Low socioeconomic class is a risk factor for upper and lower gastrointestinal symptoms: a population based study in 15 000 Australian adults

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Abstract

Background—The association of social class with health has been extensively studied, yet relationships between social class and gastrointestinal symptoms remain almost unexplored.

Aims—To examine relationships between social class and gastrointestinal symptoms in a population sample.

Methods—The prevalence of 16 troublesome gastrointestinal symptoms was determined by a postal questionnaire sent to 15 000 subjects (response rate 60%) and compared with a validated composite measure of socioeconomic status (index of relative socioeconomic disadvantage). Comparisons across social class were explored for five symptom categories (oesophageal symptoms; upper dysmotility symptoms; bowel symptoms; diarrhoea; and constipation). Results are reported as age standardised rate ratios with the most advantaged social class as the reference category.

Results—There were clear trends for the prevalence rates of all gastrointestinal symptoms to increase with decreasing social class. These trends were particularly strong for the five symptom categories. Lower social class was associated with a significantly (p<0.0001) higher number of symptoms reported overall and with a higher proportion of individuals reporting 1–2 symptoms and more than five symptoms. In both sexes, the most pronounced effects for subjects in the lowest social class were found for constipation (males: rate ratio 1.83 (95% confidence intervals (CI) 1.16–2.51); females: rate ratio 1.68 (95% CI 1.31–2.04)) and upper dysmotility symptoms (males: rate ratio 1.45 (95% CI 1.02–1.88); females: rate ratio 1.35 (95% CI 1.07–1.63)). Oesophageal symptoms and diarrhoea were not associated with social class.

Conclusions—Troublesome gastrointestinal symptoms are linked to socioeconomic status with more symptoms reported by subjects in low socioeconomic classes. Low socioeconomic class should be considered a risk factor for both upper and lower gastrointestinal symptoms.

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The association of social class with health has been extensively studied over the past two decades. There is now persuasive evidence linking social position to adult mortality and morbidity, with persistent trends of poorer health among the lower social classes. These trends have emerged with most measures of social class (for example, occupation, education, and income), and have been reported in many industrialised regions. However, some areas of morbidity show only modest or no relationship with socioeconomic disadvantage. Thus in a recent questionnaire study from the UK, there was no correlation between disorders of the gastrointestinal system and socioeconomic disadvantage, as opposed to respiratory conditions and depression.[1]

The epidemiology of gastrointestinal symptoms has recently been well described in detail by population surveys.[2–5] The vast majority of gastrointestinal symptoms in the general population are presumably caused by functional gastrointestinal disorders such as irritable bowel syndrome and functional dyspepsia, with symptoms due to structural aetiologies comprising less than a few per cent of all cases.[6] Prevalence estimates have been presented for a broad range of symptoms and potential risk factors for individual symptoms have been explored, although few have emerged.[7–9] Yet relationships between social class and gastrointestinal symptoms remain almost unexplored. A US survey found strong associations between low income and reporting of symptoms compatible with functional gastrointestinal disorders.[6] Unfortunately, this study was performed in a selected marketing panel of householders and the results are unlikely to be representative of the general population. A recent Canadian study reported a higher prevalence of upper gastrointestinal symptoms in respondents with low income or low educational level[10] but this was based on a very selected sample as most subjects refused participation. A few other studies have investigated the association between social class and a single distinct gastrointestinal symptom, such as constipation[11 12] or dyspepsia.[13–15] However, conclusions have been conflicting, possibly related to the fact that some of the studies relied on single indicators such as income, type of labour, or educational level to infer socioeconomic status.

There are reasons to believe that the distribution of gastrointestinal symptoms

varies by social class. It has been well documented that peptic ulcer disease is associated with low socioeconomic status.[16–18] That association may be explained, at least in part, by a higher risk of *Helicobacter pylori* infection among the less advantaged groups,[19 20] probably due to crowded living conditions and poor standards of hygiene.[21] Psychological stress, health risk behaviours, analgesic use, and hard physical work may be important additional risk factors for peptic ulcer in low socioeconomic populations.[22]

The aetiology of functional gastrointestinal disorders is essentially unknown but a number of candidate risk factors are likely to be unevenly distributed across social classes. These include dietary factors,[23] smoking,[23 24] use of medication, risk factors for infection, and psychosocial distress.[25 26]

The purpose of this study was to examine relationships between social class and gastrointestinal symptoms in a population sample recruited in western Sydney (NSW, Australia). We used a standard questionnaire with well accepted criteria for gastrointestinal symptoms and applied a validated composite measure of socioeconomic disadvantage. We hypothesised that lower social class would be associated with higher rates of self reported gastrointestinal symptoms.

Subjects and methods

These data were collected as part of a larger study of gastrointestinal symptoms in diabetes mellitus.[27] The study was conducted in the catchment area of the Wentworth Area Health Service; this is a state government health authority which services the Penrith and Blue Mountains regions of western Sydney. This area has a population of 155 258 and is demographically very similar to the Australian population, according to 1996 census data.

The Federal Electoral Commission provided names and addresses for a random sample of 15 000 individuals. These were selected from the electoral rolls of all local government authorities that fall within the boundaries of the Wentworth Area Health Service. The sample was gender stratified, and equal numbers of males and females were selected. In Australia, all adults aged 18 years or older are required by law to be registered on the electoral rolls.

A two page symptom questionnaire was sent to all subjects. (A copy of the questionnaire can be obtained from the corresponding author.) A $1.00 lottery ticket was included as a method of improving survey response rates.[28] Two reminder letters were sent at three week intervals.

The study was approved by the Wentworth Area Health Service Research and Ethics Committee of Nepean Hospital, Penrith, Australia, and funded from a National Health and Medical Research Council project grant.

ASSESSMENT OF SYMPTOMS

The questionnaire contained 16 items concerning the frequency of troublesome gastrointestinal symptoms over a three month presurvey period. The frequency of symptoms was recorded on a five point Likert scale with the response options being "not at all, rarely, sometimes, often, and very often". Symptoms that were not completely self explanatory were anchored to a standard description, consistent with the Rome II criteria.[29 30] The response options of "often" and "very often" were used to identify a symptom as present. Symptoms were then grouped to form broader categories in the following manner:

- *Oesophageal symptoms*: heartburn and/or dysphagia
- *Upper dysmotility symptoms*—at least one of early satiety, postprandial fullness, bloating, nausea, or vomiting.
- *Bowel symptoms*—at least one of self reported diarrhoea or constipation, loose or watery stools, >3 bowel movements each day, urgency, faecal incontinence, <3 bowel movements each week, hard or lumpy stools, or feelings of anal blockage.
- *Diarrhoea*—at least one of >3 bowel movements each day, loose or watery stools, or urgency.
- *Constipation*—at least one of <3 bowel movements each week, hard or lumpy stools, anal blockage.

RELIABILITY OF SYMPTOM REPORTING

In a separate study, a sample of 87 individuals, identified by the postal survey, were invited for an interview. Subjects completed the questionnaire and were interviewed by an experienced physician about troublesome gastrointestinal symptoms over the past three months. The physician was unaware of the answers completed by the patient on the self report questionnaire. Based on this interview the physician also completed the questionnaire. Subjects were classified into the gastrointestinal symptom categories based on the answers to the individual questions about the 16 gastrointestinal symptoms. Data were compared using kappa values with 95% confidence intervals (CI).[31] A kappa value less than 0.4 indicates significant but poor agreement while values between 0.4 and 0.75 indicate good agreement; values above 0.75 indicate excellent agreement.[32]

SOCIAL CLASS

Social class was assigned on the basis of the index of relative socioeconomic disadvantage (IRSD; Australian Bureau of Statistics).[33] This is a composite measure of area socioeconomic status which is derived from census data concerning area characteristics such as income, educational and unemployment levels, housing, and ethnic representation. The index provides a single value, which summarises area affluence at the postcode level; low values indicate the least advantaged areas.

The Australian Bureau of Statistics conducts a population census every five years, with the most recent census in 1996. The IRSD is recalculated at the end of each census. Following the 1996 Census, IRSD values ranged from 602.28 to 1179.15 across NSW; the Penrith

Table 1 Response rate and demographic characteristics by socioeconomic class

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
No questionnaires mailed	1538	2636	2969	4409	3448
No questionnaires returned	1035	1590	1647	2479	1804
Response rate (%)	67.3	60.3	55.5	56.2	52.3
Males (%)	46.9	47.0	46.7	44.7	47.9
Mean (SD) age (y)	47.3 (15.9)	44.2 (15.6)	44.9 (14.9)	45.5 (16.0)	45.2 (16.2)

5th quintile is the most disadvantaged socioeconomic class.

and Blue Mountains areas are more advantaged compared with the whole of NSW (mean index values 1034.15 *v* 997.31).

Postcode areas covered by the survey were ranked into five categories, based on a quintile split of IRSD values. Postcodes in the lowest quintile (quintile 5) represent the least advantaged areas while postcodes in the highest quintile (quintile 1) represent the most advantaged areas.

STATISTICAL ANALYSIS
Analysis was limited to all individuals aged 25–64 years, following the rationale of Mathers.[23] Social class tends to be more transient in people who are entering (that is, <25 years) or leaving (that is, >64 years) the workforce, and the construct may be less reliably measured than among working age adults.

Prevalence estimates (with 95% CI) were calculated for gastrointestinal symptom groupings, stratified by social class. The estimates were age standardised to the 1996 NSW population, using the direct method.[34] Confidence intervals were calculated on the basis of binomial distribution.

Comparisons across social class groups were expressed as age standardised rate ratios (with 95% CI). The most advantaged group (1st quintile) was chosen as the reference category in all comparisons. The 95% CI for rate ratios were calculated according to the method described by Mathers.[23]

Statistical power for the current study has been addressed in retrospect as assessment of the relationship between social disadvantage and gastrointestinal symptom prevalence was not the primary aim of the survey. The large sample available has however made it an attractive vehicle with which to address this question. Statistical power has been assessed for comparison of the least disadvantaged cohort with increasingly disadvantaged cohorts (in quintiles). The most prevalent symptom in the least disadvantaged cohort is reported by approximately 15% of respondents and is the most conservative basis for estimation of power. An elevation in the more disadvantaged group of at least 10% was considered of practical significance. To achieve statistical power of 0.9 at the 0.05 level of statistical significance would require 330 subjects per cohort. As the smallest cohort contains over 1000 respondents, statistical power is clearly adequate.

Table 2 Crude prevalence rates of gastrointestinal symptoms and symptom complexes by socioeconomic class. All values are percentages

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Oesophageal symptoms	9.0	10.2	11.0	13.1	13.3
Upper dysmotility symptoms	12.3	15.5	14.0	16.4	17.0
Diarrhoea symptoms	8.9	9.8	9.8	11.3	10.3
Constipation symptoms	6.3	8.7	9.6	10.3	10.2
Bowel symptoms	15.2	18.0	18.9	21.2	20.5
Abdominal pain	9.2	10.8	9.8	11.9	11.6
Early satiety	3.0	3.9	3.9	4.6	5.4
Postprandial fullness	4.1	5.1	4.3	6.0	6.3
Bloating	9.7	11.5	11.0	12.6	11.5
Heartburn	8.2	9.5	10.6	12.2	12.4
Nausea	1.5	4.2	3.1	3.7	4.6
Vomiting	0.3	0.8	0.8	1.2	1.8
Dysphagia	1.3	1.7	1.2	2.5	2.1
Diarrhoea/constipation	8.3	10.6	9.9	11.9	11.3
Anal blockage	3.5	5.4	5.0	5.5	5.4
>3 bowels each day	4.9	4.9	5.4	6.1	5.5
<3 bowels each week	2.6	3.4	3.7	3.7	4.5
Lumpy or hard stools	3.0	5.8	6.1	6.4	5.6
Watery stools	5.1	5.4	5.3	6.2	5.7
Urgency	3.4	5.7	5.2	5.9	5.6
Faecal incontinence	0.5	0.4	0.9	1.0	1.3

5th quintile is the most disadvantaged socioeconomic class.
All symptoms counted if reported to occur often or very often.

Table 3 Number of gastrointestinal symptoms reported by socioeconomic class

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Mean (IQ range) No symptoms	0.71(0–1)	0.93(0–1)	0.91(0–1)†	1.08(0–1)‡	1.09(0–1)‡
No symptoms reported (%)	71.6	69.0	67.0	63.7	63.2
1–2 symptoms reported (%)	18.2	17.7	20.4	20.9	20.8
≥5 symptoms reported (%)	3.8	6.9	6.2	8.3	7.4

5th quintile is the most disadvantaged socioeconomic class.
†p<0.01 compared with 1st quintile (Mann-Whitney test); ‡p<0.001 compared with 1st quintile (Mann-Whitney test).
Symptom counted if reported to occur often or very often.

Results

RESPONSE RATE

Of 15 000 questionnaires mailed, 429 were returned undelivered and 99 were sent to people who had recently died or were away from home throughout the duration of the survey. A further 102 individuals returned completed questionnaires but reported postcodes that were outside of the catchment area (these individuals were removed from the sample).

Completed questionnaires were returned by 8555 eligible subjects, yielding a response rate of 60%. The response rate varied with social class (table 1) with the lowest response among the most disadvantaged group (5th quintile) and the highest response among the most advantaged group (1st quintile). Comparisons between respondents and the population of the surveyed area indicated very similar age strata (p=1.00, χ^2 test) and a slightly higher proportion of females among respondents (53.5% *v* 50.9%; p<0.001).

SURVEY VALIDITY

Agreement between self reported gastrointestinal symptoms and symptom assessment based on physician interview was good to excellent. The lowest kappa value was for constipation symptoms (κ 0.65; 95% CI 0.26–1.00) and the highest for oesophageal symptoms (κ 0.82; 95% CI 0.58–1.00). For the symptom complexes dysmotility-like symptoms, bowel symptoms, and diarrhoea symptoms, kappa values were 0.78, 0.73, and 0.69, respectively.

PREVALENCE OF GASTROINTESTINAL SYMPTOMS AND SOCIAL CLASS

Table 2 shows crude prevalence rates for the five gastrointestinal symptom categories and for individual symptoms that form these categories. There were clear trends for prevalence rates to increase with decreasing social class. These trends were particularly strong for the five symptom categories, and were evident (to a lesser degree) for individual symptoms. Social class was also related to the number of symptoms reported (table 3): lower social class was associated with a significantly higher number of symptoms overall (p<0.0001, Kruskal-Wallis test) and with a higher proportion of individuals reporting 1–2 symptoms and more than five symptoms.

GASTROINTESTINAL SYMPTOMS AND SEX

Tables 4–8 show age standardised rates and rate ratios for the five symptom categories, with separate estimates for females and males. The five symptom groups showed considerable variation across social classes, with evidence of a general trend reflecting increased prevalences with decreasing social class. However, the trends were different for females and males.

Males

The association of socioeconomic disadvantage with oesophageal symptoms (table 4), dysmotility symptoms (table 5), and diarrhoea (table 7) was generally weak. There was evidence of a trend for prevalence rates to increase with increasing socioeconomic disadvantage. However, differences in the rate ratios were non-significant or were only marginally significant (for example, dysmotility symptoms in the 5th quintile) in most comparisons.

Bowel symptoms (table 6) and constipation symptoms (table 8) revealed stronger patterns. For both symptom groups, the prevalence rates

Table 4   Oesophageal symptoms. Population standardised prevalence rates (with 95% confidence intervals (CI)) and rate ratios (with 95% CI) for 2nd to 5th quintiles of socioeconomic class relative to 1st quintile

	Males		Females	
	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)
1st quintile	10.35 (6.77–13.94)	—	10.74 (7.61–13.87)	—
2nd quintile	10.94 (8.42–13.45)	1.06 (0.64–1.47)	10.43 (8.10–12.75)	0.97 (0.60–1.34)
3rd quintile	9.97 (7.63–12.32)	0.96 (0.54–1.38)	12.62 (10.11–15.14)	1.18 (0.82–1.53)
4th quintile	13.17 (10.71–15.63)	1.27 (0.88–1.67)	14.17 (12.06–16.28)	1.32 (0.99–1.65)
5th quintile	13.95 (11.21–16.69)	1.35 (0.95–1.75)	13.74 (11.21–16.69)	1.28 (0.93–1.63)

5th quintile is the most disadvantaged socioeconomic class.
Oesophageal symptoms: heartburn and/or dysphagia reported to occur often or very often.

Table 5   Upper dysmotility symptoms. Population standardised prevalence rates (with 95% confidence intervals (CI)) and rate ratios (with 95% CI) for 2nd to 5th quintiles of socioeconomic class relative to 1st quintile

	Males		Females	
	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)
1st quintile	8.38 (5.23–11.53)	—	16.28 (12.54–20.01)	—
2nd quintile	9.17 (6.82–11.52)	1.09 (0.64–1.55)	21.49 (18.26–24.73)	1.32 (1.05–1.59)
3rd quintile	9.36 (6.82–11.90)	1.12 (0.65–1.58)	18.82 (15.89–21.76)	1.16 (0.88–1.43)
4th quintile	11.84 (9.43–14.24)	1.41 (0.99–1.84)	21.17 (18.68–23.66)	1.30 (1.04–1.56)
5th quintile	12.16 (9.55–14.78)	1.45 (1.02–1.88)	21.96 (18.91–25.01)	1.35 (1.07–1.63)

5th quintile is the most disadvantaged socioeconomic class.
Upper dysmotility symptoms: any of the following symptoms, if reported to occur often or very often: early satiety, postprandial fullness, bloating, nausea, or vomiting.

Table 6   Bowel symptoms. Population standardised prevalence rates (with 95% confidence intervals (CI)) and rate ratios (with 95% CI) for 2nd to 5th quintiles of socioeconomic class relative to 1st quintile

	Males		Females	
	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)
1st quintile	12.57 (9.08–16.07)	—	16.94 (13.24–20.63)	—
2nd quintile	15.04 (12.15–17.94)	1.20 (0.86–1.53)	22.57 (19.28–25.86)	1.33 (1.07–1.59)
3rd quintile	17.64 (14.39–20.90)	1.40 (1.07–1.74)	22.74 (19.58–25.90)	1.34 (1.08–1.60)
4th quintile	17.38 (14.61–20.15)	1.38 (1.06–1.70)	24.39 (21.77–27.01)	1.44 (1.20–1.68)
5th quintile	16.71 (13.75–19.66)	1.33 (1.00–1.66)	25.14 (21.93–28.35)	1.48 (1.23–1.74)

5th quintile is the most disadvantaged socioeconomic class.
Bowel symptoms: any of the following symptoms if reported to occur often or very often: self reported diarrhoea or constipation, watery stools, >3 bowel movements each day, urgency, faecal incontinence, <3 bowel movements each week, lumpy or hard stools, or anal blockage.

Table 7   Diarrhoea symptoms. Population standardised prevalence rates (with 95% confidence intervals (CI)) and rate ratios (with 95% CI) for 2nd to 5th quintiles of socioeconomic class relative to 1st quintile

	Males		Females	
	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)
1st quintile	9.42 (6.29–12.54)	—	8.23 (5.49–10.97)	—
2nd quintile	10.34 (7.88–12.79)	1.10 (0.69–1.51)	10.67 (8.24–13.09)	1.30 (0.89–1.70)
3rd quintile	11.13 (8.49–13.77)	1.18 (0.77–1.59)	9.39 (7.20–11.57)	1.14 (0.73–1.55)
4th quintile	12.22 (9.80–14.63)	1.30 (0.91–1.68)	11.62 (9.66–13.57)	1.41 (1.04–1.78)
5th quintile	11.48 (8.95–14.02)	1.22 (0.82–1.62)	10.36 (8.14–12.58)	1.26 (0.86–1.65)

5th quintile is the most disadvantaged socioeconomic class.
Diarrhoea symptoms: any of the following symptoms if reported to occur often or very often: watery stools, >3 bowel movements each day, or urgency.

Table 8 Constipation symptoms. Population standardised prevalence rates (with 95% confidence intervals (CI)) and rate ratios (with 95% CI) for 2nd to 5th quintiles of socioeconomic class relative to 1st quintile

	Males		Females	
	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)	Standardised prevalence rate (95% CI)	Rate ratio (95% CI)
1st quintile	2.81 (1.17–4.45)	—	8.53 (5.82–11.25)	—
2nd quintile	4.03 (2.44–5.62)	1.43 (0.73–2.14)	14.06 (11.30–16.81)	1.65 (1.28–2.02)
3rd quintile	6.99 (4.73–9.24)	2.49 (1.82–3.15)	13.35 (10.78–15.92)	1.57 (1.19–1.94)
4th quintile	5.68 (4.01–7.35)	2.02 (1.37–2.67)	13.95 (11.82–16.07)	1.64 (1.28–1.99)
5th quintile	5.15 (3.39–6.91)	1.83 (1.16–2.51)	14.31 (11.73–16.89)	1.68 (1.31–2.04)

5th quintile is the most disadvantaged socioeconomic class.
Constipation symptoms: any of the following symptoms if reported to occur often or very often: <3 bowel movements each week, lumpy or hard stools, or anal blockage.

increased across social class to the 3rd quintile, and decreased thereafter. Rate ratios confirmed that the prevalence of bowel symptoms was significantly higher among men in the 3rd, 4th, and 5th quintiles compared with men in the 1st quintile (rate ratios 1.40, 1.38, and 1.33, respectively); similarly, the prevalence of constipation was significantly higher among men in the 3rd, 4th, and 5th quintiles compared with those in the 1st quintile (rate ratios 2.49, 2.02, and 1.83, respectively).

Females
Socioeconomic disadvantage was not strongly related to oesophageal symptoms (table 5) or diarrhoea symptoms (table 7) among females. For oesophageal symptoms, the rate ratios revealed trends that were in the predicted direction but all comparisons were non-significant. Women in the 4th quintile were significantly more likely to report diarrhoea than women in the 1st quintile (rate ratio 1.41). However, there were no significant differences for the remaining quintiles.

Prevalence rates for dysmotility symptoms (table 5) and constipation (table 8) varied by social class among women. For both symptoms, the general trend tended to be U shaped, with prevalence rates decreasing from the 2nd to the 3rd quintile, and increasing thereafter.

There was a clear trend for bowel symptoms to increase progressively with increasing socioeconomic disadvantage. The rate ratios were significant for all levels of social class, and ranged from 1.33 among women in the 2nd quintile to 1.48 in the 5th quintile.

Discussion
In this population based study, we found pronounced effects of socioeconomic status on the prevalence rate of a number of gastrointestinal symptoms. Progressive increases in socioeconomic disadvantage predicted higher rates of upper and lower gastrointestinal symptoms in both males and females. Also, the number of gastrointestinal symptoms reported was highly correlated with social class, with more symptoms reported among the less advantaged groups. This study also shows that gastrointestinal symptoms are a major problem in the community with about one third of the adult population reporting at least one troublesome gastrointestinal symptom occurring often or very often in the preceding three months.

The current study has a number of strengths. We used a validated composite measure of socioeconomic status and applied clinically relevant and validated criteria of troublesome gastrointestinal symptoms, consistent with the Rome II criteria.[29] [30] The validity study showed the self report questionnaire to provide a reliable classification of gastrointestinal symptom complexes compared with a physician interview. The large sample size provided both statistical precision and permitted detailed examination of variation in prevalence by socioeconomic classes. To our knowledge, this study is the first to explore in detail the association between troublesome gastrointestinal symptoms and social class in a population based sample.

Potential limitations of our study should be noted. It must be emphasised that these projections are based on a study with a 60% response rate. However, the three month prevalence rates of gastrointestinal symptoms in our study are comparable with the results of recent multinational studies,[10] [35] lending support to the methodology used to estimate symptom prevalence. More importantly, response rate varied with social class with the lowest response in the most disadvantaged group. Unfortunately, we do not know if response rate varied with the prevalence rates of gastrointestinal symptoms. Thus we cannot exclude the possibility that subjects in lower socioeconomic classes without troublesome gastrointestinal symptoms were less likely to respond. On the other hand, participants were not aware that the study was concerned with socioeconomic status and this may have minimised bias.

We imputed socioeconomic status to individuals on the basis of an index of disadvantage at the neighbourhood level rather than on the basis of data on individual subjects. Aggregate socioeconomic characteristics of the population of a defined geographical area can be used as a proxy for individual socioeconomic status although they are most usefully thought of as a measure of the socioeconomic characteristics of a person's local environment.[23] There is good evidence to support this method,[24] [36] [37] even though others have argued that it is unsafe to assume an individual's (as opposed to a group's) social class on the basis of his or her address.[38] Furthermore, this indirect method of assigning social class to individuals does not rely on a high response rate to individual questions concerning income, educational level, working status, and other sensitive pieces of information, which has been a limiting factor in other studies.[11]

Low social class has been linked to excess mortality from diseases of the digestive system in Australian[23] [39] [40] and overseas studies.[41] [42] This has been reported for all digestive diseases combined, and for individual digestive diseases—most notably stomach cancer[23] [43] and liver disease.[39] [40] [42] [44] However, most gastrointestinal symptoms in the general population are associated with functional gastrointestinal disorders rather than structural diseases, such as cancer or peptic ulcer, and the association of

social class with gastrointestinal symptom reporting has not been extensively studied. Considering that almost all other health related parameters vary with socioeconomic class, it is reasonable to assume such an association. In the present study that assumption was supported by the finding of a significant correlation between numbers of gastrointestinal symptoms reported and lower social class. Furthermore, there was a clear trend for some gastrointestinal symptoms to increase progressively with socioeconomic disadvantage, most notably for upper dysmotility symptoms in men. The differentials in symptom reporting were found for only some of the gastrointestinal symptoms, which suggests that the increased prevalence in the most disadvantaged areas was not the result of a systematic bias but rather a genuine effect related to differences in socioeconomic status. The surveyed area is relatively homogenous and it is likely that we would have found even more pronounced differentials if the study had included a wider range of socioeconomic levels.

The potential significance of this line of inquiry should not be underestimated. The social patterning of disease risk factors has been extensively documented (including physiological, behavioural, psychosocial, and socioenvironmental risk factors). Potential disease-risk relationships may be identified by comparisons of social trends for gastrointestinal symptoms with those for specific risk factors. Such relationships could then be investigated using more rigorous methodology.

Many risk factors and lifestyles that are relevant to gastrointestinal symptoms are unevenly distributed across social classes, with a higher prevalence of risk behaviour among the disadvantaged classes. These factors include smoking (both sexes), obesity (in women), physical inactivity (both sexes), and alcohol (in males).[23 24] Obesity has been shown to be an important risk factor for dyspepsia (broadly defined) in women, even more important than *H pylori*,[45] whereas smoking is an important risk factor for dyspepsia in both sexes.[45] Physical inactivity and dietary factors might be responsible for the higher prevalence rates of constipation symptoms found with increasing levels of disadvantage. Crowding could lead to stress and could dispose to infections. *H pylori* is related to crowding.[21] Diarrhoea predominant irritable bowel syndrome has been linked to bacterial gastroenteritis;[46 47] perhaps other functional gastrointestinal disorders are also sequelae of infectious diseases.

In summary, troublesome gastrointestinal symptoms are frequent in the community. Symptoms are linked to socioeconomic status with more symptoms reported by subjects in low socioeconomic classes. Low socioeconomic status should be considered a risk factor for both upper and lower gastrointestinal symptoms.

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