ORIGINAL ARTICLE

Effect of the oral health care program (FUNDEE) on the oral health care behavior status of elderly ethnic groups living in rural areas: a quasi-experimental study

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Received: 10 March 2022 **Revised:** 26 April 2022 **Accepted:** 7 May 2022 **Available online:** September 2022
DOI: 10.55131/jphd/2022/200306

ABSTRACT

The oral health of elderly people plays a major role in their overall health and quality of life and is an integral part of personal care. The aim of this study was to evaluate the effect of implementing the oral health care program on the oral health status of elderly people living in rural areas. This quasi-experimental study was carried out using a pretest-posttest design on 60 elderly people (30 in the intervention group and 30 in the control group) residing in two randomly selected rural areas of lower-northern Thailand. In the intervention group, the "FUNDEE" model was applied to Hmong elderly people for 12 weeks. The control group received routine care. Using the oral health care behavior assessment tool, the oral health behavior status of elderly people was assessed in both groups on two occasions: a pretest at the onset of the study, and the 12th week after the start of the study. The oral health behavior status of the elderly people in both groups was not statistically significantly different at the baseline, but it changed significantly at the 12th week ($p<0.01$). The implementation of the "FUNDEE" model for elderly people residing in rural areas may improve their oral health status after 12 weeks. It is recommended that the "FUNDEE" model be included in the care plans of all rural areas to improve the elderly people's oral health behavior status.

Key words:
oral health care behavior; aging; elderly; rural areas

Citation:
Songsak Suksan, Supaporn Sudnongbua. Effect of the Oral Health Care Program (FUNDEE) on the Oral Health Care Behavior Status of Elderly Ethnic Groups Living in Rural Areas: a Quasi-Experimental Study. J Public Hlth Dev. 2022;20(3):70-80 (https://doi.org/10.55131/jphd/2022/200306)

INTRODUCTION

The increase in the number of elderly people living in developing countries is one of the most important challenges of the twenty-first century. According to the World Health Organization (WHO), the number of people over the age of 60 was 585 million in 2001 and accounted for 9% of the world population; this rate will double by 2025.[1]

The age structure of the population in many countries is changing into a more aging society. This demographic phenomenon is a consequence of declining fertility and increased longevity. This aging of the population is having profound effects on the social and economic dimensions of many countries.[2]

Thailand has experienced a huge increase in the population of older people similar to the rest of the world. Thailand's older population ranked second at the Association of Southeast Asian Nations (ASEAN) level, accounting for 16.0% of the population after Singapore with 18.0%.[3] Thailand's older population has experienced a surge in recent decades, and in 2002, 2007, and 2011 the rates were 9.4%, 10.7%, and 12.2%, respectively.[2] From Thailand's population aging structure in the 12th National Economic and Social Development Plan (2017-2021), when the older population reaches 19.8%, Thailand would adjust to the aging society.[4]

From the health data, the physical body deteriorations owing to organ dysfunctions were the factors contributing to health problems among elderly citizens. The oral health problem was one of the issues affecting the overall health of the elderly. Some of these problems are insufficient food consumption or digestion and absorption dysfunctions, little or incomplete absorption, and slow digestion caused by decreased hydrochloric acid in the stomach. The slow digestion arising from the slow-moving intestine also affected bowel movement. Furthermore, the decline in the efficiency of the endocrine gland lessened hormones and decreased the nutrient use of the body. Some older people have digestive problems because they are unable to eat food or chew properly owing to tooth loss.[5] The outcome of the Thailand Dental Public Health survey in 2017 showed that 98.6% of older people aged 60-74 suffered from tooth loss.[6] The outcome of the health survey showed that some older people had no access to dental health services, especially in minority ethnic groups.[7]

It has been shown that the oral health status of elderly people is poor and that living in rural areas may increase the likelihood of oro-dental diseases, as well as the need for oro-dental-related evaluation and education.[8] Since the population of elderly people living in rural areas is increasing, and their ability to care for themselves may be impaired due to physical and psychological problems, they need support to maintain their oro-dental health.[9]

Therefore, taking care of one's own oral health is important for elderly people living in rural areas.[10] However, several studies have suggested that offering oro-dental care to elderly people from healthcare providers is a matter of low priority, and also they do not have an appropriate level of behavior about the importance of oro-dental health in elderly people.[11, 12] Thus, there is a need to implement educational programs for healthcare providers to promote oro-dental health care in elderly people.[13] Jablonsky et al. showed that all nursing home employees should take additional training to understand the importance of oro-dental health.[14] Gammack et al. showed that while an oral health education program increased the knowledge of nurses about the oro-dental health of elderly people, it had no effect on the oro-dental health status of

elderly people.[15] To the best of our knowledge, no study has been done on using an oral health care behavior program to train elderly Hmong people and assessing its impact on the oro-dental health status of elderly people in rural areas of Thailand.

METHODS

Population and Sample

The sample in this study consisted of males and females above 60 years of age who had been living in the village of Khek Noi, Khao Kho District in Phetchabun Province for at least one year. A theory on sample size calculation was employed in this quasi-experimental or correlation research. Hypotheses were tested and conclusions were drawn with statistical significance at the practical level of 95 percent reliability. In this study, the sample participants in both the experiment and control groups were adjusted to 30 by the researchers using purposive sampling. The qualified sample participants in this study were elderly persons whose participation was voluntary.[16]

Inclusion Criteria

1. Voluntary older persons with no chronic illness or with only non-serious illnesses who were able to participate in the research activities.

2. Voluntary older persons with the ability to speak and respond in the Thai language.

Exclusion Criteria

1. Older persons with no chronic illness or with a non-serious illness who had declined to participate in this research.

2. Voluntary older persons who were eligible for the oral health care program but absent from more than three activities, etc.

Research Instruments

Data Collection Tools

The aim of the present study was to evaluate the effect of a model for changing the oral health care behaviors of the elderly Hmong people upon the oro-dental health status of elderly people resident in rural areas.

The present quasi-experimental study was carried out using a pretest-posttest design in 2021 on elderly people residing in rural areas of lower-northern Thailand. From a total of 5 provinces, 2 provinces were randomly selected. Power analysis was used to determine the sample size. The power of the test was set at .80, with a 0.05 level of significance and a 50-effect size.[16] The sample size was 60 people. The sample was drawn by random lottery from the lists of elderly people in different villages in lower-northern Thailand. These randomly selected elderly people were divided into an intervention group and a control group, with 30 persons in each group. Among the participants in the study, 29 were females and 1 was male in the intervention group. Based on the inclusion criteria, 60 elderly people were selected by convenience sampling to participate in the study. In total, 60 elderly people, 30 in the intervention group and 30 in the control group, completed the study. The inclusion criteria for the elderly people were elderly Hmong persons aged 60 years and over, and able to communicate in Thai or understand the local language. The date, time, place, and person are recognized normally. The demographic questionnaire was then administered to the elderly Hmong people. Also, three experts in oro-dental health provided comments that were used to determine the validity of the questionnaires. The internal consistency reliability of the oral health care behaviors questionnaire was in an acceptable range (Cronbach's alpha= 0.852).

Data Analysis

Reliability was evaluated according to data collection by equivalent forms between the data from the interobserver reliability (researcher and the colleague), which was statistically significant ($p <$

0.001), indicating very reasonable reliability. Demographic information and behaviors questionnaires were completed by the elderly Hmong in northern Thailand. The elderly Hmong in two provinces provided baseline measurements (pretest). The elderly Hmong at the intervention center were invited to participate in a training program, which consisted of four 90-minute sessions, twice a week, for two weeks. At the end of the two weeks, the oral health care behaviors questionnaires were completed again by the caregivers in both centers as a posttest. The researcher completed the demographic questionnaire and the oral health care behaviors for elderly people before intervention in the two groups (pretest).

Behavior levels on oral health care were split into three levels from the lowest to the highest score for the elderly Hmong using the criteria described previously according to Best's 15 criteria: poor (a score of <34%), moderate (a score of 34-66%), and good (a score of >66%).[17] The researcher reassessed their oral health behavior status using the oral health care behavior assessment form in both centers after 4 weeks and 12 weeks of the oral health behavior being implemented by the caregivers (posttest).

Proper space and facilities were provided for the elderly people who were able to independently carry out their oral care, and only needed reminders or monitoring.

Descriptive statistics including frequency, mean, percentage, and standard deviation were applied in the analysis phase of this study. The paired-samples t-test was used to compare the oral health care behaviors between, before, and after the experiments of the experimental group and the control group. The independent samples t-test was used to compare the oral health behavior between the experimental group and the control group using the SPSS application program.

Experiment Tools

The participation program on oral health behaviors for older persons' behavior development for the older persons' health behaviors concept comprised six aspects: Role model (F), Perceived benefits (U), Emotional stimulation (N), Use of persuasive words (D), Perceived susceptibility (E), and Successful experience (E). Experimental schemes were as follows:

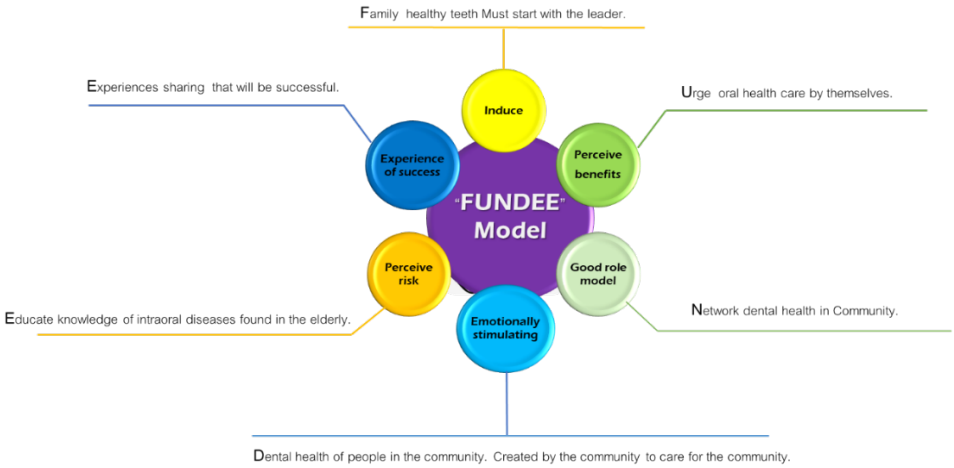


Figure 1 Behavioral Modification Model (FUNDEE model)

Conceptual Research Framework

Upon completing the literature review, the researchers applied the concept of Orem's self-care theory which states "selfcare is the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well-being".[18] This concept was used in conjunction with Pender's health promotion theory,[19] which is based on the concept of cognition that expects the outcome caused by behaviors or outcome expectancies. The researchers applied Rogers' (1959) theory of the notion of self or self-concept. This is defined as "the organized, consistent set of perceptions and beliefs about oneself". It consists of all the ideas and values that characterize 'I' and 'me' and includes perception and valuing of 'what I am' and 'what I can do'.[20] Promoting mental health activities in the area of self-esteem by allowing the elderly to consider themselves will enable them to perceive their own values and priorities in various fields. The ability to take care of themselves in daily life can result in greater levels of self-recognition, leading to a higher quality of life at an older age. To be happy in life will help the elderly to change their view toward themselves creatively. They are enthusiastic about taking care of their health and are able to develop themselves to be elderly with better mental health.

Hmong Elderly Health Care Behavior Modification Program "FUNDEE" Model

1. Using the Role model (F)
- Activity "Family increase the resistance" (as a prototype)
- Activities carried out by "Clan Leader"

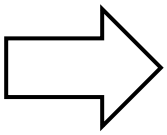
2. Perceived benefits (U)
- Organize a meeting to enhance knowledge and understanding about your own oral health care
- Activities "Incite to know to see for yourself"

3. Emotional stimulation (N)
- Set up a team to care for the elderly in dentistry
- Co-production of Hmong dental health media such as Hmong audio
- Speech competition "Good teeth, no decay, can be used for a long time"

4. Use of persuasive words (D)
- Audio activities along the lines through the broadcast tower
- Share experiences from role models to emotionally stimulate self-care
- Learning to exchange oral health care

5. Perceived susceptibility (E)
- "Give to increase and fill the deficit" activity
- Activity "Be aware so that you won't risk it"

6. Successful experience (E)
- Activities to share experiences of oral health care



Oral health care behaviors of the Hmong elderly

Figure 2 Research Framework

Human Research Ethics

This study was conducted following the ethical standards of the Declaration of Helsinki, the Belmont Report, the Council for the International Organization of Medical Science (CIOMS Guidelines) and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP). Ethical approval for this study was obtained from the Human Research Ethics Committee, Naresuan University (IRB No. P10006/63).

RESULTS

The greater percentage of caregivers who participated in the study were women and their mean age was 69.47 ± 6.84 years. The elderly people in the intervention and control groups were homogenous in terms of gender and educational level ($p > 0.05$). There was no significant difference between the two groups of elderly people in terms of gender, educational level, marital status, level of independence, and underlying disease, ($p > 0.05$). The mean age of the elderly people in the intervention group was 69.47 ± 6.837 years, compared to 71.78 ± 6.163 years in the control group ($p=0.001$). The results showed that the difference in the ages of the elderly people had no significant effect ($p = 0.781$).

Table 1 demonstrates that the first behaviors scores of the elderly people in the two groups were not significantly different ($p = 0.400$); however, Table 2 shows that there was a significant difference in the behavior scores between the two groups after the training sessions ($p = 0.0015$).

Table 1: Comparison of the pretest behaviors scores of elderly people in the Experiment and Control groups. (n=30).

Pretest Behaviors Scores	Number	Mean (S.D.)	Mean Difference (Pretest)	t	df	p-value
Oral Health Care Behaviors						
Experiment groups	30	43.60 (5.636)	-0.333	-0.254	29	0.400
Control groups	30	43.93 (4.456)				

**Statistically significant at p < 0.05*

Table 2: Comparison of the posttest behaviors scores of elderly people in the Intervention and Control groups. (n=30)

Posttest Behaviors Scores	Number	Mean (S.D.)	Mean Difference (Posttest)	t	df	p-value
Oral Health Care Behaviors						
Experiment groups	30	47.17 (4.340)	3.600	3.126	29	0.0015**
Control groups	30	43.57 (4.576)				

* *Statistically significant at p value < 0.05*
** *Statistically significant at p value < 0.01*

Table 3 demonstrates that the behaviors scores of pretest and posttest on oral health of the elderly people in the intervention showed a significant difference ($p < 0.001$**); however, Table 4 shows that the behavior scores for pretest and posttest on oral health were not significantly different ($p = 0.642$).

Table 3: Comparison of the mean pretest and posttest oral health scores of the elderly people in the Intervention. (n=30)

Experiment groups	Mean	S.D.	t	df	p-value
Oral Health Care Behaviors					
Pretest	43.60	5.636	-4.018	29	<0.001**
Posttest	47.17	4.340			

* *Statistically significant at p value < 0.05*
** *Statistically significant at p value < 0.01*

Table 4: Comparison of the mean pretest and posttest oral health scores of the elderly people in the Control groups. (n=30)

Control groups	Mean	S.D.	t	df	p-value
Oral Health Care Behaviors					
Pretest	43.93	4.456	0.469	29	0.642
Posttest	43.57	4.576			

**Statistically significant at p < 0.05*

A paired t-test with repeated measures was conducted to explore the impact of the training of elderly Hmong people in rural areas on the oral health status of elderly residents in these rural areas. The between-subjects variable was whether or not the elderly Hmong people were trained; the within-subject variable was repeated measures of appraisal time (study onset, end of 12th week); and the dependent variable was the oral health behaviors status scores of the rural area residents as measured by Behavioral Assessment Form. An alpha level of .05 was used for statistical significance. Means and standard deviations are shown in Tables 1-4, and a line graph of the results is shown in Figure 3.

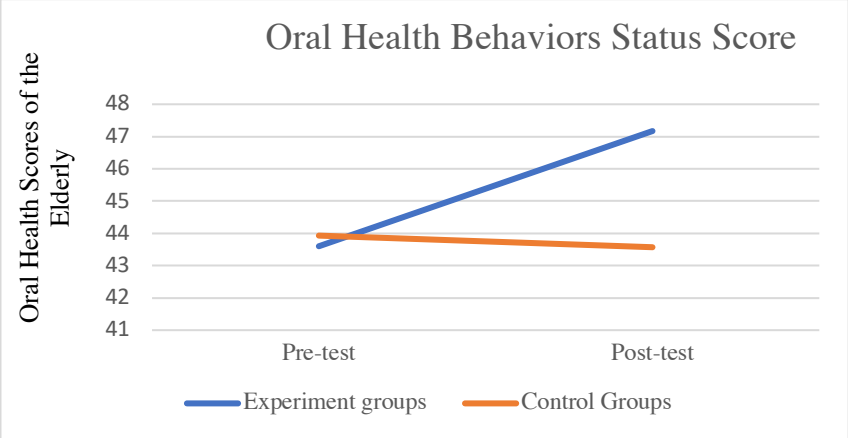


Figure 3 Trend of oral health behaviors status scores at the study onset, and the end of the 12th week in the two groups.

The assumption of normality was met. There was also a significant interaction between appraisal time and training of the elderly Hmong people. Therefore, post hoc tests using the Bonferroni correction were conducted to assess the simple effects. Examination of Table 1 indicates that the oral health behaviors status of rural area elderly residents was similar at the study onset, but improved considerably at the end of the 12th week in the intervention group, suggesting a positive effect of caregivers' training on the oral health status of rural area elderly residents. Post hoc Bonferroni pairwise comparison tests (α=.005) revealed that the oral health scores were significantly different at the study onset and the end of the 12th week (t=3.600, df=29, p=0.0015*). In the control group, the oral health behaviors mean scores were different from the study onset to the end of the 12th week, although such differences were not clinically significant. The mean score difference at the end of the 12th week was not statistically significant (t=0.469, df=29, p=0.642).

Moreover, there was a significant difference in oral health behaviors mean scores between the elderly Hmong residents of the two rural areas at the study onset (t=-0.254, df=29, p=0.400). Although this difference is indicative of a slightly better oral health status in the intervention group, it was not clinically important. Also, the oral health status mean scores at the end of the 12th week (t=-4.018, df=29, p<0.001**) were significantly different. This shows a substantial incremental improvement in the oral health behaviors status of the elderly Hmong residents only 12 weeks after training.

DISCUSSION

The results of this study indicated that the "FUNDEE" model significantly improved the oral health behavior status of elderly people living in rural areas. Based on the behavior questionnaire, the mean behaviors scores of the elderly Hmong people in the intervention group after 12 weeks of training sessions increased compared to the control group. Also, the oral health status of the elderly people in the intervention group was significantly improved. The findings of the present study are in line with the results of the studies reported by McKeown et al.,[21] Le et al.,[22] Kim et al.,[23] and De Visschere et al.[24]

Le et al. carried out a study on residents in nursing homes. The caregivers were educated about oral care using a 40-minute video, which was a shorter training session than provided in our study. The

results showed that the plaque index (PI) and the knowledge of the caregivers improved from the beginning of the oral health education program to six months after the intervention,[22] which agreed with the results of our study. Visschere et al. evaluated the implementation of an oral hygiene protocol over five years. In their study, a one-hour training session was provided for caregivers to explain the principles of intervention, and to provide theoretical and practical education about oral hygiene. In this case the length of the single training session was obviously shorter than the training sessions in our study. They found that the dependence level was correlated with the dental plaque score, which is consistent with our results. Also, it has been shown that two years after the implementation of the OHCP in the nursing home, the dental plaque score reached its lowest value and the oral health status of elderly people improved.[24] These results were consistent with our findings. The reason for the agreement of the results between the two studies is related to the oral hygiene protocol and the education given to the elderly Hmong people.

Kim et al. examined the effect of an OHCP on stroke patients in an intensive care unit. The OHCP was conducted for two weeks. The OHAT was employed to assess the impact of the OHCP on the oral health status of elderly people. The results showed that the PI and the gingival index (GI) were much lower in the intervention group than in the control group,[23] which was similar to our results. One possible reason for this similarity is the implementation of the OHCP, which is a coherent and systematic program. Simon et al. assessed an oral health training program for the caregivers of elderly people in residential homes. The results showed no changes in the status of oral hygiene or the PI six months after the intervention, which was inconsistent with the results of our study.[25] This difference between studies may be due to the absence of trained elderly people during the six months in the same nursing home, insufficient time given to provide oral care by the caregivers, and the lack of adequate facilities to provide optimal care. Overall, despite the differences in the duration and types of training in the various studies, a majority of the studies showed that training the elderly people improved the oral health of those elderly people living in rural areas with varying degrees of dependency.

Some of the limitations of the present study were the elderly people who were unwilling to participate in the training courses, the failure of the managers in the rural areas to provide a suitable place for training the elderly people, and the failure of the elderly people to follow the instructions correctly.

RESEARCH FINDINGS

Posttest results of the oral health behaviors program for the elderly showed improved levels of oral health behaviors as well as health behaviors representing improvements over the pretest and the control group.

RESEARCH STRENGTHS

The training of the elderly Hmong people and subsequent implementation of the “FUNDEE” model by those elderly people for 12 weeks significantly improved their oral health behaviors status. It is recommended that the “FUNDEE” model be implemented in all rural areas to improve the oral health status of elderly people.

RESEARCH WEAKNESSES AND LIMITATIONS

This quasi-experimental research was conducted with sample participants aged 60 years and over, some of whom exhibited signs of physical deterioration. Some participants had problems answering

the oral health behavior questionnaire. Most elderly individuals in the sample had poor eyesight, rendering them unable to read. This, in turn, consumed more time during the data collection process. To solve this weakness, it is necessary to organize activities to focus on two-way communication to ensure that perceptions of information are correct and consistent. Furthermore, the research was conducted in an expedited manner due to the restrictions imposed by the COVID-19 epidemic.

Since this study is area based, the group was divided into an experimental group and a control group. To prevent contamination of the intervention we studied, the sample participants were not randomly assigned to the experimental or control group. Therefore, it may be a limitation that this study is a quasi-based study. To ascertain that the baseline characteristics of the two groups were not different because of the areas on which they were based, the investigators confirmed by testing. See the differences in Table 1.

RECOMMENDATIONS FOR RESEARCH

Further research should cover innovative health literacy media production and its accessibility to the elderly so that the sustainable development of health literacy and quality of life of the elderly can be attained. The researcher confirmed the behavioral change model for oral health care for the elderly Hmong in Health Area 2 under the “FUNDEE” model.

ACKNOWLEDGMENTS

This study has been adapted from the results of a Doctor of Public Health Program thesis from Naresuan University. The study was conducted with the academic and scientific support of the Faculty of Public Health. We would also like to thank all those who assisted us in this study.

FOOTNOTES

Conflicts of interest: All authors declare no conflict of interest; no conflict of interest exists for any of the authors associated with the manuscript. The organization had no role in the design and conduct of the study, or in the collection, analysis, and interpretation of the data.

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