

Basic Research on the Burden of Dropping off and Picking up Children: Differences by Employment Type and Gender in the Tokyo Metropolitan Area

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Abstract

There is a need to reduce the burden of child drop-off and pick-up for child-rearing generations, but most studies on the actual situation in Japan are based on survey results. In this study, we analyzed differences in child drop-off and pick-up by employment type and gender, utilizing the “Metropolitan Area Person Trip Survey,” which is a statistical data set. The study targeted households in which both spouses were between 30 and 49 years old, had children under the age of 6, and included the following three groups. 1) Dual-income Group 1 (both spouses employed/on contract/temporary); 2) Dual-income Group 2 (husband employed/on contract/temporary, wife part-time); 3) Full-time housewife group (husband employed, wife unemployed). The analysis revealed that a) wives are almost always responsible for dropping off and picking up their children; b) husbands drop off and pick up their children less frequently in dual-income households; and c) households with children raising within 10 to 30 km of Tokyo Station have longer commuting times and need to reduce the burden of dropping off and picking up their children.

Keywords

Drop-Off and Pick-Up, Employment Type, Gender, Dual-Income Households, Tokyo Metropolitan Area

1. Introduction

According the Vital Statistics, the number of births in Japan in 2022 was

770,759, falling below 800,000 for the first time since statistics began and marking a new record low [1]. In addition, the total fertility rate decreased to 1.26 in 2005 and then increased to 1.45 in 2015, but after that it continued to decline and decreased to 1.26 in 2022 [2].

On the other hand, in recent years, the employment rate of women has increased regardless of age, and the number of people who quit their jobs due to marriage or childbirth has decreased. According to the Labor Force Survey, the number of dual-income households (households where both husband and wife are employed in non-agricultural and forestry industries) is increasing year by year, reaching 12.62 million households in 2022. According to the Employment Structure Basic Survey, the proportion of employed women among women raising children will reach 85.2% in 2022 [3].

According to the Basic Social Life Survey, in 2021, the daily childcare time for households with children under 6 years old will be 1 hour and 5 minutes for men and 3 hours and 54 minutes for women. In addition, the total time spent on housework, including housework, childcare, nursing care, and shopping, was 1 hour and 54 minutes for men and 7 hours and 28 minutes for women [4]. Due to the low burden of childcare on husbands, there is a lack of sharing and collaboration between husbands and women, and the burden of childcare is heavy on women. According to the Employment Equality Basic Survey, the rate of men taking childcare leave is increasing year by year, reaching 17.13% in 2022, but it is overwhelmingly low compared to overseas countries [5]. Considering that childcare by dual-income households will continue to become mainstream in the future, it is important to understand the transportation burden of child-rearing households from the actual transportation situation, taking into account the division of roles between husband and wife.

Based on the results of the 2018 Tokyo Metropolitan Area Person Trip Survey, the most recent data available at this time, this study aims to understand and analyze the respective child transportation behaviors of husbands and wives in households in the Tokyo metropolitan area, and to provide data for considering improvements in the living conditions of households with children.

2. Literature Review

Using the 2010 American Time Use Survey (ATUS) data, C. Bernardo *et al.* [6] analyze the time-use patterns of adults in dual-earner households with and without children as a function of several individual and household socio-demographics and employment characteristics. A major finding of the study is that the presence of a child in dual-earner households not only leads to a reduction in in-home non-work activity participation (excluding child care activities) but also a substantially larger decrease in out-of-home non-work activity participation (excluding child care and shopping activities), suggesting a higher level of mobility-related social exclusion relative to overall time-use social exclusion. N. McGuckin *et al.* [7] use data from the 1995 National Personal Trans-

portation Survey and the 2001 National Household Travel Survey to examine trip-chain trends in the United States. T. Schwanen [8] explored the impact of such factors as household structure, employment and commute characteristics, residential location, and culturally defined norms about parenthood on chauffeuring arrangements for dual-earner households in Utrecht, the Netherlands. The results revealed that fathers go out as chauffeurs at a fairly high rate, but their arrangements are often influenced by traditional gender norms. The study found that, in two-parent, two-worker households that drop off children at school, women are far more likely than men to incorporate that trip into their commute and that those trips are highly constrained between 8:00 a.m. and 9:00 a.m.

Research on the transportation of children to child-rearing generations in Japan has focused on the burden of transporting children to and from daycare centers. Yamada *et al.* [9] conducted a questionnaire survey targeting households using daycare centers in Tama City and Utsunomiya City to understand the working status of households, the division of transportation between parents and children, and their awareness of balancing work and childcare. Ariga *et al.* [10] conducted a questionnaire survey targeting dual-income households using daycare centers in the Tokyo metropolitan area and the Utsunomiya metropolitan area. As a result, they analyzed the feasibility of childcare center transportation, the actual personnel in charge of transportation, and attitudes toward transportation, and clarified similarities and differences among different metropolitan areas and location patterns. Suzuki *et al.* [11] conducted a questionnaire survey targeting households using 11 childcare facilities in Akita City, and determined their behavior and awareness when transporting children to and from childcare facilities. In addition to the above, there are many studies regarding the burden of transportation to and from daycare centers. However, these studies are based on questionnaire surveys regarding drop-off and pick-up at daycare centers in a limited area, and are not studies that ascertain the actual state of drop-off and pick-up movements for the child-rearing generation based on statistical data for the entire city.

Kawakami *et al.* [12] analyzed changes in women's transportation behavior from 1968 to 2008 using the Tokyo Metropolitan Area Person Trip Survey. Furthermore, using data from 2008, they classified women in child-rearing households into full-time, part-time, and housewives based on their employment status, and analyzed the characteristics of the trip production rate by time of day. On the other hand, as future issues in its study, they noted that since the 2008 survey did not capture the relationship of the household members, future analysis should be based on accurate relationships among household members, detailed analysis should include men, and detailed analysis should be conducted on the characteristics of districts.

In this paper, we analyze the characteristics of travel for commuting and transportation purposes by region within the metropolitan area from a macro perspective, utilizing the 2018 Tokyo Metropolitan Area Person Trip Survey,

following the research methodology of Kawakami *et al.* In particular, from the perspective of gender equality, we focus mainly on the transportation burden of dual-income households, and analyze the trip production rate by purpose and its time characteristics for husbands and wives according to the employment status of the couple. The relationship of the household members, which was an issue in the study by Kawakami *et al.* [10], has been added to the survey items since the 2018 Person Trip Survey, making it possible for this study to analyze based on the accurate relationship of household members.

3. Method

3.1. Data Overview

This study uses the Tokyo Metropolitan Area Person Trip Survey (Tokyo Metropolitan Area PT Survey) conducted in 2018. The study area is the Tokyo metropolitan area, which consists of Tokyo (excluding islands), all of Kanagawa prefecture, all of Saitama prefecture, all of Chiba prefecture, and southern Ibaraki prefecture, and has a population of approximately 37 million people. This person trip survey is a survey on the movement of people, and it captures a person's daily movements on weekdays. The survey was conducted from September to November 2018. The number of samples targeted for analysis is approximately 310,000 people.

Based on this sample, the Tokyo Metropolitan Area Transportation Planning Council, which is the main body of the survey, is conducting expanded aggregation by individual attribute and region in order to restore the population to the population at the time of the survey. In this research, we will utilize this expanded and aggregated data.

3.2. Survey Target Settings

Using the Tokyo Metropolitan Area PT survey data, we will classify the characteristics of child-rearing households in the Tokyo metropolitan area and select households to be surveyed. Here, in light of the recent trend of late marriage and childbearing, we will analyze nuclear households where both husband and wife are between 30 and 49 years old, and classify households by the age of the youngest child in the household. Specifically, the classification is as follows: 1) There are children under the age of 6, who are equivalent to preschool children, and 2) There are no children under the age of 6. Regarding (2), for reference, we also checked the percentages for cases where there were children aged 7 to 12, equivalent to elementary school students, and there were no children aged 12 or younger. The spatial characteristics within the Tokyo metropolitan area are divided into less than 10 km, 10 km or more but less than 30 km, 30 km or more but less than 50 km, and 50 km or more from Tokyo Station, the center of the Tokyo metropolitan area.

Table 1 shows the composition ratio of households where both husband and wife are between 30 and 49 years old by region. In the metropolitan area as a

whole, 40.8% of households where both husband and wife are between the ages of 30 and 49 have children under the age of 6. For reference, 38.9% of households have children between 7 and 12 years old, and especially in areas less than 30 km from Tokyo Station, over 80% of households have children under 12 years old.

Next, the employment status of households is classified into the following seven groups.

1) Dual-income group 1: Both husband and wife are employed/contract/dispatched.

2) Dual-income group 2: Husband is employed/contract/dispatched, wife is part-time worker.

3) Dual-income group 3: Husband is part-time worker, wife is employed/contract/dispatched.

4) Dual-income group 4: Both husband and wife are part-time worker.

5) Full-time housewife group: only husband is employed, wife is not employed.

6) Full-time househusband group: only wife works, husband is not employed.

7) Not working group: Both husband and wife are not employed.

Table 2 shows the composition ratio of this category for households with children under the age of 6, who are expected to have a large transportation burden. As can be seen from this table, (1) Dual-income group 1 accounted for 31.6%, (2) Dual-income group 2 accounted for 21.5%, and (5) Full-time housewife group accounted for 45.6%. These three categories account for 99%, and the percentages of other categories are small. In addition, the total of Dual-income group 1 and Dual-income group 2 exceeds 50%, which is higher than households with Full-time housewife group. This trend is the same in all regions.

For this reason, households that satisfy all of the following conditions of this study will be set as the target of the survey.

Table 1. Composition ratio of households where both husband and wife are between 30 and 49 years old by region.

attribute	<10 km	10 km≤ <30 km	30 km≤ <50 km	50 km≤	Total
(1) Have children under 6 years old	45.5%	40.9%	40.1%	37.1%	40.8%
(2) No children under 6 years old					
Have children between 7 and 12 years old	39.0%	40.3%	37.6%	36.6%	38.9%
No children under 12 years old	15.5%	18.8%	22.2%	26.2%	20.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2. Employment status of households where both husband and wife are between 30 and 49 years old (with children under 6 years old).

attribute	<10 km	10	30	50 km≤	Total
		km≤, <30 km	km≤, <50 km		
(1) Dual-income group 1	39.1%	33.2%	26.2%	32.8%	31.6%
(2) Dual-income group 2	15.5%	18.6%	25.2%	30.6%	21.5%
(3) Dual-income group 3	0.0%	0.3%	0.3%	0.7%	0.3%
(4) Dual-income group 4	0.6%	0.4%	0.5%	0.1%	0.4%
(5) Full-time housewife group	44.6%	46.9%	47.3%	35.3%	45.6%
(6) Full-time househusband group	0.0%	0.3%	0.2%	0.5%	0.2%
(7) Not working	0.3%	0.3%	0.4%	0.0%	0.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

- Households where both husband and wife are between 30 and 49 years old.
- Households with children under 6 years old who are expected to have a large transportation burden.
- The following three groups with large numbers of households: (1) Dual-income group 1, (2) Dual-income group 2, and (5) Full-time housewife group.

The following sections will analyze the burden on husbands and wives to drop-off and pick-up their children for these three groups.

4. Analysis of the Burden of Transportation for Households Raising Children

4.1. Burden of Transportation for Husbands and Wives

To analyze the burden on husbands and wives to drop off and pick up their children, the following three groups of households with children 6 years old or younger, organized in 3.2 ((1) Dual-income group 1, (2) Dual-income group 2, and (5) Full-time housewife group) are targeted to understand the trip production rate (trips/day) by purpose for husbands and wives, and compared to households with no children under 6 years old. The results for wives are shown in **Figure 1**, and the results for husbands are shown in **Figure 2**.

For households with children under the age of 6, the trip production rate for the purpose of drop-off and pick-up for their wives ranges from 0.99 to 0.79, which is larger than the 0.11 to 0.17 for households without children under 6. As a result, the total trip production rate is also large. Furthermore, in the case of Dual-income group 1 and Dual-income group 2, the trip production rate for the purpose of going to work is large at 0.84 and 0.63. In households with children under 6 years of age, the production rate of husbands for dropping off and picking up is 0.27 (27% for wives) in Dual-income group 1 and 0.08 (10% for wives)

in Dual-income group 2.

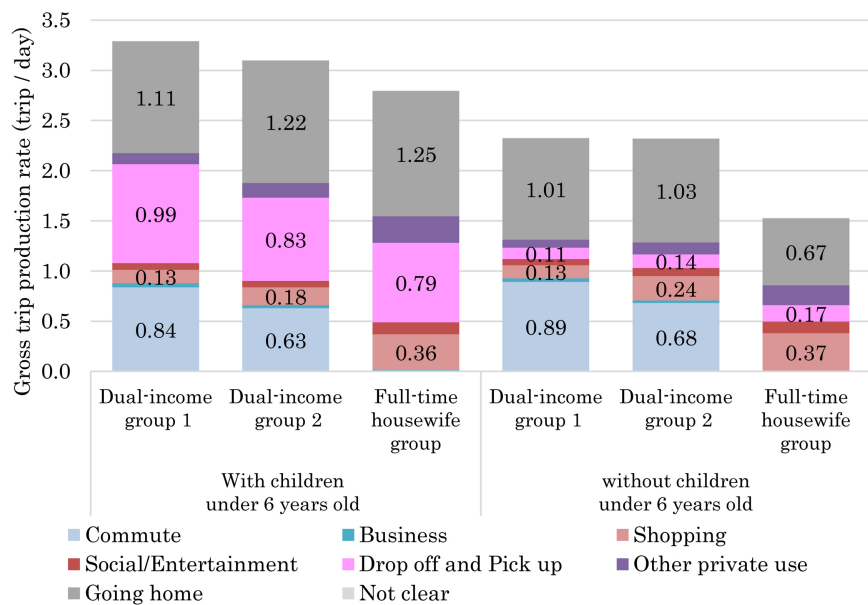


Figure 1. Wives' trip production rate (by purpose, by presence or absence of children under 6 years old).

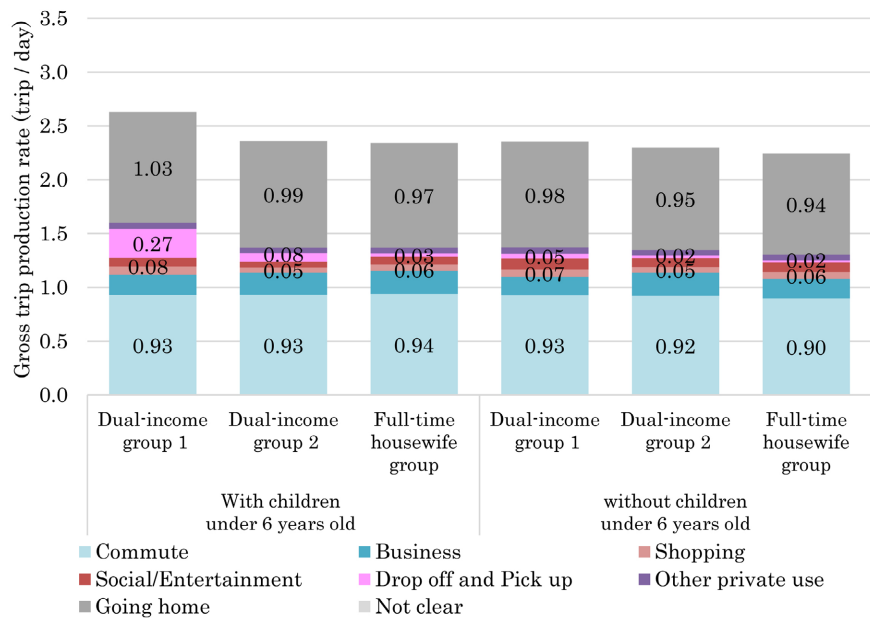


Figure 2. Husbands' trip production rate (by purpose, by presence or absence of children under 6 years old).

The results of this study show that even in cases where both spouses work, the husband's production rate for dropping off and picking up children is low, and it is the wife who is responsible for dropping off and picking up children. Even in Dual-income group 1, where there is thought to be little difference in income between couples, the burden on wives is greater. This is thought to be due to the

cultural influence that women are responsible for raising children, and the social environment that assumes this. Furthermore, in Dual-income group 2 and Full-time housewife group, where there is thought to be a difference in income between couples, it is thought that wives bear more of the burden of dropping off and picking up children due to economic factors in addition to these cultural and social influences.

4.2. Trips by Time of Day

To examine the situation in 4.1 above in detail, we analyze the time-of-occurrence distribution of trips for wives and husbands for households with children under 6 years old. **Figure 3** shows the time distribution of trips for wives by purpose and **Figure 4** shows the time distribution of trips for husbands by purpose.

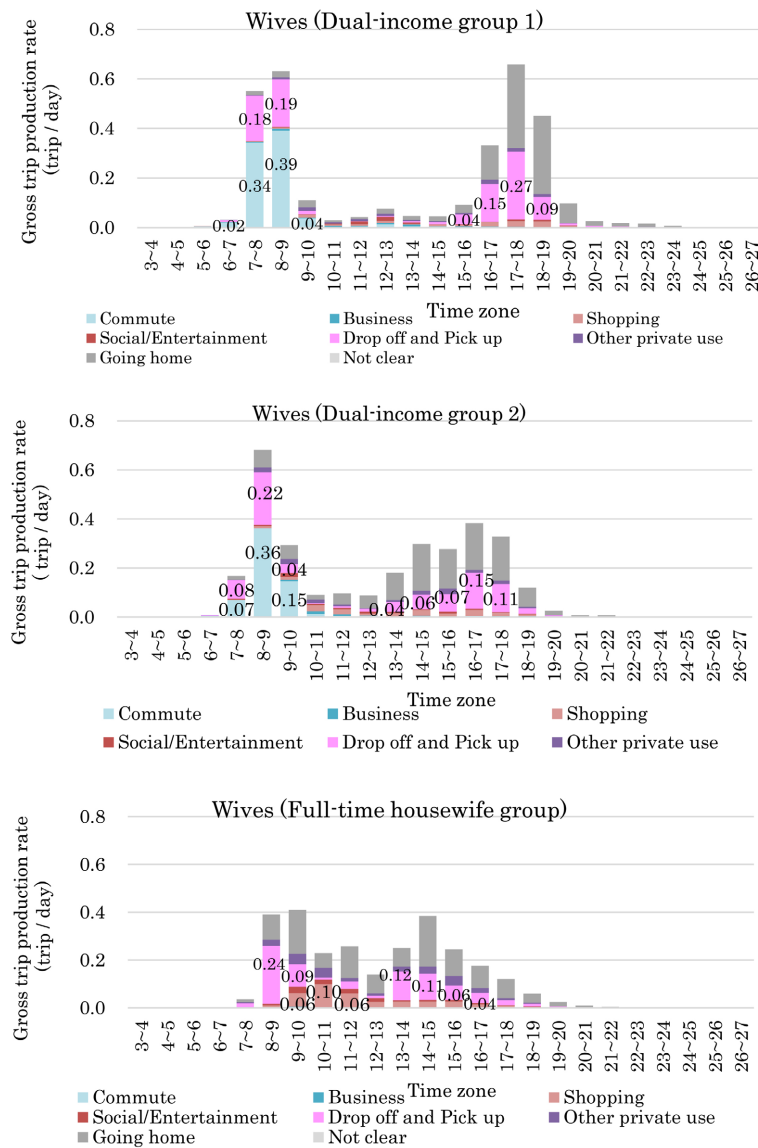


Figure 3. Wives' trip production rate by time of occurrence (Households with children under 6 years old, by purpose).

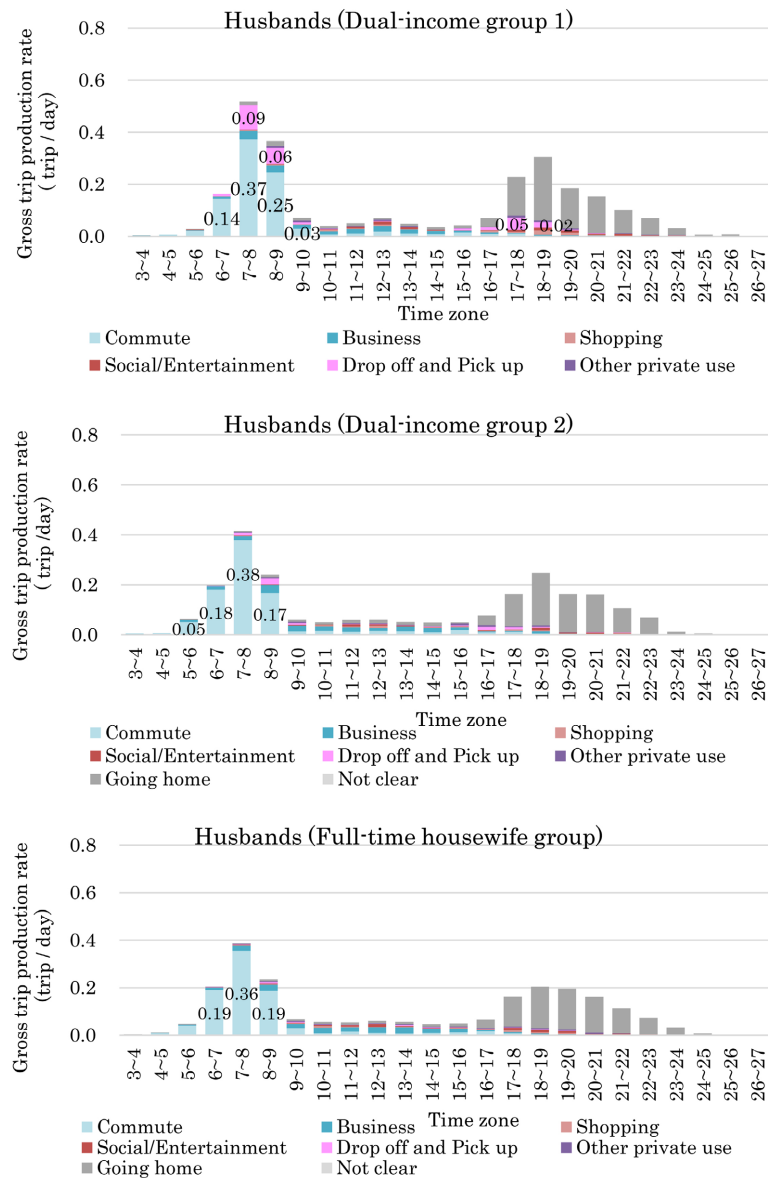


Figure 4. Husbands' trip production rate by time of occurrence (Households with children under 6 years old, by purpose).

For wives in Dual-income group 1, the commuting trip production rate peaks between 7 and 9 a.m. (0.34 trips, 0.39 trips). Similarly, the trip production rate for drop-offs and pick-ups peaks between 7 and 9 a.m. (0.18 trips, 0.19 trips, 0.09 trip). Furthermore, it can be seen that the incidence rate during working hours from 9 a.m. to 3 p.m. is low. As a result, wives were found to have to drop-off and pick-up their children or go shopping during limited hours in the morning and evening.

Wives in Dual-income group 2 have a peak in the commuting trip production rate between 8 to 9 am (0.36 trips). Similarly, the trip production rate for drop-offs and pick-ups peaks between 8 to 9 am, but compared to wives in Dual-income group 1, the trip production rate is smaller. Additionally, some of

these wives go to work between 9 to 10 am (0.15 trips), which suggests that they have less time constraints in the morning. In addition, the trip production rate for these wives, such as dropping off and picking up, was widely distributed between 1 and 7 pm (0.04 - 0.11), suggesting that they have a certain degree of freedom compared to the wives in Dual-income group 1.

Wives in Full-time housewife group do not have to commute to work, and their trip production rate for drop-offs and pick-ups peaks between 8 and 9 am (0.24 trips). In the afternoon, the trip production rate of drop-offs and pick-ups peaks between 1 p.m. and 2 p.m. (0.12 trips, 0.11 trips), and there are fewer drop-offs and pick-ups after 3 p.m. Additionally, there is a trip production rate for shopping and other private purposes during daytime hours. Wives in Full-time housewife groups have a higher degree of freedom in their time compared to wives in Dual-income group 1 and Dual-income group 2, such as finishing shopping early in the day and picking up children in the early afternoon.

For husbands in Dual-income group 1, the commuting trip production rate peaks between 7 and 8 am (0.37 trips), but the trip production rate for drop-off and pick-up is lower than for wives (0.09 trips). Travel for the purpose of returning home peaks around 6 pm, but the trip production rate for drop-off and pick-up is lower than that of their wife (0.05 trips, 0.02 trips). These husbands' drop-off and pick-up their children less in the evening than in the morning. From this, it is clear that the husband is not particularly responsible for drop-off and pick-up their children in the evening.

Husbands in Dual-income group 2 have significantly lower trip production rate for pick-ups and drop-offs than that of wives. Their trip production rate in this group is not significantly different from that of husbands of Full-time housewife groups.

For comparison, we check the differences in the time distribution of trips for wives and husbands, respectively, for households without children under the age of 6 (**Figure 5** and **Figure 6**). **Figure 5** shows the time distribution of trips for wives by purpose and **Figure 6** shows the time distribution of trips for husbands by purpose.

The distribution of working hours for wives in Dual-income group 1 and Dual-income group 2 is similar to that of households with children, but they are not seen dropping off and picking up children. There are some pick-ups and drop-offs between 5 pm and 7 pm (group 1: 0.04 trips, 0.02 trips, group 2: 0.03 trips, 0.03 trips), but these are likely to be pick-ups and drop-offs for children over the age of 7 for lessons. Wives who are Full-time housewife group travel widely for shopping during the day, peaking between 10 and 12 pm (0.08 trips, 0.05 trips). Looking at the husband's trip production rate, there is little difference in the distribution by purpose or time of day between groups depending on the couple's employment.

From the above, it became clear that in Dual-income group 1 with children, the wife was primarily responsible for dropping off and picking up children in

the morning and husbands bear some of the burden. Especially in the evening, she was responsible for most of the dropping off and picking up children. This is thought to be influenced by the social environment in which men work overtime in the evenings. It is necessary to create an environment in which husbands cooperate in dropping off and picking up children, and there is a need for companies to change their attitudes toward men in child-rearing.

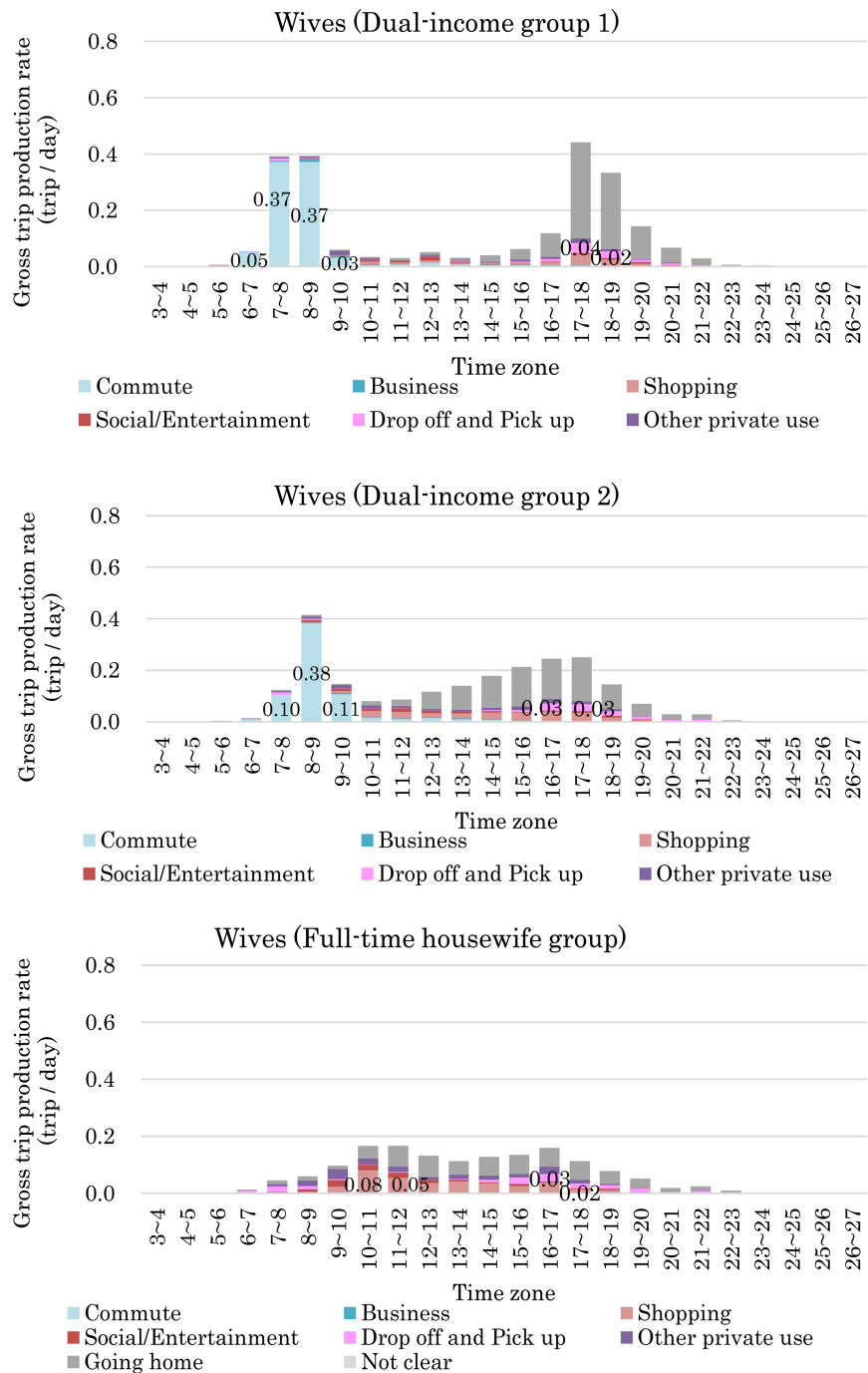


Figure 5. Wives' trip production rate (Households without children under 6 years old, by time of occurrence, by purpose).

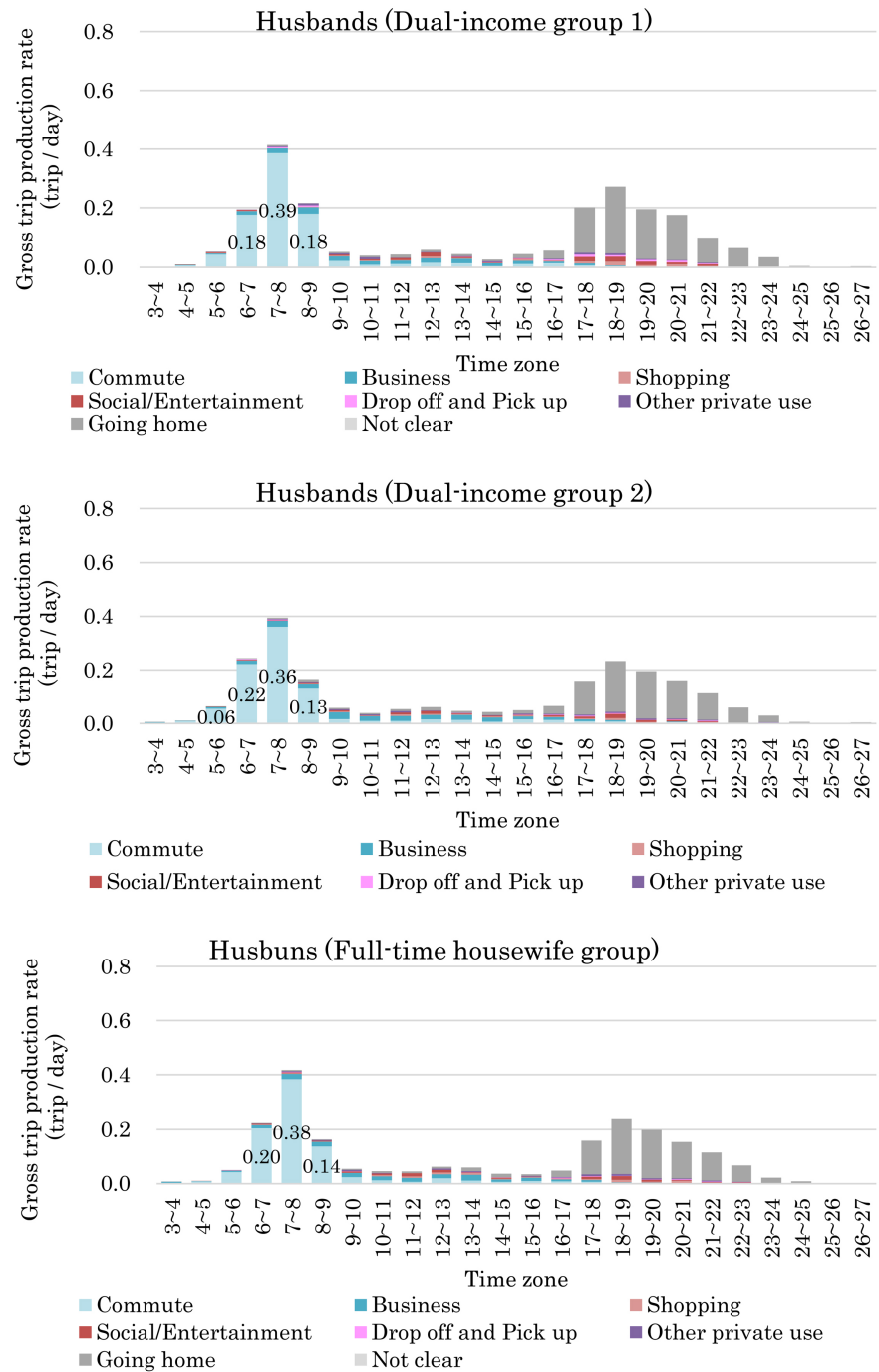


Figure 6. Husbands' trip production rate (Households without children under 6 years old, by time of occurrence, by purpose).

In Dual-income group 2 and the Full-time housewife group, husbands do not shoulder the burden in the mornings either. This is thought to be due to economic factors such as the difference in income between spouses. It suggests that the burden of childcare is limiting women's job choices. It appears necessary to create an environment where it is easy for women to work, and in particular to implement policies to reduce the burden associated with dropping off and pick-

ing up children.

4.3. Production of Trips for Drop-Off and Pick-Up Purposes by Region

As a result of the analysis in 4.2, it was found that Dual-income group 1 had a particularly heavy burden of transportation for their wives.

For this reason, we will analyze the time periods in which trips to drop-off and pick-up children occur by region for husbands and wives in Dual-income group 1 who have children under 6 years of age. In the Tokyo metropolitan area, the urban area is spread out around Tokyo Station, so we classified the areas by distance from Tokyo Station to the place of residence.

Figure 7 shows the times when the wife's trip to drop-off and pick-up, and **Figure 8** shows the times when the husband's trip to drop-off and pick-up.

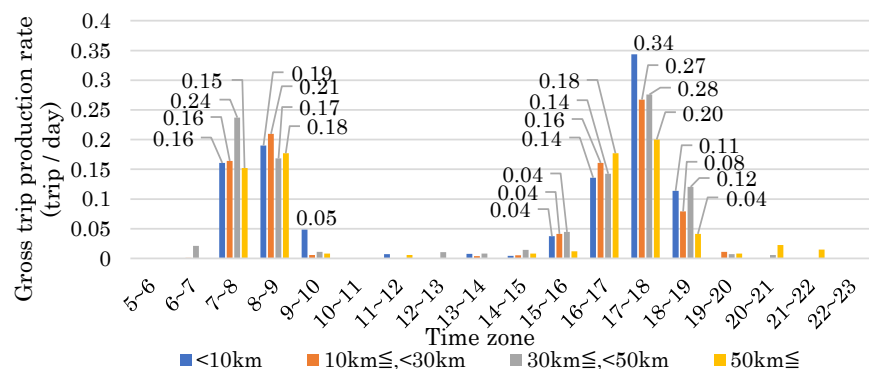


Figure 7. Wives' trip production rate for dropping off and picking up. (Dual-income group 1, households with children under 6 years old, by distance rank from Tokyo Station, by time zone).

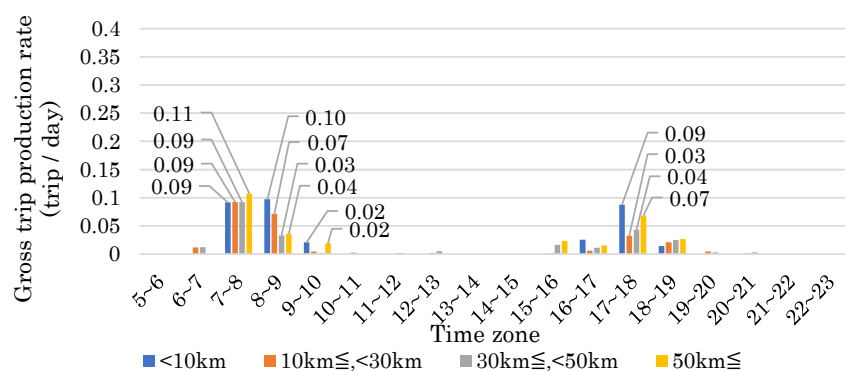


Figure 8. Husbands' trip production rate for dropping off and picking up. (Dual-income group 1, households with children under 6 years old, by distance rank from Tokyo Station, by time zone).

In areas less than 10 km from Tokyo Station, the wife's drop-off and pick-up trips occur at 7 (0.16 trip), 8 (0.19 trip), and 9 am (0.05 trip), but in areas be-

tween 10 km and 30 km, they are concentrated at 7 (0.16 trip) and 8 am (0.21 trip). Focusing on the evening, there is a peak around 5 pm in areas less than 10 km from Tokyo Station (0.34 trip). On the other hand, in areas less than 10 to 30 km from Tokyo Station, compared to areas less than 10 km, there are more trips around 16:00 (0.16 trip), and fewer trips around 17:00 (0.27 trip), meaning people leave their places of work earlier.

Regarding the husband's drop-off and pick-up trips, in areas less than 10 km from Tokyo Station and 10 to 30 km, there are about 0.09 trips at around 7 am. However, between 8 am and 9 am, the 10 to 30 km (0.07 trips) is smaller than that between less than 10 km (0.10 trips). Focusing on the evening, in areas less than 10 km from Tokyo Station, 0.09 trips are seen 5 pm, but in other areas there are almost no pick-ups.

Based on these circumstances, it can be said that regardless of the distance from Tokyo Station, wife's drop-off and pick-up children in the morning and evening in all areas. These results suggest that the differences in the roles of couples in dropping off and picking up children are largely due to cultural and social influences related to gender rather than geographical factors. On the other hand, within 10 km of Tokyo Station, husbands may be in charge of dropping off and picking up children in the evening, but in other areas, husbands tend not to do so. This suggests that husbands may cooperate if the commute time is short.

4.4. Relationship between Commuting Time and Pick-Up Time

Similar to 4.3, we will analyze the relationship between commuting time and pick-up time for wives and husbands for Dual-income group 1 households with children under 6 years of age, where the burden of drop-off and pick-up was particularly heavy on wives.

Figure 9 shows the wife's commuting time and drop-off time by distance range from Tokyo Station, and **Figure 10** shows the husband's commuting time and drop-off time by distance range from Tokyo Station. For both husbands and wives, commuting time is longer in areas 10 to 30 km from Tokyo Station compared to areas less than 10 km away, with wives commuting 12 minutes longer at 52.7 minutes and husbands commuting 9.7 minutes longer at 60.7 minutes. Commuting time decreases in the order of 30 to less than 50 km and 50 km or more. On the other hand, when looking at the drop-off and pick-up time, it is around 10 to 12 minutes in all regions, and there is no major difference. This shows that wives living in areas less than 10 km to 30 km have a heavy burden due to long commuting times and drop-off and pick-up times.

Overall, in every region, wives' commute times are about 10 minutes shorter than their husbands'. These results suggest that wives tend to choose workplaces close to their homes because they are responsible for dropping off and picking up children. In order to give wives more options for where to work, it is necessary for husbands to cooperate and reduce the burden of dropping off and picking up children.

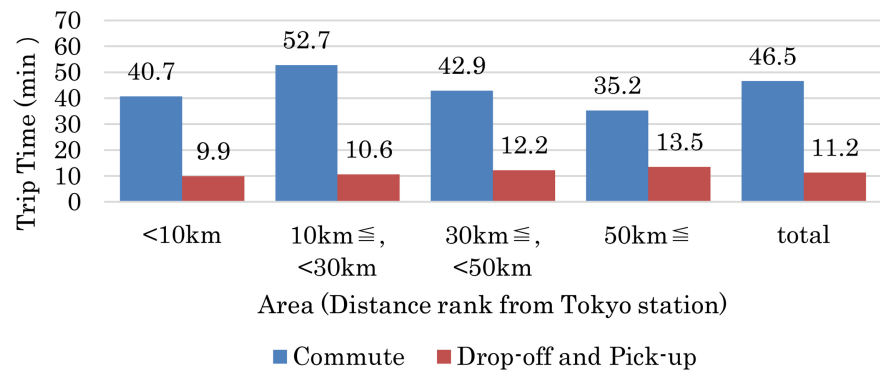


Figure 9. Wives' morning commuting time and drop-off time (Dual-income group 1, households with children under 6 years old, by distance rank from Tokyo Station).

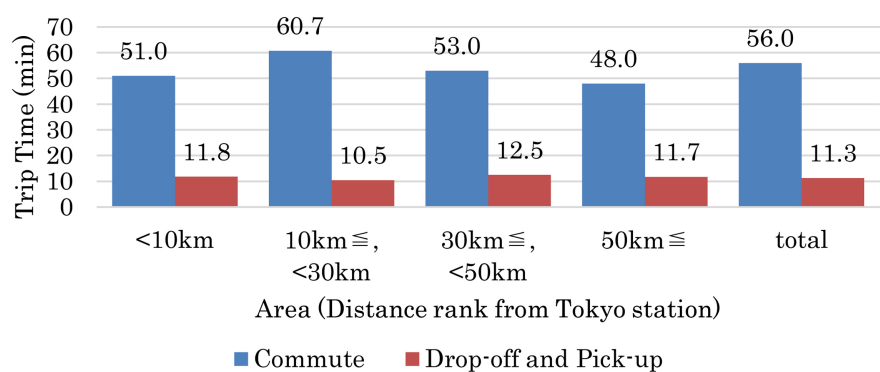


Figure 10. Husbands' morning commuting time and drop-off time (Dual-income group 1, households with children under 6 years old, by distance rank from Tokyo Station).

5. Conclusions

In this study, by analyzing the latest 2018 Tokyo Metropolitan Area PT survey data, we attempted to show statistical data about the behavior of wives and husbands regarding dropping off and picking up children, focusing on the generation where both parents work and raise children. This is possible for the first time through a person trip survey that captures personal attributes, household attributes, and relationships together with trip information, and is considered as basic information for future policies.

The survey found that wives are responsible for most of the child drop-offs and pick-ups, and this trend is true even when both husbands and wives are full-time employees. The husband does about 1/3 of his wives' transportation in the morning, but hardly any in the evening. Considering that wives' works long hours, they have to go to work, drop-off and pick-up within a limited amount of time, and is restricted from traveling for shopping and other personal purposes.

In order to reduce the burden on wives, husbands are expected to take on the responsibility of picking up and dropping off their children. In addition, a system is expected to reduce the burden of commuting and transportation for families with children. The introduction of various work styles (telework, flexible work hours, etc.) at each workplace, the use of telework and coworking facilities

with childcare centers and daycare centers near residential areas, and the development of drop-off and pick-up stations to reduce the burden of commuting to and from work are already being promoted. The results of this study revealed the need for further promotion of these measures.

There have been some limitations to note in this study. This study used statistical survey data for analysis, but there may be potential bias in the classification of child-rearing households, and data with a small sample size may have potential biases. Furthermore, this study may not yet have been able to perform a comparative analysis between different employment types and gender. Future studies could use more sophisticated statistical examination to attribute differences directly to these factors while controlling for other variables. In addition, this study's findings are an analysis of the Tokyo metropolitan area in Japan, and there may be a lack of discussion of comparisons in similar regions around the world. Therefore, further research is needed to evaluate and verify our findings in metropolitan areas in the United States, the EU, and even Southeast Asian countries. This comparative approach would provide deeper insights for policy evaluation.

The following points can be raised as issues for future research.

- In this study, the analysis focused on commuting to and from work. In addition to this, a more detailed analysis of the relationship with various activities such as shopping, socializing, entertainment, and other private activities is required to understand the behavior of the child-rearing generation.
- In this study, we categorized the regional characteristics by distance from Tokyo Station to the place of residence, but more detailed analysis of the distance between the place of residence and the place of employment and the distance between the place of residence and the nearest station is required to understand the behavior of the child-rearing generation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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