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Implementation of a Geographic Information System-Based Smartphone Application for Health Vigilance in Older Adults by Village Health Volunteers (OSOMO)

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Abstract This paper mainly studies the smartphone application for health vigilance in elderly adults, based on geographic information system (GIS) for village health volunteers (OSOMO in Thai) to monitor elderly's health. Eight areas from 4 provinces of 7th health territory (Roi Et, Khon Kaen, Maha Sarakham, and Kalasin) were employed for research. The smartphone application called "OSOMO Prompt" was created for both iPhone (iOS) and Android devices for 1,246 OSOMOs. The comparison results of the difference of mean scores of knowledge of before and after using the "OSOMO Prompt" smartphone application, showed that the trial group, 240 elderly participants had the mean scores after smartphone application use of 1.69, higher than before use smartphone application. The results also indicated a statistically significant difference (p-value < .001) at 95%, confidence interval between 2.15-1.22. In conclusion, the "OSOMO Prompt" smartphone application was proved as a tool for village health volunteers to make health decision for the elderly persons. Moreover, the system was easy to use and could improve the quality of the elderly's healthcare.

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Keywords Smart phone application, Geographic information system, Community health, Elderly population

1. Introduction

Medical service industry is creating various tools for health promotion. Aging society has changed paradigm of medical services and makes smart health become an important issue [1]. With the increasing number of elderly people and advance of technology, creation of age-friendly environments is a priority in the design of new products [2]. Mobile phones have been closed environments until recent years [3]. Mobile devices such as smartphones and tablets play a very important role in our daily lives. Particularly, the sector that has benefits from eHealth are elderly persons, who can live in age-friendly environments [2]. This study described outcomes of the smartphone application called "OSOMO Prompt" for health surveillance in elderly adults based on geographic information system (GIS) [4] allowing village health volunteers (OSOMO in Thai) to monitor elderly's health information in the area responsible for the 7th Health Territory. The "OSOMO Prompt" smartphone application also obtains the map showing the elderly's residential location – a map supporting data to identify the risk points of chronic disease of the elderly, as well as the road map for convenient access to hospitals for the benefit of the elderly. The development of "OSOMO Prompt" smartphone application will benefit the village health volunteers who are the frontline of the community which such information can be transmitted from the application to the relevant medical services or public health authorities.

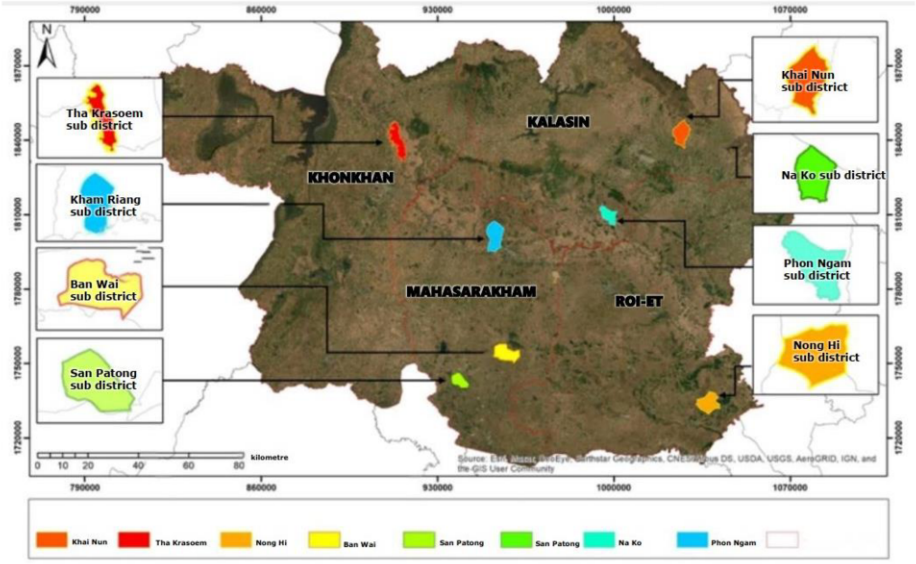

Figure 1. Boundaries of the 7th Health Territory

2. Methods

2.1. Locations

The 8 areas for this research were Nong Hee from Roi Et province, Tha Kra Serm from Khon Kaen province, Kham Rieng, San Pa Tong, Na Chueak, and Ban Wai from Maha Sarakham province; and Khai Noon, Phon Ngam, and Nako from Kalasin province. The total of participants is 8,949 older people and 1,246 of Village Health Volunteers. All research protocols have been performed in accordance with the Declaration of Helsinki, voted by 2 reviewers, approved by the Ethical Review Committee for Human Research, Maha Sarakham Provincial Public Health Office, and endorsed by the chairperson Mr.Pakee Sappipat (No.6/2564).

2.2. Population and samples

A total of 1,246 village health volunteers were selected from 8 villages, 30 people for each village were selected for each sample group, which come to the total of 240 village health volunteers.

2.3. The trial program of "OSOMO Prompt" Smartphone Application

The smartphone application calls "OSOMO Prompt" was created for both iPhone (iOS), Android devices and web browser, that allows 1,246 village health volunteers to interact with the monitoring of elderly health information. The main page menu consists of 4 menus: 1) health assessment, 2) home visit, 3) knowledge management menu, and 4) emergency [5]. Then "OSOMO Prompt" was tested for language grammar, computer language, accuracy to obtain results and database system on the smartphone system by three IT experts. Implementation of "OSOMO Prompt" was tested by village health volunteers using a one group experimental model (before-after used) for comparing the scores of using the smartphone application.

3. Results

The results showed that most volunteers answered the question "how to test blood sugar level" correctly (96.30 %), followed by ability to indicate the elderly at risk of cardiovascular disease correctly (93.30%). However, they had low scores for the risk of malnutrition (14.60%) and dementia testing (9.20%). The 240 participants had an average of 10.49+2.53 and 12.18+2.76 before and after using application, indicating a significant difference ($p < .001$) (Table 1).

Table 1. Comparison of mean scores of knowledge of village health volunteers (n=240).

Knowledge	n	Mean	SD	Mean difference	95% Mean difference		t	df	P-value
					Lower	Upper			
Before	240	10.49	2.53	-1.69	-2.15	-1.22	-7.12	239	<.001
After	240	12.18	2.76						

4. Discussion

The village health volunteer will be able to access that main screen of "OSOMO Prompt" smartphone apps. These four menus are accessed through a physical button found at the middle of the screen. It allows village health volunteers to assess the elderly health, this found that the expect context menus in the default mobile application should be designed for natural position of thumbs [6]. The "OSOMO Prompt" smartphone apps allowed the village health volunteers view health history of the elderly persons. In addition, depending on selected from 4 main menus from the apps of smartphone. This evidence verified that the changed environment brought additional opportunities for the current mobile application developers [7].

5. Conclusions

The "OSOMO Prompt" smartphone application improved knowledge of village health volunteers. The "OSOMO Prompt" smartphone application allowed interaction between village health volunteers and healthcare professionals through information transfer from the application to the public health authorities.

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