

Difficulties in Accessing Grocery Stores in a Super-Aged Society

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Executive summary of the Japanese-language article “*Cho-Korei-Shakai ni Okeru Shokuryohin Akusesu Mondai—Kaimono Nanmin, Kaimono Jyakusha, Food Desert Mondai no Kaiketsu ni Mukete—*” (March 2015, Harvest-sha) written by Tetsuro YAKUSHIJI (ed.), Tatsuto ASAKAWA, Nobuyuki IWAMA, Katsuya TAKAHASHI, and Koichi TANAKA

1 Introduction

1.1 Background

According to the 2010 national census, Japan now has the world’s highest percentage of aged people, as people aged over 65 years account for 23.0% of the Japanese population. The National Institute of Population and Social Security Research predicts that there will be a 27% increase in this population in 25 years, from 29.48 million in 2010 to 37.41 million in 2035; this will increase the percentage of people aged over 65 years to 33.4% of the population.

Meanwhile, the number of food stores continues to decline; the number of retailers dealing in food and drink decreased by 26% in 10 years from 526,000 in 1997 to 390,000 in 2007. This trend has accelerated since the abolition of the Large-Scale Retail Store Law in 2000.

In the current climate, characterized by the aging of the population and the declining number of grocers, senior citizens—who constitute an increasingly larger segment of the population—face the challenges of inconvenience and laboriousness with regard to shopping for food. For example, there are cases in urban areas where the opening of a large-scale commercial complex has led to the closure of shops downtown and to elderly residents in the area, as a consequence, experiencing inconveniences when shopping for food. In rural areas, where the aging of the population is progressing rapidly, the closure of shops run by Japan Agriculture has made it more difficult for residents to shop for food. More than 80% of local authorities in Japan recognize the need, at least to a degree, for measures to assist people with regard to difficulties experienced when shopping for food; this is a widely recognized issue throughout the country.

Given this situation, the Ministry of Agriculture, Forestry and Fisheries' Annual Report on Food, Agriculture, and Rural Areas in Japan FY2011 included "food access difficulties" as an important policy issue to be addressed in the field of food in order to rectify situations in which vulnerable people such as the elderly experience shopping for food as inconvenient and laborious.

Implementing measures to ease difficulties related to accessing food is urgently necessary, as the forecasted increase in the aged population will directly increase the number of elderly people who experience difficulties when shopping for food. However, Japan does not have adequate research data on this problem.

1.2 Difficulties in Accessing Grocery Stores

In this analysis, situations where certain difficulties are experienced when shopping for food are referred to as “difficulties in accessing grocery stores.” This is because experiencing difficulties in the act of shopping for food is directly related to the accessibility to food, which is closely related to factors such as spatial conditions (e.g., distance to stores) and personal conditions (e.g., car ownership and age).

1.3 Consumer Costs in Shopping

The theory of commerce, in relation to food retail, can provide a context for studying problems related to difficulties in accessing grocery stores. In this context, the distribution sector is responsible for creating distribution services and reduced standards of service increase the consumer cost of acquiring assets. Consumer costs in shopping for food increase when consumers experience more inconvenience and greater difficulties in shopping for food—for example, when nearby shops have closed. This in turn lowers the level of service provided by distributors in regard to distribution.

Consumer costs take three forms: (a) monetary costs (transport fees, parking fees, etc.); (b) time spent on shopping (convertible into monetary costs as opportunity costs); and (c) psychological/physical costs (in crowded shopping environments, etc.). Difficulties in shopping for food directly reflect these consumer costs.

1.4 Food Security Perspective

When increased consumer costs for buying food necessitate restrictions on food consumption, the food security in a household is threatened. Although Japan has a low level of national food self-sufficiency, the overall demand for food is met with sufficient supply. Under such conditions, however, constraints on food consumption may still arise for some households in the event of diminished accessibility to stores.

The 2010 Ministry of Agriculture, Forestry and Fisheries’ Basic Plan for Food, Agriculture and Rural Areas states that Japan, “in response to the aging population, will strive to

ensure a ready food supply to consumers through the sound development of diverse delivery services by private companies” as part of its Policies for Securing a Stable Food Supply.

In the UK, where food deserts have been recognized since the 1990s, the UK Department for Environment, Food and Rural Affairs has included in its assessments household access to food stores as an indicator of a household's food security. The desired outcome is for “all households, including those without cars, [to] have adequate physical access to food stores.” The specific indicator is “the number and percentage of households within 15 and 30 minutes of a supermarket/food store accessible by public transport, walking, and cycling.” Similarly, the US Department of Agriculture, in accordance with the Food, Conservation, and Energy Act of 2008, assessed the extent of areas with limited access to affordable and nutritious food, identified characteristics and causes of limited access in such areas, considered the effect of limited access on local populations, and outlined recommendations to address the problem.

1.5 Problem and Structure of the Study

This study conducted current-state analyses on difficulties in accessing food from a number of perspectives. The results were used to come up with solutions for addressing these difficulties. To achieve the purpose of the study, the current-state analyses were divided into analyses based on four perspectives.

The first analysis pertained to the current situation and future projection of the problem. This analysis was conducted on a nationwide basis. Previous analyses of difficulties in accessing food have been based on case studies and have tended to result in case study bias. Therefore, on a nationwide basis, this analysis clarified perceptions of these difficulties across Japan.

The second analysis pertained to difficulties faced by residents. This analysis was conducted on a regional basis. From this perspective, based on the results of consciousness surveys conducted using a uniform method in a number of regions, the analysis clarified the characteristics of each region and the difficulties experienced by the elderly in particular regions.

The third analysis pertained to the relations between elderly people's food accessibility, food intake, and health. In this analysis, it was examined whether food accessibility was a constraint factor on elderly people's food intake and therefore an influence on their health.

The fourth analysis pertained to stakeholders' opinions in regard to solutions for difficulties in accessing food. To highlight solutions for the future, this analysis clarified opinions regarding difficulties actually experienced by the local populace and regarding local authorities charged with addressing such difficulties.

Finally, the implications of the four analyses were determined; the findings were integrated and their applicability to future measures was summarized.

2 Current-State Analyses

2.1 Current Situation and Future Projection of the Problem

To address the food access problem, current-state analyses on a nationwide basis were conducted in three parts. The first part, the demand-side analysis, elucidated the future of food consumption in Japan given the declining birthrate and the aging of the population. The second part, the supply-side analysis, determined variation factors in the number of food stores in the past to provide data that could be used to predict the number of food stores in the future. The third part, an analysis of the accessibility of food stores for local populations and future projections, encompassed the integrated results of the demand- and supply-side factors.

2.1.1 Projection of Food Consumption

People have started purchasing processed items instead of fresh foods. Will this tendency continue in the future with a population composed largely of elderly people? We examined expenditure ratios among elderly and single-person households. Two results were obtained: first, with respect to overall food expenditures, expenditure ratios as a part of total expenditures of all households for households with elderly household heads and for single-person households will increase to a large degree. The expenditure ratio for households with household heads aged 65 years or older will increase from 30.8% in 2010 to 41.4% in 2035, while ratios for single-person households will increase from 23.3% in 2010 to 28.7% in 2035. Secondly, with respect to the shift from fresh to processed items, purchased cooked foods and home meal replacements will replace home cooking even in households with elderly heads, leading to an increase in the outsourcing of food, or more specifically, a dietary dependency on the food industry. The expenditure ratio of cooked food or meals in households with elderly heads in 2035 will increase to 17.1% (from 12.0% in 2010) for households with two or more persons and to 21.8% (from 11.9% in 2010) for single-person households.

2.1.2 Supply-Side Analysis

The number of fresh food stores, including vegetable and fruit stores, fresh fish stores, and meat and poultry stores, has continued to decline. The analysis results confirmed that in medium and small cities and farming villages, in addition to competition between fresh food stores that are close to each other (i.e., within 200–300 m of each other), the presence of general merchandise stores (GMSs) that service a wide area was a contributing factor in the declining number of fresh food stores in distantly located areas. It is thought that in the future, fresh food stores within an approximate range of 500 m to 5 km of a GMS will face difficulties as a result of

their larger rivals' ability to attract customers. However, the presence of GMSs was not the largest factor in the decline of fresh food stores.

It was found that in big cities such as ordinance-designated cities, the presence of a GMS in a distant area had no impact on the number of fresh food stores. This was attributed to the large size of the markets surrounding fresh food stores. It was confirmed that in large cities, competition between closely situated fresh food stores was a major contributing factor to the declining number of stores.

However, the analysis results also confirmed that the presence of a GMS within approximately 500 m of a fresh food store did not contribute to a decline in the number of fresh food stores in any region. This could be because fresh food stores located near GMSs benefit from GMS' ability to attract customers or from their role in the formation of commercial districts.

2.1.3 Current Status of Food Store Accessibility

Accessibility is the total effect of demand (population) and supply (number of stores). Based on the analysis, which is presented subsequently, we formulated a standard to estimate the number of people that will experience more difficulties in shopping than others—that is, the number of individuals aged 65 years or over who do not have cars and whose nearest stores are located further than 500 m away in terms of linear distance. The number of people satisfying this standard, as well as their average distance to stores, was calculated in the context of urban, densely inhabited districts (DIDs) and rural, non-DID areas. We assumed access to two types of store: fresh food stores necessary for everyday meals and food supermarket stores, which carry a better range of goods.

We estimated that, in 2010, approximately 3.8 million people fitted this description in regard to fresh food stores, while 6.4 million people fit this description in regard to food supermarket stores. People who fit the description in regard to fresh food stores were largely in rural, non-DID areas. A larger proportion of people in urban, DID areas fit the description in regard to food supermarket stores. For fresh food stores, the average distance to stores in rural areas was 2.7 times greater than that in urban areas. For food supermarket stores, the average distance to stores was 4.1 times greater in rural areas than in urban areas, suggesting that people in rural areas are disadvantaged with regard to benefiting from shops with an adequate range of products.

In addition, over the past five years, the number of people in urban areas who fit the description increased considerably. Looking at these changes in the number of people who fit the description, according to changes in store numbers (supply) and population dynamics such as aging (demand), it is clear that the number of people who fit the description greatly increased because of population dynamics.

2.1.4 Forecasting Future Food Store Accessibility

Considering the above findings and given past trends in the number of stores, we estimated the number of people aged 65 years or over without cars whose nearest stores would be located further than 500 m away in 2025. For fresh food stores, this population will increase to 6.0 million in 2025 from 3.8 million in 2010 for an increase of 56.4%. Of the additional 2.2 million people, 1.7 million will be in the urban areas; half of these 1.7 million people will become part of this population as the result of the decrease in the number of fresh food stores and the other half will become part of this population as the result of population dynamics.

For food supermarket stores, this population will increase by 26.4% to 8.1 million in 2025 from 6.4 million in 2010. As is the case with fresh food stores, this increase will largely be in urban areas: of the additional 1.7 million people, 1.2 million will be in urban areas. The decrease in the number of food supermarket stores is forecasted to be small; hence, this change will be mainly due to population dynamics.

In other words, if trends in store numbers and demographics continue, it is expected that, in the future, there will be an increase in the number of elderly people experiencing inconvenience and laboriousness, particularly in urban areas. Elderly people in rural areas will continue to experience unfavorable conditions in accessing stores.

2.2 Inhabitants' Difficulties in Accessing Grocery Stores

After conducting analyses on a nationwide basis, we analyzed the problem from the viewpoint of inhabitants—that is, on a regional basis. This analysis was based on consciousness surveys conducted in a big-city suburban housing complex, a small city center, and a farming village in 2010. By comparing data between regions and age groups, local populations were analyzed in terms of the inconvenience and laboriousness they experienced when shopping for food. This analysis was also an analysis of consumer costs, as inconvenience and laboriousness while shopping can be considered a reflection of the shopping costs borne by the customer. The analysis comprised three parts. The first part compared the regions and age groups of the proportion of the local population experiencing inconvenience and laboriousness when shopping for food. In the second part, factor analysis in relation to inconvenience and laboriousness was conducted; incidentally, reasons a portion of the local population did not experience inconvenience or laboriousness were also determined. The third part analyzed changes in inconvenience and laboriousness over time.

2.2.1 Degrees of Difficulty and Regional Characteristics

In the survey, among all respondents aged 65 years or older in the big-city suburban housing complex, small city center, and farming village, 46.7%, 48.8%, and 52.3%, respectively, indicated that they experienced inconvenience and laboriousness when shopping for food.

Although there were significant differences in the percentages of those younger than 50 years and those aged 65 years or older in the small city center and the farming village, there were no significant differences in the big-city housing complex. This result suggests that not only the aging population but also the child-raising population in the housing complex experienced many difficulties in accessing food.

2.2.2 Factors Impacting Difficulties and Their Regional Characteristics

Supply-side factors in regard to inconvenience and laboriousness such as distance to stores most frequented, as well as demand-side factors such as the availability of cars, age, sex, family members, and jobs, were analyzed. The factors with the most impact on difficulties in shopping for food were means of transport and spatial conditions such as traveling time and distance to stores. These factors significantly influenced the difficulties experienced by pedestrian shoppers with journeys to stores over a road distance of more than 1 km. In addition, distance affected the elderly population more than the younger population. By contrast, means of transport had the potential to considerably reduce difficulties—shoppers who had cars and could drive themselves faced considerably fewer difficulties. We also confirmed that people aged 65 or older experienced significantly more difficulties while shopping than those younger than 65 years.

The results support the finding that the elderly, who do not own cars and who experience difficulties walking, experience increased inconvenience and laboriousness when shopping for food and that this can be attributed to changes in spatial conditions due to increased distances to stores. These increased distances are a consequence of changes in supply-side factors—for example, the closure of nearby stores.

From these findings, we can suppose that the people with most difficulties in food shopping are people who fulfill three criteria: people who live a road distance of more than 1 km from the nearest stores, do not drive their own cars, and are aged 65 years or older. To address difficulties in accessing food stores, these conditions can be used to specify areas where difficulties tend to occur and the number of people who live in such areas and would tend to have difficulties.

However, a regional examination indicated that supply and demand factors differ in influence from region to region. For example, in the small city center, citizens aged 65 years and older who usually walk to stores tend to be inconvenienced when stores are located more than 1 km away; citizens aged younger than 65 years who frequently use their cars exhibited a reduced level of inconvenience. The older population faced greater difficulties. People in the city center experienced difficulties in shopping that were influenced by both supply and demand factors.

In the big-city suburban housing complex, no significant differences between the older and younger population were determined, indicating that the latter—inclusive of young families raising children—also experienced difficulties. In the housing complex, it was determined that both

the younger and older population experienced difficulties in shopping; the difficulties of the younger population mainly resulted from demand factors.

Finally, in the farming village, the older population experienced difficulties in shopping when stores were located 1 km away or more, whereas the younger population only experienced difficulties when distances were 10 km or more. However, the use of cars did not appear to reduce the difficulties experienced. In addition, age did not appear to influence the difficulties experienced; the younger population indicated a level of difficulty similar to the older population. On the other hand, for the older people in this region, fewer difficulties in regard to the maintenance of autonomy had substantially greater effects than in the other regions. Furthermore, households engaged in farming experienced a lesser degree of difficulty in shopping, as they produce part of their food supply themselves. The results from this village indicate that, while supply factors strongly influence difficulties in shopping, some demand factors contribute to reducing these difficulties.

2.2.3 Reasons Some Residents Do Not Experience Inconvenience or Laboriousness

There were some residents aged 65 and older who did not experience inconvenience and laboriousness when shopping for food. An analysis of the reasons revealed that residents who lived in the big-city suburban housing complex who did not experience inconvenience or laboriousness shared the characteristic of using online shopping and delivery services and meal delivery services. In the small regional city center and farming village, residents who did not experience inconvenience or laboriousness had people to provide shopping support and used mobile retailers and store deliveries. Among people younger than 65 years in the big-city suburban housing complex and farming village who did not experience inconvenience or laboriousness in shopping, a shared characteristic was the ability to shop on the way to and from work or school.

2.2.4 Changes in Degrees of Difficulty in the Past

Examining subjective estimations of changes over the past five years in terms of inconvenience and laboriousness experienced when shopping for food, the elderly in the three regions particularly experienced increased inconvenience and laboriousness. The investigation revealed that such increased difficulties were experienced even when their distances to stores were quite short. In addition, people inconvenience and laboriousness increased with age. Conversely, elderly people who were more autonomous and those who owned a car and drove it themselves exhibited reduced levels of inconvenience and laboriousness. An analysis of the reasons for increased laboriousness indicated that elderly people living in the big-city suburban housing complex, from which stores are located a short distance away, were substantially burdened because of physical fitness problems. Residents in the regional city and farming village, who had to travel a

long way to reach stores, exhibited increased laboriousness because of factors such as store closures and discontinued public transport services.

2.3 Difficulties in Accessing Grocery Stores and Elderly Persons' Nutrition and Health

Health problems among the elderly are an important issue in a super-aged society. Using data from the big-city suburban housing complex, we revealed that elderly persons' difficulties in accessing grocery stores have certain effects on food intake and, therefore, their health. The analysis comprised three parts. The first part described the actual situation of food intake. In the second part, we analyzed how eating alone and how food access constraints affected food intake. The third analysis revealed interrelations among food access, food outsourcing, eating alone, and food intake.

2.3.1 Current Situation of Health and Food Intake among the Elderly

For elderly people, a good measure of health status, more so than ill health, is whether a person has autonomy with high-level functional capacity—that is, the competence to live by themselves in the community. Research in geriatrics has revealed that the autonomy of elderly people is greatly influenced by their dietary variety—that is, the range of food they eat every day.

The survey results indicated that, in 2013, in the big-city suburban housing complex, men had less dietary variety than did women. Furthermore, younger people had less dietary variety than did older people. If this limited variety is characteristic of young people, it is a concern that future elderly people could have a much more limited diet than is typical among elderly people at present.

2.3.2 Various Factors Influencing Food Intake

Food intake is affected by different factors, including the way a person takes meals (i.e., alone or with others) and the way they are oriented toward their own diet (i.e., whether they attempt to eat balanced meals). Among elderly people who were not oriented toward eating a balanced diet in the big-city suburban housing complex, the frequency of both vegetable-sourced and animal-sourced foods intake was lower among both men and women. Moreover, among those who often ate alone, the frequency of both vegetable-sourced and animal-sourced foods intake for men and the frequency of vegetable-sourced food intake for women were lower.

Furthermore, among both men and women, a high frequency of vegetable-sourced food intake was correlated with higher autonomy with high-level functional capacity. For men, a high frequency of animal-sourced food, oil, and fat intake was correlated with a lower future risk of malnutrition.

By contrast, constraints on food access and ways to prepare meals (i.e., whether people frequently cooked fresh food, cooked processed food, purchased prepared meals or boxed lunches, or ate meals at restaurants) also affected food intake. Elderly people in the big-city suburban housing complex who experienced inconvenience and laboriousness when shopping for food and those who frequently cooked processed foods had more limited diets than did others. By contrast, people who frequently cooked fresh food exhibited substantial dietary variety. Furthermore, there were some correlations between conditions of food access and ways of preparing meals. Elderly people who experienced inconvenience and laboriousness when shopping for food were highly dependent on processed foods and food services.

2.3.3 Interrelationships among Factors Concerning Food Intake and Elderly Persons' Health

Relationships among the aforementioned factors were examined based on the example of elderly people living in the big-city suburban housing complex. Among women, inconvenience and laboriousness in shopping and the tendency to eat alone was correlated with food outsourcing—that is, the shift from cooking fresh food to cooking processed foods or purchasing prepared meals. Furthermore, those who had a strong tendency to engage in food outsourcing had limited dietary variety. Few of those who had limited dietary variety had autonomy with high-level functional capacity. Furthermore, in turn, people with low levels of autonomy exhibited high levels of inconvenience and laboriousness in shopping. Here, a vicious circle may be recognized: inconvenience and laboriousness when shopping → food outsourcing → reduced dietary variety → reduced autonomy with high-level functional capacity → further inconvenience and laboriousness when shopping. This spiral could become a virtuous circle if inconvenience and laboriousness were to be reduced through improving conditions for food access.

For men more than women, the tendency to eat alone led to the tendency not to cook fresh or processed food but to purchase cooked meals or boxed lunches. For men, inconvenience and laboriousness when shopping for food was directly correlated with reduced dietary variety; this relationship was not mediated through food outsourcing.

Thus, in this example of an urban region where the elderly population is forecasted to encounter increasingly unfavorable food access conditions, food intake—which has an influence on health among elderly people—is in turn influenced by certain social conditions, such as food access condition and the tendency to eat alone. From this point of view, implementing measures to improve food access and to revitalize communities in the urban region is crucial.

2.4 Stakeholders' Opinions on Solutions

Finally, the opinions of stakeholders on solutions to difficulties were analyzed, as taking such opinions into consideration is indispensable. First, members of the local population who had actually experienced difficulties were asked for their opinions regarding types of problems and the nature of solutions. Secondly, the local authorities, who play an important role in implementing solutions, were asked for their opinions regarding reasons for the problems faced and important solutions for the future. Third, as an example of how problems faced by inhabitants may be addressed by inhabitants themselves, we analyzed the characteristics of their activities, their relationships with their regions, and effects on food access.

2.4.1 Viewpoint of the Local Populace

According to regions and individuals' own circumstances, elements of difficulties and desired improvement measures varied among the local populace. These elements of difficulties and desired improvement measures were analyzed. The respondents unanimously highlighted the opening of new stores as a desired improvement measure. However, taking into account the relationship between opinions and the specific nature of the experienced difficulties, the following were concluded: (a) senior citizens in rural or remote towns who lived far from stores and did not drive cars desired improved public transport services and mobile grocery stores more than the opening of new stores close to them, (b) residents of the provincial city center considered the opening of new stores to be important, and (c) shopping assistance services, such as improved delivery services for purchased goods, were desired by residents of the big-city suburban residential complex, who mainly walk to nearby stores for shopping, irrespective of age. In particular, with regard to this final point, it was clarified in this case study that not only the elderly population but also the child-raising population experienced difficulties in carrying shopping bags; thus, they desired the availability of delivery services for goods they had bought.

An examination of the current methods used by inhabitants to deal with inconvenience and laboriousness established correlations between current ways to deal with the problem and solutions considered important by the local populace.

2.4.2 Viewpoint of the Local Authorities

More than 80% of local authorities in Japan recognize that solutions are needed, at least to a degree, to alleviate difficulties when shopping for food. This problem is widely recognized, throughout the country, as an important agenda item. Regarding the implementation of such measures, 80% of local authorities are implementing or examining measures. The implementation of such measures is progressing. As difficulties with accessing food stores are regional problems in nature, cooperation among relevant government departments is necessary, but only a few government departments are cooperating with each other. It may be noted that there are substantial obstacles to implementing effective measures.

The opinions of local authorities regarding solutions for difficulties were analyzed; it was understood that measures considered important by the local authorities were strongly connected to the factors that they believed to be causing the difficulties. Among local authorities in cities with low proportions of people living a distance of 500 m or more to stores, one characteristic opinion was that a factor that had caused difficulties was the decline of shopping districts. They viewed measures for city centers and commerce as important. Other local authorities opined that factors causing difficulties included service reductions implemented by JA-managed agricultural coops and reduced public transport services. Measures deemed important in solving these difficulties were support for community shops, support for bus routes and other public transport, mobile grocery vehicles, and support for people going out of their homes.

2.4.3 An Example of Addressing the Problem by Inhabitants Themselves

We analyzed Nakayoshi, an example of a food store operated by inhabitants themselves that is incorporated as a nonprofit organization (NPO). “Nakayoshi” means “friend” in English. Nakayoshi is located in an old residential area in a provincial city where the population is aging and nearby shops have successively closed. We confirmed that the existence of Nakayoshi in the area has cut the road distance to stores and is playing a substantial role in improving the convenience of shopping for neighboring elderly persons, among whom there are strong intentions to continue to shop at Nakayoshi. Those who intend to shop more at Nakayoshi have strong intentions to improve their dietary habits and to intake a balanced diet. Furthermore, Nakayoshi hosts seminars on health; it is likely that through participation in such seminars, people have come to shop more frequently at Nakayoshi.

The participation of elderly persons in operations as volunteers is characteristic of Nakayoshi’s activities. In a super-aged society, it is crucial that elderly people are provided opportunities to participate in society in proportion with their abilities. Many residents of nearby areas are interested in Nakayoshi’s volunteer operations. A few—those who shop at Nakayoshi more than once a week—even have the intention to actually participate as volunteers. These people are also likely to be highly motivated to improve their dietary habits.

The intention to improve one’s dietary habits—or at least the recognition of the present state of one’s dietary habits—is related both to the intention to shop at Nakayoshi and to the intention to participate in its operations as a volunteer. This is the result of the highly admirable role that Nakayoshi has played to improve dietary habits by hosting seminars on health. Thus, Nakayoshi’s activities include not only the direct improvement of food access through the sale of food but a range of regional activities. Moreover, these activities are characteristically undertaken on the initiative of area inhabitants.

3 Implications for Future Measures

The implications of future measures to address difficulties in accessing food obtained from the results of the current-state analyses are described below.

3.1 Measures Corresponding to Regional Conditions

3.1.1 Elderly People without Cars Who Have to Travel More than 500 m to Stores

In examining appropriate measures to be taken in the region, it is necessary to specify the nature of difficulties and the districts in need of assistance. We can assume that the local group experiencing the greatest inconvenience and laboriousness when shopping comprises people aged 65 years and older, who do not have cars, and who have to travel a distance of 1 km or more by road to reach stores. When ascertaining this distance on a map, it is possible to use a straight-line distance of 500 m. This 500-m standard has also been used in other research projects. However, when investigating a specific regional area, a more in-depth analysis is needed to consider the actual circumstances of the region, as situations vary from region to region. An example would be additionally investigating public transport utilization possibilities among the local population. In the example of the suburban housing complex in a big city, it was found that child-rearing individuals under the age of 40 experienced major inconvenience and laboriousness specifically when shopping for food. Therefore, the difficulties experienced by individuals other than the elderly in some regions must also be considered.

3.1.2 Important Measures in Urban and Rural Areas

At present, rural areas have unfavorable conditions for accessing food stores. In the future, however, many more elderly people will have difficulties in food shopping in urban areas, as population aging will advance mainly in urban areas. Therefore, in various regions of Japan, regardless of whether areas are urban or rural, addressing the food access problem is urgently necessary. In this sense, what are the important measures needed in each region, according to their nature?

A comparative analysis of the food access problem among regions clarified that issues to be resolved and solutions to which concerned inhabitants and local authorities attach importance differ by region. There were, however, similarities in consciousness between inhabitants and local authorities. In local city centers, both inhabitants and local authorities believe that measures for commerce to ensure a comparatively short distance to stores are important; in other regions, both inhabitants and local authorities believe that improving public transport services or providing mobile grocery vehicles is important. This would be because of the common understanding between these two groups of the conditions in each region.

3.1.2.1 Regional Conditions

Table 1 compares conditions and important measures in urban and rural areas. Examining spatial conditions, the distance traveled to stores in urban areas is shorter than that in rural areas. In relation to transportation mode, shopping on foot is more common in the big city and cars are also used in the local city center, but cars are much more typically used in rural areas.

It is because there are many stores that distances to stores are short in urban areas. This reflects a high population density and relatively favorable market opportunities. As for economic conditions (market opportunities or profitability), urban areas provide opportunities for the profitable operations of public transport and for the development of new retail business categories, such as small-scale shops. Such opportunities are extremely restricted in rural areas.

In addition, when considering social conditions or activity levels of the local community, rural communities were found to be relatively more active than those in urban areas. However, in some rural regions, the remaining populace can hardly constitute communities due to significant declines in population. On the other hand, even in urban areas, there are some regions where local communities are relatively active. Thus, situations in various regions are diverse.

3.1.2.2 Important Measures

Important measures in each area are based on their different conditions as follows.

First, there are two means to overcome the problem of distance to stores: (a) by making travel to stores easier or (b) by enabling stores to regularly travel to places near where people live. The former requires improved means of transport and the latter requires initiating or improving the operations of mobile shops. Improving mobile retail services and the public transport system in rural areas would reduce the hardships associated with long-distance traveling—for example, those experienced by elderly individuals unable to use cars. These measures will probably become important as well in districts such as those with old housing complexes, where inhabitants are aged and nearby shops have closed.

Opening new stores, which is also a means to shorten the distance to stores, is commercially difficult in rural areas with the exception of large-scale stores that presuppose car utilization. However, given the potential for the establishment of new stores in urban areas, the development of various types of retail business, such as small-scale shops, is more feasible in such areas.

In addition, since shopping on foot is frequent in urban areas, shopping support services, such as delivery services for purchased goods, are extremely important given the fact that elderly individuals and, in some cases, child-rearing individuals in these areas experience difficulties with transporting purchased goods.

Table 1
Conditions in Various Regions and Important Measures to Improve Food Access

	Urban Areas	Rural Areas
Conditions:		
- Spatial conditions (distance to stores)	- Stores near home	- Stores far from home
	- Shopping on foot or by car	- Shopping mainly by car
- Economic conditions (business profitability)	- Possibly profitable in public transport	- Few possibilities for profitable public transport
	- Great possibilities for the development of new retail business categories	- Limited categories of retail business
- Social conditions (local communities)	- Less active local communities than in rural areas	- More active local communities than in urban areas
	- Greater probability of much less active local communities in housing complexes	- Some areas face difficulties in maintaining communities because of significant declines in population
Important Measures:		
- Mobile stores and improved public transport	- Important in some districts	- Particularly important
- Opening of new stores	- Business development through establishing new retail categories	
- Shopping assistance services such as delivery services for purchased goods	- Important in regions in which shopping is mainly done on foot	
- Shopping online or by telephone	- Probably more important in the future in both urban and rural areas	
- Offering a rich variety of goods	- In improving food access to stores, it is essential that stores in both urban and rural areas provide a rich variety of goods	
- Reactivation of local communities	- Reorganization or activation of local communities	- Reorganization of local communities in areas with significant declines in population
- Utilization of active local communities	- Possibility of utilizing local communities in the districts where they are active	- Possibility of taking measures that can utilize relatively active local communities

Furthermore, the provision of delivery services online, by mail order, and by telephone could be relatively more important in both urban and rural areas. Non-elderly individuals acknowledge the importance of these services as future solutions to various shopping challenges. Elderly people do not attach much importance to them. These solutions, however, will be able to ease difficulties in shopping; there are actually existing inhabitants who are without difficulties because they use such delivery services. As today's non-elderly are tomorrow's elderly, it is possible that such retail methods will become more important in the future.

Lastly, access to stores offering a variety of goods is important in both urban and rural areas. It has been forecast that in the future, even in elderly households and single-person elderly households, food purchases will shift from fresh to processed items. Under such circumstances, fresh food stores will not be able to fulfill the demand among elderly people. Consequently, the role of food supermarket stores offering a wide variety of produce will become increasingly important. As distances to food supermarket stores tend to be particularly far in rural areas, it is important that these stores develop different services to compensate, such as mobile grocery stores.

3.1.3 Importance of Local Communities

The implementation of the above-mentioned measures requires the active participation of local communities. The results of the consciousness survey indicated that one reason certain people did not experience inconvenience and laboriousness when shopping, even when stores were located a long distance away, was because they had people around them who could support them in shopping. When such people are unable to rely on a cohabiting family member, it is important that there are "shopping supporters" other than family members who can easily be asked for help. However, for such support to function smoothly in regions such as urban regions, where many people live alone or in two-person households, it is necessary first for local communities to be revitalized.

In addition, local communities can play an especially important role in providing support for retail or transportation services in regions where market opportunities are insufficient. The utilization of local communities is crucial in regions, such as many rural areas, that have active local communities. In regions where local communities are weak, such as many big cities, reorganizing or activating local communities is crucial.

However, there are urban districts where local communities are relatively active and rural areas that are facing difficulties in maintaining local communities because of significant declines in population. In the case of the former, relatively active local communities could be utilized. In the case of the latter, the reorganization or reintegration of rural communities will be necessary to enable the creation of new communities.

If regional communities provide support, opening new stores or maintaining public transportation might be possible even in rural areas.

3.1.4 Comprehensively Improving Convenience in People's Lives

Inconvenience and laboriousness in shopping for food is but one problem among the many that people experience in their lives. It has been said that when an elderly person leaves their home, their objectives are often to go to the hospital and shopping. Thus, an efficient solution could be yielded by simultaneously mitigating the difficulties they experience in these two activities to the same level of ease as for non-elderly people who do not experience inconvenience or laboriousness in shopping because they do so on the way to and from work or school. Measures would be more effective if they could comprehensively improve convenience in inhabitants' lives, including in regard to going shopping and to the hospital. To achieve this, there must be cooperation between relevant local governmental departments and not only direct stakeholders but also relevant parties from a wide range of fields.

Furthermore, in order to address difficulties experienced by individuals in their daily lives such as in regard to access to food, a diverse range of policy-related problems must be resolved. These include the decline of city centers and shopping districts, the suburbanization of cities, the deterioration of local public transport services, and the weakening of personal relationships in local communities, as well as health and nutrition problems among the elderly. These problems are not only the responsibility of local governments; these problems must also be addressed by the national government through collaboration between relevant governmental departments.

3.2 Interrelationships between Health and Access to Food among Elderly People

Autonomy, more so than ill health, is regarded as a good measure of elderly individuals' health status. In a super-aged society, it is critically important that active elderly persons, who account for more than 80% of the total elderly population, can live healthy lives without nursing care for as long as possible. The factor analysis of inconvenience and laboriousness in food shopping revealed that elderly people with higher levels of autonomy and high-level functional capacity experienced less inconvenience and laboriousness in shopping. In other words, maintaining high-level functional capacity can contribute to resolving the food access problem. Improving access to food stores will directly reduce inconvenience and laboriousness experienced when shopping for food. Furthermore, if this also increases the variety in food intake among elderly people, this can contribute to slowing down the aging process and thus assist elderly people in maintaining autonomy. In addition, it may be possible to generate the virtuous circle shown in Figure 1, as elderly people with greater levels of autonomy experience less inconvenience and laboriousness when shopping for food and are more able to increase variety in their food intake. If

improving food access facilitate delayed aging among elderly people and the maintenance of their autonomy for a longer period of time, this can also contribute to maintaining a solid food market.

However, it has been reported that in large cities, despite favorable access to food stores, the local populace has a low variety of food intake. It was previously reported that the problem of food intake among the elderly is related to problems in local communities. Therefore, in large cities, it is necessary to implement policies effective for local communities to initiate the virtuous circle aforementioned.

On the other hand, relationships between the health of the elderly and food access are not limited to the aforementioned relationships concerning elderly people as consumers. The results of our survey suggested that levels of autonomy among elderly individuals did not decrease significantly until the age of 80. To address difficulties experienced by elderly members of society in accessing grocery stores, these individuals must not solely be treated as vulnerable; rather, healthy, active senior citizens must also be offered opportunities to demonstrate their abilities.

Figure 1
Improved Food Access for Elderly Persons: A Virtuous Circle

