SOCIO-ECONOMIC FACTORS, LIFESTYLE AND PERSONAL ATTITUDES INFLUENCE REPORTS OF SBS-SYMPTOMS IN QUESTIONNAIRE SURVEYS

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ABSTRACT
Differences have been reported on indoor climate as perceived and SBS symptoms in different types of dwellings, but not been supported by technical measurements. To extend the study of the impact of non-physical factors on health, we have utilized data from a community health survey. Those who rented their flats in multi-family buildings reported a significantly higher prevalence of health problems than those who owned their flat or house. Socio-economic factors, lifestyle and personal attitudes highly influenced the health parameters, including the SBS symptoms. Therefore, when using questionnaires to assess the indoor climate, it is important to apply correct reference values in order to reduce the influence of such strong factors.

INTRODUCTION
In a nationwide survey conducted in 1991-1992 and covering the whole housing stock in Sweden, differences in perceived indoor climate and symptoms among people living in different types of dwellings were observed (Andersson et al. 1995). Those living in their own house reported fewer symptoms than those living in purchased flats and much less then those who rented their flats. These differences were not supported by technical measurements. On the contrary, the ventilation rates were lower and measurements of TVOC and formaldehyde showed more contaminated air in single-family houses compared with multi-family buildings. A questionnaire survey covering 10,000 dwellings in Stockholm and performed during the same time period, showed similar results (Engvall et al. 2000).

Numerous studies showing strong regional links between poor health (i.e. mortality, disability) and socio-economic background factors have been published (Kawachi et al. 1997, Rognerud et al. 1998, Marmot and Wilkinson 1999). The conclusion from these studies is that a strong segregation in living conditions affects the prevalence of reported health problems. In this study we try to quantify the impact of different factors on reported or registered health outcome.

INDEX TERMS
SBS symptoms, dwellings, socio-economic, lifestyle, social netword, attitudes.

MATERIAL AND METHODS
Area Of Study
The studied municipality, situated in central Sweden, had 117,112 inhabitants at the end of 1993. Among these 67,119 were in the ages between 20 and 64 years. The national registration in Sweden of 1990 showed that in the municipality there were 20,732 single-family houses (among them 2,031 farms) and 34,694 flats in 1,759 multi-family building. For administrative purposes the municipality was divided in 50 service areas. Official statistics, including data about demography, education, work situation, income, unemployment rates and rates of social allowances, were available for these areas.

Study Population Examined
A population-based community questionnaire survey was performed in late 1993. A random sample, stratified by age (20-34 years, 35-49 years and 50-64 years), sex and type of residential area (city, multi-family buildings (MB), single-family houses (SH), countryside and mixed) was selected among 67,119 persons in the ages between 20 and 64 years living in the 50 service areas (SA). In total, 4,500 questionnaires were distributed by mail and 3,145 of them were returned, representing a response rate of 70 %. The respons rate varied from 53 % for men in the ages between 35 and 49 years, living in MB to 87 % for women in the ages between 50 and 64 years in SH.

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Comparisons with official statistics showed somewhat higher frequency of drop-outs among immigrants, unemployed persons and blue-collar workers.

Questionnaire employed

The questionnaire had 79 questions covering questions about type of housing, socio-economic factors, lifestyle factors, attitudes towards life situation and health outcome. The definition of the indices used are presented in Table 1.

Statistical Methods

Correlations between different socio-economic factors in the ecological analyses were tested with Spearman´s rank correlation test using SA as unit of analysis. The individual-related analyses between different types of dwellings, socio-economic factors, lifestyle factors, attitude towards life situation and health were made through logistic regression models with age and sex as confounders. Two-sided tests were used in all analyses.

Table 1*. Definition of the indices used in this paper. SE-index is based on official data, the other indices are based on questions asked in the questionnaire survey.*

SBS symptoms	at least one symptom of "often" headache, fatigue, allergic symptoms or skin irritation (1,0)
Somatic symptoms	at least one symptom of "often" headache, dizziness, angina, stomach problems, nausea, bad appetite, muscular pain, skin irritation or allergic symptoms (1,0)
Mental symptoms	at least one symptom of "often" sleeping problems, fatigue, irritation, tension, worries or depression (1,0)
Allergic symptoms	"often" allergic problems (1,0)
Social support (emotional, practical support(2))	weak (0-1), median (2), strong (3)
Social network (family, work, friends, spare-time activities.(2))	weak (0-2), median (3), strong (4,5)
Lifestyle factors (smoking, alcohol, physical activity, food, weight)	(0, 1-2, > 2 negative factors)
Economic problems	(0, 1= problems to pay bills)
Attitudes towards life situation (loneliness, boredom, meningfulness, worries, belief in future, own control)	negative = at least one extreme alternative positive = no extrem alternative
Socio-economic status **(economic problems, week social support, week social network, unemployment, low education, immigrant status)**	weak (>1), median (1), strong (0)
Socio-economic index = SE-index (low education, unemployment, low income, social allowances, immigrant status)	mean rank order for the five factors ranked from 1 to 50 based on official data.

RESULTS

The relations between official health outcome (standardized health index) and socio-economic index are illustrated in figure 1. Residential areas with single-family houses have high ranks, while those with multi-family buildings have the lowest ranks together with the highest health indices. The correlations between the socio-economic factors (unemployment, low income, low education, immigrant status and social allowances) are highly significant ($p<0.01$) with the exception of the correlation between immigrant status and low education and low education and social allowances (no data shown).

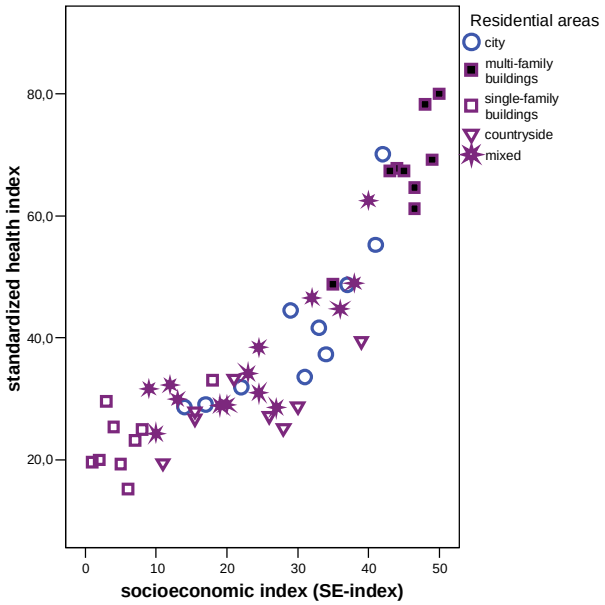

Figure 1. *The relation between the standardized health index and ranking of the socio-economic index (high ranking means better socio-economic situation) for the 50 service areas.*

Comparisons made between different types of dwellings show significant differences both in socio-economic and lifestyle conditions (Table 2). Those who lived in flats they owned did not separate significantly from those living in single-family houses with regard to education, occupation and economic conditions but they had a weaker social support and were more often single parents and immigrants. However, those living in rented flats fell out negatively on all factors.

This could also be observed in health indices except in those regarding allergic symptoms (Table 3). When controlling for the influence of age, sex, socio-economic and lifestyle factors and general attitude towards life situation all these differences disappeared, as shown in Table 4.

Table 2. *The different factors and their relation to type of dwelling are presented as odds ratios (OR), with single-family homes used as reference category. Logistic regression analyses are performed, with age and sex used as confounders.*

	Single-family house	Owned flats	Rented flats
smoker	1.00	1.33*	2.40***
> two neg. lifestyle factors	1.00	1.19	2.55***
low education	1.00	1.13	1.70***
blue-collar worker	1.00	1.17	2.10***
unemployed	1.00	1.15	2.05***
immigrant	1.00	2.64***	4.36***
single parent	1.00	3.01***	4.33***
economic problems	1.00	1.39	3.23***
weak social network	1.00	2.19***	4.59***
weak social support	1.00	1.81**	1.88***
negative attitude	1.00	1.34*	1.88***

*=p< 0.05; ** =p<0,01; *** =p<0,001;

Table 3. *The odds ratios (OR) for different health indices, with single-family houses used as reference category and age and sex as confounders.*

	Type of dwelling		
	Single-family house	Owned flats	Rented flats
SBS symptoms	1.00	1.38*	1.38**
Somatic symptoms	1.00	1.18	1.29**
Mental symptoms	1.00	1.01	1.56***
Allergic symptoms	1.00	1.32	1.36

Table 4. *Health problems related to different types of dwelling, using single-family house as reference. The results are presented as odds ratios and analysed with logistic regression technique controlling for socio-economic factors, lifestyle factors, attitudes, sex and age.*

	Type of dwelling		
	Single-family house	Owned flats	Rented flats
SBS symptoms	1.00	1.27 (0.95-1.70)	1.06 (0.86-1.32)
Somatic symptoms	1.00	1.09 (0.85-1.40)	0.99 (0.83-1.19)
Mental symptoms	1.00	0.82 (0.60-1.11)	1.03 (0.84-1.27)
Allergic symptoms	1.00	1.20 (0.72-2.01)	1.17 (0.80-1.70)

The reported SBS symptoms were associated with sex (women reported more symptoms), negative lifestyle factors, weak socio-economic status and a more negative attitude towards life situation, marked out in Table 5.

Table 5. *SBS symptoms and their relation to lifestyle factors, socio-economic factors, general attitude and type of dwelling, analysed with logistic regression methods. Both the risk estimates and their 95 percent confidence intervals are shown in the table.*

		Odds ratio (OR)	95 %- confidence interval
Sex	male	1.00	
	female	2.02***	(1.67-2.44)
Type of dwelling	singel-family homes	1.00	
	owned flats	1.27	(0.95-1.70)
	rented flats	1.06	(0.86-1.31)
Attitude	optimistic	1.00	
	pessimistic	2.65***	(2.18-3.21)
Lifestyle factors	0 negative factor	1.00	
	1-2 negative factors	1.23	(0.99-1.52)
	>2 negative factors	1.53**	(1.18-1.98)
Socio-economic status	strong	1.00	
	median	1.03	(0.81-1.30)
	weak	1.30*	(1.02-1.66)

* =p<0,05; ** =p<0,01; *** =p<0,001

DISCUSSION

The intention was to study the impact on health, specifically of those symptoms usually related to indoor climate problem. The data available were collected from a community health survey with no focus on indoor climate problems and the only "SBS symptoms" included were fatigue, headache, skin problems and allergic symptoms. In spite of this it was possible to show that the "SBS symptoms" differed between different types of housing the same way as described earlier (Andersson et al. 1995, Engvall et al. 2000). Anyhow, the impact of socio-economic factors, lifestyle and personal attitudes is even stronger, well worth attention in indoor climate studies. The best way to bring about this is to use valid reference data (Andersson 1998).

The response rate was 70 %, which is what can be expected from a population study carried out in Sweden. Young men living in rented flats, unemployed persons and immigrants showed a somewhat lower response rate. Probably a higher response rate in these groups would have strengthened the drawn conclusions.

CONCLUSION AND IMPLICATIONS

The difference in reported health effects (including SBS symptoms) in indoor climate investigations may partly be due to factors not related to the physical indoor climate. Therefore, it is important to use correct reference data to reduce the impact of these strong factors, when using questionnaires in assessing the indoor climate.

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