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The Development of Geographic Information System for the Elderly Healthcare Management in Thailand

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Abstract--- *This research aimed to develop the elderly's health database by applying the Geographic Information System* (*GIS*). *The sample of this research is carried out on people aged 60 years and over with 1,023 elderly people, five healthcare professionals, two chiefs of the village, and 30 health volunteers in the studied area. The necessary data for this research are as follows*: *1*) *The elderly population data in the area which consisted of the locations of the elderly's accommodations, data concerning the elderly's health, and other general information such as age, profession, etc.; 2*) *the creation of a database system in terms of applying GIS, which is the use of spatial data from the offline database, in order to develop the elderly health mapping; 3*) *the utilization of the online database through the website in order to be applied as a guideline for the elderly healthcare management in the studied area. The results of this research are as follows*: *1*) *the health mapping for the elderly in Tambon Nong Phra, Wang Thong District, Province of Phitsanulok classified by the set of data from both online and offline systems. The mentioned database was presented by visualization in order to make it possible to interpret the map instead of reading from a data statistics table. The data can also be always updated. 2*) *The results can be a guideline for Nong Phra Health Promoting Hospital in Wang Thong District, Province of Phitsanulok to utilize the developed database for the purpose of the elderly's healthcare management in the mentioned area.*

Keywords--- *elderly, database, geographic information system (GIS)*

I. INTRODUCTION

The Division of Older Persons Welfare Promotion and Rights Protection estimates that the elderly population will increase by 20 percent in 2021, which means that Thailand will become a complete aging society [1]. The National Statistical Office in 2017 conducted a survey of Thai people around the country in 2017 and identified the overall number of elderly people, those at the age of 60 years old and older, and found that the total population was 65,931,550, of which 9,934,309 were elderly, representing 15.07 percent of the nation's total population [2]. The Phitsanulok city in Thailand had 140,148 elderly people, representing 16.19 percent of the province's total population, which was higher than the national statistics [1]. There are 1,023 elderly people in Tambon Nong Phra, Wang Thong District, Phitsanulok city,

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Thailand, which represents 20 percent of the village's total population. This means that Tambon Nong Phra has completely become an aging society [1].

The change in the elderly impacts their physical, mental and emotional problems. If the elderly do not make adjustments in themselves, these problems will cause them irritability or depression. They would probably think that they are worthless. Consequently, it causes them physical and mental health problems, especially chronic or non-communicable diseases, which need to be cured and requires receiving medical treatment for a long time. This has an impact on both the elderly themselves and their beloved family in terms of resources needed for their health and society [3].

Nowadays, most of the basic data of the elderly are classified in the "paper and press" form, which is not convenient to use. Information and communication technology (ICT) can efficiently help us to classify information of the elderly. It is convenient for searching information and it can be always be updated. Organizations should apply this technology to be used in their work in order to reduce problems and obstacles. It can also enhance the effectiveness of elderly healthcare management. The application of the GIS and the advancement of spatial data analysis – for the health data management of the elderly – are ways which can effectively help involve organizations to use information for their elderly healthcare management [4].

According to the interview with the chief of the village and the healthcare professionals in the area, it found that the information relating to the elderly in the area was kept in paper form with the Microsoft Excel program. It also found that searching for information was very slow, and the information was not updated. The elderly's health information was not covered in all terms. Thus, an online elderly database development becomes a beneficial mechanism to analyze, design, and decide for the elderly's healthcare management. This study is a part of the study that reports the finding on the process of development of Geographic Information System (GIS) for the elderly healthcare management in Thailand. The study aimed to develop the elderly's health database by applying GIS [5].

II. METHODS

After being approved by the Naresuan University Ethics Committee on the 8th of November 2020 (COA No.666/2019, IRB No.06615/62), the researcher first performed a qualitative assessment of the stakeholders in the community, which included a director of a Health Promoting Hospital, health officials, chiefs of the village, village health volunteers and the elderly, about the elderly's health situation and needs and key informant interviews. The collection of information from the study of the elderly's health situation and needs in the first phase was carried out by using the developed instrument. The instrument consisted of the elderly's health questionnaire applied using Google Document. The information could be gathered via a mobile phone. All volunteers passed training on the instrument's application and the information collection. After passing the practical test, they went to the research field. During the information collection phase, the quality control and verification of the information were organized. The researcher created a group chat on the Line mobile application that made the follow-up more convenient and faster.

The registration and collection of the geographic information were carried out via the EPIDATA version 3.1 program. The information was analyzed by using the STATA version 12.2 program in order to examine, report, assess and develop a geographic information database. The report was presented with the Microsoft Excel program because it is a fundamental and easy-to-understand program.

III. RESULTS

After analyzing the data, the information analysis could be reported and discussed to the community for the purpose of furthering the elderly's healthcare management. The director of the Health Promoting Hospital and health office were interviewed regarding the validity of the information displayed in the maps, their ability to interpret them, and their confidence in sharing them with other community stakeholders.

The satisfaction assessment of the elderly's health database, which was applied with a free and open source GIS software, as an offline system from the in-depth interviews, found that the stakeholders – healthcare professionals, chiefs of the village and village health volunteers – were satisfied with the clear and easy-to-understand presentation of information. The information is also updated. Two main themes were identified as follows: (1) Easy to understand and (2) Saves time and resources.

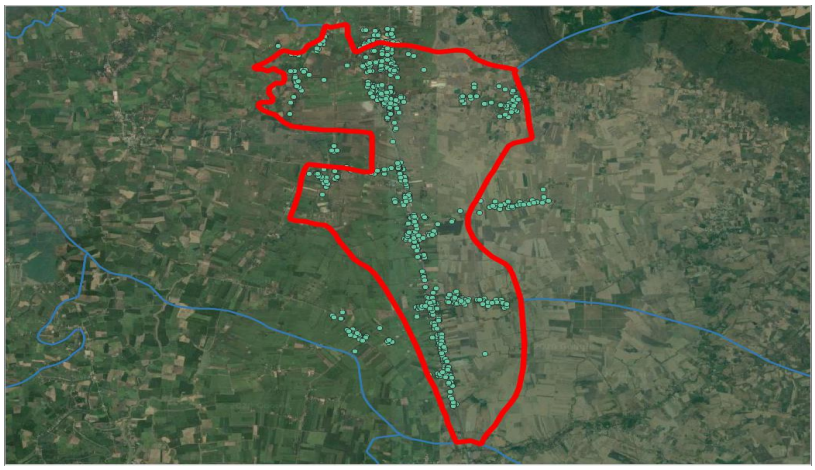

Figure 1. The locations of the elderly's accommodations in QGIS.

In addition, the visualization of the elderly's healthcare management can be employed as an online system through the Google Map's website. Figure 2 shows an example of the elderly's accommodations locations and the details of the elderly for healthcare management. The elderly's health information and online map on the Google Map also benefits for healthcare professionals to assess the accessibility of health services. For example, the suitable route from the elderly's accommodations to a local public hospital is carried out by routing on the Google Map, as shown in Figure 3.

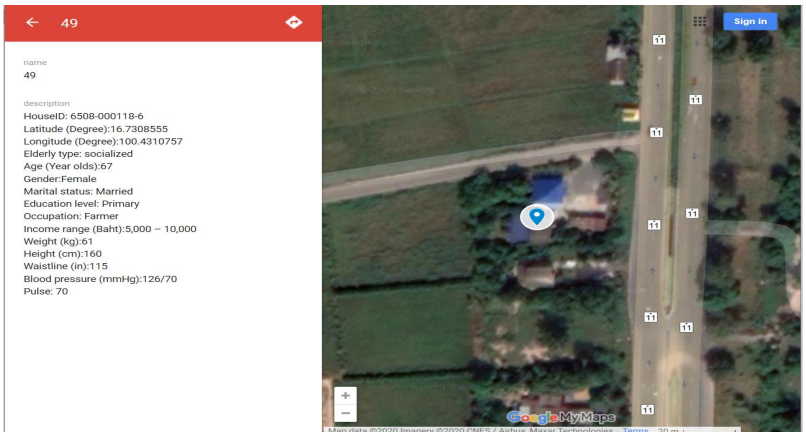

Figure 2. An example of the elderly's healthcare management based on the Google Map's website.

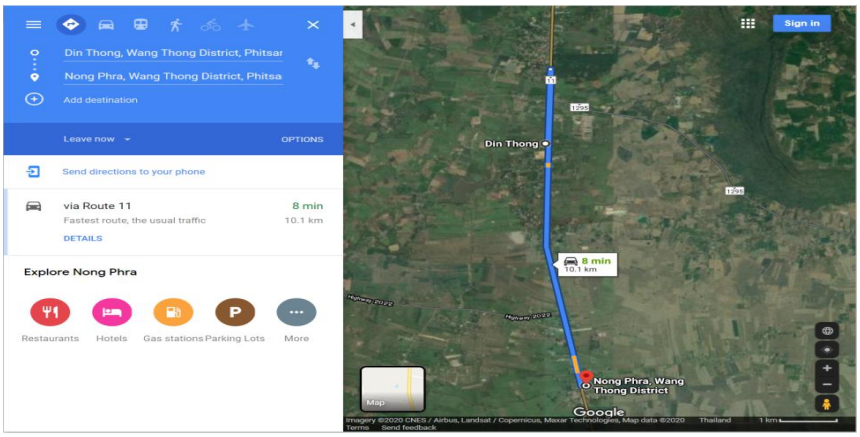

Figure 3. An example of finding route from the elderly's accommodations to health services using the Google Map's website.

IV. DISCUSSION

This research and development aimed to develop the elderly's health database by applying GIS in Tambon Nong Phra, Wang Thong District, Phitsanulok city, Thailand. The research has the objectives to develop the elderly's information and to solve related problems. The results of this research can be directly used to serve the actual needs and problems of the community.

From studying of the elderly's health situation and need it was found that the community requires a practical development of the elderly's health database. The information must be completed and valid in which the community takes part in the development by giving them an opinion and by fixing the content and making a framework. This is in accordance with the policy of the Ministry of Public Health in 2012 [6]: "a sustainable health achievement must allow the community to cooperate with the public sector". The community recommended the process of information collection by using the community itself in every step of the development. This is in accordance with the policy of the World Health Organization (WHO) in 2015 [7]: "in order to take care of the community, it depends on the participation of every sector". Concerning the elderly's health database, which is applied with GIS, it must always consider every aspect to reach the maximum benefit, to serve the user's needs and to be practical to use. This is in accordance with Booncheing et al, in 2014 [8], who studied a health database development by using GIS at the Province of Chiang Mai.

During the information collection phrase, the quality control and verification of the information were held. The researcher created a group Line application for making the follow-up more convenient and faster. This is in accordance with Patthanaroj [9], who, in 2016, studied the application of GIS to build a Health Promotion Model by using public participation. She concluded that "the system development shall allow the concerning population to participate in every step and the information collection phrase because the population in the area know well the content and their routine. It will consequently give us valid and reliable information."

From the satisfaction of the assessment of the database development with a sample group, it was found that they were satisfied with the public participation in the development process. The community was satisfied with public participation, which makes the database development successful, and the community was able to give suggestions concerning the management. This is in accordance with the study of Khunchamnan and Thippacha (2018), who studied the village's philosopher knowledge database development for creating a sustainable community business by using

information technology [10]. Database development can be useful for the user to solve health problems in the community. This makes an efficient performance, which is in accordance with the study of Tonee (2015) who found that, after participating in the public participation program, the population gained knowledge, attitudes, and practice [11].

V. CONCLUSION

The GIS is an existing tool applied to highlight community assets and display spatial patterns in a way that was not previously possible. The GIS was used for the geographic mapping of data collected from a wide range of sources, so that healthcare professionals can investigate the factors associated with health problems of the elderly in the community. The system helps the user to manage and gives the user convenience to search the information for transferring it to the next generation. Thus, the best way to maximize the benefit of the database is to create the continuation of public participation.

CONFLICT OF INTEREST

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REFERENCES

[1] Anantakun, A., "Elderly People," *The meeting of National Academy and Members of Thammasat University and Political Bureau (The Royal Institute)*, 2017. http://www.royin.go.th/wp-content/uploads/2017/12/%25E0%25 (accessed Sep. 21, 2018).

[2] National Statistical Office, "The survey of Thailand's elderly population of 2017," 2017. http://www.nso.go.th/sites/2014en/Survey/social/domographic/OlderPersons/2017/Full Report_080618.pdf.

[3] Kiatsawee, S., "The main factors that help Thai people live longer," 2013. http://www.thaicentenarian.mahidol.ac.th/TECIC/index.php?option=com_content&view=article&id=276:201. (accessed Sep. 09, 2018).

[4] Chaiwan, J., Boonchieng, W., & Narin, R., "Development of migrant worker Health Community Database System Using Geographic Information System," *J. Public Health (Bangkok).*, vol. 46, no. 3, pp. 248–260, 2016.

[5] Jirakajornkul, S., *Learn Geometry with ArcGIS Desktop 9.3.1*. Nonthaburi: S.R. Printing Mass Products Limited, 2009.

[6] Bureau of Policy and Strategy, "A Report of achievement of health implementation program under MoPH policies and strategies for fiscal year 2012," 2012. Accessed: Sep. 09, 2018. [Online]. Available: http://bps.moph.go.th/new_bps/sites/default/files/health_statistics2555.pdf.

[7] World Health organization, "Community involvement in Health," 2006. https://www.who.int/bulletin/volumes/94/5/15-168492/en/ (accessed Sep. 09, 2018).

[8] Boonchieng, E., Boonchieng, W., & Senaratana, W., "Development of mHealth for public health information collection, with GIS, using private cloud: A case study of Saraphi district, Chiang Mai, Thailand," in *Proceedings of the Computer Science and Engineering Conference (ICSEC)*, 2014, pp. 350–360, [Online]. Available: https://ieeexplore.ieee.org/document/6978221.

[9] Patthanaroj S., "Application of GIS in the creation of a health promotion by the participation of the community .," Chiangmai Rajaphat University, 2019.

[10] Khunchumnan, P., Tipprapa, P., Nongyao, I. & Theepakorn, N., "Development of Data Ware

accomodations wisdom of the wise people in the community," *Rajamakala University of Technology Srivijaya*, 2015. https://repository.rmutsv.ac.th/handle/123456789/440.

[11] Tornee S., "Community Participation for Exercise Behavior Promotion in Ban Plaiklong, Ongkharak District," *J. Public Health (Bangkok).*, no. Special Issue, pp. 104–106, 2015, [Online]. Available: http://www.peswu-journal.info/article/74.