Women’s Recall of Obstetric Complications in South Kalimantan, Indonesia

Carine Ronsmans, Endang Achadi, Surekha Cohen, and Ali Zazri

The search for indicators for monitoring progress toward safe motherhood has prompted research into population-based measures of obstetric morbidity. One possible such measure is based on women’s reports of their past childbirth experiences. In this prospective study in three hospitals in South Kalimantan, Indonesia, the accuracy of women’s reporting of severe birth-related complications was examined. The findings of this study suggest that poor agreement exists between the way women report their experience of childbirth and the way doctors diagnose obstetric problems, although the degree of agreement varies with the type of complication. Questionnaires relying on women’s experience of childbirth will tend to overestimate the prevalence of medically diagnosed obstetric problems such as those associated with excessive vaginal bleeding or dysfunctional labor. Questions suggestive of eclampsia may be more promising, although the small number of eclamptic women in this study precludes firm conclusions. (STUDIES IN FAMILY PLANNING 1997; 28,3: 203-214)

Progress in attaining the conditions necessary for safe motherhood has been hampered by the lack of reliable indicators to monitor change. Although reductions in maternal mortality remain the ultimate goal of maternal health programs, the difficulties in obtaining reliable and precise estimates of maternal mortality have precluded the use of mortality indicators as a measure of the effectiveness of such programs (Graham et al., 1996). Recently, maternal morbidity has been suggested as an alternative indicator for monitoring and evaluating safe motherhood programs (Campbell and Graham, 1991; Filippi et al., 1996). Work is now in progress to better define maternal morbidity and to identify appropriate sources for gathering such information (Campbell and Graham, 1991; Stones et al., 1991; Filippi et al., 1996).

In settings where most women give birth at home without a trained attendant, population-based information on maternal morbidity will have to rely on self-reporting by means of interviews (Stewart et al., 1996). Unlike other reproductive health problems, such as reproductive tract infections or chronic gynecological morbidities, where women’s self-reports of morbidity can be complemented with medical examinations to document the various dimensions of ill health (Zurayk et al., 1993), surveys aimed at documenting the magnitude of obstetric complications rely solely on the woman’s report of her past childbirth experiences. The acute nature and relative infrequency of obstetric complications make it nearly impossible to identify a sufficient number of pregnant women during a survey designed to document the prevalence of obstetric complications other than by means of recall.

Whether women’s reports of their experience of childbirth accurately represent the magnitude of obstetric morbidity in medically defined terms is unknown. So far, only one study has been published on the degree of agreement between self-reported and medically defined obstetric morbidity in a hospital-based sample of women (Stewart and Festin, 1995). Recently, two more studies have attempted to address the validity of women’s reporting of obstetric complications (Amoaful et al., 1996; Danel et al., 1996). Because women’s reports of their childbirth experience may vary with the medical and sociocultural context within which childbirth takes place, assessing the validity of women’s reporting within different settings is important.
The objective of this study is to assess the validity of women's reporting of severe birth-related complications in three hospitals in South Kalimantan, Indonesia. This study forms part of a larger evaluation plan of a safe motherhood intervention in three districts in South Kalimantan. It was designed to identify the combinations of questions that could most accurately estimate the prevalence of obstetric complications when incorporated into a questionnaire for application in a population-based survey of women of reproductive age.

Methods

South Kalimantan, the study site, is one of the four Indonesian provinces on the island of Kalimantan. South Kalimantan is one of the less populated provinces of Indonesia and has a total fertility rate of 2.3 children per women of reproductive age and an infant mortality rate of 82.9 deaths per 1,000 live births (CBS et al., 1995). The maternal mortality ratio for Indonesia has been estimated at 390 deaths per 100,000 live births (CBS et al., 1995). Female literacy is relatively high. In 1994, 89 percent of ever-married women had received some formal education, and 28 percent had reached secondary school or higher (CBS et al., 1995).

The study was conducted in three urban hospitals: Ulin, Banjar Baru, and Martapura. Ulin hospital is the teaching and referral hospital for severe obstetric complications. Banjar Baru and Martapura are smaller district-level hospitals. The three hospitals cover almost all obstetric emergencies for Banjarmasin, the provincial capital, and the surrounding districts.

The majority (90 percent) of the women in South Kalimantan give birth at home (CBS et al., 1995). Hospitals operate on a fee-for-service basis, charging fixed rates for routine interventions, such as normal vaginal deliveries, cesarean sections, or blood transfusions. Admissions in the hospitals distinguish between socioeconomic classes using three categories: class I, class II, and class III patients. A small proportion of the patients do not pay for the hospital services, provided that they can show an official certificate entitling them to free health care.

Case Definition and Recruitment

This study focuses on severe obstetric morbidities occurring during or after labor and delivery. Cases were defined as women with these four obstetric morbidities: dystocia (dysfunctional labor), hemorrhage, hypertensive diseases of pregnancy, and postpartum sepsis. Standard criteria were developed to identify women who were eligible for participation in the study (see Table 1). These criteria were developed in collaboration with the obstetricians and midwives from the three hospitals using the criteria from a validation study in the Philippines as a basis for discussion (Stewart and Festin, 1995). The final criteria presented in the table incorporate current clinical practice in all of the three hospitals.

The criteria for dystocia included cesarean-section delivery for cephalopelvic disproportion, transverse lie, frank or footling breech, ruptured uterus, vacuum extraction for prolonged second stage of labor, or no progress of labor as diagnosed by the partograph. Although the use of the partograph was initially part of the inclusion criteria, only 13 such cases were identified, because the partograph was not routinely used at any of the hospitals.

Hemorrhage was defined as blood loss of 500 milliliters or more with an identified cause. Excessive blood loss was estimated clinically. Possible causes of the bleeding included retained placenta, uterus atony, ruptured uterus, or cervical or perineal laceration. Antepartum bleeding qualified as a case of hemorrhage only if the excessive bleeding persisted after labor had started.

Hypertensive diseases of pregnancy (HDP) consisted of eclampsia and pre-eclampsia and were defined by the standard triad of hypertension, proteinuria, and
Eclampsia was diagnosed when convulsions were present in women with signs of HDP. The diagnosis of pre-eclampsia was based on the presence of hypertension, albuminuria, and/or edema.1

Because blood cultures were not routinely analyzed, clinical criteria for the diagnosis of puerperal sepsis were used. Puerperal sepsis was defined as high fever with either uterine tenderness or purulent discharge from a wound infection after delivery. Postabortion sepsis was not included in the case definition.2

A group of women who were attending the three facilities for spontaneous vaginal deliveries and showed no complications was selected from among the women paying the lowest fees in the hospital (class III patients) to attain socioeconomic comparability with the obstetric cases, who are generally of lower socioeconomic status than women attending the hospital for a normal delivery.

Women giving birth in the delivery ward and fitting the inclusion criteria were recruited on an ongoing basis from the three hospitals. Cases were also sought in the postdelivery ward to ensure ascertainment of cases of puerperal sepsis. A standard medical form was developed, and the midwife in charge of the study noted the signs and symptoms present at the time of entry and during hospitalization.

**Questionnaire Development and Interview Plan**

All the women recruited for the study were interviewed at discharge from the hospital and three months later in their homes. Although the study was initially designed to interview women only at the time of discharge, the home interview was added because the latter was thought to better represent the context of a population-based survey in which women are asked to recall their childbirth experiences months or years after the event occurred. A combined open and precoded structured questionnaire was used for each of these interviews. The questionnaire was written in Indonesian, the language spoken by most patients attending the three hospitals.

The questionnaire was developed in multiple stages. The first version of the questionnaire incorporated the findings from qualitative research into the women’s perceptions of and terminologies for obstetric complications. The qualitative research included focus-group discussions with women from the three main language groups in South Kalimantan and with traditional birth attendants and midwives. After pretesting it with a small sample of women, the questionnaire was used to conduct the interviews at discharge. The latter interview gave further useful insights into the appropriateness of the wording of some of the questions, and the questionnaire for the home interview was modified to incorporate the changes suggested after the discharge interview. In the second questionnaire, key questions such as those on the duration of labor and the presence of convulsions or abnormal bleeding were reworded, and the sequence of the questions was changed. The findings reported here are drawn from the interview conducted at the women’s homes. Comparing the answers given at discharge with those given at the later interview would have been a useful strategy had the two questionnaires not been too dissimilar to allow a valid comparison.

The questionnaire started with an open-ended question asking the women to recall the problems they had had during pregnancy, labor, and delivery without a specific reference to the timing of these problems. This question was repeated with specific reference to labor and delivery. The open question was followed by a series of prompted questions on signs and symptoms suggestive of obstetric complications. In order to determine the questions having the greatest diagnostic accuracy for medical conditions, similar questions were repeated using different formulations. For example, questions on the length of labor pains were asked prompting an answer in hours (“How many hours passed between the start of the pain and delivery?”), a yes/no answer (“Did your pain last for more than one day and one night?”), and a categorical answer grouped by 12-hour intervals (“Did your pain last for fewer than 12 hours, between 12 and 24 hours, or for more than 24 hours?”). Similarly, to quantify the amount of blood lost after delivery, the following series of questions were asked: “Did you lose any blood around the time of labor and delivery?”; “Did you use a sarong or pads to protect yourself from the bleeding?”; “How many times a day did you have to change the sarong/pads?”; “Was the amount of blood lost excessive?”; and “Did you bleed so much that you were afraid you were going to die?”.

The interviewers conducting the home interviews were students from the Nutrition Academy and the University of Lambung Mangkurat in Banjarmasin. The interviewers received extensive training, and all took part in pilot-testing the questionnaire. They were not aware of the patients’ diagnoses. The quality of the interview data was assured by weekly meetings with the supervisor.

**Measures of Validity and Reliability**

To assess the agreement of the women’s recall with medical diagnosis, the sensitivity and specificity4 of a single or a combination of questions were computed for each obstetric complication (Hennekens and Buring,
The specificity of reported symptoms was assessed in two groups: women without any complications and women with obstetric complications other than the one of interest. This separate categorization was deemed important because women who have a normal delivery may be expected to experience childbirth in a way that is different from those who have a complicated one.

To determine which question(s) had the highest degree of diagnostic accuracy, the sensitivity and specificity of single questions were noted first. When a single question had a very high specificity (that is, >95 percent) but poor sensitivity, an attempt to increase the sensitivity was made by combining questions using the "or" relationship. Conversely, when the specificity was poor (that is, <70 percent), multiple questions were combined using an "and" relationship. In general, the goal was to reach a specificity of more than 95 percent while maintaining a sensitivity of more than 50 percent (Ronsmans, 1996).

Where possible, the sensitivity and the specificity of the questions that most resembled those asked in the Indonesian Demographic and Health Survey (CBS et al., 1995) were reported. The similarity between the English questions may hide differences in the Indonesian version of the questionnaire. The IDHS questionnaire, for example, used the Indonesian word "mules" to indicate labor pain, whereas the study used the less specific expression "rasa sakit." Neither of these terms is specifically related to labor, however. The word "mules" refers to abdominal pain or cramps, whereas the term "rasa sakit" is used to express pain in general.4

The reliability of single questions was measured by comparing the responses that the attending midwife noted in the hospital records with those given during the home interview. Reliability is expressed by the Kappa statistic that measures agreement between two data sources beyond that which could be expected by chance alone. The Kappa statistic is scaled as zero when the amount of agreement is what would be expected to be observed by chance and one when there is perfect agreement (Landis and Koch, 1977). Groups were compared using the t-test, the chi-square test or Fisher's exact test when expected cell values were less than five.

**Estimating Prevalence of Morbidity**

Although sensitivity and specificity are useful measures for assessing the degree of agreement between a survey question and a medical condition, they do not show how closely the prevalence of morbidity obtained from a survey using this question represents the actual prevalence of the medical condition in the population surveyed. Using the sensitivity and specificity obtained from the above analysis, an estimate of the bias in the reported prevalence of morbidity can be made that could be obtained from a survey using the same questions as those tested in this study (Kalter, 1992; Ronsmans, 1996). These estimates must be interpreted with caution, however, because the sensitivity and specificity obtained from a sample of women attending hospitals may not represent those that would have been obtained if the same questions had been asked of the general population.

The prevalence of reported morbidity (Pr) obtained from a survey using a question with a sensitivity (SE) and a specificity (SP) in a population where the actual prevalence of disease is P can be computed using the following formula (Vecchio, 1966; Ronsmans, 1996):

\[
Pr = P \cdot (SE + SP - 1) + (1 - SP)
\]

Using the sensitivities and specificities observed in this study, the estimated prevalence of morbidity was computed for selected questions, assuming that the actual—but unknown—prevalence of obstetric complications in an unselected population was 1 percent, 5 percent, and 10 percent, respectively.

**Results**

Between September 1995 and January 1996, the three hospitals recruited 169 obstetric cases and 115 normal deliveries. Among the cases, 72 were associated with dystocia, 65 with excessive bleeding, 12 with eclampsia, and 31 with pre-eclampsia. No cases of sepsis were identified. The majority of the women with an obstetric problem (158 or 93 percent) had a single complication. Most of the women (N = 238) delivered in the hospital; 46 were admitted after delivery. The study sample included 11 stillbirths.

Among the 72 women with labor-related problems, 13 (18 percent) had prolonged labor as defined by the partograph; 13 (18 percent) had a prolonged second stage of labor; 5 (7 percent) had a transverse lie; 21 (29 percent) had frank or footling breech; and 20 (28 percent) had a cesarean section because of cephalopelvic disproportion. None of the women had a diagnosis of ruptured uterus. The most common method of delivery in women with labor problems was cesarean section (46 of 72, or 64 percent).

Of the 65 women with hemorrhage, the majority (66 percent) had a retained placenta (39 of these women were admitted after delivery). In the remaining 22 women, the bleeding was due to atonia uterus (N = 15), placenta previa (N = 3), or other causes. About one-fourth of the wom-
en with bleeding were either admitted in shock (N = 12) or went into shock during hospitalization (N = 5). Cesarean section was performed in 10 (15 percent) of the women diagnosed with excessive bleeding.

Eclampsia was diagnosed in 12 women. The blood pressure (BP) recorded ranged from 150 to 220 mmHg for systolic BP and from 100 to 120 mmHg for diastolic BP. Nine women had edema of the legs, six had edema of the face, and 6 had edema of the arms.

Among the 31 cases of pre-eclampsia, the recorded diastolic BP ranged from 90 to 150 and the recorded systolic BP from 130 to 230. Edema of the legs was present in 28 (90 percent) of the women with pre-eclampsia and six women had edematous arms and faces.

Number and Timing of Interviews

Of the 284 women enrolled in the study, only 204 (72 percent) could be found at their homes for later interview. The home interview took place between 1.9 and 11.8 months after discharge from the hospital. The loss to follow-up was the result either of having the wrong address for the women or of their living too far away to interview. The loss to follow-up affected the various categories of morbidity to the same extent (not shown).

Selection Bias

To assess selection bias in the sample of women interviewed at home, their demographic and socioeconomic characteristics were compared with those of the women who were not interviewed at home. Women interviewed at home had similar age and parity distributions to those interviewed only in hospital (not shown). The proportion of those who had attended senior high school was higher among those interviewed at home than among those not interviewed there (41 percent versus 28 percent); and more of those interviewed at home were married to government employees or businessmen (59 percent) than to men earning lower incomes, such as farmers, laborers, or fishermen (40 percent). Therefore, women interviewed in their homes generally belonged to a higher socioeconomic group than did those who were interviewed only in hospital.

The sociodemographic characteristics of women with obstetric complications were compared with those without such complications (see Table 2). Women admitted to the hospital with an uncomplicated delivery were, on average, slightly younger and more likely to be primigravid, had higher levels of schooling, and were married to men holding jobs associated with a higher income level than were women admitted with obstetric complications.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Women with obstetric problems</th>
<th>Women with normal delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age (mean years)</td>
<td>28.8*</td>
<td>26.6</td>
</tr>
<tr>
<td>Gravida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>32.5 (38)</td>
<td>47.7 (41)</td>
</tr>
<tr>
<td>2-4</td>
<td>48.7 (57)</td>
<td>43.0 (57)</td>
</tr>
<tr>
<td>5+</td>
<td>18.8 (22)</td>
<td>9.3 (8)</td>
</tr>
<tr>
<td>Maternal schooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or primary</td>
<td>46.1 (54)</td>
<td>29.1 (25)</td>
</tr>
<tr>
<td>Junior high</td>
<td>21.4 (25)</td>
<td>16.6 (16)</td>
</tr>
<tr>
<td>Senior high</td>
<td>32.5 (38)</td>
<td>52.3 (45)</td>
</tr>
<tr>
<td>Husband's profession</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laborer, farmer, fisherman, lumber extractor</td>
<td>49.6 (58)*</td>
<td>26.7 (23)</td>
</tr>
<tr>
<td>Government employee</td>
<td>14.5 (17)</td>
<td>23.3 (20)</td>
</tr>
<tr>
<td>Businessman or employed in private company</td>
<td>35.9 (42)</td>
<td>50.0 (43)</td>
</tr>
</tbody>
</table>

Significant at *p ≤ 0.01.
*Sociodemographic information was missing for one woman.

Validity of Questions on Obstetric Morbidity

As Table 3 indicates, when they were asked if they had experienced any problems during pregnancy, labor, or delivery in an open-ended question, 44 percent of women diagnosed with dystocia and 8 percent of normal

<table>
<thead>
<tr>
<th>Signs and symptoms of dystocia</th>
<th>Dystocia</th>
<th>Normal pregnancy and delivery</th>
<th>Other obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous report of labor-related problem*</td>
<td>44.4</td>
<td>91.9</td>
<td>95.3</td>
</tr>
<tr>
<td>Labor lasted more than 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response in hours</td>
<td>5.6</td>
<td>91.9</td>
<td>98.4</td>
</tr>
<tr>
<td>Categorical response</td>
<td>18.5</td>
<td>91.9</td>
<td>96.9</td>
</tr>
<tr>
<td>Lasted more than one day and one night*</td>
<td>22.2</td>
<td>89.5</td>
<td>93.7</td>
</tr>
<tr>
<td>Labor lasted more than 12 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response in hours</td>
<td>31.5</td>
<td>76.7</td>
<td>89.1</td>
</tr>
<tr>
<td>Categorical response</td>
<td>42.6</td>
<td>76.7</td>
<td>82.8</td>
</tr>
<tr>
<td>Breach delivery</td>
<td>14.8</td>
<td>97.7</td>
<td>95.3</td>
</tr>
<tr>
<td>Breach delivery or labor lasting more than one day and one night (N)</td>
<td>35.2</td>
<td>87.2</td>
<td>89.1</td>
</tr>
<tr>
<td>(N)</td>
<td>54 (88)</td>
<td>(84)</td>
<td></td>
</tr>
</tbody>
</table>

*Spontaneously reported labor-related problems in an open-ended question included "difficulty pushing," "no energy," "pushing too long," "tired," "baby," "breach delivery," and "transverse lie." *Question similar to the question used in the Indonesian Demographic and Health Survey (CBS, 1995). In this and the following tables, sensitivity is defined as the proportion of all those diagnosed with a condition who are correctly identified by self-reported symptoms as having the condition. In this and the following tables, specificity is defined as the proportion of all those diagnosed as not having a condition who are correctly identified by self-reported symptoms as not having the condition.
controls reported having had problems during labor. The responses given by the seven women considered to have had a normal labor and delivery were “narrow pelvis,” “no progress of labor,” “it took a long time for the baby to come out,” or “transverse lie.” Questions on duration of labor failed to reach any acceptable standard of sensitivity or specificity. High specificity for these questions, whatever the wording, could only be achieved at the cost of very low sensitivity. The sensitivity of questions on labor duration did not exceed 43 percent. The study question most resembling that asked in the IDHS (“Did your labor pains last for more than one day and one night?”) achieved high specificity (90 percent) but low sensitivity (22 percent).

To gain more insight into the reasons for this low sensitivity, the answers given by women with dystocia for whom a cesarean section had been performed were compared with those from women diagnosed with dystocia who had delivered vaginally. The sensitivity of labor-related questions remained poor, however, independent of whether or not the woman had been given a cesarean section. Labor-related problems were spontaneously reported by 46 percent of women who had had a cesarean section for dystocia and by 42 percent of women with dystocia who had not had a cesarean section (not shown). Similarly, 29 percent of women who had had a cesarean section for dystocia reported that their labor had lasted for more than one day and one night, compared with 11 percent of women who had had dystocia but no cesarean section (not shown).

For eclampsia, the single question reaching the highest specificity with acceptable levels of sensitivity was that in which women were asked about the presence of convulsions (sensitivity 75 percent, specificity 99 percent) (see Table 4). Although seven (88 percent) of the eight women with eclampsia reported a severe headache or blurred vision, so did 15 (17 percent) of the 86 women without any complications, resulting in a specificity of only 83 percent. When women were asked about the presence of convulsions or fainting, the sensitivity was 100 percent and the specificity 95 percent. However, the specificity of these questions among women with other complications was only 87 percent. The study question most similar to the IDHS question (“Did you have convulsions with loss of consciousness?”) had a specificity of 100 percent and a sensitivity of 50 percent.

Table 5 shows that 59 percent of the 22 women with pre-eclampsia reported signs and symptoms suggestive of pre-eclampsia in an open-ended question. These symptoms were spontaneous reports of “pre-eclampsia,” “high blood pressure,” “vomiting,” “nausea,” or “headache.” These symptoms were reported by only eight women without any complications, resulting in a specificity of 91 percent. None of the closed questions, either single or combined, achieved higher combined sensitivity or specificity than the open-ended question.

For hemorrhage, no questions reached very high specificity, except for a spontaneous report of bleeding or retained placenta (shown in Table 6). Spontaneous reports of bleeding or retained placenta had surprisingly low sensitivity. Among the 41 women with a diagnosis of hemorrhage, only 17 (42 percent) spontaneously reported bleeding or retained placenta, 11 (27 percent) reported no problem, and 13 (32 percent) re-

### Table 4: Sensitivity and specificity of signs and symptoms of eclampsia, according to responses of women diagnosed with eclampsia, of those with a normal pregnancy and delivery, and of those with obstetric problems other than eclampsia, South Kalimantan, 1995

<table>
<thead>
<tr>
<th>Signs and symptoms of eclampsia</th>
<th>Eclampsia</th>
<th>Normal pregnancy and delivery</th>
<th>Other obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitivity</td>
<td>Specificity</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>Spontaneous report of eclampsia-related problem</td>
<td>87.5</td>
<td>90.7</td>
<td>80.9</td>
</tr>
<tr>
<td>Swelling of face or arms</td>
<td>70.0</td>
<td>95.3</td>
<td>80.9</td>
</tr>
<tr>
<td>Severe headache or blurred vision</td>
<td>87.5</td>
<td>82.6</td>
<td>81.8</td>
</tr>
<tr>
<td>Loss of consciousness during pregnancy</td>
<td>75.0</td>
<td>96.5</td>
<td>90.9</td>
</tr>
<tr>
<td>Convulsions during pregnancy</td>
<td>75.0</td>
<td>98.8</td>
<td>96.4</td>
</tr>
<tr>
<td>Severe headache or blurred vision, or convulsions</td>
<td>100.0</td>
<td>81.4</td>
<td>90.0</td>
</tr>
<tr>
<td>Convulsions during pregnancy or loss of consciousness</td>
<td>100.0</td>
<td>93.5</td>
<td>87.3</td>
</tr>
<tr>
<td>Convulsions during pregnancy and loss of consciousness</td>
<td>50.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Spontaneously reported eclampsia-related problems in an open-ended question included "convulsions," "pre-eclampsia," "high blood pressure," "vomiting," "nausea," "headache," and "loss of consciousness." *Question similar to the question used in the Indonesian Demographic and Health Survey (CBS, 1995).

### Table 5: Sensitivity and specificity of signs and symptoms of pre-eclampsia, according to responses of women with pre-eclampsia, of those with a normal pregnancy and delivery, and of those with obstetric problems other than pre-eclampsia, South Kalimantan, 1995

<table>
<thead>
<tr>
<th>Signs and symptoms of pre-eclampsia</th>
<th>Pre-eclampsia</th>
<th>Normal pregnancy and delivery</th>
<th>Other obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitivity</td>
<td>Specificity</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>Spontaneous report of pre-eclampsia-related problem</td>
<td>59.1</td>
<td>90.7</td>
<td>66.5</td>
</tr>
<tr>
<td>Swelling of face or arms</td>
<td>50.0</td>
<td>95.3</td>
<td>85.4</td>
</tr>
<tr>
<td>Swelling of feet, face, or arms</td>
<td>72.7</td>
<td>75.6</td>
<td>50.0</td>
</tr>
<tr>
<td>Severe headache or blurred vision</td>
<td>40.9</td>
<td>82.6</td>
<td>81.2</td>
</tr>
<tr>
<td>Loss of consciousness during pregnancy</td>
<td>9.1</td>
<td>96.5</td>
<td>85.4</td>
</tr>
<tr>
<td>(N)</td>
<td>(22)</td>
<td>(88)</td>
<td>(96)</td>
</tr>
</tbody>
</table>

*Spontaneously reported pre-eclampsia-related problems in an open-ended question included "pre-eclampsia," "high blood pressure," "vomiting," "nausea," and "headache." *See Table 3, note 1. *See Table 3, note 2.
Table 6  Sensitivity and specificity of signs and symptoms of hemorrhage, according to responses of women with hemorrhage, of those with a normal pregnancy and delivery, and of those with obstetric problems other than hemorrhage, South Kalimantan, 1995

<table>
<thead>
<tr>
<th>Signs and symptoms of hemorrhage</th>
<th>Hemorrhage</th>
<th>Normal pregnancy and delivery</th>
<th>Other obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitivity</td>
<td>Specificity*</td>
<td>Specificity*</td>
</tr>
<tr>
<td>Spontaneous report of hemorrhage-related problem*</td>
<td>41.5</td>
<td>96.5</td>
<td>93.5</td>
</tr>
<tr>
<td>Any bleeding during labor or delivery</td>
<td>70.7</td>
<td>58.1</td>
<td>70.1</td>
</tr>
<tr>
<td>Abnormal bleeding during labor or delivery</td>
<td>63.4</td>
<td>88.4</td>
<td>83.1</td>
</tr>
<tr>
<td>Excessive bleeding during labor or delivery</td>
<td>51.2</td>
<td>89.5</td>
<td>90.9</td>
</tr>
<tr>
<td>Delayed delivery of placenta²</td>
<td>80.6</td>
<td>86.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Abnormal bleeding during labor or delivery of placenta²</td>
<td>86.1</td>
<td>79.1</td>
<td>79.5</td>
</tr>
<tr>
<td>Abnormal bleeding during labor and delivery of placenta²</td>
<td>44.4</td>
<td>98.8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(N) (41) (86) (77)

*Spontaneously reported hemorrhage-related problems in an open-ended question included “bleeding,” “retained placenta,” and “placenta in front.” *Question similar to the question used in the Indonesian Demographic and Health Survey (CBS, 1995). *Excludes women who delivered by cesarean section. See Table 3, note 1. *See Table 3, note 1.

reported an unrelated problem such as vomiting, abdominal pain, or headache. Using the prompted questions, abnormal or excessive bleeding was reported by 12 percent and 11 percent, respectively, of women who had not had any complication during labor or delivery. Similarly, 14 percent of the women among whom labor and delivery had been considered normal reported delayed delivery of the placenta, although none of the 77 women with other obstetric complications did. The question most closely resembling the IDHS question about hemorrhage (“Did you experience excessive vaginal bleeding?”) had a specificity of 90 percent and a sensitivity of 51 percent. The question in which women were asked to recall the number of pads or sarongs that they had used failed to elicit satisfactory answers. In general, the women tended to be surprised when hearing this question, and many said they did not know the answer.

The sensitivity of signs and symptoms for sepsis could not be assessed because no such cases had been identified. The specificity was generally poor, except for the open-ended question (see Table 7). In the open-ended question, none of the women reported the presence of signs or symptoms suggestive of infection (specificity 100 percent). When prompted, fever, foul-smelling vaginal discharge, and severe abdominal pain were reported by 14 percent, 31 percent, and 19 percent, respectively, of the women in whom no such problems had been identified. The IDHS question (“Did you experience high fever and foul-smelling vaginal dis-

Table 7  Specificity of signs and symptoms of sepsis, according to responses of women with a normal pregnancy and delivery and of those with obstetric problems other than sepsis, South Kalimantan, 1995

<table>
<thead>
<tr>
<th>Signs and symptoms of sepsis</th>
<th>Normal pregnancy and delivery</th>
<th>Other obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous report of signs and symptoms of infection*</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Fever after delivery</td>
<td>86.0</td>
<td>65.3</td>
</tr>
<tr>
<td>High fever after delivery</td>
<td>86.4</td>
<td>91.9</td>
</tr>
<tr>
<td>Foul-smelling vaginal discharge after delivery</td>
<td>68.6</td>
<td>68.6</td>
</tr>
<tr>
<td>Severe abdominal pain after delivery</td>
<td>81.4</td>
<td>83.0</td>
</tr>
<tr>
<td>High fever and foul-smelling vaginal discharge after delivery*</td>
<td>93.2</td>
<td>95.3</td>
</tr>
</tbody>
</table>

(N) (86) (118)

*Spontaneously reported signs and symptoms of infection in an open-ended question included “fever,” “foul-smelling vaginal discharge,” and “severe abdominal pain after delivery.” *Question similar to the question used in the Indonesian Demographic and Health Survey (CBS, 1995). *See Table 3, note 1.

Accuracy of Reporting

To assess whether the diagnostic accuracy varied with the number of pregnancies the woman had had, the sensitivity and specificity of selected questions were compared among primigravidae and multigravidae (shown in Table 8). Overall, almost no differences were found in reporting accuracy between primigravidae and multigravidae, except for the question about labor duration. Primigravidae who had been diagnosed with dysfunctional labor were more likely to report labor pains lasting for more than one day and one night than were multigravidae (35 percent versus 13 percent). Conversely, none of the multigravidae who had had a normal delivery reported labor pains that lasted more than one day and one night (specificity 100 percent) compared with 22 percent of the primigravidae (specificity 78 percent). Swelling of the face and arms was more commonly reported by primigravidae with pre-eclampsia than by multigravidae with the same condition, but this difference was not statistically significant (75 percent versus 36 percent).

Because their level of schooling may affect women’s reporting, the sensitivity and specificity of selected questions were compared among women who had no or primary school education with those who had obtained higher levels of education (shown in Table 9). Small differences were found between the two groups, but none were statistically significant. Caution is required in the interpretation of these findings, because the numbers in each group are small, particularly those
used for computing sensitivity. However, no indication was found that the woman’s level of education affects the accuracy of her reporting in this sample.

Reliability of Questions on Labor Duration and Timing of Placenta Delivery

The reliability of the questions regarding duration of labor was explored by comparing duration of labor as noted in the hospital records with duration of labor as reported by the woman three months after delivery. Because the majority of the women were admitted to the hospital after their labor had started, the recorded duration of labor in the hospital combines the woman’s recall with the observed duration of labor.

The results are shown in Table 10. The duration of labor was noted in only 104 hospital records. The length of labor was missing in a large proportion of the hospital records, because some women had either entered the hospital after delivery or had required an urgent intervention immediately after admission. Reliability was poor regardless of the wording of the questions. In general, the prevalence of prolonged labor (defined as more than 24 hours’ duration) was lower in the reports women gave when interviewed at their homes than in the hospital records. Although 19 (18 percent) of the 106 hospital records noted a labor duration of more than 24 hours, only three women (3 percent) mentioned that their labor had lasted for more than 24 hours when they were asked to report the length of labor in hours; nine (9 percent) responded positively to the question of whether their labor had lasted for more than 24 hours, and 11 (10 percent) said that their labor had lasted for more than one day and one night.

Table 9  Sensitivity and specificity of selected questions comparing levels of schooling of the mother, South Kalimantan, 1995

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Sensitivity**</th>
<th>Specitivity**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None or primary</td>
<td>Higher*</td>
</tr>
<tr>
<td></td>
<td>Percent (N)</td>
<td>Percent (N)</td>
</tr>
<tr>
<td>Open-ended question</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor-related</td>
<td>50.0 (16)</td>
<td>57.9 (38)</td>
</tr>
<tr>
<td>Bleeding-related</td>
<td>46.1 (29)</td>
<td>35.7 (14)</td>
</tr>
<tr>
<td>Eclampsia-related</td>
<td>100.0 (5)</td>
<td>66.7 (3)</td>
</tr>
<tr>
<td>Pre-eclampsia-related</td>
<td>40.0 (10)</td>
<td>75.0 (12)</td>
</tr>
<tr>
<td>Sepsis-related</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selected closed questions**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor duration of more than one day and one night</td>
<td>31.3 (16)</td>
<td>19.4 (38)</td>
</tr>
<tr>
<td>Excessive bleeding during labor or delivery</td>
<td>64.3 (26)</td>
<td>46.1 (14)</td>
</tr>
<tr>
<td>Convulsions during pregnancy</td>
<td>60.0 (5)</td>
<td>100.0 (3)</td>
</tr>
<tr>
<td>Swelling of face or arms</td>
<td>50.0 (10)</td>
<td>50.0 (12)</td>
</tr>
<tr>
<td>Fever after delivery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

— Not applicable. *Sensitivity is calculated for the sample of women with the relevant obstetric complication. **Specificity is calculated for the sample of women who had a normal delivery. *Questions with high specificity and sensitivity of more than 50 percent, where possible. *See Table 3, note 2. **See Table 3, note 2.
Similarly, the time that had passed between the delivery of the baby and the delivery of the placenta as noted in the hospital records was compared with that reported by the woman. Information was available for 154 women who had had a vaginal delivery. As shown in the table, the agreement was good. The reliability was slightly higher for the question in which the woman was asked to recall the time in minutes than for the question where she was asked whether the placenta came out quickly after the baby or not. This result could reflect the fact that ten women did not know the answer to the latter question, suggesting that the term "quickly" may not be specific enough to have been well understood.

**Implications for the Interpretation of Survey Results**

In Table 11, the prevalence of obstetric morbidities is computed that would be obtained from a survey using two sets of questions: the open-ended question and a selection of closed questions. The selection of closed questions is, to some degree, arbitrary, because the best combination of sensitivity and specificity is difficult to estimate (Ronsmans, 1996). As shown in the formula above, the reported prevalence not only depends on the sensitivity and the specificity of the survey question, but also on the actual but unknown prevalence of disease. Because the true prevalence of disease in the population is unknown, estimating the optimal combination of specificity and sensitivity is not possible. In rare circumstances, high specificity should be favored at the cost of sensitivity (Vecchio, 1966). Under the assumption that the true prevalence of each obstetric complication is relatively low in the general population of pregnant women, that is, 10 percent or less, the questions with the highest specificity and, where possible, a sensitivity exceeding 50 percent have been chosen. The results are presented assuming a "true" prevalence for each obstetric complication of 10 percent, 5 percent, and 1 percent, respectively.

Almost all the questions will tend to overestimate the true prevalence of obstetric complications in populations where such complications are rare. For example, in a population where 1 percent of pregnant women have dystocia, 8 percent of the women will report labor-related problems in response to an open-ended question. If, on the other hand, the true prevalence of dystocia were 5 percent, twice as many women (10 percent) would report labor-related problems. This overestimation results from the specificity of labor-related problems being only 92 percent, and 8 percent of women without dystocia will incorrectly report labor-related problems (false positives). When a population consists of a large number of uncompli cated cases, even a relatively small proportion of false positives will inflate the estimate of prevalence greatly.

Prompted questions on bleeding will also tend to overestimate the true prevalence of hemorrhage. Excessive bleeding during labor or delivery would be reported by 13 percent of the women, even if the true prevalence of hemorrhage was only 5 percent. This overestimation is largely due to the relatively low specificity of reports on excessive bleeding (90 percent; see Table 6). The open question, on the other hand, elicits

<table>
<thead>
<tr>
<th>Source of report</th>
<th>Percent (N)</th>
<th>12-24 Percent (N)</th>
<th>&gt;24 Percent (N)</th>
<th>Percent agreement [Kappa]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital record (N = 106)</td>
<td>56.6 (50)</td>
<td>25.5 (27)</td>
<td>17.9 (19)</td>
<td></td>
</tr>
<tr>
<td>Home interview (N = 106)</td>
<td>76.4 (81)</td>
<td>18.9 (20)</td>
<td>2.8 (3)</td>
<td>53.8 [0.10]</td>
</tr>
<tr>
<td>How many hours passed between the start of the pain and delivery?</td>
<td>68.9 (73)</td>
<td>22.6 (24)</td>
<td>8.5 (9)</td>
<td>54.7 [0.16]</td>
</tr>
<tr>
<td>Did your pain last for less than 12 hours, between 12 and 24 hours, or for more than 24 hours?</td>
<td>88.8 (95)</td>
<td>10.4 (11)</td>
<td></td>
<td>81.1 [0.22]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of report</th>
<th>Percent (N)</th>
<th>30 min Percent (N)</th>
<th>30 min Percent (N)</th>
<th>Unknown Percent (N)</th>
<th>Percent agreement [Kappa]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital record (N = 154)</td>
<td>82.5 (127)</td>
<td>17.5 (27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home interview (N = 154)</td>
<td></td>
<td></td>
<td>89.0 [0.59]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Not applicable  "Less than one day and one night," compared with ≤24 hours, according to hospital records.
racy observed in this study suggest that questionnaires
Second, women attending the hospital for a normal de-
give birth in the hospital in South Kalimantan (CBS,
Studies 212, 1995), and, therefore, the hospital population is unlikely
or followed-up. This finding, nevertheless, needs
further inquiry. If verified, it suggests either that these se-
vere obstetric endpoints are uncommon, that they are ef-
fectively managed in the community, or that the wom-
en who suffer these conditions die before reaching the

Discussion
The findings of this study suggest that poor agreement
exists between the way women report their experience
of childbirth and the way doctors diagnose obstetric
problems, although the degree of agreement varies with
the type of complication. The levels of diagnostic accu-

<table>
<thead>
<tr>
<th>Type of question</th>
<th>&quot;True&quot; prevalence of obstetric complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-ended question</td>
<td>&quot;True&quot; prevalence of obstetric complications</td>
</tr>
<tr>
<td>Labor-related</td>
<td>0.10 0.05 0.01</td>
</tr>
<tr>
<td>Bleeding-related</td>
<td>0.12 0.10 0.08</td>
</tr>
<tr>
<td>Eclampsia-related</td>
<td>0.07 0.05 0.04</td>
</tr>
<tr>
<td>Pre-eclampsia-related</td>
<td>0.17 0.13 0.10</td>
</tr>
<tr>
<td>Sepsis-related</td>
<td>0.14 0.12 0.10</td>
</tr>
<tr>
<td>Closed question with the highest</td>
<td>0.05 0.03 0.01</td>
</tr>
<tr>
<td>predictive accuracy*</td>
<td></td>
</tr>
<tr>
<td>Labor duration more than one day and</td>
<td></td>
</tr>
<tr>
<td>one night</td>
<td></td>
</tr>
<tr>
<td>Excessive bleeding during labor</td>
<td></td>
</tr>
<tr>
<td>or delivery</td>
<td></td>
</tr>
<tr>
<td>Convulsions during pregnancy</td>
<td></td>
</tr>
<tr>
<td>Swelling of face or arms</td>
<td></td>
</tr>
<tr>
<td>Fever after delivery*</td>
<td></td>
</tr>
</tbody>
</table>

Note: Estimated prevalence = true prevalence *(sensitivity + specificity -1) + (1 - specificity).

*Assuming a sensitivity of 50 percent. The questions with the highest predic-
tive accuracy were defined as those with the highest specificity and a sensitivity
of more than 50 percent.

Table 11 Estimated prevalence of obstetric complications in
a surveyed population using different estimates of sensitivity,
specificity, and "true" prevalence of obstetric complications,
South Kalimantan, 1995

The relatively poor diagnostic accuracy of the wom-
en's responses may be, in part, the result of the rela-
tively mild nature of the obstetric complications in this
study. Women's recall of obstetric complications may
improve toward the severe end of the morbidity spec-
trum (Filippi et al., 1996). Severe obstetric cases such as
those associated with ruptured uterus or puerperal sep-
sis (excluding postabortion sepsis) were not reported
in this study, nor were they commonly noted in the de-

livery, though selected from the group paying the low-
est fees, were still generally better off than those ad-
mitted for an obstetric complication. Third, despite the
prospective nature of the data collection and the efforts
to obtain detailed information about the women's ad-
dresses, about one-third of the women could not be
found for follow-up interviews in their homes. Com-
parison of the levels of education in the final sample
with those reported for women in South Kalimantan
(CBS, 1995) suggests that the study sample was better
educated than the general population.

This selection bias is likely to affect the estimates of
sensitivity and specificity, and the use of these mea-
ures to estimate community-based prevalence of mor-
bidity should be interpreted with caution. The hypoth-
esis might be made that the women in this sample were
more likely to report adequately on their complications
than were women giving birth at home, because their
care seeking suggests a recognition of the problem, and
because the information given in the hospital may have
improved their knowledge of the nature of their com-
pliances. In addition, the specificity from community-
based estimates may well be lower than that found, be-
cause it depended on women’s recall in uncomplicated
cases who were better off than women suffering from
complications or women in the general population. Be-
cause neither the direction nor the magnitude of the bias
can be assessed with certainty, however (Ronsmans
1996), the exact extent to which community-based esti-
mates of morbidity based on self-reported morbidity
will deviate from estimates based on medically defined
conditions cannot be ascertained. In general, surveys
using women's reports will tend to overestimate the
true prevalence of obstetric complications unless the
specificity of the survey questions is very high.

The relatively poor diagnostic accuracy of the wom-
en's responses may be, in part, the result of the rela-
tively mild nature of the obstetric complications in this
study. Women's recall of obstetric complications may
improve toward the severe end of the morbidity spec-
trum (Filippi et al., 1996). Severe obstetric cases such as
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prospective nature of the data collection and the efforts
to obtain detailed information about the women's ad-
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with those reported for women in South Kalimantan
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sensitivity and specificity, and the use of these mea-
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more likely to report adequately on their complications
than were women giving birth at home, because their
care seeking suggests a recognition of the problem, and
because the information given in the hospital may have
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pliances. In addition, the specificity from community-
based estimates may well be lower than that found, be-
cause it depended on women’s recall in uncomplicated
cases who were better off than women suffering from
complications or women in the general population. Be-
cause neither the direction nor the magnitude of the bias
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1996), the exact extent to which community-based esti-
mates of morbidity based on self-reported morbidity
will deviate from estimates based on medically defined
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using women's reports will tend to overestimate the
true prevalence of obstetric complications unless the
specificity of the survey questions is very high.

The relatively poor diagnostic accuracy of the wom-
en's responses may be, in part, the result of the rela-
tively mild nature of the obstetric complications in this
study. Women's recall of obstetric complications may
improve toward the severe end of the morbidity spec-
trum (Filippi et al., 1996). Severe obstetric cases such as
those associated with ruptured uterus or puerperal sep-
sis (excluding postabortion sepsis) were not reported
in this study, nor were they commonly noted in the de-

livery, though selected from the group paying the low-
est fees, were still generally better off than those ad-
ier
health facility. Currently, no data are available with which to refute any of these hypotheses.

The failure of prolonged labor to predict dystocia adequately is consistent with findings from other studies (Stewart and Festin, 1995; Amoafu et al., 1996). The concept of “labor” or “labor pains” could not easily be translated into Indonesian, and some women seemed to equate labor pains with the presence of strong contractions when the delivery was near. From the medical point of view, prolonged labor is only one of the many possible signs of dystocia, and may often be absent. The poor agreement between the length of labor that the woman recalled and the length of labor noted in the hospital charts is not surprising. To determine the length of labor, medical professionals do not rely solely on the presence of regular contractions. In medical terms, contractions are recognized as labor when they lead to progressive dilatation of the cervix and descent of the presenting part (Gibb, 1989). Perceptions of the intensity and the length of labor are subjective and change over time (Oakley, 1989).

Not surprisingly, questions for conditions in which the medical diagnosis itself relies to a large extent on the presence or absence of a symptom reached better agreement with the medical diagnosis than questions aimed at identifying obstetric problems that represent the severe end of a normal continuum. Examples of the former include convulsions for the recognition of eclampsia and questions on the timing of the delivery of the placenta. The diagnosis of medical conditions such as excessive bleeding or prolonged labor, on the other hand, requires the recognition of a threshold beyond which signs or symptoms that are present consistently during labor or delivery qualify as “abnormal.” Standard criteria of severity are difficult to agree upon, even in medical terms (Murray and Chen, 1992; British Medical Journal, 1993; Bouvier-Colle, 1996), and women, after only one or a few experiences of childbirth, may not know what constitutes excessive or abnormal symptoms.

Despite the limitations of this hospital-based study, the findings were useful for the purpose of designing and interpreting a population-based survey to assess safe-motherhood needs in South Kalimantan. While the efforts to design the questionnaire were helpful in developing the final questionnaire for the survey, the quantification of the sensitivity and specificity for each question helped in the selection of specific questions for final analysis. The validation study prompted an analysis of and gave confidence in the findings from the open questions, which otherwise might have been overlooked. It also provided useful insights into the nature of women’s reporting beyond the information that can be obtained from a prevalence study alone. Questions for which a high specificity had been observed, such as the questions indicative of eclampsia, gave some assurance that overreporting was unlikely, and that the women who had reported these symptoms deserved medical attention despite their failure to name the problem correctly. Responses to questions having a lower specificity, such as reports of excessive bleeding or prolonged labor, on the other hand, will have to be interpreted with caution, because a substantial proportion of the women without any such problem reported experiencing it. Such reports may, therefore, illustrate the magnitude of perceived problems, but should not be taken as indicative of the prevalence of medical conditions.

Although reports of symptoms women perceive can provide useful insights into the women’s own awareness of ill health and related treatment-seeking behavior (Bhatia and Cleland, 1996), the evidence so far suggests that self-reporting is not, in itself, adequate to provide accurate estimates of obstetric complications.

Notes

1 Reaching a consensus on the definition of pre-eclampsia was difficult because the experience of the clinicians differed markedly. Because the urine was not routinely tested for the presence of albumin, most of the women fulfilling the criteria of pre-eclampsia had hypertension with generalized edema.

2 Obstetric complications occurring in early pregnancy such as those associated with abortion or ectopic pregnancy were not included in this study. The main reason for this exclusion was the difficulty in finding appropriate normal controls in early pregnancy. The findings of this study relate only to obstetric problems during or following labor.

3 Sensitivity is defined here as the proportion of all those diagnosed with a condition who are correctly identified by self-reported symptoms as having the condition. Specificity is defined here as the proportion of all those diagnosed as not having a condition who are correctly identified by self-reported symptoms as not having the condition.

4 Neither the qualitative research nor repeated inquiries of the interviewers could identify an appropriate expression for labor pains. Apparently, no specific terminology exists for labor pain in Indonesian.

5 The distribution of obstetric cases and normal deliveries by hospital was 62, 62, and 45 obstetric cases and 77, 29, and 9 normal deliveries for Ulin, Banjar Baru, and Martapura hospitals, respectively. Relatively few women attended Banjar Baru or Martapura hospital for a normal delivery.
References


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