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Reported disease and psychological well-being in Swiss adults[1]

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The term "health" as used in biomedical health sciences and health care usually refers to absence of health (non-health) or to disease. There are good reasons for this practice, one being the availability of medically defined categories of non-health such as those included in the International Classification of Disease[1], another one the common use of well-established methods to classify disease with an acceptable degree of reliability – a necessary requirement for producing "hard data". Moreover, health is regarded as a goal or, as sociologists say, a value legitimising medical intervention (Legitimationswert). The medical task focuses on disease of all kind and at all stages[2]. From the medical perspective the argument makes sense that there are many diseases but only one health[3].

In social epidemiology, public health and health promotion, on the other hand, we have to deal with notions of health and disease defined by social groups or individuals using concepts such as health problems, impairment, psychological stress and well-being. Data are generally collected by interview or questionnaire and are often considered "soft" and therefore of relatively little use, although self-reported health may predict mortality[4], use of health services[5] and coping with chronic disease very well[6].

Social scientists studying general or global health, illness and sickness from an economic, social, cultural and psychological perspective have identified a relatively large number of health concepts shared by social groups in each society studied, in addition to medical diagnoses and professional problem descriptions adopted by lay people[7,8]. Psychosocial health concepts may be put into two major categories: a sociological dimension which we define as functional capacity, for example the ability to fulfill social roles, and a psychological dimension which most health researchers refer to as physical and psychosocial well-being[9,10].

This paper reports a socio-epidemiological study of two dimensions of general health, reported disease and psychological well-being. In a first part the prevalence of reported disease and psychological well-being as measured by empirically derived meta-indicators is analysed in relation to gender, age, level of education, place of living and region or canton. The second part presents a multivariate analysis of reported disease and psychological well-being with regard to a number of environmental, person-specific and behavioural factors. The overall aim of this study is to test two general socio-epidemiological hypotheses: that the distribution of self-reported disease and well-being in Swiss adults follows patterns known from other studies (e.g.[11]), and that interindividual differences on these health dimensions can be explained by a linear model including environmental, personal and behavioural factors.

Study design and methods

The data of this study were drawn from a survey conducted in 1988 as part of the Swiss Intercantonal Health Indicators Project (IGIP/PROMES)[12–14]. This project involved two mainly German-speaking cantons, Berne and Zurich, two French-speaking cantons, Geneva and Vaud, and the Italian-speaking canton Tessin. The aim of the survey was primarily methodological and policy-related; it also became a pilot study of the first national micro-census of health.

The design of the survey was guided by a comprehensive working model (Figure 1) which assumes that health results from, or reflects, the interaction of three groups of interrelated factors: the ecological and social environments (macro and micro), physical and psychological personal factors, and health-related lifestyle or behaviour characteristics, conceptualized as the active interaction of a person with his/her environment, and coping with internal demands.

Instruments and data collection

Standardized instruments were developed by a multi-lingual working group of experienced research workers and public health professionals. Special care was taken to ensure semantic equivalence of the German, French and Italian forms of interview and questionnaire. Instruments were pre-

[1] Paper presented at a symposium on "The Public Health Perspective of Social and Preventive Medicine", in celebration of the 20th anniversary of the Department of Social and Preventive Medicine, University of Berne, 25 June 1992 in Berne.

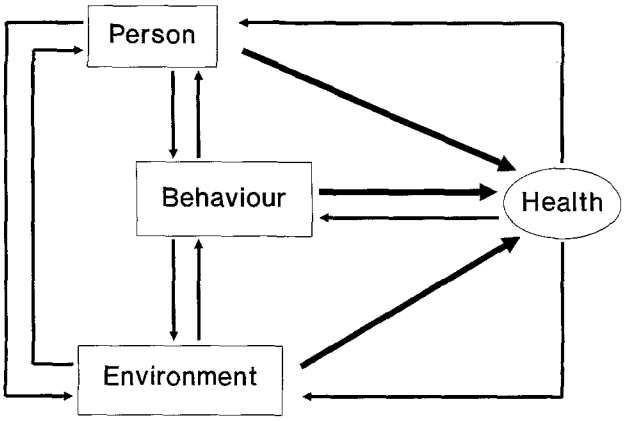

Fig. 1. A comprehensive working-model of health. Heavy lines indicate (postulated causal) relationships analyzed by general linear model.

tested in the field and finalised on the basis of pretest results.

In each of the five cantons random samples stratified by age (four groups of equal size aged 20–34, 35–49, 50–64, 65–74 years) were drawn aiming at 400 completed interviews and assuming a 40% non-response rate. Telephone interviews (average duration: 28 minutes) were conducted by a professional private institute. Subsequently a 20-page questionnaire was mailed by the Federal Office of Statistics. Slightly more than 400 interviews were carried out in each canton and response rates ranged from 65% to 75% with an average rate of 70% (Table 1). Between 64% and 80% of those interviewed returned a completed questionnaire (average: 72%, i.e. 50% based on the sample). Only the subset of the sample for which both interview data and questionnaire data were available was used in this study (study sample n = 1511). Because of over-sampling of people older than 64 relative to younger ones, and of inhabitants of smaller cantons relative to larger ones, application of weighting formulas with correction factors was necessary. Weighting factors were applied to calculate descriptive statistics representative of the population[13].

Indicators and data analysis

Data analysis was mainly performed using SAS on a VAX computer. To construct theoretically meaningful and comprehensive meta-indicators of health, principal components factor analysis was applied to 13 health indicators. After Varimax rotation, the overall factor patterns seemed to support our hypothesis of three dimensions of health; psychological health, physical health, social health or social functioning, and an additional dimension of psychosocial distress (Table 2). Factor 1 expresses psychological health measured by four positive and negative items of the Bradburn affective balance scale, Kunin faces scale, and Pearlin control scale[15,16]. Factor 2 expresses physical health measured by five scales: general well-being; reported chronic disease (number of chronic conditions like rheumatic disorders, allergy, hypertension, depression under medical treatment during the past year); social impairment (number of restrictions due to health problems with regard to hobbies, social activities and intimate relationships); physical complaints (index of intensity of pain or physical strain due to a disturbance like backache, headache, sleeping problems and fatigue during last four weeks), and functional limitations (number of days with functional limitation due to health problems). Factor 3 summarises three indicators of psychosocial distress (experience of psychological strain, negative and positive feelings during the last week, frequency of worries or dissatisfaction due to ill-health, financial problems, friends, family etc.). Factor 4 indicates lack of functional capacity or disability in reading, hearing, tasting, leaving the bed, dressing and eating.

The meta-indicator "Psychological Well-being" (Well-being) (14 items, Cronbach Alpha = 0.86) corresponds to Factor 1. The meta-indicator "Reported Disease" (Disease) combines two components of Factor 2: number of medically treated chronic conditions (14 items) and social impairment due to health problems (3 items). Each meta-indicator was calculated as an average of its components, the sign of which had been reversed if necessary and linearly transformed to give measures ranging from 0 to 10. Low values correspond to negative health and high values to positive health. The sample distribution of the meta-indicator Disease is markedly skewed to the left, with 40.6% of the sample scoring 10, a mean of 8.75 and a median of 9.17. The distribution of the meta-indicator Well-

Tab. 1. Unweighted sample size and response rates.

	Berne	Tessin	Vaud	Geneva	Zürich	All
Sample size	543	594	636	690	572	3035
Numbers of interviews	406	415	438	444	408	2111
Response rate (interview) (%)	75	70	69	64	71	70
Numbers of completed questionnaires	302	266	311	307	325	1511
Response rate (questionnaire) (% of interviews)	74	64	71	69	80	72
Response rate (questionnaire) (% of sample)	56	45	49	44	57	50

Tab. 2. Factor loadings of 13 health indicators.

	Factor 1	Factor 2	Factor 3	Factor 4
Kunin faces scale [a]	**0.72**	−0.22	−0.01	0.02
Pearlin control scale	**0.71**	−0.06	−0.33	−0.04
Bradburn, neg. Affect	**0.71**	−0.09	−0.34	−0.12
Bradburn, pos. Affect	**−0.74**	0.08	0.02	−0.02
General well-being	−0.17	*0.72*	0.00	−0.06
Chronic disease	−0.17	**0.70**	−0.04	0.02
Social impairments	−0.11	**0.64**	0.08	0.17
Physical complaints	−0.19	*0.64*	0.36	0.12
Function. limitations	0.08	*0.53*	0.09	0.01
Stress experience	0.04	0.03	*0.77*	−0.01
Mood during last week	0.25	−0.20	*−0.66*	−0.02
Life problems	−0.39	0.04	*0.65*	−0.04
Chronic physic. Disabil.	−0.03	0.14	−0.01	*0.97*

[a] Bold-face indicators were used to build meta-indicators 'Well-being' (factor 1) and 'Disease' (factor 2).

being is skewed to the left with a mean of 7.12 and a median of 7.33.

For the descriptive analysis (first part of study) both meta-indicators were dichotomized. The category "high level of Disease" includes individuals with more than one chronic condition under medical care and social impairment (values below 9.16). Psychological Well-being was dichotomized at the highest tertile (value of 7.92) dividing individuals with high and low levels of Psychological Well-being. For the multivariate analysis of individual scores of Disease and Well-being (possible range from 0 to 10) (second part of study) a general linear model (GLM) was chosen as the statistical method. This approach is certainly a rather crude one for at least two reasons: First, treating all environmental, personal and behavioural factors as equivalent independent variables ignores the functional hierarchy of, and the interdependency among, these variables. Second, the relationship between certain independent variables and the dependent variables may be curvilinear rather than linear. Despite these obvious limitations application of the GLM was considered as a reasonable compromise, because very little is known about the social epidemiology and the determinants of self-reported disease and psychological well-being.

The multivariate analysis involved two steps (see [17]). First, a model was fitted to a random half (modelling sub-sample, n = 755) of the study sample. Model fitting started with 29 (Disease) or 31 (Well-being) independent variables (Table 3). All independent variables were dichotomized or, in a few cases, divided into 3 or 4 categories (e.g. 4 age groups, 3 levels of employment status, education and physical activity). Although Well-being was conceived to measure habitual rather than acute Well-being [10] and therefore as a relatively stable aspect of psychological health, this variable was nevertheless thought to be subject to faster change than Disease. Therefore, only a unidirectional causal link between Disease (cause) and Well-being (effect) was assumed and not vice versa, and Disease was included in the GLM for psychological Well-being but Well-being was not included in the Disease model. For similar reasons, the variable "physical complaints" was included in the Well-being model and the variable psychosocial distress (Factor 3) was neither included in the Disease model nor in the Well-being model. With regard to the other independent variables the initial models for Disease and Well-being were identical. For each dependent variable three distinct models were fitted: one for the whole modelling sub-sample (n = 755), one for women only (n = 424) and one for men only (n = 331).

In a step-wise procedure, statistically insignificant variables ($p \geq 0.10$) were eliminated unless a variable was either regarded as indispensable from a theoretical point of view (like gender and age) or unless it was the last remaining representative of a particular "variable family" (sub-categories of environment, e.g. macro-context, micro-context, social status, or of behaviour, e.g. coping behaviour, physical activities, nutrition behaviour) (Table 3). In a second step the final models were validated on the other random half of the total study sample (validation sub-sample, n = 756) and the female (n = 400) and male (n = 356) subsamples, respectively.

Results

The prevalence of Disease and Well-being

This part addresses the prevalence of Disease and Well-being in several important population groups. Prevalence of chronic Disease is measured as the proportion (per cent) of individuals reporting more than one chronic condition under medical care

Tab. 3. Families of independent variables as derived from the working model.

	Variable family		Variables
Environment	Macro context		Canton, language, place of residence
	Micro context	Ecological	Pollution at work, pollution at home
		Social	Number of living partners, help from neighbours, intimate person, loneliness, marital status, social contacts during usual daily activities
	Social status		Occupational grade, level of education, housing tenure, financial problems, employment status
Person	General/physical characteristics		**Age**[a], **Gender**[b], **Body mass index**[c]
	Attitudes/competences		Health orientation, health-related competence, knowledge of cholesterol, urge for health information
Behavior	Coping behaviour		**Smoking**[c], daily alcohol consumption
	Physical activity		Exercise, physical activity in leisure time, doing something for fitness
	Nutrition behaviour		Nutrition orientation
Health[d]			Disease, physical complaints

[a] Bold-face variables were retained regardless of their statistical significance.
[b] Only in models for men *and* women.
[c] Only in the Disease models.
[d] Only in the Well-being models.

during the last year and/or at least one social impairment (see methods section). Whereas prevalence of Disease refers to a period of roughly one year, prevalence of psychological Well-being is defined as point prevalence and refers to a short time interval, i.e. around the time of data collection. Prevalence of Well-being is measured as the proportion (per cent) of individuals falling into the upper tertile of a composite score on four short scales of psychological health.

A descriptive analysis of the prevalence of Disease and Well-being was conducted to explore the validity of general hypotheses about the social distribution of these measures derived from previous research[11,18]. Thus it was expected that the prevalence of Disease would tend to be higher in women than in men; that prevalence of Disease would be linearly related to age and inversely related to level of education; and that it would differ with regard to place of residence and canton, although it did not seem possible to formulate any specific hypotheses about the nature of area differences and regional differences. It was further expected that more men than women would report Well-being; that prevalence of Well-being would be inversely associated with age and positively associated with level of education, and that these associations would be weaker than the respective links with Disease, and that places and cantons would tend to differ systematically with regard to prevalence of Well-being.

Gender

Overall 31.6% of the study sample were estimated to fall into the Disease category and 35.4% into the Well-being category. (This latter proportion slightly exceeds the tertile because the categories "positive" and "negative" Well-being were defined on the basis of unweighted data.) As expected, prevalence of Disease was higher in women (33.5%) than in men (29.0%). However, contrary to our hypothesis, Well-being was more prevalent among women (38.7%) than among men (33.6%) (Figure 2).

Age

As expected, a linear age trend of Disease was found both in men and in women (Figure 3). Prevalence in men ranged from 18.6% in the 20–34 year group to 53.2% in the 65–74 year group, and in women from 18.5% to 60.1%. Thus the relative risk of Disease in the oldest group as compared to the youngest group is about 3. Contrary to our hypothesis, there was no systematic age trend of Well-being in men (Figure 4); prevalence was highest among the 35–

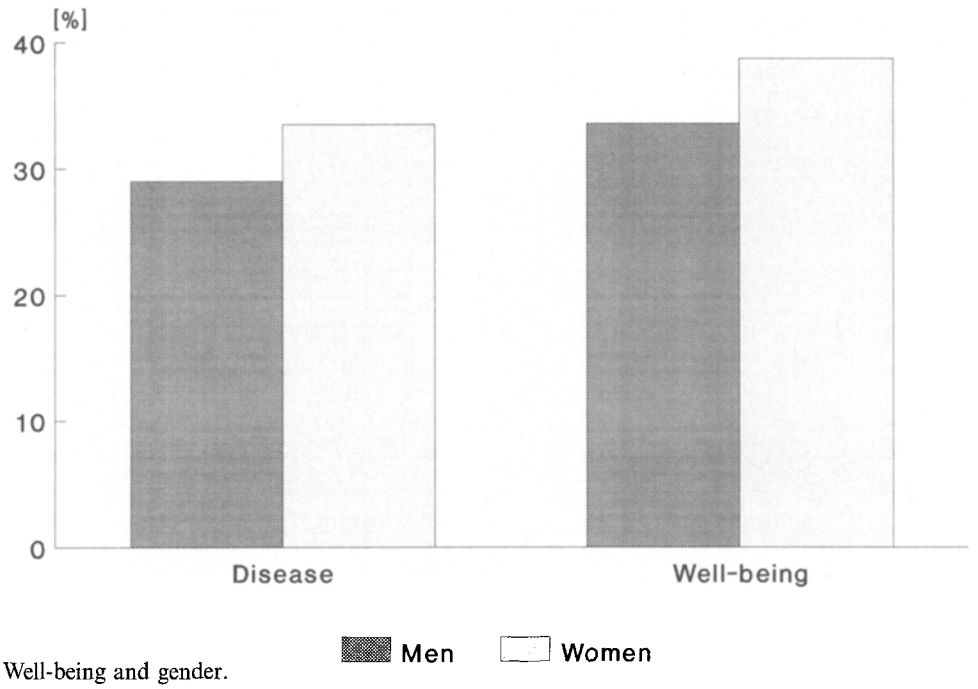

Fig. 2. Disease, Well-being and gender.

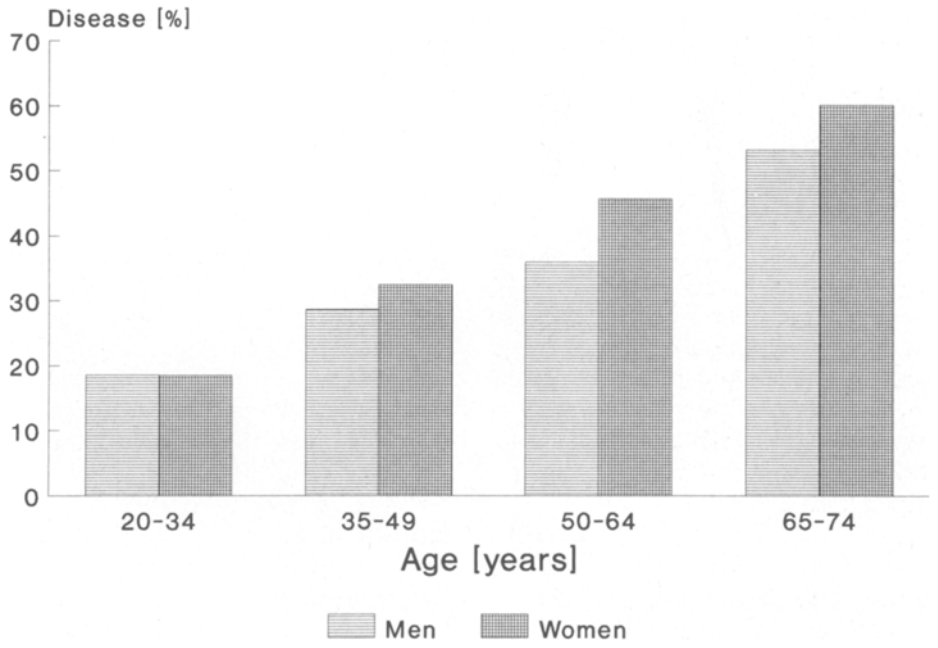

Fig. 3. Disease and age.

49 year old (35.9%) and lowest among the 50–64 year old (30.9%). In women a U-shaped age trend was found, with the highest prevalence of Well-being in the youngest group (47.1%) and a somewhat lower value (39.7%) in the oldest group. It is perhaps interesting to note that both in men (31.8%) and women (30.1%) the lowest prevalence of Well-being was found in the 50–54 year-olds.

Education

As in previous analyses[13, 14] level of education was used as an indicator of social status. Three levels were distinguished: basic level (primary school only, no apprenticeship), medium level (secondary school, apprenticeship/vocational training) and high level (professional school, university). A finding which was somewhat different from what we had expected was a curvilinear relationship between level of education and prevalence of Disease in men (43.7%, 25.7%, 29.9%) (Figure 5). However, agreement with our hypothesis there was an in inverse linear association in women (40.8%, 34.1%, 24.7%). Whereas at the medium level of education Disease was more prevalent among women than among men, a reverse relation-

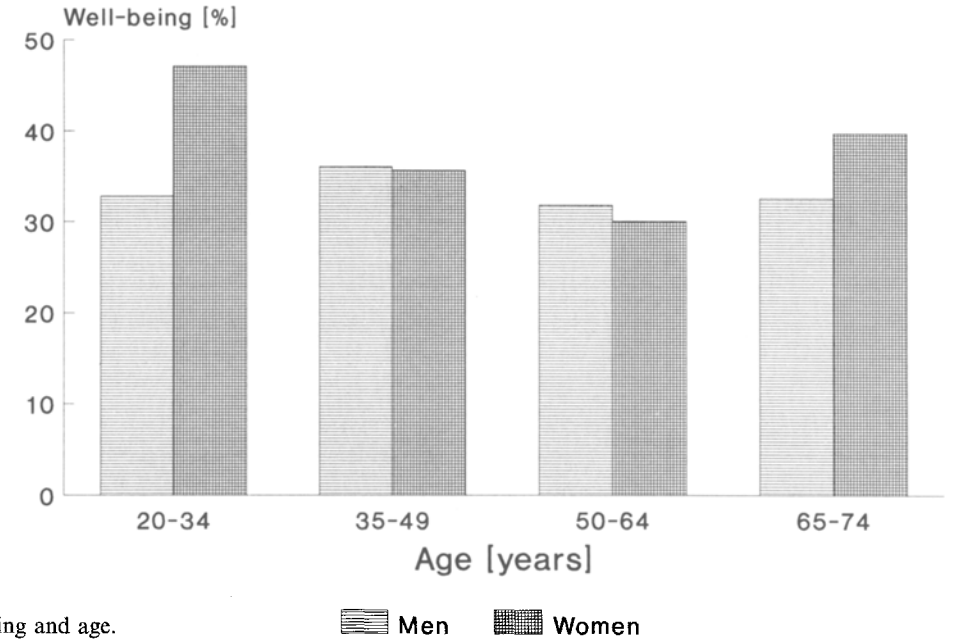

Fig. 4. Well-being and age.

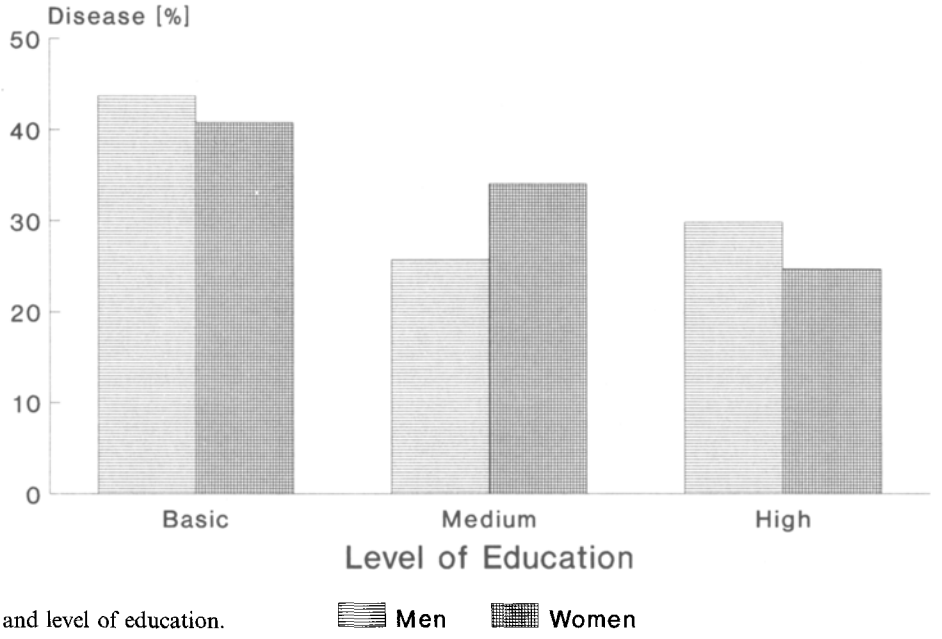

Fig. 5. Disease and level of education.

ship at the basic and high levels was observed. Overall, prevalence of disease was substantially higher at basic level than at medium and high levels of education. Contrary to our hypothesis, prevalence of Well-being was inversely related to level of education in men (40.4%, 34.6%. 30.0%) (Figure 6). More or less in accordance with what we had expected, a direct relationship between Well-being and education in women was found (32.6%, 40.2%, 39.1%).

Place

According to size of the population places of residence were divided into three categories: cities, towns and villages (see Appendix). As shown in Figure 7, there was only a weak association between size of place of residence and prevalence of Disease in men, declining from 33.9% in cities to 27.0% in villages. In women a much stronger association was found, with the prevalence of Disease declining from 44.0% to 29.1%. Whereas in villages and towns gender differences were small, in cities Disease was more prevalent in women than in men. Different gender patterns were found for the distribution of Well-being. In men, prevalence of Well-being follows a U-shaped distribution with about equally high frequencies in cities and villages (38.2%, 35.3%) and low frequency in towns (27.2%) (Figure 8). However, in women, preva-

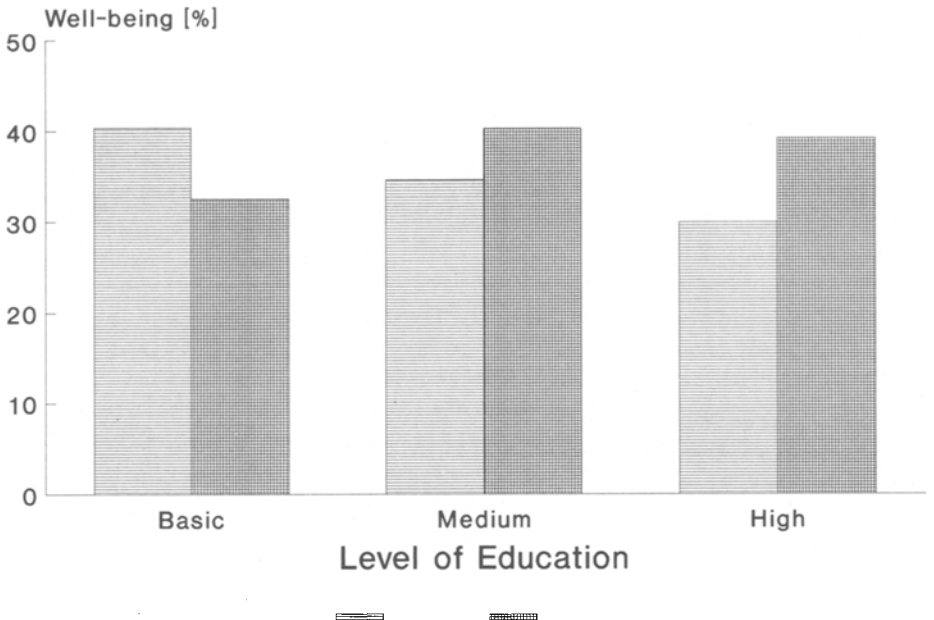

Fig. 6. Well-being and level of education.

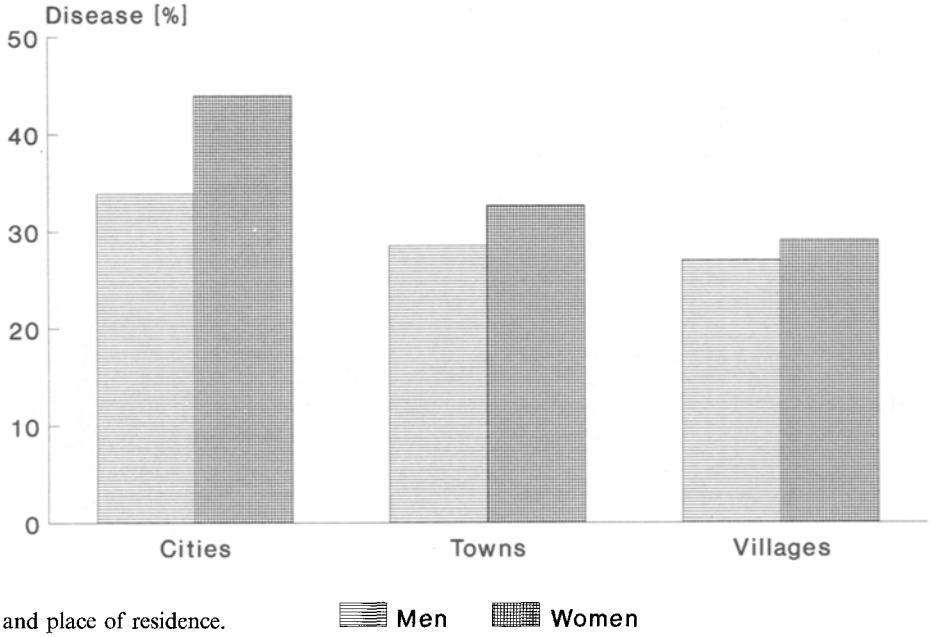

Fig. 7. Disease and place of residence.

lence of Well-being was lowest in cities (34.5%) and about equally high in towns and villages (39.7%, 40.0%).

Canton

As hypothesized, Disease patterns differed markedly in the five cantons (Figure 9). In men, prevalence of Disease was lowest in the canton of Berne (23.6%), relatively low in Zurich and Vaud (29.3%, 28.3%) and relatively high in Tessin and Geneva (35.8%, 37.5%). In women, prevalence of Disease was relatively high in Zurich, Berne, Tessin and Geneva (ranging from 33.4% to 37.2%) and relatively low in Vaud (27.2%). The expected gender differences were observed only in the German-speaking cantons. In the Italian-speaking and French-speaking cantons prevalence of Disease was about the same in men and women.

Overall prevalence of Well-being was relatively high in the German-speaking cantons (Figure 10). In men prevalence of Well-being was relatively high in Zurich, Berne and Vaud (ranging from 35.0% to 36.8%), lower in Geneva (26.5%) and low in Tessin (20.2%). In women high prevalence of Well-being was found in Zurich and Berne (43.3%, 43.9%), lower levels in Vaud and Geneva (33.6%, 33.5%)

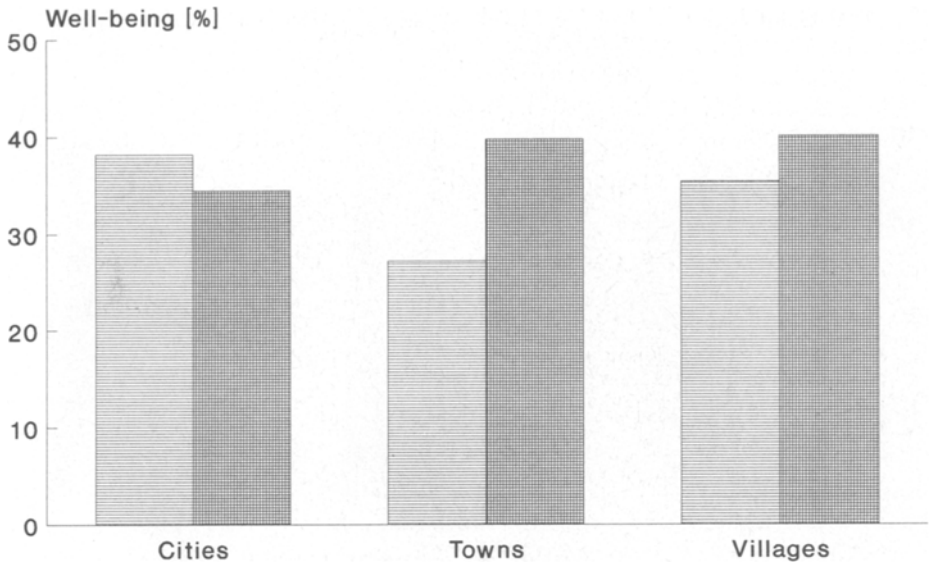

Fig. 8. Well-being and place of residence.

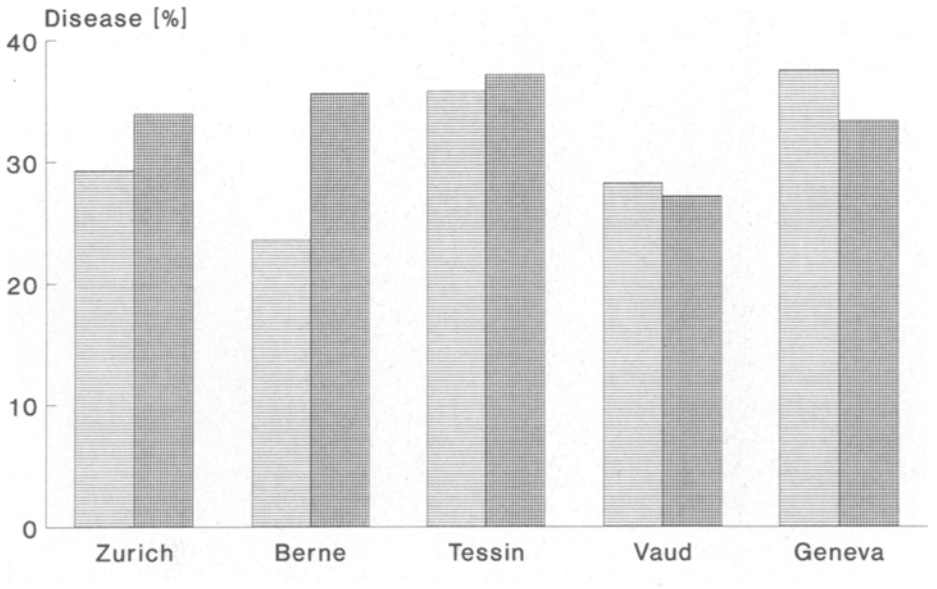

Fig. 9. Disease in five cantons.

and again a very low level in Tessin (18.0%). Whereas in both German-speaking cantons and in Geneva women reported Well-being more frequently than men, a reverse relationship was observed in Tessin and Vaud.

Multivariate analysis of Disease and Well-being

The second part of this study explores to what extent environmental, personal, behavioural and health-related factors independently explain inter-individual differences in Disease and Well-being.
The working model of this study (Figure 1) distinguishes three categories of independent or explanatory factors, each divided into groups or "families" of still more specific factors (Table 3). Thus we define four groups of environmental factors: macro context, ecological and social micro contexts and social status; two groups of personal factors: general/physical characteristics and attitudes/competencies; three groups of behavioural factors: coping behaviour, physical activity and nutrition behaviour; and in the Well-being model two additional health-related variables: Disease and physical complaints.
On the basis of accumulated epidemiological and psychosocial health research (e.g.[19,20]) we hypothesized that in the validation study for each variable family at least one sub-factor will emerge as

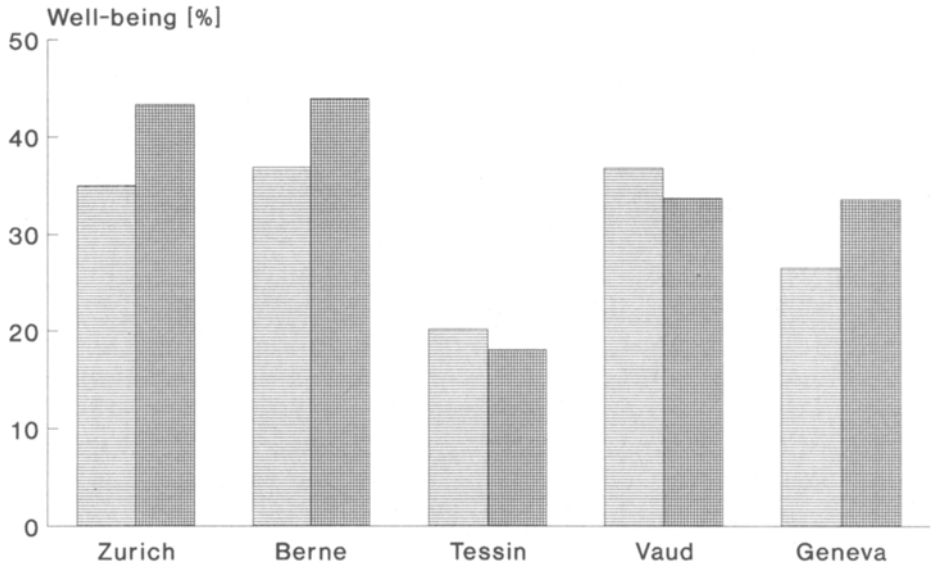

Fig. 10. Well-being in five cantons.

a statistically significant predictor of Disease and Well-being, for example, in the variable family "social status" at least one of the following: occupation, level of education, housing tenure, financial problems, employment status. A further hypothesis was that inter-individual differences in men and women are explained by different patterns of independent variables.

Disease

Model-fitting to a random half of the study sample reduced the original model of 29 independent variables to an analysis model with 17 variables, 9 of which were statistically significant, accounting for 20.1% of the variance (R-square = 0.20). When this model was applied to the validation sample the proportion of explained variance dropped to 17.0% (Table 4). Three context factors (one ecological and two social) were found to be statistically significant: pollution at home, number of living-partners, and loneliness. Employment status was marginally significant. Among personal factors, age was highly significant and body mass index was marginally significant. Contrary to our hypothesis, no behavioural factor reached statistical significance. Estimation of main effects (Table 5) revealed the relative contributions to the level of Disease of each statistically significant factor. Thus a hypothetical person who is living in a polluted environment and who has no living-partners, feels lonely, is part-time employed, has an elevated body mass index and who is older is likely to experience a high level of Disease. Age accounts for the largest proportion of variance, followed by number of living-partners and pollution at home. It is interesting to note that in contrast to our hypothesis no further environmental factors (macro context, social status), no further personal factors (gender, health-related attitudes and competencies) and, as already indicated, no behavioural factors (coping patterns such as smoking and alcohol consumption, physical activity and nutrition behaviour) were found to make an independent contribution to the explanation of Disease.

As hypothesized, in men and women different patterns of independent factors did account for inter-individual differences in Disease (Table 4). In women two statistically significant personal factors (age, body mass index) and a marginally significant behavioural factor (nutrition orientation) were found, but no significant context factors. In men two significant context factors (pollution at home, employment status) and one marginally significant

Tab. 4. Main effects (Type III sum of squares) in the Disease models.

	All	Women	Men
	$R^2=0.17$	$R^2=0.14$	$R^2=0.22$
Context:			
Pollution at home	14.61**[a]		11.68*
Number of liv. partners	12.29*		
Loneliness	9.39*		5.18+
Employment status	11.20+		9.77**
Person:			
Age	51.74***	25.05*	28,45**
Body mass index	6.34+	10.80*	
Behaviour:			
Nutrition orient.		12.55+	

[a] +p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

Tab. 5. Estimates of main effects in the Disease models.

Intercept		All	Women	Men
		8.53***[a]	7.77***	9.77***
Context:				
Pollution at home	no	0.32**		0.41*
	yes	0.00		0.00
Number of living partners	none	−0.55*		
	one	0.05		
	> one	0.00		
Loneliness	yes	−0.28*		−0.31+
	no	0.00		0.00
Employment status	full-time	0.20		−0.02
	part-time	−0.24		−1.38**
	unemployed	0.00		0.00
Person:				
Age	20–34	1.21***	0.94**	1.14**
	35–49	0.98***	0.75**	0.84*
	50–64	0.73**	0.72*	0.29
	65–74	0.00	0.00	0.00
Body mass index	normal	0.23+	0.44*	
	elevated	0.00	0.00	
Behaviour:				
Nutrition orientation	low		−0.06	
	medium		0.40*	
	high		0.00	

[a] +p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

context factor (loneliness) as well as age were observed to be statistically significant. The model for men explained a markedly higher proportion of variance than the model for women (R-square = 0.22 versus 0.14). In the analysis of estimated main effects (Table 5), both in men and women, age emerged as a very powerful explanatory variable. Whereas in women elevated body mass index and low as well as high nutrition orientation were shown to be equally important variables, in men part-time employment was found to contribute more to the explanation of Disease than age, and far more than pollution at home.

Well-being

In the first step of model-fitting the original set of 31 independent variables was reduced to 14 independent variables; 12 were statistically significant. Application of the analysis model to the validation sub-sample reduced the proportion of explained variance from 26.1% to 22.5% (Table 6). Seven variables remained statistically significant: three context factors (canton, loneliness and level of education with marginal significance), two personal factors (health orientation and health-related competence), one behavioural factor (physical activity) and two health-related factors (physical complaints, Disease). Contrary to our hypothesis, no significant factors were found in three variable families: ecological context, general physical characteristics and coping behaviour. As shown by estimates of the main effects (Table 7) the relative contribution of significant variables to the variance of Well-being was particularly large for health-related competence, living in Tessin, experience of loneliness and physical complaints.

Tab. 6. Main effects (Type III sum of squares) in the Well-being models.

	All	Women	Men
	$R^2=0.23$	$R^2=0.20$	$R^2=0.31$
Context:			
Canton	22.10**[a]	33.02**	
Number of liv. partners			8.69*
Marital status			9.33+
Loneliness	24.80***	25.58***	
Level of education	7.90+		10.69*
Person:			
Health orientation	15.81**		
Health-rel. competence	47.66***	13.33**	48.35***
Behaviour:			
Physical activity	10.23*		8.67*
Health:			
Disease	9.26*	5.53+	13.60**
Physical complaints	21.98***	11.16*	14.53**

[a] +p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

Tab. 7. Estimates of main effects in the Well-being models.

Intercept		All	Women	Men
		7.83***[a]	7.21***	7.89***
Context:				
Canton	Zürich	−0.15	−0.05	
	Berne	0.10	0.44+	
	Tessin	−0.49**	−0.63*	
	Vaud	−0.08	0.17	
	Geneva	0.00	0.00	
Number of living partners	none			0.71*
	one			0.28
	> =two			0.00
Marital status	single			−0.78
	married			−0.19
	divorced/sep.			−0.45
	widowed			0.00
Loneliness	yes	−0.46***	−0.62***	
	no	0.00	0.00	
Level of education	basic	0.32+		0.68**
	medium	−0.04		0.10
	high	0.00		0.00
Person:				
Health orientation	passive	−0.33**		
	active	0.00		
Health-rel. competence	low	−0.60***	−0.43**	−0.92***
	high	0.00	0.00	0.00
Behaviour:				
Physical activity	low	−0.36*		−0.43+
	medium	−0.07		−0.03
	high	0.00		0.00
Health:				
Disease	yes	−0.29*	−0.30+	−0.52**
	no	0.00	0.00	0.00
Physical complaints	no	0.46***	0.41*	0.64**
	yes	0.00	0.00	0.00

[a] +p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

In accordance with our hypothesis, differences in Well-being in women and men were explained by different patterns of statistically significant variables (Table 6). Canton and loneliness were shown to be woman-specific factors, number of living-partners, marital status (marginally significant), level of education and physical activity turned out to be man-specific factors. The model for men explained considerably more variance than the model for women (R-square = 0.31 versus 0.20). In the women's model the largest main effects were estimated for canton and loneliness, followed by health competence and physical complaints; in the men's model the largest estimate was health competence, followed by marital status and number of living partners.

Discussion and conclusion

In Switzerland as well as in other countries, so far a relatively complete picture of the health situation of the population can be drawn only for overall and disease-specific mortality or life expectancy. More or less consistent demographic, social and regional mortality differentials were found, for example, in Switzerland and the United Kingdom (e.g.[20,21]). However, only very little evidence exists about the prevalence of medical morbidity, self-reported disease and well-being[11,18,22]. As stated in the introduction the aims of this study were two-fold: first, to explore demographic, social and regional varitions in self-reported Disease and psychological Well-being in a random sample of Swiss adults and second, to analyse some of the possible multivariate determinants of Disease and Well-being.

Demographic, social and regional variations in Disease and Well-being

In accordance with these aims and the additional objective of utilizing as much information as possible, two relatively global indicators of Disease

and Well-being were defined on the basis of principle component factor analysis. Assuming that long-standing physical health problems show a somatic and a social dimension a meta-indicator Disease was constructed to include two variables, chronic disease under medical treatment and social impairment due to health problems. They were found to be elements of a key dimension of overall health labelled "physical health". Following extensive research in health psychology [10] it was assumed that the meta-indicator psychological Well-being measures another key dimension of overall health. To calculate prevalences of "high" levels of Disease and Well-being, both indicators were arbitrarily dichotomized at about the upper tertile. Since no prior knowledge about these novel indicators was available, hypotheses about the prevalence of Disease and Well-being were formulated on the basis of analogies with results from other studies [18, 22] obtained by using similar indicators.

Overall, the results tend to support our hypotheses about the demographic, social and regional variation of prevalence of Disease. As expected, prevalence of Disease was higher in women than in men, it was linearly related to age, and – with a slight deviation – was inversely related to level of education. Furthermore prevalence of Disease was directly related to the size of the place of residence, and varied among cantons although not in an obvious way. No or reversed gender differentials were observed at the lowest and highest educational levels, and also in French-speaking and Italian-speaking cantons. These findings cannot be explained easily and may at least in part be due to methodological features of the meta-indicator Disease. Perhaps use of specific indicators of chronic disease and social impairment would have led to more consistent results with regard to social and regional Disease differentials.

In contrast with these results the findings on the prevalence of Well-being do not support our hypotheses about the association between demographic, social and regional factors and this meta-indicator. Thus, different from our hypothesis and from research on psychosocial symptoms [18], Well-being was somewhat more prevalent in women than in men, and there was not the expected age gradient; rather there was a relatively flat distribution in men and a U-shaped distribution in women. This finding has been reported in other studies as well [23]. Quite surprisingly, we found almost opposite patterns in men and women of the association between prevalence of Well-being and both education and place of residence. In men at high educational levels prevalence of Well-being was low, and in men living in cities it was high, whereas in women with medium and high levels of education prevalence of Well-being was high and in women living in cities it was low. Striking differences in the prevalence of Well-being were observed between German-speaking and French-speaking as well as Italian-speaking cantons, in addition to opposite patterns for men and women. Although methodological reasons accounting for these rather unexpected results cannot be ruled out, particularly for the observed differences between cantons, there tend to be systematic social status and gender differentials in Well-being. They may be attributable to differences in health-related social demands and resources as well as to differences in thresholds for perceiving psychological problems. Thus, women in middle age and in lower social status groups as well as women living in cities may experience more distress and receive less social support than younger and older women living in towns and villages. Men at higher educational levels may have less close social ties and lower thresholds for psychological problems and hence feel less well than men at lower educational levels.

Multiple determinants of Disease and Well-being

As a preliminary analysis of possible environmental, personal and behavioural determinants of Disease and Well-being a general linear model (GLM) was developed and validated by applying it to an independent sub-sample of the data set. As pointed out in the Methods section the assumptions of this model are not quite realistic. Independent procedures of model-fitting and validation were, however, assumed to safeguard the findings against this shortcoming. Nevertheless, the results about possible determinants of Disease and Well-being must be interpreted cautiously.

As to the proportion of variance accounted for, the GLM fits the Well-being data markedly better than the Disease data, and the models developed for men show a much better fit than the models developed for women. These findings are difficult to explain. Two methodological features are, however, worth mentioning. In case of Well-being two more independent variables (Disease and physical complaints) were included and more methods variance may have been accounted for (a psychological variable explained by psychosocial factors). With the exception of two social context factors (number of living-partners and loneliness), in the total validation sub-sample entirely distinct sets of independent variables were found to account for inter-individual differences in Disease and Well-being. From the perspective of interdisciplinary health research it seems plausible that more physical factors (age, body mass, nutrition behaviour) explain Disease and that more psychosocial factors explain Well-being. Similarly, different sets of independent variables explain inter-individual differences in Disease and Well-being in women and men. The Disease models for women and men share only the personal factor "age", and the Well-being

models for women and men share only the personal factor "health-related competence" and the general health factors "physical complaints" and "Disease". Thus the multivariate analyses tended to support our hypotheses that a GLM consisting of families of environmental, personal and behavioural factors explains inter-individual differences in Disease and Well-being, and that different sets of such factors explain the variation in Disease and Well-being in women and men.
Given the novelty of the health indicators used, the limitations of the data set and the shortcomings of the statistical methods employed, only preliminary conclusions can be drawn from this study. First, self-reported Disease and psychological Well-being seem to represent distinct and unique dimensions of global health. Second, the distributions of prevalence of Disease and prevalence of Well-being differ with regard to age, gender, level of education, size of place of living and region. Third, inter-individual differences in Disease and Well-being in the total population as well as in men and women can be accounted for by distinct sets of environmental, personal and behavioural factors.
It will be a challenge for further research to improve and validate indicators of self-reported health and ill-health, and to explain inter-individual, social and regional differences by using suitable complex models derived from relevant health theory (e.g. [9]). Work along these lines will help to establish a social epidemiology of perceived ill-health and well-being, to guide health promotion and health care by identifying health needs and health problems, and to build more valid theoretical models and conceptual tools as prerequisites of a better interpretation of demographic, social and regional health differences in a multicultural society.

Summary

In Switzerland, and in many other countries as well, the distribution of morbidity and perceived health in the general population and their determining factors have not been systematically studied so far. This article reports an exploratory study of prevalence of two complex health indicators, long-standing disease (Disease) and psychological well-being (Well-being) and of their environmental, person-specific and behavioural determinants. Data from a health survey conducted in five cantons and three language regions as part of the Swiss Intercantonal Health Indicators Project were used. Whereas distributions of prevalence of Disease according to gender, age, level of education and place of living confirm results of other studies, unexpected prevalence patterns were found for Well-being, especially with regard to gender differences. Multivariate analyses by general linear models (independent sub-samples of the study population were used to develop and validate models) showed different sets of environmental, person-specific and behavioural factors to explain inter-individual differences of Disease and Well-being, both in the total validation sample and in sub-samples of women and men. The results are discussed with regard to implications for socio-epidemiological health research.

Résumé

Maladies chroniques et bien-être psychologique: Enquête auprès de la population adulte suisse
En Suisse, comme dans beaucoup d'autres pays, la morbidité et le bien-être psychologique de la population générale n'ont presque pas été étudiés jusqu'à présent. Dans ce rapport, les résultats d'une étude exploratoire sur deux indicateurs complexes de santé, maladie chronique (Disease) et bien-être psychologique (Well-being) et sur les facteurs de l'environnement, de la personnalité et du comportement qui influencent ces deux indicateurs sont présentés. Cette étude faisait part du projet intercantonal sur les indicateurs de santé (IGIP-PROMES) et se base sur les données tirées d'une enquête auprès des populations de cinq cantons et trois régions linguistique de la Suisse. Tandis que la prévalence de l'indicateur «maladie» par sexe, age, degré de formation et dimension du lieu de résidence était conforme aux résultats d'autres études, des distributions inattendues de la prévalence de «bien-être psychologique», notamment des différences entre hommes et femmes ont été trouvées. Une analyse des différences entre individue de «maladie» et «bien-être» au moyen d'un modèle linéaire généralisi – le développement et l'évaluation duquel ont été faits à l'aide de deux échantillons d'occasion indépendents – a montré que des constellations spécifiques constituées de facteurs de l'environnement, de la personnalité et du comportement, peuvent expliquer ces différences, soit dans l'échantillon d'évaluation totale, soit dans les échantillons partiels de femmes et d'hommes. Ces résultats sont discutés par rapport à l'évolution de la recherche socio-épidémiologique.

Zusammenfassung

Chronische Krankheit und psychisches Wohlbefinden: Eine Studie der erwachsenen Bevölkerung in der Schweiz
Wie in zahlreichen anderen Ländern so sind bisher in der Schweiz die Verteilung und die Determinanten von Morbidität und wahrgenommener Gesundheit in der Gesamtbevölkerung nicht systematisch untersucht worden. Die vorliegende Arbeit berichtet über eine explorative Studie über die Prävalenz zweier komplexer Gesundheitsindikatoren, länger

andauernde Krankheit (Disease) und psychisches Wohlbefinden (Well-being), und über deren jeweilige umweltbedingte, personale und verhaltensbezogene Einflußfaktoren. Grundlage dafür waren Daten, die in einer Bevölkerungsbefragung in 5 Kantonen und 3 Sprachregionen im Rahmen des Interkantonalen Gesundheitsindikatorenprojekts (IGIP-PROMES) erhoben wurden. Während die Verteilung der Prävalenz von Krankheit nach Geschlecht, Alter, Bildungsstatus und Wohnortgrösse den Ergebnissen anderer Studien entspricht, ergaben sich bei der Prävalenz von Wohlbefinden unerwartete Verteilungsmuster, insbesondere Unterschiede zwischen Frauen und Männern. Eine Analyse interindividueller Unterschiede von Krankheit und Wohlbefinden mit Hilfe eines allgemeinen linearen Modells (Modellentwicklung und Validierung an unabhängigen Teilstichproben) zeigte, dass diese durch jeweils spezifische Konstellationen von Umwelt-, Personen- und Verhaltensfaktoren erklärt werden können, sowohl in der gesamten Validierungsstichprobe als auch in den Teilstichproben für Frauen und Männer. Die Ergebnisse der Studie werden in Hinblick auf die Weiterentwicklung der sozialepidemiologischen Gesundheitsforschung diskutiert.

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Appendix

Items and Indices
The items were translated by the authors from German into English. The abbreviation 'I' refers to item from interview, 'Q' refers to item from questionnaire. All items or indices included in the final models are described below.

Place of residence:
Defined by postal code. 'City': place of residence with population over or equal to 100000; there are no 'cities' in Tessin. 'Town': population smaller than 100000 and over or equal to 10000. Village: population less than 10000.

Number of living-partners:
"How many people are living in your household?" (I) Answer categories: "living alone"; "living with one person"; "living with two persons"; "living with three persons"; "living with four persons"; "living with five persons". For data analysis three categories were defined: "living alone", "living with one person", and "living with more than one person".

Help from neighbours:
"How many people in your neighbourhood would you ask for help (i.e. to do you a favour or to lend you something)?" (I) The four answer categories were dichotomized into 'no one' and 'at least one'.

Loneliness:
"Do you sometimes miss such a person?" (referring to preceding question: "Are there really close persons with whom you can talk about very personal problems?") (I) Yes/No.

Level of education:
'Basic': compulsory education only. 'Medium': secondary school, vocational school. 'High': gymnasium, professional and technical school, university (I).

Pollution at home:
"When you are at home, are you regularly or frequently bothered by nuisances like: traffic noise, noise from an industrial plant, noise caused by people or children not belonging to your household, exhaust fumes from traffic, industry or other sources? (I) This item was dichotomized into the categories 'no' and 'yes, at least one disturbance'.

Employment status:
"How is your employment status: full-time, part-time or not employed?" (I) (three categories).

Health orientation:
The index was constructed by using two items: "I cannot afford to be ill." (Q) "Sometimes one has to get sick in order to relax." (Q) The four answer categories ranged from "I fully agree (1)" to "I do not agree at all (4)". The index (Cronbach alpha .37) was dichotomized at the median of the sample distribution into two categories 'active' (high value) and 'passive' (low value).

Health-related competence:
The index was contructed by using three items: "How do you rate your knowledge about physical complaints and health problems?" (Q) "Do you know what to do about psychological or emotional problems?" (Q) "Do you know what to do when you have problems with your partner, your family, with peers or with being alone?" (Q) The four answer categories ranged from "I definitely do not know enough about what to do" (1) to "I know very well what to do" (4). The index (Cronbach alpha .76) was dichotomized at the median.

Body mass index:
Based on self-reported height and weight (I). Values were considered to be normal if lower than 23.8 kg/m^2 for women and 25 kg/m^2 for men.

Smoking:
Actual or former smoking vs. never having smoked (I) (two categories).

Nutrition orientation:
The index was constructed by using three items: 1. "In your nutrition to which of the following issues do you pay attention": Thirteen alternative answers were given like "Not eating too much" or "Eating healthy food". The marked items were counted (I). 2. "What meals do you regularly eat? (breakfast, snack in morning, lunch, snack in afternoon, dinner). The number of meals were counted (Q). 3. "How much attention do you pay to: how regularly, how much, and what you eat?" Five answer categories were provided ranging from "Not paying attention at all" (1) to "Paying much attention" (5) (Q).
The three items (Cronbach alpha .40) were equally weighted and added, high values corresponding to high nutritional awareness, low values to low awareness. The index was trichotomized at the tertiles.

Physical activity in leisure time:
"Which of the following statements comes closest to your usual activity during your leisure time (including exercise): I spend most time sitting around, and e.g. watching TV, reading a book, doing handicrafts; I am regularly going for walks and hikes or riding may bike or doing some garden work or being active in a similar way; I regularly do some exercise (like jogging) (three answer categories) (Q).

Physical complaints:
The following symptoms or complaints were assessed (I): "... Please tell me wether in the four past weeks you have been bothered ('not at all', 'a little', or 'heavily') by some of the health problems or complaints I am going to read to you right now: Back pain/lower back pain; Pain in joints and/or in arms/legs; General weakness, fatigue, lack of energy; Abdominal pain or discomfort; Diarrhea and/or constipation; Difficulties in falling asleep, or waking up during the night; Headache, sensation of pressure in head or pain in the face; Palpitation of the heart, racing or irregular heart beat; Breast pain or discomfort; Cough with sputum; Fever. A binary index was constructed with the two categories 'Not seriously troubled by any of the complaints' and 'seriously troubled by at least one complaint'.