

PH-7-11-113  
10-3-1988

**GUATEMALA TRIP REPORT**

**INCAP QUETZALTENANGO MATERNAL  
and  
NEONATAL HEALTH PROJECT**

**JUNE 14 - 25, 1993**

**Barbara E. Kwast, PhD, MCommH, MTD  
Women's Health Advisor  
MotherCare/John Snow, Inc.**

Report Prepared for the  
Agency of International Development  
Contract #DPE-5966-Z-00-8083-00

## TABLE OF CONTENTS

<b>I. EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>II. PURPOSE OF VISIT</b> .....	<b>1</b>
<b>III. ACTIVITIES</b> .....	<b>2</b>
<b>A. Early neonatal deaths audit in Quetzaltenango Hospital</b>	
<b>B. TBA Referral Hospital Study (R3)</b>	
<b>C. Vital Events Reporting System (VERS)</b>	
<b>D. Assessment of Performance of Health Center and Health Post Staff (D1 - D6)</b>	
<b>E. Meetings and seminar at INCAP</b>	
<b>IV. RECOMMENDATIONS AND FOLLOW-UP REQUIRED</b> .....	<b>8</b>

### APPENDICES

1. Contact list
2. Timetable Health Post/Center Studies
3. Timetable Vital Events Reporting System
4. Timetable All Studies
5. Questionnaire for early neonatal deaths audit
6. Preliminary data from Early neonatal deaths audit
7. List of women included in the neonatal deaths audit for linkage with VERS and R2
8. Research analysis R3 by Kathleen Rourke
9. Preliminary data from D1-D6 by Rebecca Rohrer
10. Reference articles for early neonatal deaths audit

## **I. EXECUTIVE SUMMARY**

The main objective of Dr. Barbara Kwast's visit to Guatemala was to provide support for the conduct and evaluation of case management for a medical audit of early neonatal deaths in Quetzaltenango Hospital covering the years 1989, 1991 and 1992 and to discuss progress of the various ongoing studies with regard to the final report of the INCAP/MotherCare Quetzaltenango Maternal and Neonatal Health project.

The project has accomplished a great deal so far. Drs. Schieber and Kwast reviewed the draft final report which was submitted by Dr. Schieber at the TAG. Some components need expansion. The deliverables that will be ready for the closing of the Project at the end of July 1993 are the OB/GYN and Perinatal Hospital norms, health post/center norms, TBA manual (with 7 components), INCAP/MotherCare project technical document, Diagnostics Studies manual, the referral forms, flip charts and posters.

Regarding the studies, a report of the supervisory visits to assess health post/center personnel (D1-D6) has been prepared by Becky Rohrer; an outline of the early neonatal deaths audit will be prepared by Drs Kwast, Mejia and Schieber; initial results of TBA referrals (R3) and a publishable article on the community perinatal case control study (R1) (already submitted for publication) will be prepared by Kathleen Rourke. The final analysis of all four rounds of the Vital Events Reporting System will be postponed until the commencement of MotherCare II. However, the field data collection will be completed at the end of July 1993, and the data will have been entered and cleaned by mid-August, 1993.

The financial status regarding the printing of the deliverables (norms, posters, TBA manual and others) has been reviewed. As the line item for reproduction and photocopying has been exhausted due to the large number of products from this project, additional funds need to be sought to cover duplication and printing costs for the final products.

## **II. PURPOSE OF THE VISIT**

The purpose of the visit was to:

- provide support for the conduct and analysis of a medical audit of early neonatal deaths occurring in Quetzaltenango Hospital in 1989, 1991 and 1992;
- meet with the Principal Investigator and Specialist Physicians (Obstetrics and Gynecology and Neonatology) to discuss the evaluation of case management;
- work together on other data analysis and final report with the Principal Investigator and other project staff.

### **III. ACTIVITIES**

#### **A. Early Neonatal Deaths Audit in Quetzaltenango Hospital**

This project envisaged a hospital peri/neonatal case control study in Quetzaltenango Hospital using the R2 questionnaire. At the end of 1992, during review for the analysis of this study, it transpired that the data cannot be used as originally thought due to omissions in data collection. As the most important objective of this study was to assess improvement in management after training of hospital staff in obstetric and neonatal management norms, a medical review (audit) of case management seemed a good alternative. A draft questionnaire, based on the British perinatal audit was made by Barbara Kwast in January 1993 and forwarded for review to the investigators for this audit, Drs. B. Schieber and Mario Mejia.

#### **The methodology:**

##### **a) The Sample**

As Dr. Mejia, a Neonatologist, was the principal investigator for this review, and neonatal management needed to be included, the following **exclusion criteria** were decided upon:

1. stillbirths (these preclude evaluation of neonatal management)
2. late neonatal deaths from 7-28 days (these preclude evaluation of obstetric management)
3. neonates not delivered in hospital
4. neonates with congenital abnormalities incompatible with life
5. neonates weighing less than 1500 grams
6. neonates born before 28 weeks gestation

##### **b) The Selection of Cases**

Dr. Carlos Gonzales who was in charge of hospital data collection for the project, listed all eligible early neonatal deaths (first week deaths) in 1989, 1991 and 1992. The year 1989 represented the period before training and implementation of norms, the arrival of a neonatologist and residents in OB/GYN, and the years 1991 and 1992 represent post-implementation years. The reason for choosing two years of the post-implementation period was the change in neonatal mortality rates between all three years. Eliciting avoidable factors in obstetric and pediatric management and availability of equipment and drugs, was thought to provide clues to above mentioned change.

After completing step one, a random number was drawn and from there 30 cases were to be systematically chosen for each year. As it turned out, all available cases according to the

exclusion and inclusion criteria were exhausted for 1989 and 1992. This meant that two cases with congenital abnormalities were included in the review. Also four cases of twin pregnancy were reviewed, but subsequently deleted from analysis as twins are special events and each case had one twin alive and one dead.

Dr. Sara Koritz, Obstetrician/Gynecologist reviewed obstetric management and Dr. Mario Mejia reviewed the neonatology management. In each case, management was designated as correct or incorrect according to the correspondence between the protocols and actual management as written down in the case notes. The questionnaire is contained in Appendix 5. The review was done from the actual records in the records department in the hospital and no records were removed from the hospital. Anonymity was honored throughout the review and nowhere are names of patients or staff attached to the audit forms. Avoidable factors were assigned according to a realistic assessment of what would be below acceptable standard of care or availability of equipment or drugs in this hospital. Avoidable factors were allocated to: patient/home circumstances, referral by TBAs, other physicians, health centers/posts, obstetric/pediatric/nursing staff, lack of equipment/facilities and drugs. While management may not always have been correct, due to lack of drugs or equipment, no avoidable factor was allocated to staff management. An effort was made to decide whether a death was preventable. This is not always clear as all levels from home to health services may contribute. It is therefore more revealing to allocate avoidable factors as conclusions and recommendations for improvement can be acted upon.

The writer, Barbara Kwast, attempted to make preliminary summary tables as an ongoing process. This meant an in depth review of the completed questionnaires and an opportunity to discuss missing information or unexplained management information with the two specialists. A number of hospital records were re-pulled for additional information.

The Obstetric and Neonatology Staff organized a joint morning meeting on 22 June, 1993 in Quetzaltenango hospital. Dr. Mario Mejia talked about the case review of early neonatal deaths, its objectives and methodology. Drs. Barbara Schieber and Sara Koritz contributed to the discussion and the writer, Barbara Kwast, was asked to talk about experiences elsewhere in the world with maternal and perinatal deaths audits. The content of all talks was well received and the discussion was helpful. The obstetrician, Dr. Jorge Umana, suggested that a five-year review prior to the start of the residency program in 1989 and five years subsequent to that year would be more revealing than a shorter period. Dr. Umana was positively inclined to monthly perinatal deaths meetings and was also interested in publications on maternal mortality and confidential enquiries into maternal deaths.

**Linkage** was done with the R3 forms in INCAP by Dr. Jose Antonio. Of the 60 cases reviewed for the 1991 and 1992 audit, only 7 were confirmed TBA referrals from the R3. The writer, Barbara Kwast, compared the information and for 4 cases there was no write-up about TBA referral in the hospital records. It also became apparent that several women had received prenatal care from a health center/post or a TBA, while this information was not found in the hospital records. This makes the assignment of an avoidable factor to the patient/home for not attending prenatal care doubtful and this will be taken into consideration during the write-up. No attempt was made as yet to link the hospital records to the available

R2 forms administered in hospital and VERS, but it was discussed with Dr. Schieber that this should be possible before the final write-up of this study is completed. In order to help this process, MotherCare Arlington will generate a list with the relevant information (Hosp. No., date of baby's birth, mother's name and location) from the enquiry forms of 1991 and 1992 and forward it to Dr. Schieber.

Tables with preliminary results are contained in Appendix 6.

A list of all cases included in the early neonatal deaths audit with specific identifying variables to attempt linkage with R2 and VERS is contained in Appendix 7.

## **B. TBA Referral Hospital Study (R3)**

The data collection for this study which began in September 1990, ended in May 1993, one year after the training of 400 TBAs in the Quetzaltenango intervention area. Ms. Mary McNerny has described the work she did with Drs. Schieber and Sazdi on review of the data and detection of problem variables ( ref. Trip Report Mary McNerny, April 1-4, 1993).

Mrs. Kathleen Rourke has arrived in Guatemala in June 1993 and will work on the R3 data for her PhD thesis until December 1993. The proposed analysis plan by Mrs. Rourke is contained in Appendix 8. Drs Kwast and Schieber and Mrs. Rourke had an opportunity to discuss her excellent analysis plan in the light of the 5 questions she will try and answer:

1. Will the **reasons** for TBA referrals in the intervention districts differ from the reasons for TBA referrals in the non-intervention districts evaluated by comparisons during all three intervention periods.
2. Will there be a decrease from the pre-intervention to post-intervention periods in the **timing** of TBA referrals for all women as well as for women with the following conditions:
  - \* preterm labor
  - \* prolonged labor
  - \* malpresentation

Question two was discussed relative to confounding by malpresentation on prolonged labor. Mrs. Rourke is aware of this and will take this into consideration. We also discussed whether the obstetric referrals can be separated into prenatal and labor referrals. The question then arose whether there could be multiple records for women and this will be looked at. Whether detailed analysis relative to the 11 conditions taught in TBA training is possible, will depend on the number of cases once the time periods and intervention from non-intervention periods are separated. Mrs. Rourke is aware that the comparison of intervention and non-intervention area needs to be looked at using the same criteria as for VERS, which includes a variable on distance and community size. Mrs. Rourke was not aware of the vital events reporting system (VERS). This data set however, may be of great help to her. It is also not clear whether all TBAs in one particular community were trained by the project and thus there may be a pattern of program effect.

**Linkage of VERS and R3** was discussed and it will be done by computer according to date of birth and location. Mrs. Rourke will then pull the cases and compare names of women for verification.

3. Will there be a decrease in the timing of all TBA referrals in the intervention districts as compared with the timing of referrals by TBAs in the non-intervention districts as evaluated by comparisons during all three intervention periods.
4. Will there be a decrease from the pre-intervention to the post-intervention periods in the peri-neonatal mortality rates of TBA referrals for all women and for women with the following conditions:
  - \* preterm labor
  - \* prolonged labor
  - \* malpresentation
5. Will peri-neonatal mortality rates of all women referred by TBAs in the intervention districts decrease over time as compared to peri-neonatal mortality rates of all women referred by TBAs in the non-intervention districts as evaluated by comparisons during all three intervention periods.

Mrs. Rourke will endeavor to have the first two questions analyzed as a preliminary result for the project's final report. It is especially important to get a good understanding of the increase in referrals by intervention and non-intervention area relative to time of intervention.

As Mrs. Rourke will use these data for her PhD thesis, she will also write relevant articles for publication. As long as the Institution and the AID contract is duly acknowledged, it seems reasonable that Mrs. Rourke and Dr. Schieber should share authorship and that Mrs. Rourke should be first author on the major R3 publications.

### **C. Vital Events Reporting Systems (VERS)**

The data from the three rounds of VERS have been collected and entered into the computer. Miss Mary McInerny has reviewed the frequencies from the first two rounds during her last trip in April 1993. Round four data are at present being collected and this round will be completed at the end of July and data entry will be complete by mid-August.

This data set is very important and will answer the effect of the TBA training on recognition of complications, timeliness and appropriateness of referral by TBAs and the acceptance of this referral by the TBA. As this is a community based study, it will tell us about all complications during pregnancy, labor, the puerperium and of the neonate and show the proportions detected and referred by TBAs compared to those detected by the women and the pattern of self-referrals.

The data of round one, and two months of round two are very clean and basically Miss McInerny has worked with Dr. Sazdi to separate pre- and post intervention periods and set up

criteria for intervention and non-intervention areas. Work on this data set will continue in MotherCare II and has been proposed as a carry-over activity. The criteria as set up for VERS regarding intervention and non-intervention areas will help Mrs. Rourke with the grouping for the R3 data set.

Mrs. Rourke will with the help of Dr. Sazdi link the R3 and VERS questionnaires.

#### **D. ASSESSMENT OF PERFORMANCE OF HEALTH CENTER AND HEALTH POST STAFF (D1 - D6)**

Miss Rebecca Rohrer, an MPH student, has been working on these data during the month of June 1993. Dr. Schieber requested her to compare the data contained in D1-D6 to the S1-S7 questionnaires which were administered during the pre-MotherCare assessment data collection.

Preliminary analysis showed that there was a marked improvement in performance between pre-and post intervention periods. However, there are differences in the methodology of collection of data pre and post intervention. The S1-S7 questionnaires were applied once by staff who no longer works with the project. Supervisory visits in the present project were done on four occasions. The first was done By Dr. Carlos Gonzales and the subsequent three were done by him together with Dr. Jorge. The initial analysis combined the four visits in the results and after further analysis it transpired that there was a 100% improvement in almost all variables relative to performance, recording and teaching by nurses to clients. Clarification by the two physicians shed some light on these results:

1. During the first visit, there were hardly any records available in the health posts and health centers. This was still the case during the second visit, after which the health posts and health centers were supplied with records by the Ministry of Health.
2. The two physicians found a remarkably positive change in the attitude of the health personnel towards the clients. During every visit, there was discussion of the cases that they had observed and saw recorded or heard teaching delivered. This re-enforcement obviously increased standard of performance.
3. The third visit was after the training of trainers for TBAs, but there were only 12 out of 35 nurses who had participated in the training and this could not be the sole influencing factor for the steep increase in performance during the third visit.
4. Interestingly, performance during the fourth visit showed more or less the same results as those for the second visit. The explanation was that the patient load had increased considerably and staff had less time for teaching and recording. On questioning why the patient load had increased (at first presuming that this was because of improved services), the physicians explained that there is a regular in- and out movement by families from the highlands to the coast because of agricultural practices.

5. It is probably advisable to analyze the four visits separately and interpret results with great caution and the input from the physicians who actually did the visits rather than comparing the four combined results with the pre-intervention period.

6. We also learned that supervisory visits were not easily accepted, particularly by health center physicians and nurses. There are obviously more health post with auxiliary nurses in the area and these two facilities should be separated in the analysis. Dr. Carlos showed us the increasing acceptance of supervision by health center staff as the rounds progressed and this is to the credit of the doctors who did such good work and were increasingly more trusted.

Preliminary data analysis as done by Rebecca Rohrer are contained in Appendix 9. The writer, Barbara Kwast, has spent considerable time to unravel some of the technical issues with all concerned following some preliminary work done by Barbara Kwast in Washington in March 1993. It is certainly of interest to relate the findings to the 11 conditions the staff in the centers is to give attention to for the detection of complications, all of which are in posters in the health facilities. Barbara Kwast will keep in contact with Miss Rohrer on the write-up of her paper for the MPH.

Dr. Schieber is keen to get these data into publishable form to disseminate information around the whole issue of supervision which was attempted in a very conscientious fashion in this project. Lessons have been learned and it is worthwhile to know about these.

#### **E. MEETINGS AND SEMINAR AT INCAP**

Several meetings were arranged with INCAP Staff, mainly to discuss strategies and content for the continuation of the Quetzaltenango Maternal and Neonatal Health Project after MotherCare I. A meeting was held with Dr. Marie Ruell.

Dr. Olga Torres, Microbiologist in the Infectious Diseases Section of INCAP told me that Dr. Jose Cruz who is in charge of that programme wishes Dr. Torres to develop a project focusing on maternal and/or neonatal infections. STDs and UTIs (bacterial infections) are the focus of interest. The same sample to detect UTI could also test for keto-acids as a measure for undernutrition. During the discussion of possible sights for such an intervention, an NGO (SHARE) which works in urban disadvantaged districts and rural areas with an infrastructure and food distribution programs, was mentioned as an option. It could be a subject for consideration under a MotherCare II project in the future.

The writer was invited to give a lunchtime seminar on June 21 in INCAP. The theme was: Safe Motherhood - the first decade, with particular emphasis on MotherCare projects in other countries.

#### **IV. RECOMMENDATIONS AND FOLLOW-UP**

##### **1. Printing costs for final products of the project**

The line item for photocopying is exhausted and it is Dr. Schieber's sincere wish to get some of the most important documents printed for distribution, e.g. the INCAP advocacy document on the Quetzaltenango Maternal and Neonatal Health Project; the diagnostic studies manual by Elena Hurtado; the TBA manual with 7 modules; the obstetric and neonatal norms for hospital and health center/posts.

The writer will discuss this matter with MotherCare Staff, Washington.

##### **2. Early neonatal deaths review (audit)**

Barbara Kwast will return the original questionnaires by DHL to Dr. Schieber in the first week of July together with available articles on perinatal audit for Drs. Mario Mejia and Schieber.

Preliminary results, particularly those regarding avoidable factors, will be sent by DHL to Dr. Schieber for inclusion of her final report.

##### **3. Preliminary data analysis R3 (TBA referral) and D1-D6**

Mrs. Rourke and Miss Rohrer who are working on these data sets will have preliminary results ready for Dr. Schieber's final report. MotherCare Staff, Washington and in particular the writer will work on further analysis in Washington for MotherCare final report at the end of August 1993.

##### **4. Module II - Adult Education for the TBA Manual**

Dr. Schieber asked the writer to review this section as this was the only module which may need some final touches. Barbara Kwast has done this and faxed suggestions and editorial comments to Dr. Schieber on 2 July, 1993.

**APPENDIX 1**  
**LIST OF CONTACTS**

## **LIST OF CONTACTS**

### **USAID/Guatemala**

Ms. Jayne Lyons, Population Advisor  
Ms. Pat Connor, Maternal and Child Health Advisor

### **INCAP**

Dr. Marie Ruell, Director Health and Nutrition Division  
Dr. Barbara Schieber, Quetzaltenango Principal Investigator  
Dr. Jose Antonio Sazdi, Programmer  
Dr. Carlos Gonzales, Medical Officer

### **Health Area, Quetzaltenango**

Dr. Luis Roberto Santamarina, Medical Officer  
Dr. Enrique Ottoniel Aguilar T., Medical Officer  
Dr. Carlos Alberto Cobos B, Medical Officer  
Dr. Gustavo Adolfo Barrios Izaguirre, Medical Officer  
Dr. Jose Martin Amezcuita de Paz, Medical Officer  
Dra. Yris Briseida Ovalle de Piedrasanta, Medical Officer

Lic. Clara Luz Barrios, Chief of Nursing and TBA Training  
Lic. Julita  
Lic. Maria  
Mr. Abimael

### **Xela Hospital**

Dr. Mario Mejia, Chief Neonatology  
Dr. Jorge Umana, Obstetrician/Gynecologist  
Dr. Francisco Alvarado Lima, Obstetrician/Gynecologist

### **Other**

Dr. Sara Koritz, Obstetrician/Gynecologist  
Mrs. Kathleen Rourke (PhD student)  
Miss Rebecca Rohrer (MPH) student

**APPENDIX 2**  
**TIMETABLE HEALTH POST/CENTER STUDIES**

## GUATEMALA

### Health Center/Health Post Monitoring System Timetable

<u>ROUND</u>	<u>PERIOD OF DATA COLLECTION</u>	<u>DATA ENTRY DATA ANALYSIS</u>	<u>REPORT</u>
1st	1 Nov 91 - 28 Feb 92	completed by 30 Nov 92	submitted by 30 Dec 92
2nd	30 Mar 92 - 30 Sept 92	Completed by 30 Dec 92	submitted by 1 Feb 93
3rd	30 Oct 92 - 28 Feb 93	competed by 31 Mar 93	submitted by 30 Apr 93
4th	1 Mar 93 - 1 Jul 93	completed 1 Aug 93	include in final report

\* After the third round the data from this monitoring system can be used to assist in the write-up of a supervisory manual that can be used by the supervisors of the health post/health center. It should be more simplistic and less time consuming than the process currently being used for this project.

**APPENDIX 3**  
**TIMETABLE VITAL EVENTS REPORTING SYSTEM**

## GUATEMALA

### Vital Events Reporting System Timetable

<u>ROUND</u>	<u>PERIOD OF DATA COLLECTION</u>	<u>FIELD WORK</u>	<u>DATA ENTRY DATA ANALYSIS</u>	<u>REPORT</u>
1st	1 Jul 90 - 30 Jun 91	finishes Apr-May 92	completed by 15 Aug 92	submitted by 15 Oct 92
2nd	1 Jan 92 - 30 Jun 92 Implementation 1 mo.	1 Jul - 30 Nov 92	completed by 15 Jan 93	submitted by 30 Jan 93
3rd	1 Jul 92 - 31 Dec 92 Implementation 6 mos.	1 Jan 93 - 31 May 93	completed by 30 Jun 93	submitted by 15 Jul 93
4th	1 Jan 93 - 31 Apr 93 Implementation 5 mos.	1 Jun 93 - Aug 93	completed 30 Sept 93	

**APPENDIX 4**  
**TIMETABLE ALL STUDIES**

## GUATEMALA STUDIES

No.	Questionnaire	Subject	Period of Study	Data Entry	Analysis Write-Up	Person
<i>Pre-MotherCare: Diagnostic Studies</i>						
1-7	S1-S7	<u>Health Services (KAP)</u> Health centers and health posts	1988-1989	Completed	Report in Spanish <i>Needs Publication</i>	INCAP
1.	S1	Health Personnel Knowledge of Risk Conditions	"		"	
2.	S2	Health Personnels' Attitude to TBAs	"		"	
3.	S3	Observation of ANC in Health Posts	"		"	
4.	S4	Observation of ANC in Health Centers (No B/P observed)	"		"	
5.	S5	Normal & high-risk neonatal records	"		"	
6.	S6	Evaluation of normal & high risk pregnancy clinical records	"		"	
7.	S7	Evaluation of postnatal checks	"		"	
8-10	C2-C4	<u>Community</u>	1988-1989	Completed	Report in Spanish <i>Needs publication</i>	INCAP and Carmen
8	C2	Mother's KAP on risk factors	"			
9	C3	Father's KAP on risk factors (Father & Mother)				
10	C4	TBA survey				

19

No.	Questionnaire	Subject	Period of Study	Data Entry	Analysis Write-Up	Person
<i>MotherCare-Supported Studies</i>						
1-3	M1-M3	<u>Maternal Mortality Case Control Study at Community</u>	Aug. 90 - Apr. 91	Completed	Report - Needs publication	Barbara S. Barbara K. will write the article
1.	M1	Maternal Mortality Case Detection				
2.	M2	MM Control Detection				
3.	M3	MM Case Control Interviews				
4-6	R1-R3	<u>Peri/Neonatal mortality case control study</u>				
4.	R1	<u>Community:</u> Peri/neonatal mortality case control study (contains maternal attitude towards neonatal death)	Jan. 90 - Aug. 90	Completed	Needs Publication	Carmen Barbara S. Al Bartlet
5.	R2	<u>Hospital:</u> Case control peri/neonatal mortality study (maternal attitude toward death)	Sept. 90 - Sept. 92	Sept.90-91 completed Sept 91-92 completed by 93	analysis and report completed by Dec 92	Kathleen Rourke
6.	R3	Referral of obstetric cases to hospital from TBA (mother is interviewed)	Sept. 90 - ongoing to May. '93	Oct.90-May 92 completed by Nov 92 *All data entered by Jun.93	analysis baseline completed by Dec 92 *analysis all data by end Jun.93	preliminary report Jose Antonio
<i>Vital Events Reporting System (VERS) = Surveillance in 80 clusters.</i>						
7.	SV1	<u>Community:</u> Data from the 1st surveillance before it was modified	Jul. 90 - Jun. 91	Completed	Not started	INCAP Health Area ProjectHope

17

No.	Questionnaire	Subject	Period of Study	Data Entry	Analysis Write-Up	Person
	SV1	Pre-Implementation District Health Team Training	Jul. 90 - Jun. 91		Not started	INCAP
	SV1	Pre-Implementation TBA Training	May 91 - Apr. 92		Not started	INCAP
	SV1	Post-Implementation TBA Training	May 92 - Apr 93			INCAP
8.	Not numbered	Evaluation of H. staff knowledge through test (40 questionnaires)	Nov.91 - Jul 93			Carlos Gonzalez
9-15	D1-D7	Review of statistics and records observations of ANC, PNC Observation of neonate	Nov 91 - Jul. 93			Carlos Gozalez
9.	D1	Statistics of ANC, PNC, monthly neonatal complications	Nov 91 - Jul 93			Carlos Gonzalez
10-12	D2, D4, D6	Observation: ANC and PNC and Neonate (5 from each of 19 H.P. and 7-10 from each of 4 H.C.)	Nov. 91 - Jul. 93			Carlos Gonzalez
13-15	D3, D5, D7	Clinical history review: ANC, PNC Neonate (5 from each of 19 H.P. and 7-10 from each 4 H.C. depending on attendance)	"			Carlos Gonzalez
6	?	Referral forms by TBAs probably not feasible.				INCAP
<p>Dr. Schieber requests MotherCare to formulate indicators for: D2, D4, D6: Observation questionnaire. D3, D5, D7: History questionnaire.</p>						

**APPENDIX 5**  
**QUESTIONNAIRE FOR EARLY NEONATAL DEATHS AUDIT**

**Medical Audit Early Neonatal Mortality and Morbidity**  
**Guatemala, 1990-1992**

**HOSPITAL RECORD NO.** \_\_\_\_\_

1. Neonatal death: \_\_\_yes \_\_\_no
2. Condition: \_\_\_\_\_
3. ICD Code: \_\_\_\_\_

**MOTHER'S PARTICULARS**

4. Surname \_\_\_\_\_
5. Other Name \_\_\_\_\_
6. Ethnic Group \_\_\_\_\_
7. Address \_\_\_\_\_
8. Age \_\_\_\_\_
9. Maternal height \_\_\_\_\_

**OBSTETRIC HISTORY**

10. EDD (expected date of delivery) \_\_\_\_\_
11. Gestation in weeks \_\_\_\_\_
12. No. of pregnancies (present included) \_\_\_\_\_
13. No. of previous live births \_\_\_\_\_
14. No. of previous still-births \_\_\_\_\_
15. No. of previous neonatal deaths (0-28 days) \_\_\_\_\_
16. No. of Infant death (28 days - 1 year) \_\_\_\_\_
17. No. of surviving children \_\_\_\_\_
18. No. of Caesarean deliveries \_\_\_\_\_
19. Other important social, medical and obstetric history (e.g. previous APH & eclampsia; cardiac/renal disease, Rh-ve; diabetes) \_\_\_\_\_

**PRESENT PREGNANCY**

20. Underlying risk factor: \_\_\_\_\_

21. Detected: yes no

22. Management:

Place: \_\_\_\_\_

Diagnosis: \_\_\_\_\_

Treatment: \_\_\_\_\_

**MANAGEMENT**

Compare to Protocol	CORRECT	INCORRECT

**AVOIDABLE FACTOR:**

Referral:

e.g. - Not referred from TBA yes no doubtful N/A

Not referred from Healthpost yes no doubtful N/A

Not referred from Healthcentre yes no doubtful N/A

Medical Service:

Medical Staff factors yes no doubtful

Nursing Staff factors yes no doubtful

Inadequate equipment yes no doubtful

Shortage of drugs yes no doubtful

Other: specify yes no doubtful

2

Patient / Home Circumstances - yes - no - doubtful



Fill your choice of key points

Compare to Protocol	CORRECT	INCORRECT

**AVOIDABLE FACTOR:**

Referral:

e.g. - Not referred from TBA                    \_\_yes \_\_no \_\_doubtful \_\_N/A

          Not referred from Healthpost        \_\_yes \_\_no \_\_doubtful \_\_N/A

          Not referred from Healthcentre    \_\_yes \_\_no \_\_doubtful \_\_N/A

Medical Service:

Medical Staff factors                            \_\_yes \_\_no \_\_doubtful

Nursing Staff factors                            \_\_yes \_\_no \_\_doubtful

Inadequate equipment                         \_\_yes \_\_no \_\_doubtful

Shortage of drugs                                \_\_yes \_\_no \_\_doubtful

Other: specify                                    \_\_yes \_\_no \_\_doubtful

**INFANT**

35. Date of birth \_\_\_\_\_

36. Place of birth \_\_\_\_\_

37. Date of death \_\_\_\_\_

38. No. of hours/days after birth \_\_\_\_\_

39. Sex \_\_\_\_\_

40. Gestation in weeks (Pediatric assessment) \_\_\_\_\_





**Medical Service:**

<b>Medical Staff factors</b>	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> doubtful
<b>Nursing Staff factors</b>	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> doubtful
<b>Inadequate equipment</b>	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> doubtful
<b>Shortage of drugs</b>	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> doubtful
<b>Other: specify</b>	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> doubtful

47. Autopsy: yes no N/A (baby alive)

48. Autopsy findings \_\_\_\_\_  
\_\_\_\_\_

49. Clinico-pathological diagnosis \_\_\_\_\_  
\_\_\_\_\_

50. ICD code of death or disease \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

51. Sequence of events leading to death \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

52. Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**AVOIDABLE FACTOR:**

Referral:

e.g. - Not referred from TBA yes no doubtful N/A  
Not referred from Healthpost yes no doubtful N/A  
Not referred from Healthcentre yes no doubtful N/A



Table 1

**Medical Audit Early Neonatal Mortality and Morbidity  
Guatemala, 1990-1992  
All Causes of Death**

Variable	BEFORE IMP.		AFTER IMP.	
	Cases	Control	Cases	Control
Correct protocol management throughout				
Incorrect/doubtful management				
Antenatal				
Labor				
At birth				
Day 1-7				

Can be done for specific causes:

- neonatal asphyxia (antepartum or intrapartum anoxia)
- neonatal sepsis
- pulmonary immaturity
- hyaline membrane disease
- intracranial hemorrhage
- iso-immunization
- congenital anomaly

**APPENDIX 6**

**PRELIMINARY DATA FROM EARLY NEONATAL DEATHS AUDIT**

**TABLE 1****CAUSE OF DEATH IN EARLY NEONATAL DEATHS BY WEIGHT  $\geq 37$  GESTATION  
(1989, 1991, 1992)**

CAUSE OF DEATH	1989		1991		1992	
	1501-2499	$\geq 2500$	1501-2499	$\geq 2500$	1501-2499	$\geq 2500$
Asphyxia	1	6	2	5	0	9
Sepsis	0	4	0	1	0	2
Intracranial Hemorrhage	0	0	0	1	0	0
Hyaline Membrane Disease	1	0	0	0	0	0
Broncho Aspiration	0	0	0	1	0	0
Pulmonary Hemorrhage	0	0	0	1	0	0
Congenital Abnormalities	0	1	1	0	0	0
ALL CASES	2	11	3	9	0*	11*

\* Total excludes one twin pregnancy

**TABLE 2****CAUSE OF DEATH IN EARLY NEONATAL DEATHS BY WEIGHT  $\geq 28$  -  $< 37$  WEEKS GESTATION IN 1989, 1991, 1992**

CAUSE OF DEATH	1989			1991			1992		
	< 1500	1501-2499	> 2500	< 1500	1501-2499	> 2500	< 1500	1501-2499	> 2500
Asphyxia	0	1	0	1	5	0	0	5	0
Sepsis	0	2	1	0	2	1	0	4	0
Hyaline Membrane Disease	0	12	0	2	5	1	0	7	0
Meconium Aspiration	0	0	1	0	0	0	0	0	0
ALL CASES	0	15	2	3	12	2*	0	16*	0

\* Total excludes one twin

**TABLE 3**

**SELECTED CONDITIONS AND THEIR MANAGEMENT IN HOSPITAL IN 1989, 1991 AND 1992**

CONDITIONS	1989		1991		1992	
	Management		Management		Management	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
<b>PRENATAL</b>						
-- Adolescent pregnancy					(1)	
-- Assessment of gestational age						1
-- Threatened preterm labor	1	1				
-- Preterm labor		1	2		2	
-- Premature rupture of membranes	3		3		1	1
-- Reduced fetal movements						1
-- Fever		1				
-- Severe pre-eclampsia	2	1			1	
-- Placenta previa		1	1			
-- Breech	1					
-- Previous cesarean section	4				2	
-- Previous stillbirth		1				
-- Previous preterm labor					1	
-- Excessive weight gain		1				
-- Polyhydramnios		1				
-- Pulmonary TB	1					
-- Anemia	1					
-- UTI			1			
-- Antepartum hemorrhage			1			
-- Transverse lie			1			

CONDITIONS	1989		1991		1992	
	Management		Management		Management	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
<b>LABOR</b>						
-- Severe pre-eclampsia	3				1	
-- Induction						1
-- Eclampsia					1	
-- Previous cesarean section	1		1		2	
-- Prolonged labor	5	2	5	2	4	1 (1)
-- Placenta previa	1		1			
-- Prolapse of cord	1				2	
-- Prolonged second stage					1	
-- Intrapartum hemorrhage	3					
-- Fetal distress				2	1	
-- Premature rupture of membranes			3	1	2	
-- Chorioamnionitis			1			
-- Cord presentation			1			
-- Meconium			1 (2)		(1)	
-- Cephalo-pelvic disproportion					1	
-- Preterm labor	8	2	6	4	8 (1)	1
-- Breech	2		2	2		1
-- Forceps delivery						1
-- Transverse lie	2		3		2	
-- Fever with premature rupture of membranes		1				1

CONDITIONS	1989		1991		1992	
	Management		Management		Management	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
<b>NEONATE</b>						
<b><u>At Birth</u></b>						
-- Resuscitation	29	1	27	2	19	6
-- Temperature control	4		12	1		
<b><u>Subsequent Management</u></b>						
-- Ventilation	9	19	26	1	6	17
-- Temperature control	22	4	20	3	6 (1)	4
-- Drug administration	7	22	18	6	8	6
-- Control of infection	12	16	21	5	6	8

Numbers in parentheses are condition management factors designated as "doubtful."

TABLE 4

## EARLY NEONATAL DEATHS WITH AVOIDABLE FACTORS -- 1989

EVIDENCE	Patient /Home	Referral		Med Staff			Nursing Staff	Equip/ Facilit	Drugs
		TBA	HC/HP	Priv	Obstet	Ped			
<b>Prenatal</b>									
No prenatal care	10 (2)								
Threatened preterm labor									1
Preterm labor					1				1
Fever before labor					1				
Pre-eclampsia					1				
Fetal monitoring					1				
Placenta previa					1				
<b>Labor</b>									
Elective c/s for preterm baby					1				
Pre-eclampsia					1				
Transverse lie		1							
Preterm labor	3				2				
Dysfunctional labor	(1)	2			3			1	
Non-reactive fetal heart					1				
Intrapartum hemorrhage	1 (1)								
Impacted breech	(1)				1				
<b>Neonate</b>									
Ventilation						18(1)	(1)		
Temperature control						3 (2)	(3)	1	
Drug administration						20(1)	(1)		1
Control of infection						10(4)	(5)		

Numbers in parentheses are avoidable factors designated as "doubtful."

Out of 30 cases had one or more avoidable factors.

EARLY NEONATAL DEATHS WITH AVOIDABLE FACTORS -- 1991

EVIDENCE	Patient /Home	Referral		Med Staff			Nursing Staff	Equip/ Facilit	Drugs
		TBA	HC/HP	Priv	Obstet	Ped			
<b>Pre-natal</b>									
No prenatal care	20								
Prem rupture of membranes	(1)			(1)	1				
Previous cesarean section			(2)	(1)					
Previous stillbirth / NND		(1)							
Previous preterm labor				(1)					
UTI	1								
<b>Labor</b>									
Fetal distress					1				
Transverse lie	1								
Preterm labor	2				3				1
Dysfunctional labor	(1)	3			2			1	
Prem rupt of membranes		1							
Breech		1			2				
Prolonged labor	1 (1)								
Meconium					(1)				
<b> neonate</b>									
Resuscitation at birth						1			
Warmth at birth								1	
Ventilation						1			
Temperature control						1	(1)	1	
Drug administration						2	(1)		
Pneumothorax						(1)			
Control of infection						2	(2)		1

Numbers in parentheses are avoidable factors designated as "doubtful."

29 cases had one or more avoidable factors.

**TABLE 5**

**AVOIDABLE FACTORS IN PRENATAL, LABOR AND EARLY NEONATAL PERIOD  
1989, 1992, 1992 (N=86)**

PRENATAL YEAR / AVOIDABLE FACTOR	Patient /Home	Referral		Med Staff			Nursing Staff	Equip	Drugs
		TBA	Other	Priv	Obst	Ped			
1989 (n = 30)									
YES	10				5				2
DOUBTFUL	2								
1991 (n = 29)									
YES	21				1				
DOUBTFUL	1	1	2	3					
1992 (n = 27)									
YES	11	1			3		2		
DOUBTFUL	1		1						

## EARLY NEONATAL DEATHS WITH AVOIDABLE FACTORS -- 1992

EVIDENCE	Patient /Home	Referral		Med Staff			Nursing Staff	Equip/ Facilit	Drugs
		TBA	HC/HP	Priv	Obstet	Ped			
<b>enatal</b>									
No prenatal care	10 (1)								
Assessment of gest age					1				
Preterm labor	1								
Prem rupture of membranes					1		1		
Previous cesarean section			(1)						
Reduced fetal movements					1		1		
Adolescent pregnancy		1							
<b>abor</b>									
Eclampsia		(1)							
Fetal distress					(2)				
Transverse lie		1 (1)							
Preterm labor	1				2		1		
Fever with prem rupt memb					1				
Premature rupture of memb		1 (1)							
Breech		1			1				
Prolonged labor	1	3 (1)			1(1)				
Forceps delivery					1				
<b>eonate</b>									
Ventilation				1		4 (3)	3 (1)	11	11
Temperature control						2	2	1	
Drug administration				1		1 (2)	1 (1)		
Control of infection						5 (1)	5 (3)	1	1

Numbers in parentheses are avoidable factors designated as "doubtful."

27 cases had one or more avoidable factors.

**TABLE 5**

**AVOIDABLE FACTORS IN PRENATAL, LABOR AND EARLY NEONATAL PERIOD  
1989, 1992, 1992 (N=86)**

PRENATAL YEAR / AVOIDABLE FACTOR	Patient /Home	Referral		Med Staff			Nursing Staff	Equip	Drugs
		TBA	Other	Priv	Obst	Ped			
1989 (n = 30)									
YES	10				5				2
DOUBTFUL	2								
1991 (n = 29)									
YES	21				1				
DOUBTFUL	1	1	2	3					
1992 (n = 27)									
YES	11	1			3		2		
DOUBTFUL	1		1						

LABOR YEAR / AVOIDABLE FACTOR	Patient /Home	Referral		Med Staff			Nursing Staff	Equip	Drugs
		TBA	Other	Priv	Obst	Ped			
1989 (n = 30)									
YES	4	3			9			1	
DOUBTFUL	3								
1991 (n = 29)									
YES	4	5			8			1	1
DOUBTFUL	2				1				
1992 (n = 27)									
YES	2	6			6		1		
DOUBTFUL		4			2				

NEONATE YEAR / AVOIDABLE FACTOR	Patient /Home	Referral		Med Staff			Nursing Staff	Equip	Drugs
		TBA	Other	Priv	Obst	Ped			
1989 (n = 30)									
YES						51		1	1
DOUBTFUL						8	10		
1991 (n = 29)									
YES						7		2	1
DOUBTFUL						1	4		
1992 (n = 27)									
YES				2		12	11	13	12
DOUBTFUL						6	5		

**APPENDIX 7**

**LIST OF WOMEN INCLUDED IN THE NEONATAL DEATHS AUDIT FOR  
LINKAGE WITH VERS AND R2**

## REQUEST FOR LINKING WITH VERS AND R2

1991

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address</u> (all in Quetzaltenango)	<u>Infant Birth Date</u>
1	218187	Ramirez Romero, Emilia Santa Maria de Jesus	11/8/91
2	2140-19	Lopez-Diaz, Maria Magdalena Aldea Buenavista, San Juan Ost	8/4/91
3	1714-36	Cortes Chuc, Maria Federica Canto Pasac Primero, Cantel	29/1/91
4	664-26	Escobar Garcia, Aura Elena Canton Rosario, San Juan Ost	23/2/91
5	1234-16	Mendoza Camacho, Carmen Canton Chuicavioc	25/6/91
6	159974	Deleon Puac, Lucila Amalia Calle Cirilo Flores, 015 Zona 5	23/6/91
7	16-39-14	Aguilar Ramos, Leonarda Canton Marroquin Salcaja	15/5/91
8	1120-95	Ramirez Lopez, Alba Janeth 2a Calle 26-95 Zona 7	27/7/91
9	17-23-44	Cabrera Lopez, Marciana Aldea Duraznales Conception Chiquirichapa	19/7/91
10	21-39-91	De Leon, Maria del Rosario 8a Calle 0--10 Zona 4	26/3/91
11	219891	Hernandez Tizol, Hermina San Andrez Xecul Totonicapan	12/10/91
12	22-09-53	Garcia Luis, Irma Canton Agua Tibia, San Juan Ost	14/11/91
13	1339-79	Castillo Rosal, Gladis Nohemi Campo los Pinares Zona 1 San Juan Ost	16/5/91

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address</u> (all in Quetzaltenango)	<u>Infant Birth Date</u>
14	20-62-12	Roblero Sanchez, Vilma Judith Callejon D 0-57 Zona 5	12/9/91
15	13-42-93	Garcia Juarez, Eva Yolana 4a avenida 12-23 Zona 1	12/4/91
16	17-69-58	Perez Sacalxot, Resario Canton Xecaracoj	12/5/91
17	21-47-18	Chan Vasquez, Maria Canton Chajalal San Andrez Xeol Totonicapan	21/4/91
18	2211-36	Ordonez Say, Maria Fermina Aldea Santa Rita Salcaja	23/11/91
19	21-77-92	Lopez, Elias Christina Aldea Justo Rufino Barrios Olintepeque	29/7/91
20	21-41-47	Lopez Aguilen, Santa Barrio San Antonio Zona 3 San Juan Ost	30/3/91
21	1829-89	Barrios Alvarado, Luisa La Esperanza	10/10/91
22	2193-64	Castro Lopez, Adela Atras Rastro Minicipal	8/10/91
23	222066	Chanchavac Vicente, Everilda Aldea San Vicente Buena Baj Momostenango (village 30 km away)	23/12/91
24	18-80-90	Ramos Chiche, Aura Marina 11 Calle No. 9-53 Zona 1	28/5/91
25	20-42-14	Gramajo de Leon, Orfa Canton Recuero a Barrios San Carlos Sija	20/1/91
26	207719	Ruiz Ajqui, Hipolita 25 Av D-3-61 Zona 3	19/1/91

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address</u> (all in Quetzaltenango)	<u>Infant Birth Date</u>
27	145-60	Hernandez Nolasco, Rosa Canton Pasac Seudo Cantel	27/10/91
28	221351	Maldonado Mazariegos, Calixta Elizabeth Aldea Chicabal Sibia	29/11/91
29	271846	Morales Barreno, Maria Elena 37 Av 1-81 Zona 8	25/11/91
30	31178	Estrada Monterrosa, Magdely Adelina 1a Av 1-22 Zona 7 Colonia Jardines de Xelaju	11/6/91

## REQUEST FOR LINKING WITH VERS AND R2

1992

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address</u> (all in Quetzaltenango)	<u>Infant Birth Date</u>
1	159010	DeLeon Argueta, Olga Lidia 21 Av "A" 2-60 Zono 1	7/2/92
2	228563	Itzep, Maria Canton Urbina Cantel	3/8/92
3	169696	Solis Barrios, Ademia Luz Canton Las Taplas 2a Calle No 4-35 Zona 8	15/7/92
4	222841	Agustin Oroxom, Vicenta 7a Calle --- Zona 1 Canton Centro La Esperanza	23/1/92
5	226867	Cite Lopez, Lucia San Anres Xecul Totonicapan	2/6/92
6	230859	Yacabalquiej Garcia, Maria Ventura Canton Pacatom	11/10/92
7	37052	Monterroso Ralda, Eva Elvira Aldea La Esperanza San Juan Ost	27/9/92
8	233226	Tajiboy Cuc, Anastacia San Ranon Salcja	27/12/92
9	231627	Poroj Orozco, Lidia 28 Av Sin # 1a Casa Zona 3	7/11/92
10	225913	Castro, Zoila Nohemi 8 Calle Zona 1	2/5/92
11	226851	Chan Cop, Juana Guadalupe Canton Centro Olinstepeque	1/6/92
12	599-09	Tepe Menchu, Maria Gloria Colonia el Paraiso Canton Paraja	25/9/92
13	1797-55	Sop Xivir, Ventura Zunil	3/6/92

115

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address</u> (all in Quetzaltenango)	<u>Infant Birth Date</u>
14	227848	Barreno Yac, Juventina Cementerio Antiguo Cantel	30/6/92
15	2098-98	Morales Yac, Elia Aldea la Estancia Cantel	30/1/92
16	1598-76	De Leon, Ingrid Yaneth 19 Av 1-61 Zona 1	5/11/92
17	231311	Camacho Hernandez, Juliana Canton Xecam Cantel	30/10/92
18	2149-89	Ralda Gomez, Tomasa Barrio El Calvario San Juan Ost	11/10/92
19	1685-97	Hernandez Gonzales, Filomena Izabel (none given)	28/11/92
20	155-60	Hernandez Cabrera, Margarita Aldea Durasnales Concepcion Chiquirichapa	8/9/92
21	135947	Perez Sacalxot, Marcelina (none given)	12/10/92
22	230047	Diaz Marroquin, Petronila Angela Caserio Los Lopez Palestina a los Altos	17/9/92
23	227439	Diaz Garcia, Elbia Consuelo Aldea el Rodeo San Carlos Sija	18/6/92
24	1600-20	Vasquez Sajche, Francisca Canton San Felipe Xejuyup San Andres Xecul Totonic	24/4/92
25	228336	Cabrera Perez, Gumercinda Barrio San Antonio 23 San Juan Ost	23/7/92
26	141704	Yax Soch, Maria Esperanza Pacaja Zona 10	3/9/92
27	2244-03	Mateo Antonia, Lidia 3 Av 3-11 Zona 1	15/4/92

<u>Audit Number</u>	<u>Hospital Record Number</u>	<u>Name and Address (all in Quetzaltenango)</u>	<u>Infant Birth Date</u>
28	226974	Yax Serech, Yolanda Aldea Santa Rita Salcaja	7/6/92
29	1426-15	Bamaca Bamaca, Evarista Vicenta Rejutla San Marcos	27/4/92
30	102476	Tiguila Chavez, Francisca 3a Calle 3-69 Zona 3 Olintepeque	30/5/92

**APPENDIX 8**

**RESEARCH ANALYSIS R3 BY KATHLEEN ROURKE**

*A: Dra. Schuler*

72

## V. Proposed Analysis

*D: Catherine O'Rourke*

### A. Purpose of the Study

Most births in Guatemala occur within the woman's home because of limited health care resource availability. Only 20% of all births can be accommodated within hospitals, and this situation is not expected to change in the near future. Home births are generally managed by TBAs, who account for over 80% of all deliveries in Quetzaltenango. In situations without obstetrical complications, TBAs effectively perform home deliveries; however, when complications occur, they may not have the necessary skills to manage the delivery. In the latter situation, the transfer of a laboring woman to a clinic or local hospital may be the safest alternative.

WHO and other international health organization have advocated TBA training programs as a means of decreasing perinatal mortality rates. Central to these programs is educating TBAs to recognize high-risk situations and transfer these mothers to area hospitals. Few training programs have been evaluated, and their effectiveness is unknown (Leedam, 1985). One problem with evaluating such programs is that many factors impact on perinatal mortality. As a result, a systematic and methodological evaluation of TBA training programs is needed to improve existing programs.

The purpose of this study is to evaluate a comprehensive TBA training program initiated in Quetzaltenango. Information obtained from this analysis will determine if TBA training programs can be effective in changing TBA practices and, consequently, improving rates of peri-neonatal mortality.

## **B. Overall Goal**

The goal is to evaluate the Quetzaltenango TBA Training Project through analysis of data collected on patient referrals. First, comparisons will be made between two groups, intervention and non-intervention. Changes from pre-intervention to post-intervention will be analyzed to determine if significant differences occur in TBAs from intervention communities when compared with TBAs from non-intervention communities. Second, the data will be analyzed at three time intervals (pre-intervention, during intervention, and post-intervention) to determine if any changes occurring during the program period are sustained over time.

## **C. Specific Objectives**

The objective is to determine if the training project resulted in changes in referral patterns of the intervention group. This will be accomplished by evaluating 5 study questions. Evaluation will be based upon two process measures and one outcome measure. Process measures determine the impact of the training program on TBA practices. The outcome measure determines the impact of the training program on perinatal mortality among referred women.

## **D. Program Effects**

*Process Measures.* The first process measure will be a comparison of the reason for referrals by TBAs in the intervention districts as compared with those by TBAs in the non-intervention districts. The purpose of this measure is to determine if specific areas addressed in the training course affected the conditions for which TBAs made

referrals. Whenever possible, the identification of the condition will be based upon diagnosis by the hospital staff rather than by the TBA to determine true conditions and control for potential misclassification.

The second process measure examined will be the timing of the decision to refer patients to the hospital. TBAs were taught in the training program to refer patients when risk situations are identified rather than after complications occurred. Timing will be defined as the time between the onset of labor or the appearance of a risk situation, and the time a decision to transfer is made.

In addition, timing will also be evaluated from the onset of labor or the appearance of a complication to the time of arrival at the hospital, controlling for the distance of the community from the hospital. Although this measure is affected by other variables, arrival time is a more objective measure and can serve as a validation of the time of a decision. Each of the referrals will be evaluated according to the most appropriate time interval. For example, in women with multiple pregnancy or fetal malpresentation, transfer should occur either prior to labor or as soon as labor occurs. In contrast, transfers for women with prolonged labor would not occur until sufficient time has passed and a diagnosis could have been made.

*Outcome Measure.* The outcome variable examined will be a comparison of peri-neonatal mortality between women referred by TBAs in the intervention and those referred by TBAs in nonintervention districts. It is recognized that not all of the "at risk" patients referred to the hospital by TBAs would have experienced a peri-neonatal death had they delivered in the community. Thus, decreased peri-neonatal mortality in this group of women does not necessarily indicate a parallel change in mortality on a community level. However, based on prior research, women at risk for peri-neonatal mortality are at greater risk if they deliver in the community with TBAs than if the delivery occurs at the hospital (Leedam, 1985). A decrease in peri-neonatal mortality rates of referred woman

demonstrates both (a) the effectiveness of the program in teaching TBAs to identify and refer high risk women prior to a poor outcome, and (b) improved outcome associated with more timely referral of women.

## E. Study Questions

### Process Measures

The first research question addresses a crude measures of program effect: the reason for referrals. Comparisons are based upon an analysis of three study periods: pre-intervention, during the intervention, and post-intervention. This analysis will also provide information on the immediate impact of the program, and provide a means of determining if any changes due to the program are sustained after the intervention.

*Question #1:* Will the reasons for TBA referrals in the intervention districts differ from reasons for TBA referrals in the non-intervention districts evaluated by comparisons during all three intervention periods (pre-intervention, during the intervention, and post-intervention)? Comparisons will be based upon whether the reason for referral was presented in the training program.

Questions #2 and #3 examine the effect of the program upon the timing of referrals, i.e. the time between the onset of a complication and both the time the TBA decides to transfer a woman to the hospital and the time of arrival at the hospital. If the training program is successful, the timing of referrals should be decrease for those TBAs who attended the training program when compared with TBAs in the other districts.

Timing is examined separately for women with preterm labor, prolonged labor, and malpresentation, as well as for all women in the study. In questions #2,

comparisons are made between the pre-intervention period and the post-intervention period. Data collected during the intervention is excluded for two reasons. First, as the intervention is not presented to all TBAs at the same time, this reflects a mixed period, with some TBAs trained and others not. Secondly, changes occurring during the intervention period may be the result of a Hawthorne effect, i.e. a short-term change in behavior directly related to the presence of the intervention which is generally short-term (Kelsey, Thompson, et al., 1986).

In question #3, the timing of the referrals for all women will be evaluated with the inclusion of the intervention period to determine any trends in the timing of referrals. Thus, it will be possible to determine if there is a greater impact during the study period, and whether any changes continue over time.

*Question #2:* Will there be a decrease from the pre-intervention to the post-intervention periods in the timing of TBA referrals for all women as well as for women with the following conditions:

- Preterm labor
- Prolonged labor
- Malpresentation

Comparisons will be based upon women referred by TBAs in the intervention districts and women referred by TBAs in the non-intervention districts over the two time periods.

*Question #3:* Will there be a decrease in the timing of all TBA referrals in the intervention districts as compared with the timing of all referrals by TBAs in the non-intervention districts as evaluated by comparisons during all three intervention periods (pre-intervention, during the intervention, and post-intervention)?

### Outcome Measure

Questions #4 and #5 examine the effect of the program on peri-neonatal mortality rates of the referred women. If the training program is successful, the peri-neonatal mortality rates should decrease in women who are attended by TBAs in the intervention district as compared with TBAs in the other districts.

Assessment of peri-neonatal mortality rate measures indirect program effect, as measurements are based upon the referred women rather than TBA practices. Peri-neonatal mortality is not only dependent upon TBA practices but also on many other factors, such as underlying conditions, cooperation of the women and her family, and treatment after arrival at the hospital. However, since the overall goal of the project is to decrease peri-neonatal mortality, this is an extremely important measure. Decreased peri-neonatal mortality in women referred by intervention district TBAs when compared with non-intervention district TBAs supports the effectiveness of TBA training programs as a means of improving pregnancy outcomes.

Peri-neonatal mortality rates are compared separately for infants of women with preterm labor, prolonged labor, and malpresentation, as well as for all women in the study. In question #4, comparisons are made between the pre-intervention period and the post-intervention period. Data collected during the intervention is excluded as previously described.

In question #5, the peri-neonatal mortality rate of infants of all women will be evaluated by comparisons during all three intervention periods (pre-intervention, during the intervention, and post-intervention) to determine any trends in the mortality rates.

*Question #4:* Will there be a decrease from the pre-intervention to the post-intervention periods in the peri-neonatal mortality rates of TBA referrals for all women and for women with the following conditions:

- Preterm labor
- Prolonged labor
- Malpresentation

Comparisons will be based upon women referred by TBAs in the intervention districts and women referred by TBAs in the non-intervention districts over the two time periods.

*Question #5:* Will peri-neonatal mortality rates of all women referred by TBAs in the intervention districts decrease over time as compared to peri-neonatal mortality rates of all women referred by TBAs in the non-intervention districts as evaluated by comparisons during all three intervention periods (pre-intervention, during the intervention, and post-intervention)?

## F. Analyses

*Identification of Intervention and Comparison Groups.* Women referred to the Hospital by TBAs and residing in intervention communities will form the intervention group; women referred to the hospital and residing in non-intervention districts will form the comparison group. It would be extremely unlikely for a woman to receive care from a TBA living in another community. Consequently, since women live in the same community as their TBAs, groups formed on the basis of the mothers' residency should be an accurate classification of the TBAs' community. Since there may be multiple deliveries by each TBA, the data will be examined to determine if the unit of analysis should more appropriately be the TBA.

Identification of intervention and comparison groups are not based upon trained versus untrained TBAs but rather on health district. It would be difficult to determine with accuracy the extent to which a particular TBA attended a training program as attendance records were not always available. In addition, there may be strong differences between trained and untrained TBAs that could result in a selection bias. Significant differences may also exist if TBA referral patterns were independent of the results of the training project. For example, trained TBAs are more integrated within the medical community than untrained TBAs. Untrained TBAs may be more likely to care for women from more remote communities who would be more likely to refuse a recommended hospital referral.

Within an intervention district, there is likely to be frequent communication between trained and untrained TBAs. Untrained TBAs living in the intervention community may receive some of the information presented in the training program, and thus change their practices. However, since this evaluation is on community-wide intervention, the inclusion of TBAs who heard about the program from their peers who attended training classes is

also a measure of program effect. In contrast, there is likely to be little communication between TBAs in different districts due to distance.

**Control for Confounding.** Baseline comparisons will be performed using the data collected during the pre-intervention period (Table 1). These results will determine if there are important baseline differences between women referred by TBAs in the intervention districts and those in the non-intervention districts. Variables to be examined include ethnicity, literacy, educational level, marital status, maternal age, parity, and socio-economic status. In this rural community there are no measures of income per se. Rather, socio-economic status (SES) can be estimated by analyzing quality of dwellings based on the type of floor, number of rooms in the house, and the presence or absence of electricity. Comparisons will also be made on other socio-demographic variables but interpretation is problematic as some of these variables may reflect different community practices which have no impact on peri-neonatal mortality and are not an accurate measure of SES. For example, in some communities farmers are likely to grow corn while in others they may grow beans. Thus, the type of crop cultivated is not relevant to this study. Only those variables identified as potentially significant confounders through statistical tests on the baseline data will be controlled for in the analysis.

**Table 1. Identification of intervention and non-intervention groups during different study intervals.**

<b>Study Interval</b>	<b>Date</b>	<b>Intervention</b>	<b>Non-intervention</b>
Pre-intervention	8/90 -- 2/92	I-1	N-1
During Intervention	3/92 -- 8/92	I-2	N-2
Post-intervention	8/92 -- 8/93	I-3	N-3

**Statistical Methods.** Study effects will be evaluated for changes from pre-intervention to post-intervention. A comparison will be made to determine if there are

significant differences in the intervention group following the training program when compared with the non-intervention group (see Table 1). Multi-variable models (logistic regression for dichotomous outcome and linear regression for continuous outcomes), will be utilized to control for any previously identified confounders. Study effects to be evaluated include: (a) reason for referral, (b) timing of referrals, and (c) peri-neonatal mortality rates. Analysis of timing of referrals and peri-neonatal mortality rates will include all women referred as well as separate analysis for women with specific conditions. Coding for independent variables of intervention and non-intervention over two time periods are presented in Table 2.

**Table 2. Independent Variables for Intervention (I) and Nonintervention (N) Groups during Pre- and Post-intervention Time Periods.**

	<u>Intervention</u>	
	N (0)	I (1)
Pre (0)	$\beta_0$	$\beta_0 + \beta_1$
Post (1)	$\beta_0 + \beta_2$	$\beta_0 + \beta_1 + \beta_2 + \beta_3$

Comparisons will be made using the formula,  $Y = \beta_0 + \beta_1 I + \beta_2 P + \beta_3 P * I + \beta_4 \dots \beta_i$

where:

$\beta_1 I$  = Intervention effect

$\beta_2 P$  = Period effect

$\beta_3 I * P$  = Interaction of Intervention and Period effect

$\beta_4 \dots \beta_i$  = Other variables.

In addition, analyses of trends will be performed by comparisons during all three time periods (pre-intervention, during the intervention, and post-intervention). Design variables will be created for the time period, and multi-variable models (logistic regression for dichotomous outcome and linear regression for continuous outcomes) will be utilized to control for any previously identified confounders. Study effects to be examined for trend

include: (a) reasons for referrals, (b) timing of referrals, and (c) peri-neonatal mortality rates.

Three conditions with high population attributable risk percents were identified in the analysis of the community case-control study. These include: preterm labor, prolonged labor (>12 hrs), and fetal malpresentation. Each of these conditions will be evaluated separately to determine if there are significant differences in either the timing of referrals or peri-neonatal mortality rates. Women with multiple conditions will be included in the analysis for each of the above conditions, but women will be only counted once in the overall analysis.

Determination of timing for referral varies according to specific conditions. For pre-term labor, the number of hours will be measured from onset of labor to the time a decision to refer is made. For malpresentation, the number of hours will be measured from onset of labor to the time a decision to refer is made. For those women who are instructed during pregnancy that they will deliver in the hospital, the number of hours will be recorded as 0. For prolonged labor, the number of hours will be measured from the 12th hour of labor to the time a decision to refer is made. If the decision to transfer a woman is made prior to the 12th hour, the number of hours will be recorded as 0. For other conditions, such as multiple pregnancy, pre-eclampsia, and bleeding during pregnancy, appropriate times will also be determined. While it is not possible to determine the accuracy of these measurements, it is assumed that any misclassification will be equal in both groups.

Reasons indicated for referrals will be coded to determine if they were covered in the training program curriculum. A comparison will be made to determine if those TBAs who attended the training program were more likely to refer women for reasons addressed in the course.

## **G. Validity**

Evaluation of the validity of specific variables will be performed. The accuracy of given measures will be determined through interviews with program staff to identify how measures were obtained. Whenever possible more objective data will be utilized to validate subjective measures. In addition, the correlation of community and hospital measures, such as reason for referral, will be assessed. Measurements of time may be less precise when determinations are made in the community, e.g., the time a decision is made to transfer a woman to the hospital. However, in the hospital setting, measurements such as arrival time are accurately recorded and can be used as a validation of those made in the community.

## **H. Limitations**

Ideally, this study should have been designed as a prospective cohort following all pregnant women within the intervention and comparison districts throughout their pregnancies. Diagnostic techniques, such as blood pressure monitoring, testing for anemia, and gestational diabetes, would have been employed. Physicians, blinded to the intervention status of TBAs would diagnose the condition of infants at the time of delivery, and autopsies would be performed to determine the timing and cause of death. However, this type of study is prohibitively expensive and difficult to administer in a remote rural community, such as Quetzaltenango. Furthermore, the use of diagnostic procedures could impact on the community, leading to increased study effects on the outcome. This evaluation is limited by some issues in the design strategy, but many of these limitations can be effectively managed.

The first limitation is that the outcome variable, peri-neonatal mortality, is quite broad. For example, there could be significant differences between factors causing a stillbirth prior to labor as compared with factors affecting a neonatal death. In contrast, the causes of stillbirth during labor and early neonatal death can be quite similar. Without the use of diagnostic techniques, such as autopsies, it is difficult to accurately classify the time of death in the case of a stillbirth. However, misclassification would be expected to be equal in both groups and any resulting biases would be towards the null.

The second limitation is that information was not collected on those women who were delivered by TBAs and not referred to Quetzaltenango Hospital. Thus, much of the available data will be based only on numerator data. The primary concern would be that TBAs in the intervention districts might selectively not refer women to the hospital who subsequently experience peri-neonatal mortality. While this process is in direct opposition to what TBAs learned in the training project and is consequently extremely unlikely, it does present a potential weakness to the validity of the study. However, there is currently surveillance data being collected in the intervention and comparison districts using cluster sampling to identify the frequency of complicated deliveries. Results from this data will be used to provide an estimate of peri-neonatal mortality rates in intervention and comparison districts to identify any potential increase in community peri-neonatal mortality rates.

Diagnosis of prenatal complications, such as anemia, pre-eclampsia, and infectious disease is extremely limited in Quetzaltenango due to minimal medical care. In addition, birthing intervals <12 months have been significantly associated with increased peri-neonatal mortality in the community-based study. However, as birth dates are not culturally important to the women in this study, mothers did not always know the age or birth date of their previous child. It was only possible to collect this information when the interview took place in the home, and the other child could be seen by the interviewer. Thus, it must be assumed that these prenatal complications and fertility patterns are similar throughout the study area and within the different subgroups.

While there is no reason to expect these variables to differ between districts, control of other potential confounders may provide a means of preventing bias from these variables. Both prenatal complications and fertility patterns have been found to be significantly associated with ethnicity, maternal education, and socio-economic variables (Boerma & Bicego, 1992; Cleland & Ginneken, 1988; Jayachandran & Jarvis, 1986). These variables will be examined in the pre-intervention data, and any significant differences will be controlled for in the analysis. In turn, controlling for ethnicity, educational level, and socio-economic status should partially control for prenatal complications and childhood spacing.

Recall bias is a potential confounder in this study as mothers were questioned about prenatal events after delivery. This bias may be mediated by the cultural values of the women. For example, a complication or peri-neonatal mortality may be seen as a result of the evil eye, the will of God, or having a fright during pregnancy rather than the result of not receiving prenatal care or a medical complication. Thus, recall bias may be lessened in this population where the “felt” risk factors are quite different from those being studied. However, it is not likely that mothers attended by trained versus untrained TBAs would recall experiences differently. Information recorded by hospital staff should be more objective, as they would not likely be aware of the TBA training status.

## **I. Strengths**

There will be approximately 800 detailed questionnaires administered specifically for this project. As a consequence, the population of referred women should be sufficiently sampled to answer the study questions proposed. In the study population community, the cultural value of agreeing to respond to questionnaires results in a nearly 100% response rate. While it is not possible to fully determine the accuracy of reported information, it is assumed that any misclassification would be equal in both groups.

Secondly, because of the thoroughness of the questionnaire design (Appendix 3), there are much data available on possible confounders, such as demographic variables, age, parity, etc. As a result, if any of these variables are identified as potential confounders in the analysis of the pre-intervention data, they will be controlled for in the analysis of trends and intervention effects through the use of multi-variate models.

Comparisons will be made over three time intervals (pre-intervention, during the intervention, and post-intervention) to determine if the training program effect varied over different periods of the study. For example, it will be interesting to see if there are significant differences at the peak of the intervention period, and whether changes during the intervention extend into the post-intervention period.

**APPENDIX 9**

**PRELIMINARY DATA FROM D1-D6 BY REBECCA ROHRER**

**DRAFT**

**Quetzaltenago  
Maternal Neonatal Health Project**

**Evaluation of Prenatal, Neonatal, and Postpartum  
Medical Care at Health Posts and Health Centers**

Institute of Nutrition of Central America and Panama  
(INCAP/PAHO)  
1988-1993

Prepared by: Rebecca Rohrer

Uniformed Services  
University Health Sciences of the  
Military Medical University for  
Medical Students  
Bethesda, MD  
MPh

**Quetzaltenango  
Maternal Neonatal Health Project**

**Evaluation of Prenatal, Neonatal, and Postpartum  
Medical Care at Health Posts and Health Centers**

**Table of Contents:**

I. Maternal Neonatal Health Project Summary .....	3
II. Health Post/Center Evaluation Study Description .....	4
III. Methodology .....	4
IV. Results .....	5
V. Discussion .....	

## **Quetzaltenango Maternal Neonatal Health Project**

### **I. Project Summary**

The Quetzaltenango Maternal Neonatal Health Project took place between 1988 and 1993 in the Quetzaltenango Health District of Guatemala. This was a collaborative project between the Quetzaltenango Health District and the Institute of Nutrition of Central America and Panama, under the direction of the Ministry of Public Health and funded through Mother Care/U.S.A.I.D. The overall objective of the project was to reduce the rate of maternal and neonatal mortality through more efficient utilization of existing resources specifically focussed on interventions at the community and hospital levels. The intervention focused on the early detection and adequate management of the most common obstetric complications (hemorrhage, sepsis, eclampsia, prolonged labor, and malpresentation) and neonatal complications (asphyxia, sepsis, prematurity and low birth weight).

The project comprised of three phases: diagnosis, intervention and evaluation. In the diagnosis, studies were performed to determine the limiting factors and other problems in the management of obstetric and neonatal cases at the levels of the families, Traditional Birth Attendants (TBAs), health centers, health posts, and hospitals. To identify factors which influence the appropriate management of obstetric and neonatal cases and the adequate utilization of health care services, surveys were taken of the users of the health care services, health personnel, and midwives.

In the second phase of the project interventions based on the diagnosis were developed to improve the detection and management of the principle obstetric and neonatal emergencies. Health service management protocols were established and training sessions were given for the health service personnel and traditional birth attendants. Meetings were held with health service personnel to encourage them to improve their working relationship with TBAs and their patients. Attempts were also made to improve health personnel's perceptions of TBAs. Meetings between personnel at different levels of the health care system were arranged in order to strengthen referral and back-referral system. TBA trainers were taught to improve their technical knowledge of the management of obstetric and neonatal emergencies, and were familiarized with participatory teaching methods for adult education. Practical, low cost, easily constructed visual materials were developed by trainers and facilitator for TBA participatory training.

In the evaluation phase of the project, the impact of the interventions was evaluated and monitoring and evaluation systems were established in the health services and communities involved.

### **Evaluation of Prenatal, Neonatal, and Postpartum**

## Health Care in the Health Posts and Health Centers

### II. Study Description

Various diagnostic studies were performed related to the care given in prenatal, neonatal, and postpartum cases at all levels of health service delivery: the Department of Gynecology and Obstetrics and the Neonatal Unit of the Quetzaltenango General Hospital, Health Centers and Health Posts, TBAs, and parents. At the Health Post and Health Center level, evaluations were conducted during the diagnosis phase (pre-evaluation) and after the intervention (post-evaluation) to monitor and evaluate the performance of clinical skills and clinical history taking by health personnel.

### III. Methodology

#### Intervention:

The intervention consisted of theoretical and practical skills training sessions provided to all health care personnel working at the health centers and health posts in five sub-districts of Quetzaltenango: San Juan Ostuncalco, San Martin Sacatepequez, San Carlos Sija, Palestina de los Altos, and Cabrican. Furthermore, field investigators continued training through on-going obstetric and neonatal case discussions with health center/post personnel during the post-evaluation. All of the training focused on strengthening technical problem solving abilities in the detection and management of the maternal and neonatal cases that present the greatest mortality risk.

<add: elaborate and provide examples of theoretical (norms), practical skills (what to ask, evaluate, etc.), teaching danger signs>

#### Evaluation:

The pre and post evaluation of the health care provided by health center/post personnel consisted of three levels: (1) observation of clinical skills performed by health personnel during obstetric and neonatal examinations, (2) the teaching of danger signs during by health personnel during obstetric examinations, and (3) an evaluation of the clinical history content of prenatal, postpartum, and neonatal medical charts.

During observation, field investigators, with the consent of the health personnel, evaluated whether or not the following clinical skills were performed and the results recorded: determination of the fundal height and fetal position, calculation

of the gestational age and delivery date, and whether or not they listened to the fetal heart.

<add: teaching of danger signs>

The medical chart review consisted of an evaluation of the content of the clinical histories (i.e what was recorded in the patient's medical chart) of prenatal, neonatal, and postpartum cases. Field investigators systematically randomly chose 20 prenatal cases at each health center and post. All prenatal cases were evaluated if less than 20 were available. Since relatively few exist, all neonatal and postpartum cases at the time of the study were evaluated.

The pre-evaluation was conducted during a one-year time period 1989-1990 and consisted of a one-time visit to each health center and post by field investigators. The post-evaluation was conducted during 1991-93 and consisted of four supervisory visits ("Rond" I, II, III, and IV) with the purpose of providing on-going training to the health personnel. The time periods for each post-evaluation supervisory visit are as follows:

Rond I: November 1991 - March 1992  
Rond II: June - September 1992  
Rond III: September - November 1992  
Rond IV: May - June 1993

Field investigators attempted to visit each health center/post during each Rond but the sequence in which they were visited depended on the availability and willingness of health personnel and whether or not the health center/post was open. During each post supervisory visit, observation of health personnel and medical chart reviews were conducted as in the pre-evaluation. To prevent duplication of charts being reviewed, each chart was reviewed for the time period between the supervisory visits to each health post/center.

<add: elaborate and state clearly the methodology used to visit each health center, the time periods, and how medical charts were chosen>

The analysis consisted of the following: (1) comparison of the frequencies of variables between the pre-evaluation and the combined frequencies of the four post-evaluation supervisory visits (Rond I-IV), (2) comparison of the frequencies of variables between the pre-evaluation and the last post-evaluation supervisory visit (Rond IV), and (3) comparison of the frequencies of variables

between the four post-evaluation supervisory visits (Rond I, II, III, and IV).

#### IV. Results

#### V. Discussion

<ADD: the following points should be considered in the discussion>

The following were observed by Carlos Gonzalez and Jorge \_\_\_\_\_, field investigator:

#### I. Clinical History Forms:

- A. Rond I - no clinical history forms were observed to be used by the health personnel at health centers/posts
- B. Rond II - some forms were being used at some health centers/posts
- C. Rond III-IV - clinical history forms (provided by the Guatemalan Ministry of Health) were being used at most health centers/posts
- D. All of the clinical history forms being used were the same
- E. Doctors were observed to be recording less results in the patient's medical chart than the other health personnel

#### II. Health Personnel at Health Posts/Centers:

- A. Health personnel were observed to change from one health center/post to another, and rarely were there any new health personnel
- B. New health personnel were noticed during Rond III, and were evaluated at that time in the same manner as the "old" health personnel

#### III. Additional Training (other than the intervention)

- A. During February, 1992, an additional training session was provided to 12 out of 35 health personnel
- B. Health personnel were observed to be engaging in "self-study" (i.e. reading the protocol/norms manual and other additional obstetric and neonatal references) during Rond III and IV

#### IV. Acceptance / Attitude During Evaluation

A. Poor attitudes and acceptance of the supervisory visits by the health personnel during Ronds I and II

B. Attitude improved and a greater acceptance of the supervisory visits was observed during Ronds III and IV

#### V. Cultural Characteristics - Migration

A. During the months of February/March, June/July, October/November, rural subsistence farmers often leave the Quetzaltenango area to work on agricultural plantations in the Pacific Coastal Region of Guatemala

Prenatal and Postpartum Pregnancy Risks  
Comparison of Post-Evaluation Ronds I-IV

Instrument: D-2

Sample size: Rond I = 19  
Rond II = 29  
Rond III = 23  
Rond IV = 40

		Rond I	Rond II	Rond III	Rond IV
<b>Pregnancy Risks</b>					
Premature Labor	YES	0% (0)	20.7% (6)	56.5% (13)	27.5% (11)
	NO	100 (19)	79.3 (23)	43.5 (10)	72.5 (29)
Premature Rupture of Membranes	YES	0 (0)	20.7 (6)	47.8 (11)	32.5 (13)
	NO	100 (19)	79.3 (23)	52.2 (12)	67.5 (27)
Hemorrhage	YES	0 (0)	31.0 (9)	43.5 (10)	37.5 (15)
	NO	100 (0)	69.0 (29)	56.5 (13)	62.5 (25)
Edema	YES	36.8 (7)	24.1 (7)	43.5 (10)	37.5 (15)
	NO	63.2 (12)	75.9 (22)	56.5 (13)	62.5 (25)
Twins	YES	10.5 (2)	3.4 (1)	0 (0)	2.5 (1)
	NO	89.5 (17)	96.6 (28)	100 (23)	97.5 (39)
Fetal Malposition	YES	36.8 (7)	31.0 (9)	69.6 (16)	35.0 (14)
	NO	63.2 (12)	69.0 (20)	30.4 (7)	65.0 (26)
<b>Postpartum Risks</b>					
Fever	YES	15.8 (3)	6.9 (2)	39.1 (9)	15.0 (6)
	NO	84.2 (16)	93.1 (27)	60.9 (14)	85.0 (34)
Hemorrhage	YES	10.5 (2)	6.9 (2)	21.7 (5)	20.0 (8)
	NO	89.5 (17)	93.1 (27)	78.3 (18)	80.0 (32)
Abdominal Pain	YES	15.3 (1)	0 (0)	8.7 (2)	5.0 (2)
	NO	84.7 (18)	100 (29)	91.3 (21)	95.0 (38)
Vaginal Discharge	YES	10.5 (2)	6.9 (2)	69.6 (7)	20.0 (8)
	NO	89.5 (17)	93.1 (27)	30.4 (16)	80.0 (32)

Neonatal Risks					
"Sucking"	YES	10.5 (2)	0 (0)	26.1 (6)	17.5 (7)
	NO	89.5 (17)	100 (29)	73.9 (17)	82.5 (33)
Respiration	YES	10.5 (2)	0 (0)	8.7 (2)	15.0 (6)
	NO	89.5 (17)	100 (29)	91.3 (21)	85.0 (34)
Activity	YES	10.5 (2)	0 (0)	13.0 (3)	15.0 (6)
	NO	89.5 (17)	100 (29)	87.0 (20)	85.0 (34)
Temperature	YES	10.5 (2)	0 (0)	21.7 (5)	17.5 (7)
	NO	89.5 (17)	100 (29)	78.3 (18)	82.5 (33)
Cry	YES	10.5 (2)	0 (0)	4.3 (1)	15.0 (6)
	NO	89.5 (17)	100 (29)	95.7 (22)	85.0 (34)
Premature	YES	10.5 (2)	10.3 (3)	43.5 (10)	22.5 (9)
	NO	89.5 (17)	89.7 (26)	56.5 (13)	77.5 (31)

Observation of Health Personnel Recording Pregnancy History  
Comparison of Post-Evaluation of Ronds I-IV

Instrument: D-2

Sample Size: Health Post = 54

Health Center = 17

Total = 71

		Rond I	Rond II	Rond III	Rond IV
Pregnancy History					
Premature	YES	0.0 (0)	17.2 (5)	39.1 (9)	40.0 (16)
Rupture of	NO	100 (15)	62.0 (18)	60.9 (14)	60.0 (24)
Membranes	N/A	* No Hx-4	* No Hx-6		
Premature	YES	5.3 (1)	24.1 (7)	39.1 (9)	35.0 (14)
Labor	NO	73.7 (14)	55.2 (16)	61.0 (14)	65.0 (26)
	N/A	* No Hx-4	* No Hx-6		

Medical Chart Review of Neonatal Care in Quetzaltenango  
Health Posts and Health Centers

Post-Evaluation Rond I-IV Comparison

Post-Evaluation Instruments: D-7

Post-Evaluation Sample Size: Rond I = 25  
Rond II = 13  
Rond III = 9  
Rond IV = 22

		Rond I	Rond II	Rond III	Rond IV
<u>Physical Exam:</u>					
Gestational Age at Delivery	YES	0 (0)	0 (0)	55.6 (5)	9.1% (2)
	NO	100 (25)	100 (13)	44.4 (4)	90.9 (20)
Weight	YES	96.0 (24)	92.3 (12)	100 (9)	90.9 (20)
	NO	4.0 (1)	7.7 (10)	0 (0)	9.1 (2)
Respiration	YES	24.0 (6)	0 (0)	44.4 (4)	22.7 (5)
	NO	76.0 (19)	100 (13)	55.6 (5)	77.3 (17)
Crying	YES	44.0 (11)	0 (0)	44.4 (4)	18.2 (4)
	NO	56.0 (14)	100 (13)	55.6 (5)	81.8 (18)
Activity	YES	32.0 (8)	0 (0)	66.7 (6)	4.5 (1)
	NO	68.0 (17)	100 (13)	33.3 (3)	95.5 (21)
Feeding	YES	48.0 (12)	15.4 (2)	88.9 (8)	27.3 (6)
	NO	52.0 (13)	84.6 (11)	11.1 (1)	72.7 (16)
Temperature	YES	72.0 (18)	46.2 (6)	88.9 (8)	86.4 (19)
	NO	28.0 (7)	53.8 (7)	11.1 (1)	13.6 (3)
<u>Breast Feeding:</u>	YES	36.0 (9)	15.4 (2)	88.9 (8)	31.8
	NO	64.0 (16)	84.6 (11)	11.1 (1)	(7) 68.2 (15)
<u>Diagnosis:</u> normal or complicated	YES	52.0 (13)	53.8 (7)	100 (9)	100.0
	NO	48.0 (12)	46.2 (6)	0 (0)	(22) 0.0 (0)

<u>Delivery:</u>					
Who Attended	YES	72.0 (18)	53.8 (7)	88.9 (8)	68.2
	NO	28.0 (7)	46.2 (6)	11.1 (1)	(15)
					31.8
Where	YES	68.0 (17)	53.8 (7)	88.9 (8)	(7)
	NO	32.0 (8)	46.2 (6)	11.1 (1)	
					63.6
Type (normal/complc.)	YES	72.0 (18)	53.8 (7)	88.9 (8)	(14)
	NO	28.0 (7)	46.2 (6)	11.1 (1)	36.4
					(8)
					59.1
					(13)
					40.9
					(9)

\*The post-evaluation evaluated each of characteristic (respiration, crying, activity, and feeding) separately and therefore, the calculated mean frequency and percentage of the above characteristics was used for comparison with the pre-evaluation frequency.

Observation of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

**Pre and Post Evaluation Comparison**  
**Crude Results**

Pre-Evaluation Instruments: S-3, S-4

Post-Evaluation Instruments: D-2

Pre-Evaluation Sample Size

Health Center = 11

Health Post = 42

Total = 53

Post-Evaluation Sample Size

Health Center = 17

Health Post = 54

Total = 71

Table 1: Skills Evaluation

NOTE: The Post-Evaluation Instrument, the evaluator had four "choices" to describe the action of the medical personnel: CORRECT, INCORRECT, NO, and NO APPLICATION. The Pre-Evaluation had four "choices": SI, NO, NO APPLICATION, and ACA (recorded earlier during the same visit by another health personnel). It was necessary to add the Post-Evaluation CORRECT and INCORRECT frequencies together to compare to the Pre-Evaluation SI. The A.C.A. frequencies were to the SI frequencies of the Pre-Evaluation.

		Pre-Eval	Post-Eval
Determine Fundal Height	"Measure"		
	YES	98.1% (52)	87.3% (62)
	NO	1.9 (1)	7.0 (5)
	N/A	0.0 (0)	5.6 (4)
	"Anota"		
	YES	60.1 (32)	66.2 (47)
NO	39.6 (21)	26.8 (19)	
N/A	0.0 (0)	7.0 (5)	
Calculate Gestational Age	"Estimate"		
	YES	52.3 (22)	88.8 (63)
	NO	28.6 (12)	4.2 (3)
	N/A	19.0 (8)	7.0 (5)

	"Anota"		
	YES	38.1 (16)	67.6 (48)
	NO	45.2 (19)	22.5 (16)
	N/A	16.7 (7)	9.9 (7)
Calculate the Delivery Date	"Estimate"		
	YES	NO DATA FOR	73.2 (52)
	NO	HEALTH	11.3 (8)
	N/A	CENTER**	15.5 (11)
	"Anota"		
	YES	43.4 (23)	60.6 (43)
	NO	39.6 (21)	16.9 (12)
	N/A	17.0 (9)	22.5 (16)
Determine Position of the Fetus	"Evaluate"		
	YES	94.3 (50)	92.9 (66)
	NO	5.7 (3)	1.4 (1)
	N/A	0.0 (0)	5.6 (4)
	"Anota"		
	YES	50.9 (27)	69.0 (49)
	NO	49.1 (26)	25.4 (18)
	N/A	0.0 (0)	5.6 (4)
Listen to the Fetus Heart	"Listens"		
	YES	94.3 (50)	88.8 (63)
	NO	5.7 (3)	4.2 (3)
	N/A	0.0 (0)	7.0 (5)
	"Anota"		
	YES	52.8 (28)	62.0 (44)
	NO	47.2 (25)	29.6 (21)
	N/A	0.0 (0)	8.5 (6)

\* Evaluation Instrument S-4 for the Health Center did not ask whether or not the medical personnel calculated the delivery date, only if the health personnel documented the delivery date.

Medical Chart Review of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

**Pre and Post Evaluation Comparison**  
**Crude Results**

Pre-Evaluation Instruments: S-6  
Post-Evaluation Instruments: D-3

Pre-Evaluation Sample Size

Health Center = 81  
Health Post = 240  
Total = 321

Post-Evaluation Sample Size

Health Center = 98  
Health Post = 229  
Total = 327

		Pre-Evaluation		Post-Evaluation	
<u>Physical Exam:</u>					
Uterine Height	YES	65.1%	(201)	80.4%	(263)
	NO	34.9	(112)	18.6	(61)
	N/A	0.0	(0)	0.9	(3)
Blood Pressure	YES	52.0	(167)	84.7	(277)
	NO	48.0	(154)	15.3	(50)
	N/A	0.0	(0)		
Fetus Heart Rate	YES	6.3	(20)	70.0	(229)
	NO	93.7	(301)	23.5	(77)
	N/A	0.0	(0)	6.4	(21)
Fetus Position	YES	61.5	(184)	69.1	(226)
	NO	38.5	(115)	24.8	(81)
	N/A	0.0	(0)	6.1	(20)
Edema Detection	YES	6.3	(20)	18.0	(59)
	NO	93.7	(301)	82.20	(268)
	N/A	0.0	(0)	4.0	(13)
Twins	YES	1.0	(3)	96.0	(314)
	NO	99.0	(318)		
	N/A	0.0	(0)		

Medical Chart Review of PostPartum Care in Quetzaltenango  
Health Posts and Health Centers

Pre-Evaluation and Post-Evaluation Rond IV Comparison

Pre-Evaluation Instruments: S-7  
Post-Evaluation Instruments: D-5

Pre-Evaluation Sample Size

Health Center = 21  
Health Post = 16  
Total = 37

Post-Evaluation Sample Size

Health Center = 15  
Health Post = 2  
Total = 17

		Pre-Evaluation	Post-Rond IV
<u>Physical Exam:</u>			
Temperature	YES	59.5% (22)	88.2% (15)
	NO	40.5 (15)	11.8 (2)
Invol. Uterina	YES	32.4 (12)	70.6 (12)
	NO	67.6 (25)	29.4 (5)
Vaginal Discharge	YES	2.7 (1)	47.1 (8)
	NO	97.3 (36)	52.9 (9)
Diagnosis (complicated or normal)	YES	94.6 (35)	88.2 (15)
	NO	5.4 (2)	11.8 (2)
<u>Delivery:</u>			
Where delivery occurred	YES	44.4	82.4 (14)
	NO	55.6	17.6 (3)
Who Attended	YES	24.3 (9)	64.7 (11)
	NO	75.7 (28)	35.3 (6)
Type (normal/complic.)	YES	37.8 (14)	64.7 (11)
	NO	62.2 (23)	35.3 (6)

Medical Chart Review of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

**Pre-Evaluation and Post-Evaluation Rond IV Comparison**

Pre-Evaluation Instruments: S-6  
Post-Evaluation Instruments: D-3

Pre-Evaluation Sample Size

Health Center = 81  
Health Post = 240  
Total = 321

Post-Evaluation Sample Size

Health Center = 41  
Health Post = 65  
Total = 106

		Pre-Evaluation		Post-Rond IV	
<u>Physical Exam:</u>					
Uterine Height	YES	65.1%	(201)	86.8%	(92)
	NO	34.9	(112)	10.4	(11)
	N/A	0.0	(0)	2.8	(3)
Blood Pressure	YES	52.0	(167)	93.4	(99)
	NO	48.0	(154)	6.6	(7)
	N/A	0.0	(0)		
Fetus Heart Rate	YES	6.3	(20)	75.5	(80)
	NO	93.7	(301)	21.7	(23)
	N/A	0.0	(0)	2.8	(3)
Fetus Position	YES	51.5	(184)	72.6	(77)
	NO	38.5	(115)	23.6	(25)
	N/A	0.0	(0)	3.8	(4)
Edema Detection	YES	6.3	(20)	22.6	(24)
	NO	93.7	(301)	77.4	(82)
	N/A	0.0	(0)	1.9	(2)
Twins	YES	1.0	(3)	98.1	(104)
	NO	99.0	(318)		
	N/A	0.0	(0)		

<u>Delivery:</u>					
Where delivery occurred	YES	<del>44.4</del>	<i>not in data set</i>	34.3	(12)
	NO	<del>55.6</del>		65.7	(23)
	N/A	0.0		0.0	(0)
Who Attended	YES	24.3	(9)	31.4	(9)
	NO	75.7	(28)	68.6	(24)
	N/A	0.0	(0)	0.0	(0)
Type (normal/complc.)	YES	37.8	(14)	28.6	(10)
	NO	52.2	(23)	71.4	(25)
	N/A	0.0	(0)	0.0	(0)

Medical Chart Review of Neonatal Care in Quetzaltenango  
Health Posts and Health Centers

**Pre and Post Evaluation Comparison**  
**Crude Results**

Pre-Evaluation Instruments: S-5  
Post-Evaluation Instruments: D-7

Pre-Evaluation Sample Size

Health Center = 23  
Health Post = 3  
Total = 26

Post-Evaluation Sample Size

Health Center = 57  
Health Post = 12  
Total = 69

	Pre-Evaluation	Post-Evaluation
<u>Physical Exam:</u>		
Gestational Age YES	0.0% (0)	10.1% (7)
at Delivery NO	100.0 (26)	89.9 (62)
Weight YES	5.4 (22)	94.2 (65)
NO	84.6 (4)	5.8 (4)
Appearance: YES	21.7 (5)	31.9 (15)*
-respiration NO	78.3 (18)	68.1 (32)
crying		
activity		
feeding		
Temperature YES	80.7 (21)	73.9 (51)
NO	19.3 (5)	26.1 (15)
<u>Breast Feeding:</u> YES	0.0 (0)	37.7 (26)
NO	100.0 (6)	62.3 (43)
<u>Diagnosis:</u> YES	88.5 (23)	73.9 (51)
normal or NO	11.5 (3)	26.1 (18)
complicated		

<u>Antecedents:</u>					
Prev. Cesarean	YES	2.2	(7)	34.9	(37)
	NO	97.8	(314)	65.1	(69)
	N/A	0.0	(0)		
Prev. Pregnancies	YES	65.5	(210)	72.6	(77)
	NO	34.5	(111)	27.4	(29)
	N/A	0.0	(0)		
<u>Pregnancy History:</u>					
Last Menstr.	YES	71.4*	(229)	95.3	(101)
	NO	28.7	(92)	4.7	(5)
Gestational Age	YES	59.8*	(192)	91.4	(96)
	NO	39.9	(128)	8.6	(9)
Expected Delivery Date	YES	60.1*	(193)	94.4	(100)
	NO	39.9	(128)	5.7	(6)
Hemorrhage	YES	0.0	(0)	55.7	(59)
	NO	100.0	(321)	44.3	(47)
Diagnosis (normal or complicated)	YES	6.8	(22)	44.3	(47)
	NO	93.1	(299)	55.7	(59)

\*In the pre-evaluation categories of Last Menstruation, Gestational Age, and Expected Delivery, the evaluator was instructed to mark the category "Unknown" if it was documented as being unknown by the health personnel. Therefore, the "Unknown" frequencies were added to the "Yes" in these three categories (see below for actual numbers).

Last Menstruation	YES	53.0%	(170)
	NO	28.7	(92)
	UK	18.4	(59)
	N/A	0.0	(0)
Gestational Age	YES	41.4	(133)
	NO	39.9	(128)
	UK	18.4	(59)
	N/A	0.0	(0)
Expected Delivery Date	YES	41.4	(133)
	NO	39.9	(128)
	UK	18.7	(60)
	N/A	0.0	(0)

Medical Chart Review of PostPartum Care in Quetzaltenango  
Health Posts and Health Centers

Pre and Post Evaluation Comparison  
Crude Results

Pre-Evaluation Instruments: S-7  
Post-Evaluation Instruments: D-5

Pre-Evaluation Sample Size

Health Center = 21  
Health Post = 16  
Total = 37

Post-Evaluation Sample Size

Health Center = 27  
Health Post = 8  
Total = 35

		Pre-Evaluation		Post-Evaluation	
<u>Physical Exam:</u>					
Temperature	YES	59.5%	(23)	65.7%	(23)
	NO	40.5	(22)	34.3	(12)
	N/A	0.0	(0)	0.0	(0)
Invol. Uterina	YES	32.4	(12)	8.6	(3)
	NO	67.6	(25)	91.4	(32)
	N/A	0.0	(0)	0.0	(0)
Vaginal Discharge	YES	2.7	(1)	37.1	(13)
	NO	97.3	(36)	62.9	(22)
	N/A	0.0	(0)	0.0	(0)
Diagnosis (complicated or normal)	YES	94.6	(35)	85.7	(30)
	NO	5.4	(2)	14.3	(5)
	N/A	0.0	(0)	0.0	(0)

<u>Antecedents:</u>					
Prev. Cesarean	YES	2.2	(7)	29.7	(97)
	NO	97.8	(314)	70.3	(230)
	N/A	0.0	(0)		
Prev. Pregnancies	YES	65.5	(210)	76.1	(249)
	NO	34.5	(111)	23.9	(78)
	N/A	0.0	(0)		
<u>Pregnancy History:</u>					
Last Menstr.	YES	71.4*	(229)	92.0	(301)
	NO	28.7	(92)	8.0	(26)
Gestational Age	YES	59.8*	(192)	89.6	(293)
	NO	39.9	(128)	10.9	(33)
Expected Delivery Date	YES	60.1*	(193)	82.0	(268)
	NO	39.9	(128)	18.0	(59)
Hemorrhage	YES	0.0	(0)	48.3	(158)
	NO	100.0	(321)	54.4	(178)
		0.0	(0)	0.3	(1)
Diagnosis (normal or complicated)	YES	6.8	(22)	22.9	(75)
	NO	93.1	(299)	77.1	(252)

\*In the Pre-Evaluation categories of Last Menstruation, Gestational Age, and Expected Delivery, the evaluator was instructed to mark the category "Unknown" if it was documented as being unknown by the health personnel. Therefore, the "Unknown" frequencies were added to the "Yes" in these three categories (see below for actual numbers).

Last Menstruation YES 53.0% (170)  
 NO 28.7 (92)  
 UK 18.4 (59)  
 N/A 0.0 (0)

Gestational Age YES 41.4 (133)  
 NO 39.9 (128)  
 UK 18.4 (59)  
 N/A 0.0 (0)

Expected Delivery Date YES 41.4 (133)  
 NO 39.9 (128)  
 UK 18.7 (60)  
 N/A 0.0 (0)

<u>Delivery:</u>					
Who Attended	YES	11.5	(3)	69.6	(48)
	NO	88.5	(23)	30.4	(21)
Where	YES	11.5	(3)	66.7	(46)
	NO	88.5	(23)	33.3	(23)
Type (normal/complc.)	YES	11.5	(3)	66.7	(46)
	NO	88.5	(23)	33.3	(23)

\*The Post-Evaluation evaluated each of characteristic (respiration, crying, activity, and feeding) separately and therefore, the calculated mean frequency and percentage of the above characteristics was used for comparison with the Pre-Evaluation frequency and percentage.

Medical Chart Review of Neonatal Care in Quetzaltenango  
Health Posts and Health Centers

**Pre-Evaluation and Post-Evaluation Rond IV Comparison**

Pre-Evaluation Instruments: S-5  
Post-Evaluation Instruments: D-7

Pre-Evaluation Sample Size

Health Center = 23  
Health Post = 3  
Total = 26

Post-Evaluation Sample Size

Health Center = 19  
Health Post = 3  
Total = 22

		Pre-Evaluation		Post-Rond IV	
<u>Physical Exam:</u>					
Gestational Age at Delivery	YES	0.0%	(0)	9.1%	(2)
	NO	100.0	(26)	90.9	(20)
Weight	YES	5.4	(22)	90.9	(20)
	NO	84.6	(4)	9.1	(2)
Appearance: -respiration crying activity feeding	YES	21.7	(5)	18.2	(4)*
	NO	78.3	(18)	81.8	(18)
Temperature	YES	80.7	(21)	86.4	(19)
	NO	19.3	(5)	13.6	(3)
<u>Breast Feeding:</u>					
	YES	0.0	(0)	31.8	(7)
	NO	100.0	(0)	68.2	(15)
<u>Diagnosis:</u>					
normal or complicated	YES	88.5	(23)	100.0	(22)
	NO	11.5	(3)	0.0	(0)

<u>Delivery:</u>					
Who Attended	YES	11.5	(3)	68.2	(15)
	NO	88.5	(23)	31.8	(7)
Where	YES	11.5	(3)	63.6	(14)
	NO	88.5	(23)	36.4	(8)
Type (normal/complc.)	YES	11.5	(3)	59.1	(13)
	NO	88.5	(23)	40.9	(9)

\*The post-evaluation evaluated each of characteristic (respiration, crying, activity, and feeding) separately and therefore, the calculated mean frequency and percentage of the above characteristics was used for comparison with the pre-evaluation frequency.

Medical Chart Review of PostPartum Care in Quetzaltenango  
Health Posts and Health Centers

Post-Evaluation Rond I-IV Comparison

Post-Evaluation Instruments: D-5

Post-Evaluation Sample Size: Rond I = 19  
Rond II = 13  
Rond III = 3  
Rond IV = 17

		Rond I	Rond II	Rond III	Rond IV
<u>Physical Exam:</u>					
Temperature	YES	57.9 (11)	76.9 (10)	66.7 (2)	88.2 (15)
	NO	42.1 (8)	23.1 (3)	33.3 (1)	11.8 (2)
Invol. Uterina	YES	0 (0)	0 (0)	100 (3)	70.6 (12)
	NO	100 (19)	100 (13)	0 (0)	29.4 (5)
Vaginal Discharge	YES	10.5 (2)	61.5 (8)	100 (3)	47.1 (8)
	NO	89.5 (17)	38.5 (5)	0 (0)	52.9 (9)
Diagnosis (complicated or normal)	YES	84.2 (16)	84.6 (11)	100 (3)	88.2 (15)
	NO	15.8 (3)	15.4 (2)	0 (3)	11.8 (2)
<u>Delivery:</u>					
Where delivery occurred	YES	26.3 (5)	30.8 (4)	100 (3)	82.4 (14)
	NO	73.7 (14)	69.2 (9)	0 (0)	17.6 (3)
Who Attended	YES	21.1 (4)	30.8 (4)	100 (3)	64.7 (11)
	NO	78.9 (15)	69.2 (9)	0 (0)	35.3 (6)
Type (normal/complic.)	YES	21.1 (4)	23.1 (3)	100 (3)	64.7 (11)
	NO	78.9 (15)	76.9 (10)	0 (0)	35.3 (6)

Pregnancy History:					
Last Menstr.	YES	84.0 (63)	87.3 (62)	100 (75)	95.3 (101)
	NO	16.0 (12)	12.7 (9)	0 (0)	4.7 (5)
Gestational Age	YES	82.7 (62)	87.3 (62)	97.3 (73)	91.4 (96)
	NO	17.3 (13)	12.7 (9)	2.7 (2)	8.6 (9)
Expected Delivery Date	YES	66.7 (50)	71.8 (51)	89.3 (67)	94.4 (100)
	NO	33.3 (25)	28.2 (20)	10.7 (8)	5.7 (6)
Hemorrhage	YES	14.7 (11)	38.0 (27)	68.0 (51)	55.7 (59)
	NO	84.0 (63)	62.0 (44)	32.0 (24)	44.3 (47)
		1.3 (1)			
Diagnosis (normal or complicated)	YES	2.7 (2)	21.1 (15)	64.0 (48)	44.3 (47)
	NO	97.3 (73)	78.9 (56)	36.0 (27)	55.7 (59)

Medical Chart Review of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

Post-Evaluation Rond I-IV Comparison

Post-Evaluation Instruments: D-3

Post-Evaluation Sample Size: Rond I = 75

Rond II = 71

Rond III = 75

Rond IV = 40

		Rond I	Rond II	Rond III	Rond IV
<u>Physical Exam:</u>					
Uterine Height	YES	68.0 (51)	71.8 (51)	92.0 (69)	86.8 (92)
	NO	32.0 (24)	28.2 (20)	8.0 (6)	10.4 (11)
					2.8 (3)
Blood Pressure	YES	64.0 (48)	78.9 (56)	98.7 (74)	93.4 (99)
	NO	36.0 (27)	21.1 (15)	1.3 (1)	6.6 (7)
Fetus Heart Rate	YES	66.7 (50)	50.7 (36)	84.0 (63)	75.5 (80)
	NO	28.0 (21)	38.0 (27)	8.0 (6)	21.7 (23)
	N/A	5.3 (4)	11.3 (8)	8.0 (6)	2.8 (3)
Fetus Position	YES	58.7 (44)	63.4 (45)	80.0 (60)	72.6 (77)
	NO	37.3 (28)	26.8 (19)	12.0 (9)	23.6 (25)
	N/A	4.0 (3)	9.9 (7)	8.0 (6)	3.8 (4)
Edema Detection	YES	4.0 (3)	8.5 (6)	34.7 (26)	22.6 (24)
	NO	96.0 (72)	91.5 (65)	65.3 (49)	77.4 (82)
Twins	YES	1.3 (1)	0 (0)	13.3 (10)	1.9 (2)
	NO	98.7 (74)	100 (71)	86.7 (65)	98.1 (104)
<u>Antecedents:</u>					
Prev. Caesarian	YES	17.3 (13)	16.9 (12)	46.7 (35)	34.9 (37)
	NO	82.7 (62)	83.1 (59)	53.3 (40)	65.1 (69)
Prev. Pregnancies	YES	72.0 (54)	76.1 (54)	85.3 (64)	72.6 (77)
	NO	28.0 (21)	23.9 (17)	14.7 (11)	27.4 (29)

Calculate Delivery Date					
Calculate	YES	52.6 (10)	55.2 (16)	65.2 (15)	75.0 (30)
	INCORR	26.3 (5)	3.4 (1)	21.7 (7)	10.0 (4)
	NO	10.5 (2)	17.2 (5)	4.3 (1)	5.0 (2)
	N/A	10.5 (2)	24.1 (7)	8.7 (2)	10.0 (4)
Record	YES	42.1 (8)	44.8 (13)	65.2 (15)	75.0 (30)
	INCORR	10.5 (2)	6.9 (2)	13.0 (3)	10.0 (4)
	NO	36.8 (7)	6.9 (2)	13.0 (3)	0.0 (0)
	N/A	10.5 (2)	41.4 (12)	8.7 (2)	15.0 (6)
Determine Fetus Position					
Determine	YES	78.9 (15)	82.8 (24)	100 (23)	70.0 (28)
	INCORR	10.5 (2)	6.9 (2)	0 (0)	10.0 (4)
	NO	5.3 (1)	0.0 (0)	0 (0)	0.0 (0)
	N/A	5.3 (1)	10.3 (3)	0 (0)	20.0 (8)
Record	YES	36.8 (7)	19.5 (15)	95.7 (22)	72.5 (29)
	INCORR	5.3 (1)	13.8 (4)	0.0 (0)	17.5 (3)
	NO	52.6 (10)	24.1 (7)	4.3 (1)	0.0 (0)
	N/A	5.3 (1)	10.3 (3)	0.0 (0)	20.0 (8)
Listen to Fetal Heart					
Listen	YES	42.1 (8)	48.3 (14)	91.3 (21)	67.5 (27)
	INCORR	36.8 (7)	27.9 (11)	8.7 (2)	12.5 (5)
	NO	10.5 (2)	3.4 (1)	0.0 (0)	2.5 (1)
	N/A	10.5 (2)	10.3 (3)	0.0 (0)	17.5 (7)
Record	YES	31.6 (6)	34.5 (10)	87.0 (20)	67.5 (27)
	INCORR	5.3 (1)	24.1 (7)	0.0 (0)	12.5 (5)
	NO	52.6 (10)	27.6 (8)	13.0 (3)	0.0 (0)
	N/A	10.5 (2)	13.8 (4)	0.0 (0)	20.0 (8)

Observation of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

Pre-Evaluation and Post-Evaluation Rond IV Comparison

Pre-Evaluation Instruments: S-3, S-4

Post-Evaluation Instruments: D-2

Pre-Evaluation Sample Size

Health Center = 11

Health Post = 42

Total = 53

Post-Evaluation Rond IV Sample Size

Health Center = 10

Health Post = 30

Total = 40

NOTE: The Post-Evaluation Instrument, the evaluator had four "choices" to describe the action of the medical personnel: CORRECT, INCORRECT, NO, and NO APPLICATION. The Pre-Evaluation had four "choices": SI, NO, NO APPLICATION, and ACA (recorded earlier during the same visit by another health personnel). It was necessary to add the Post-Evaluation CORRECT and INCORRECT frequencies together to compare to the Pre-Evaluation SI. The A.C.A. frequencies were to the SI frequencies of the Pre-Evaluation.

		Pre-Eval	Post- Rond IV
Determine Fundal Height	"Measure"		
	YES	98.1% (52)	95.0% (38)
	NO	1.9 (1)	2.5 (1)
	N/A	0.0 (0)	2.5 (1)
	"Anota"		
	YES	60.4 (32)	95.0 (38)
NO	39.6 (21)	0.0 (0)	
N/A	0.0 (0)	5.0 (2)	
Calculate Gestational Age	"Estimate"		
	YES	52.3 (22)	97.5 (39)
	NO	28.6 (12)	0.0 (0)
	N/A	19.0 (8)	2.5 (1)

	"Anota"		
	YES	38.1 (16)	97.5 (39)
	NO	45.2 (19)	0.0 (0)
	N/A	16.7 (7)	2.5 (1)
Calculate the Delivery Date	"Estimate"		
	YES	NO DATA FOR	85.0 (34)
	NO	HEALTH	5.0 (2)
	N/A	CENTER**	10.0 (4)
	"Anota"		
	YES	43.4 (23)	85.0 (34)
NO	39.6 (21)	0.0 (0)	
	N/A	17.0 (9)	15.0 (6)
Determine Position of the Fetus	"Evaluate"		
	YES	94.3 (50)	80.0 (32)
	NO	5.7 (3)	0.0 (0)
	N/A	0.0 (0)	20.0 (8)
	"Anota"		
	YES	50.9 (27)	80.0 (32)
NO	49.1 (26)	0.0 (0)	
	N/A	0.0 (0)	20.0 (8)
Listen to the Fetus Heart	"Listens"		
	YES	94.3 (50)	80.0 (32)
	NO	5.7 (3)	2.5 (1)
	N/A	0.0 (0)	17.5 (7)
	"Anota"		
	YES	52.8 (28)	80.0 (32)
NO	47.2 (25)	0.0 (0)	
	N/A	0.0 (0)	20.0 (8)

\* Evaluation Instrument S-4 for the Health Center did not ask whether or not the medical personnel calculated the delivery date, only if the health personnel documented the delivery date.

Observation of Prenatal Care in Quetzaltenango  
Health Posts and Health Centers

Post-Evaluation Rond I-IV Comparison

Post-Evaluation Instruments: D-2

Post-Evaluation Sample Size: Rond I = 19

Rond II = 29

Rond III = 23

Rond IV = 40

	Rond I	Rond II	Rond III	Rond IV
<b>Determine Fundal Height</b>				
Measure	YES 57.9 (11)	65.5 (19)	87.0 (20)	95.0 (38)
	INCORR 21.1 (4)	24.1 (7)	4.3 (1)	0.0 (0)
	NO 10.5 (2)	3.4 (1)	8.7 (2)	2.5 (1)
	N/A 10.5 (2)	6.9 (2)	0.0 (0)	2.5 (1)
Record	YES 36.8 (7)	55.2 (16)	82.6 (19)	92.5 (37)
	INCORR 0.0 (0)	17.2 (5)	0.0 (0)	2.5 (1)
	NO 52.6 (10)	17.2 (5)	17.4 (4)	0.0 (0)
	N/A 10.5 (2)	10.3 (3)	0.0 (0)	5.0 (2)
<b>Calculate Gestational Age</b>				
Calculate	YES 63.2 (12)	79.3 (23)	91.3 (21)	95.0 (38)
	INCORR 21.2 (4)	7.0 (2)	4.3 (1)	2.5 (1)
	NO 5.3 (1)	3.4 (1)	4.3 (1)	0.0 (0)
	N/A 10.5 (2)	10.3 (3)	0.0 (0)	2.5 (1)
Record	YES 42.1 (8)	48.3 (14)	82.6 (19)	95.0 (38)
	INCORR 15.8 (3)	10.3 (3)	4.3 (1)	2.5 (1)
	NO 31.6 (6)	24.1 (7)	13.0 (3)	0.0 (0)
	N/A 10.5 (2)	17.2 (5)	0.0 (0)	2.5 (1)

**APPENDIX 10**

**REFERENCE ARTICLES FOR EARLY NEONATAL DEATHS AUDIT**

## REFERENCE ARTICLES FOR EARLY NEONATAL DEATHS AUDIT

Appendix 1: Definition of the Terms used in the Clinico-Pathological Classification of Perinatal, Late Neonatal and Infant Death

Appendix 2: Aberdeen Classification

Barros, F. C., Huttly, S., et al, "Comparison of the Causes and Consequences of Prematurity and Intrauterine Growth Retardation: A Longitudinal Study in Southern Brazil," Pediatrics, Vol. 90, No. 2, p. 238-244. August, 1992.

Brewster, D., "Neonatology in the developing world. Part 1," Tropical Doctor, No. 19, p. 100-104. July, 1989.

Brewster, D., "Neonatology in the developing world. Part 2," Tropical Doctor, No. 19, p. 147-151. October, 1989.

Colonna, F., Uxa, F., et al, "The "kangaroo-mother" method: evaluation of an alternative model for the care of low birthweight newborns in developing countries," International Journal of Gynecology and Obstetrics, Vol. 31, p. 335-339. 1990.

Ferraz, E. M., Gray, R. H., and Cunha, T. M., "Determinants of Preterm Delivery and Intrauterine Growth Retardation in North-East Brazil," International Journal of Epidemiology, Vol. 19, No. 1, p. 101-108. 1990.

Gray, R. H., Ferraz, E. M., et al, "Levels and Determinants of Early Neonatal Mortality in Natal, Northeastern Brazil: Results of a Surveillance and Case-Control Study," International Journal of Epidemiology, Vol. 20, No. 2, p. 467-473. 1991.

Hussain, A., Kaye K., Khatun, N., "Case Study of Neonatal and Perinatal Deaths," MotherCare Project: Save the Children Bangladesh Office. Nasirnagar, Brahmanbaria District. October, 1991.

INCAP/PAHO/John Snow, Inc.: MotherCare, "Project Protocols for the Management of Obstetric Cases for Regional-Departmental Hospitals." 1993.

Mavalankar, D. V., Gray, R. H., and Trivedi, C. R., "Risk Factors for Preterm and Term Low Birthweight in Ahmedabad, India," International Journal of Epidemiology, Vol. 21, No. 2, p. 263-272. 1992.

Mavalankar, D. V., Trivedi, C. R., Gray, R.H., "Levels and risk factors for perinatal mortality in Ahmedabad, India," WHO Bulletin OMS. Vol. 69(4), p. 435-442. 1991.

MotherCare *Matters*, Vol. 1, No. 4. March, 1991 (English version).

MotherCare *Matters*, Vol. 1, No. 4. March, 1991 (Spanish version).

Portman, R. J., Carter, B. S., et al, " Predicting neonatal morbidity after perinatal asphyxia: A scoring system," American Journal of Obstetrics and Gynecology, p. 174-18?. January, 1990.

Regional Maternity Survey, Collaborative Survey of Late Miscarriage, Stillbirth, & Infant Death in the Northern Region

Renwick, Mrs. M., Suvey Co-ordinator, "Collaborative Survey of Perinatal, Late Neonatal and Infant Death in the Northern Region," Northern Regional Health Authority, Benfield Road, Newcastle upon Tyne, NE 6 4PY. 1991.

Tafari, N., and Sterky, G., "Neonatal resuscitation and prevention of hypothermia: how appropriate is the technology?" p. 118-129.

Taha, T., and Gray, R., "Perinatal Health in Developing Countries: Problem Definition and Potential Interventions."

WHO Report of the Director-General, "Child Health and Development: Health of the Newborn," Provisional agenda item 10.1, EB89/26. December 24, 1991.

Xiaocheng, Ji, "Perinatal care in China," Early Human Development, 29, p. 203-206. Elsevier Scientific Publishers Ireland Ltd. 1992.