Birth attendants as perinatal verbal autopsy respondents in low- and middle-income countries: a viable alternative?


Objective To assess the feasibility of using birth attendants instead of bereaved mothers as perinatal verbal autopsy respondents.

Methods Verbal autopsy interviews for early neonatal deaths and stillbirths were conducted separately among mothers (reference standard) and birth attendants in 38 communities in four developing countries. Concordance between maternal and attendant responses was calculated for all questions, for categories of questions and for individual questions. The sensitivity and specificity of individual questions with the birth attendant as respondent were assessed.

Findings For early neonatal deaths, concordance across all questions was 94%. Concordance was at least 95% for more than half of the questions on maternal medical history, birth attendance and neonate characteristics. Concordance on any given question was never less than 80%. Sensitivity and specificity varied across individual questions, more than 80% of which had a sensitivity of at least 80% and a specificity of at least 90%.

For stillbirths, concordance across all questions was 93%. Concordance was 95% or greater more than half the time for questions on birth attendance, site of delivery and stillborn characteristics. Sensitivity and specificity varied across individual questions. Over 60% of the questions had a sensitivity of at least 80% and over 80% of them had a specificity of at least 90%. Overall, the causes of death established through verbal autopsy were similar, regardless of respondent.

Conclusion Birth attendants can substitute for bereaved mothers as verbal autopsy respondents. The questions in existing harmonized verbal autopsy questionnaires need further refinement, as their sensitivity and specificity differ widely.

Introduction

Of the approximately 8.8 million deaths that occur annually in children under 5 years of age, 41% occur in neonates. A child is 45 times more likely to die within the first 28 days of life than in the entire period from 28 days to 5 years of age. Three quarters of all neonatal deaths, or approximately 2.7 million deaths annually, occur during the first seven days of life and are termed early neonatal deaths. In addition, an estimated 2.7 million stillbirths occur annually. Early neonatal deaths and stillbirths, which together comprise what are termed perinatal deaths, account for the highest proportion of deaths among children less than 15 years of age. In this age group, they account for twice as many deaths as malaria and human immunodeficiency virus (HIV) infection combined. Over 98% of perinatal deaths occur in low- and middle-income countries and more than two thirds occur in community settings, frequently at home. These deaths that take place outside the formal health-care system are rarely included in the vital registers. In fact, vital registration data are unavailable for over 97% of perinatal deaths, yet such data are necessary for designing measures to reduce perinatal mortality. A coherent health policy based on accurate information needs to be developed to address the most common causes of perinatal death.

Verbal autopsy is one of various techniques that have been developed to compensate for the lack of data on the causes of deaths that occur in community settings. It is an indirect method of ascertaining the cause of death where civil registration and health systems are weak. During a verbal autopsy conducted to investigate the causes of a perinatal death, a systematic description of the signs, symptoms and circumstances preceding the death is obtained through an interview with the primary caregiver, traditionally the mother, of a lost fetus or child who has died. In most cases a physician panel uses the data thus obtained to ascertain the cause of death. Less commonly, the cause of death is established by using algorithms, neural networks or probabilistic approaches to interpret these data. Verbal autopsy has been validated against more conventional methods for establishing the cause of death and it is used in large surveillance programmes and vital registration systems.

Traditionally, the perinatal verbal autopsy respondent is the mother whose neonate or fetus has died. However, birth
attendants could make better verbal autopsy respondents than mothers for several reasons: (i) they may be more aware than mothers of the circumstances surrounding the birth; (ii) they are often the first to attempt resuscitation and often have greater insight than the mother into the events that led to the death. Often the circumstances surrounding such deaths become embedded in the memory of birth attendants who live in the same community as the mother. For these reasons, our group undertook a prospective study to investigate whether birth attendants could be a suitable alternative to mothers as respondents during perinatal verbal autopsies. Our a priori hypothesis was that mothers’ and birth attendants’ responses to selected close-ended items on the verbal autopsy questionnaire would show more than 80% concordance.

Methods
Study design, setting and subjects
This prospective observational study based on verbal autopsy was an ancillary study to the FIRST BREATH Trial, conducted by the Eunice Kennedy Shriver National Institute of Child Health and Human Development’s Global Network for Women’s and Children’s Health Research. 20 The FIRST BREATH Trial was a cluster-randomized, controlled trial that investigated the effects of implementing a package of neonatal care practices and neonatal resuscitation in community settings.

Our verbal autopsy study included 38 communities in the Democratic Republic of the Congo (Equateur province), Guatemala (Chimaltenango province), Pakistan (Thatta district) and Zambia (Kafue district). Each community was a geographically defined area consisting of a cluster of villages with approximately 300 to 500 deliveries per year. For every birth enrolled in the FIRST BREATH Trial, birth attendants collected data on fetal monitoring, birth weight, Apgar score, any resuscitation required, and the use of bag or mask ventilation. The data were then reviewed for correct procedure by trained nurses (with 3 to 4 years of health training) or community health workers (high school graduates with 18 months of health training), who were designated as community coordinators. Within one week of the occurrence of an early neonatal death or stillbirth in a community, birth attendants notified community coordinators, who then visited the family, determined its eligibility for participation in our study, and requested consent from eligible mothers. The family was excluded from participating in the study if: the birth or death took place in hospital; the delivery occurred without the presence of a birth attendant; the mother was unavailable for any reason (including peripartum death); or the mother could not be enrolled in the study within seven days of the perinatal death. A seven day enrolment window was chosen to reduce the possibility of recall bias. 15,19,21 Because the mother is traditionally the respondent during perinatal verbal autopsies, we included only cases in which the mothers were available for interview. Because this study was community-based, hospital-based deliveries were excluded. Informed consent was obtained from mothers in a private and confidential setting. The consent form was read to all mothers, who were asked to sign it or, if illiterate, to affix their thumbprints. Community birth attendants participated in the study also. In addition to the mothers, birth attendants also participated in the study. They included untrained traditional birth attendants, certified traditional birth attendants, nurses and nurse midwives. Physicians were excluded from the study.

Uniform data describing the circumstances surrounding a perinatal death were collected separately from each mother and from each birth attendant using a standardized verbal autopsy questionnaire developed specifically for this study from a validated verbal autopsy tool. 22,23 Broadly, the questionnaire covered the following categories: (i) maternal medical history; (ii) parturition history; (iii) birth attendance and site of delivery; (iv) characteristics of the neonate or stillborn, and (v) early neonatal period. The order of interviewing birth attendants and mothers was alternated in each community to reduce potential bias. The interview responses were then analysed by two local physicians who independently assigned an underlying cause of death. Discrepancies between physicians in the assigned cause of death were resolved through discussion and the cause of death was established by consensus. Interview responses provided by the birth attendants were validated by comparing them with those provided by the mothers, which were treated as a gold standard.

Respondents included in this analysis
During the verbal autopsy interview, the mother and birth attendant were asked whether the baby was dead or alive when born (i.e. whether a stillbirth or an early neonatal death had occurred). Because the interview included detailed questions about the circumstances that existed before and during the death, the perceived time of death (i.e. before or after birth) may have influenced participant responses. To avoid the difficulty of interpreting results when the mother and the birth attendant had a different perception of the time of death, we restricted our analyses to the subset of deaths on whose timing the mother and the birth attendant were in agreement.

Data collection and analysis
Data were entered and transmitted electronically to the data coordinating centre (Research Triangle Institute, Durham, United States of America), where data edits, including inter- and intra-form consistency checks, were performed. The study was reviewed and approved by the institutional ethics review committees of the Research Triangle Institute, the University of North Carolina at Chapel Hill and in-country institutional review boards. Data were analysed using SAS version 9.2 (SAS Institute, Cary, USA).

Responses were defined as concordant when both the mother and the birth attendant answered yes, no or don’t know. For all non-missing responses, the percentage of concordance between the mothers’ and birth attendants’ responses to the individual questions posed during the interviews was calculated. Overall concordance was estimated by adding the percentage of concordant responses on all individual questions and dividing the result by the number of questions. The mothers’ responses were viewed as the reference standard for calculating the sensitivity (proportion of true positives correctly identified as such) and specificity (proportion of true negatives correctly identified as such) of each question when the birth attendant was the respondent. These measures were calculated using conventional two-by-two table analysis. Responses of don’t know by the mother were excluded from...
the sensitivity and specificity calculation, as they would only lead to an inconclusive diagnosis. Responses of *don’t know* by the birth attendant to questions to which the mother replied either *yes* or *no* were considered incorrect (i.e. either a false positive or a false negative).

**Results**

The FIRST BREATH trial was conducted between March 2005 and August 2008, and this verbal autopsy study took place from May 2007 to June 2008. A total of 9461 births occurred in the designated communities during this period. There were 518 perinatal deaths among these births, and 81 of them were ineligible for the study because the delivery occurred in a hospital (79) or the birth attendant was absent at the time of delivery (2). Of the 437 eligible deaths, 185 were not enrolled in the study because the mother was not available for interview within seven days after the death (145) or did not provide consent (40). This left a total of 252 perinatal deaths (from 241 deliveries, some of them multiple) that were eligible for participation and for which consent was granted. Our final sample for this analysis included the 234 deliveries (245 perinatal deaths: 134 stillbirths and 111 early neonatal deaths) for which there was concordance between the mother and the birth attendant as to the time of the death (i.e. stillbirth versus early neonatal death). Seven deaths were omitted due to discordance in this respect.

Table 1 provides the sociodemographic characteristics of the mothers by birth outcome. Mothers who experienced an early neonatal death or a stillbirth were similar in terms of age, parity, education and marital status. Mothers who experienced a stillbirth had a breech delivery significantly more often than those who experienced a neonatal death ($P = 0.04$). The place of delivery and type of birth attendant were similar in both groups.

**Early neonatal death**

Fig. 1 provides a graphical summary of the percentage of concordant responses to individual interview questions, with the mothers’ responses used as the reference standard. Questions A1–14, B1–16, C1–6, D1–12 and E1–16 marked along the $x$-axis correspond to the questions and responses presented in Appendix A (available at: http://gn.rti.org/literature/index.cfm?fuseaction=pubDetail&ID=1563). Concordance across all questions was 91%, 94% and 95% among nurses/nurse midwives, certified traditional birth attendants and untrained traditional birth attendants, respectively. Since beyond this level of analysis the sample size for each type of birth attendant became too small to permit stratification and further statistical analyses, henceforth we combine birth attendants of all types when reporting concordance. Concordance across all questions was 94%. Concordance was 95% or greater for at least half of the questions in the categories for maternal medical history, birth attendance and neonate characteristics. Concordance varied most widely for responses to questions pertaining to the early neonatal period (80–95%), whereas it varied the least for responses to questions about the characteristics of the neonate (92–99%). Concordance was 80% for one question (E16: baby was cold to the touch) and greater than 80% for all other questions.

Appendix A compares the responses given by the mothers and the

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**Table 1. Characteristics of mothers, deliveries and pregnancies in study of perinatal verbal autopsy, by birth outcome***

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. early neonatal death (%)</th>
<th>No. stillbirth (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of mothers</td>
<td>106</td>
<td>128</td>
<td>234</td>
</tr>
<tr>
<td>Age (years)</td>
<td>104</td>
<td>123</td>
<td>227</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>18 (17.3)</td>
<td>17 (13.8)</td>
<td>35 (15.4)</td>
</tr>
<tr>
<td>20–35</td>
<td>76 (73.1)</td>
<td>91 (74.0)</td>
<td>167 (73.6)</td>
</tr>
<tr>
<td>&gt; 35</td>
<td>10 (9.6)</td>
<td>15 (12.2)</td>
<td>25 (11.0)</td>
</tr>
<tr>
<td>Parity (excluding current pregnancy), mean and SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal schooling completed</td>
<td>105</td>
<td>127</td>
<td>232</td>
</tr>
<tr>
<td>None, illiterate</td>
<td>56 (53.3)</td>
<td>67 (52.8)</td>
<td>123 (53.0)</td>
</tr>
<tr>
<td>None, literate/primary</td>
<td>38 (36.2)</td>
<td>48 (37.8)</td>
<td>86 (37.1)</td>
</tr>
<tr>
<td>Some secondary/university</td>
<td>11 (10.5)</td>
<td>12 (9.4)</td>
<td>23 (9.9)</td>
</tr>
<tr>
<td>Mother with partner or spouse</td>
<td>98 (92.5)</td>
<td>122 (96.1)</td>
<td>220 (94.4)</td>
</tr>
<tr>
<td>Mother received prenatal care*</td>
<td>97 (91.5)</td>
<td>107 (84.3)</td>
<td>204 (87.6)</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td>106</td>
<td>128</td>
<td>234</td>
</tr>
<tr>
<td>Vaginal vertex</td>
<td>99 (93.4)</td>
<td>108 (84.4)</td>
<td>207 (88.5)</td>
</tr>
<tr>
<td>Vaginal breech</td>
<td>7 (6.6)</td>
<td>20 (15.6)</td>
<td>27 (11.5)</td>
</tr>
<tr>
<td>Location of delivery</td>
<td>106</td>
<td>128</td>
<td>234</td>
</tr>
<tr>
<td>Home</td>
<td>55 (51.9)</td>
<td>71 (55.5)</td>
<td>126 (53.8)</td>
</tr>
<tr>
<td>Clinic</td>
<td>27 (25.5)</td>
<td>28 (21.9)</td>
<td>55 (23.5)</td>
</tr>
<tr>
<td>Birth attendant’s home</td>
<td>24 (22.6)</td>
<td>28 (21.9)</td>
<td>52 (22.2)</td>
</tr>
<tr>
<td>En route to hospital</td>
<td>0 (0.0)</td>
<td>1 (0.8)</td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Birth attendant</td>
<td>106</td>
<td>128</td>
<td>234</td>
</tr>
<tr>
<td>Nurse or midwife</td>
<td>28 (26.4)</td>
<td>28 (21.9)</td>
<td>56 (23.9)</td>
</tr>
<tr>
<td>Traditional birth attendant, certified</td>
<td>61 (57.5)</td>
<td>79 (61.7)</td>
<td>140 (59.8)</td>
</tr>
<tr>
<td>Traditional birth attendant, untrained</td>
<td>17 (16.0)</td>
<td>21 (16.4)</td>
<td>38 (16.2)</td>
</tr>
<tr>
<td>Current pregnancy</td>
<td>106</td>
<td>128</td>
<td>234</td>
</tr>
<tr>
<td>Woman had twins/triplets</td>
<td>7 (6.6)</td>
<td>6 (4.7)</td>
<td>13 (5.6)</td>
</tr>
<tr>
<td>Deaths among twins/triplets</td>
<td>7</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>All babies died</td>
<td>3 (42.9)</td>
<td>3 (50.0)</td>
<td>6 (46.2)</td>
</tr>
<tr>
<td>One baby died</td>
<td>4 (57.1)</td>
<td>3 (50.0)</td>
<td>7 (53.8)</td>
</tr>
</tbody>
</table>

SD, standard deviation.

* All values in the table are absolute numbers and percentages unless otherwise indicated.

* The denominator used to derive each percentage is the total number of women in the particular category. For example, the denominator used to derive the percentage of illiterate women who experienced a stillbirth (52.8%) is the total number of women who experienced a stillbirth and whose educational level is known (i.e. 127). Denominators vary because missing and *don’t know* responses for specific items are excluded from the denominators.

* Other than from a traditional birth attendant.

Note: The table is restricted to the subset of deaths for which maternal and birth attendant responses to questions on the time of the death (i.e. stillbirth versus early neonatal death) were concordant.
birth attendants to the verbal autopsy questions. The shaded cells show concordant responses to specific questions. Sensitivity (in parentheses) is provided for each characteristic in the top left cell (where the column for a maternal yes response overlaps with a yes response by the birth attendant). Specificity ranged from 0.33 for Question D2 (i.e. the baby had an odour at birth) to 1.00 for 16 of the 60 questions to which at least one mother answered yes. Of the total of 60 questions, 50 had a sensitivity of 80% or more. Specificity is provided for each characteristic in the middle cell (where the column for a maternal no answer overlaps with a no answer by a birth attendant). Specificity ranged from 0.52 for Question C6 (i.e. the mother had received tetanus toxoid when first pregnant) to 1.00 for 12 of the 64 questions to which at least one mother answered no. Of the total of 64 questions, 52 had a specificity of 90% or more.

Stillbirth

Fig. 2 provides a graphical summary of the percentage of concordant responses to individual interview questions, with the mothers’ responses used as the reference standard. Questions A1–14, B1–16, C1–6, D1–12 and E1–16 correspond to responses presented in Appendix A. Concordance varied most widely for responses to questions pertaining to parturition history (80–99%), whereas it varied the least for responses to questions about the characteristics of the stillborn (85–100%). Concordance was less than 80% for Question A13 (i.e. baby moved in womb before birth).
Concordance between responses given to individual verbal autopsy questions by birth attendants and by mothers who experienced a stillbirth

![Concordance between responses graph](image)

**Discussion**

Our results show that the responses given by mothers and birth attendants to nearly all questions on the perinatal verbal autopsy questionnaire are highly concordant (80% or greater agreement) when the interviews take place within seven days after the perinatal death. This suggests that interviewing birth attendants instead of mothers may be a suitable alternative for collecting data for verbal autopsy. Using birth attendants instead of mothers as perinatal verbal autopsy respondents has potential advantages from the public health, economic, logistical, emotional and ethical perspectives. Current perinatal verbal autopsy methods are such that interviewers sometimes have to travel long distances to collect information for verbal autopsy from bereaved mothers living outside their communities. The process can take months, is relatively expensive and involves extensive logistical planning. Additionally, in the early stages of planning, community leaders often have to attend sessions where they learn about verbal autopsy, which is generally unfamiliar to them. All of this increases the logistical and economic burden of conducting perinatal verbal autopsy. Using birth attendants instead of mothers as respondents shortens the verbal autopsy process and hence decreases costs and minimizes logistical planning. For example, birth attendants from the same region could all be interviewed in a single location within a given time period. This would allow verbal autopsy interviews to be conducted at scale in resource-constrained countries. One limitation to this approach is that perinatal verbal

and 75% for question B12 (i.e. vaginal odour present), but it was greater than 80% for all other questions.

Appendix B compares the responses given by the mothers and the birth attendants to the verbal autopsy questions. Sensitivity ranged from 0.29 for Question A8 (i.e. mother had suffered abdominal trauma or accident) to 1.00 for 8 of the 44 questions to which at least one mother answered yes. Of the total of 48 questions, 31 had sensitivities of 80% or more. Question D9 (i.e. the child’s arms/legs had strength) also had poor sensitivity (0.33). Specificity ranged from 0.69 for Question A12 (i.e. mother had received antenatal care other than from a traditional birth attendant) to 1.00 for 9 of the 47 questions to which at least one mother replied no. Of the total of 48 questions, 40 had a specificity of 90% or more.

Note: The figure is restricted to the subset of deaths for which maternal and birth attendant responses to questions on the time of death (i.e. stillbirth versus early neonatal death) were concordant. Questions A1–14, B1–16, C1–6 and D1–12 correspond to responses presented in Appendix B.

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* Overall concordance was calculated by adding the percentages of concordant responses to individual questions and dividing the result by the number of questions.

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Using birth attendants as verbal autopsy respondents in constrained countries. One limitation to this approach is that perinatal verbal
Funding was provided by Bull World Health Organization and the Institute for Health Metrics and Evaluation.

Conclusion

In settings where most deaths occur outside the health system, verbal autopsy is used as a real-world, data information system and may be the only practical, available tool for describing the cause of death. Our results suggest that during perinatal verbal autopsy birth attendants can be used as surrogates for bereaved mothers. This has important implications for low-income countries from a public health, economic and logistical perspective. Although it may be premature to recommend widespread use of birth attendants as perinatal verbal autopsy respondents, we recommend, based on our findings, that further research be performed using existing harmonized perinatal verbal autopsy questionnaires to assess whether our findings would be replicable if the interviews were conducted more than seven days after a perinatal death.

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Competing interests: None declared.
Birth attendants as verbal autopsy respondents

C Engmann et al.

Purpose

Evaluate the feasibility of using birth attendants as alternative verbal autopsy respondents in low- and middle-income countries.

Methods

Conduct verbal autopsies on mothers and birth attendants for stillbirths and early neonatal deaths in four developing countries. Assess the agreement between responses from mothers and birth attendants for all questions, question categories, and individual questions. Evaluate the sensitivity and specificity of individual questions.

Results

For early neonatal deaths, agreement for all questions was 94% and agreement for more than half of maternal health history, birth, and newborn characteristics was 95%. Agreement for individual questions was never less than 80%. The sensitivity and specificity varied by question, with at least 80% of questions having sensitivity and specificity of 80% and above.

Conclusion

Birth attendants can be used as verbal autopsy respondents, and the verbal autopsy questionnaire needs further refinement.
Акушерки в качестве респONDентов вербальной аутопсии в случаях перинатальной смертности в странах с низким и средним уровнем дохода: возможная альтернатива?

Цель Оценить возможность использования акушерок вместо лишившихся детей матерей, для проведения вербальной аутопсии в случаях перинатальной смертности.

Методы Интервью для проведения вербальной аутопсии в случаях ранней неонатальной смертности и мертворождений проводились отдельно среди матерей (образец для сравнения) и акушерок в 38 общинах 4-x развивающихся стран. Был рассчитан процент соответствия ответов матерей и акушерок для всех вопросов, категорий вопросов и отдельных вопросов. Были оценены параметры чувствительности и специфичности отдельных вопросов для акушерок, участвующих в опросе.

Результаты Для случаев неонатальной смертности, соответствие по всем вопросам составило 94%. Соответствие составило минимум 95% для случая большинства вопросов, относящихся к данным медицинской карты матери, ходу родов и характеристикам новорожденного. Соответствие при ответах на все вопросы не разу не составляло менее 80%. Для отдельных вопросов уровень чувствительности и специфичности варьировался, для более чем 80% вопросов уровень чувствительности составил не менее 80%, а уровень специфичности — не менее 90%.

Для случаев мертворождений, соответствие по всем вопросам составило 93%. Для более чем половины случаев соответствие достигало уровня 95% и выше при ответах на вопросы о родовспоможении, месте родов и характеристиках мертворожденных детей. Уровни чувствительности и специфичности варьировались в зависимости от индивидуальных вопросов. Более 60% вопросов имело уровень чувствительности не менее 80% и более 80% вопросов имело уровень специфичности не менее 90%. В целом, причины смерти, установленные путем вербальной аутопсии, были схожи, независимо от того, кто отвечал на вопросы.

Вывод Акушерки могут заменить потерявших детей матерей в качестве респондентов при проведении вербальной аутопсии. Вопросы в существующих унифицированных анкетах по вербальной аутопсии нуждаются в дальнейшей доработке, так как показатели уровней чувствительности и специфичности ответов отличаются друг от друга.

Резюме

Las matronas como encuestadas en autopsias verbales perinatales en países de ingresos bajos y medios: ¿una alternativa viable?

Objetivo Evaluar la viabilidad de utilizar matronas como encuestadas en autopsias verbales perinatales en lugar de madres que han perdido un hijo/a.

Métodos Las entrevistas para las autopsias verbales de muertes neonatales prematuras y alumbamientos mortinatos se realizaron por separado entre madres (éstándar de referencia) y matronas en 38 comunidades de cuatro países en desarrollo. Se calculó la concordancia entre las respuestas maternas y las respuestas de las matronas para todas las preguntas, tanto para las categorías de preguntas como para las preguntas individuales. Se evaluaron la sensibilidad y especificidad de las preguntas individuales con la matrona como encuestada.

Resultados En las muertes neonatales prematuras, la concordancia en todas las preguntas fue del 94%. La concordancia fue de al menos el 95% para más de la mitad de las preguntas sobre el historial médico materno, atención en el parto y características neonatales. La concordancia de cualquier pregunta determinada no fue en ningún caso inferior al 80%. La sensibilidad y la especificidad variaron en las preguntas individuales.

En este caso, más del 80% de las preguntas presentaron una sensibilidad de al menos el 80% y una especificidad de al menos el 90%.

En cuanto a los alumbamientos mortinatos, la concordancia en todas las preguntas fue del 93%. La concordancia fue del 95% o más durante más de la mitad del tiempo para preguntas relacionadas con la atención en el parto, el centro de parto y las características de la mortalidad. La sensibilidad y especificidad variaron en las preguntas individuales. Más del 60% de las preguntas presentaron una sensibilidad de al menos el 80%. En este caso, más del 80% de las preguntas presentaron una especificidad de al menos el 90%. Globalmente, las causas de muerte establecidas mediante autopsia verbal fueron similares, independientemente de la persona encuestada.

Conclusión Las matronas pueden sustituir a las madres que han perdido un hijo/a como encuestadas en autopsias verbales. Es necesario perfeccionar las preguntas de los cuestionarios de autopsia verbal armonizados existentes, ya que su sensibilidad y especificidad difieren ampliamente.

References