

Does Difficulty in Accessing Grocery Stores Restrict Food Intake?

— Analysis Using Individual Data from

“The National Health and Nutrition Survey in Japan, 2011” —

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1. Introduction

To date, research on the difficulties in accessing grocery stores has pinpointed that these impediments affect the diet and health of individuals. Thus, it is essential to demonstrate the exact nature of these access difficulties. Below, the obstacles to accessing grocery stores and their relationship with food/nutrient intake and health were analyzed using individual level data. In particular, respondents were divided into two groups: one group has difficulties accessing grocery stores, while the other does not. Subsequently, the nutrition and health indices of these groups were compared.

There are numerous existing analyses on difficulties accessing grocery stores in relation to the health, food, and nutrition intake of local residents. One such study, was conducted by a team from the Policy Research Institute of the Ministry of Agriculture, Forestry, and Fisheries. However, since most studies are analyses of specific regions, it is unclear whether the problems pinpointed in them are limited to the region studied, or if they are problems existing nationwide. In this study, this connection will be clarified using the only survey that includes individual data on the difficulties in accessing grocery stores: “The National Health and Nutrition Survey in Japan, 2011” from the Ministry of Health, Labor, and Welfare.

2. Framework of Analysis

In “The National Health and Nutrition Survey in Japan, 2011,” there was no question that directly addressed difficulties in shopping. For this reason, the study focus was on the follow-up question to the respondents who answered that they obtain fresh food: “why I refrained from obtaining or could not obtain fresh food in the past year.”

The answer options for this question in relation to access to grocery stores are: “The stores where I do my shopping are far,” and “Transportation to the shopping area is bad.” In this study, respondents who selected either of the above two options will be placed in the “difficulties in access” group, meaning those who have difficulty in accessing grocery stores. On the other hand, respondents who did not select either of the above options and instead answered “never refrained from obtaining for the above reasons or could always obtain” shall be placed in the “no difficulties” group, meaning those who have no difficulty in accessing grocery stores. The analysis below compares the mean values of these two groups.

Waistline circumference and BMI (Body Mass Index) were used as health indicators. Nutrition indicators were intake of the three major nutrients (g/day) composed of protein (P), fats (F), and carbohydrates (C); intake balance (%); and intake of 16 different food groups (g/1,000 kcal) were used. In this study, the analysis results, mainly for women aged 65 years and above, will be presented.

3. Food Access and Food Intake/Health

(1) Access Difficulties and Health Indicators

First, the women’s physical characteristics were examined (Table 1). There was no significant difference in the waistline circumference or BMI value of women with difficulties in accessing food (men's waist circumference had a tendency to be smaller). From this, the conclusion is that there is a weak relation between difficulty in accessing grocery stores and health indicators in terms of physical characteristics.

(2) Access Difficulties and Intake of Three Major Nutrients

Next, the intake amount and intake balance of the three major nutrients were examined. Focusing on the intake of each nutrient, it is evident that those who have difficulty in access have a significantly lower fat intake. This lower fat intake is manifested by a lower fat intake ratio and a higher carbohydrate intake ratio, as illustrated in Figure 1. This shows the ratio (the median of the target quantity of the three major nutrients is the denominator) based on the median of the target quantity of the three major nutrients (= 1) from the “Overview of Dietary Reference Intakes for Japanese

Table 1. Comparison of Age/Health Indicators/Intake of Three Major Nutrients (Women aged 65 years and above)

| | Difficulties in access | No difficulties |
|------------------------------|------------------------|-----------------|
| Age (years) | 77.9 | 73.7** |
| Waistline circumference (cm) | 84.4 | 84.3 |
| BMI | 22.6 | 23.0 |
| Energy(kcal/day) | 1653 | 1662 |
| Protein Intake(g/day) | 62 | 64 |
| Fat Intake(g/day) | 40 | 45* |
| Carbohydrate Intake(g/day) | 255 | 245 |
| Protein Intake Ratio(%) | 14.9 | 15.4+ |
| Fat Intake Ratio(%) | 21.2 | 23.9** |
| Carbohydrate Intake Ratio(%) | 62.5 | 59.4** |
| Sample Size | 90 | 805 |

Note: **, *, + represent differences at 1%, 5%, and 10% significance levels, respectively.

(2015).²⁾⁽¹⁾ It can be confirmed here as well that the ratio of carbohydrate intake for those with difficulty in access is over one.

However, the mean value of carbohydrate intake ratio for those with difficulties in access is 62.5% for women (62.6% for men), which is lower than the upper limit standard dietary reference intake of 65%. In other words, although the mean value of carbohydrate intake rate for those with difficulties in access was statistically, significantly higher than those with no difficulties, its value is within the standard range. In terms of the average, there is no problem with this value.

Since it is an average value, it is expected that some respondents will exceed the upper limit of the target amount. Here, to find out to what extent the respondents carbohydrate intake ratio exceeds the upper limit of the target amount of 65%, the ratio was examined and subsequently compared with the group of respondents with no access difficulties (Table 2). It was found that, for women with difficulties in access, the ratio of carbohydrate intake exceeds the 65% standard (results were the same for men). A separate verification was done to confirm if this difference is statistically significant. From this, it can be inferred that respondents with difficulties in access may have a daily dietary intake with excessive carbohydrates.

(3) Access Difficulties and Intake by Food Group

Finally, the intake of 16 different food groups was examined. A statistically significant difference can be seen; respondents with difficulty in access have a high intake of grains, and low intake of fruits, algae, and eggs. This is illustrated in Figure 2 for women aged 65 years and older. This represents the ratio, taking the average for women aged 65 years and older as the standard (= 1). It is evident that respondents with difficulties in access have an unbalanced intake by food group. While the ratio of grains, root crops, sugar, and sweeteners exceeds one, the ratio of fats and oils, dairy, eggs, and meat is much lower than one. This indicates that difficulties in accessing grocery stores could lead to a diet that is biased towards carbohydrates; that is, grains.

4. Conclusion

Looking at the relationship between grocery access and health index/nutrition indicator, it was found that there is a high possibility that individuals aged 65 and older who have difficulties accessing grocery stores have an unbalanced diet that is biased towards carbohydrates. To improve access to grocery stores, there are many factors that cannot be understood using only the data that is currently at hand, such as the possibility of using mobile sites and shopping services. One task for the future will be to survey the actual situation in each regional area.

Figure 1. PFC Balance (Women aged 65 years and above)

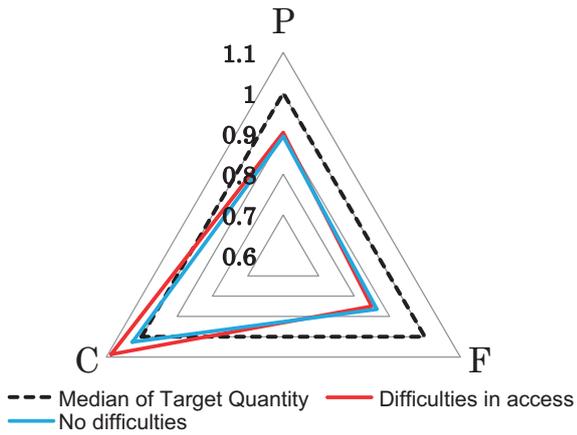
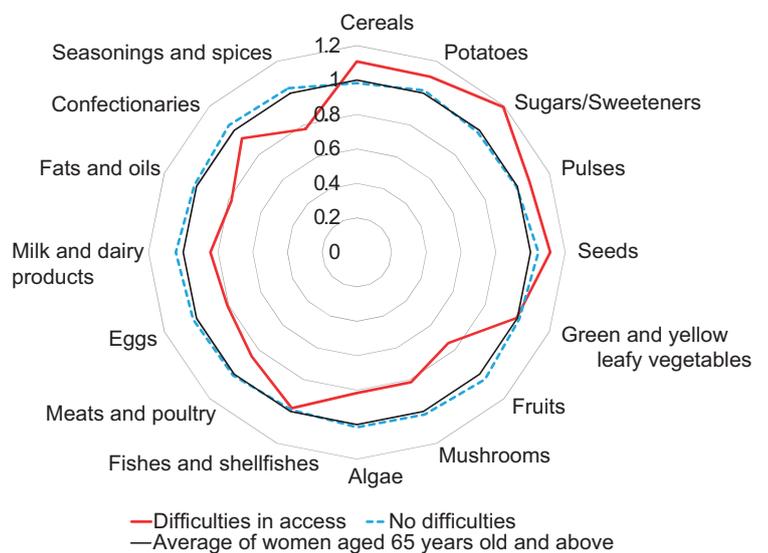


Table 2. Comparison of Carbohydrate Intake Ratio (Women aged 65 years and above)

| Carbohydrate Intake Ratio | Difficulties in access | No difficulties |
|---------------------------|------------------------|-----------------|
| Below 65% | 54.4% | 70.9% |
| More than 65% | 45.6% | 29.1% |
| Total | 100.0% | 100.0% |

Note: Pearson' s chi-square test statistic $\chi^2(1)=16.2$, which was significant at 1% level.

Figure 2. Balance of Intake by Food Group (Women aged 65 years and above)



Note (1) Since the target amount is not a single value but a range, the median was used. The target amount range for each nutrient is as follows.

Protein (P: % energy): 13-20 (median 16.5), Fats (F: % energy): 20-30 (median 25.0), Carbohydrate (C: % energy): 50-65 (median 57.5). The target amount is the same regardless of sex and age.