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Graduate School of Economics  
Osaka University, Toyonaka, Osaka 560-0043, JAPAN

"A demographic and nutritional analysis of urban lower-class dwellers in modern Japan revised version: the case of one *Saimin-chiku* in Tokyo, ca.1930"\*

Kenichi Tomobe<sup>†</sup>, Minori Oshidari<sup>††</sup>, Keisuke Moriya<sup>†††</sup>, Yoshihiro Kawano<sup>††††</sup>

[Abstract]

This study aims at investigating a method to measure the standard of living, nutritional status, and physical condition of the *saimin* ("the poor") who suddenly appeared in the modern age and settled there despite their poverty. In the study of social science, the mainstream theories of poverty are Charles James Booth's stratification theory based on income level and Benjamin Seebohm Rowntree's minimum cost of living theory based on the cost of living; both have their merits and demerits. This paper will measure the poverty levels in terms of income and cost of living using data from a specified sub-district located in Tokyo (the results of an on-site survey of approximately 180 households). Many households living in the *Saimin-chiku* faced poverty both income levels and cost of living. In addition, observation of the health status of the *saimin* households showed that roughly half of the community had a disease of some sort, or a tuberculosis patient in the household. This provides a perspective which illuminates the difference in situation between the *saimin* households, who made a living based on an economy of mutual support, and the small farmer households, who had a communal consumption lifestyle but had the capacity to be self-supporting.

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† : Corresponding author, Graduate School of Economics, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo, 186-8601, Japan. Email address: kenichi.tomobe@r.hit-u.ac.jp

† † : Bank of Yokohama, 3-1-1 Nishi-ku Minatomirai, Yokohama, Tokyo, 220-0012, Japan.

† † † : Graduate School of Economics, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo, 186-8601, Japan.

† † † † : Member of House of Councilors, House of Council Building #720, 2-1-1 Nagatacho, Chiyoda-ku, Tokyo, 100-8962

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## Introduction: Households, Living Standards, and Nutrition

Regarding the lifestyle of peasants after the Ritsuryo era (mid-7th-10th century), it is safe to assume that the household, as a unit group of independent peasant, that is, was the unit of production and labor in cultivation, a production activity that has continued since the Jomon (14,000–300 BCE) and Yayoi (300 B.C.–300 A.D.) eras.<sup>1</sup> Conversely, what is unclear, is where the consumption and nutrition of household members was supplied from. Historical studies have concluded that these peasants eventually became independent as consumption units when they built houses (dependent on the main family) and ‘Kamado’, installed cooking stoves (mainly in western Japan) and ‘Irori’, sunken hearths (mainly in eastern Japan). While this criterion is clear, it is still yet to be confirmed whether it is correct. In the late Muromachi period (1333-1573), the situation of peasants who became independent usually consisted of a community of houses and lots.<sup>2</sup> This is because it is natural to imagine that even if each house had its kitchen, the food cooked at each kitchen would be shared among the houses. This characteristic is due to the fact that multiple independent houses were built within the grounds of a main house. Hence even if each house had a kitchen, it was common to expect that any shortfalls would be accommodated between houses.

During the Edo period (1603-1867), each house emerged independently from the house community (*yashiki*); nevertheless, it is common to assume that the peasants living in these new houses in the neighborhood, including the initial house owners, continued to live together in a community of consumption, and that the group became the basis for the formation of the so-called "*Ie*" (house), which has also been a point of research to date.<sup>3</sup> Moreover, this is the ground on which well-known rural sociologist Kizaemon Ariga stated, "the household is the last redoubt of livelihood security."<sup>4</sup> Up to this point in the history of Japanese society, the *Ie* and the household are distinct, and the distinction is to be made in the analysis. In other words, the "standard of living as a household" and "standard of living as a house" differ conceptually and interpretatively in the resultant analysis.

Consequently, what is the standard of living for the "*saimin*" (a term coined as an administrative term in the late Meiji and Seed how can it be measured? Two theories on poverty have traditionally dominated the study of social sciences. The first is Charles Booth's hierarchy theory based on income level, and the other is B.S.Rountree's minimum cost of living theory based on the cost of living<sup>5</sup>. Both have advantages and disadvantages, but this paper will analyze the poverty level in terms of income level and cost of living (nutritional calories) using data from a specific small community in Tokyo in the early 1930s (results from a survey of roughly 180 households).

### 1. Income Level, Cost of Living, and Food of the *Saimin* Community

Firstly, the household income; the average monthly household income in the *Saimin-chiku* (lower-class district) was 55.9 yen (93.7 yen for Tokyo city residents; same below in parentheses), 52% (7.1%) of all households earned less than 60 yen, and 96% (16%) earned less than 100 yen. In other words, almost all households in the *Saimin* community were in the bottom 20% of the households of Tokyo city residents at that time. Thus, we consider them the least standard income earners of that time. According to the stratification of Booth's classification, we can assume a structure with "regular low-income earners" and "irregular standard earners" as the core, "occasional earners" as the very poor, and "temporary day laborers, vagrants, etc." as the lowest stratum.

Next, the cost of living, i.e., nutritional intake (converted as the amount of energy needed for a male

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<sup>1</sup> See Masashi Oguchi, 1995, "Agricultural Management Unit in Ancient Japan", Toshiya Torao eds. *Local Rule under the Nation of Ritsuryo Codes*, Yoshikawa Koubunkan Co., Ltd., pp. 248–260, and Kenichi Tomobe, 2021, "A Brief History of Markets, Households & Infectious Diseases in Japan", Japan Spotlight, 237, May/June, pp.38-41.

<sup>2</sup> See Kenichi Tomobe, 2007, *Farm Household Economy in Pre-industrialized Japan*, Yuhikaku Publishing Co., Ltd., Chapter 1. Here, the cooking stove installation is understood as a consumption unit.

<sup>3</sup> See Tsuneichi Miyamoto, 2014, "City Culture and Rural Community Culture", Zenjiro Tamura eds., *Selection of Tsuneichi Miyamoto's Lectures vol. 3*, Rural Culture Association Japan.

<sup>4</sup> See Kizaemon Aruga, 1978, *Feudal Legacies and Modernization* 2nd Ed., Takashi Nakano, Minoru Yoneji, and Kyouichi Kakizaki eds., *Works of Kizaemon Ariga* vol. 4, Mirai-sha Publishers, pp. 187–277. In this context, a village in the early modern period is understood as a cluster of houses.

<sup>5</sup> See for example Charles Booth, 1892-1896, *Life and labour of the people in London*, and B. Seebohm Rowntree, 1901, *Poverty, A Study of Town Life*.

manual laborer = 3500 kcal/day, reflecting differences in age and gender) was examined; the average daily calorie intake of "households" (reconstructed) lacked approximately 3096 kcal/day. Only 2% of households could consume more than the required calories, which meant that 98% of the households were not getting the minimum daily calorie. The detailed breakdown is as follows: 14% of all households were deficient in over 5000 kcal, 32% were deficient in 3000 to 5000 kcal, and 52% of all households were deficient in less than 3000 kcal.

Based on the theory of minimum cost of living, it is clear that the consumer life of the residents of the *Saimin* community was established based on a shared economy<sup>6</sup> (an economy of mutual support). Perhaps it is safe to conclude that "sharing" was assumed in almost every event pertaining to consumption. Although some of the *Saimin* occupied two rooms, most lived in one room, so the kitchen was probably shared. Recently, Noriko Yuzawa has offered an interesting perspective on the topic of sharing.<sup>7</sup> As far as it is known from the *Saimin* dietary menu, a simple "simmered dish" was served almost every evening as a side dish for dinner. Per Yuzawa's point, the importance of the presence of "simmered food" stalls in large urban areas comes to the fore once again. Furthermore, the issue of consuming leftovers, which is often pointed out in the study of the *Saimin* community, should not be understood simply as a phenomenon of shared poverty but rather as a way of saving money and satisfying the pride of the poor by sharing "a warm meal" called "leftovers." In addition, cooking over a fire may kill mold and bacteria, which, as will be seen, has a hygienic effect.

## 2. What is "Poverty" in Economic History ?

How to understand the term "poverty" or "impoverishment" in the context of economic history? The term "poverty" or "impoverishment" has been studied from various perspectives. In the field of economic history, it is postulated by measuring the standard of living of workers during the Industrial Revolution.<sup>8</sup> Moreover, in social welfare studies, the pros and cons of proposed measures have been determined by reference to measurements of "poverty" or "impoverishment."<sup>9</sup> Alternatively, "poverty" as a contrast to "abundance" has been the focus.

Poverty has also been measured through various methods. Real wages have been used as a measure of living standards. But, there has been criticism that while real wages can measure the standard of living of wage earners, they cannot reflect the actual living conditions of non-wage earners, especially those living in rural areas. Additionally, the method of assessing living standards by body size, especially height, was also assumed. In nineteenth-century England, people from rural areas were found to be taller than those from urban areas. This is the consequence of exposure to poor urban living conditions, commonly referred to as the urban penalty.<sup>10</sup>

It is argued that the standard of living is measured by calories expended and work intensity. Unlike real wages, the measurement of calories earned can also measure the standard of living of non-wage workers and calculate the number of calories obtained per working hour as long as the total working hours is determined. Notwithstanding, the number of calories obtained per hour of labor resulted in the hunters being by far the richest, as they were able to obtain more calories (food) in fewer hours of labor.<sup>11</sup>

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<sup>6</sup> In the book, Tetsuo Najita, 2009, *Ordinary economies in Japan : a historical perspective, 1750-1950*, ordinary economies are defined as economies of mutual assistance, which again implies the daily economy of the *Saimin* people.

<sup>7</sup> See Noriko Yuzawa, 2022, *History of Household Dish in the Modern Developed Town: Buy, Borrow, and Share the 'Fire' for Cooking*", *Gendai Shisou* February 2022 Issue. For further details of the significance of the role played by "*niuri-chaya* (simmered dish restaurant)" in the Edo area in the Edo period, see Chapter 3 of Ryouichi Iino's book, *Births of Izakaya*, Chikumashobo Ltd.

<sup>8</sup> See Takao Matsumura, 1989, "Revisiting the Discussion of Living Standard in the Period on British Industrial Revolution: First Part", *Mita Journal of Economics* 82-2, July, pp. 353–372. Various other pieces of research are available on the topic of living standards in the industrial revolution period.

<sup>9</sup> Kitahara, I. (1995), *Toshi to hinkon no shakai-shi - Edo kara Tōkyō e -*", Yoshikawakōbunkan. [A Social History of Cities and Poverty: From Edo to Tokyo, Yoshikawa Kobunkan.]

<sup>10</sup> Mokyr, Joel and Cormac, O. Grada, 1996, "Height and Health in the United Kingdom 1815-1860: Evidence from the East India Company Army", *Explorations in Economic History* 33-2, April, pp.141-168. Moriya&Tomobe, 2023, "Gakuseki-bo karamiru Senzenki Noson niokeru Jido no Taikaku"[A stature of school children in Pre-war rural Japan from the school register], pp.435-458.

<sup>11</sup> See Gregory Clark, 2007, *A farewell to Alms: A Brief Economic History of the World*, Princeton,

In consideration of the standard of living, "poverty," as most would perceive it, can be taken to mean a basic subsistence level, i.e., the minimum standard of living, or even lower. But, the demand to measure "poverty" arises on both levels. Thus, this paper will interpret "poverty" by observing the actual conditions of those identified as "poor" in accordance with the results of a survey conducted by the Tokyo Municipal Health Examination Center.

### 3. Lower-class dwellers and their household composition

There is an interesting document on "poverty" in "Nutrition Survey in a *Saimin-chiku* area in Tokyo" (hereafter referred to as "Hygienic Laboratory Survey"), which was published by the Tokyo Municipal Hygienic Laboratory in 1931 as "Tokyo Municipal Hygienic Laboratory Report: Academic Report No.7." This document was a survey of the actual conditions of a *Saimin-chiku* community in the Koishikawa district of Tokyo in 1930, in which the researcher in charge of approximately 200 households visited each household every day to observe and record the survey items. The city of Tokyo prepared this document for the purpose of conducting on-site surveys of various data on the lives of *Saimin*, and to use it as basic data for formulating relief programs. The survey items were diverse, including the number of family members by age, nutrient intake, disease status, occupation of the head of the household, household income and expenditure, type of housing, dentistry, number of pregnancies, number of births, number of infant deaths, and so on. This data was more objective than other data, especially accuracy. Although similar surveys were conducted in Osaka, their primary survey methods were questionnaires and interviews. In the Osaka City Infant Growth Survey conducted in 1937, the questionnaire collection rate was only 43.8%, and it is assumed that many of the mothers, especially those who had dropped out of elementary school, had difficulty to fill out the "record sheets," therefore, many of the households in the lowest socioeconomic group of people could not be collected.<sup>12</sup> In comparison, the survey of the *Saimin-chiku* area was highly objective because the researcher visited and observed each household every day.

The hygienic laboratory survey in a *Saimin-chiku* area in Tokyo is an extremely important investigation that can be used as the basis for administrative policy-making, and should be highly regarded as an advanced case of the evidence-based policy-making methods generally adopted today.

Firstly, policy formulation is supported by research. According to the first report of the hygienic laboratory survey, "There are some important social problems, and the poverty relief project is the most important one." and "It is truly regrettable that there are few studies that should contribute to the basis of relief methods". This is a strong indication that policy planning is not based on ad hoc episodes, but rather on a rational basis, with clearly defined policy objectives. This is considered to be an advanced example of the evidence-based policy-making method that modern administrative and legislative bodies are working on.

Secondly, the data development, which is a prerequisite for planning social relief schemes, is supported by careful surveys conducted through individual visits. The second report of the hygienic laboratory survey states: "Investigators visit each house and conduct a medical examination when the person is at home. The thoroughness of the survey, "If the researcher is not at home, he or she will visit each house and conduct a medical check-up on a public holiday", shows a strong enthusiasm for the formulation of a policy to help the poor, and can be evaluated as a remarkably superior approach compared to the survey conducted in Osaka City during the same period, and to contemporary survey methods using mail or online methods.

There the income situation of *Saimin* households was examined. As described in the previous section, the average monthly household income in the Koishikawa area was 55.9 yen, the severity of which was also highlighted by the government's response. During the time that this survey was conducted, the Osaka City Medical Association provided free medical care for households with an annual household income of 800 yen or less, or a monthly income of 66.66 yen or less, and low-cost medical care was provided for households with an annual household income of 1,200 yen or less, or a monthly income of 100 yen or less.<sup>13</sup> Despite the differences between Tokyo and Osaka, there seem to have been no significant difference in wages between the two cities. By looking at eligibility for public assistance, the lower income households in the Koishikawa area were not standard households. In addition, the "Survey of Persons with Special Circumstances in Households Requiring Public Assistance in Tokyo," prepared by the Social

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Princeton University Press.

<sup>12</sup>Higami, Emiko, *Infant Mortality and the Social Capital in Modern Osaka*, Osaka University Press. Osaka. 2016: 213

<sup>13</sup>Ibid, 235-236.

Affairs Bureau of the City of Tokyo in 1934, included a table of “Living Standards for Households Requiring Public Assistance,” as shown in Table 3-1.

**Table 3-1 Living Standards for Households Requiring Public Assistance**

Number of household	Household income (yen)
1	25
2	35
3	45
4	55
5	60

(thereafter, increased by 5 yen for each additional person in the household)

Source: Tokyo City Social Affairs Bureau, *Survey of Persons with Special Circumstances in Households Requiring Public Assistance*, Tokyo City. 1934.

Although it is debatable whether the 1934 standard is applicable, as it was heavily influenced by seriously depression, this standard was adopted for comparison for this analysis. The average number of household members in the target area was 4.7, and living standard for households requiring public assistance of 58.5 yen. Only 43 of the 183 households in Table 3-1 exceeded the standard, and even for those that did, most were only slightly above the standard amount. The fact that the average monthly household income in the target area was 55.9 yen confirmed that these households were not standard income earners.

Next, turning to expenditures, food costs were 29 yen per household per month, and rent was 8.3 yen per household per month. Since the average income was 55.9 yen, the surplus was 18.6 yen. However, since some of the households were engaged in such occupations as construction workers, laborers, and free laborers, and their income was affected by weather conditions such as rain and snowfall, the actual surplus was considered to be lower.<sup>14</sup> It is interesting that children's allowance was included in the expenditures; only 33 of the 183 households were known to have an allowance, but it amounts to 6 yen per household per month and 2.5 yen per child per month. In some cases, households whose income minus rent and food expenses was in deficit also gave their children an allowance. Although the culture of giving an allowance to children is not detailed here, it was not unique to the Koishikawa area, and it is thought that giving an allowance to children have been common practice in the *Saimin-chiku* area.

Regarding the occupation of the heads of households, while there was a segment of the population that seems to have had a regular occupation, a certain number of them were found to have irregular or temporary occupations that were closely related to poverty. In particular, household income was considered to be very low when there was no unmarried male worker in the household. This is directly related to the nutritional status of the households, which will be discussed later.

Since information on the number of household members was available for both age groups and sexes, this section divided the composition of households in the *Saimin-chiku* area as follows; households consisting of (1) one man and one woman aged 21 or older and one man and one woman aged 20 or younger (married couple and children); (2) one man and one woman aged 21 or older (married couple only); (3) one man and one woman aged 21 or older and one man and one woman aged 20 or younger (a single parent household); (4) single-person households; and (5) households with three or more persons aged 21 or older. In the case of (5), most of the households were considered to consist of a married couple and their adult children or a married couple and their parents living together.

**Table 3-2 Classification of Household in *Saimin-chiku* area**

<sup>14</sup>According to the report, it was found in an interview by the investigators. Tokyo Municipal Hygiene Laboratory, Tokyo Municipal Hygiene Laboratory Report Academic Report 7 1931.

Household Classification	Number of Households	Average Monthly Income (yen)
Married couple and children	113	54.8
Married couple only	19	38
Single parent household	7	61.3
Single person household	2	—
Households with 3 or more men and women over 21 years old	42	67.6

Source: Tokyo Municipal Hygienic Laboratory, 1931, Tokyo Municipal Hygienic Laboratory Report Academic Report No. 7.

The average monthly income of households was available for only 109 of the 183 households. This is because some households refused to be surveyed due to low income, irregular income, or other family circumstances. Therefore, the average monthly income of single-person households was unknown.

The most striking feature of the survey was that there was a large difference in household incomes between the households headed by a married couple plus children and those headed by a married couple alone. Although the 1927 survey conducted by Tokyo City Hall found that households with lower incomes were more fertile, Table 3-2 suggests that households made their own choices regarding reproduction in accordance with their economic situation.

Next, by examining the housing conditions of the lower income households, of the 110 households whose housing was known according to the hygienic laboratory survey, only 22 households lived in a house of two or more rooms, and 88 households lived in a one room house. The number of tatami mats per household was 5.9 tatami mats, and 1.2 tatami mats per person, and with the most extreme case, being 4.5 tatami mats occupied by 8 persons (one tatami mat is about 0.9 meter by 1.8 meter). Not only were the houses small and cramped, but they were also unsanitary. The Tokyo City Social Affairs Bureau's "Survey of Special Circumstances of Households Requiring Aid in Tokyo" pointed out that 57.6% of the housing in the *Saimin-chiku* area was in poor condition, though this was the subjective opinion of the surveyor. Although the environment referred to "extremely vague, including the state of sewage in the vicinity, the density of houses, and the degree of cleanliness," the fact that more than half of the respondents lived in housing that was even worse in the areas designated as "slum" cannot be overlooked. In addition, 71% of the households live in low areas and 63.9% live in swamp areas, indicating that most of the households live in low areas. Although these results cannot be taken as a complete list of all households, it is clear that many of the households were located in low wetlands and were exposed to the risk of disease and epidemics.

#### 4. Nutritional and physical conditions of lower-class households

As calorie intake has already been discussed in the previous section, this section examines household intake of various nutrients. The average protein intake per household was 361 grams per day, or 51 grams per person. The necessary dietary intake, taking into account differences in age and gender, only 23.5% of the households had insufficient protein intake, which means that many of these households could obtain sufficient amounts of protein. However, 60% of the protein intake was covered by staple foods, and only 18% was made up of animal protein. They were not consuming a nutritionally well-balanced diet. In contrast, daily household fat intake averaged at 31.7 grams and 8.3 grams per person, meaning that most households were significantly deficient in fat intake. Their intake shows that animal fats accounted for only 32.6%, and most fat intake was obtained from staple foods and vegetable sources. Household intake of

carbohydrates averaged at 1,500 grams per day or 350 grams per person. According to a nutritional survey conducted by the Osaka Prefectural Health Department in 1920 in the *Saimin-chiku* area, the average daily protein intake for an adult male was 81 grams, of which 15% was animal proteins, 9 grams of fat, and 580 grams of carbohydrates. Although the City of Tokyo estimated the intake per person with only a simple calculation, it is assumed that the result would be similar to that of the survey conducted by the Osaka Prefectural Health Department in 1920, considering the differences in gender and age.<sup>15</sup>

We examine the meals of lower-class households. Unfortunately, there was no survey conducted on the menus of all these households in that area; however, there were some survey results on the menus of some households and lower-class households with pulmonary tuberculosis patients. Both cases show that cooked dishes such as miso soup and simmered dishes were served at least once a day. As mentioned above, it is evident that the sharing of "cooked dishes" was considered a creative way to save money and give a sense of pride to underprivileged people. Also, their meal menus indicate deficiencies in animal protein and fat.

At the same time, as shown in Table 4-1, among the 213 households that were available for the health survey of all household members, 47.4% of males and 52.5% of females had some form of illness. Of these, 21.5% appeared to have eye diseases, suggesting that most of them were myopic, while roughly 30% of the rest had some form of disease. Among those with diseases, gastrointestinal, neurological, and respiratory disorders were the most common, accounting for 35.5%, 16.5%, and 13.7% of the illnesses, respectively. Most of the neurological diseases occurred after 41 years, while digestive and respiratory diseases tended to occur between 6 to 15 and 16 to 40 years.

**Table 4-1 Health Survey Results**

	Under the age of 5	Age 6~15	Age 16~40	Age 41 or older	Total
Healthy (Male)	28	62	74	68	232
Healthy (Female)	32	45	67	50	194
Patients (Male)	23	66	47	73	209
Patients (Female)	26	68	51	69	214

(Unit: person)

Source: Tokyo City Hygienic Laboratory, 1931, "7<sup>th</sup> Scientific Report of Tokyo City Hygienic Laboratory," P.241-242

In the case of gastrointestinal diseases, malnutrition is thought to be the leading cause, while respiratory diseases were mainly due to unhygienic living conditions. Of the 849 patients surveyed, 150 had gastrointestinal disorders (17.7%), and 58 had respiratory diseases (6.8%). In the 183 households where the nutrition study was conducted, the incidence rate of gastrointestinal disorders was 9.4% (66 out of 700), while for respiratory diseases it was 7% (49 out of 700). Although the incidence rate of gastrointestinal illnesses varied, the incidence of gastrointestinal disorders was not as high as one would expect, given the unhygienic living conditions. As mentioned earlier, the low incidence level was probably the result of cooked dishes, which killed some virus in the cooking process.

In addition, most households in the *Saimin-chiku* used to live in a single room with a shared kitchen and bathroom. Their houses were poorly lit and not well-ventilated, making them vulnerable to respiratory diseases. This is also apparent because tonsillitis accounted for 17% of the diseases. The proportion of sick infants under five years old was not as high as in other age groups. This was due to the minimal number of those with eye diseases. Excluding eye diseases, the proportion of sick infants is higher than in other age groups. Moreover, since infants with inferior physical strength and immunity tended to die from

<sup>15</sup> Emiko Higami(2016), 131.



gastrointestinal or respiratory diseases, they are not listed as patients.

Lastly, regarding the infant mortality rate, there were 636 childbirths and 179 infant deaths in all households surveyed, resulting in an infant mortality rate of 275‰. Although a simple comparison cannot be made because the infant mortality rate is unknown, an extremely high mortality rate is evident, considering that its national average at that time was about 120‰. It is not surprising because the infant mortality rate in the *Saimin-Chiku* area in Osaka was 195‰.<sup>16</sup> In a survey conducted by the Bureau of Social Affairs of Tokyo City between 1935 and 1936, infant deaths and stillbirths were concentrated in the areas with households in need of social assistance, that is, the *Saimin-chiku* area. The total numbers of childbirths and infant deaths of the families in need of social assistance were 494 and 124, respectively, resulting in an infant mortality rate of 251‰. Despite the difference in years, the infant mortality rate of households in *Saimin-Chiku* area did not change significantly and remained high. Moreover, the high number of sick children between 6 and 15 years old and the high infant mortality rate indicates that children were exposed to poverty before entering the workforce.

## ▪ 5. Determinants of pregnancy and infant mortality

The previous section discussed child mortality. Here, multivariate regression analysis is undertaken so as to identify possible factors affecting the incidence of pregnancy, gravidity and child mortality rate, which could be directly associated with child death<sup>17</sup>.

### • 5. 1 Factors affecting the presence of pregnancy experience

First, for the factors affecting the presence of pregnancy experience, a binomial logistic analysis was performed using the experience of pregnancy (yes = 1, no = 0) as a response variable. The Model is stated as the following Formula.

$$p = \frac{1}{1 + \exp[-(b_1x_1 + b_2x_2 + \dots + b_ix_i + b_0)]} \quad \dots(1)$$

(‘p’ represents the probability of the dependent variable to be 1. ‘ $x_i$ ’ is an explanatory variable and ‘ $b_i$ ’ a partial regression coefficient, calculated by the maximum likelihood estimation.)

Table 5-1 summarizes the factors examined as the explanatory variables and their descriptive statistics. In addition to items from the Hygiene Laboratory Survey, it also includes other factors that this study calculated based on them.

**Table 5-1. Relations with the presence of pregnancy experience**

Categories	Explanatory variables	The number of samples	Min	Max	Mean	SD
Economic factors	Household monthly income	109	15	125	56.4	19.5
	Monthly income/ the number of family members	110	5	35	13.5	6.1
	Monthly income/ the square root of the number of family members	109110	8.7	57.7	27.1	9.0
	Monthly income – primary expenditures	109	-20.3	98.6	26.9	18.9
	(Monthly income – primary expenditures)/ monthly income		-0.33	0.79	0.44	0.21
Nutritional factors	Calorie intake	182	685	3165	1681	349.3
	Proportion of calorie intake from staple foods	182	0.5	0.96	0.85	0.06
	Protein intake	182	10.4	108.9	51.1	13.4
	Fat intake	182	1.9	86.2	8.3	7.7
	Carbohydrate intake	182	144.9	1861	347.7	132.3

<sup>16</sup>Emiko Higami, 2016, P.218

<sup>17</sup> As a concept gravity means the number of pregnancy including miscarriage, stillbirth and livebirth which is different from parity, number of livebirth as a demographic word but the real scene wasn't seen clearly.

	food cost per person	182	0.03	0.31	0.16	0.04
Health factors	Proportion of sick persons	167	0	1	0.44	0.31
	The number of dental caries per person	143	0	32	7.6	5.7
Family structure factors	Presence of a female worker	110	0	1	0.35	—
	Ratio of males	182	0.2	1	0.52	0.16
	Proportion of workers	110	0	1	0.38	0.21
Dwelling factor	The number of tatami per person	110	0.29	7.75	1.51	0.98

The results of partial regression coefficients of logistic analysis are demonstrated in the following Table 5-2. Using AIC (Akaike Information Criterion), Model (1) was obtained as the best fit model. Also, in order to confirm that multicollinearity did not occur, Variance Inflation Factor (VIF) values were calculated.

**Table 5-2. Estimation of partial regression coefficients**

	Model(1)	VIF value
Monthly income – primary expenditures	0.051 (0.032)	1.177
Protein intake	-0.137** (0.067)	3.093
Fat intake	0.539* (0.291)	3.984
Ratio of male	3.583 (3.208)	1.055
The number of tatami per person	-2.057*** (0.731)	1.676
Constant	6.146** (3.001)	
The number of samples	87	
Log-likelihood	-17.863	

Note) \*\*\*, \*\* and \* indicate a significance level at 1%, 5% and 10%. Values in parentheses show the standard error.

Monthly income – primary expenditures indicated a positive partial regression coefficient, but the value was not significant. It would be easy to imagine that a financially secure family is more likely to experience pregnancy; however, no clear tendency was observed in the presence of pregnancy experience only. Similarly, despite the positive correlation in the ratio of male family members, the finding was not statistically significant. In contrast, regarding nutritional intake, a negative correlation was found in protein intake, as well as a positive correlation in fat intake. Although further analysis would be required to scrutinize the negative correlation of protein intake, it was presumably because protein was ingested largely from staple foods as mentioned previously. As for fat intake, since it is the most effective energy source with the function of storing surplus energy, a higher intake of fat seemingly led to better health and eventually to a higher chance of pregnancy. Moreover, while a negative correlation was detected in the number of tatami per person, it seemed to have been caused by the increased number of family members after pregnancy and childbirth.

## • 5. 2 Factors affecting gravidity

In 140 households with a wife having experience of pregnancy, a multiple regression analysis was conducted using gravidity as the response variable. The Model is stated as the following Formula.

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_ix_i + u \quad \dots(2)$$

(‘ $x_i$ ’ is an explanatory variable, ‘ $u$ ’ an error term, and ‘ $\beta_i$ ’ a regression coefficient, obtained by the least squares method.)

Here, regarding the explanatory variables in Table 5-1, the study explored correlation with gravidity. The findings are depicted in Table 5-3.

**Table 5-3. Relations with gravidity**

Categories	Explanatory variables	Correlation coefficient	Lower limit of 95% confidence interval	Upper limit of 95% confidence interval	P value
Economic factors	Household monthly income	0.237**	0.034	0.421	0.023
	Monthly income/ the number of family members	-0.468***	-0.614	-0.291	2.59E-0.6
	Monthly income/ the square root of the number of family members	-0.082	-0.244	0.084	0.331
	Monthly income – primary expenditures	0.017	-0.188	0.219	0.875
	(Monthly income – primary expenditures)/ monthly income	-0.269***	-0.449	-0.068	0.01
Nutritional factors	Calorie intake	-0.11	-0.27	0.056	0.194
	Proportion of calorie intake from staple foods	0.312***	0.156	0.454	0.0002
	Protein intake	-0.232***	-0.383	-0.07	0.005
	Fat intake	-0.291***	-0.435	-0.133	0.0004
	Carbohydrate intake	-0.067	-0.229	0.099	0.428
Health factors	Food cost per person	-0.246***	-0.395	-0.085	0.003
	Proportion of sick persons	0.175**	0.009	0.331	0.039
Family structure factors	The number of dental caries per person	-0.079	-0.256	0.102	0.392
	Presence of a female worker	0.188***	0.024	0.342	0.025
	Ratio of males	-0.057	-0.22	0.109	0.5
Dwelling factor	Proportion of workers	-0.214**	-0.4	-0.01	0.04
	The number of tatami per person	-0.519***	-0.653	-0.352	1.02E-0.7

Note) \*\*\*, \*\* and \* indicate a significance level at 1%, 5% and 10% respectively.

The response variables with a significant correlation coefficient at 10% level or less were applied to the Model of Formula (2) so as to perform the multiple regression analysis. The results are illustrated in Model (2) of Table 5-4. Also, the best fit models, subsequently obtained using AIC, are shown in Model (3) of the same Table.

**Table 5-4. Relations with gravidity**

	Model(2)	Model(3)
Household monthly income	0.091*** (0.017)	0.090*** (0.013)
Monthly income/ the number of family members	-0.176* (0.103)	-0.256*** (0.050)
(Monthly income – primary expenditures)/ monthly income	-5.181*** (1.941)	-3.908*** (1.507)
Proportion of calories intake from staple foods	2.071 (5.300)	
Protein intake	0.036 (0.039)	
Fat intake	-0.088 (0.152)	
Food cost per person	-10.401 (10.093)	
Proportion of sick persons	-0.462 (0.751)	
Presence of a female worker	0.747 (0.597)	0.716* (0.412)
Proportion of workers	-0.311 (1.722)	
The number of tatami per person	-0.279 (0.590)	
Constant	2.906 (5.063)	4.050*** (0.716)
The number of samples	92	92

Coefficient of determination	0.559	0.535
Adjusted coefficient of determination	0.498	0.514
F-statistic	9.206***	25.050***
	(df=11.80)	(df=4.87)

Note) \*\*\*, \*\* and \* indicate a significance level at 1%, 5% and 10% respectively. Values in parentheses show the standard error.

In Model (3), standardized partial regression coefficients were calculated so as to investigate the degree of effect each explanatory variable had on the dependent variable. Then, in order to ensure that multicollinearity did not occur, Variance Inflation Factor (VIF) was evaluated, of which findings are presented in Table 5-5.

**Table 5-5. Standardized partial regression coefficients and VIF values of Model (3)**

	Standardized partial regression coefficient	VIF value
Household monthly income	0.6883	1.737
Monthly income/ the number of family members	-0.5543	1.983
Presence of a female worker	0.1182	1.050
(Monthly income – primary expenditures)/ monthly income	-0.3260	2.783
Constant	-0.0252	—

Despite the positive correlation in the household monthly income, Table 5-5 illustrated a negative correlation in both monthly income/ the number of family members and (monthly income – primary expenditures)/ monthly income. Among the economic factors categorized by income levels, the negative explanatory variables especially reflected the standard of living. The higher the household monthly income as a simple income level was, the more frequently the wife became pregnant. However, the examination of living standards demonstrated that the households with lower living standards had higher gravidity. According to the standardized partial regression coefficients in Table 5-5, the household monthly income was +0.69, monthly income/ the number of family members -0.55, and (monthly income – primary expenditures)/ monthly income -0.33. That is, with respect to the scale of influence on the dependent variable, the negative impact on living standards was more considerable than the positive impact of the household monthly income. Given that the living standards of households were not fixed but fluctuated depending on pregnancy and childbirth, the result of higher gravidity in the families with lower living standards implies that pregnancy proved relatively more of a burden for the participating households than a benefit. It might explain that the standard of living dropped after the first pregnancy and childbirth and further deteriorated after another.

At the same time, the proportions of burdens and benefits of parenting differ according to the age of children. When children are still small, the increased expenditures worsen the household's living standards. However, if they are old enough to work, the standard of living could improve due to the rise of household monthly income. Gravidity of lower-class families had a positive correlation with the household monthly income and a negative correlation with the variables reflecting the living standards. These findings indicated that, whilst grown-up children could raise the household monthly income, many families were not able to recover the costs spent on child-rearing. Assuming that one of the purposes of having children in the lower-class households was to improve the future income and living standards, there seem to have been unforeseen background circumstances (that the husband and wife did not want) that resulted in decreased living standards after childbirth.

In addition, a positive correlation appeared between the presence of a female worker and gravidity. This could be considered as evidence that, if they had unemployed children, parents needed to go to work for a living even after childbirth.

### • 5. 3 Factors affecting the child mortality rate

In the households having experience of pregnancy, a multiple regression analysis was performed with the child mortality rate (the number of child deaths under five years/ the number of deliveries) as the response variable. The Model is stated in Formula (3) as below.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_i x_i + u \quad \dots(3)$$

(‘ $x_i$ ’ is an explanatory variable, ‘ $u$ ’ an error term, and ‘ $\beta_i$ ’ a regression coefficient, obtained by the method of least squares.)

First, as with the analysis of gravidity, correlation between the candidate explanatory variables and child mortality rate was explored. Table 5-6 presents the results.

**Table 5-6. Relations between the child mortality rate and each explanatory variable**

Categories	Explanatory variables	Correlation coefficient	Lower limit of 95% confidence interval	Upper limit of 95% confidence interval	P value
Economic factors	Household monthly income	-0.303***	-0.479	-0.105	0.003
	Monthly income/ the number of family members	0.099	-0.107	0.297	0.344
	Monthly income/ the square root of the number of family members	-0.141*	-0.299	0.025	0.095
	Monthly income – primary expenditures	0.153	-0.346	0.052	0.143
	(Monthly income – primary expenditures)/ monthly income	-0.093	-0.293	0.114	0.376
Nutritional factors	Calorie intake	0.319***	0.162	0.459	0.0001
	Proportion of calorie intake from staple foods	-0.036	-0.2	0.129	0.668
	Protein intake	0.319***	0.163	0.46	0.0001
	Fat intake	0.298***	0.14	0.441	0.0003
	Carbohydrate intake	0.145*	-0.02	0.303	0.083
	Food cost per person	0.232***	0.07	0.382	0.005
Health factors	Proportion of sick persons	0.074	-0.093	0.237	0.382
	The number of dental caries per person	0.059	-0.122	0.237	0.523
Family structure factors	Presence of a female worker	-0.046	-0.209	0.119	0.584
	Proportion of male family members	-0.015	-0.170	0.15	0.862
	Proportion of workers	0.263***	0.063	0.443	0.011
Dwelling factor	The number of tatami per person	0.181*	-0.024	0.371	0.083

Note) \*\*\*, \*\* and \* indicate a significance level at 1%, 5% and 10% respectively.

The multiple regression analysis was run by applying the dependent variables with a significant correlation coefficient at 10% level or less to Formula (3). Model (4) of the following Table 5-7 demonstrates the results. Besides, the best fit models, calculated using AIC, are illustrated in Model (5) of the same Table. Furthermore, Table 5-8 presents the standardized partial regression coefficients and VIF values of Model (5).

**Table 5-7. Relations with the child mortality rate**

	Model(4)	Model(5)
Household monthly income	-0.006 (0.004)	-0.004** (0.001)
Monthly income/ the square root of the number of family members	0.007 (0.008)	
Calorie intake	0.0001 (0.0005)	
Protein intake	-0.001 (0.007)	
Fat intake	-0.013 (0.019)	
Carbohydrate intake	0.001 (0.002)	0.001 (0.0005)
Food cost per person	-0.289 (1.487)	
Proportion of workers	0.234 (0.179)	0.323** (0.150)

The number of tatami per person	0.013 (0.073)	
Constant	0.175 (0.238)	0.130 (0.198)
The number of samples	92	92
Coefficient of determination	0.187	0.168
Adjusted coefficient of determination	0.098	0.140
F-statistic	2.099** (df=9.82)	5.942*** (df=3.88)

Note) \*\*\*, \*\* and \* indicate a significance level at 1%, 5% and 10% respectively. Values in parentheses show the standard error.

**Table 5-8. Standardized regression coefficients and VIF values of Model (5)**

	Standardized regression coefficient	VIF value
Household monthly income	-0.258	1.062
Carbohydrate intake	0.346	1.100
Proportion of workers	0.215	1.037
Constant	-0.045	—

A negative correlation was found between the household monthly income and child mortality rate. It was not a surprising result because the higher the household income is, the more money should be spent on children. By contrast, the positive correlation with the proportion of workers, the child mortality rate seems to have risen due to the absence of a caregiver at home. In the households without grandparents and older children who could take care of younger ones, it was difficult for the parents to provide enough care for children all day long. Especially in the case of lower-class households, the husband worked outside from morning to night without a day-off, while the wife was very busy with piecework and chores at home. The result of the lower child mortality rate in the households with many family members seemingly reflects the fact that unemployed family members could look after children and that the parents already had some experience of child-rearing. Obviously, leaving children at home alone while working was not child neglect for the parents from the lower-class family. Their income was just enough to live from day to day, so working outside of the house was directly related to their capacity to live, meaning the survival of children at home. Children might die if the parents do not provide constant care; however, the end would be the same if they do not work outside. Therefore, the determinant of the child mortality rate is depending on whether the family has younger children or grandparents who can no longer work.

Moreover, Tables 5-6 and 5-7 depicted a positive correlation between the number of tatami per person and child mortality rate. Although Model (4) could unfortunately not verify a significant result, this finding was considered to support evidence that the households with a ‘babysitter’ have a lower rate of child mortality, as stated above.

Carbohydrate intake showed a positive correlation, but no observed significance. This was because the number of household members, utilized for calculating the amount of nutritional intake per person, and the infant mortality rate possessed a negative correlation. Regression analysis using the total nutritional intake of the household indicated a negative correlation, which was a convincing result. Regarding nutritional status of households, further investigation would be necessary, for example, by employing indicators of the entire household, instead of per person.

## Conclusion

We have examined the living standards and nutritional conditions of the households in the *Saimin-chiku* area based on a survey conducted by the Hygiene Laboratory. Many of the households surveyed in Tokyo City were considered poor, positioned in the bottom 20% of all households in the city, and 98% had inadequate caloric intake. These findings can be confirmed by the menus of the households in the *Saimin-Chiku* area and households with pulmonary tuberculosis patients. While there were few households with a single family member, most households comprised two or more adult men and women aged 21 or older. Nearly half of the respondents suffered from some disease or health condition. Of those households in poverty, the infant mortality rate tended to be lower for households with more family members. In contrast, the infant mortality rate tended to be higher for households with a higher proportion of working family

members. This suggests that childcare support mattered.

For couples in those households, pregnancy, childbirth, and parenting their children were a bet for life with the hope of escaping poverty. When public assistance and social welfare for the poor were not yet in place in Japan, all they could do was rely on the young labor force they had fostered on their own. Despite the hope that children would grow up healthy enough to become part of the workforce, in many cases, those couples often faced the loss of their children because they had to work hard and had little time or energy left to take care of their children. The loss of children led them to a vicious circle in which they had no choice but to give birth again. As a result, they must have sunk further into the swamp of poverty rather than escaping from it.

Small farming households that emerged independently from the Yashiki residence communities in the Edo period continued to live in separate houses while maintaining the commonality of consumer life. In contrast, even among the lower-class households residing in the urban areas, we could see the reality that they lived based on the economy of mutual support. Unlike small farming households, which maintained the commonality while having independent houses and the capacity to support themselves, lower-class households who shared the same kitchen with other households could not consume without an economy of mutual support. It might also have been possible that sharing the kitchen kept the incidence of gastrointestinal diseases at a lower level by sharing cooked dishes. The shared economy cannot be ignored in considering poverty in the modern metropolis.

Despite numerous studies on lower-class people called *Saimin*, few studies have delved into the level of nutritional conditions of their households. Whether in rural or urban areas, the primary living unit is the "family" or household; the household faces poverty. Like some researchers who emphasize the life-cycle perspective in the household (or "family") in considering the farmer's economy, it is essential to have a household perspective in the analysis of urban areas.<sup>18</sup> Of course, it is necessary to conduct research from the perspective of households while paying attention to the differences between rural areas.

Most recently Noriko Yuzawa reported that the eating space and daily life of workers at the Fukagawa district in Tokyo c.1920s which was totally different from our case of *Saimin* district in this paper but there are some issues related to gender division of labor and the difference of labor and living environment between gender to consider in the next stage of research<sup>19</sup>. The case of laborers in Tokyo got their autonomous system of food supply provided by their companies while the *Saimin* case had to secure their food supply by themselves.

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<sup>18</sup> Makoto Numata, 2001, *Household, Village, and Historical Phase*, Nihon Keizai Hyouronsha Ltd.  
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<sup>19</sup> Basically Yuzawa(2023) is a conference report and will be more comprehensive and deeply thinking in a full paper.

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