# The WOMB (WOMen's views of Birth) antenatal satisfaction questionnaire: development, dimensions, internal reliability, and validity

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*SUMMARY*

***Background.*** *Antenatal services continue to change, stimulated by the Changing Childbirth report. Women's views should be an important component of assessing the quality of such services. To date, no published quantitative multidimensional assessment instrument has been available to measure their satisfaction with care.*

***Aim.*** *To develop a valid, reliable, multidimensional questionnaire to assess quality of antenatal care.*

***Method.*** *A multidimensional satisfaction questionnaire was developed using psychometric methods. Following fieldwork to pilot a questionnaire, three successive versions of it were given by midwives to pregnant women in their final trimester in nine trusts in the old South Western region of England. Their replies were analysed by principal components analysis (PCA) with varimax rotation; internal reliability was assessed by Cronbach's alpha. Face, content, and construct validity were all assessed during development.*

***Results.*** *Out of 196 women, 134 (68.4%) returned the pilot questionnaires. One hundred and seventy-two (57.3%) out of 300 women returned version 1 of the WOMB (WOMen's views of Birth) antenatal satisfaction questionnaire proper, 283 (56.6%) out of 500 returned version 2, and 328 (65.6%) out of 500 returned the final development version. This final version consisted of 11 dimensions in addition to a general satisfaction one. These were [Cronbach's alpha]: five related to antenatal clinic characteristics (travelling to clinic [0.75], waiting at clinic [0.90], clinic environment [0.69], timing of appointment [0.78], car parking [0.85]), three 'professional' characteristics (professional competence [0.80], knowing carers [0.79], information provided [0.81]), antenatal classes [0.76], social support from other pregnant women [0.83], checking for the baby's heart beat [0.63]. There were significant moderate correlations (range = 0.24 to 0.77) between individual dimensions and the general satisfaction dimension. Women's dimension scores were significantly related to age, parity, social class, and best educational achievement.*

***Conclusion.*** *This multidimensional satisfaction instrument has good face, content, and construct validity, and excellent internal reliability. It could be used to generally assess antenatal services or to screen them to detect areas where further in-depth qualitative enquiry is merited. Its sensitivity to change over time, external reliability, and transferability to non-Caucasian groups needs to be assessed.*

*Keywords: antenatal care; questionnaire; patient satisfaction.*

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## Introduction

THE quality of antenatal care could be assessed in various ways. Traditionally, medical measures have been used, but, to fully assess care, patient-centred measures, such as satisfaction, are needed. Measurement of satisfaction can be problematic; it must be broken down into dimensions,[1-5] these being distinct from general satisfaction which has poor sensitivity in detecting deficiencies.[6-8] To compare care, a quantitative measure is needed.[9] Such psychometric measures exist for medical[6,7,10,11] and nursing[12] care but none have been published for maternity care.

When designing such an instrument (questionnaire), its content[3,5,13,14] and methodological issues[5,9,16,17] must be considered. Analysis of general satisfaction has suggested a range of potential dimensions; for example, continuity,[18-20] access, availability, interpersonal skills, technical competence, and duration of consultation.[1,6,7,21,22] 'Home-made' satisfaction questionnaires tend to overestimate satisfaction, as do those that ask satisfaction questions about care in general.[5,8] Following the *Changing Childbirth* report,[23] major changes have occurred in the organisation and delivery of maternity care. There is a need for a valid, reliable, multidimensional questionnaire to assess the effect of changes on the quality of the care. The mistakes of the past must not be repeated when scant regard was taken of the consumer views when changing maternity services.[24,25]

## Method

### *Face and content validity*

There were three development versions of the WOMB questionnaire proper. Questions were selected from five sources to ensure face and content validity: fieldwork questions from the Bath and Wiltshire pilot,[26,27] the North American patient satisfaction questionnaire (PSQ-III),[28] Mason's yellow book,[29] and specially written questions for content gaps — either (a) (Version 1) from a literature review, or (b) (Version 3) from two open questions asking responders to describe areas of good antenatal care, and areas needing improvement in version 2. The fieldwork enabled the discarding or re-writing of questions that were frequently not answered or badly skewed. Many questions were deliberately very positively or negatively worded to enhance expression of minimal dissatisfaction.[5] To enhance sensitivity,[5,9,16] 'questions' were, in fact, statements that required responders to circle one answer out of seven on a Likert scale ('totally agree', 'strongly agree', 'agree', 'neutral', 'disagree', 'strongly disagree', and 'totally disagree').

### *Development*

The questionnaire proper was developed over three years in nine trusts in the South West region of England (Version 1 in three trusts and Versions 2 and 3 in nine trusts). Questionnaires were accompanied by a covering letter and freepost envelope for return. No reminders were used as the questionnaires had no patient identifier. The second and third versions had additional sections on demographic details and on pregnancy details, to

judge generalisability of results and to allow testing of construct validity.

### *Internal reliability*

Replies were entered onto a database and analysed using the SPSS-PC statistical package. Initial analysis using Bartlett's test suggested significant interrelationships between individual variables, and the Kaiser–Meyer–Olkin (KMO) measure suggested that sensible groupings could be formed. Repeated step-wise principal components analysis (PCA) with varimax rotation was therefore used to group questions together that were answered in a similar way. This produced factors (dimensions),[30,31] each consisting of two or more questions that were re-read as a group to intuitively label the dimension; e.g. continuity of care. The aim was to evolve distinct groups of questions with each addressing a specific dimension, so that those not loading to any dimension, or that loaded >0.5 to more than one dimension, were removed. General satisfaction questions were not included in the PCA as they would confound the analysis. Finally, Cronbach's alpha was used to check the internal reliability of individual dimensions.[32] Remaining questions were checked to guarantee content validity to ensure the PCA had not excluded all questions related to an important content area. New questions were added where content validity had fallen or where the internal reliability of a dimension was low and the next version evolved.

### *Scale generation*

Scale scores were generated to allow easily comprehensible comparisons between individual dimensions of antenatal care. To produce scale scores for each identified dimension constituent questions were added (negatively worded questions being reversed) and then transformed so that the minimum score was always zero (total dissatisfaction with that dimension) and the maximum possible score was 100 (total satisfaction with that dimension).

### *Construct validity*

Individual transformed dimensions were tested against the transformed general satisfaction dimension. Pearson's correlation coefficients were calculated: moderate correlation was expected if dimensions are related to, but distinct from, 'satisfaction' as a global concept.[7,10] Secondly, construct validity was tested to assess the compatibility of dimensions with prior research evidence about how different groups of women should score; e.g. older women are generally more satisfied with health care. Individual transformed dimension scores were therefore analysed by one-way analysis of variance: age, parity, planned place of delivery, best educational attainment of mother, and with social class of head of household. If the scores were significant, pairwise comparisons were then made using the Student–Neuman–Keuls test that allows for multiple comparisons.

## Results

### *Development*

The pilot tested a large number of questions that were thought to tap eight dimensions of satisfaction identified from a literature review (Table 1), and sought women's views on areas of antenatal importance to them. In summary, 134 (out of 196) women returned two postal questionnaires (at 16 to 20 weeks and at 32 to 36 weeks) seeking their views and were then interviewed at 36 to 38 weeks by a research midwife to explore the validity of their open and closed Likert scale responses. Responders included women booked for delivery at home, in community units, and in a consultant obstetric unit.[26,27] Face validity, readability, and relevance had thus been previously addressed for these three sources of questions. A small number of additional questions were written to ensure good content validity of Version 1 of the 72-question WOMB antenatal questionnaire proper. This was sent to 300 women in three trusts; 172 (57.3%) replied.

Principal component analysis revealed eight factors excluding general satisfaction, reducing its length to 27 questions. Eight extra questions were added to try and improve internal reliability and also two open questions to create Version 2. This was sent to 500 women in nine trusts; 283 (56.6%) replied. PCA confirmed the eight factors excluding general satisfaction, with the number of questions reduced to 25 (Table 1). Analysis of the open questions suggested seven new areas that were important. Thus, further questions to cover these content areas were either written or taken from the three previous sources and added to the remaining 25 questions to create Version 3, which consisted of 53 questions, together with demographic and pregnancy details, but no open questions.

### *Responders*

Version 3 was sent to 500 women in nine trusts; 328 (65.6%) replied. They were completed and returned between April and October 1997. Of these, 223 (71%) women were aged 25 to 34 years; 56 were less than 25 years of age, 36 were more than 34 years of age, and 13 did not state their age. Three hundred and twelve (99%) women were white, two were 'other', and 14 did not state their racial origin. Two hundred and eighty-six (91%) women were not single, 24 were single, five were 'other', and 13 did not state their marital status. One hundred and twenty (38%) women were of social class I or II, 45 were of social class IIIN, 91 were IIIM, 24 were IV, 11 were V, 27 were 'other', and 10 did not state their social class. One hundred and fifteen (37%) women were educated to only secondary school level, 57 were educated to sixth form level, 63 to professional or technical level, 80 to diploma/degree level, and 13 did not state their educational level.

Of the 328 responders, 193 (65.4%) were 34 to 39 weeks pregnant at completion of the questionnaire, 58 were less than 34 weeks pregnant, 39 were more than 39 weeks, five were postnatal, and 33 did not indicate their stage of pregnancy. Two hundred and fifty-eight (81%) women planned to deliver in a consultant unit, 18 planned to deliver at home, 42 in a community unit, and 13 did not state their plans for delivery. One hundred and fifty-six (48%) women were primigravidas, 113 had one baby, 42 had two babies, 16 had more than two babies, and one did not state how many children she had. Two hundred and sixty (83%) women had not been inpatients during this pregnancy, nor had they any other antenatal problems (219 [69%]); nine gave no indication of either.

### *Dimensions*

Principal component analysis suggested 11 dimensions comprising 30 questions in addition to general satisfaction (details available from the author). Five dimensions were related to antenatal clinic characteristics (travelling to clinic, waiting at clinic, clinic environment, timing of appointment, car parking), three were 'professional' dimensions (professional competence, knowing carers, information provided), and the remainder were related to antenatal classes, social support from other pregnant women, and checking for the baby's heartbeat. Each of the 30 questions highly load only onto one dimension (details available from the author). Most dimensions had responses across their possible range (0 to 100%), with the exception of professional care (mean score = 77.6), antenatal clinic environment (28.4), and checking the foetal heart (79.9).

**Table 1.** Parameters of the final and two development versions of the antenatal satisfaction questionnaire (WOMB ANQ).

| | WOMB Version 1 | | WOMB Version 2 | | WOMB Version 3 | | |
|---|---|---|---|---|---|---|---|
| Parameter | Pretest | Post analysis | Pretest | Post analysis | Pretest | Post analysis | |
| Year tested | 1995 | | 1996 | | 1997 | | |
| Responders | – | 172 | – | 283 | – | 328 | |
| Bartlett, P[a] | – | <0.0001 | – | <0.0001 | – | <0.0001 | |
| KMO statistic[b] | – | 2701 | – | 2903 | – | 4033 | |
| Factors (dimensions)[c] | 7 | 8 | 8 | 8 | 15 | 11 | |
| Overall Cronbach's alpha[c] | – | 0.810 | – | 0.874 | – | 0.889 | |
| Percentage variance explained | – | 72.3 | – | 75.2 | – | 76.1 | |
| Factors (dimensions) | No of questions | | No of questions | | No of questions | | Alpha[e] |
| Waiting at clinic | 18[d] | 4 | 4 | 4 | 4 | 3 | 0.895 |
| Access to antenatal clinic | 18[d] | 3 | 3 | 3 | 3 | 2 | 0.753 |
| Clinic environment | 18[d] | 1 | 5 | 3 | 4 | 3 | 0.688 |
| Availability | 18[d] | 2 | 4 | 1 | – | – | – |
| Information | 8 | 6 | 6 | 4 | 4 | 3 | 0.808 |
| Professional competence | 10 | 4 | 4 | 4 | 4 | 3 | 0.795 |
| Communication | 10 | 3 | 3 | 4 | 4 | 0 | – |
| Knowing carers | 4 | 2 | 4 | 3 | 3 | 3 | 0.790 |
| Choice | 2 | 0 | – | – | – | – | – |
| Interpersonal skills | 9 | 0 | – | – | – | – | – |
| Timing of appointments | – | – | – | – | 3 | 3 | 0.784 |
| Parking | – | – | – | – | 2 | 2 | 0.848 |
| Antenatal classes | – | – | – | – | 4 | 3 | 0.759 |
| Social support | – | – | – | – | 3 | 3 | 0.826 |
| Foetal heart | – | – | – | – | 2 | 2 | 0.633 |
| Professional support | – | – | – | – | 4 | 0 | – |
| Risk | – | – | – | – | 3 | 0 | – |
| General satisfaction | 11 | 2 | 2 | 2 | 2 | 2 | 0.835 |

[a]A significant Bartlett test implies that significant interrelationships exist between variables; [b]a high KMO value implies that variables can be sensibly grouped into dimensions; [c]excluding 'a general satisfaction' dimension at all stages; [d]in original version the separate dimensions were not evident, 18 questions covered this general area; [e]Cronbach's alpha for dimension in final version, values 0.7 to 0.9 imply good internal reliability.

### *Internal reliability*

Overall reliability of the total scale was good, with Cronbach's alpha of 0.889, excluding the general satisfaction scale. Values for the individual dimensions were generally good, ranging from 0.63 to 0.90 (details available from the author). Seven of the eight dimensions in each of the previous two versions also had good alpha values of 0.62 to 0.95 (data not shown).

### *Construct validity*

The individual dimensions were tested against the general satisfaction scale and found to be moderately correlated (Pearson's rho = 0.24–0.77). Inter-correlations between most dimensions were acceptable (Table 2). Construct validity was also tested by analysing scores on each dimension across five independent variables; significant results are indicated in Table 3 and detailed below.

Compared with multiparous women, primiparous women were more satisfied with the time waited to be seen at the antenatal clinic (score = 61.2% versus 54.9%, degrees of freedom [df] = 1,320, one-way analysis of variance $F = 6.48$, $P<0.02$), peer support (score = 54.0 versus 48.2, df = 1,311, $F = 7.75$, $P<0.01$), and antenatal classes (score = 68.5 versus 62.1, df = 1,298, $F = 9.97$, $P<0.01$). Older women were more satisfied with their wait at antenatal clinic ($n = 311$, Pearson's rho = 0.153, $P<0.01$). Younger women appeared more satisfied with peer support ($n = 303$, Pearson's rho = 0.191, $P<0.001$), antenatal classes ($n = 292$, Pearson's rho = 0.173, $P<0.01$), and checking the baby's heartbeat ($n = 310$, Pearson's rho = 0.200, $P<0.001$). Those booked for a consultant unit (CU) delivery found car parking at the clinic less satisfactory ($F = 6.14$, df = 2,311, $P<0.01$, CU score = 58.0 versus 69.0 [home] and 71.0 [community unit]). They were also less satisfied overall with their care ($F = 5.62$, df = 2,312, $P<0.01$, CU score = 72.1 versus 77.8 [home] and 82.7 [community unit]).

Overall, social class was significantly associated with satisfaction with:

- peer support ($F = 2.92$, df = 3,276, $P<0.05$), with social class IIIN (score = 56.8) more satisfied than social class I/II combined (score = 50.5);
- information received ($F = 4.17$, df = 2,287, $P<0.01$), with social classes IV/V combined (score = 56.2) more satisfied than both IIM (score = 43.2) and I/II (score = 46.6);
- ease of travelling to clinic ($F = 3.24$, df = 3,283 $P<0.05$), with social classes I/II (score = 75.3) finding it easier than IIIM (score = 68.9); and
- checking the baby's heartbeat ($F = 5.47$l, df = 3,282, $P<0.01$), with social classes IV/V (score = 88.3) more reassured than both I/II (score = 76.0) and IIIM (score = 80.0).

Overall, educational level was significantly associated with satisfaction with:

- peer support ($F = 4.76$, df = 4,298, $P<0.001$). Women with degrees were less satisfied (score = 41.8) compared with all other groups (secondary school [score = 53.9], sixth form [51.2], professional/technical [52.8], and diploma [56.3]);
- knowing their carer ($F = 3.02$, df = 4,305, $P<0.02$). Those

**Table 2.** Matrix of correlation coefficients between all scales (upper right part of table) and number of responders in each interscale comparison (lower left).

| | Antenatal classes | Clinic environment | Foetal heart check | Information | Knowing carers | Clinic parking | Peer support | Professional competence | Time of antenatal clinic appointment | Access | Antenatal clinic waiting time | General satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antenatal classes | – | 0.305 | 0.224 | 0.189 | 0.252 | 0.094[c] | 0.465 | 0.308 | 0.277 | 0.239 | 0.177[b] | 0.469 |
| Clinic environment | 299 | – | 0.142[a] | 0.337 | 0.241 | 0.197 | 0.121[b] | 0.278 | 0.314 | 0.290 | 0.355 | 0.410 |
| Foetal heart check | 297 | 320 | – | 0.082[c] | 0.100[c] | 0.064[c] | 0.203 | 0.278 | 0.146[a] | 0.096[c] | 0.038[c] | 0.243 |
| Information received | 297 | 320 | 317 | – | 0.318 | 0.203 | 0.069[c] | 0.443 | 0.319 | 0.324 | 0.312 | 0.489 |
| Knowing carers | 298 | 321 | 318 | 318 | – | 0.303 | 0.282 | 0.385 | 0.252 | 0.226 | 0.369 | 0.449 |
| Parking at antenatal clinic | 296 | 320 | 318 | 317 | 319 | – | 0.178 | 0.273 | 0.264 | 0.373 | 0.282 | 0.286 |
| Peer support | 296 | 313 | 310 | 310 | 310 | 311 | – | 0.244 | 0.241 | 0.081[c] | 0.202 | 0.300 |
| Professional competence | 296 | 317 | 315 | 315 | 316 | 317 | 307 | – | 0.370 | 0.382 | 0.258 | 0.765 |
| Timing of antenatal clinic appointment | 296 | 319 | 318 | 316 | 317 | 317 | 310 | 314 | – | 0.476 | 0.426 | 0.404 |
| Access to antenatal clinic | 298 | 312 | 319 | 319 | 321 | 320 | 312 | 317 | 318 | – | 0.272 | 0.395 |
| Waiting at antenatal clinic | 298 | 322 | 319 | 319 | 319 | 320 | 312 | 316 | 320 | 318 | – | 0.301 |
| General satifaction | 297 | 321 | 318 | 318 | 319 | 318 | 311 | 315 | 314 | 317 | 316 | – |

All are significant at P<0.001, except [a]P<0.01 and [b]P<0.05. [c]P is not significant.

with professional/technical qualifications (score = 65.0) were more satisfied than those who left at sixth form level (score = 52.8);

- ease of travelling to clinic ($F$ = 3.83, df = 4,306, $P$<0.01). Secondary school leavers were less happy with travel (score = 67.2) than both professional/technical (score = 75.0) and degree level (score = 77.0) women;
- checking the baby's heartbeat ($F$ = 3.22, df = 4,305, $P$<0.02). Women with a degree (score = 72.3) were less reassured than the other groups (secondary education [score = 81.5], sixth form [score = 81.2], professional/technical [score = 80.7], and diploma [score = 81.6]).

## Discussion

The WOMB antenatal satisfaction questionnaire is the first multidimensional psychometric instrument published that specifically measures women's satisfaction with their antenatal care. It is valid and internally reliable, relatively short, and completed without assistance. It is suitable for direct or postal distribution. It could be used to compare global antenatal care services or perhaps to measure change over time, although its sensitivity is yet to be confirmed. Its value may well be as a screening instrument to detect an aspect (dimension) of a global service that is causing women concern. Such an aspect could then be examined in greater detail, perhaps by focused qualitative interviewing or by a more detailed questionnaire. Alternatively, it could be used to produce a single, global antenatal satisfaction score as its overall internal reliability is high.

This WOMB questionnaire has good face and content validity, in that the questions were adapted from previously validated instruments,[28,29] developed from fieldwork,[26,27] or based on women's beliefs given during the questionnaire's development. Seven of its 11 specific dimensions detected by principal components analysis are consistent with published satisfaction work. There is good supporting evidence for knowing one's carer,[5,6,13,14,21] access to care,[5,6,11,14,20] information giving,[5,21,22] professional competence,[5,6,13,14] waiting at appointments,[5,34] availability of appointments, and the clinic environment.[6,13,14,33] There is limited support for a parking dimension,[33] and none for peer support, antenatal classes, or listening for the foetal heartbeat. Questions concerned with these latter four dimensions were only added to the final development version, being noted by women in Version 2 as examples of either good antenatal care or areas where improvement was needed.

This instrument can discriminate between primigravid and multigravid women, particularly in terms of first-time mothers-to-be rating more highly the peer support they received from other pregnant women and the value of antenatal classes. This is an expected finding in that those who have already had a baby might be expected to need less education through classes or peer support. Other satisfaction work has found that older patients are generally more satisfied with health care;[5,22] this was the case here for four of the dimensions although there will be some confounding as older women are more likely to be multigravida. Those planning to give birth in large hospitals found parking at antenatal clinics less satisfactory and, overall, were less happy with their care. Both social class and highest educational attainment affected four dimensions of satisfaction, although these differences are difficult to interpret. Other workers[5] have found education to affect satisfaction. Each of the 11 dimensions was moderately correlated with overall satisfaction but not too strongly, as should be the case.[7,10]

Finally, the WOMB antenatal questionnaire has good internal reliability with just one dimension having a Cronbach's alpha of

**Table 3.** Testing of construct validity of dimensions against, age, planned place of delivery, best educational level attained, and social class of head of household. Where significant associations were found these are marked with a * (see text for details).

| Dimensions | Parity | Age | Planned place of delivery | Educational level obtained | Social class |
|---|---|---|---|---|---|
| Professional care | | | | | |
| Information giving | | | | | 3 |
| Knowing carers | | | | 3 | |
| Clinic environment | | | | | |
| Timing of clinic appointments | | | | | |
| Waiting at clinic | 3 | 3 | | | |
| Access/travel to clinic | | | | 3 | 3 |
| Ease of parking | | | 3 | | |
| Utility of antenatal classes | 3 | 3 | | | |
| Peer support | 3 | 3 | | 3 | 3 |
| Foetal heart check | | 3 | | 3 | 3 |
| General satisfaction | | | 3 | | |

less than 0.75. This suggests that the dimensions are internally consistent and yet separate from 'global satisfaction'. One problem with this instrument is whether it is generalisable to pregnant women with other experiences and in other antenatal settings. Caucasians, those from social classes I and II, and older women were over-represented in responders;[34,35] further work is needed to test its validity in under-represented groups. This should be combined with assessment of its external reliability and sensitivity to change over time before one can be fully certain that this new instrument can be used throughout the National Health Service to measure maternal satisfaction with antenatal care and thus assist in the evaluation and improvement from women's perspectives of the quality of care provided.

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