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Original article

Socioeconomic status and gastric cancer survival in Japan

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Abstract

Background. **Few studies have investigated the association between socioeconomic status and the survival of cancer patients in Japan.**

Methods. **We examined whether occupation or educational level was associated with the survival of 725 gastric cancer patients who were diagnosed within an ongoing large population-based cohort study.**

Results. **After adjustment for age at diagnosis, and sex, we found that, compared with professionals or office workers, unemployed subjects (hazard ratio [HR], 2.23; 95% confidence interval [CI], 1.27–3.92) and manual laborers (HR, 1.68; 95% CI, 1.07–2.62) had an increased risk of gastric cancer death. After further adjustment for the clinical extent of disease, the increased risk disappeared. Educational level was not associated with the risk.**

Conclusions. **These findings suggest that a disparity in survival by occupation exists among Japanese gastric cancer patients, largely due to a lower proportion of early disease among the unemployed and manual laborers.**

Key words Education · Disparities · Gastric Cancer · Japan · Occupations

Introduction

A large number of studies in Western countries have reported inequalities in cancer patient survival according to socioeconomic status (SES) parameters such as occupation, education, and income. In the past 5 years, 22 prospective studies have reported an association between the survival of cancer patients and SES, measured as various variables such as social class, car access, housing tenure, educational level, and rate of unemployment [1–22]. Most studies indicated that a low SES was associated with poorer survival.

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Although its mortality is decreasing, gastric cancer remains the most common incident cancer in Japan. To our knowledge, however, the question of whether SES influences the survival of gastric cancer patients in Japan has not been investigated. Here, we investigated the association between SES (occupation and education) and the survival of gastric cancer patients diagnosed within an ongoing large population-based cohort study of middle-aged Japanese.

Subjects and methods

The subjects of this study were gastric cancer patients who were enrolled in the Japan Public Health Center-based Prospective Study (JPHC Study) cohort I (See Appendix.) The design of the JPHC study has been detailed elsewhere [23, 24]. Briefly, the study started in January 1990. Eligible subjects were 61 595 men and women (29 982 men and 31 613 women) aged 40–59 years who lived in five public health center areas (Ninohe Public Health Center in Iwate Prefecture; Yokote Public Health Center in Akita Prefecture; Saku Public Health Center in Nagano Prefecture; Ishikawa Public Health Center in Okinawa Prefecture; and Katsushika Public Health Center in the Tokyo metropolitan area). A total of 7097 subjects from the Katsushika area were excluded from the present analyses because cancer incidence data were not collected. Among the 54 498 eligible subjects in four areas, 43 149 (20 665 men and 22 484 women) responded to the baseline questionnaire survey (response rate, 79.2%). The study protocol was approved by the institutional review board of the National Cancer Center, Japan.

Gastric cancer patients

Incidence data were available from the specific cancer registry for the JPHC. Data were collected through vol-

untary reports from local major hospitals, on-site visits to the hospitals, and records from the prefecture-wide population-based cancer registry, if available. Cases were coded according to the International Classification of Diseases for Oncology, Third Edition (ICD-O-3). Diagnosis of gastric cancer was made from January 1, 1990, to December 31, 2004. For each case, we recorded information such as patient name, address, date of diagnosis, age at diagnosis, clinical extent of the disease (localized, regional lymph node metastasis, invasion to adjacent tissues, and distant metastasis), and depth of tumor invasion (mucosa [m], submucosa [sm], and muscularis propria [mp] or deeper). Information on the mode of diagnosis (screen-detected, symptom-diagnosed, or unknown) was not systematically recorded and was available for only 50.6% of cases. Annual screening for gastric cancer with barium X-ray examination (gastric photofluorography) has been conducted since the 1980s as a national program in Japan, and various observational studies have demonstrated the efficacy of the program in reducing mortality from gastric cancer [25–27].

Socioeconomic status

As indicators of SES, we used occupation and education reported in the baseline questionnaire. The subjects were asked to describe in free format their current occupation at baseline. Responses were then grouped into ten categories (professionals, administrators, office clerks, sales clerks, workers in service industries, security guards, farmers, workers in transportation or communication industries, manual laborers, and unemployed [including housewives]). For the present analyses, we made five categories from these categories; professionals or office workers (professionals, administrators, and office clerks), sales clerks or others (sales clerks, workers in service industries, security guards, and workers in transportation or communication industries), farmers, manual laborers, and unemployed. Regarding education, the questionnaire asked subjects about their highest educational achievement, using the five categories of university or higher, college or vocational school, high school, junior high, and "others". We made three categories for the analysis in this study; namely junior high school, high school, and college or higher. No information on income was collected in the baseline questionnaire.

Follow-up

The endpoints of this study were mortality from gastric cancer, all-cause mortality, and mortality from any cause except gastric cancer. The follow-up period was from January 1, 1990, to December 31, 2005. From 959 gastric cancer patients, we excluded 182 patients whose year of diagnosis was not confirmed, 1 patient who was lost to follow-up, 14 patients who were diagnosed with gastric cancer before study entry, 23 patients whose educational data were not available, and 14 patients whose educational background was "others". Finally, data from 725 gastric cancer patients were used for the analysis of the association between educational level and the survival of gastric cancer patients in this study. For the analysis of the association between occupation and the survival of gastric cancer patients, the number of patients was 719 because we excluded 6 patients whose occupational data were not available.

Statistical analysis

For each subject, we calculated person-years of follow-up from the date of diagnosis until the date of death, date of moving out of the study area, or the end of follow-up, whichever came first. Total person-years were 2855 for men and 1276 for women. The median length of follow-up was 4.51 years.

We estimated hazard ratios (HRs) and their 95% confidence intervals (CIs) of gastric cancer death, all-cause death, and all-cause death except gastric cancer death according to occupation and education. Cox proportional hazards regression was used to adjust for potentially confounding variables. We first adjusted for sex and age at diagnosis (continuous). We then adjusted for sex, age at diagnosis, and clinical extent of disease (localized, regional lymph node metastasis, invasion to adjacent tissues, and distant metastasis). We finally adjusted for sex, age at diagnosis, clinical extent of disease, and participation in gastric cancer screening at baseline (gastric photofluorography or gastrointestinal endoscopy) during the previous year, reported in the baseline questionnaire, as a proxy for the mode of diagnosis of disease. We also examined the HRs of gastric cancer death stratified by sex, age group at baseline, and clinical extent of disease (localized or more advanced).

Results

Table 1 compares the characteristics of the subjects according to occupation and education. For men, professional or office workers were more likely than those in other occupations to attain higher education, have early disease (depth m or sm), localized disease, and participate in screening examinations (gastric photofluorography or gastrointestinal endoscopy). Unemployed subjects were more likely than other occupations to be older at baseline and at diagnosis, and were less likely to have localized disease and to participate in

Table 1. Occupation, education, and other characteristics of gastric cancer patients

	Occupation					Education		
	Professionals or office workers	Sales clerks or others	Farmers	Manual laborers	Unemployed	College or higher	High school	Junior high school
Men								
Number	108	104	136	149	21	49	198	275
Education (%)								
Junior high school	18.6	49.0	69.9	63.8	57.1			
High school	50.9	46.2	29.4	32.9	19.1			
College or higher	30.5	4.8	0.7	3.3	23.8			
Age at baseline, years (%)								
<45	11.1	9.7	5.1	11.5	0.0	16.3	9.6	7.2
45–49	15.7	19.2	9.6	20.1	9.5	16.3	17.7	14.6
50–54	26.9	26.9	26.5	29.5	19.1	18.4	28.3	28.0
55–59	46.3	44.2	58.8	38.9	71.4	49.0	44.4	50.2
Age at diagnosis, years (%)								
<45	0.0	1.0	0.7	0.6	0.0	2.0	1.0	0.0
45–49	3.7	4.8	1.5	5.4	0.0	14.3	2.0	2.9
50–54	10.2	8.7	7.4	12.8	9.5	6.1	9.6	10.9
55–59	24.1	24.0	22.8	27.5	9.5	16.3	26.8	23.6
≥60	62.0	61.5	67.7	53.7	81.0	61.3	60.6	62.6
Depth of tumor invasion (%)								
m	39.8	26.9	36.8	31.5	19.1	34.7	35.4	31.3
sm	20.4	16.4	17.7	21.5	4.8	14.3	23.2	16.0
mp or deeper	30.6	47.1	37.5	36.2	61.9	40.8	32.3	42.6
Missing	6.5	5.8	2.8	4.8	9.4	8.1	5.1	4.7
Unknown	2.7	3.8	5.2	6.0	4.8	2.1	4.0	5.5
Clinical extent of disease (%)								
Localized	68.5	51.0	61.8	57.1	42.9	63.3	63.1	54.9
Regional lymph nodes	13.0	20.2	19.9	18.8	28.5	16.3	16.2	20.7
Adjacent tissue invasion	4.5	9.6	5.9	8.1	14.3	2.1	6.6	8.7
Distant metastasis	10.2	14.4	9.6	14.1	14.3	12.2	9.6	13.8
Missing	1.9	1.9	0.0	1.3	0.0	6.1	1.5	0.4
Unknown	1.9	2.9	2.8	0.6	0.0	0.0	3.0	1.5
Screening examinations at baseline (%)								
Gastric photofluorography	51.9	38.5	43.4	35.6	38.1	55.1	42.4	38.6
Gastrointestinal endoscopy	26.8	24.0	28.9	20.8	23.8	36.7	26.3	21.5

Women								
Number	27	38	52	33	51	17	58	128
Education (%)								
Junior high school	22.2	44.7	84.6	57.6	80.4			
High school	51.9	44.7	13.5	36.4	13.7			
College or higher	25.9	10.6	1.9	6.0	5.9			
Age at baseline, years (%)								
<45	25.9	2.6	9.6	6.1	7.8	17.6	10.3	7.8
45–49	25.9	23.7	19.2	27.3	7.8	17.6	27.6	15.6
50–54	40.7	44.7	23.1	39.4	35.3	47.2	34.5	33.6
55–59	7.4	29.0	48.1	27.3	49.0	17.6	27.6	43.0
Age at diagnosis, years (%)								
<45	3.7	1.0	0.0	0.0	0.0	6.0	0.0	0.0
45–49	18.5	2.6	3.8	6.1	3.9	17.6	6.9	3.9
50–54	22.2	15.8	17.3	18.2	13.7	23.5	22.4	13.3
55–59	22.2	34.2	28.9	24.2	13.7	23.5	27.6	22.7
≥60	33.3	47.4	50.0	51.5	68.7	29.4	43.1	60.1
Depth of tumor invasion (%)								
m	40.7	42.1	34.6	36.4	27.5	47.0	34.5	33.6
sm	14.8	10.5	19.1	6.1	15.7	11.8	12.1	14.8
mp or deeper	29.6	36.8	38.5	42.4	47.1	29.4	41.4	41.4
Missing	11.1	2.7	3.9	9.0	3.8	11.8	3.4	5.5
Unknown	3.8	7.9	3.9	6.1	5.9	0.0	8.6	4.7
Clinical extent of disease (%)								
Localized	63.0	52.6	63.5	54.6	49.0	64.7	48.3	58.6
Regional lymph nodes	18.5	21.1	21.2	12.1	23.5	17.6	17.2	21.1
Adjacent tissue invasion	0.0	13.2	5.8	9.1	7.8	11.8	8.6	7.1
Distant metastasis	11.1	7.9	7.9	15.2	15.7	5.9	17.2	8.6
Missing	3.7	2.6	0.0	6.1	0.0	0.0	1.7	2.3
Unknown	3.7	2.6	3.9	3.0	3.9	0.0	6.9	2.3
Screening examinations at baseline (%)								
Gastric photofluorography	37.0	44.7	59.6	36.4	21.6	52.9	39.7	38.3
Gastrointestinal endoscopy	37.0	23.7	17.3	18.2	15.7	47.1	25.9	14.8

m, mucosa; sm, submucosa; mp, muscularis propria

screening examinations. Similar trends were observed for women. With regard to education, men and women with the lowest education level (junior high school) were less likely than other groups to participate in screening examinations at baseline. However, the proportions of early disease (depth m or sm) and localized disease did not substantially differ from those in the other two groups.

Table 2 shows the HRs for deaths from gastric cancer, all-cause death, and causes other than gastric cancer, according to occupation and education. After adjustment for age and sex, unemployed subjects (HR, 2.23; 95% CI, 1.27–3.92) and manual laborers (HR, 1.68; 95% CI, 1.07–2.62) had an increased risk of gastric cancer death compared to professionals or office workers. However, after further adjustment for the clinical extent of disease or participation in gastric cancer screening at baseline, occupation was not associated with the risk of gastric cancer death. Unemployed subjects had significantly increased risks of death from all causes and causes other than gastric cancer in all models. Education showed no significant association with the risk of gastric cancer death, all-cause death, or all-cause death except gastric cancer in all models.

Table 3 shows HRs for gastric cancer death according to occupation and education stratified by sex, age at baseline, and clinical extent of disease. In men, unemployed subjects had an increased risk of gastric cancer death (HR, 2.66; 95% CI, 1.26–5.59). However, no significant increase in risk was found in women. In subjects aged less than 50 years at baseline, unemployed subjects had an increased risk of gastric cancer death (HR, 5.78; 95% CI, 1.96–17.1) after adjustment for sex, and manual laborers had an increased risk with borderline significance (HR, 2.18; 95% CI, 0.92–5.17). In subjects aged 50 years or above at baseline, occupation had no significant association with the risk of gastric cancer death.

We also examined the HRs of gastric cancer death stratified by age at diagnosis, instead of age at baseline. In subjects aged under 60 years at diagnosis, unemployed subjects and manual laborers had an increased risk of gastric cancer death, whereas those aged 60 or older had no elevation in risk (data not shown). When stratified by the clinical extent of disease, occupation was not associated with the risk of gastric cancer death. Education showed no significant association with the risk of gastric cancer death in any of the stratified analyses.

Analyses stratified by study areas generally showed higher risks for gastric cancer death among manual labors and the unemployed as compared with professional and office workers (data not shown). However, a small number of gastric cancer deaths in each category in each area resulted in nonsignificant results in most of the analyses and precluded informative inferences regarding regional differences in the associations between occupation and risk for gastric cancer death. Analyses stratified by years of diagnosis (1990–1994/1995–1999/2000–2004) revealed no remarkable change over time in the HRs for manual laborers and for the unemployed.

Discussion

In the past 5 years, 22 prospective studies in Western countries have assessed the association between SES and the survival of cancer patients: 6 for breast cancer [1–6], 3 for uterine cancer [7–9], 2 for cancer of the pancreas [10, 11], 2 for colorectal cancer [12, 13], and 9 for cancer at other sites or several sites combined [14–22]. Most but not all [9, 11] of the studies reported that low SES was significantly associated with poorer survival. As measures of SES, however, most studies used SES community level data, such as median annual household income or rate of male unemployment, or composite variables from census data, which were then assigned to individuals. Thus, few studies have used SES indicators at individual levels.

In Japan, only one prospective study has examined the effect of SES on cancer patient survival. Ueda et al. [28] reported that after adjustment for age, cancer stage, histology, and treatment, patients with cervical and corpus cancer living in municipalities with high unemployment rates showed significantly lower cumulative 5-year survival than patients from municipalities with low unemployment rates. In addition, patients with cervical cancer from municipalities with low rates of college or graduate school graduates showed significantly lower cumulative 5-year survival than patients from municipalities with a high rate of college or graduate school graduates, after adjusting for age, cancer stage, histology and treatment. Because the difference in survival remained after the adjustment for cancer stage and treatment, this association may have been due to greater comorbidity in low SES patients, or other psychosocial factors, such as differences in health care seeking behavior. As the authors mentioned, however, these findings should be interpreted cautiously because they compared only all-cause mortality, and individual SES data were not available. Our study has an advantage over their study because we examined mortality from all causes, mortality from gastric cancer, and mortality from other causes in relation to occupation and education.

In the present study, we examined whether occupation and educational levels were associated with the survival of Japanese gastric cancer patients. We used individual data and analyzed the risk of gastric cancer death, death from all causes, and death from causes

Table 2. Associations between occupation, education, and risk of death among gastric cancer patients

	Occupation					Education		
	Professionals or office workers[a]	Sales clerks or others	Farmers	Manual laborers	Unemployed	College or higher[a]	High school	Junior high school
Number[b]	135	142	188	182	72	66	256	403
Number of deaths								
Gastric cancer	28 (20.7%)	43 (30.3%)	37 (19.7%)	60 (33.0%)	27 (37.5%)	14 (21.2%)	70 (27.3%)	113 (28.0%)
Causes other than gastric cancer	12 (8.9%)	13 (9.2%)	18 (9.6%)	14 (7.7%)	12 (16.7%)	8 (12.1%)	22 (8.6%)	40 (9.9%)
All cause	40 (29.6%)	56 (39.4%)	55 (29.3%)	74 (40.7%)	39 (54.2%)	22 (33.3%)	92 (35.9%)	153 (38.0%)
Gastric cancer death								
HR1[c]	1.0	1.59	0.94	1.68	2.23	1.0	1.34	1.40
(95% CI)	(Ref.)	(0.99–2.57)	(0.58–1.54)	(1.07–2.62)	(1.27–3.92)	(Ref.)	(0.76–2.39)	(0.80–2.45)
HR2[d]	1.0	1.34	1.17	1.25	1.52	1.0	1.47	1.60
(95% CI)	(Ref.)	(0.83–2.17)	(0.71–1.93)	(0.79–1.97)	(0.86–2.68)	(Ref.)	(0.82–2.62)	(0.91–2.80)
HR3[e]	1.0	1.29	1.14	1.17	1.42	1.0	1.40	1.48
(95% CI)	(Ref.)	(0.80–2.09)	(0.69–1.87)	(0.74–1.87)	(0.80–2.52)	(Ref.)	(0.79–2.51)	(0.84–2.61)
All cause except gastric cancer								
HR1[c]	1.0	1.18	0.90	0.91	3.03	1.0	0.61	0.72
(95% CI)	(Ref.)	(0.54–2.60)	(0.43–1.87)	(0.42–1.97)	(1.29–7.09)	(Ref.)	(0.27–1.39)	(0.33–1.54)
HR2[d]	1.0	1.22	0.92	0.97	3.21	1.0	0.62	0.74
(95% CI)	(Ref.)	(0.55–2.69)	(0.44–1.92)	(0.44–2.11)	(1.34–7.60)	(Ref)	(0.27–1.39)	(0.34–1.60)
HR3[e]	1.0	1.24	0.91	0.93	3.17	1.0	0.59	0.70
(95% CI)	(Ref.)	(0.57–2.74)	(0.44–1.90)	(0.42–2.03)	(1.33–7.59)	(Ref.)	(0.26–1.34)	(0.32–1.53)
All cause								
HR1[c]	1.0	1.47	0.94	1.44	2.47	1.0	1.09	1.17
(95% CI)	(Ref.)	(0.98–2.20)	(0.62–1.42)	(0.98–2.12)	(1.55–3.96)	(Ref.)	(0.68–1.73)	(0.75–1.83)
HR2[d]	1.0	1.35	1.11	1.20	1.96	1.0	1.17	1.26
(95% CI)	(Ref.)	(0.90–2.04)	(0.73–1.68)	(0.81–1.77)	(1.22–3.14)	(Ref.)	(0.73–1.86)	(0.80–1.99)
HR3[e]	1.0	1.32	1.08	1.13	1.82	1.0	1.12	1.18
(95% CI)	(Ref.)	(0.87–1.99)	(0.72–1.64)	(0.76–1.68)	(1.13–2.94)	(Ref.)	(0.70–1.80)	(0.74–1.86)

HR, hazard ratio; CI, confidence interval
[a] Referent category
[b] Number of gastric cancer patients
[c] HR1, hazard ratios were adjusted for age at diagnosis (continuous) and sex
[d] HR2, hazard ratios were further adjusted for clinical extent of disease (localized, regional lymph node metastasis, invasion to adjacent tissues, and distant metastasis)
[e] HR3, hazard ratios were further adjusted for gastric cancer screenings at baseline (gastric photofluorography; gastrointestinal endoscopy)

Table 3. Associations between occupation, education, and risk of gastric cancer death among gastric cancer patients stratified by sex, age, and clinical extent of disease

	Occupation					Education		
	Professionals or office workers[a]	Sales clerks or others	Farmers	Manual laborers	Unemployed	College or higher[a]	High school	Junior high school
By sex								
Men								
N (deaths/patients)[b]	23/108	34/104	28/136	48/149	10/21	12/49	51/198	81/275
HR[c]	1.0	1.70	0.94	1.61	2.66	1.0	1.06	1.26
(95% CI)	(Ref.)	(1.00–2.89)	(0.54–1.64)	(0.98–2.65)	(1.26–5.59)	(Ref.)	(0.57–1.99)	(0.68–2.30)
Women								
N (deaths/patients)[b]	5/27	9/38	9/52	12/33	17/51	2/17	19/58	32/128
HR[c]	1.0	1.35	0.97	2.17	2.09	1.0	3.32	2.45
(95% CI)	(Ref.)	(0.45–4.10)	(0.32–2.94)	(0.76–6.21)	(0.75–5.84)	(Ref.)	(0.77–14.35)	(0.58–10.35)
Age at baseline (years)								
<50								
N (deaths/patients)[b]	7/43	12/40	8/35	20/58	7/10	4/22	18/76	32/90
HR[d]	1.0	1.93	1.42	2.18	5.78	1.0	1.40	2.17
(95% CI)	(Ref.)	(0.76–4.91)	(0.51–3.91)	(0.92–5.17)	(1.96–17.1)	(Ref.)	(0.47–4.14)	(0.77–6.15)
≥50								
N (deaths/patients)[b]	21/92	31/102	29/153	40/124	20/62	10/44	52/180	81/313
HR[d]	1.0	1.52	0.84	1.54	1.88	1.0	1.30	1.20
(95% CI)	(Ref.)	(0.87–2.66)	(0.48–1.47)	(0.91–2.62)	(0.98–3.62)	(Ref.)	(0.66–2.56)	(0.62–2.31)
By clinical extent of disease								
Localized								
N (deaths/patients)[b]	3/91	4/73	2/117	4/103	1/34	1/42	5/153	8/226
HR[e]	1.0	1.47	0.40	1.06	0.72	1.0	1.25	1.30
(95% CI)	(Ref.)	(0.33–6.63)	(0.07–2.41)	(0.24–4.73)	(0.07–8.02)	(Ref.)	(0.15–10.70)	(0.16–10.51)
Advanced[f]								
N (deaths/patients)[b]	24/38	37/62	33/65	52/73	24/36	13/21	60/89	99/166
HR[e]	1.0	1.00	0.83	1.21	1.34	1.0	1.18	1.04
(95% CI)	(Ref.)	(0.60–1.67)	(0.49–1.41)	(0.74–1.96)	(0.74–2.43)	(Ref.)	(0.64–2.15)	(0.58–1.86)

HR, hazard ratio; CI, confidence interval
[a] Referent category
[b] Number of gastric cancer deaths/number of gastric cancer patients
[c] HR, hazard ratios were adjusted for age at diagnosis (continuous)
[d] HR, hazard ratios were adjusted for sex
[e] HR, hazard ratios were adjusted for age at diagnosis (continuous) and sex
[f] Advanced gastric cancer: regional lymph node metastasis, invasion to adjacent tissues, and distant metastasis

other than gastric cancer. In multivariate analysis adjusted for age and sex, the unemployed and manual laborers showed poorer gastric cancer survival than professional or office workers. This disparity disappeared after further adjustment for the clinical extent of disease or participation in gastric cancer screening at baseline. In Japan, the rate of people undergoing health check-ups is lower among unemployed people (49.2%) than among those engaged in any occupation (67.6%) [29]. Our findings suggest that gastric cancer patients who were unemployed or those who were manual laborers had lower access to screening programs, which resulted in more advanced disease at diagnosis and poorer prognosis. In contrast, we found no significant difference in survival according to education. Differences in the proportion of localized disease might have not been large enough to produce any notable difference in survival. Furthermore, although the screening rate was lower among subjects with the lowest education, information on screening reported at baseline might not be a good proxy for the actual mode of diagnosis (screen-detected or symptom-diagnosed).

In the stratified analyses according to sex, age, and clinical extent of disease (Table 3), poor prognosis among unemployed patients was not found in women and patients aged 50 years or older at baseline. These findings also support the idea that factors related to the occupational environment cause the difference in survival, because unemployed status does not always mean adverse healthcare conditions for women and retired people. The 2004 *Comprehensive survey of the living conditions of people on Health and Welfare* [29] found that most unemployed women aged 30 years or older in Japan were housewives. We do not have data on individual or household income which might have clarified the economic status of the unemployed women in our study. Further, unemployed patients aged 50 or older at baseline included retired patients.

The limitations of the present study include its relatively small sample size, lack of systematic information on mode of diagnosis, and relatively crude classification of occupations. In addition, the observed higher risk of mortality among the unemployed might have been in part due to reverse causality, in that ill health, including gastric cancer, had led to a loss of employment. These limitations notwithstanding, this is the first prospective study to document the effect of SES on the survival of gastric cancer patients in Japan, using individual data about occupation and education. Our findings demonstrated a disparity in the survival of gastric cancer patients according to occupational status. The main reason for the poorer prognosis in the unemployed and manual laborers appeared to be the lower rate of early cancer among these groups, presumably resulting from a lower rate of participation in screening programs.

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Appendix

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