
Adams et al., 2005 (E)	•4 rural counties in Lhasa Prefecture, Tibet •Remote mountainous plateau (1-2 hour drive from Lhasa), mostly home deliveries	•Ethnographic research	•38 Tibetan women aged 18-40 •Health care providers at prefecture, county, and township health facilities (sample size not reported)	•Purposeful sampling: women represent range of household size, income, and occupation; health care providers represent various levels within health care hierarchy.	•Semi-structured interviews with open-ended questions in 2004 •Use of interview guide •Interviews were conducted in Tibetan with English translation by local Tibetan counterparts. •Answers were written down in a combination of English and Tibetan on questionnaire templates. •Some interviews were tape recorded.	•4 interviewers are female and US-based. •Interviews were conducted in women's house or village clinic. •Unclear if the local Tibetan counterparts came from health system	•Ethical approval from University of California, San Francisco and local approval for data collection (no details) •Verbal consent	•Transcriptions were translated into English for coding and analysis. •Findings were compared among different stakeholders but analytical methods were unclear.
Moderate Quality	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*No*	*Yes*	*No*

Tian et al., 2007 (E)	•2 rural counties and 1 urban district in Yunnan Province •Mountainous area, high maternal mortality, mostly home deliveries	•Case study •23 villages from 7 townships selected to represent different geographic, social, economic and demographic contexts	•515 villagers (including Han, Lisu, Yi and Dai) (age range and sample size of ethnic minority women not reported) •21 policy makers and programme managers at county and township level •36 health care providers at county, township and village level	•Sampling method not reported	•Interviews, focus group discussions, field observations, and facility records review (unclear data collection time) •Use of interview guides and observation checklists •Tape recordings were transcribed and cross-checked. •Unclear how interviews and group discussions were conducted and which language was used	•Unclear who conducted interviews and group discussions, and where these activities took place	•Ethics approval from Yunnan Medical Review Board. •Verbal consent •All respondents informed about the purpose and benefits of study. •All responses data kept confidential and anonymous	•Field notes and transcriptions were reviewed, coded, edited and analysed. •Thematic analysis was used to identify two main themes and specific issues.
Moderate Quality	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*Yes*	*Yes*
Harris et al., 2010 (E)	•1 predominantly Yi township in Sichuan Province •Remote mountainous area (3 hour drive to main town), mostly home deliveries	•Case study •3 villages selected for their contrasting degrees of accessibility to the township	•56 women aged 17-85 (46 Yi, 9 Mong, 1 Han) •7 traditional birth attendants •2 male traditional healers •5 township health workers •6 managers and staff at County Hospital •2 officials from County Health Bureau	•Convenience sampling: interviewees identified through snowball sampling.	•Semi-structured interviews, field observations, and births records review •Use of interview guides •Interviews were conducted in Yi language by local female obstetrician, responses were translated into Mandarin by same obstetrician and into English by Chinese researchers. •Field notes were taken in Mandarin and English, and reviewed and discussed by the team at the end of day	•Local female obstetrician did all interviews. •Interviews were conducted where women felt comfortable.	•Ethical approval from Charles Darwin University and Sichuan University. •Verbal consent	•Thematic analysis was used to identify themes and key phrases. •Responses were examined according to age groups and distance of place of residence from the township hospital.
High Quality	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*

Zhou et al., 2005 (C)	•1 predominately Miao and Tujia county in Chongqing •Remote, poor mountainous area, mostly home deliveries	•Case study •Good, moderate and poor performing townships selected based on hospital delivery rate, and 2 villages from each township selected according to the distance	•15 women aged 20-49 •74 other stakeholders (52 male and 22 female) including women's family members, hospital directors and health care providers at county and township level, village leader, and traditional birth attendants	•Purposeful sampling: 5 women were chosen from each township. •Sampling method used for other stakeholders not reported	•Interviews, focus group discussions, and facility records review (unclear data collection time) •Use of interview guides •Unclear how interviews and group discussions were conducted and which language was used •Unclear how the responses data were recorded	•Unclear who conducted interviews and group discussion, and where these activities took place	•Ethics approval process not reported •All respondents informed about the purpose and benefits of study	•Data analysis process not reported
Low Quality	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*	*No*
Wen et al., 2011 (C)	•6 ethnic minority counties in Yunnan, Guizhou, Qinghai and Tibet Provinces, high maternal and under-five mortality	•Case study •2 townships chosen from each county to represent different distance to county city, economic status, ethnicity and geographic features, and 2 villages within one township selected randomly.	•445 women aged 15-49 (73.3% ethnic minority: Tibetan, Miao, Dong, Hui, Jingpo, Dai and De'ang)	•Purposeful sampling: around 20 married women were selected from each village.	•Interviews (unclear data collection time) •Interview guides not reported •Unclear how interviews were conducted and which language was used •Unclear how the responses data were recorded	•Unclear who conducted interviews, and where these activities took place	•Ethics approval process not reported	•Data analysis process not reported
Low Quality	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*

Wang and Zhang, 2012 (C)	•5 predominately Yi counties in Sichuan Province •Very poor	•Case study	•120 women of reproductive age (100 Yi, 15 Tibetan, 1 Miao, 1 Mong and 3 Han) •73 women's relatives (64 Yi, 7 Tibetan and 2 Han) •67 village doctors and village maternal care providers (65 Yi and 2 Han)	•Sampling method not reported	•Focus groups discussions and individual interviews in September-October 2011 •Interview or discussions guides not reported •Each focus group or interview was conducted by one trained facilitator, with a recorder, a Yi language translator and an observer. •Field notes were reviewed and organized by recorder and observer by the end of each day.	•Unclear who conducted interviews and group discussions, and where these activities took place	•Ethics approval process not reported	•Thematic analysis was used.
Low Quality	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*	*Yes*
Zhang et al., 2012 (C)	•1 township in Sunan Yugur Autonomous County, Gansu Province •Highland pasture with cold weather	•Case study	•280 married Yugur women aged 20-40 who sought outpatient care in department of gynecology in Kangle township hospital	•Sampling method not reported	•Interviews in March-November 2009 •Interview guides not reported •Unclear how interviews were conducted and which language was used •Unclear how the responses data were recorded	•Interviews were conducted at the outpatient sector in department of gynecology •Unclear who conducted interviews	•Ethics approval process not reported	•Data analysis process not reported
Low Quality	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*	*No*

Nie, 2013 (C)	•Aksu Prefecture in Xinjiang Uygur Autonomous Province	•Case study	•200 Uygur women who sought outpatient care in department of gynecology in Aksu maternal and child health hospital (age range not reported)	•Sampling method not reported	•Interviews in March-October 2011 •Interview guides not reported •Unclear how interviews were conducted and which language was used •Unclear how the responses data were recorded	•Interviews were conducted at the outpatient sector in department of gynecology •Unclear who conducted interviews	•Ethics approval process not reported	•Data analysis process not reported
Low Quality	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*	*No*
Yang et al., 2013 (C)	•Predominantly Yi county in Sichuan Province •Remote mountainous area (5-6 hour drive away from the county city), high HIV prevalence	•Case study •One township with higher HIV prevalence rate and another with lower HIV prevalence rate were selected	•27 Yi HIV-positive and 30 Yi HIV-negative women of childbearing age •8 programme managers and 6 obstetricians in medical institutions at different levels within county •13 maternal and child health care workers working in the villages •17 village doctors	•HIV-positive women selected randomly; HIV-negative women selected using 1:1 paired sample •Purposeful sampling used to select health workers at different levels within county health system	•Interviews (unclear data collection time) •Use of interview guides •All the interviewers attended training and passed test. •Unclear which language was used in interviews	•Unclear who conducted interviews, and where these activities took place	•Ethics approval process not reported •Verbal consent •All responses kept confidential	•Tape recordings were transcribed and field notes were reviewed within three days after interview. •Thematic analysis was used. •Frequencies of response were calculated and the results were cross-compared between different groups.
Moderate Quality	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*Yes*

Abbreviation: E=English paper, C=Chinese paper

Note: Studies were rated as "high", "moderate" or "low" quality by the studies meeting 8-7, 6-5 or 4-0 of the criteria, respectively.

Table 3 Summary of barriers to accessing maternal health care identified in studies included in qualitative review

Barriers to accessing maternal health care	Contributing Studies	Contributing geographical spreads	Contributing ethnic minority populations	Comments
Sociocultural status				
Local beliefs and fears arouse ethnic minority women's suspicion of seeking maternal health care. • Refusal to stay at unfamiliar places and meeting outsiders during pregnancy and childbirth to avoid attacks by spirits and demon • Refusal of medical interventions to break the natural process of pregnancy and childbirth • Pregnancy regarded as "dirty" and taboos against pregnant women • Fear of diseases detected during pregnancy	Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Wen et al., 2011 (C) Wang and Zhang 2012 (C) Zhang et al., 2012 (C)	Tibet, Yunnan, Sichuan, Guizhou, Qinghai, and Gansu	Tibetan, Lisu, Yi, Dai, Mong, Miao, Dong, Hui, Jingpo, De'ang, and Yugur	• Six studies together offer this finding, which is shared by six provinces and eleven ethnic minority groups. • The finding is consistent across most studies. The certain tradition and culture hider women from seeking maternal health care. However, one study suggested the local belief may play a positive role in improving maternal service utilisation if making good use of it. • Moderate concern comes from the three studies with low methodological rigour. However, three studies with high or moderate quality confirmed this finding.
Low level of education limited health literacy among ethnic minority women	Wong et al., 1995 (E) Tian et al., 2007 (E) Wen et al., 2011 (C) Wang and Zhang 2012 (C) Nie 2013 (C)	Yunnan, Guizhou, Qinghai, Tibet, Sichuan, and Xinjiang	Yi, Miao, Lisu, Dai, Tibetan, Dong, Hui, Jingpo, De'ang, Mong, and Uygur	• Five studies together offer this finding, which is shared by six provinces and ten ethnic minority groups. • The finding is consistent within and across all studies. Low-educated status is the obstacle to accessing health knowledge which further affect utilisation among women. • Moderate concern comes from the three studies with low methodological rigour. However, two studies with moderate quality confirmed this finding.

Husband and male members of family decided regarding where and when ethnic minority women ought to seek health services.	Tian et al., 2007 (E)	Yunnan	Lisu, Yi, and Dai	• Only one study offers this finding, which is shared by one province and three ethnic minority groups. • The finding is consistent within studies. Women's participation in whole decision making process is limited. • High concern comes from that only one study provided finding.
Ethnic minority women have to work during pregnancy and up to delivery and long-hour labour work left women no time to seek maternal health care.	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E)	Yunnan and Tibet	Yi, Miao, Tibetan, Lisu, and Dai	• Three studies together offer this finding, which is shared by two provinces and five ethnic minority groups • The finding is consistent within and across all studies. Women's restricted mobility and opportunity cost of going to health facilities cannot be neglected. • Little concern due to three studies meeting most quality criteria.
Perceived benefits/risks of care-seeking				
Poor awareness of risk of home delivery and unfamiliarity with maternal health services among ethnic minority women	Wong et al., 1995 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Yang et al (C) Zhou et al., 2005 (C) Wen et al., 2011 (C) Wang and Zhang 2012 (C) Zhang et al., 2012 (C) Nie 2013 (C)	Yunnan, Sichuan, Chongqing, Guizhou, Qinghai, Tibet, Xinjiang, and Gansu	Yi, Miao, Lisu, Dai, Mong, Tujia, Tibetan, Dong, Hui, Jingpo, De'ang, Uygur, and Yugur	• Nine studies together offer this finding, which is shared by eight provinces and thirteen ethnic minority groups. • The finding is consistent within and across all studies. Women do not seek maternal health care is that they do not feel there is any need or they don't know what service is available. • Moderate concern comes from the five studies with low methodological rigour. However, four studies with high or moderate quality confirmed this finding. The presence of health system staff in interview or group discussion may make women stressful. But women couldn't change their responses easily in this case if they were unware of risk and need.

Many women still rely on an informal assistance in childbirth at home.	Wong et al., 1995 (E) Harris et al., 2010 (E)	Yunnan and Sichuan	Yi and Miao	• Only two studies offer this finding, which is shared by two provinces and two ethnic minority groups. • The finding is consistent within studies. The traditional birth attendant may still play a role in childbirth in rural areas. • High concern comes from that only two studies provided finding.
Ethnic minority women may hide themselves to avoid penalties of revealing an unapproved pregnancy to hospital staff.	Harris et al., 2010 (E)	Sichuan	Yi and Mong	• Only one study offers this finding, which is shared by one province and two ethnic minority groups. • The finding is consistent within studies. Current birth control policy may hinder women who have unapproved pregnancy from going to health facilities. • High concern comes from that only one study provided finding.
Financial affordability				
Economic obstacles to maternal health care • The cost of hospital birth exceed insurance reimbursement. • High cost of transportation and accommodation • Lack of cash and hard to provide prepayment before getting reimbursement. • Hard to navigate reimbursement and poverty assistance schemes • No reimbursement policy for unapproved birth defined by China's birth control policy	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Yang et al., 2013 (C) Zhou et al., 2005 (C) Wen et al., 2011 (C) Wang and Zhang 2012 (C)	Yunnan, Tibet, Sichuan, Chongqing, Guizhou, Qinghai, and Gansu	Yi, Miao, Tibetan, Lisu, Dai, Mong, Tujia, Dong, Hui, Jingpo, and De'ang	• Eight studies together offer this finding, which is shared by seven provinces and eleven ethnic minority groups. • The finding is consistent across most studies. Although one study suggested that economic barrier has been decreased by a range of reimbursement schemes, most studies reported hospital birth is still too costly to pay for rural women, especially when non-medical expenditure is considered. • Moderate concern comes from the three studies with low methodological rigour. However, five studies with high or moderate quality confirmed this finding.

Geographic accessibility				
Difficulties in travel to health facilities • Long distance to hospital and fear of giving birth on the road • Winding and bumpy road and fear of pain and bleeding on the road • Hard to find a transportation and drivers' unwillingness because of local taboos • Difficulties in arranging accommodation close to hospital in advance with unclear due date • No enough ambulance when seeking an emergency care • No birth plan which include where women should go and who they can contact with when labour starts	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Yang et al., 2013 (C) Zhou et al., 2005 (C) Wen et al., 2011 (C) Wang and Zhang 2012 (C) Zhang et al., 2012 (C)	Yunnan, Tibet, Sichuan, Chongqing, Guizhou, Qinghai, and Gansu	Yi, Miao, Tibetan, Lisu, Dai, Mong, Tujia, Dong, Hui, Jingpo, De'ang, and Yugur	• Nine studies together offer this finding, which is shared by seven provinces and twelve ethnic minority groups. • The finding is consistent across most studies. The difficulties in travelling to health facilities may decrease the maternal service utilisation. However, one study suggested utilisation was not necessarily increased through easy access to a health facility. • Moderate concern comes from the four studies with low methodological rigour. However, five studies with high or moderate quality confirmed this finding.
Institutional capacity				
Poor quality of rural health facilities (township hospital) • Insufficient and unqualified health workforce providing maternal health care • Low capacity to select high risk pregnancies and treat complications • Lack of female doctors • Poor condition of infrastructure • Shortage in drugs and equipment (e.g. blood transfusion and ward beds) • Lack of incentives such as pain relief during childbirth	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Yang et al., 2013 (C) Zhou et al., 2015(C) Wang and Zhang 2012 (C) Zhang et al., 2012 (C) Nie 2013 (C)	Yunnan, Tibet, Sichuan, Chongqing, Xinjiang, and Gansu	Yi, Miao, Tibetan, Lisu, Dai, Mong, Tujia, Uygur, and Yugur	• Nine studies together offer this finding, which is shared by six provinces and nine ethnic minority groups. • The finding is consistent within and across all studies. Perceived low capacity of health facilities and low quality of care provided may undermine women's utilisation of maternal service. • Moderate concern comes from the four studies with low methodological rigour. However, five studies with high or moderate quality confirmed this finding. The presence of health system staff in interview or group discussion may make women uncomfortable and curtail their responses. But the conclusion might not be changed because health workers agreed with women on the weakness of rural health facilities.

Patient satisfaction				
Current doctor-patient relationship arouses women's reluctance to go to health facilities. • Little confidence in western medicine and distrust of local hospital because of disappointment with services and outcomes • Language barriers and social class differences leading to misunderstanding and miscommunication • Women were treated with discrimination in health facilities.	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Yang et al., 2013 (C)	Yunnan, Tibet, and Sichuan	Yi, Tibetan, Lisu, Dai, and Mong	• Five studies together offer this finding, which is shared by three provinces and five ethnic minority groups. • The finding is consistent within and across all studies. The doctor-patient relationship affects women's choice of going to health facilities. • Little concern due to five studies meeting most quality criteria. Although the presence of health system staff in one study made women stressful more or less, it provided opportunities for researchers to observe and assess the informal dynamic between health worker and client.
Cultural inappropriateness of facility birthing practices cause women discomfort and embarrassment. • Need of silence and secrecy about reproduction, sexuality and diseases • Natural shyness of reproductive examination • Refusal to male doctors and health workers • Specific requirements around delivery services like birth position, handling of placenta and newborn feeding	Wong et al., 1995 (E) Adams et al., 2005 (E) Tian et al., 2007 (E) Harris et al., 2010 (E) Wen et al., 2011 (C) Wang and Zhang 2012 (C) Zhang et al., 2012 (C) Nie 2013 (C)	Yunnan, Tibet, Sichuan, Guizhou, Qinghai, Xinjiang and Gansu	Yi, Miao, Tibetan, Lisu, Dai, Mong, Dong, Hui, Jingpo, De'ang, Uygur, and Yugur	• Eight studies together offer this finding, which is shared by seven provinces and twelve ethnic minority groups. • The finding is consistent within and across all studies. The birthing practices in health facilities which conflict with local tradition and culture may cause women discomfort and embarrassment and influence the utilisation. • Moderate concern comes from the four studies with low methodological rigour. However, four studies with high or moderate quality confirmed this finding.

Abbreviation: E=English paper, C=Chinese paper

Note: Studies in black were awarded a high or moderate quality in methodological rigour based on the criteria adapted from Critical Appraisal Skills Program (CASP) Qualitative Research Checklist, and studies in red were rated as the low quality with methodological limitations.

Supplementary Appendix

A1. Search strategies and terms used for the systematic review on ethnicity and access to maternal and child health in Western China

A1.1 English databases search

Search strategies	Search terms
Embase search up to 23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	((exp health care utilisation/ or exp health care system/ or exp health care delivery/ or exp child health care/ or exp maternal care/ or exp rural health care/ or exp health care, postnatal/ or exp health care, primary/ or exp health care, rural/ or exp health center/ or exp home delivery/ or exp transcultural care/ or exp child health/ or exp minority health/ or exp womens health/ or exp reproductive health/ or exp health service/ or exp maternal mortality/ or exp childhood mortality/ or exp pregnancy/ or exp prenatal care/ or exp prenatal screening/ or exp named groups by pregnancy/ or exp infant mortality/ or exp parameters concerning the fetus, newborn/) and pregnancy/) or exp perinatal mortality/ or exp cesarean section/ or exp immunisation/ or exp hepatitis B vaccine/ or exp measles vaccine/ or exp measles vaccination/ or exp BCG vaccine/ or exp BCG vaccination/ or exp diphtheria pertussis tetanus vaccine/ or maternal health*.mp. or child health*.mp. or neonat* health*.mp. or infant health*.mp. or MCH.mp. or MNH.mp. or MDG4.mp. or MDG5.mp. or millennium development goal*.mp. or maternal death*.mp. or maternal mortality.mp. or infant mortality.mp. or infant death*.mp. or neonat* mortality.mp. or neonat* death*.mp. or safe motherhood.mp. or perinatal mortality.mp. or perinatal death*.mp. or prenatal.mp. or pre-natal.mp. or antenatal.mp. or ante-natal.mp. or postnatal.mp. or post-natal.mp. or c-section*.mp. or caesarean section*.mp. or cesarean section*.mp. or facility deliver*.mp. or facility-based deliver*.mp. or hospital* deliver*.mp. or hospital-based deliver*.mp. or homebirth.mp. or home birth.mp. or home childbirth.mp. or home deliver*.mp. or skilled deliver*.mp. or institutional* deliver*.mp. or pregnancy complication*.mp. or vaccin*.mp. or immuniz*.mp. or immunis*.mp. or EPI.mp.
2. Ethnic minorities	exp ethnic group/ or exp minority group/ or ethnic*.mp. or minorit*.mp. or nationalit*.mp. or Zhuang.mp. or Hui.mp. or Manchu.mp. or Uyghur.mp. or Uighur.mp. or Miao.mp. or Yi.mp. or Lolo.mp. or Tujia.mp. or Tibetan.mp. or Mongol*.mp. or Dong.mp. or Kam.mp. or Bouyei.mp. or Puyi.mp. or Buyi.mp. or Buyei.mp. or Yao.mp. or Mien.mp. or Bai.mp. or Baip.mp. or Korean.mp. or Chaoxian*.mp. or Chosen.mp. or Hani.mp. or Ho.mp. or Li.mp. or Hlai.mp. or Kazakh.mp. or Kazak.mp. or Dai.mp. or She.mp. or Lisu.mp. or Dongxiang.mp.

	or Gelao.mp. or Gelo.mp. or Lahu.mp. or Wa.mp. or Sui.mp. or Shui.mp. or Nakhi.mp. or Naxi.mp. or Qiang.mp. or Tu.mp. or Monguor.mp. or Mulao.mp. or Xibo.mp. or Xibe.mp. or Sibe.mp. or Kyrgyz.mp. or Kirgiz.mp. or Jingpo.mp. or Kachin.mp. or Daur.mp. or Salar.mp. or Blang.mp. or Bulang.mp. or Bulong.mp. or Maonan.mp. or Tajik.mp. or Pumi.mp. or Primi.mp. or Achang.mp. or Ngac'ang.mp. or Maingtha.mp. or Nu.mp. or Evenki.mp. or Ewenki.mp. or Gin.mp. or Jing.mp. or Jino.mp. or Jinuo.mp. or Palaung.mp. or De'ang.mp. or Deang.mp. or Bonan.mp. or Bao'an.mp. or Baoan.mp. or Russian.mp. or Yugur.mp. or Yugu.mp. or Uzbek.mp. or Monpa.mp. or Monba.mp. or Menba.mp. or Oroqen.mp. or Orochen.mp. or Orochon.mp. or Drung.mp. or Derung.mp. or Dulong.mp. or Nanai.mp. or Hezhen.mp. or Hezhe.mp. or Gaoshan.mp. or Lhoba.mp. or Luoba.mp. or Tatar*.mp.
3. Western China	exp china/ or ((west* adj4 china) or (west* adj4 chinese) or (china adj4 region*) or (southwest* adj4 china) or (south-west* adj4 china) or (northwest* adj4 china) or (north-west* adj4 china) or (southwest* adj4 chinese) or (south-west* adj4 chinese) or (northwest* adj4 chinese) or (north-west* adj4 chinese) or Tibet or Qinghai or Xinjiang or Gansu or "Shaan'xi" or Shaanxi or Sichuan or Guizhou or Guangxi or Yunnan or Chongqing or Ningxia or Inner Mongolia or Lhasa or Xining or Urumqi or Lanzhou or "Xi'an" or Xian or Chengdu or Guiyang or Nanning or Kunming or Yinchuan or Hohhot or autonomous count* or autonomous prefecture* or autonomous region* or autonomous banner* or (border* adj4 china) or (border* adj4 chinese) or (rural adj4 china)).mp.
4. 1 and 2 and 3	1 and 2 and 3
Medline search up to 23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	exp "delivery of health care"/ or exp "pregnancy complication"/ or exp "cesarean section"/ or exp "nursing, maternal child"/ or exp "midwifery"/ or exp "obstetric nursing"/ or exp "pediatric nursing"/ or exp "health centers, maternal child"/ or exp "home childbirth"/ or exp "health service, maternal"/ or exp "prenatal care"/ or exp "prenatal education"/ or exp "prenatal diagnosis"/ or exp "child health services"/ or exp "maternal health"/ or exp "infant death"/ or exp "infant mortality"/ or exp "perinatal mortality"/ or exp "perinatal death"/ or exp "care, perinatal"/ or exp "infant, newborn"/ or exp "infant, newborn, diseases"/ or exp "child care"/ or exp "infant health services"/ or exp "intensive care, neonatal"/ or exp "child mortality"/ or exp "child health"/ or exp "vaccination"/ or exp "immunisation"/ or exp "BCG Vaccine"/ or exp "measles vaccine"/ or exp "diphtheria-tetanus-pertussis vaccine"/ or exp "Hepatitis B Vaccines"/ or maternal health*.mp. or child health*.mp. or neonat* health*.mp. or infant health*.mp. or MCH.mp. or MNH.mp. or MDG4.mp. or MDG5.mp. or millennium development goal*.mp. or maternal death*.mp. or maternal mortality.mp. or infant mortality.mp. or infant death*.mp. or neonat* mortality.mp. or neonat* death*.mp. or safe motherhood.mp. or perinatal mortality.mp. or perinatal death*.mp. or prenatal.mp. or pre-natal.mp. or antenatal.mp. or ante-natal.mp. or postnatal.mp. or post-natal.mp. or c-section*.mp. or caesarean section*.mp. or cesarean

	section*.mp. or facility deliver*.mp. or facility-based deliver*.mp. or hospital* deliver*.mp. or hospital-based deliver*.mp. or homebirth.mp. or home birth.mp. or home childbirth.mp. or home deliver*.mp. or skilled deliver*.mp. or institutional* deliver*.mp. or pregnancy complication*.mp. or vaccin*.mp. or immuniz*.mp. or immunis*.mp. or EPI.mp.
2. Ethnic minorities	exp "Ethnic Groups"/ or ethnic*.mp. or minorit*.mp. or nationalit*.mp. or Zhuang.mp. or Hui.mp. or Manchu.mp. or Uyghur.mp. or Uighur.mp. or Miao.mp. or Yi.mp. or Lolo.mp. or Tujia.mp. or Tibetan.mp. or Mongol*.mp. or Dong.mp. or Kam.mp. or Bouyei.mp. or Puyi.mp. or Buyi.mp. or Buyei.mp. or Yao.mp. or Mien.mp. or Bai.mp. or Baip.mp. or Korean.mp. or Chaoxian*.mp. or Chosen.mp. or Hani.mp. or Ho.mp. or Li.mp. or Hlai.mp. or Kazakh.mp. or Kazak.mp. or Dai.mp. or She.mp. or Lisu.mp. or Dongxiang.mp. or Gelao.mp. or Gelo.mp. or Lahu.mp. or Wa.mp. or Sui.mp. or Shui.mp. or Nakhi.mp. or Naxi.mp. or Qiang.mp. or Tu.mp. or Monguor.mp. or Mulao.mp. or Xibo.mp. or Xibe.mp. or Sibe.mp. or Kyrgyz.mp. or Kirgiz.mp. or Jingpo.mp. or Kachin.mp. or Daur.mp. or Salar.mp. or Blang.mp. or Bulang.mp. or Bulong.mp. or Maonan.mp. or Tajik.mp. or Pumi.mp. or Primi.mp. or Achang.mp. or Ngac'ang.mp. or Maingtha.mp. or Nu.mp. or Evenki.mp. or Ewenki.mp. or Gin.mp. or Jing.mp. or Jino.mp. or Jinuo.mp. or Palaung.mp. or De'ang.mp. or Deang.mp. or Bonan.mp. or Bao'an.mp. or Baoan.mp. or Russian.mp. or Yugur.mp. or Yugu.mp. or Uzbek.mp. or Monpa.mp. or Monba.mp. or Menba.mp. or Oroqen.mp. or Orochen.mp. or Orochon.mp. or Drung.mp. or Derung.mp. or Dulong.mp. or Nanai.mp. or Hezhen.mp. or Hezhe.mp. or Gaoshan.mp. or Lhoba.mp. or Luoba.mp. or Tatar*.mp.
3. Western China	exp "China"/ or ((west* adj4 china) or (west* adj4 chinese) or (china adj4 region*) or (southwest* adj4 china) or (south-west* adj4 china) or (northwest* adj4 china) or (north-west* adj4 china) or (southwest* adj4 chinese) or (south-west* adj4 chinese) or (northwest* adj4 chinese) or (north-west* adj4 chinese) or Tibet or Qinghai or Xinjiang or Gansu or "Shaan'xi" or Shaanxi or Sichuan or Guizhou or Guangxi or Yunnan or Chongqing or Ningxia or Inner Mongolia or Lhasa or Xining or Urumqi or Lanzhou or "Xi'an" or Xian or Chengdu or Guiyang or Nanning or Kunming or Yinchuan or Hohhot or autonomous count* or autonomous prefecture* or autonomous region* or autonomous banner* or (border* adj4 china) or (border* adj4 chinese) or (rural adj4 china)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
4. 1 and 2 and 3	1 and 2 and 3
Web of Science search up to 23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	TOPIC: (maternal health* or child health* or neonat* health* or infant health* or MCH or MNH or MDG4 or MDG5 or millennium development goal* or maternal death* or maternal mortality or infant mortality or infant death* or neonat* mortality or neonat* death* or

	safe motherhood or perinatal mortality or perinatal death* or prenatal or pre-natal or antenatal or ante-natal or postnatal or post-natal or c-section* or caesarean section* or cesarean section* or facility deliver* or facility-based deliver* or hospital* deliver* or hospital-based deliver* or home birth or home birth or home deliver* or skilled deliver* or institutional* deliver* or pregnancy complication* or vaccin* or immuniz* or immunis* or EPI) DocType=All document types; Language=All languages;
2. Ethnic minorities	TOPIC: (ethnic* or Zhuang or Hui or Manchu or Uyghur or Uighur or Miao or Yi or Lolo or Tujia or Tibetan or Mongol* or Dong or Kam or Bouyei or Puyi or Buyi or Buyei or Yao or Mien or Bai or Baip or Korean or Chaoxian* or Chosen or Hani or Ho or Li or Hlai or Kazakh or Kazak or Dai or She or Lisu or Dongxiang or Gelao or Gelo or Lahu or Wa or Sui or Shui or Nakhi or Naxi or Qiang or Tu or Monguor or Mulao or Xibo or Xibe or Sibe or Kyrgyz or Kirgiz or Jingpo or Kachin or Daur or Salar or Blang or Bulang or Bulong or Maonan or Tajik or Pumi or Primi or Prmi or Achang or Ngac'ang or Maingtha or Nu or Evenki or Ewenki or Gin or Jing or Jino or Jinuo or Palaung or De'ang or Deang or Bonan or Bao'an or Baoan or Russian or Yugur or Yugu or Uzbek or Monpa or Monba or Menba or Oroqen or Orochen or Orochon or Drung or Derung or Dulong or Nanai or Hezhen or Hezhe or Gaoshan or Lhoba or Luoba or Tatar*) DocType=All document types; Language=All languages;
3. Western China	TOPIC: (china or (west* near4 china) or (west* near4 chinese) or (china near4 region*) or (southwest* near4 china) or (south-west* near4 china) or (northwest* near4 china) or (north-west* near4 china) or (southwest* near4 chinese) or (south-west* near4 chinese) or (northwest* near4 chinese) or (north-west* near4 chinese) or Tibet or Qinghai or Xinjiang or Gansu or "Shaanxi" or Shaanxi or Sichuan or Guizhou or Guangxi or Yunnan or Chongqing or Ningxia or Inner Mongolia or Lhasa or Xining or Urumqi or Lanzhou or "Xian" or Xian or Chengdu or Guiyang or Nanning or Kunming or Yinchuan or Hohhot or autonomous count* or autonomous prefecture* or autonomous region* or autonomous banner* or (border* near4 china) or (border* near4 chinese) or (rural near4 china)) DocType=All document types; Language=All languages;
4. 1 and 2 and 3	1 AND 2 AND 3 DocType=All document types; Language=All languages;

A1.2 Chinese databases search

Search strategies	Search terms
China National Knowledge Infrastructure (CNKI) search up to 23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	SUBJECT=妇幼保健+孕期卫生服务利用+孕产期保健+孕产妇+围产期保健+围生保健+围产期死亡+围产儿死亡+剖腹产+剖宫产+分娩方式+妊娠并发症+产科并发症+产科护理+住院分娩+孕期保健+孕前保健+产前保健+孕前护理+产前护理+产前检查+建卡率+儿童健康+儿科护理+儿童保健+婴儿卫生服务+婴儿死亡+新生儿死亡+儿童死亡+接种+疫苗+计划免疫+免疫规划+卡介苗+麻疹疫苗+百白破+乙肝+脊髓灰质炎+脊灰 Translation: SUBJECT=maternal health care+ maternal health care utilisation+ pregnancy health care + pregnant women+ perinatal health care+ perinatal care+ perinatal mortality+ perinatal death+ caesarean section+ cesarean section+ delivery+ pregnancy complication+ obstetric complication+ obstetric care+ hospital delivery+ pregnancy care+ pre-pregnancy health care+ prenatal health care+ pre-pregnancy care+ prenatal care+ prenatal test+ health care card+ child health+ pediatric care+ child health care+ infant health care+ infant death+ neonatal death+ child death+ vaccination+ vaccine+ planned immunisation+ immunisation programme+ BCG+ measles vaccine+ DPT+ hepatitis B+ poliomyelitis+ polio
2. Ethnic minorities	SUBJECT=民族+蒙古族+回族+苗族+傣+傈僳+藏族+壮族+纳西+布朗+阿昌+怒族+鄂温克+鄂伦春+门巴+白族+保安族+布依+达斡尔+德昂+东乡+侗+独龙族+俄罗斯族+哈尼+哈萨克+基诺+京族+景颇+柯尔克孜+拉祜+珞巴+满族+毛南+仫佬+普米+羌+撒拉+水族+塔吉克+塔塔尔+土家+佤+维吾尔+乌孜别克+锡伯+瑶族+裕固+彝+赫哲族+黎族+畲族+朝鲜族+高山族 Translation: SUBJECT=Ethnicity+Mongol+Hui+Miao+Dai+Lisu+Tibetan+Zhuang+Naxi+Blang+Achang+Nu+Ewenki+Oroqen+ Monba+Bai+Bonan+Buyei+Daur+De'ang+Dongxiang+Dong+Derung+Russian+Hani+Kazak+Jino+Gin+Jingpo+ Kyrgyz+Lahu+Lhoba+Manchu+Maonang+Mulao+Pumi+Qiang+Salar+Sui+Tajik+Tatal+Tujia+Va+Uyghur+Uzbek+ Xibe+Yao+ Yugur+Yi+Hezhen+Li+She+Korean+Gaoshan
3. Western China	SUBJECT=西部+西南+西北+西藏+青海+新疆+甘肃+陕西+四川+贵州+广西+云南+重庆+宁夏+内蒙古+自治州+自治县+自治区

	Translation: SUBJECT=West+Southwest+Northwest+Tibet+Qinghai+Xinjiang+Gansu+Shaanxi+Sichuan+Guizhou+Guangxi+ Yunnan+Chongqing+Ningxia+Inner Mongolia+autonomous prefecture+autonomous county+autonomous region
4. 1 and 2 and 3	1 AND 2 AND 3
VIP search up to 23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	KEYWORD=孕产妇 OR 儿童死亡 OR 新生儿死亡 OR 婴儿死亡 OR 住院分娩 OR 免疫规划 OR 计划免疫 OR 接种 OR 产前检查 OR 剖宫产 Translation: KEYWORD =pregnant women OR child death OR neonatal death OR infant death OR hospital delivery OR immunisation programme OR planned immunisation OR vaccination OR prenatal test OR caesarean section
2. Ethnic minorities	KEYWORD =民族 Translation: KEYWORD =Ethnicity
3. Western China	KEYWORD =西部 OR U=西南 OR U=西北 OR U=西藏 OR U=青海 OR U=新疆 OR U=甘肃 OR U=陕西 OR U=四川 OR U=贵州 OR U=广西 OR U=云南 OR U=重庆 OR U=宁夏 OR U=内蒙古 Translation: KEYWORD =West OR U=Southwest OR U=Northwest OR U=Tibet OR U=Qinghai OR U=Xinjiang OR U=Gansu OR U=Sha'anxi OR U=Sichuan OR U=Guizhou OR U=Guangxi OR U=Yunnan OR U=Chongqing OR U=Ningxia OR U= Inner Mongolia
4. 1 and 2 and 3	1 AND 2 AND 3
Wanfang search up to23 February 2018 to include studies reporting data from 1990 onwards	
1. Health care utilisation	主题：（妇幼保健+孕期卫生服务利用+孕产期保健+孕产妇/+围产期保健+围生保健+围产期死亡+围产儿死亡+剖腹产+剖宫产+分娩方式+/妊娠并发症+产科并发症+产科护理+住院分娩+孕期保健+孕前保健+产前保健+孕前护理+产前护理+产前检查+/建卡率

	+儿童健康+儿科护理+儿童保健+婴儿卫生服务+婴儿死亡+新生儿死亡+儿童死亡+/接种+疫苗+计划免疫+免疫规划+卡介苗+麻疹疫苗+百白破+乙肝+脊灰+脊髓灰质炎） Translation: TOPIC: (maternal health care+ maternal health care utilisation+ pregnancy health care + pregnant women/+ perinatal health care+ perinatal care+ perinatal mortality+ perinatal death+ caesarean section+ cesarean section+ delivery+/ pregnancy complication+ obstetric complication+ obstetric care+ hospital delivery+ pregnancy care+ pre-pregnancy health care+ prenatal health care+ pre-pregnancy care+ prenatal care+ prenatal test+/ health care card+ child health+ pediatric care+ child health care+ infant health care+ infant death+ neonatal death+ child death+/ vaccination+ vaccine+ planned immunisation+ immunisation programme+ BCG+ measles vaccine+ DPT+ hepatitis B+ poliomyelitis+ polio)
2. Ethnic minorities	主题：（民族+蒙古族+回族+苗族+傣+藏族+壮族+布朗+阿昌+布依+达斡尔+德昂+东乡+侗+独龙族+俄罗斯族+哈尼+哈萨克+基诺+京族+景颇+柯尔克孜+拉祜+珞巴+满族+毛南+仫佬+普米+羌+撒拉+水族+塔塔尔+土家+佤+维吾尔+锡伯+瑶族+彝+黎族+畲族+朝鲜族+高山族） Translation: TOPIC: (Ethnicity+Mongol+Hui+Miao+Dai+Tibetan+Zhuang+Blang+Achang+Buyei+Daur+De’ang+Dongxiang+ Dong+Derung+Russian+Hani+Kazak+Jino+Gin+Jingpo+Kyrgyz+Lahu+Lhoba+Manchu+Maonang+Mulao+Pumi+ Qiang+Salar+Sui+Tatal+Tujia+Va+Uyghur+Xibe+Yao+Yi+Li+She+Korean+Gaoshan)
3. Western China	主题：（西部+西南+西北+西藏+青海+新疆+甘肃+陕西+四川+贵州+广西+云南+重庆+宁夏+内蒙古+自治州+自治县+自治区） Translation: TOPIC: (West+Southwest+Northwest+Tibet+Qinghai+Xinjiang+Gansu+Sha’anxi+Sichuan+Guizhou+Guangxi+Yunnan +Chongqing+Ningxia+Inner Mongolia+autonomous prefecture+autonomous county+autonomous region)
4. 1 and 2 and 3	1 AND 2 AND 3

A2. Barriers to accessing maternal health care identified in each study included in qualitative review

Reference	Sociocultural Factors		Perceived/Actual Accessibility of Facilities		Perceived/Actual Quality of Care	
	Sociocultural Status	Perceived benefits/risks of care-seeking	Financial Affordability	Geographic Accessibility	Institutional Capacity	Patient Satisfaction
Wong et al., 1995 (E)	• Low education level among women • Long-hour labour work and gender inequality in work divisions didn't allow women to think about their own health.	• Poor awareness of risk of home delivery among women, especially Yi women • Many women continued to rely on an informal assistance in childbirth at home.	• Hospital delivery was still too costly to pay with the original insurance scheme (cooperative medical scheme).	• Long distance to township hospital • Hard to find a transportation, especially for labour started at night	• Local health system failed to identify pregnant women. Women said they went to see the doctor on their own accord. • Women thought village doctors were helpless during their pregnancy and delivery.	• Women complained health workers were often absent and health care provided at primary level was in poor quality. • Women were reluctant to go to health facilities because of their fear of being bullied or looked down upon. • The male doctor caused women discomfort and embarrassment, especially during reproductive examination.
Adams et al., 2005 (E)	• Fear of attacks by spirits and pollution causes suspicion for facility delivery • Women have to work during pregnancy and up to delivery.	• Not given	• Lack of cash and unable to provide prepayment before getting reimbursement. • Hard to navigate reimbursement procedures	• Long distance to hospital and fear of giving birth on the road • Winding and bumpy road and fear of pain and bleeding on the road • Drivers' unwillingness to send pregnant women to hospital because of taboos against blood	• Women concerned limited training provided to rural health workers • Health workers complained of the lack of medical equipment and supplies • Perception of poorly staffed and equipped health facility decreased women's confidence in health care provided at township and county level.	• Language barriers and social class differences led to miscommunication between doctors and patients. • Need of silence and secrecy among Tibetan women caused embarrassment and bad luck of talking about reproduction or sexuality, which conflicted with medical practice.

Tian et al., 2007 (E)	• Pregnancy regarded as "dirty" and taboos against pregnant women among Dai nationality • Low education level and lack of hygiene knowledge among women • Husband decided regarding where and when women ought to seek health services. • Excessive work load left women no time to seek health care.	• Poor awareness of risk of home delivery and importance of maternal care among villagers	• Hospital delivery involves various costs: transportation, food and lodging, a carer that looked after the patient overnight. • Many rural and particularly poor households could not come up with the cash deposits required within a short time.	• Long distance to township hospital • Hard to find a transportation to send women to hospital because of taboos against pregnant women	• Lack of basic equipment such as weighing scales, tape measures, and stethoscope for basic antenatal check-ups in village clinics and township hospitals was observed • Health workers complained of the lack of female doctors and lack of women's participation to make decision within health system	• Some women reported they were treated with discrimination and injustice at public hospital. • The male doctor prevented Dai women from seeking antenatal care. • "Culture of silence" and being anxious when talking about complications, which conflicted with medical practice.
Harris et al., 2010 (E)	• Refusal to stay at unfamiliar places and meet outsiders during pregnancy and childbirth to avoid attacks by spirits and demon	• Poor awareness of risk of home delivery among women • Many women continued to rely on an informal assistance in childbirth at home. • Penalties of the unapproved pregnancy defined by birth control policy	• The cost of hospital birth exceed insurance reimbursement. • Expensive transportation and accommodation fees; no space for accompanying families in hospital • Hard to navigate reimbursement and poverty assistance schemes	• Utilisation was not necessarily increased through easy access to a health facility. The lack of good roads and transport was not as important as many presume. • No enough ambulance when seeking an emergency care • Difficulties in arranging accommodation close to hospital	• Lack of qualified maternal health care providers in local health facilities was observed. • Shortage in drugs, equipment (blood transfusion) at local health facilities was observed. • Women complained of the lack of incentives such as pain relief during labour	• Distrust doctors because of poor capacity of local hospital • Refusal of male doctors and health workers • Cultural inappropriateness of birthing practices caused women discomfort and embarrassment. Many women said they would prefer not to be shaved, to be allowed to walk around during labour and to birth in a traditional semi-sitting position, which was not available in hospitals.

Zhou et al., 2005 (C)	• Not given	• Poor awareness of risk of home delivery among women	• Low income and unable to pay the total cost of hospital delivery including transportation and accommodation costs	• Long distance to hospital (at least one hour walk) and fear of giving birth on the road	• Lack of qualified health workforce and equipment in township hospital was found by reviewing facility records • Limited health services can be provided. • Poor condition of infrastructure (e.g. hot water supply) in township hospital was found observed.	• Not given
Wen et al., 2011 (C)	• Local fears of meeting outsiders during pregnancy among Miao women • Pregnancy regarded as "dirty" and taboos against pregnant women among Dai nationality • Low education level among ethnic minority women	• Lack of health knowledge and poor awareness of maternal health care	• Economic barrier to accessing health care had been decreased by a range of reimbursement (new cooperative medical schemes) and subsidy schemes • High non-medical expenditures, like payment for a carer that looked after the patient overnight	• Hard to find a transportation to send women to hospital because of taboos against pregnant women	• Not given	• The male doctors caused women discomfort and embarrassment.

Wang and Zhang, 2012 (C)	• Refusal to tell outsiders about pregnancy because of shyness • Low education level and lack of hygiene knowledge among Yi women	• Poor awareness of risk of home delivery among women	• High cost of delivery care including transportation and accommodation fees • Hard to provide prepayment before getting reimbursement. • Poor awareness of reimbursement scheme	• Poor geographic accessibility with long distance and winding road • Hard to find transportation when seeking an emergency care • Difficulties in arranging accommodation close to hospital in advance with unclear due date	• Health care providers at local level complained of the lack of health workforce, training, and equipment in township hospitals (high labour mobility due to low income)	• Cultural inappropriateness of birthing practices (e.g. refusal of male doctors) • Previous health promotion campaign didn't work well. Women preferred watching video or talking with female health worker rather than reading leaflet.
Zhang et al., 2012 (C)	• Refusal to receive medical treatment and examination during pregnancy because of shyness	• Poor awareness of reproductive knowledge and maternal health care among Yugur women	• Not given	• Long distance to hospital and lack of transportation • Living in deep forest or steep mountain or valley with traffic difficulties • Yugur people moved their house frequently and hard to keep in touch	• Shortage in maternal health care providers and relative equipment in township hospitals was observed • Low capacity to select high risk pregnancies and treat complications in township hospitals was observed	• Women complained of maternal health promotion campaign ignored the natural shyness of reproductive examination and fear of diseases among women
Nie, 2013 (C)	• Low education level among Uygur women	• Lack of maternal health knowledge among Uygur women	• Not given	• Not given	• Shortage in maternal health care providers and relative training and equipment in local health facilities was observed	• Previous health promotion campaign didn't work well. Women preferred watching video rather than reading leaflet.

Yang et al., 2013 (C)	• Not given	• Poor knowledge of HIV and risk of home delivery among Yi women	• Low income and unable to pay the total cost of hospital delivery including transportation and accommodation • Hard to provide prepayment before getting reimbursement. • No reimbursement policy for unapproved birth defined by birth control policy	• Long distance to hospital and fear of giving birth on the road • Difficulties in arranging accommodation close to hospital in advance with unclear due date • No enough ambulance when seeking an emergency care • No birth plan which include where women should go and who they can contact with when labour starts	• Lack of enough ward beds in local hospital	• Language barriers led to miscommunication between doctors and patients.

Abbreviation: E=English paper, C=Chinese paper