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Implementation of a Training Program for Low Literacy *Promotoras* in Oral Rehydration Therapy

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Abstract

Objective—The purpose of this study was to ascertain the effectiveness of a culturally appropriate *promotora* training program related to oral rehydration therapy and diarrheal management. Factors that influenced the development, implementation, and evaluation of the program provided to low-literacy women in Guatemala are explored.

Design and Sample—*Promotora* training was conducted with 15 Mayan women from a rural community in the highlands of Guatemala. Women were selected by leaders of the community to participate in the program.

Measures—Quantitative data were collected and analyzed to determine descriptive statistics and reliability coefficients for the pretests and posttests. A non-parametric Wilcoxon test for paired-samples was conducted. The qualitative data from the program evaluations were analyzed for themes.

Results—Mean scores increased from 41.73 ($sd = 9.65$) to 70.33 ($sd = 21.29$) on the pretest and posttest. The Cronbach's alpha was 0.54 on the pretest with 0.65 on the posttest. The Wilcoxon test demonstrated a significant difference between the pretest and posttest scores ($Z = 3.040, p < .05$).

Conclusions—Extremely low literacy levels played a major role in the ability of the women to successfully complete the requirements of the training program. The curriculum demonstrated effectiveness, but will benefit from replication with a larger sample.

Keywords

child health; family health; health disparities; health literacy; Latinos; underserved populations; *promotora*; Guatemala

Background

The second leading cause of death in children under five in Guatemala is diarrhea (Pan American Health Organization, 2012) (PAHO). Causes for this preventable mortality are associated with the lack of access to healthcare providers, the absence of culturally and linguistically appropriate health and education services, and the high rates of poverty that exist among the indigenous populations (e.g., Mayan, Garifuna, and Xincas). Only three out of 10 people below the poverty level seek health services in formal settings. Although education has improved in recent years, the average number of years of school among the indigenous population is 2.1 years with women having the lowest rates of literacy. In 2010, the per capita gross domestic product was US\$ 2,868, and indigenous people accounted for over three-quarters of the population living in poverty. In the rural regions where many of the indigenous Maya live, over half of the homes are overcrowded with dirt floors and have questionable access to clean water sources. Each of these factors plays a significant role in the diarrheal-related mortality rate, which remains over 18% for children under five years of age (PAHO, 2012).

The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) issued a joint statement recommending oral rehydration therapy (ORT) with zinc supplementation (ZS) to manage diarrhea almost a decade ago, yet the implementation in low to moderate income countries has been poor (Arvelo, Degollado, Reyes, & Alvarez, 2013; Walker, Fontaine, Young, & Black, 2009). A recent study by Arvelo et al. (2013) in Guatemala found the use of ORT for the treatment of diarrhea in children to be as low as 8%. Contributing factors included delays in seeking healthcare, views that diarrhea was a normal occurrence, lack of knowledge about ORT use among parents, and children disliked the taste of ORT. Of the caregivers who were aware of ORT, many administered the ORT in small doses similar to antibiotics or cough syrups. Therefore, the amounts given were insufficient for adequate hydration. Zafar, Luby, and Mendoza (2010) found that diarrhea was viewed as such a common event that mothers frequently overlook the occurrence unless the symptoms become severe. Both studies emphasized the need to increase public awareness of dehydration as a potentially severe consequence of diarrhea.

In the rural regions of Guatemala, access to social media remains very limited. The standard methods of public awareness campaigns are not applicable given the high rates of illiteracy and the absence of internet capability. Community health workers, commonly referred to as "*promotoras de salud*" in Latin American cultures, have demonstrated effectiveness for increasing access to care in hard-to-reach or underserved, ethnic populations (Swider, 2002). *Promotoras* are usually women from the community who are well-respected and often recognized as leaders, either formally or informally. *Promotora* programs have been used successfully for diabetes self-management (McEwen, Pasvogel, Gallegos, & Barrera, 2010), colorectal screening education (Moralez, Rao, Livaudais, & Thompson, 2012), depression

management (Waitzkin et al., 2011), and breast cancer prevention (Livaudais, Coronado, Espinoza, Islas, Ibarra, & Thompson, 2010) with Latin American populations. Although, Bailey and Coombs (1996) reported the use of a case management program with village health promoters nearly two decades ago, no significant research has been reported in the literature in recent years specific to Guatemala. The absence of recent evidence to support the use of *promotoras* in Guatemala, in conjunction with the renewed emphasis on diarrheal case management, led to the current research study. Swider (2002) proposes that although studies have demonstrated effectiveness with *promotoras*, there is a lack of detailed information to facilitate replication of *promotora* training programs.

Research Question

Our objective is to determine the effectiveness of a culturally appropriate *promotora* training program related to ORT, diarrheal management, and dehydration recognition and treatment. This paper explores the factors that influenced the development, implementation, and evaluation of a training program provided to low-literacy women in Guatemala.

Curriculum Development and Planning

The curriculum for the *promotora* program was based on the *Diarrhoea treatment guidelines including new recommendations for the use of Oral Rehydration Solution and zinc supplementation for clinic-based healthcare workers* (World Health Organization, 2005), which was designed to implement the recommendations of WHO and UNICEF. Although these case management guidelines were originally designed for use with clinic-based healthcare workers, we adapted the curricula for use with community-based *promotoras*. In addition, we used information gathered from community focus groups to inform the curriculum. For example, during our focus group and community assessment interviews community members were not aware of the existence or need for ZS in the presence of prolonged diarrhea. This lack of awareness indicated that detailed and repeated information on ZS would be necessary during the training. Several experts; including a nurse educator, a medical anthropologist, a sociologist, and a medical physician reviewed and provided input for the curriculum. Finally, Wuqu' Kawoq, a Guatemalan non-governmental organization (NGO), conducted a review of the curriculum for local cultural context as a final component of the IRB process. At each stage of review, we incorporated the suggestions from experts into the curriculum plan (see Table 1 for the topical outline of the curriculum plan) and evaluation materials.

In order to accommodate low-literacy levels, we adapted the teaching and evaluation materials to simplify wording and improve the readability levels. Readability levels are based on the average sentence length and the percentage of multisyllabic words in phrases. We incorporated the use of pictures and culturally relevant graphics into the teaching materials for this low-literacy Kaqchikel population to facilitate comprehension (Coronado, Sanchez, Petrik, Kapka, Devoe, & Green, 2013; Garcia, Chismark, Mosby, & Day, 2010; Harvey & O'Brien, 2011; Heinrich, 2012). A PowerPoint presentation was created for each topic area with a focus on maintaining the reading level at approximately fourth to fifth grade level or lower when possible. Previous research suggested this level of reading

materials when planning for *promotora* training (Koskan, Friedman, Brandt, Walsemann, and Messias, 2013). Additional adaptations were made to incorporate common wording used by the people in the rural areas of Guatemala. A final review was conducted with a Guatemalan language teacher in Antigua, Guatemala. Graphics were added to the powerpoints that portrayed local products and people of indigenous descent.

The PowerPoint presentations were designed to teach the *promotoras* in the classroom environment. Stories or fotonovelas (photo stories) are a commonly used teaching strategy in many Latin American countries to promote health education (Koskan et al., 2013); thus, stories were developed for the *promotoras* to use when teaching families in their community. In a study in Nicaragua (McDermott-Levy and Weatherbie, 2012), *promotores* (includes both males and females) emphasized the need for materials related to specific health problems to be used when teaching in the community. Two stories were adapted with permission from a local NGO to focus specifically on diarrhea, dehydration, ORT, and the use of ZS. The original stories included drawings of local people wearing traditional Maya clothing and focused on hygiene training using the examples of two children, Gabriela and Felipe. The stories were adapted to incorporate essential information from the curriculum and graphics were added to fit the revised storyline. The storyline relied heavily on graphics to depict the actions of the characters.

Methods

Design and Sample

Following approval by the institutional review board (IRB) of the sponsoring university and approval of the Guatemalan government, this study took place in a rural village in the Department of Sololá, Guatemala. Six months prior to the implementation of the training program, we met with the local *cocode* (mayor and town council) to seek approval to work in the community and to solicit their input on the training program and potential participants. In addition, a local pastor's wife assisted in the process of inviting participants to enroll in the program.

As part of a pre-intervention community assessment, four focus groups (four to six women per group) were conducted to seek the input of local women and to learn about the unique needs of the community that might impact the proposed training. Feedback from the groups indicated that scheduling of the training sessions should allow the women to have time to prepare breakfast and lunch-time meals for their families. Thus, the training program was scheduled over a one week period with the daily sessions to begin at 8:30 AM and end at noon each day. Feedback also suggested that mothers would be more likely to follow the advice of *promotoras* who were mothers. The program was held in a local school, which was chosen based on the availability of adequate classroom accommodations and educational resources (overhead projectors, desks, whiteboards, etc.).

Study Participants

Participants were recruited for the study based on the following criteria: (a) must be able to count to 100, (b) must have attended at least three – five years of primary school, (c) must

be proficient in both Spanish and Kaqchikel (the local indigenous language), (d) must have access to the use of a cell phone, and (e) should be a mother (preferred but not required).

A total of 20 women attended the first day of training. Following a review of the criteria for participation and the provision of informed consent, five women declined further participation. Three women did not meet the criteria due to literacy skills, one woman could not attend all the training sessions, and one woman was pregnant and could not walk each day to attend the program. A total of 15 women agreed to continue in the program. The target community consisted of eight *caserios* (neighborhoods), of which five *caserios* were represented by the women who completed the training.

The training attendees ranged from 17 – 54 years in age. Initially, the investigators anticipated using only women 21 years or older. An amendment was obtained from the IRB of the sponsoring university to facilitate the participation of women 18 years or older. In Guatemala, the age of consent is 18 years. One training attendee did not meet the minimum age requirement of 18 years. She was allowed to attend the training sessions, but could not participate in the *promotora* program. Of the 20 initial training attendees, only four attendees had attended seven or more years of school. Six attendees had only received one to two years of school. The remaining attendees varied in school attendance from three to six years of primary school. On the first day of training, we reviewed the criteria for inclusion in the study and emphasized the importance of having basic skills for reading and writing.

Measures

Data were collected using a pretest and posttest to evaluate the acquisition of knowledge related to ORT and ZS. Approximately 50% of the test consisted of questions using pictorial answers. The remaining questions consisted of simple format questions, such true and false, multiple response, and multiple choice. Multiple choice and multiple response questions were created using pictorial answers. For example, one question asked participants to choose ways to prevent diarrhea. The possible answers included pictures of handwashing, breastfeeding, getting water from the river, boiling water, administering immunizations to infants, and using latrines. The participants were asked to circle all the correct pictures. The test consisted of 17 questions with a total of 44 possible responses (some of the questions contained more than one correct answer).

Quantitative and qualitative data were collected through *promotora* feedback on the training program. Likert scales have been reported to problematic with low literacy Latinos; therefore, self-evaluatory questions regarding skills gained during the training and required for participation as a *promotora* were developed using “I am sure that I can” (*Estoy segura que puedo*), “Maybe I can” (*Quizas si puedo*), and “I am sure I cannot” (*Estoy segura que no puedo*) based on previous Likert-scale research (D’Alonzo, 2011). Three additional open-ended questions allowed the participants to provide feedback regarding the most helpful part of the training, which parts needed improvement, and suggestions to improve future training.

Analytic strategy

Quantitative data from the pretest and posttest were entered into a database (SPSS, Inc., Version 21) to provide descriptive statistics, reliability coefficients, and test for the difference between the pretest and posttest scores using a non-parametric Wilcoxon test. The Wilcoxon test compares the difference in ranks of scores between two paired groups. This non-parametric test is appropriate for small sample sizes when the assumption of distribution is non-normal (Polit & Beck, 2004). Quantitative and qualitative data from the program evaluations were entered into a separate database (Microsoft Excel, 2010). Answers to open-ended questions from the *promotora* feedback were reviewed and categorized.

Implementation of the training program

Because schooling in Guatemala is largely conducted only in Spanish and women who act as *promotoras* must be able to refer patients to the government health system, where most business is conducted in Spanish, *promotoras* need be able to communicate in this language. The pretest was administered the first morning of class and was read aloud in Spanish to accommodate the low literacy skills of participants. Questions were interpreted into Kachikel for participants who expressed confusion about questions written in Spanish. During the test administration, the participants were reminded that they should answer the questions without help from their peers. In the Guatemalan culture working in groups is common and answering questions individually proved to be problematic for several women. Many of the women were also observed to have limited Spanish literacy skills. None of the women in our study could read or write in Kachikel, although this was their first language. Therefore, translation of the training or evaluation materials into Kachikel was not a feasible option.

All educational content was presented in Spanish by the co-primary investigator who is proficient in Spanish, although not a native Spanish-speaker. When questions arose regarding the meaning of specific Spanish words or phrases, one or more of the participants would interpret the meaning in Kachikel to facilitate the comprehension of the group. We continued to emphasize the importance of being literate in Spanish in order to participate fully in the research study as *promotoras*. Throughout the week, the participants were given the opportunity to read aloud the stories of Gabriela and Felipe, because they would use these materials to teach families in their communities. The ability to interpret the storyline to families in the local indigenous language was important. Each woman was provided with a copy of the stories and allowed time to individualize the graphics of the story with color and decorations. Psychomotor skills (e.g., how to mix ORT in the home) were taught with demonstrations, and participants were encouraged to provide return demonstrations. Role play emphasized how family teaching should be conducted. Graphics and pictures were used to review content that had been covered in previous days. Question and answer sessions were conducted through group activities to facilitate the cultural practices of working in groups. The last day of the training session focused primarily on evaluation. The posttest was administered, and the questions were read aloud in Spanish to facilitate the performance of women with the lowest literacy skills. The psychomotor skills gained during the training, such as the correct mixing and administration of ORT, were evaluated individually. At the completion of the evaluation and testing, a small celebration with cake was provided, and

certificates of completion were presented to the women who passed the posttest. Each *promotora* was presented with supplies to be used in her teaching activities. These supplies included salt, sugar, spoons, and written materials to supplement the stories of Gabriela and Felipe. Written materials to be left in the homes with families relied primarily on graphics to serve as helpful reminders about the proportions of salt, sugar, and water to be used to make ORT.

During the program, the women were encouraged to choose a group name and a logo that would be printed on a name badge. This activity was meant to facilitate ownership of the program by the women and also as a way to bring recognition of their role within the community. The women chose the name for their group in their indigenous language of Kaqchikel. The group name emerged as “Ixq’ Ajkunanël,” meaning “Healing Women.” On the last day of class during the graduation ceremony, each woman who had successfully completed the program was presented with a name badge bearing the logo, the group name, and her individual name.

Results

The pretest was administered to 20 women on the first day of class. Four of the 20 pretests contained missing data. The pretest scores ranging from 28 to 70, out of a possible 100. Based on the scores, it was clear that much of the information was new and unknown. For several of the participants, when they did not know the answer they simply skipped the question. A Cronbach’s alpha for the pretest indicated a less than optimal reliability with a score of 0.54. A reliability coefficient of 0.7 to 0.8 is usually considered acceptable for classroom tests (Billings & Halstead, 2012). Reliability scores will be lower with smaller groups of students. During the scoring of the pretest several typographical errors were noted on the test that may have influenced how questions were answered. These typographical errors were corrected prior to the administration of the posttest.

The posttest was administered to 15 women on the last day of class. A total of eight women completed the posttest with a score of 75 or higher, with 75 being the minimum score required for graduation. The passing scores ranged from 80 to 97. The Cronbach’s alpha indicated a higher level of reliability with a score of 0.65, which approached the level of acceptability. No missing data were present for this administration of the test. The mean on the pretest was 41.73 ($sd = 9.65$), and the mean on the posttest was 70.33 ($sd = 21.29$). A non-parametric Wilcoxon test was performed with a significant difference found between the pretest and posttest scores ($Z = 3.040, p < .05$), indicating an increase in knowledge of ORT and ZS.

As part of the final evaluation, each woman demonstrated the preparation of ORT, the ability to read a consent form, and verbalized when to obtain verbal consent for family teaching and where to obtain ORT and zinc. All the participants completed the ORT preparation check-off successfully.

We originally planned to administer daily feedback forms, but recognized the effort was time-consuming and overwhelming to participants after the first day. Beyond low literacy,

the cultural factor of *simpatía* played a significant role in getting useful feedback. *Simpatía* is the value of smooth, pleasing relationships that avoid conflict or confrontation (Organista, 2007). Recognizing the existence of this cultural value, the investigators anticipated that it would be difficult to get honest, constructive feedback on issues that the women may have perceived as less than favorable. All participants indicated on the final summative evaluation a self-perception of “I am sure that I can” (*Estoy segura que puedo*) recognize, treat, and prevent diarrhea and dehydration while teaching people in the community. The open-ended questions revealed that learning how to make ORT and to give zinc was most beneficial. Suggestions for improvement indicated a need for more questions and practice for teaching with their neighbors. Participants also suggested that all content be interpreted into Kaqchikel.

Discussion

The statistically significant difference in pretest and posttest scores suggests that learning did occur, despite the lower reliability coefficients. Linn and Gronlund (1995) suggest that teacher-made tests frequently have reliability coefficients between 0.65 and 0.85. Although the reliability coefficient for the pretest was low, which suggests a potential for less dependable or consistent scoring (Billings & Halstead, 2012), several factors could have influenced this low score. These factors include a small sample size, several typographical errors in the pretest, the high number of tests with missing data, and the potential for miscommunication in the Spanish language. The reliability coefficient for the posttest, however was close to an acceptable range.

Health literacy is “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Heinrich, 2012, p. 218). Health literacy requires the ability to read and understand written materials on a basic level. The researchers believe low literacy levels played the major role in the inability of women to successfully complete the posttest and the program, although low literacy was anticipated and materials adapted accordingly. Minimum literacy was required to enable participants to record and report information on the training sessions *promotoras* would be asked to undertake during the study. Literacy levels were lower than anticipated, though many participants had attended the minimum number of years of school. Low literacy levels are commonly associated with shame and increased anxiety which may have influenced the participants’ willingness to admit their difficulty with reading (Heinrich, 2012). Social desirability commonly influences self-reported behaviors as participants may underreport their abilities in order to avoid embarrassment with their peers or other members of the community. Limited Spanish literacy skills are a common problem in the rural areas of Guatemala. Foster, Anderson, Houston, and Doe-Simkins (2004) encountered difficulty during midwifery training in Guatemala with data collection instruments that required documentation. Their study suggested that the documentation tools would hold promise with midwives who had basic literacy in Spanish. In our study, participants demonstrated commendable effort to return to class each day despite difficulties with reading. As a result, an unanticipated benefit of the study implementation was that additional women who did not become *promotoras* gained practical knowledge on ORT, dehydration, and zinc supplementation.

The existence of language barriers clearly impacted health literacy skills. The inclusion criteria required that participants be proficient in Spanish in addition to their indigenous language. The majority of women did speak and understand Spanish reasonably well, but they experienced greater difficulty in being able to read in Spanish. All of the lectures were presented in Spanish by the investigators, but a native speaker of Spanish may have been easier for the women to understand. We acknowledge the potential for miscommunication or inaccurate interpretations during the training program. In order to decrease this occurrence, having a trainer who is proficient in both Spanish and the indigenous language is important. However, translation of slides and written materials into Kaqchikel would not have improved outcomes, because none of the *promotoras* had been taught to read in Kaqchikel.

Several factors impacted attendance for the program. The pastor's wife, who served as an informal leader within the community, advised us that dismissing women with less than three years of primary school would embarrass participants and would have a negative impact on the program. Agreeing with this advice, we encouraged all women to continue attending classes for their own learning and skills-building. Several women could not participate due to family responsibilities or work requirements outside of the home. Although availability issues were explored during focus groups prior to implementing the program, participants frequently asked to leave early or arrive late. One participant was absent during the week and did not pass the posttest; thus emphasizing the importance of daily attendance. We suggest more flexibility in the schedule and making accommodations to provide make-up activities in the event that participants are absent. Travel issues also influenced participation. Very few people in this rural region have access to a personal vehicle; therefore many of the women had to walk several miles to arrive at the school where training sessions were held.

Cultural beliefs played a significant role in the learning process. As part of the case management guidelines, participants were taught about which liquids were good to give to children experiencing diarrhea. On the pretest no participants selected broth as a good liquid. This response is consistent with the hot-cold theory that is common among the Maya culture. Diarrhea is most commonly considered a hot disease, which should therefore be treated with a cold remedy (Pebbley, Hurtado, & Goldman, 1999). Thus, hot broth is not considered an appropriate treatment in the Maya culture. On the posttest, 27% of the participants still did not select broth as a good liquid for diarrhea. Another cultural belief may have influenced the responses on the test. Many cultures, including Maya culture, believe that breastfeeding should be avoided during periods of diarrhea. On the pretest, only 25% of participants chose breastfeeding as a way to prevent diarrhea. The response rate only increased to 47% on the posttest. Clearly, some cultural beliefs will continue to persist even with training and education. Future investigators or trainers should be aware of these cultural influences and be prepared to make adaptations to program content.

Limitations

Several methodological limitations should be noted in our study. The low sample size influences the power of the statistical tests and the generalizability of the findings. With a larger sample size, we could have explored the differences in knowledge gained that may

have occurred between different age groups (e.g., younger versus older participants). The low Cronbach's alpha may have been associated with the smaller sample size as well. This study was conducted in one rural community with a unique cultural group. Findings may differ when the program is conducted in different or multiple geographical regions with varying cultural groups. Also, the study did not use a control group. Future replication with a randomized group and a larger sample is recommended.

Conclusion

Recommendations for future training of *promotoras*

This paper highlights many of the issues that need to be addressed in order to develop and implement an effective *promotora* training program with low literacy women. We make the following recommendations for future training: (a) use a native Spanish-speaker who is also proficient in the indigenous language for teaching content areas, (b) provide daily handouts so participants can review the information outside the classroom environment, (c) adhere to a schedule that ensures consistent classroom attendance while adapting to the home and family obligations of the participants, (d) ensure that all documents have been written at the lowest level of readability possible or use training materials that do not require literacy, (e) use local grade-level reading standards for determining minimum literacy levels, (f) check all pretests and posttests for grammatical errors that may influence answers, (g) plan additional time for case studies and role play activities, (h) administer a reading test on the first day to determine literacy levels, (i) emphasize from the onset of the training the requirements for successful completion of the program, and (j) provide funds for transportation to attend the training. One of the most challenging issues of developing a *promotora* program in a low literacy population is the development of teaching materials and tracking procedures that do not require reading or writing. Our recommendations for accommodation include: (a) developing educational materials that contain only graphics, (b) assigning one lead *promotora* with higher literacy skills to assist other *promotoras* with documenting teaching activities, (c) using cell phone communication to allow for immediate support, and (d) developing inclusion criteria that allows for younger women to participate in the program. Younger women in the community are more likely to have higher health literacy skills and less family demands. Ongoing educational support and evaluation are planned for the future to determine the retention of the knowledge gained during this program and community perceptions of diarrhea, including incidence and prevalence, and knowledge of ORT and ZS. The results of the ongoing education and evaluation will be reported in future publications. We encourage replication in order to fill the gap that currently exists regarding the training processes of *promotora* programs.

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Table 1

Topical Outline of the Curriculum Plan

Day 1	Day 2	Day 3	Day 4	Day 5
Welcome & introductions Completion of enrollment forms Overview of the program: Roles & expectations Purpose of the program	What is diarrhea? Causes of diarrhea Prevention techniques Treatment protocols Ineffective treatments	IRB training: ethical values, history of unethical research Benefits & risks Voluntary participation Confidentiality Informed consent	Evaluating for complications When & where to make referrals How to communicate with mothers (ask, praise, advise, check)	Post-Evaluation of <i>promotoras'</i> knowledge of dehydration and ORT
Break	Break	Break	Break	Break
Pre-assessment of <i>promotoras'</i> knowledge of dehydration and use of ORT	What is dehydration? Sign/Symptoms Categories of dehydration Recommended treatments Types & recommended administration of ORT	Adult learning principles Methods of learning evaluation	Role Play Scenarios Diarrhea Dehydration ORT/zinc use and preparation Research participants' rights & informed consent Practice with teaching materials	Post-Evaluation
Break	Break	Break	Break	Break
Assessment of cell phone availability Introduction to data collection	Continuation of dehydration Practice with data collection Role play with diarrhea, dehydration, & ORT	Continuation of practice with data collection Role play related to teaching/ IRB protocols	Continuation of practice teaching Check-off on data collection	Celebration Lunch Presentation of Certificates/ Teaching Materials/ Incentives