work. The exposure to unfavorable and physically demanding working conditions is likely to increase the risk of chronic medical conditions, physical pain, and activity restriction, and eventually lower general health conditions and perceptions.

(2) We hypothesize that educational attainment increases the likelihood of maintaining good health. Medical knowledge and information on health care are likely to increase by educational attainment, so people with higher levels of education are expected to be more health conscious and capable of coping with changes in health conditions thereby maintaining better health, than people with lower levels of education.

(3) Income level is hypothesized to affect health-related outcomes. People with higher income are able to buy special services and have better access to medical technology, and they should be able to maintain superior health conditions than those with lower income.

(4) Finally, we hypothesize that asset holdings affect health conditions. By using various resources available to people with a lot assets, these individuals are likely to enjoy better health care services and avoid negative consequences of ill-health such as physical pain and activity restrictions than those with limited assets.

DATA AND VARIABLES

The data set used in this paper comes from the Health and Social Stratification module which was attached to the National Omnibus Survey conducted by the Central Research Services in Japan in November 2000. The Central Research Services, a private opinion research firm, conducts every month individual omnibus survey, and the November 2000 survey added a module of about twenty questions related to health and social stratification.[3] A sample of 2000 individuals aged 20 years and above was selected by the two-stage stratified random sampling method (stratification done by region and city size). The respondents were interviewed by interviewees face-to-face in November 2000. The response rate of 71.5% yielded a usable sample of 1429 cases.

The survey asked a number of questions related to the respondents' health conditions. Five health-related outcomes are used in this paper. The first variable, chronic medical conditions, was constructed based on the question about chronic illness. The respondents were asked to report any chronic diseases diagnosed by a doctor and were given a list of 16 common illnesses as well as a chance to report a disease not on the list. The list included such diseases as heart disease, high blood pressure, diabetes, asthma, and cancer. The responses were dichotomized so that the variable represents the presence of any chronic medical conditions. The second variable measures the visits to doctor's office. The respondents were asked to report the number of times they visited doctor's office (including dentist's office) in the past year. Those with at least one visit and those who never used the doctors were distinguished. The third

variable measures the presence of physical pain and discomfort. The respondents were asked whether they had any physical pain and discomfort in the past month. The responses were "frequently," "sometimes," "rarely," and "never." The first two responses and the last two responses were grouped together. The fourth variable relates to the respondents' physical ability. The respondents were asked whether they had to restrict household and work activities due to their physical conditions and illness in the past month. The responses were "frequently," "sometimes," "rarely," and "never." The first two responses and the last two responses were grouped together to form a dichotomous variable. Finally, the fifth variable, self-reported health, is constructed. This variable is based on the following question: "how do you feel about your own health? Is it 'very good,' 'good,' 'fair,' 'not good,' or 'poor'?" If the respondents felt that their health was "not good" or "poor," they are given the score of 1 and the score of zero otherwise.

Socio-economic variables include the following: social class, education, income, and asset. Our prime independent variable, social class, is measured by the Erikson-Goldthrope-Portocarero (1979) class scheme (see also Ganzeboom, Luijkx, and Treiman 1989; Erikson and Goldthorpe 1992). The class categories are constructed using the questions related to employment status, managerial status, detailed occupation, and firm size. The six-category version of the EGP class schema is used. The categories are: (1) the professional-managerial class (I/II), (2) the routine non-manual class (III), (3) the petty bourgeoisie (IVab), (4) the farming class (IVc/VIIb), (5) the skilled manual working class (V/VI), and (6) the non-skilled manual working class

(VIIa). The first category (I/II) is used as the base reference group in the logistic regression analyses reported below.

Education is measured by years of schooling. The original responses contained four categories (years of education attached to each category are shown in parentheses): (1) elementary and higher elementary schools in the pre-war system of education and junior high schools in the post-war system (9 years), (2) old middle schools in the pre-war system of education and senior high schools in the post-war system (12 years), (3) junior colleges in the post-war system (14 years), and (4) old high schools and universities in the pre-war system of education and four-year universities in the post-war system (16 years). Income is measured by the approximate yen amount. The respondents were asked to choose one of 12 categories representing their household income. The midpoints of each category are used to estimate the household income of the respondent in each category. Because about a fifth of the respondents did not report their household income, we included a dummy variable representing these respondents whose income was missing.

The possessions of a wide range of amenity and asset-related items were asked in the survey. These items include: private bath, air-conditioner, personal computer, private automobile, stocks and securities, private life insurance, private medical insurance, own home (home ownership), second home, and golf club membership. The number of items possessed by the respondents was used as a measure of the total asset holdings.

Finally, gender and age of the respondent are included as control variables. In

addition, the size of the city where the respondents lived is also added. The three categories are: (1) 13 largest cities, (2) other cities, and (3) rural villages and small towns. The last category is used as the base reference category in the logistic regression analyses.

The analyses are based on a series of binary logistic regression models which are conducted separately for five different health-related outcomes. For each dependent variable, we consider models which include different set of independent variables. Since our prime independent variable is social class, we enter social class, gender, and age into the equation first. We then add other socio-economic variables (education, income, asset, and city size) into the equation. For the analyses of the determinants of the visit to doctors, we introduce an additional model in which we add the variable measuring chronic medical conditions into the equation. For the analyses predicting physical pain, activity restriction, and self-reported health, we have a fifth model where both chronic conditions and visit to doctors are added into the equation.

ANALYSIS

Table 1 presents the descriptive statistics for the variables used in this paper. The first five rows present the proportion of health-related outcomes. In our sample, respondents with at least one chronic health condition account for 43.2 percent. Chronic diseases include any chronic medical conditions diagnosed by doctors. The most frequent responses (multiple answers possible) include high blood pressure (14.1 percent), neuralgia (7.6 percent), allergy (4.6 percent), and hearth disease (4.6 percent). About three-quarter of the respondents (73.7 percent) visited doctor's office at least once during the last year. About 28 percent of the respondents had visits less than ten days, while 14 percent had visits more than 30 days. In response to the question about physical pain and discomfort, more than a half (54.4 percent) reported that they either "frequently" or "sometimes" had pain and discomfort. When they were asked whether their regular activities (job or house work) were restricted due to physical conditions, about 11 percent responded positively ("frequently" or "sometimes"). Finally, respondents were asked to report their health condition: 15 percent reported that their health was "poor" or "not good."[4]

There are significant correlations among these five health-related variables. However, these correlations are not exceptionally high. Among the highest ones are the correlations between self-reported health and activity restriction (r=.371), between self-reported health and chronic condition (r=.352), and between chronic condition and visit to doctors (r=.359). Other correlations are less than .300. These results suggest that five variables are related but tap different aspects of respondent's health condition.

The distributions of independent variables are also reported in Table 1. Our sample includes more females than males and contains relatively large proportion of older people since there was no upper age limit in the sample. The distributions of social class and of education are similar to those of other national surveys (after adjustment of age range). The distribution of city size accurately reflect census figures. The distribution of household income shows that about a fifth of our sample (21.5 percent) did not report income. Since they constitute a relatively large segment of our sample, we included a variable representing those whose household income was missing. The asset variable includes a wide range of amenity and asset-related items, such as private bath (owned by 97 percent of respondents), automobile (83 percent), personal computer (46 percent), and second home (1.4 percent).

Table 2 reports the results of logistic regression predicting chronic medical conditions. There are three models shown in the table. Model 1 includes our prime independent variable, social class, along with control variables (gender and age). When the bivariate relationship between social class and chronic conditions is examined, we found a highly significant association (likelihood ratio chi-square statistic=19.68, d.f.=5, $p<.001$). Farmers (IVc+VIIb) and the petty bourgeoisie (IVab) are more likely to have chronic health conditions than other classes. However, there is correlation between age and social class and between age and chronic conditions. Farmers and the petty bourgeoisie are on average older because self-employment provides work opportunities for older people, and older people are more likely to have chronic diseases than younger people. Therefore, the association between class and chronic conditions

disappears after controlling for age, as shown in Model 1, Table 2.

Model 2 adds education and city size into the equation. Age continues to exert strong and significant effect on chronic conditions, but class and education do not show any significant effects. City size affects the chronic conditions in that those who lived in medium-sized cities are less likely to report chronic diseases than those who lived in rural area. Model 3 enters income and asset, in addition to the variables already in Model 2. Again, the overall picture of the determinants of chronic conditions does not change. The strong and significant effect of age dominates, and income and asset do not exert any significant effects. In summary, we do not find any socio-economic differentials in the chances of occurrence of chronic medical conditions. The significant bivariate relationship between social class and medical conditions is explained by age differences, and class, education, income and asset do not seem to influence the chances of the occurrence of chronic diseases.

Table 3 reports the results of the logistic regression predicting visit to doctor's office. Models 1 through 3 contain the same independent variables as those in Table 2. As shown in these three models, we find a strong and significant effect of age. The older the respondent, the more likely they are to make a visit to doctors. Social class also exerts strong and significant effect. Farmers (IVc/VIIb) and the petty bourgeoisie (IVab) are less likely to go and see doctors than the professional managerial class (I+II). These effects are persistent even after controlling for gender, age, education, income and asset. Those whose household income was missing are less likely to visit doctors than those who reported household income. Although we do not information on

income for these respondents, we know that their level of education is slightly lower than those who reported income and they are less likely to be the professional managerial class and more likely to be manual working classes than those who reported income amount. It is possible, therefore, that the respondents who did not report income belonged to the lower income group and had less access to doctors than those who reported income.

Model 4 in Table 3 introduces chronic diseases, in addition to all the variables in Model 3. The model assesses the effect of socio-economic variables on doctor's visit after controlling for medical conditions. The overall picture does not change even after medical condition is held constant. Age increases the likelihood of office visits. Those whose household income is missing are less likely to visit doctors than those who reported income. Farmers and the petty bourgeoisie are less likely to visit doctors than the professional-managerial class. Although we control for city size, the base category of town and villages include truly rural areas as well as small towns. The persistent effect of farmers may be due to the fact that access to doctors is restricted in rural villages. It is not clear why the urban petty bourgeoisie are less likely to visit doctors. The most likely interpretation lies in their long working hours. The average working hours for the self-employed and family workers are much longer than those of employees. More than 20 percent of self-employed and family workers work more than sixty hours per week, compared to nine percent of employees (Ishida 2003, figure 3; Ishida 2004). The urban petty bourgeoisie may not be able to find time to visit doctors.

Table 4 shows the results of logistic regression predicting the presence of physical pain. Models 1 through 4 contain the exactly the same variables as the models reported in Table 3. Four findings stand out from these four models. First, men are about 1.7 times more likely than women not to report physical pain. The gender difference persists even after controlling for age and chronic conditions, as well as socio-economic variables. Although there is no significant gender difference in chronic medical conditions diagnosed by doctors, it is possible that men suffer less from minor pain and discomfort than women.

Second, age increases the likelihood of physical pain. However, the age effect is due entirely to the fact that older people are more likely to have chronic medical conditions. Once the presence or absence of chronic disease is controlled, age effect completely disappears. Third, manual working classes are about one and a half times more likely to report physical pain than the professional-managerial class and the routine non-manual class. There is a clear white-collar versus blue-collar divide in the presence of physical pain. The division may be derived from the fact that blue-collar workers are subject to more physically demanding work conditions than white-collar workers. Fourth, residents of medium-sized cities are about one and a half times more likely to experience physical pain than residents of small towns and villages. It is not clear how to interpret this effect, but it may be due to the long commuting which some suburban residents have to make every day in order to get to their workplace in large cities.[5]

Model 5 in Table 4 introduces visit to doctor's office, in addition to all the

variables included in Model 4. The introduction of visit to doctor's office purports to assess the impact of availability or accessibility to healthcare. The survey questionnaire did not contain any question which asks for the physical proximity to healthcare facilities or readiness and accessibility to doctors (such as whether one could call doctors at any time). The variable of visit to doctors is used as a proxy. The introduction of this variable did not change the overall picture of the effects of independent variables. Although visit to doctor's office had a strong and significant impact on pain (one could even reverse the causal order between the two variables), the effects of other variables remained. The coefficient for the skilled manual working class even became significant at .10 level after the introduction. These results suggest that if visit to doctors is used as a proxy for access to healthcare facilities, the effects of class, gender, and city size are not influenced by the accessibility.

Table 5 reports the results of running logistic regression predicting whether the respondents had restriction on their daily activities due to physical conditions. Models 1 through 5 include exactly the same independent variables as those models in Table 4. First, age has a strong positive effect on restriction on daily activities: the older the respondents, the more restriction. However, the age effect is almost entirely explained by the fact that older people are more likely to have chronic diseases and visit doctors than younger people and that chronic conditions and visit to doctors are positively associated with activity restriction. Second, the petty bourgeoisie and skilled manual workers are more likely to report activity restriction than the professional-managerial class after controlling for gender and age. However, these class differences disappear

after controlling for education and asset. The advantage of the professional-managerial class over the petty bourgeoisie and the skilled manual class probably derives from their higher levels of education and asset holdings.

Third, the level of asset holdings is negatively associated with the presence of activity restriction: the higher the asset level, the less likely the activity restriction. Since this effect persists even after controlling for chronic conditions and visit to doctors, the respondents with sufficient assets are probably much more effective in using their assets to avoid being physically constrained than those with limited assets. Their assets include home ownership, private automobile, and private health insurance, and these resources probably make difference in continuing daily activities without much restriction and facilitating geographical mobility.

Fourth, the presence of chronic medical conditions and the visit to doctors affect the chances of activity restriction. The respondents who have chronic diseases are about three times more likely to have activity restriction than those without chronic conditions, and the respondents who visited doctors in the last year are 3.7 times more likely to report activity restriction than those who never visited doctors. In summary, other than health conditions (chronic diseases and visit to doctor's office), the only significant socio-economic factor affecting the chances of activity restriction is asset holdings.

Table 6 presents the results of logistic regression predicting self-reported health. The analysis examines the factors affecting the chances of the respondents reporting their health as "poor" or "not good." Models 1 through 5 include exactly the same

independent variables as those models in Table 4 and 5. Several findings stand out from this table. First, men are about 1.4 times more likely to report their health to be either fair or good than women. The tendency for men to report better health than women is persistent, even after chronic medical conditions and visit to doctor's office are controlled. Men generally perceive themselves to be healthier than women. Second, age is positively associated with perceived ill-health. The older the respondents, the poorer their self-reported health. This perception is in part explained by the fact that older people are more likely to suffer from chronic diseases, but even among those with the same medical conditions, older people tend to report that their health is poorer than younger people.

Third, regarding our prime independent variable, social class, we find that there are class differences in self-reported health. The petty bourgeoisie and the manual working classes are more likely to report that their health is in "poor" or "not good" condition than the professional-managerial class. These class differentials are present even if we control for chronic conditions and visit to doctors. In other words, even among those who have the same chronic conditions and accessibility to healthcare, respondents' social class still makes difference in their subjective perception of health. Fourth, contrary to our expectation, years of education exert a positive effect on perceived ill-health: the higher the educational level of the respondents, the more likely they report their health to be "poor" or "not good." Fifth, the size of city where respondents reside affect self-reported health. The respondents who live in medium-sized cities perceive themselves to be healthier than those who live in rural

areas and small towns.

Sixth, although household income does not influence subjective health, the asset holdings show a strong and significant effect on self-reported health: the higher the asset holdings, the better the perceived health status. The effect is very strong and is not influenced by the introduction of chronic health conditions and visit to doctor's office. Those with sufficient assets probably feel that their financial resources offer better protection at the time of sudden change in their health and that they feel more secure about their health conditions than those with limited assets.

DISCUSSION

This paper examined the relationship between socio-economic factors and health-related outcomes. We identified five different health-related outcomes and examined the effects of various socio-economic variables separately for each outcome. The first major conclusion from the analyses pertains to the finding that the effects of socio-economic factors depend on the different health-related outcomes. The presence of chronic medical conditions and the restriction on daily activities are generally independent of socio-economic factors. Age is the major determinant predicting these outcomes. The other three outcomes, the presence of physical pain, the visit to doctor's office, and the self-reported health, are affected by socio-economic factors. The lack of the effects of socio-economic factors on chronic diseases and activity restriction is contrary to our original hypothesis. The emergence of chronic diseases and the subsequent limitation in daily activities are largely driven by genetic and

constitutional factors which may be independent of socio-economic differences. The differences in working conditions by social class, for example, affect the presence of physical pain and fatigue, but probably do not directly influence chronic medical conditions, except for occupationally driven symptoms and diseases.

The second major finding relates to the predictive power of different socio-economic factors. Social class, our primary independent variable, and asset holdings are the two most important factors in predicting health-related outcomes. In contrast, education and income have very limited effects on predicting people's health conditions and perception. What makes difference in people's health is not how much schooling they had or how much money their household had. Instead, work positions in the labor market and various amenities and resources affect people's physical well-beings.

Turning to the more detailed effects of various socio-economic factors, we begin by summarizing the effects of social class. Class differentials are manifested in the following way. First, regarding the visit to doctor's office, the petty bourgeoisie and the farming class are less likely to visit doctors than the professional-managerial class. The farming class probably has less access to medical facilities because remote rural areas often do not have medical clinic nearby. The reason why the urban petty bourgeoisie are less likely to go and see doctors was not clear. The most likely interpretation rests on the fact that self-employed and family workers tend work for much longer hours than employees and that it is difficult for them to find time to visit doctors due to long working hours. Second, regarding the presence of physical pain

and the self-reported health, the skilled and non-skilled manual working classes are more likely to report physical pain than the two white-collar classes (the professional-managerial class and the routine non-manual class) and also to rate their own health to be "poor" or "not good" than the professional-managerial class. There seems to be a divide between the white-collar classes and the blue-collar classes. Manual work is physically more demanding than non-manual work. The exposure to unfavorable and physically demanding working conditions will increase the risk of physical pain and fatigue and eventually lower general health conditions and perceptions. The petty bourgeoisie also tend to have lower rate of health conditions than the professional-managerial class, and this difference is probably derived from the longer working hours of the petty bourgeoisie. All these findings suggest that the positions in the labor market have profound influence on the workers' health.

In addition to social class, asset holdings are important determinant of health-related outcomes. People with greater amount of assets are less likely to have restrictions on daily activities and more likely to rate their health to be in good condition than those with limited amount of assets. People with greater amount of assets are probably able to derive various resources that help them avoid being physically constrained at home and feel more secured even when their health conditions worsen. Finally, it is important to note that these socio-economic differentials in health persist even after controlling for chronic medical conditions. In other words, class and asset differentials are found among both chronically ill and those who do not suffer from chronic diseases.

With regard to our two control variables, age and gender, there are two conclusions. First, any study of health must take into account age. Aging process is closely related to health conditions of the individuals, and there is usually a positive linear effect of age on poor health. Our results clearly support this point. In all our five health-related outcomes, age is a powerful determinant. It should be noted, however, that age affects physical pain and activity restriction through chronic conditions. The major reason why older people are more likely to report physical pain and discomfort and to experience restriction in their daily activities than younger people is due to their higher incidence of chronic medical conditions. Older people are nonetheless more likely to visit doctors and have ill-heath perception than younger people, regardless of their chronic diseases. This is because older people are more likely to suffer from health-related problems than younger people, even though they do not have any chronic diseases. Second, gender differences are found in some health-related outcomes. Although men and women do not differ in their chances of having chronic medical conditions, men are less likely to visit doctor's office, less likely to have physical pain and discomfort, and less likely to report that their health is not in good condition. Therefore, men seem to be healthier, at least on these aspects of health-related outcomes.

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Table 1 Descriptive Statistics of Variables

Health-related variables	
Chronic health condition	0.423
Visit to doctor's office	0.737
Health-related variables	0.524
Activity restriction	0.106
Self-reported health (poor, not good)	0.146
Independent variables	
Gender	
Male	0.457
Female	0.543
Age	
20 to 39	0.267
40 to 59	0.391
60 or older	0.342
average age	51.261
Social class	
I+II (professional-managerial)	0.226
III (routine non-manual)	0.300
IVab (petty bourgeoisie)	0.113
IVc/VIIb (farmers)	0.056
V/VI (skilled manual work)	0.131
VIIa (unskilled manual work)	0.175
Education	
Junior high school level	0.224
Senior high school level	0.493
Junior college/technical college	0.091
Univesity/graduate school	0.192
average years of schooling	12.278
City size	
Large cities (13 largest cities)	0.204
Medium (other cities)	0.567
Small (towns and villages)	0.230
Income	
Below 1 million yen	0.035
1 million to less than 3 miilion yen	0.144
3 million to less than 5 milliion yen	0.191
5 million to less than 7 million yen	0.151
7 million to less than 9 million yen	0.112
9 million yen or more	0.150
Income missing	0.215
average income in million yen	4.885
Asset	
0 to 3	0.101
4 to 5	0.367

Table 2. Logistic Regression Predicting Chronic Health Conditions

Independent variables	Model 1	Model 2	Model 3
Male	−0.142	−0.140	−0.153
Age	0.061 **	0.061 **	0.061 **
Class (I+II)			
III	−0.141	−0.167	−0.161
IVab	0.253	0.219	0.220
IVc/VIIb	−0.286	−0.410	−0.407
V/VI	0.225	0.156	0.181
VIIa	−0.210	−0.232	−0.225
Education (years)		−0.010	−0.009
City size			
Large		−0.211	−0.218
Medium		−0.277 +	−0.282 +
Income (in 10 million yen)			0.002
Income missing			−0.027
Asset			−0.039
Constant	−3.524 **	−3.424 **	−3.332 **
−2 Log Likelihood	1407.334	1398.209	1396.337
Number of Cases	1193	1186	1186

Note: ** p<.01, * p<.05, + p<.10

Table 3. Logistic Regression Predicting Visit to Doctor's Office

Independent variables	Model 1	Model 2	Model 3	Model 4
Male	−0.249 +	−0.215	−0.244 +	−0.233
Age	0.036 **	0.038 **	0.037 **	0.018 **
Class (I+II)				
III	−0.165	−0.102	−0.095	−0.080
IVab	−0.474 +	−0.447 +	−0.439 +	−0.588 *
IVc/VIIb	−1.172 **	−1.085 **	−1.057 **	−1.079 **
V/VI	−0.335	−0.290	−0.274	−0.389
VIIa	−0.289	−0.200	−0.186	−0.136
Education (years)		0.012	0.013	0.018
City size				
Large		0.144	0.149	0.229
Medium		0.143	0.138	0.254
Income (in 10 million yen)			−0.001	−0.002
Income missing			−0.371 +	−0.406 +
Asset			0.026	0.050
Chronic conditions				1.998 **
Constant	−0.921 **	−1.074 +	−1.258 *	−0.065
−2 Log Likelihood	1310.92	1297.226	1293.662	1162.400
Number of Cases	1193	1186	1186	1186

Note: ** p<.01, * p<.05, + p<.10