

Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature

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Abstract

Title. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature

Aim. This paper is a report of a systematic review to identify and analyse the main factors affecting the utilization of antenatal care in developing countries.

Background. Antenatal care is a key strategy for reducing maternal mortality, but millions of women in developing countries do not receive it.

Data sources. A range of electronic databases was searched for studies conducted in developing countries and published between 1990 and 2006. English-language publications were searched using relevant keywords, and reference lists were hand-searched.

Review methods. A systematic review was carried out and both quantitative and qualitative studies were included.

Results. Twenty-eight papers were included in the review. Studies most commonly identified the following factors affecting antenatal care uptake: maternal education, husband's education, marital status, availability, cost, household income, women's employment, media exposure and having a history of obstetric complications. Cultural beliefs and ideas about pregnancy also had an influence on antenatal care use. Parity had a statistically significant negative effect on adequate attendance. Whilst women of higher parity tend to use antenatal care less, there is interaction with women's age and religion. Only one study examined the effect of the quality of antenatal services on utilization. None identified an association between the utilization of such services and satisfaction with them.

Conclusion. More qualitative research is required to explore the effect of women's satisfaction, autonomy and gender role in the decision-making process. Adequate utilization of antenatal care cannot be achieved merely by establishing health centres; women's overall (social, political and economic) status needs to be considered.

Keywords: antenatal care, developing countries, health service utilization, maternal health, midwifery, nursing, systematic review

Introduction

The risk of maternal death in developing countries is estimated to be one in 61, while for the developed countries it is about one in 2800 (WHO, UNICEF & UNFPA 2004). Complications during pregnancy and childbirth are the leading cause of death and disability among women of reproductive age in developing countries. There are an estimated 529,000 maternal deaths each year, of which 99% occur in developing countries (WHO 2005). Millions of women in these countries lack access to adequate care during pregnancy. Inadequate access and under-utilization of modern healthcare services are major reasons for poor health in the developing countries (Amin *et al.* 1989). This inequality in the health and wellbeing of women in the developing and the developed world is a growing concern.

Antenatal care (ANC) is an important determinant of safe delivery (Bloom *et al.* 1999). Although certain obstetric emergencies cannot be predicted through antenatal screening, women can be educated to recognise and act on symptoms leading to potentially serious conditions (Bhattia & Cleland 1995); this is one strategy for reducing maternal mortality (Nuraini & Parker 2005). One of the most important functions of ANC is to offer health information and services that can significantly improve the health of women and their infants (WHO & UNICEF 2003). In addition, ANC during pregnancy appears to have a positive impact on the utilization of postnatal healthcare services (Chakraborty *et al.* 2002). Empirical evidence shows that four visits are sufficient for uncomplicated pregnancies and more are necessary only in cases of complications (Villar *et al.* 2001); hence the World Health Organization currently recommends at least four ANC visits in the course of pregnancy.

Several studies have examined factors affecting ANC utilization (Magadi *et al.* 2000, Nisar & White 2003, Overbosch *et al.* 2004, Sharma 2004, Alam *et al.* 2005, Kabir *et al.* 2005) but none has systematically summarized them in developing countries. Only one review has examined interventions, which increase use of ANC (Sibley *et al.* 2004).

The review

Aim

The aim of the review was to identify and analyse the main factors affecting the utilization of antenatal care in developing countries.

Design

Recent methodological debate has highlighted the advantages of integrating qualitative and quantitative studies in systematic reviews (Mays *et al.* 2005, Dixon-Woods *et al.* 2005, Roberts *et al.* 2002). Roberts *et al.* (2002) argue that there are real risks of excluding potentially valuable information if only one type of evidence is used in a systematic review. Qualitative studies fill in the gaps, providing detailed information unavailable in quantitative studies. Use of qualitative and quantitative research alone might omit relevant factors, or might result in inappropriate judgements about their relative importance. Contributions from both qualitative and quantitative research are required to underpin the formation of evidence-based healthcare policy. Therefore, this review included both quantitative and qualitative studies to identify all factors affecting the use of ANC.

The methodology used for this review drew on systematic review methods developed by the Cochrane Collaboration as well as the NHS Centre for Reviews and Dissemination (NHS Centre for Reviews & Disseminations 2001).

Cross-sectional surveys, cohort studies, case-control studies, randomized controlled trials and qualitative studies carried out among women examining any aspect of the utilization of ANC in developing countries (using the United Nations' definition) were reviewed.

Search methods

All studies published between 1990 and 2006 in English were searched using the electronic databases: Cochrane Collaboration, CINAHL, MEDLINE, Science Direct, EMBASE, ASSIA, Web of Science, Scopus, PubMed and JSTOR. Keywords used in the search are shown in Figure 1. Hand-searching of reference lists increased comprehensiveness, and key personnel and organizations working in sexual and reproductive health, especially those involving maternal health in developing countries were contacted for published studies.

Search outcome

Of 3986 research papers initially identified using the search criteria, 3576 proved irrelevant when the titles were examined and 130 were duplicates. The abstracts of these 280 papers were then examined, resulting in 79 papers being examined in full. Of these, 45 were excluded after reading the full texts. The remaining 34 were fully read and quality assessed. Of these, six were excluded on the basis of quality assessment (see Table 1) and 28 papers were included in the review (Figure 2).

Developing countries/ or middle income countries/ or low income countries/ or poor countries

Maternal health/ or maternal welfare/ or pregnancy outcome/ or pregnancy/ or prenatal care/ or antenatal care/ or pregnancy complications/ or maternal health services/ or maternal care/ or care during pregnancy/ or maternity care

Health services research/ or community health services/ or health services/ or delivery of health care/ or health services utilization/ or health care utilization

Socioeconomic factors/ or patient satisfaction/ or acceptability/ or patient acceptance of health care/ or health services accessibility/or attitude to health/ or health knowledge, attitudes, practice/ or health seeking behaviour/ or health service availability

Randomised control trial/ or intervention studies/ or quasi-experimental design/ or cohort studies/ or case-control studies/ or observational studies

Figure 1 Examples of Keywords used in literature search.

Table 1 Excluded papers

Sno.	References	Reasons for exclusion
1	Alam <i>et al.</i> (2004)	Multiple publications (paper published in two journals and using the same data. Source and poorly reported paper is excluded)
2	Jimoh (2003)	Poor study design; women excluded who did not visit clinic particular month during survey Lack of adequate method describes to address validity and reliability
3	Mondal (1997)	Sample size not mentioned although data drawn from National Family Health Survey Limitation of the study not mentioned
4	Manocha <i>et al.</i> (1992)	Poor study design : Sample selection Primiparous women excluded – no reason for exclusion (only lactating women with second pregnancy were Included) Methods is poorly written No discussion and clear message from the study
5	Mishra <i>et al.</i> (1998)	Data analysis is poorly described. Limitation of the study not mentioned
6	Brieger <i>et al.</i> (1994)	Small sample size for quantitative study Poor generability

Quality appraisal

In view of the heterogeneous nature of the studies identified, we could not use a single quality assessment tool but developed a checklist based on CRD's Guidance for study quality assessment (Khan *et al.* 2001). We assessed the methodological quality of each paper meeting the inclusion criteria using the following criteria: (a) relevance to the systematic review (b) validity and appropriateness of methodology (c) quality of evidence –generalisability of results (d) quality of reporting (e) limitations of the study and how it was adjusted.

Data extraction

All 34 papers were independently assessed by two reviewers. The data extraction form was developed by the team using the Centre for Reviews and Dissemination (CRD) Guidance template (Khan & Kleijnen 2001) (Copy available from first author). The data extraction forms were used to record general information (date, title, authors, publication details),

specific information (study design, aims of the paper, study location, study population, sample size, relevant findings, quality assessment) and reviewers' comments.

Synthesis

There is no single agreed framework for synthesising the extensive range of evidence available. Indeed, integrating different types of data within one review is one of the key challenges facing systematic reviewers (Thomas *et al.* 2004). The data synthesis in this review follows CRD Guidance (Deeks *et al.* 2001). Because of the heterogeneity of the methods employed and countries examined (socio-economic and cultural differences), no meta-analysis could be undertaken. Study characteristics and results were tabulated and statistically significant factors were reported. Both content and thematic analyses were conducted (Joffe & Yardley 2004), relationships between the different themes were then identified and grouped into the broad overall themes discussed below (Forrest Keenan *et al.* 2005).

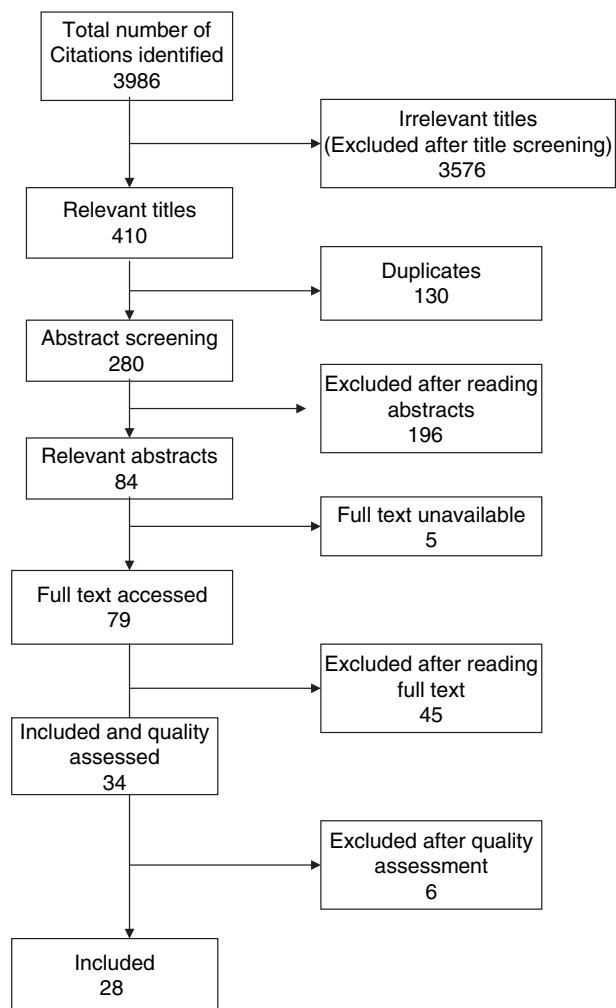


Figure 2 Flow diagram of the process of identifying and including references for the systematic review.

Results

Of the 28 studies included, 22 were quantitative, four were qualitative and two combined quantitative and qualitative methods (See Table 2). Among the selected studies, five analysed secondary data from demographic health surveys and eight analysed secondary data from other national surveys. The rest were primary studies. Eighteen of 28 studies were set in Asia, seven in Africa, two in Latin America and one in the Caribbean. The 28 studies identified factors affecting use of ANC services which were categorized into seven themes: Socio-demographic factors, availability, accessibility, affordability, characteristics of health services, women's position in the household and society, and women's knowledge, attitudes, beliefs and culture.

Socio-demographic factors

Socio-demographic factors include women's education, husband's education, parity, birth order and interval, intendedness of pregnancy, age of women at marriage or at pregnancy, marital status, religion, caste and ethnicity, family size, and knowledge of family planning and ANC.

Sixteen studies found that women's education was the best predictor of ANC visits (Table 2). Women with better education were more likely to receive the recommended number of ANC visits (Nielsen *et al.* 2001, Erci 2003). Educated women are more likely to start ANC visits early than less educated women (Miles-Doan & Brewster 1998, Matthews *et al.* 2001). In contrast, education did not show any association with utilization of ANC services in Pakistan (Nisar & White 2003). Women's education emerged as a key factor in a qualitative study leading to an appreciation of the importance of ANC (Mumtaz & Salway 2005).

Five studies indicated that use of ANC increased with husband's educational level (Table 2). Husband's education was a statistically significant predictor in Andhra Pradesh (AP), but not in Karnataka (Navaneetham & Dharmalingam 2002). Husband's educational level is a stronger predictor than woman's education in the Philippines (Miles-Doan & Brewster 1998).

Eleven studies found strong associations between parity and ANC utilization (Table 2). Higher parity was generally a barrier to adequate use of ANC (Celik & Hotchkiss 2000, Magadi *et al.* 2000, Erci 2003, Overbosch *et al.* 2004, Sharma 2004, Paredes *et al.* 2005), but high parity women tended to use the service more often than primiparous women in Ethiopia (Mekonnen & Mekonnen 2003). Similarly, women's first ANC visit was earlier in higher parity women in India (Matthews *et al.* 2001). Family size and structure proved significant factors in the use of ANC in four studies (Table 2). Women from nuclear families were considerably less likely to use ANC than women from extended/joint families (Matsumura & Gubhaju 2001).

Two studies found birth order and interval were significantly associated with ANC visits (Table 2). Higher order births were associated with a late start or inadequate use of ANC (Magadi *et al.* 2000, Navaneetham & Dharmalingam 2002). Births occurring after an interval of more than three years received more frequent ANC visits than those where the preceding birth was within two years (Magadi *et al.* 2000). Furthermore, intendedness of pregnancy was a statistically significant determinant of ANC use in four studies (Table 2), women whose pregnancies were 'unwanted' having later starts and less frequent visits (McCaw-

Table 2 Summary of significant factors in the use of antenatal care (ANC)

Major factors	Statistically significant factors	Total number of studies	References
Socio-demographic factors	Women's education	16	Sharma (2004), Navaneetham and Dharmalingam (2002), Pallikadavath <i>et al.</i> (2004), Matsumura and Gubhaju (2001), Mekonnen and Mekonnen (2003), McCaw-Binns <i>et al.</i> (1995), Ciceklioglu <i>et al.</i> (2005), Nielsen <i>et al.</i> (2001), Erci (2003), Obermeyer and Potter (1991), Raghupathy (1996), Celik and Hotchkiss (2000), Overbosch <i>et al.</i> (2004), Glei <i>et al.</i> (2003), Matthews <i>et al.</i> (2001), Kabir <i>et al.</i> (2005)
	Husband education	5	Navaneetham and Dharmalingam (2002), Pallikadavath <i>et al.</i> (2004), Miles-Doan and Brewster (1998), Nielsen <i>et al.</i> (2001), Kabir <i>et al.</i> (2005)
	Parity	11	Matthews <i>et al.</i> (2001), Glei <i>et al.</i> (2003), Bhattia and Cleland (1995), Erci (2003), Nielsen <i>et al.</i> (2001), Paredes <i>et al.</i> (2005), Sharma (2004), Pallikadavath <i>et al.</i> (2004), Celik and Hotchkiss (2000), Ciceklioglu <i>et al.</i> (2005), Mekonnen and Mekonnen (2003)
	Birth order or interval	2	Navaneetham and Dharmalingam (2002), Magadi <i>et al.</i> (2000)
	Intend pregnancy	4	McCaw-Binns <i>et al.</i> (1995), Paredes <i>et al.</i> (2005), Magadi <i>et al.</i> (2000), Erci (2003)
	Age of women at marriage or at pregnancy	8	Sharma (2004), Pallikadavath <i>et al.</i> (2004), Obermeyer and Potter (1991), Bhattia and Cleland (1995), Matthews <i>et al.</i> (2001), McCaw-Binns <i>et al.</i> (1995), Ciceklioglu <i>et al.</i> (2005), Miles-Doan and Brewster (1998)
	Marital status	4	Mekonnen and Mekonnen (2003), Magadi <i>et al.</i> (2000), Glei <i>et al.</i> (2003), McCaw-Binns <i>et al.</i> (1995)
	Ethnicity/cast/religion	9	Matthews <i>et al.</i> (2001), Glei <i>et al.</i> (2003), Magadi <i>et al.</i> (2000), Mekonnen and Mekonnen (2003), Pallikadavath <i>et al.</i> (2004), Navaneetham and Dharmalingam (2002), Celik and Hotchkiss (2000), Adamu and Salihu (2002), Bhattia and Cleland (1995)
	Family size and structure	4	Obermeyer and Potter (1991), Matsumura and Gubhaju (2001), Magadi <i>et al.</i> (2000), Miles-Doan and Brewster (1998)
	Availability Accessibility	Availability service	2
Place of residence		8	Navaneetham and Dharmalingam (2002), Sharma (2004), Mekonnen and Mekonnen (2003), Paredes <i>et al.</i> (2005), McCaw-Binns <i>et al.</i> (1995), Obermeyer and Potter (1991), Celik and Hotchkiss (2000), Matthews <i>et al.</i> (2001)
Distance or travel time to health facilities		2	Glei <i>et al.</i> (2003), Magadi <i>et al.</i> (2000)
Affordability	Women occupation/ employment	7	Navaneetham and Dharmalingam (2002), Pallikadavath <i>et al.</i> (2004), Miles-Doan and Brewster (1998), Erci (2003), Kabir <i>et al.</i> (2005), McCaw-Binns <i>et al.</i> (1995), Magadi <i>et al.</i> (2000)
	Socio-economic status/ Standard of living	12	Celik and Hotchkiss (2000), Sharma (2004), Navaneetham and Dharmalingam (2002), Pallikadavath <i>et al.</i> (2004), Matsumura and Gubhaju (2001), Magadi <i>et al.</i> (2000), McCaw-Binns <i>et al.</i> (1995), Obermeyer and Potter (1991), Overbosch <i>et al.</i> (2004), Glei <i>et al.</i> (2003), Matthews <i>et al.</i> (2001), Miles-Doan and Brewster (1998)
	Cost of the services	2	Overbosch <i>et al.</i> (2004), Adamu and Salihu (2002)
	Husband occupation	1	Ciceklioglu <i>et al.</i> (2005)

Table 2 (Continued)

Major factors	Statistically significant factors	Total number of studies	References
Characteristics of health services	Insurance coverage	2	Celik and Hotchkiss (2000), Ciceklioglu <i>et al.</i> (2005)
Women's status in the household	Women status/autonomy	4	Pallikadavath <i>et al.</i> (2004), Matsumura and Gubhaju (2001), Adamu and Salihu (2002), Mumtaz and Salway (2005)
	Friends, family and social support	2	Erci (2003), McCaw-Binns <i>et al.</i> (1995)
Women's knowledge, attitude, belief and culture	Media exposure	3	Navaneetham and Dharmalingam (2002), Sharma (2004), Pallikadavath <i>et al.</i> (2004)
	History of obstetric problems	6	Matthews <i>et al.</i> (2001), Gleit <i>et al.</i> (2003), Bhattia and Cleland (1995), Ciceklioglu <i>et al.</i> (2005), McCaw-Binns <i>et al.</i> (1995), Paredes <i>et al.</i> (2005)
	Knowledge of family planning, ANC (diet, danger signs) and personal hygiene	7	Sharma (2004), Pallikadavath <i>et al.</i> (2004), Magadi <i>et al.</i> (2000), McCaw-Binns <i>et al.</i> (1995), Paredes <i>et al.</i> (2005), Nisar and White (2003), Alam <i>et al.</i> (2005)

Binns *et al.* 1995, Magadi *et al.* 2000, Erci 2003, Paredes *et al.* 2005).

Married women were more likely to receive ANC and seek earlier than single or unmarried women (McCaw-Binns *et al.* 1995, Gleit *et al.* 2003). Unmarried women in Kenya, who started childbearing before 20 years of age, had fewer antenatal visits than married women who started at a later age (Magadi *et al.* 2000). Eight studies have found that ANC utilization is strongly associated with age of women at marriage and at pregnancy (Table 2). In rural north India (Pallikadavath *et al.* 2004) and in Nepal (Sharma 2004) age at marriage was positively associated with access or attendance for ANC. Antenatal check-ups were more likely among women who married at the age of 19 or above, compared with those who married younger (Pallikadavath *et al.* 2004). However, age at marriage was not a statistically significant predictor of utilization of ANC in Jordan (Obermeyer & Potter 1991).

The majority of women in their thirties attend ANC early and more frequently than teenagers and older women (Bhattia & Cleland 1995, McCaw-Binns *et al.* 1995, Miles-Doan & Brewster 1998, Matthews *et al.* 2001). A qualitative study also showed that women below 35 years preferred frequent clinic visits to be reassured that the baby was growing well and to learn its position, whereas older women who did not experience any problems, were not concerned about having frequent visits (Mathole *et al.* 2004). However, some of the studies suggested that women's age was not a significant predictor of utilization of ANC (Celik & Hotchkiss 2000, Nisar & White 2003, Overbosch *et al.* 2004, Kabir *et al.* 2005).

Nine studies showed that ethnicity, caste and religion played a significant role in ANC utilization (Table 2). Women belonging to 'Schedules' castes and tribes generally had lower uptake of ANC in India (Navaneetham & Dharmalingam 2002, Pallikadavath *et al.* 2004). Muslims were much more likely to seek routine ANC in India (Bhattia & Cleland 1995, Pallikadavath *et al.* 2004) than other religions. In Hausa culture, 'God's Will' was the strongest factor in non-utilization in Nigeria (Adamu & Salihu 2002; Table 3). Mekonnen and Mekonnen (2003) found significant variation in the uptake of ANC by religion. Women who followed Muslim, Orthodox and Protestant religions were more likely to use ANC in Ethiopia. In contrast, religion was not a statistically significant predictor of antenatal check-ups in India (Navaneetham & Dharmalingam 2002) and in Ghana (Overbosch *et al.* 2004).

The timing of the first visit varied between ethnic groups in Kenya (Magadi *et al.* 2000). Kurdish women were less likely to use ANC services in Turkey (Celik & Hotchkiss 2000). Non-Spanish speaking indigenous women in Guatemala used biomedical services less (Gleit *et al.* 2003). More marginalized groups were less likely to use ANC.

Availability

Two studies showed that use of ANC was associated with the availability of the service or a healthcare worker and waiting time for services. Women who lived near a village health worker/nurse were more likely to receive adequate and early ANC visits than women without a village health worker

Table 3 Descriptions of studies showing statistically significant factors affecting antenatal care (ANC) in developing countries

Reference	Location/study setting	Study design	Study population and sample size	Statistically significant factors affecting use of antenatal care
Adamu and Salihu (2002)	Nigeria	Quantitative Interview	107 pregnant women within 8–40 weeks	↓Limited Financial Means – CI (36–56·5), ↓God's will – CI (9·3–25·1), ↓Husband's denial – CI (9·3–25·1)
Alam <i>et al.</i> (2005)	Pakistan	Cross-sectional survey	200 women aged 15–49	↑Knowledge (increased dietary intake) – CI (1·87–7·21)
Bhattia and Cleland (1995)	India	Cross-sectional survey conducted during 1993	3595 currently married women aged under 35 years	↑Religion/caste (in Muslim) – $P < 0·001$, ↑History of obstetric outcomes (prior foetal loss + neonatal death) – $P < 0·05$, ↑Parity – $P < 0·001$ (among primipara and more than 5 pregnancy), ↓Age (≤ 18) – $P < 0·001$, ↑Personal hygiene – $P < 0·001$
Celik and Horchkiss (2000)	Turkey	Turkey Demographic and health survey	6519 ever-married women aged 15–49 years	↑Women's education ($P < 0·01$), ↑Low Parity ($P < 0·01$), ↑Health Insurance coverage ($P < 0·01$), ↑Geographic regions ($P < 0·01$), ↑Household wealth (car ownership – $P < 0·05$, flush toilet – $< 0·01$ in urban and $P < 0·10$ in rural), Ethnicity ↓(Kurdish) $P < 0·05$
Ciceklioglu <i>et al.</i> (2005)	Turkey	Quantitative Follow-up study	245 pregnant women	↑Women's education – $P < 0·03$, ↑Age (19–34) $P < 0·04$, ↑Parity – $P < 0·001$ (no previous live birth), $P < 0·05$ (one previous live birth), ↑History of abortion $P < -0·03$, ↑Occupation of husband $P < 0·001$ (in other than worker), ↑Health Insurance $P < 0·001$
Erci (2003)	Turkey	Quantitative Cross-sectional survey	446 women who had delivered infants but still in hospital	↑Employment – $P < 0·002$, ↑Women's education – $P < 0·001$, ↑Parity (high) – $P < 0·005$, ↑Intendness of pregnancy (wanted) – $P < 0·005$, ↑Family support – $P < 0·009$

Table 3 (Continued)

Reference	Location/study setting	Study design	Study population and sample size	Statistically significant factors affecting use of antenatal care
Glei <i>et al.</i> (2003)	Guatemala	Guatemalan Survey of family health 1995	2872 women aged 18–35 whose last two live births occurred within five years	<p>↓Parity(high) – $P < 0.001$, ↓Ethnicity(non-Spanish speaking indigenous) – $P < 0.001$, ↑Women's education – $P < 0.01$, ↑Marital status(married) – $P < 0.001$, ↑Socio-economic status (Enabling resources) – $P < 0.05$, ↑History of obstetric complications – $P < 0.001$, ↑Distance (in city) – $P < 0.001$ ↑Women education – $P < 0.05$, ↑Husband's education – $P < 0.05$, ↑Women's occupation – $P < 0.05$</p>
Kabir <i>et al.</i> (2005)	Nigeria	Cross sectional survey	200 women of child bearing age	<p>Frequency of ANC ↑Socio-economic status(high) – $P < 0.05$, ↓Marital status(unmarried) – $P < 0.05$, ↑Pace of childbearing (more than 3years) $P < 0.05$, ↓Unwanted pregnancy $P < 0.05$, ↓Family size – $P < 0.05$ (with 7 or more children), ↓Distance $P < 0.05$ (lived more than 10km) Timing of first ANC ↑Socio-economic status(high) – $P < 0.05$, ↑Employment status of women(paid) – $P < 0.05$, ↓Ethnicity (Kikuyu,Meruand Milikenda) – $P < 0.05$, ↓Birth order $P < 0.05$ (more than 4 children), ↑Family planning $P < 0.05$ (modern FP method user), ↑Availability of health worker $P < 0.05$</p>
Magadi <i>et al.</i> (2000)	Kenya	Kenya demographic and health survey	5104 women aged 15–49 receiving ANC	<p>↓Caste (tribal start late first ANC contact) – $P < 0.01$, ↑Women's education – $P < 0.05$, ↑Age – $P < 0.05$, ↑Previous obstetric problems – $P < 0.01$, ↑Parity(low) – $P < 0.05$, Place of residence (Location) ↑(large village) – $P < 0.01$ ↓(tribal village), ↑Socio-economic status (high value of possessions) – $P < 0.05$</p>
Matthews <i>et al.</i> (2001)	India	Survey	282 pregnant women	

Table 3 (Continued)

Reference	Location/study setting	Study design	Study population and sample size	Statistically significant factors affecting use of antenatal care
Matsumura and Gubhaju (2001)	Nepal	Nepal family health survey 1996	1388 ever married women aged 15–49	<p>↑Women's education – $P < 0.01$, ↑Household economic status(high) – $P < 0.01$, ↓Family structure (in nuclear family) – $P < 0.01$, ↓Head of house (male headed households) – $P < 0.01$</p>
McCaw-Binns et al. (1995)	Jamaica	The Jamaican perinatal morbidity and mortality survey 1986–1987	10,382 women interviewed at delivery	<p>↓Maternal age (teenage) – $P < 0.001$, ↑Women's Education – $P < 0.05$, ↓Unwanted pregnancy – $P < 0.001$, ↑Support from family and friends – $P < 0.001$, ↑Family planning method user – $P < 0.001$ (for early attendant), ↑Home ownership – $P < 0.001$, ↑Occupation of the major wage earner – $P < 0.001$, Region of residence – $P < 0.001$, ↓ (south east region-Urbanized) ↑south, ↑Outcome of last pregnancy – $P < 0.01$, ↓Marital status (unmarried) – $P = 0.001$</p>
Mekonnen and Mekonnen (2003)	Ethiopia	Ethiopian Demographic and health survey 2000	7978 women aged 15–49	<p>↑Women's Education – 40(2.7–5.9), ↑Religion (Muslim) – 1.33(1.1–1.6), ↑Place of residence (Addis Ababa) – 9.9(7.1–13.8), ↑Marital status (married) – 1.4(1.1–1.9), ↑Parity (ever born 2–4) – 1.1(0.9–1.4) ↑Age – $P < 0.05$ (aged 25–34), ↑Husband's education – $P < 0.001$ (with secondary education), ↑Women's type of employment (white collar worker) $P < 0.001$, ↑Household assets (property) – $P < 0.05$, ↓Family size – $P < 0.001$(with preschool children) ↑Autonomy (accompanied mobility) – $P < 0.05$</p>
Miles-Doan and Brewster (1998)	Philippines	Cebu Longitudinal health and nutrition survey 1984	Sample of 3327 women during third trimester of pregnancy	
Mumtaz and Salway (2005)	Pakistan	Pakistan fertility and family planning survey 1996–1997	7848 women	

Table 3 (Continued)

Reference	Location/study setting	Study design	Study population and sample size	Statistically significant factors affecting use of antenatal care
Navaneetham and Dharmalingam (2002)	India	National family and health survey	1594 in Andhra Pradesh and 1951 in Karnataka	<p>↑Women's education – $P < 0.01$, ↑Husband's education – $P < 0.01$, ↑Living standard (high) – $P < 0.05$, ↓Caste (Scheduled caste and tribes) – $P < 0.05$, ↓Birth order (4 or more) – $P < 0.01$, ↑Place of residence (Urban) $P < 0.01$, ↓Women's work status (working but not earning) – $P < 0.01$, ↑Exposure to mass media – $P < 0.05$</p>
Nielsen <i>et al.</i> (2001)	India	Cross-sectional community-based survey 1995	1320 women given birth in last six months	<p>↓Parity (high) – 1.3(0.8–2.2), ↑Availability – 1.4 (1.1–1.8), ↑Women's education – 2.2 (1.7–2.9), ↑Husband education – 1.7 (1.3–2.2)</p>
Nisar and White (2003)	Pakistan	Cross-sectional survey	295 married women of reproductive age 15–49 ever had pregnancy	<p>↑Socio-economic status (high income) – CI(1.00–3.13), ↑Knowledge (about diet)-CI(1.04–2.62), ↑Knowledge (danger sign) – significant (P value and C I not reported)</p>
Obermeyer and Potter (1991)	Jordan	Jordan Fertility and family health survey 1983	2949 women (15–49 years) who had a child within five years	<p>↑Average level of education in household $P < 0.01$, ↑women education – $P < 0.01$, ↑Place of residence (Amman) – $P < 0.01$, ↑Standard of living (High) – $P < 0.01$, ↑Age (only among 15–24) $P < 0.05$, ↓Family size (having larger no of children) $P < 0.01$</p>
Overbosch <i>et al.</i> (2004)	Ghana	Ghana Living standard survey 2000	766 women whose pregnancy ended in the last 12 month	<p>↑Women's education – (is significant – P-value not reported), ↓Household living standard (poor)-(is significant – P-value not reported), ↓Cost related to distance – (is significant – P-value not reported)</p>

Table 3 (Continued)

Reference	Location/study setting	Study design	Study population and sample size	Statistically significant factors affecting use of antenatal care
Pallikadavath <i>et al.</i> (2004)	India	Indian National family health survey in 1998–1999	11,369 ever married women	<p>↑Women's education – $P < 0.010$, ↑Husband Education – $P < 0.010$</p> <p>↑Women's autonomy – $P < 0.05$ in MP and UP, ↓Women's work status (working) – $P < 0.010$, ↓Religion and Caste (schedule tribes) ↑(among Muslim) – $P < 0.010$ among Muslim in MP, ↑Standard of living(high) – $P < 0.010$ in UP, ↑Age at marriage (≥ 19) – $P < 0.05$ in MP, ↓Parity (two or more children) – $P < 0.010$ in all state except Rajasthan, ↑Use of Family Planning – $P < 0.010$ in UP, ↑Exposure to media – $P < 0.010$ in all states.</p>
Paredes <i>et al.</i> (2005)	Ecuador	Quantitative Cross-sectional survey	1016 women with a pregnancy duration greater than 20 weeks who were delivered at the labour unit	<p>↑Knowledge – $P < 0.05$, ↓Undesired pregnancy $P < 0.002$, ↑History of obstetric problems (Last pregnancy had adverse outcome) – $P < 0.003$, ↓Parity (higher) – $P < 0.007$, ↓Residence of rural area – $P < 0.04$</p> <p>↑Women's Education – $P < 0.001$</p>
Raghupathy (1996)	Thailand	Demographic health survey of 1988	6775 ever married women bet age 15–49	<p>↑Women's Education – $P < 0.001$, ↑Economic status of women(high) – $P < 0.001$, ↑Place of residence – $P < 0.001$ (in urban residence), ↑Exposure to mass media – $P < 0.01$ (listening to some radio programmes had adequate ANC), ↑Knowledge on family planning – $P < 0.001$, ↑Age – $P < 0.001$ ↑Age at marriage – $P < 0.01$, ↓Parity (higher) – $P < 0.001$</p>
Sharma (2004)	Nepal	Between Census Household Information Monitoring and Evaluation System (BCHIMES 2000)	5257 currently married women	

↑, More likely to use ANC; ↓, less likely to use ANC.

(Magadi *et al.* 2000, Nielsen *et al.* 2001). In addition, qualitative study suggested that availability of healthcare workers in the local community encouraged women to use ANC services (Griffith & Stephenson 2001). The opening time of the service was important for urban slum-dwelling women in Bangladesh (Chowdhury *et al.* 2003), whereas long waiting times were a barrier to ANC use (Chowdhury *et al.* 2003, Mathole *et al.* 2004).

Accessibility

Ten studies have found that ANC use is influenced by accessibility of the services (Table 2), mainly place of residence, distance and transport to the healthcare facilities. Place of residence was a statistically significant factor identified in eight studies (Table 2). Women in urban areas used ANC more than rural women (Paredes *et al.* 2005, Sharma 2004, Obermeyer & Potter 1991). Women in urban areas were more likely to use ANC from a healthcare professional in Ethiopia (Mekonnen & Mekonnen 2003). In contrast, women in urban areas of Karnataka in India were about 45% less likely to receive ANC than those living in rural areas (Navaneetham & Dharmalingam 2002). Urban and rural status did not emerge as statistically significant after holding constant regional status and other variables in Turkey (Celik & Hotchkiss 2000). There was no statistically significant difference between urban and slum areas regarding utilization of ANC in Pakistan (Alam *et al.* 2005). Whereas living in developed region of the country was positively and significantly associated with ANC use (Celik & Hotchkiss 2000).

Distance was significantly associated with ANC use (Magadi *et al.* 2000, Gleit *et al.* 2003). An increase in distance or travel time to the nearest healthcare facilities was associated with fewer antenatal visits (Magadi *et al.* 2000), and lower uptake of ANC (Nielsen *et al.* 2001). Qualitative studies also showed that the distance to services or physical access were barriers to ANC services utilization (Griffith & Stephenson 2001, Chowdhury *et al.* 2003, Myer & Harrison 2003, Mathole *et al.* 2004). Moreover, qualitative studies found that uncomfortable transport, poor road conditions and difficulties in crossing big rivers were also barriers (Mathole *et al.* 2004, Mumtaz & Salway 2005).

Affordability

Twenty-one studies found significant relationships between economic factors (cost of services, socio-economic status or income of the household, occupation of woman/husband and

employment) and ANC utilization. Financial constraint was the most important factor in non-use of ANC services. The costs of the service including transportation and necessary laboratory tests were major factors prohibiting service utilization (Adamu & Salihu 2002, Overbosch *et al.* 2004). Qualitative studies also support this finding (Griffith & Stephenson 2001, Myer & Harrison 2003, Mathole *et al.* 2004, 2004, Mumtaz & Salway 2005). Women who perceived ANC from private hospitals to be superior were prevented from using these services because of the high cost (Griffith & Stephenson 2001). Free or subsidized services improved uptake of ANC among urban slum-dwelling women (Chowdhury *et al.* 2003).

Household economic status has a positive and significant impact on use of ANC (Table 2). Women with high economic status were more likely to receive adequate and early ANC than those with low economic status (Magadi *et al.* 2000, Matsumura & Gubhaju 2001, Sharma 2004). In Pakistan, household income was 1.75 times higher among women receiving ANC than those who received none (Nisar & White 2003). Owning property, a car, or having a flush toilet (McCaw-Binns *et al.* 1995, Miles-Doan & Brewster 1998, Celik & Hotchkiss 2000, Matthews *et al.* 2001, 2001, Gleit *et al.* 2003) and higher standards of living (Obermeyer & Potter 1991, Navaneetham & Dharmalingam 2002, Overbosch *et al.* 2004, Pallikadavath *et al.* 2004) were positively associated with ANC. Women living in communities characterized by frequent migration abroad are more likely to receive ANC than women living in other communities (Gleit *et al.* 2003).

Women who were civil servants or white collar workers utilized the services more than housewives and unemployed (Miles-Doan & Brewster 1998, Kabir *et al.* 2005). Those in paid employment tend to start ANC earlier (Magadi *et al.* 2000, Navaneetham & Dharmalingam 2002). Employment outside the home during pregnancy was significantly related to ANC (Erci 2003). Woman's relationship to the major wage earner influenced attendance for ANC (McCaw-Binns *et al.* 1995). In contrast, uptake of ANC through healthcare facilities was higher among non-working women than working women in India (Pallikadavath *et al.* 2004). The proportion of women receiving ANC at home was higher among working women although it was not statistically significant (Pallikadavath *et al.* 2004).

Women married to jobless men or whose husbands were labourers had inadequate ANC compared with those whose husband had other jobs (Ciceklioglu *et al.* 2005), but the sector or field of employment of the household's head was not statistically significant (Obermeyer & Potter 1991).

Characteristics of healthcare services

Celik and Hotchkiss (2000) and Ciceklioglu *et al.* (2005) found that health insurance coverage had a positive and significant impact on utilization of ANC, encouraging use in Turkey but not proving significant in Erci's (2003) study. Mathole *et al.* (2004) found poor quality of care and negative attitudes of service providers were barriers to utilization in Zimbabwe. They highlighted that poor relationships between patients and healthcare providers, and rude and unfriendly attitudes of nurses, were major reasons women preferred not to be referred to some hospitals.

Women's position in the household and society

Women's autonomy was positively related to use of ANC in rural north India (Pallikadavath *et al.* 2004). Husband's refusal was one of the major reasons for non-utilization of ANC in Nigeria (Adamu & Salihu 2002). Women from male-headed households were significantly less likely to use ANC in Nepal (Matsumura & Gubhaju 2001). Travelling in the company of another adult (accompanied mobility) was positively associated with ANC use in Pakistan (Mumtaz & Salway 2005).

Social support from family members significantly affected use of ANC (Erci 2003). Older women, especially mothers-in-law did not consider ANC essential during pregnancy and often discouraged their daughters-in-law from attending ANC in rural Bangladesh (Chowdhury *et al.* 2003). Women who felt friends and family to be unsupportive were twice as unlikely to attend ANC as other women (McCaw-Binns *et al.* 1995).

Women's knowledge, attitudes, beliefs and culture

Seven studies showed that exposure to mass media (especially television and radio) significantly predicted utilization of ANC (Table 2). Women with high levels of exposure were more likely to received ANC (Navaneetham & Dharmalingam 2002). Studies by Pallikadavath *et al.* (2004) and Sharma (2004) found that watching television every week substantially increased the chances of women seeking ANC.

Seven studies found that knowledge of family planning and ANC has a positive and statistically significant effect on ANC use (Table 2). Women with family planning knowledge were more likely to attend ANC visits in Nepal (Sharma 2004). Use of family planning was positively associated with ANC in India (Pallikadavath *et al.* 2004). Additionally, contraceptive users attended early ANC in Jamaica (McCaw-Binns *et al.* 1995, Magadi *et al.* 2000). Alam *et al.* (2005) and Nisar and

White (2003) found that women's dietary knowledge was significantly associated with utilization of ANC; knowledge about danger signs in pregnancy was found to be statistically significant in Pakistan (Nisar & White 2003) and in Ecuador (Paredes *et al.* 2005). Bhattia and Cleland (1995) found that personal hygiene appeared to be the important predictor of ANC.

A qualitative study in India highlighted the perception of pregnancy as a natural process that only warranted ANC when problems arose (Griffith & Stephenson 2001). One reason for not attending ANC at first trimester was fear associated with the local belief that the early period of pregnancy was most vulnerable to witchcraft. There was a fear that blood could be used for bewitching women if it came into the wrong hands, or that it would be tested for HIV and the result recorded on their ANC card in Zimbabwe (Mathole *et al.* 2004). Some women booked ANC very late because they were unsure whether they were pregnant (Myer & Harrison 2003).

Two studies (Mathole *et al.* 2004, Mumtaz & Salway 2005) suggested that shame associated with the pregnant state was a deterrent and this included visiting the clinic wearing tight dresses. Qualitative studies suggested that most women saw little direct benefit from ANC and did not visit early if they had not experienced problems in previous pregnancies in South Africa (Myer & Harrison 2003). Neither urban nor rural women were sure about the benefits of ANC for their health or their unborn child in Zimbabwe (Mathole *et al.* 2004). Similarly, ANC was not seen as essential unless there was physical discomfort during pregnancy and complications in previous pregnancy or childbirth (Chowdhury *et al.* 2003).

Women's perceptions of the risk factors associated with adverse obstetric outcomes were significantly related to the probability of seeking ANC. Women who had prior foetal loss or neonatal death are more likely to receive ANC (Bhattia & Cleland 1995, Gleit *et al.* 2003, Ciceklioglu *et al.* 2005). McCaw-Binns *et al.* (1995) and Paredes *et al.* (2005) highlighted that the complications experienced during earlier pregnancies had a positive effect on early and adequate attendance for ANC. Similarly in India, pregnant women without previous obstetric problems were more likely to attend late (Matthews *et al.* 2001).

Discussion

This review has evaluated a limited number of studies published in English in peer-reviewed journals during 1990–2006. Book chapters and grey literature are not included because of space constraints. Although the review

has identified several important factors, they should be seen as context- or country-specific. Significant factors in the use of ANC in one country or culture may not be significant in another. For example, use of reproductive health services is mediated by cultural influences that shape the way individuals perceive their bodies, their health and available healthcare services. In South Asian culture, for example, the use of preventive services such as routine ANC is alien as healthcare services are perceived as curative only (Stephenson & Tsui 2002). Most studies used quantitative methods. There is very limited qualitative research which would be beneficial for exploring women's satisfaction, autonomy and decision-making processes in relation to ANC.

The decision to exclude non-English language studies and the grey literature was made for practical reasons based on the increased time, expense and complexity of translating and synthesizing these studies. However, much research in developing countries may not be published in peer-reviewed journals, but might be available as grey literature in local languages.

In this systematic review, we found several factors that emerged consistently to explain the utilization of ANC in developing countries, and both similarities and differences between countries in the use of ANC. Most studies found that women's education is the dominant factor in the utilization of ANC in developing countries, but husband's education is also important. Educated women are more likely to realise the benefits of using maternal healthcare services (Matsumura & Gubhaju 2001). Education increases female autonomy (Raghupathy 1996), decision-making power within the household (Matsumura & Gubhaju 2001) and builds greater confidence and capability to make decisions regarding their own health (WHO & UNICEF 2003).

Many studies identified cost as a barrier for poor people in developing countries. Cost of accessing care (travel cost, service fees, equipment cost) is an important determinant of whether to seek care or not, especially where distances to healthcare facilities are large. The financial constraints are reinforced in settings where local customs and values deny women the right to travel alone or to be in the company of men outside their immediate family (WHO 1998). Women with higher living standards may also have better access to mass media informing them of the benefits of ANC (WHO & UNICEF 2003).

Access and availability are key concerns in ANC utilization. Transportation to distant healthcare facilities may discourage women because of both the time taken and costs involved. Distance to healthcare facilities is important even in developed countries, women living farther away being less likely to use healthcare facilities (Bedics 1994). Although

there is some debate in the literature about location and the use of ANC, most studies found rural women are less likely to use ANC. Pregnant women may find it difficult to travel in rural areas especially when the condition of the roads is poor. Shortages of skilled attendants are common throughout developing countries, especially in rural areas. In general, there is a lack of adequate staff in rural areas compared with cities (WHO 2006).

The effect of mothers' age on use of ANC services is unclear. Some studies suggest that women in their thirties are more likely to have ANC than older women and teenagers and others that age is not a significant factor. This anomaly may be because of the confounding effect of parity, women of higher parity and teenagers not expecting to become pregnant, tending to use less ANC in developing countries. Low utilization of ANC among high parity women could be because of time management, limited resources in the family and negative perceptions resulting from previous pregnancies. Interestingly age at marriage was significant in South Asia – India and Nepal (Pallikadavath *et al.* 2004, Sharma 2004) – but not in the Middle East (i.e. Jordan). It could be because of early marriage, as Singh and Samara (1996) identified that early marriage is more prevalent in South Asia than the Middle East.

None of the selected studies examined women's satisfaction with ANC and thus we do not know whether usage is related to satisfaction with the experience in developing countries. Yet satisfaction is a major determinant of health service utilization in general (Aldana *et al.* 2001). Patient satisfaction as a component of quality of care has been given high priority in maternity care in developed countries (van Teijlingen *et al.* 2003). Lack of satisfaction with quality of care could be a major demotivating factor in the use of maternity care facilities. Complaints about the services offered in Kenya included shortage of drugs and essential supplies, lack of commitment by staff, poor quality of food and lack of cleanliness (Mwaniki *et al.* 2002). Only one study has looked at the effect of the quality of services on their uptake and reported negative attitudes of healthcare workers and poor relations between healthcare workers and women as major barriers (Mathole *et al.* 2004). The recent neglect of quality of care in developing countries (Haddad & Fournier 1995), is now being addressed (Peabody *et al.* 2006).

It is unclear whether religion and caste/ethnicity play an important role in ANC utilization, perhaps because the issues are so varied and the instruments used to examine them differ. Muslim women are less likely to use reproductive and sexual health services such as family planning because of lack of privacy (Mishra 2004) and exposure of legs and arms,

What is already known about this topic

- Social and cultural factors affect the uptake of antenatal care in individual countries.
- Systematic reviews are available on aspects of antenatal care utilization in developed countries, but not in undeveloped and developing countries.
- There are few qualitative studies of women's views or experiences of antenatal care in developing countries.

What this paper adds

- The major factors that can affect the uptake of antenatal care services in developing countries are maternal education, husband's education, marital status, availability, cost, household income, women's employment, media exposure and having a history of obstetric complications.
- Adequate utilization of antenatal care cannot be achieved merely by establishing health centres; women's overall (social, political and economic) status needs to be considered.
- Integrating quantitative and qualitative studies in a single review can give valuable insights into the social and cultural factors identified.

which is embarrassing for Muslim women (Holland & Hogg 2001). However, they have high ANC use despite this cultural belief (Bhattia & Cleland 1995, Pallikadavath *et al.* 2004). Women in some cultures do not use ANC because of the perception that the modern healthcare sector is intended for curative services only (Magadi *et al.* 2000). As cultural beliefs and ideas about pregnancy have an influence on women's use of ANC, it would be appropriate to explore how issues in Muslim culture and belief may act as barriers to use of some reproductive healthcare services.

Women's autonomy is positively associated with ANC. Several Asian studies suggest that under-utilization of ANC is because of lack of women's autonomy. Social ties with others may influence a woman's decision to seek ANC by exposing her to different ideas and by imparting information about providers (Bloom *et al.* 2001). In some developing countries men often control the cash, making it difficult for women to pay for healthcare or for transportation to clinics. In most societies women do not experience equality with men and often this will influence their access to healthcare (Holland & Hogg 2001). Traditional beliefs and fear are strong in some communities, and may explain low ANC utilization. In some cultures, male involvement has not been recognized as

important in reproductive health. Men generally do not accompany their partners to ANC or attend the birth of their children (Mullick *et al.* 2005); this lack of involvement and the attitude it reflects may affect ANC utilization and should be explored in further qualitative studies.

Conclusion

This review has raised several practical, policy and research issues. First, merely recommending that women receive a number of ANC check-ups does not ensure that they get quality care. Comprehensive health promotion through awareness-raising and appropriate education of healthcare workers could help to improve the uptake of ANC services (Simkhada *et al.* 2006). Midwives and nurses, as the main ANC providers should be aware of potential barriers to utilization in developing countries. They should be trained to be sensitive to women's socio-economic situation and their cultural and traditional beliefs and their communication skills improved.

At the policy level, this review suggests that increasing women's participation in education, will not only have a long-term positive effect on ANC utilization, but also improve many other aspects of health and health care in developing countries. ANC and preventative services in general, should be higher on the healthcare agenda. We also recommend further (qualitative) research into women's perceptions of, and satisfaction with ANC and other maternity services.

Author contributions

BS, EVT, MP and PS were responsible for the study conception and design and BS was responsible for the drafting of the manuscript. BS performed the data collection and BS, EVT, MP and PS performed the data analysis. BS provided administrative support. BS, EVT, MP and PS made critical revisions to the paper. EVT and MP supervised the study.

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