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A spatial relationship between density of agricultural land and unmet need for work among elderly in Thailand

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ABSTRACT

Background: Thailand's aging society is growing as compared to the youngers because of the decreasing birth rate. The transition to an aging society affects the country's economic system, employment systems, institutional systems, and families. Less productivity of older workers leads to issues like farm succession problems and elderly unemployment.

Objectives: The purpose of this study was to assess the proportion of unmet needs for work among the elderly and the spatial association of the density of agricultural land in Thailand.

Methods: Data set of 2017 Elderly Population Survey of the National Statistical Office and agricultural area information of the National Statistical Office Thailand were used**.** A Moran's *I* and Local Indicators of Spatial Association were used to identify the spatial autocorrelation between unmet needs of work among elderly and density of agriculture land in Thailand. Quantum GIS program and Geo Da program were applied to analyse spatial data.

Results: The highest prevalence of unmet needs for work among the elderly in Thailand was in Bueng Kan Province (78.32%) and the lowest was in Lamphun Province (37.20%). Univariate Moran's I analysis showed that there was a concentration of surrounding neighbourhoods with the work needs of the elderly (Hot spot or High-High) in the Samut Prakan Province, and Bueng Kan Province (red area). A high concentration of agricultural land densities with the high unmet work needs of the elderly was found in the Udon Thani and Bueng Kan Province.

Conclusion: The findings of this study show the positive and statistically significant relationship in Thai population between agricultural land density and unmet work needs among the elderly. Concern agencies can use the results of this study to establish values and social roles for the elderly in Thailand. Furthermore, this study enables policymakers in the agriculture industry to create and implement an acceptable working environment based on the willingness of elderly.

Keywords: Density of agricultural areas, Elderly, LISA, Unmet need

1. Introduction

Thailand's transition to an aging society, which impacts the institutional structures, families, employment systems, and economic system, is a significant issue as a result of the country's declining birth rate [1]. Thailand is estimated to encounter labour shortage in the future [2]. Therefore, It is critical to emphasize the desire of the elderly to work more in the present era, as some elderly still have potential expertise and the ability to work effectively [3].

Thailand's agricultural regions are varied and significant to the nation's economy and society. However, the working age group is currently losing ground in agricultural jobs, which has an impact on the nation's economy, industry, and agricultural output and income [4]. There are drawbacks to relying solely on labour from nearby nations because such nations have labour demands of their own as well [5]. So, Thai society needs to develop public policies that support the elderly to work efficiently to tackle the labour shortage problem [6]. However, according to the Thailand National Statistical Office's Elderly Population Survey published in 2022, only 36.86% (4.88 million) of the elderly were employed [7].

Spatial analysis is a type of study that identify whether a specific location has a significant impact on knowledge and decision-making in many dimensions of resources and environments in planning policies. It can be used to analyse trends and spatial systems, manage spatial resources, plan and implement health policies [8].

Although it is important to identify the possibility of elderly people working in the agricultural sector, there has been no study showing agricultural land having a spatial relationship with the unmet work needs of the elderly in the past. Therefore, this study aimed to find out spatial autocorrelation of proportion of unmet work need among elderly and the density of agricultural land in Thailand.

2. Methods

2.1 Study Area

This cross-sectional study used data from the 2017 Elderly Population Survey conducted by the National Statistical Office in 77 provinces of Thailand [9].

2.2 Sample size and sampling

This study enrolled 32,035 elderly individuals, focusing on their work needs and situations. The survey included 83,880 cases from the National Statistical Office in 2017. To ensure appropriate sample, inclusion and exclusion criteria were established which include 1) participants answering the survey of the elderly

population in Thailand in 2017 2) able to communicate, read, and write; 3) population aged 60 years and over. In addition, exclusion criteria include: 1) the household no longer has permanent members 2) The household has moved and is unable to follow up. 3) The questionnaire has incomplete information on wanting to work with the elderly.

2.3 Data Collection

Independent variables such as agricultural density, agricultural areas, and reported land use data were extracted from the National Statistical Office Thailand [10]. The data about unmeet work needs of the elderly in Thailand has been gathered from the database of the elderly population survey in Thailand 2017 [9].

2.4 Data Analysis

We have performed local Moran's I and the Local Indicator of Spatial Association (LISA) for autocorrelation studies. GeoDa v. 1.22, was used for spatial data analysis, with QGIS v. 3.34.3 utilized to combine and integrate all the data into one dataset, which was then imported into GeoDa for analysis by LISA [11]. Moran's, *I* range between −1 and 1, where the latter indicates a highly positive spatial autocorrelation and the former an extremely negative one Values around 0 indicate absence of spatial autocorrelation. This study was performed with 999 permutation simulations at the significance level of $p<0.05$.

Moreover, areas with high levels of and unmet need for work among elderly surrounded by other areas with high levels are called High-High (HH) clusters or hotspots, while areas with low such levels surrounded by other areas with low levels are called Low-Low (LL) clusters or cold spots. In addition, there are outliers, i.e. high-level areas surrounded by low level ones (HL) or low-level areas surrounded by high level ones (LH). Moran's I is a presentation of autocorrelation, where both HH and LL are positive outcomes, while HL and LH are negative[12].

2.5 Ethical Clearance

This study used secondary data and ethical permission for this study was obtained from the Human Research Ethics Committee of Khon Kaen University, Khon Kaen, Thailand (HE632300).

3. Results

3.1 General information

The highest prevalence of unmet needs for work among the elderly in Thailand is in Bueng Kan Province (78.32%) and the lowest is Lamphun Province (37.20%). When classified into quantities, it is found that the provinces in

the highest prevalence group (66.5-78.3) consist of the group Bueng Kan Province Nonthaburi Province, Phayao Province, Sakon Nakhon Province Sa Kaeo Province Phra Nakhon Si Ayutthaya Province Amnat Charoen Province and Nong Khai Province (Figure 1).

In analyzing high density of agricultural land by each province, the highest concentration was found in Singburi Province i.e. 95.68%, and the least was Mae Hong Son Province (3.83%). When classified into Quantiles, it was found that the provinces in the highest prevalence group (73.6%-95.7%) consisted of Singburi Province. Maha Sarakham Province, Rayong Province, Surin Province, Samut Songkhram Province, Chainat Province, Phra Nakhon Si Ayutthaya Province, and Sisaket Province (Figure 2).

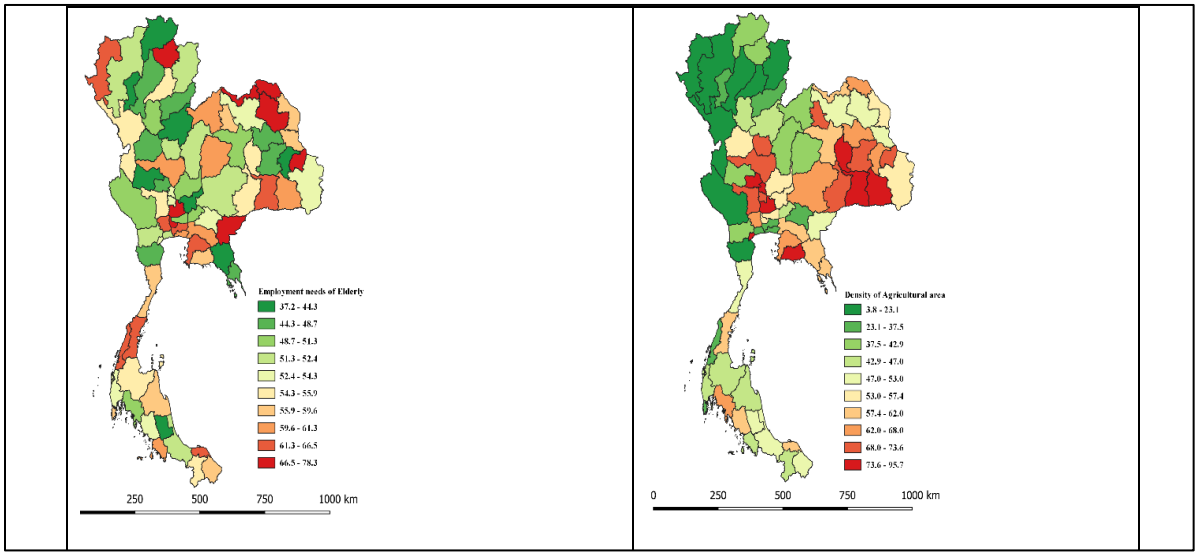

Figure 1: Prevalence of Unmet work demand among elderly in Thailand

Figure 2: Proportion of Density of Agriculture land in Thailand

3.2 Univariate analysis

Spatial correlation was analyzed using Univariate Moran's I analysis and considered in more detail using Local Indicators of Spatial Association (LISA) analysis, with the boundaries of connected areas being the criteria for defining neighborhoods. It shows the nature of the relationship between the surrounding neighborhood factors and the variables. The work needs of the elderly have a spatial correlation with surrounding neighborhoods that has a pattern of distribution in the same direction as the work needs of the elderly in Thailand at p-value of < 0.05. With a Moran's I value of 0.067, we found the areas

where there is a concentration of nearby areas surrounding the unmeet work needs of the elderly that have high values or risk areas (Hot spot or High-High) in the Samut Prakan Province group, Bueng Kan Province (red area), which means the density of agricultural land Surrounding neighborhoods are spatially interrelated (p-value <0.05). We found a distribution pattern in the same direction as the density of agricultural land in Thailand with a Moran's I value of 0.409 in the Roi Et province group, Ang Thong Province, Lopburi Province, Nakhon Sawan Province, Chainat Province, Singburi Province, Buriram Province, Suphanburi Province, Ubon Ratchathani Province (red area) where there is a concentration of nearby areas surrounding the density of agricultural land that have high values or risk areas (Hot spot or High-High) (p-value < 0.05) (Figure 3 to 8).

3.3 Spatial relationships using Bivariate Moran's I analysis

Spatial relationships were analyzed using bivariate Moran's I analysis and considered in more detail using Local Indicators of Spatial Association (LISA) analysis, with the boundaries of connected areas being the criteria for defining neighborhoods. It shows the nature of the relationship between spatial factors and the work needs of the elderly in Thailand. It was found that the density of agricultural areas has a spatial correlation with the work needs of the elderly in Thailand with a Moran's I value of 0.103 showing high values or high-risk areas (Hot spots or High-High) in the Udon Thani province group, Bueng Kan Province (red area) and has low values or low risk areas (Low spot or Low-High) in the Sukhothai Province group (Figure 9 to 11).

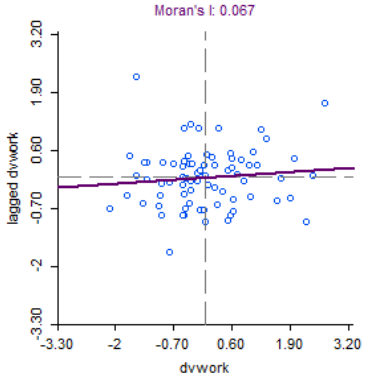

Figure 3. Moran's I scatter plot matrix values of nearby surrounding areas. with unmet work demand of the elderly in Thailand

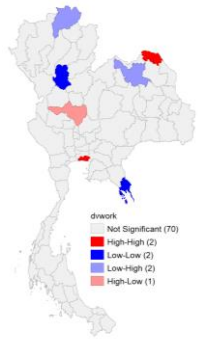

Figure 4. Cluster maps of nearby surrounding areas with the unmet work demand of the elderly in Thailand

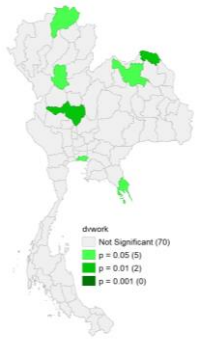

Figure 5. Significance maps of nearby surrounding areas. with the unmet work demand of the elderly in Thailand

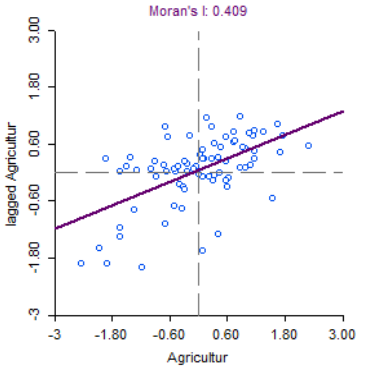

Figure 6. Moran's I scatter plot matrix values of nearby surrounding areas with the density of agricultural land in Thailand

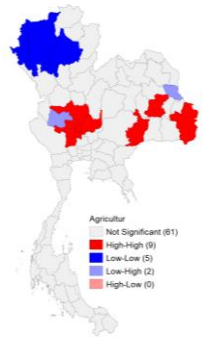

Figure 7. Cluster maps of nearby surrounding areas. with the density of agricultural land in Thailand

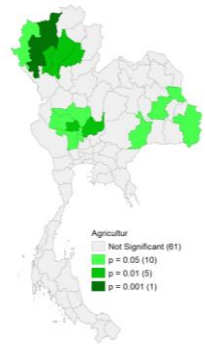

Figure 8. Significance maps of nearby surrounding areas. with the density of agricultural land in Thailand

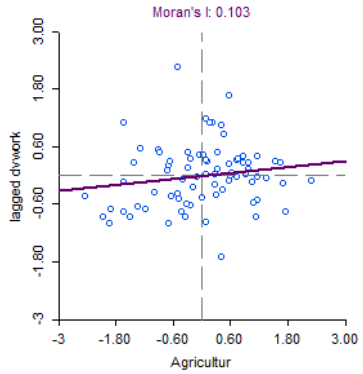

Figure 9. Moran's I scatter plot matrix of the density of agricultural land with the unmet work demand of the elderly in Thailand

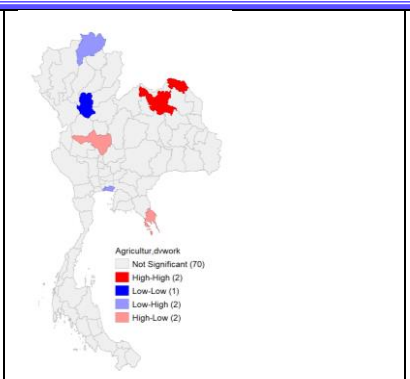

Figure 10. Cluster maps of the density of agricultural areas with the unmet work demand of the elderly in Thailand

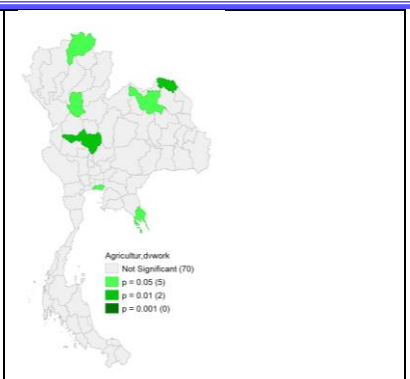

Figure 11. Significance maps of the density of agricultural areas with the unmet work demand of the elderly in Thailand

4. Discussion

At present, the demand for unmeet work among the elderly tends to increase all over the world. In our settings, it has been found that there were 9,947 elderly people who wanted to work out of 32,035 people (31.05%). Thailand has policy measures to promote the work of the elderly who still have the potential to work and support work in the form of employment for the elderly through a system of part-time work in line with the SDG (Sustainable Development Goals) goals 3.8 (Good working and living together) and 8.5 (Promote work in industries with a future). Promoting the work of the elderly is beneficial to both the elderly and society. It can increase the potential of human resource management and create a more diverse and sustainable organization [13, 14].

From the results of this study, Bueng Kan Province was found to be the highest proportion of unmet needs to work among elderly in Thailand (78.32%). This provided the information that the needs of the elderly in the northeastern region are consistent with the proportion of agricultural land in their province which creates enabling environment to work. Similarly, a study by Shibata H. found the reason which brings the elderly to return to work is that the work culture which allows the elderly to do it so [15]. Moreover, the employment of the elderly in Thailand is still not popular in the company because of its values. As some groups of elderly people still have the potential to work and have confidence among themselves, it is important to create enabling environment which allows them to work to encourage elderly's feeling of self-

worthiness in the social roles and to enjoy living life [6, 16, 17].

This study found the highest density of agricultural land ranging from 73.6% to 95.7% in Singburi Province, Maha Sarakham Province, Rayong Province, Surin Province, Samut Songkhram Province, Chainat Province, Phra Nakhon Si Ayutthaya Province, and Sisaket Province. Although the unmet work needs of elderly in those areas are not that high according to the survey, there are also some groups those want to help, ease the family's burden in finding another way to earn money to help the family. This is a driving force in the need for more work among the elderly. Therefore, the opportunity of having agricultural land can be used as a valuable resource in filling up the gap of unemployment of elderly [18, 19].

Moreover, this study also found Bueng Kan and Udon Thani provinces were the area where most of the elderly with desire to work were working mainly in agriculture. The area of Udon Thani province and Bueng Kan Province are area next to a large river named Mekong River. Therefore, the area is conductive to farming to generate income. In the context of occupations in the province, they are in the form of urban communities that rely mainly on working age groups. Therefore, the elderly choose agriculture as their main focus. Encouraging the elderly to leverage their past knowledge and experiences, particularly in rural communities will foster self-reliance and emphasize the crucial role of the elderly in preserving tradition, culture, and instilling confidence in the agricultural sector which in turn will be benefited to develop economy of each region [18, 19].

In addition to that, this study also found out that Sukothai province group has the low-high cluster values for agricultural land and work needs of elderly. As there are physical areas that are not conducive to agriculture. For example, Chiang Rai province is characterized by steep mountains and the cold weather which makes it difficult for farmers including putting the elderly at risk of accidents from the terrain. As a result, the elderly went to other occupations. Similarly, Sukothai province is one of the tourist attraction areas in Thailand. Therefore, it is important to consider the local context such as trading in tourist areas as an alternative idea in creating working environment for the elderly.

Secondary data were obtained from the National Statistical Office. As a result, there are restrictions in terms of variable selection and data quality. As a consequence, the analysis in this study was unable to use several

variables to establish correlations between them. As this is cross-sectional study, a causal relationship cannot be established.

5. Conclusion

The findings from this study revealed that there are positive and statistically significant associations in the Thai population between density of agricultural land and unmet need for work among elderly. The evidence from this study can provide invaluable insights to the government and related agencies to plan and support the work needs of the elderly to promote their social roles and enabling them to be valued. In addition, the results from this study also allow policy planning in the agricultural sector to manage appropriate vacancies for the elderly group in order to manage human resources for the development of the economic and industrial sectors of the country. In provinces where there is a need for the work of the elderly, this study can serve as a reference for sustainable development of the province by taking the elderly as the foundation for the development of families, communities, and society.

Acknowledgement

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