

Evaluation of the home-based maternal record: a WHO collaborative study*

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Thirteen centres in eight countries (Egypt, India, Pakistan, Philippines, Senegal, Sri Lanka, Democratic Yemen and Zambia) participated in the WHO collaborative study to evaluate the home-based maternal record (HBMR). The evaluation showed that use of the HBMR had a favourable impact on utilization of health care services and continuity of the health care of women during their reproductive period. When adapted to local risk conditions, their cut-off points and the available resources, the HBMR succeeded in promoting self-care by mothers and their families and in enhancing the timely identification of at-risk cases that needed referral and special care.

The introduction of the HBMR increased the diagnosis and referral of at-risk pregnant women and newborn infants, improved family planning and health education, led to an increase in tetanus toxoid immunization, and provided a means of collecting health information in the community. The HBMR was liked by mothers, community health workers and other health care personnel because, by using it, the mothers became more involved in looking after their own health and that of their babies. Apart from local adaptation of the HBMR, the training and involvement of health personnel (including those at the second and tertiary levels) from the start of the HBMR scheme influenced its success in promoting maternal and child health care. It also improved the collection of community-based data and the linking of referral networks.

Introduction

Over large parts of the developing world, one in about every 200 pregnant women die during pregnancy or delivery, or in the postpartum period; late fetal or early newborn deaths occur once in every 20 live births. While many of the maternal deaths occur in apparently healthy women with no previous complications, a large proportion of them

are associated with pre-existing risk factors or early signs of complications arising during pregnancy. Many of the risk factors or early signs can be prevented from progressing further if these women could be managed at a level in the health care system where skills and facilities are available to prevent serious morbidity or death. When women or their families are aware of the implications of certain risk factors or early signs of complications during pregnancy they can contribute to their own health and nutrition by risk-monitoring and self-care. The use of a home-based maternal record (HBMR) encourages such self-monitoring and care during pregnancy.

Home-based maternal records

Rationale. The HBMR is a simplified system for recording risk factors and early signs or symptoms of complications in a form easily understood by the mother. Data may be entered by clinic staff, community health workers (CHW), traditional birth attendants (TBA) or the mother herself. Through information on risk factors, referrals and treatment of the mother and her newborn infant, the idea is to empower women to recognize and understand health problems and participate in the improvement of their own health care and that of their newborn infants.

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The home-based record differs in purpose from the centre- or institution-based record. The latter are usually designed for medical professionals, provide the results of clinical and laboratory investigations, and record clinical details of the pregnancy. These records are too complex and difficult for illiterate TBAs and mothers or semi-literates such as CHWs to use. Therefore in many countries, especially at the peripheral level, information on maternal health is often incomplete or of poor quality. When linked with centre-based records, the HBMR can provide constantly available important information at the level of the mother, family and CHW.

The HBMR is intended to improve continuity of care. In many countries prenatal care and delivery care are provided by different health services and facilities, often without any linkage between their information systems. In addition, in many cultures a woman may return to her parent's home for the delivery, often in a different place. The record can be adapted to cover care throughout the reproductive period of women, i.e., during pregnancy, labour, and the postpartum and interpregnancy periods, rather than during a single pregnancy. It can also assist TBAs and health care workers in providing appropriate care and in referring mothers to more skilled services when necessary. Its use can improve the communication, understanding and working relationship between TBAs, CHWs and the women themselves.

In addition, the HBMR can be used in educating women about their health status and the services that should be provided to them. It also provides a means of collecting health information from the community.

Previous experience. Simplified antenatal records have been developed and used in Botswana (1), Kenya (2), Papua New Guinea (3), United Republic of Tanzania (4, 5), and Zambia (6). Some of these records were developed around the risk concept (2, 3, 5) and were filled in by nurse-midwives or physicians at health centres. These records varied in design; some reported on one pregnancy only, others on two or more; and some included fundal height over the period of pregnancy. Cards in Kenya had a built-in warning system to identify high-risk cases which made decision-making easier for nurses and midwives (2). In Papua New Guinea, use of the cards at health centre level raised the detection of high-risk conditions to 86%, from 55% with a conventional antenatal card (3).

A simple home-based card for monitoring upto four pregnancies and the interpregnancy periods was devised in 1972 and used for more than six years in villages in Maharashtra, India (7,8). It provided an action-oriented record using the local language.

CHWs filled in about 6800 cards covering 88% of eligible women. They used marks and symbols to enter information while making home visits. The cards were liked by women and proved to be an excellent source of health information from the rural community and a useful guide to physicians receiving referrals.

Illiterate TBAs and mothers in Haryana and Vellore, India (9, 10), Guinea Bissau (11), and Indonesia (12) used pictorial home-based records which were filled in by placing marks alongside appropriate drawings. An analysis of more than 2024 pictorial records in Haryana showed that over 90% of pregnant women possessed completed records and that the cards encouraged families to initiate appropriate action after identifying a risk that was illustrated in the record.

Some of these records included weight gain (7, 8, 12), and fundal height curves (1, 13) during the pregnancy, with the object of monitoring the nutritional status of the mother and the fetus.

Among developed countries, two controlled trials in the United Kingdom to assess use of the home-based maternal record showed that women liked keeping the record at home, felt significantly more in control of their antenatal care, and found that the record made it easier to talk to the midwives and physicians caring for them (14, 15). In a study in the USA, about 82% of literate women admitted an increase in their motivation to follow treatment and 78% said they had changed their pattern of living and eating habits because of the home-based card (16). In another pilot project in the USA, the people who used a home-based record claimed that their willingness to comply with medical advice had increased (17).

The WHO prototype and evaluation guidelines. A WHO prototype HBMR for local adaptation was developed in 1982 based on the review of earlier experience. A collaborative multi-centred study was organized to examine the following hypotheses:

- (1) The HBMR provides a means of promoting continuity of care throughout pregnancy, labour, delivery, and the postpartum and interpregnancy periods.
- (2) It encourages early recognition of "at risk" women and newborns for initiation of action.
- (3) It promotes referral that suits the needs of women, encouraging self-care where appropriate.
- (4) It promotes initiation of appropriate care suited to the identified needs.
- (5) It provides a useful and practical record of care and health information that also serves to generate community health statistics.

(6) It provides a focus for health education about risk and care during pregnancy and the interpregnancy period of the mother, and for the neonatal period of the newborn.

A set of guidelines was designed to evaluate the objectives (linked to the above hypotheses) and to explore the functions of the HBMR. One major activity in this evaluation was the introduction of a locally adapted record based on the WHO prototype (Fig. 1 and 2). The evaluation addressed the following questions:

- What are the characteristics of a successfully functioning HBMR?
- What does it take for an HBMR to be used correctly?
- Can an HBMR be developed that contains useful information pertinent to the care of the woman?
- What is needed to adapt an HBMR to various cultures?
- What are the characteristics of the existing system of the health care delivery system that encourages or impedes the use of an HBMR?
- What is needed for training health professionals involved in using the HBMR?
- How do mothers use and relate to the HBMR?
- What benefits, problems and constraints were experienced in using the HBMR?

Materials and methods

Study population

This article summarizes the main findings from 13 centres in eight countries: Egypt, India, Pakistan, Philippines, Senegal, Sri Lanka, Democratic Yemen, and Zambia. Between 1984 and 1988 the investigators (in the ministry of health or a medical school) adapted the design of the HBMR to their own setting before carrying out the evaluation. Initially, four regional training workshops for investigators were organized, followed in five countries by national workshops to review progress and share experiences.

The participating centres tested the HBMR in a variety of circumstances, such as literate and illiterate populations, different geographical and cultural conditions, and communities with easy or poor access to health services in rural and urban populations. In most cases the WHO prototype HBMR was adapted locally, although some centres used the prototype without change. The adapted HBMRs varied in colour and size (from 29.6 × 25 cm in most countries to 43 × 65 cm in Senegal). Some investigators provided polyethylene bags to protect the HBMR. In

two countries (Pakistan and Senegal) pictorial records were developed for use by illiterate mothers and/or TBAs. In ten centres dark and light shading and in three centres colours were used to indicate different degrees of risk. Both colours and pictures were used in Pakistan.

The lists of risk factors and risk factor cut-off points were adjusted to reflect local conditions. For example, the HBMR in both Democratic Yemen and India indicated risk for primiparity but that in Democratic Yemen indicated the risk for women with eight pregnancies or more, whereas in India the cut-off point was four prior births. Both cut-off points yielded about 37.5% of the population of pregnant women as being at high risk. Decisions on cut-off points were made depending on the resources available to care for the women declared as being at risk.

Common terms were used for health conditions, with particular care being taken in areas where there are many local languages, such as India and Zambia. The adapted records were pre-tested in focus group discussions to assess the appropriateness of the wording and pictures before final printing.

Study design

A pre- and post-intervention design with comparison group was recommended. The evaluation compared the changes in the area of HBMR use with those in a similar area but where the HBMR was not introduced. The majority of studies included a control group (see Table 1). It was difficult to obtain adequate and comparable data from the control areas because of the lack of records and a special system of log books or registers had to be developed. In India the comparison of findings in both HBMR and control areas was restricted only to interviews and focus group discussions.

In five countries the evaluation was undertaken by the Ministry of Health and in the remaining three by schools of medicine. The Indian Council of Medical Research supported and conducted the six-centre study in India. The evaluation at other centres was supported by WHO headquarters or the WHO regional offices.

CHWs, TBAs, nurse-midwives, and physicians were trained to use the HBMR and they in turn taught the mothers about the interpretation of tick and cross marks in the shaded or coloured boxes with reference to risk criteria. In Senegal, the training of illiterate TBAs in the use of their pictorial HBMR took longer than expected.

In all countries, during the first two months of the study period, HBMRs were issued to women who were 2–8 months pregnant. Mothers were asked to seek help if they considered themselves at risk

Fig. 1. The WHO prototype home-based maternal record: panels 1, 5 and 6 (when unfolded).

(5) REMARKS TO AND FROM REFERRAL CENTRE			(6) BEFORE FIRST PREGNANCY AND DURING INTER PREGNANCY PERIOD										(1) MOTHER'S HEALTH RECORD																																		
Date	Problem Identified	Action taken/Advice	Breast feeding	Menstruation	Pills	Injections	IUD	Surgical	Other	No methods	Very Thin	Very Pale	Malaria	Other problems	Chloroquine Tablets	Name.....Number.....	Address.....	Date of First Visit.....	Age:	Height:	PREVIOUS HISTORY:	Number of Deliveries:	Abortion (last pregnancy):	Oedema:	Fits:	Stillbirth (last pregnancy):	Abnormal Deliveries:	Excess Vaginal Bleeding after Delivery:	Labour lasting more than 24 hours:	Low Birth Weight: (less than 2 500 gm.)	Death of Child during first week:	OTHER HEALTH PROBLEMS:															
19 Jan-Mar																			18 - 35	below 145 cm. or over	below 18	above 35	less than 145 cm.	1	2	3	4	0	5 or more	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes						
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and the TBAs and CHWs were instructed to refer moderate- and high-risk women immediately for appropriate care. At all centres, the mothers were followed for a period of 15–24 months after entering the study.

Check sheets or log books were maintained with CHWs or at health centres to extract information from the HBMR. Investigators compared this compiled information with that contained in the HBMRs themselves. Semi-open-ended interviews and focus group discussions with mothers, CHWs, TBAs, nurse-midwives, and physicians were held to gather a broader set of information on attitudes and opinions about the HBMR.

Results

The results of evaluation from the 13 centres in Egypt, India, Pakistan, Philippines, Senegal, Sri Lanka, Democratic Yemen, and Zambia are presented below according to the hypotheses/objectives given above.

The size of the population groups covered in the HBMR and control areas varied from centre to centre, ranging from 14 000 to 250 000; female literacy rates varied from 15% to 91% and the sample size of pregnant women included varied from 75 to 819 (Table 1). Some problems were experienced as a result of cultural norms. For example, in Democratic Yemen, although male health care workers were able to register and visit mothers, they were not able to obtain information about early pregnancy or about menstrual periods; the General Union of Yemeni Women took over the work with the HBMR. Because the study was relatively short, the evaluation focused on process rather than impact.

Objective 1: To provide a means of promoting continuity of care throughout pregnancy, labour, delivery, and the postpartum and interpregnancy periods

Fig. 2. The WHO prototype home-based maternal record: panels 2, 3 and 4 (when unfolded).

(2) PRESENT PREGNANCY: L.M.F.....E.D.D..... up to MONTH 3 4 5 6 7 8 9

Date/Month:.....

Severe Pallor:

Pitting Oedema:

Vaginal Bleeding:

Very Thin:

Very Large Abdomen:

Abnormal Presentation:

Weak Foetal Movements:

B.P. above 140/90:

Haemoglobin below 8:

Urine-Albumin:

Weight in Kg.:

ACTION TAKEN:

Food Advice:

Iron Tablets:

Chloroquine Tablets:

Tetanus Toxoid:

Advice on place of delivery:

LABOUR/DELIVERY:

Duration:

Presentation:

Type of delivery:

Excess Vaginal Bleeding:

BABY:

Date of Delivery:..... Sex: male/female

Place of Delivery:

Conducted by:

Duration of pregnancy:

Number of Babies:

Birth Weight:

Crying:

Breathing Difficulty:

Condition of Baby:

Breast-feeding by one month:

(3) PRESENT PREGNANCY: L.M.F.....E.D.D..... up to MONTH 3 4 5 6 7 8 9

Date/Month:.....

Severe Pallor:

Pitting Oedema:

Vaginal Bleeding:

Very Thin:

Very Large Abdomen:

Abnormal Presentation:

Weak Foetal Movements:

B.P. above 140/90:

Haemoglobin below 8:

Urine-Albumin:

Weight in Kg.:

ACTION TAKEN:

Food Advice:

Iron Tablets:

Chloroquine Tablets:

Tetanus Toxoid:

Advice on place of delivery:

LABOUR/DELIVERY:

Duration:

Presentation:

Type of delivery:

Excess Vaginal Bleeding:

BABY:

Date of Delivery:..... Sex: male/female

Place of Delivery:

Conducted by:

Duration of pregnancy:

Number of Babies:

Birth Weight:

Crying:

Breathing Difficulty:

Condition of Baby:

Breast-feeding by one month:

(4) PRESENT PREGNANCY: L.M.F.....E.D.D..... up to MONTH 3 4 5 6 7 8 9

Date/Month:.....

Severe Pallor:

Pitting Oedema:

Vaginal Bleeding:

Very Thin:

Very Large Abdomen:

Abnormal Presentation:

Weak Foetal Movements:

B.P. above 140/90:

Haemoglobin below 8:

Urine-Albumin:

Weight in Kg.:

ACTION TAKEN:

Food Advice:

Iron Tablets:

Chloroquine Tablets:

Tetanus Toxoid:

Advice on place of delivery:

LABOUR/DELIVERY:

Duration:

Presentation:

Type of delivery:

Excess Vaginal Bleeding:

BABY:

Date of Delivery:..... Sex: male/female

Place of Delivery:

Conducted by:

Duration of pregnancy:

Number of Babies:

Birth Weight:

Crying:

Breathing Difficulty:

Condition of Baby:

Breast-feeding by one month:

Since continuity of care throughout a woman's reproductive life is important, the HBMR aims to provide this at different times and places by CHWs. Containing all the relevant information about a woman's health status and the treatment received from various providers, the HBMR would be kept by the mothers and brought with them to the health services each time; also, children would be weighed and their growth charts issued, and remarks to and from other centres about referred cases would be noted on the card.

In most study centres a higher proportion of pregnant women attended the antenatal clinics in HBMR areas than in control areas and many of these subsequently availed themselves of postnatal, interpregnancy and newborn care (Table 2). For example, in the Philippines there was a much larger antenatal (100%) and postpartum attendance (91.0%) in the HBMR area than in the control area (51.9% and 36.6%, respectively). Similarly, in Zambia, postnatal

care was high in the HBMR area (93.5%) compared with the control area (49.8%).

A higher number of women were given family planning advice during the interpregnancy period in HBMR areas than in control areas (Table 2). In Egypt and the Philippines there were significantly higher numbers of contraceptive acceptors during the study. Also, growth charts were received by a higher proportion of infants in the HBMR areas, ranging from 65.6% in Democratic Yemen (control area, 46.4%) to 95.7% in the Philippines (control area, 5.4%).

In the focus group discussions with the mothers, it was revealed that their visits to health centres increased after the introduction of HBMR and they perceived receiving better care during pregnancy as compared with what had happened in the past. Also, CHWs and nurse-midwives were better welcomed in communities with the HBMR, thus ensuring the continuation of care, and the number of home visits by

Table 1: The study population and use of the HBMR

Country	Total population in the study area		Female literacy rate (%)	No. of mothers registered		No. of mothers migrated/ records missing or lost		No. of HBMRs filled and analysed	
	HBMR area	Control area		HBMR area	Control area	HBMR area	Control area	HBMR area	Control area
Egypt	180 000	250 000	41.5	502	819	172 (34.3) ^a	125 (15.3)	330 (65.7)	694 (84.7)
India (6 centres)	152 424	145 069	24.8	2446 ^b		264 ^b (10.8)		2182 ^b (89.2)	
Pakistan	20 015	19 985	30.0	400	685	100 (25.0)	NA ^c	300 (75.0)	NA
Philippines	29 437	24 127	91.0	540	337	95 (17.6)	23 (6.8)	445 (82.4)	314 (932.2)
Senegal	56 000	NA	15.0	422	310	24 (5.7)	NA	398 (94.3)	NA
Sri Lanka	75 000	78 000	73.0	75	NA	Nil	NA	75 (100)	NA
Yemen (urban)	63 000	56 000	19.5	319	220	136 (42.6)	NA	183 (57.4)	NA
Zambia	14 986	14 000	25.0	463	502	96 (20.7)	NA	367 (79.3)	NA
Total	590 862 (in 13 centres)	587 181 (in 12 centres)	Range 15.0–91.0	5167 (in 13 centres)	2873 (in 6 centres)	887 (17.2)	(Information from 2 centres only)	4280 (82.8)	(Information from 2 centres)

^a Figures in parentheses are percentages.

^b The findings of interviews and focus group discussions in the HBMR and control areas were compared.

^c NA: information not available.

Table 2: Initiation and continuation of care by mothers and CHWs^a

Country	No. of women receiving ante-natal care		No. of women receiving post-natal care		No. of women receiving family planning education		No. of women receiving tetanus toxoid immunization		No. of infant growth charts made	
	HBMR area	Control area	HBMR area	Control area	HBMR area	Control area	HBMR area	Control area	HBMR area	Control area
Egypt	294 (89.1) ^b	242 (34.9)	310 (93.9)	148 (21.3)	319 (96.7)	34 (4.9)	314 (95.2)	103 (14.8)	Higher no. of charts in HBMR area	
India (6 centres)	1214 ^c (55.6)		NA ^d		593 ^c (27.2)		1495 ^c (68.5)		NA	NA
Pakistan	270 (90.0)	NA	NA	NA	NA	NA	120 (40.0)	NA	198 (66.0)	138 (46.0)
Philippines	445 (100.0)	163 (51.9)	405 (91.0)	115 (36.6)	417 (93.8)	41 (13.1)	371 (83.4)	54 (17.2)	426 (95.7)	17 (5.4)
Senegal	277 (69.6)	144 (53.5)	277 (69.6)	NA	NA	NA	NA	NA	NA	NA
Sri Lanka	62 (82.7)	NA	61 (81.3)	NA	62 (82.7)	NA	62 (82.7)	NA	62 (82.7)	NA
Yemen (urban)	150 (82.0)	NA	120 (65.6)	NA	70 (38.3)	NA	NA	NA	120 (65.6)	85 (46.4)
Zambia	365 (99.5)	86 (17.1)	343 (93.5)	250 (49.8)	342 (93.3)	380 (75.7)	266 (72.5)	0 (0)	NA	NA

^a Data gathered from retrieved HBMRs in the study areas; in the control areas information was collected from log books.

^b Figures in parentheses are percentages.

^c The findings of interviews and focus group discussions in the HBMR and control areas were compared.

^d NA: information not available.

CHWs increased. In the Philippines, for example, the average number of home visits per mother by CHWs increased by 20% after introduction of the HBMR. Health personnel found the information given in the HBMR useful in identifying risks and reminding them of the appropriate care to provide. Both mothers and health personnel spent less time in health check-ups since activities were more regular and risk conditions, if any, were marked on the record.

One of the weak areas in the use of the HBMR concerned feedback from referral centres. A common complaint from all the collaborative study centres was that the physicians at second referral level services did not show as much cooperation as nurse-midwives and CHWs in writing about the action taken on referred patients, although the HBMR provided a small space for recording this information. For example, in Egypt, Senegal, Sri Lanka and Yemen, few of the obstetricians or physicians at referral centres wrote their comments on the cards (Table 3). Even CHWs often did not record the action they had taken on the HBMR. In many cases the physicians and nurses at the second and higher referral levels had received no instructions in the use of the HBMR or had not been informed about the HBMR programme. However, in the Philippines where the referral service staff were oriented about the use of the HBMR, 92.4% of cards had feedback information (Table 3).

Objective 2: To encourage early recognition of "at risk" women and newborns for initiation of action

The HBMR promoted the identification of women at risk of selected conditions. A small number of selected risk factors appear in the HBMR with different colours or shading and cut-off points suitable to the population under study. Guidelines were provided to CHWs to assist in deciding the type of care or services they should provide in the detected risk conditions.

Severe anaemia, moderate or severe oedema, hypertension, abnormal presentation, proteinuria, bleeding, prolonged labour and bad obstetric history were common risk factors assessed during pregnancy in most of the countries. Evaluation of the success in diagnosing the presence of risk factors was undertaken after the HBMR had been introduced for some time. Identification of risk conditions in HBMR mothers varied from 19.6% to 82.7% of the mothers. In India and the Philippines it was found that, with proper training, CHWs could reliably assess most risk factors. In Pakistan, CHWs identified 20% of women as at risk (12% at high risk and 8% low risk) and the remainder showing no risk factors (Table 3). The evaluation showed that assessment of pallor and thinness was too subjective and therefore these were unreliable as risk factors.

Unless there is careful selection of risk factors and their cut-off points, an overwhelming number of

Table 3: Identification of risk conditions and referral care

Country	No. of women identified as at-risk by mothers/CHWs		No. of at-risk mothers referred		No. of mothers cared for at referral centres		No. of records giving feedback from referral centres	
	HBMR area	Control area	HBMR area	Control area	HBMR area	Control area	HBMR area	Control area
Egypt	137 (41.5) ^a	4 (0.6)	128 (93.4)	0 (0.0)	128 (100.0)	0 (0.0)	"Very few wrote remarks" NA NA	
India	1460 ^b (66.9)		543 ^b (37.2)		423 ^b (78.0)			
Pakistan	60 (20.0)	35 (5.1)	55 (91.7)	35 (100.0)	53 (96.4)	35 (100.0)	53 (100.0)	35 (100.0)
Philippines	87 (19.6)	7 (2.2)	82 (94.3)	4 (57.1)	72 (87.8)	4 (100.0)	66 (91.7)	2 (50.0)
Senegal	212 (53.2)	103 (38.4)	65 (30.7)	8 (7.8)	44 (67.7)	2 (25.0)	11 (25.0)	1 (50.0)
Sri Lanka	62 (82.7)	NA ^c	60 (96.8)	NA	17 (28.3)	NA	17 (100)	NA
Yemen (urban)	91 (49.7)	NA	91 (100.0)	NA	75 (82.4)	NA	36 (48.0)	NA
Zambia	235 (64.0)	111 (22.1)	11 (4.7)	42 (3.4)	NA	NA	NA	NA

^a Figures in parentheses are percentages.

^b The findings of interviews and focus group discussions in the HBMR and control areas were compared.

^c NA: information not available.

mothers in the community may be classified as at risk, as occurred in Sri Lanka where 82.7% were so identified. About two-thirds (67.1%) of these mothers had a birth interval of less than two years, parity five or more, or anaemia as the risk factor. As most of the mothers had experienced uneventful pregnancies previously, this "over-selection" resulted in them disregarding the diagnosis with poor compliance (28.3%) at the referral level (Table 3). Similarly, in some countries, listing of a haemoglobin level of <8 g/dl as a high-risk factor would result in designating 40–50% of women as high risk. Such high rates, which can be considered as false positives, can lower the credibility of the HBMR in the eyes of mothers and health care workers at all levels.

At most centres a higher proportion of mothers were identified as at risk in HBMR areas than in control areas. For example, in Senegal, CHWs considered that 53.2% of mothers in HBMR areas were at risk compared to 38.4% in control areas. Similarly, in Zambia the figures were 64.0% and 22.1%, respectively (Table 3). A device like the HBMR is likely to lead to the detection of more women who are at risk than had been noted previously, since health care workers trained in its use are better skilled in making assessments. This means that careful attention should be given to the selection of risk factors including their cut-off points and the implication for needed services.

Objective 3: To promote referral that suits the needs of women, encouraging self-care where appropriate

The HBMR is designed to empower women and CHWs to recognize risk conditions that require the services of a trained professional at a referral level. The referral service would receive only those women who have problems requiring the level of care available at that service. In India, the knowledge of mothers regarding risk conditions was better in HBMR areas (49.4%) than in control areas (28.2%). The assessment of impact of the HBMR on referrals showed that the number of at-risk mothers attending referral centres was higher in HBMR areas than in control areas, and that HBMR mothers arrived earlier at referral centres (Table 3).

In focus group discussions, many mothers said that the HBMR was a useful "passport" in the referral system because it led to contact with "someone who knows our problem and takes better care of us at the centre". Some CHWs felt that although they identified at-risk mothers and referred them, the mothers did not go to the referral centres. Reasons for the lack of successful referrals included local cultural attitudes, poor transportation, cost of care at higher levels, and refusal of mothers to leave

other children unattended at home. In India, women, especially primipara, frequently migrated to their parental village for delivery, thus reducing the use of the referral system in HBMR areas and reducing feedback. All of the mothers who were referred and went to health centres or hospitals received proper care. However, if referral centres are inadequately equipped, HBMR implementation might exacerbate existing problems since it is likely that CHWs will refer more cases for care and more mothers will seek services.

In situations where the HBMR system had not properly been integrated in the referral system, there were problems when the mothers arrived at the centres. In the focus group discussions, the mothers said that they still had to wait long hours and presentation of the HBMR did not make any difference in the physician's attitudes towards them. However, in places like the Philippines, where the health personnel of referral services were included in the design and planning of the HBMR, mothers were more likely to arrive once referred and had a better experience at the referral centres. In Egypt, all the mothers who were referred (93.4% of the at-risk mothers, Table 3) felt they had received better health care at the maternal and child health centre during the period that they had the HBMR and wanted their records returned to them (investigators had collected the HBMRs for analysis).

In Zambia, the percentage of mothers referred was low among both HBMR (4.7%) and control (3.4%) groups (Table 3) because a number of midwife posts remained vacant for half of the project period. In Pakistan, TBAs were reluctant to refer women for delivery since this meant a reduction in their income. Such circumstances are common and must be addressed, since the HBMR is meant to stimulate referral when high-risk cases are recognized.

Objective 4: To promote initiation of appropriate care suited to the identified needs

The HBMR is designed to provide visual information on the mother's health status and needs and to remind her, her family members and CHWs of timely action most appropriate for those needs. CHWs in most countries believed that they could identify problems better when using the HBMR. They all perceived the usefulness of the HBMR in determining specific needs and corresponding care.

The proportion of women receiving antenatal care was higher in HBMR areas (55.6–100.0%) than in control areas (17.1–53.5%) (Table 2). In the Philippines, for example, there was an increase in the attendance of women at antenatal clinics of 33% in

the HBMR area compared with 7% in the control area during the study period. In Yemen, where women in the proposed HBMR area generally made fewer antenatal visits than women in the control area before the introduction of the HBMR, the proportion increased by about 12.8% in the HBMR area, compared with only about a 1% increase in the control area at the end of the study.

In the Philippines, tetanus toxoid coverage was about 83.4% in HBMR areas and 17.3% in control areas at the end of the study, compared to nil in both areas before the introduction of the HBMR. In Zambia, 72.5% of the mothers with HBMRs received tetanus toxoid immunization compared with none from the control area. CHWs and nurse-midwives in India reported that with the introduction of the HBMR the distribution of tetanus toxoid, iron and folic acid tablets, and food advice had improved.

At most of the centres, family planning education was given to about 27.2% to 96.7% of the HBMR women as compared to 4.9% to 75.7% of the women in control areas (Table 2). However, increases in family planning practices varied from country to country.

In Democratic Yemen, the HBMR encouraged involvement of mothers as well as supervision by the members of the General Union of Yemeni Women and proved that women in the community could take care of and supervise mothers during childbearing.

Objective 5: To provide a useful and practical record of care and health information that also serves to generate community health statistics

The HBMR has to survive regular use as well as provide information about a woman's reproductive years. HBMRs could be a source of information permitting rapid and accurate assessment of the community or individual health status and use of services indicated on the HBMR. Common terminology for health conditions was important to the understanding of mothers but it was a problem in some countries, for example, in Zambia and India where there are many local languages. In India, some physicians from other regions of the country could not understand the common terms used in the HBMR; these issues were addressed and resolved prior to introducing the HBMR system.

Health workers introduced the HBMR into a community over a two-month period. Mothers were unused to keeping their own health or medical records at home and some were afraid to keep it, especially if they were illiterate. Health workers were also unused to having mothers keep the records. Although strange at first, investigators found that after a brief period of time mothers liked having

the HBMR at home. The amount of explanation given to the mother about the use of the HBMR affected the mother's willingness to keep it.

Local communities were receptive to the HBMR. Community leaders found the HBMR informative and useful as it showed them which women had problems and might need referral. Mothers also found that the HBMR provided useful information on their own health and that of their newborn infants, and kept the cards until the end of the evaluation period. The mean record retention in all centres was about 80%; in the Philippines, for example, the proportion was 82.4%. Most mothers stated that they would like to have the record for their next pregnancy. In Pakistan, all the CHWs, 69% of the mothers, and 90% of community members responded "yes" to the question, "Is the HBMR helpful to the community?" A similar response was obtained at other centres. Mothers also found that the information was useful in identifying local health problems.

Many mothers welcomed being given a plastic cover that was larger than the HBMR in order to keep it in good condition. Generally, the colour and thickness of the HBMR were considered satisfactory. However, in some countries, for example, Democratic Yemen and Senegal, health care workers felt that the HBMR was too large.

In most centres the majority of mothers (65.7 – 94.3%) kept the HBMR in good condition for the period of the study; a few were torn and the remainder were lost. In Yemen, 45% of women required a new HBMR every year. The kind of paper used affected the HBMR's longevity. Experience suggests that the HBMR will be most cost-effective if it covers two or more pregnancies.

Problems arose with the introduction of the HBMR that could impede its functioning. In Senegal the training of illiterate TBAs took longer than expected, but once it was accomplished, they were able to use the pictorial HBMR. Other impediments were the result of cultural norms. In Yemen, for example, male health workers were registering and visiting the mothers, but they could not obtain information on pregnancy or menstrual periods for the HBMR. A local women's group took over the activity of registering and working with the mothers. Health personnel who had not received orientation about the HBMR were the least likely to cooperate and to fill it in properly. Physicians and staff at the second referral levels in most of the study centres were unaware of the HBMR.

Written entries on the HBMRs were generally good. The completion of information about the mother and her previous health status ranged from 100% in Zambia to 75% in Pakistan. Completion of information about the present pregnancy ranged from

98% in Egypt to 48% in Zambia, with similar findings for interpregnancy conditions. The section on referral was the most incomplete portion of the HBMR, except in the Philippines where completion was 96.4%. In many centres, information on the frequency of health problems among mothers was generated from the HBMRs.

The home-based record contains important information at the level of the mother, family and CHW. At the first and second referral levels, health personnel recorded information on a system of simple tally sheets or registers, incorporating only a few important items from the HBMR. The district and provincial levels received copies of these registers for their further use. The HBMR generated useful data in all eight countries.

The HBMR provided reliable data on the use of health services. In the Philippines, the master list and service log confirmed 81% of the recordings in the HBMRs. The quality of diagnosis and services improved following the introduction of the HBMR. At two centres where specific data were available, the reasons for referral given on the HBMR and on the service register were in agreement and the actions taken by CHWs and health professionals compared favourably in 90% of cases. In countries that used the pictorial HBMR, there was good agreement between the findings of TBAs and nurse-midwives. Therefore, there is some indication that the quality of health information as well as services improved with the HBMR, particularly at the primary health care level. The HBMR, whose information was as accurate as that contained in conventional medical records, proved most useful where a primary health care system was functioning well and where existing supervisory mechanisms were available.

Objective 6: To provide a focus for health education about risk and care during pregnancy and the interpregnancy period of the mother, and for the neonatal period of the newborn

The HBMR improved health education. For example, about 40% of mothers receiving health education in Egypt could recognize the danger signs in pregnancy. In India, mothers' understanding of risk increased in HBMR areas compared to control areas, which led to increased interaction between mothers and CHWs. One centre (Assam) in India reported that the mothers with identified risks had asked for health care and had complained to the village council about the lack of action from CHWs. In Zambia, 80% of the mothers knew that bleeding before delivery was a risk, and 85% considered that moderate to severe swelling of the feet during pregnancy was dangerous.

The educational background of the mothers played a major role in their understanding of the risk factors marked on the HBMR and the action to be taken. In Sri Lanka, an HBMR designed primarily for literate mothers was not very useful in educating illiterate mothers about risk factors.

Suggestions from HBMR users

Mothers and health workers suggested improvements in the HBMR. The most frequent recommendation was to make it more simple for illiterate mothers, using clear, attractive pictures, and/or bold illustrations. In some studies the print size was considered too small, the material too technical, or the presentation too cluttered.

Other suggestions were to enhance the content of the HBMR, depending on the setting, by adding the husband's occupation and the woman's birth date rather than age, providing space for recording weight gains, mention of neonatal problems, and newborn death.

Health workers reported inadequate training of mothers and themselves, and a lack of continued surveillance by project officers in some studies. This points out the need for appropriate training of all levels of health workers involved with the HBMR, and for continued supervision during the time when the HBMR is being implemented. Some workers thought the HBMR too detailed and time-consuming, and that the columns required a lot of questioning and examination of the mothers. However, the experience in the Philippines is a good example of the evolution that occurs as workers become familiar with the HBMR.

In the Philippines the training and the first few months of HBMR use produced a considerable amount of work. In meetings, planners and programme managers discussed the HBMR, outlined responsibilities, and developed check-lists for various aspects of care, since the HBMR would be kept at home and not duplicated in the clinic. First, it seemed there was more paper work using the HBMR system, but as time went on, staff discovered that there was actually much less paper work. In the end, there were only two or three logs/registers kept in the clinics for tracking the information from the HBMR. The first few attempts to fill out the HBMR took about 20 minutes or more, and it seemed difficult, cumbersome and time-consuming to handle. With practice the staff was able to fill out the HBMR in three minutes. They learned where items were on the HBMR so that they could quickly and easily review it, and obtain information about the mother's condition.

Most investigators found that use of the HBMR indicated the need for guidelines to identify risk fac-

tors and for standards of care for the actions to be taken after identifying these factors. They suggested guidelines for referrals to hospitals or clinics, and for ensuring that referral units were adequately equipped for emergencies and could provide the necessary drugs, vaccines, or clinical supplies. The HBMR activities further pointed out the need to have a functioning transport and communication network so that referrals could be made when required.

Discussion

The WHO collaborative study evaluated the process and functioning of the HBMR system, using a control and/or pre-post design. An evaluation of the impact of HBMR use on mortality and morbidity rates in the community has not yet been undertaken. This would require a longer period of investigation and much larger population sizes in order to detect meaningful changes in mortality or morbidity rates.

The evaluation showed that use of the HBMR contributed substantially to an increase in the quality and quantity of antenatal, postnatal and interpregnancy care of mothers. It also provided better neonatal health care. The HBMR also improved the mothers' knowledge about helpful practices, as well as early identification of risk factors during and after pregnancy, referral of high-risk mothers and infants, initiation of their care, registration of mothers and infants at health centres, coverage with tetanus toxoid, and provision of useful health information in participating communities. The HBMR had an impact on the continuity of care; more women started antenatal care and continued into the postnatal and interpregnancy periods in HBMR areas when compared with the baseline for these areas or with control areas. Mothers, CHWs and health professionals at referral levels found the HBMR useful.

Most centres adapted the WHO prototype HBMR to their local situations and available human resources. The study demonstrated that this adaptation of the HBMR to the community setting resulted in its success. The incorporation of colours, shading and pictures in the HBMR improved the understanding of mothers, TBAs, CHWs, and other health personnel and its use by them. In situations where the literacy rate among users was low, pictorial adaptation of the record resulted in better understanding and participation of mothers as well as family and community members. The adapted HBMRs in Bandung, Indonesia and Shanghai, China (results from these centres are not included in the present study) have one/two red dots or blue/red circles representing moderate/high risks. Both these records also have pictures to assist illiterate and semiliterate mothers and community members.

Some risk factors should apply only if a multiparous woman has previously experienced a poor pregnancy outcome. For example, short stature is a risk factor often used to designate a high risk of cephalopelvic disproportion or of prolonged labour; but a woman of short stature who has had a previous pregnancy with no adverse maternal or fetal outcome should not be classified as high risk. However, it is appropriate to classify primiparous women with short stature as high risk.

It is inappropriate to list risk factors for which preventive action is routinely taken for all women. For example, a low haemoglobin level in pregnancy should not be listed as a risk factor in countries where all pregnant women receive iron tablets. However, in one of the study centres in India, local data showed that a haemoglobin level of less than 8 g/dl carried a relative risk of maternal death of 14. Since about 5% of women in the study population had haemoglobin levels of less than 8 g/dl, the population attributable risk for the factor was 40%, suggesting that 40% of maternal mortality might be prevented by providing skilled care for such women. Women with this characteristic were therefore advised to deliver at a health centre or hospital.

Hence, the choice of risk criteria and the adaptation of cut-off points is clearly important in determining the selection of mothers and newborn infants for referral and their subsequent compliance. The study revealed that if the proportion of pregnancies identified as at-risk is very high the system will not work well. There will be disappointment and loss of confidence in mothers when they find that they were unnecessarily referred to a centre or the centre is not adequately equipped or cannot cope with the numbers referred. Moreover, mothers may question the validity of the risk identification.

Given its various functions, the HBMR is suitable for use with all women of childbearing age in the community irrespective of their pregnancy status. After training, the women, their family members or women's organizations can monitor menstrual history and some of the risk conditions and thereby relieve health care workers of these tasks.

Programme managers need to address workload issues for CHWs and other health care staff. At the start of the HBMR evaluation in the Philippines, for example, CHWs and nurse-midwives felt that their workload had increased. However, after some time they realized that the introduction of the HBMR had in fact reduced their workload.

Disregard of cultural practices could make the introduction of the HBMR to pregnant women in a community a very difficult task, especially in early pregnancy. For example, some women were reluctant to report pregnancy early, particularly the first

pregnancy, fearing that the early announcement might result in a miscarriage. Fear and suspicion among women can affect their early registration on the HBMR. The study emphasizes the importance of choosing an appropriate person to introduce the HBMR in the community. Experience has shown that, at the start, only those women who are visibly pregnant accepted the HBMR, but after some experience with the function of the HBMR, other women wanted it and asked for it early in their pregnancy. This only occurred because women began to perceive that the HBMR promoted their health and that of their unborn babies. Noting their menstrual history is something that women can do themselves and they should be taught this. In Yemen, a woman's organization accepted the responsibility of registering women on the HBMR, and teaching them about its use. The organization's members filled the records regularly.

Most investigators found that the introduction of the HBMR system stimulated the need to prepare guidelines for identifying risks and standards of care for actions to be taken after risk identification. They suggested that guidelines and standards of care for referrals to hospitals or health centres should be prepared to ensure proper functioning of the HBMR system. The referral units should be adequately equipped for emergencies and provided with the necessary drugs, vaccines, equipment and supplies. This study further pointed out the need to have a functioning transport and communication network for referrals.

WHO has responded to the need for training materials to support the introduction of the HBMR on a broader, non-experimental basis by developing guidelines,^a and preparing and field-testing a set of four modules for programme managers, trainers, health care workers and TBAs.^{b-e} The guidelines contain information on ways to adapt the HBMR to local situations, the selection of risk criteria, administrative aspects of the introduction of the HBMR into the health care system including the workload and related tasks of various health functionaries, promotion of countrywide use of HBMRs, and materials

for training CHWs and other health care workers. They also discuss problems and constraints that have been encountered so far in introducing the HBMR so that countries can build on the experience of others.

With the HBMR, information about the individual no longer rests in a medical record at the health clinic. Information about a woman's pregnancy and interpregnancy periods remains with her in her home. In services where the HBMR has been used, a minimum of information is kept in centre-based records, just sufficient to generate the composite data needed at the primary health care clinic level. In most centres in the study, the arrangement of a log or register at the health centre to enter the information from the HBMRs worked well. In countries where women move around frequently, information on medical records is often incomplete. It seems reasonable therefore that each mother should keep her record with her. When information on a community is required, rapid assessment techniques permit gathering information from the HBMRs. Usually this information is more complete than that which can be gathered at the health centre.

The present evaluation provides a more complete picture of the problems and pitfalls of HBMR use, as well as its benefits. The intention is now to expand the introduction of the HBMR into the general health care system in countries. While most studies have been in small areas, the operational feasibility of the HBMR system in a wider area was studied by a nongovernmental organization (NGO) or ministries of health in Bangladesh, Philippines and Viet Nam.

A nongovernmental organization in Bangladesh field-tested 73 000 pictorial records. This WHO-supported evaluation revealed that the HBMR facilitated early recognition of at-risk mothers and, enabled prompt action, promoted self-care through active participation of the mothers and their families, generated health service statistics, served as a teaching and evaluation tool, and improved referral linkages. The evaluation team concluded that, on the whole, the HBMR had proved to be an effective innovation for promoting maternal and child health, collecting community-based data, developing human resources, and linking the referral network. They recommended that the possibilities of introducing the HBMR on a broader scale through selected government and nongovernmental health programmes be explored.^f

The work undertaken for the present multicentre study by the Ministry of Health in the Philippines

^a *Guidelines for the development, adaptation and evaluation of home-based maternal records*. Geneva, World Health Organization (in press).

^b *Home-based maternal record: a guide for programme managers* (1992, WHO unpublished document).

^c *Home-based maternal record: a training module for trainers* (1992, WHO unpublished document).

^d *Home-based maternal record: a training module for health workers* (1992, WHO unpublished document).

^e *Home-based maternal record: an illustrated guide for TBAs and community health workers* (1992, WHO unpublished document).

^f *The pictorial home-based maternal record and evaluation*, Dhaka, Bangladesh Population and Health Consortium NGO Project, September 1991 (unpublished document).

was subsequently expanded to three regions for a further two-year period. The analysis of 3353 records has revealed better results than those presented above. The investigators recommended a further expansion of the HBMR scheme; eventually it is hoped to cover the whole country. They emphasized the need to strengthen the referral system and to ensure continuous training on HBMR use.^g

Between December 1991 and April 1992, a final evaluation was carried out in eight provinces of Viet Nam through a survey of 7844 married women of reproductive age (out of 409 839 who used the HBMR) and of 128 health staff from commune clinics and district-level polyclinics or hospitals. It was evident that the HBMR has been well introduced and accepted in the health system. Links between commune clinics and polyclinics/hospitals were functioning fairly well. The system has begun to generate more reliable data in the districts and has increased the data collection and analysis skills of staff. There was some evidence of increased quality in MCH care and family planning. In the districts there was an early evidence of decrease in the mortality rates including the maternal mortality rate from 105 in 1990 to 68 per 100 000 in 1991.^h

In the USA, the concept of introduction of the home-based record has been nationally mandated since 1989.ⁱ Different considerations for implementation of the HBMR on a regional or a country-wide basis mean that the record will have to be adapted to the varying situations within a large country. A periodic review of the utility of the risk factors and their cut-off levels will be useful since changes in risk may occur as services improve or the populations change.

The commitment of the government, private sectors, voluntary agencies and the community is essential if HBMRs are to be introduced and operated successfully throughout a country, with academic institutions and ministries working together to adapt the HBMR to the community in its content, wording, appearance and design. The HBMR must be considered as an integral part of primary health care.

Résumé

Evaluation de la fiche de santé maternelle tenue à domicile: étude collective OMS

Treize centres de huit pays (Egypte, Inde, Pakistan, Philippines, Sénégal, Sri Lanka, Yémen et Zambie) ont participé à une étude collective OMS pour évaluer la fiche de santé maternelle tenue à domicile (HBMR). L'évaluation a montré que l'emploi de la HBMR contribuait sensiblement à améliorer la qualité et la quantité des soins anténatals, postnatals et des soins dispensés entre deux grossesses, et assurait également de meilleurs soins néonataux. La fiche de santé améliorerait de plus les connaissances des mères quant aux pratiques utiles, et permettait une identification précoce des facteurs de risque pendant et après la grossesse, l'orientation des mères et des nourrissons à haut risque vers un centre de recours, la mise en route des soins, l'enregistrement des mères et des nourrissons dans les centres de santé, la couverture vaccinale par l'anatoxine tétanique, et la transmission d'informations sanitaires utiles aux communautés participantes. La HBMR a eu un impact sur la continuité des soins; dans les zones où elle était employée, un plus grand nombre de femmes ont eu recours à des soins anténatals, et ont poursuivi ces soins dans la période postnatale et intergestationnelle, par rapport à la pratique habituelle dans ces régions ou dans des régions témoins. Les mères, les agents de santé communautaires et les professionnels de santé du centre de recours ont jugé cette fiche de santé utile.

La plupart des centres ont adapté le prototype de fiche de santé maternelle tenue à domicile à la situation locale et aux ressources humaines disponibles. L'étude a démontré que c'est cette adaptation de la fiche aux conditions de la communauté qui a permis son succès. L'introduction de couleurs et d'illustrations a amélioré la compréhension de la fiche par les mères, les accoucheuses traditionnelles, les agents de santé communautaires et autres personnels de santé, et a entraîné une meilleure utilisation. Lorsque le taux d'alphabétisation était faible, une version entièrement illustrée de la fiche a entraîné une meilleure compréhension et une meilleure participation des mères ainsi que des membres de la famille et de la communauté. L'adoption de la HBMR à l'échelon régional ou national supposera une adaptation de la fiche aux diverses situations qui prévalent dans un vaste pays. Un examen périodique de la pertinence des facteurs de risque retenus et des valeurs limites correspondantes sera utile du fait

^g *Evaluation of home-based maternal record. Region III. Final report.* Manila, Ministry of Health, January 1992 (unpublished).

^h Feuerstein, M.T. *Final evaluation of the maternal and child health and family planning services: mission report.* Manila, WHO Regional Office for the Western Pacific, 1992 (unpublished).

ⁱ A maternal and child health handbook (called *Health Diary*, Maternal and Child Health Bureau, US Dep. of Health and Human Services, Washington DC, 1993) has been authorized by the Omnibus Budget Reconciliation Act, 1989, Public Law 101-239, Sect. 6509.

des modifications des risques, de l'amélioration des services ou de changements au niveau de la population.

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