A Fundamental Survey on Personal Mobility Needs in an Aging Society

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Abstract: Today, many municipalities provide kinds of move support services for elderly people. For some people, however, such services are not the best ones, since their health conditions and living environments are different from one by one. One might feel difficulty in approaching places for the support services. As a supplementary means of transportation reducing the burden of going out, personal mobility (PM) as walking aid attracts attention in recent years. Although PM is expected to improve quality of life of elderly people, little promotion has been seen in mountainous area whose population is aging, unlike urban areas and sightseeing spots. This study investigated if there is really PM needs in mountainous, depopulating area, and which factors prevent people from eliciting PM needs.

Keywords: Aging Society, Personal Mobility, Interview Survey, Quantification Theory

1. INTRODUCTION

Falling birthrate and aging population has become a serious problem all over Japan, especially countryside. It is considered that this trend will continue for years. Aging of population and society results in various problems. Restriction on outings due to transportation matters would be one of them. Mental and physical depression from aging makes senior citizens difficult to drive cars and bikes or even to walk by themselves. In this way their activity level decreases, so would be their quality of life. Therefore, in order to diminish such restrictions, transportation services for elderly people are needed.

In fact, today, kinds of mobility support services are available such as subsidized community bus. However, those services might not be enough for every elderly person. This is because mental and physical health of the elderly differs from person to person. Some person's performance differs little from that of the young, some person has difficulty even in picking himself up. Thus, there is variety of needs for transportation modes as to health problem in addition to purpose or frequency of activities, distance from houses, and so on.

Progress of personal mobility (PM) such as electric carts, or senior cars attracts attention as a solution to the above problem. Senior car is three-wheeled or four-wheeled, one-seater electric car, designed for the elderly people. Its speed is no more than 6 kilometers per hour. In Road Traffic Law of Japan, it is supposed to pass through sideway and considered as foot passenger. PM is expected to diminish the restriction of the elderlies so that they could make trips without assistance of others, resulting in increase of their quality of life. Moreover, if they obtain an opportunity of muscular habit by themselves, their mental and physical performance might be kept well. More seniors with good health would contribute to reducing health care costs. Therefore, it would be no doubt that municipalities and medical

administration are interested in progress of PM.

On the other hand, the elderlies may hesitate to use PM, because it is not common, or accepted with prejudice among senior citizens. Another problem is that driving a senior car still requires the minimum level of physical capabilities. Therefore, this study conducted a fundamental survey in order to investigate essential needs for PM and to make clear characteristics of the elderlies who would like to use PM. In addition, the study tries making clear which factors prevent them from using PM.

Mizokami *et al.* (2012) conducted a pilot program on next-generation personal mobility, and assessed the impact by improvement of QOL. On the other hand, as described above, such experiment or even an introductory survey on personal mobility needs has not been done enough in mountainous, depopulating areas. This study thus applies knowledge of existing research for the case study in Daisen town.

This paper consists of five sections. First, the background of the study is introduced here. In the next section, the survey design and implementation are explained. In section 3, major descriptive statistics of the survey is summarized. In section 4, employing quantification theory, we investigate characteristics of the elderlies who would/would not like to use PM. Section 5 concludes the paper by summarizing the findings.

2. THE SURVEY

2.1 Overview of the Surveyed Region

We conducted a survey on PM needs for the senior citizens in Daisen town, Tottori prefecture. Daisen town is located in the west of Tottori prefecture (Figure 1). It has an area of 189.8 square kilometers, bordering Mt. Daisen on the south, and the Sea of Japan on the north, respectively. Since the difference of above sea-level is almost 1,700 meters, there are kinds of industries such as agriculture, livestock, fishery and tourism, providing variety of commodities. In April 2013, the population is 17,631, which has been declining by 3~7 % in these 20 years. More than 30% is the aged people of over 65 years old.

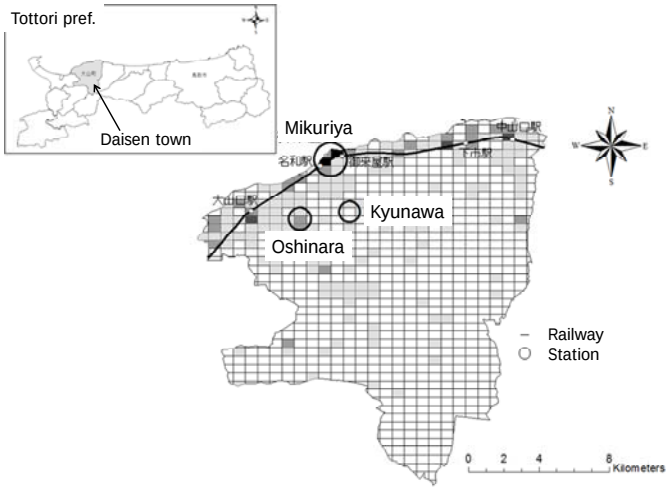

Figure 1 Outline of Daisen town and the three surveyed areas

2.2 Survey Design

Although PM is expected to improve quality of life of elderly people, little promotion has been seen in mountainous area whose population is aging, unlike urban areas and sightseeing spots. In order to investigate if there is really PM needs in mountainous, depopulating area, and which factors prevent people from eliciting PM needs, the survey was conducted in this study. It was designed as follows.

Firstly, three areas in the town were selected for survey: Kyunawa, Oshinara and Mikuriya. For the selected areas, all senior citizens of over 65 years old are respondents except for the handicapped. Each of selected areas has thus 47, 118 and 188 respondents, respectively. The data was collected by interview-style survey. Note that the interviewers explain about PM in advance that it is electric auxiliary cart and that people can operate it without license, so that the interviewees can have common understanding for responses. The outline of the survey is summarized in Table 1. Almost all questions are of multiple choices.

Table 1 The outline of the survey

Date	from Nov.12 to Dec.3, 2012 (every Monday)			
Surveyed Areas	Kyunawa	Oshinara	Mikuriya	Total
#interviewees	47	118	188	353
#responses (response rate)	42 (89%)	77 (65%)	136 (72%)	255 (72%)
Method	Interview based on questionnaire Placement method for empty homes			
Questionnaire items	1) physical performance 2) actual condition for outings 3) problems and anxieties of going out 4) acknowledgement and intention to usage of senior cars (PM) 5) problems and anxieties to usage of senior cars (PM) 6) attributes of individuals			

3. PERCEPTION AND INTENTION OF USAGE OF PERSONAL MOBILITY

This section mainly introduces some results of simple and cross tabulation from the data. Figure 2 shows the transportation devices of the respondents in usual going out. Figure 3 shows acknowledgement and convenience of senior cars. For all figures, line graph or bar charts in the top line indicate simple aggregations to each question. The others are cross tabulations of the main questions and some attributes: age, sex, community and physical performance. Figure 2 reveals relationship between the transportation devices and people's health; the percentage of use of car or motorcycle decreases as they become old in general, or it does if their physical performances are low.

From Figure 3, almost 75% of the elderlies know what a senior car is, and 45% of them think it is convenient. However, the percentage of people who want to use it remains 20% or less (Figure 4). This is an overall trend. It might be described that there are surely a few aged people interested in using senior cars, although they are not major facilities for transportation. Section 4.2 may also help understand this trend.

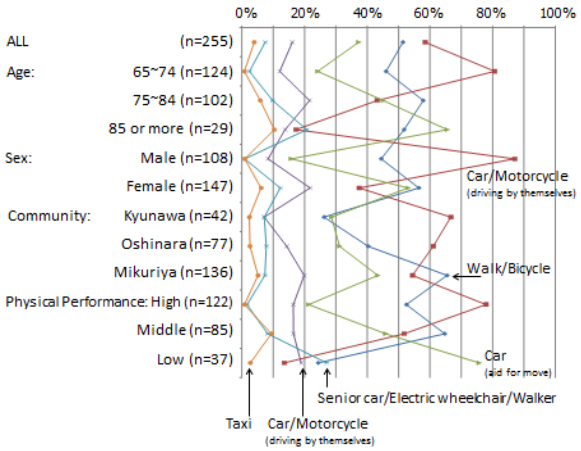

Figure 2 The transportation devices in usual going out

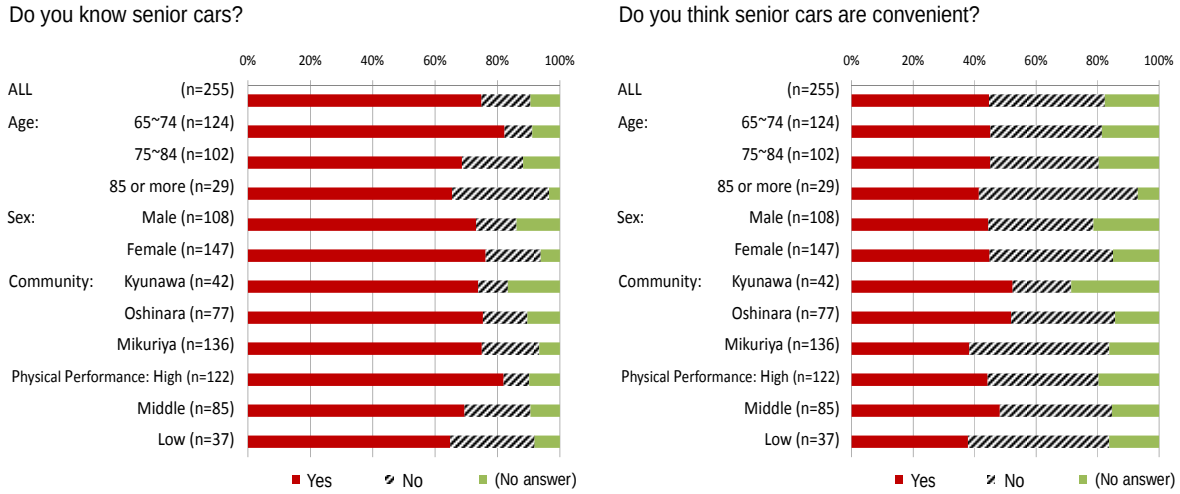

Figure 3 Acknowledgement (left) and convenience (right) of senior cars

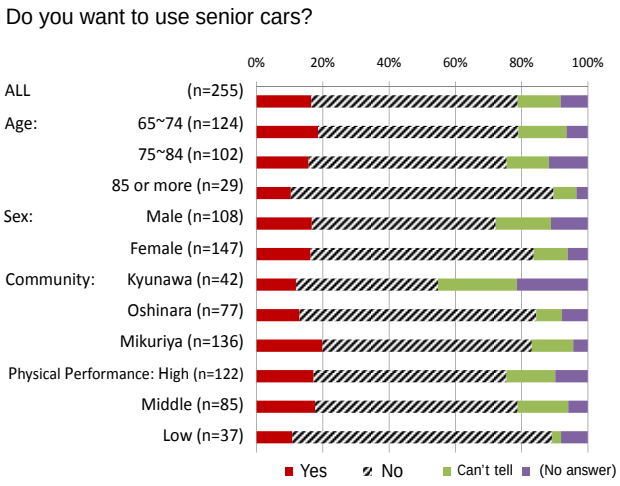

Figure 4 Intention to usage of senior cars

4. FACTOR ANALYSIS AS TO INTENTION OF USAGE OF PM

4.1 Factors Affecting Positive Intention to Use of PM

In order to find which factors influence intention to usage of senior cars, we employed the Hayashi's quantification methods (group II) to see it. This approach might be nice for our qualitative data for both explanatory and objective variables.

There are three combinations of binary choice extracted from "yes", "no", "can't tell", which are to be tested. Figure 5 shows the better result of the binary choice: "yes" and "no". This figure reveals that an aged person who has driver's license shows strong intention to use PM. By contraries, those who have no license tend to convey their little intention. It is considered the difference comes from an experience of driving a car. The senior people with poor physical performance such as "disable to carry somewhat heavy thing", "poor ability of walking", "disable to walk up stairs", also show weak intention. In other words, with extremely low physical performance, one could hardly handle even a senior car.

Other performances of this test are hitting ratio and correlation ratio. They are 78.6% and 0.263, respectively.

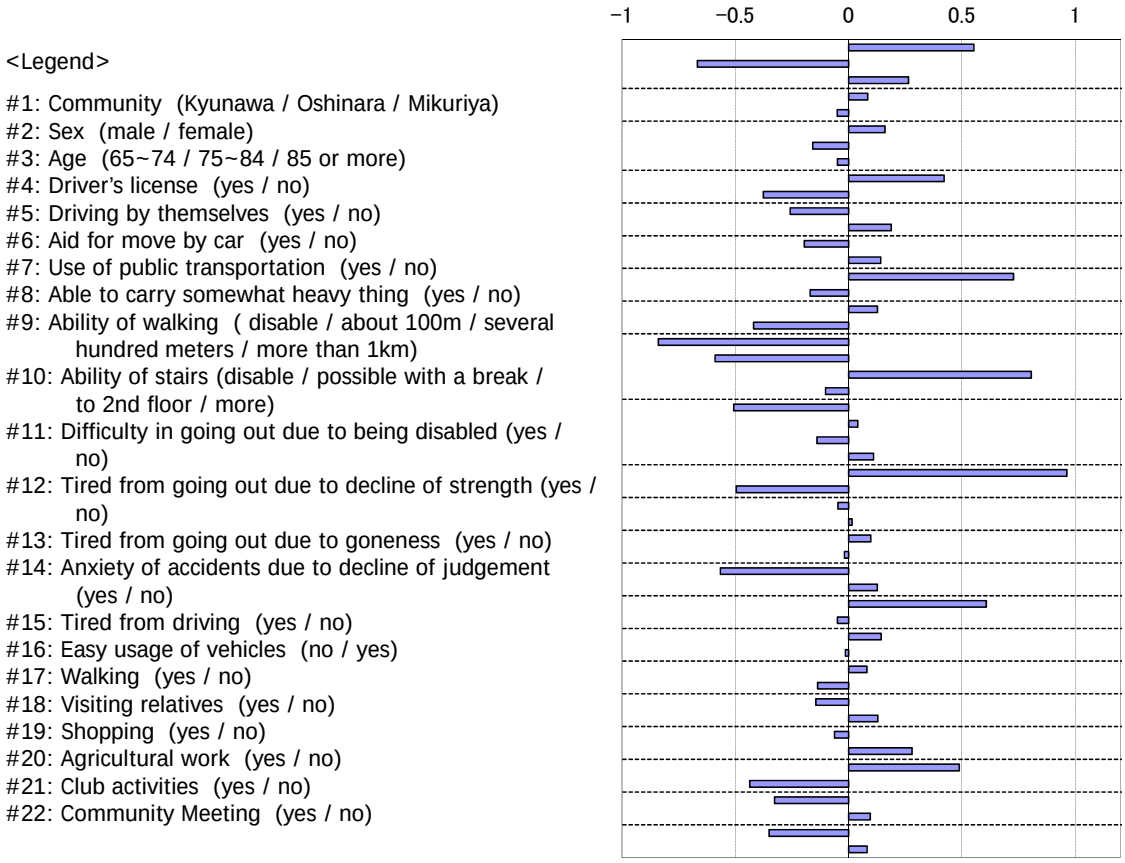

Figure 5 Category scores

4.2 Problems and Anxieties for Using PM

Figure 6 shows a result about problems or anxieties to usage of senior cars. The left-hand side graph shows if the interviewees have some problems or anxieties to use senior cars. In total, 40% of the people answered yes. Moreover, those who have positive intention to usage of PM with some problems or worries count for 50%. The right-hand side graph describes specific problems by attitude to the intention. In this graph, the percentage of whether problem is very high regardless of the intention to use. On the other hand, remarkable difference can be seen in the items of driver performance and falling, between positive and negative attitude to the intention. This might imply that people who now accomplish driving vehicles to some extent tend to have little worries for operation, resulting in little anxiety for such items. In conclusion, it can be considered that there are three items influencing a lot to usage of senior cars: whether, driver performance and anxiety for traffic accident.

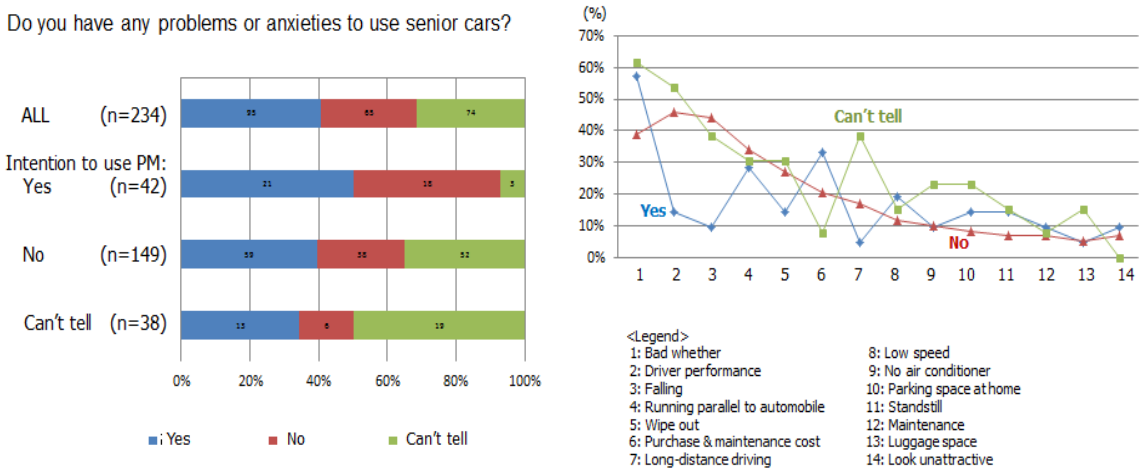

Figure 6 Problems and anxieties of senior cars

5. SUMMARY

This study investigated PM needs for the senior citizens in Daisen town. The result implies that, not many people show intention to usage of PM, and that therefore PM needs is limited at the present stage. Also, people have some problems and anxieties of its use. Consequently, the municipality should be careful about promoting PM. We need to create environment firstly so that it diminishes worries of the aged people. Both soft and hard actions, such as lectures and road improvement, are necessary so that people can handle PM safely. So is pilot program to check the environment improved.

REFERENCES

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