Comparison of HIS/HES data: Health-related quality of life and cardiovascular risk

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HEALTH SURVEYS IN THE EU:

HIS AND HIS/HES EVALUATIONS AND MODELS

Phase 2 / Subproject 1

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CONTENTS

INTRODUCTION

Among the tasks of phase 2 of the project “Health Surveys in the EU: HIS and HIS/HES evaluations and models” were those of evaluating the comparability and feasibility of the methods used in national HIS and HIS/HES, including an exploratory comparison of some key health data already collected in the surveys. This subproject was therefore set up to investigate the possibility of merging data collected in different European national health surveys, and the practicalities of pooling and analysing the merged data.

The comparison of measures of self-assessed health status seemed to offer a reasonably good working example. If health status measurements are comparable between high-quality national surveys they can be used to address important questions in international epidemiology. In particular, there is growing interest in monitoring the health of the population and in comparing performances of health systems worldwide, variations in health status across different populations as well as across individuals within a population. The WHO emphasised recently that health inequalities could be measured as a distinct dimension of the performance of health systems (WHO 2000). This can be done by measuring the distribution of health expectancy for a cohort, which implies that the range of fatal and non-fatal health outcomes should be incorporated in the measurement. Assessing inequalities in the distribution of health expectancy involves using data from cross-sectional surveys on the prevalence of non-fatal health outcomes. If self-reported responses from various health status surveys (using instruments such as SF-36, or activities of daily living) are to be used in estimating health expectancy, special attention will need to be paid to the comparability of these responses across different groups. If the problem of translation and content can be satisfactorily solved the potential also exists to undertake international comparisons, comparing the health status and quality of life of people with different conditions in different countries.

The specific aims of this study were to compare the self-assessed health status of people with some chosen risk factors for cardiovascular disease (CVD) measured by questionnaire and by biological correlates in different countries: hypertension and obesity were chosen as two major CVD risk factors and their impact on the health of the population was investigated. Information on high blood pressure and excessive body mass were collected both by direct measurement and self-reporting and the two can also therefore be compared. It was also of interest to determine whether each condition showed a distinctive profile in terms of health status.

2 METHODS

Three national surveys were included in this subproject: the Health Survey for England 1996 (HIS/HES survey, Prescott-Clarke et al 1998), the German National Health Interview and Examination Survey 1998 (Thefeld et al 1999) and the Italian HIS ('Health Conditions and the Use of Health Services') 1999-2000 (ISTAT 2001). Investigators from these surveys participated in this project and provided the data to the co-ordinating centre (Department of Epidemiology & Public Health, University College London Medical School, UK).

Table 2.1 shows the main characteristics of the national surveys included in the analysis. The German and the English surveys included both an interview and examination, while the Italian survey consisted of interview only. All studies were based on a random probability sample of the whole country, with the sampling being conducted on population registries or postcode addresses.

Table 2.1 Characteristics of National Surveys.

Country	Year	N	Participation rate	Age range	Sampling methods	HIS/HES
Germany	1998	7124	61.4%	18-79	Population registry	HES
England	1996	16443	75%	16+	Multistage, postcode address	HES
Italy	1999/2000	14987*	86.6%**	20+	Multistage, population registry	HIS

* sub-sample of a sample of 140,000 individuals

** the rate refers to the whole original sample

The number of participants in the national surveys ranged from 7124 in Germany to 140,000 in Italy, with the age distribution of participants also varying, from 16+ (England), to 20+ (Italy), to 18-79 (Germany). To achieve overlap, the analysis was restricted to 20-79 years.

For the purpose of this study a systematic subsample of 14987 people was extracted from the original Italian sample, excluding proxies and keeping the original stratification by geographic area, area types, sex and age groups. In the German sample weights were

applied to take into account the disproportionate inclusion of people from the ex-DDR in the survey.

All surveys included a higher proportion of women, reflecting the national distribution by gender: 52%, 54% and 51% respectively in Germany, England and Italy.

Prior to merging the data, the first stage of the study was to build on the information available from phase 1 of the project (Health Surveys in the EU), reviewing the surveys' questionnaires, protocols and variables definition (Hupkens & Swinkels 2001).

The SF-36 is perhaps the best known and widely used generic health status measure. This instrument has been translated into several languages, by an international project (IQOLA, Bullinger et al 1998a, Bullinger et al 1998b). A cross-cultural comparison of the content of translated SF-36 items suggested that the translations are generally culturally appropriate and comparable in their content (Gandek & Ware 1998). The SF-12 includes a subset of the SF-36. Both measures were available in the national surveys. SF-36 and SF-12 were therefore the chosen measures of self-assessed health status.

As well as these measures of health-related quality of life, other variables were considered for inclusion in the merged dataset. The following showed a certain degree of consistency between surveys and were therefore included in the study: age, sex, education, occupation, smoking status, blood pressure measurements, self-reported diagnosis of high blood pressure, height and weight (measured and self-reported). Blood pressure and weight and height were measured in Germany and England (see below), self-reported diagnosis of hypertension was assessed in Germany and Italy, as well as self-reported height and weight.

2.1 Data selection

SF-36 – SF-12. The SF-36 includes a set of questions derived from a longer instrument (the Medical Outcome Study General Health Survey Instrument), designed to be short enough to be used in large-scale studies. It was originally developed for use in clinical practice, but it was designed as a general outcome measure, which attempts to measure aspects of health that are important to all patients, therefore making it readily applicable to the general population (Jenkinson et al 1994, Kurth & Ellert 2002).

The SF-36 is a self-completion instrument, comprising 36 items. 35 of the items cover 8 dimensions of health, each dimension being therefore represented by more than one item. The SF-12 was developed to be a shorter, yet valid, alternative to the SF-36; the 12 items of the SF-12 are a subset of the SF-36, including one or two items from each of the eight domains. The number of items contributing to each dimension varies, the number being indicated in brackets in the list below, separately for each instrument (see table 2.1.1).

Table 2.1.1 Number of SF-36 and SF-12 health survey items per dimension.

Dimension	**SF-12**	**SF-36[a]**
Physical Functioning	2	10
Role Limitation (Physical)[b]	2	4
Bodily Pain	1	2
General Health	1	5
Energy and Vitality	1	4
Social Functioning	1	2
Role Limitation (Emotional)[c]	2	3
Mental Health	2	5
[a] The 36th item, on health changes over the past 12 months, is not scored and will not be presented further in this study		
[b] i.e. limitations attributed to physical problems		
[c] i.e. limitations attributed to emotional problems		

For each dimension item scores are coded, summed and transformed onto a scale from 0 (worst health) to 100 (best health). The eight-dimension profile based on SF-12 items appear to be very similar, on average, to the original SF-36 profile, although each score is estimated with less precision (Ware et al 1996).

The English and German surveys included the SF-36, the Italian survey the SF-12. In the merged dataset this was calibrated to reproduce the original SF-36 scales, according to instructions of the SF-12 manual (Ware et al 1995).

Social class. In general, social class is assessed on the basis of educational level, occupation and income. These measures have been used for prediction of health behaviours and have been shown to contribute to various risk factors (Winkelby et al 1992). The variables used in this study were education and occupation.

Education. Education was classified by defining the highest level of education attained. The classification contains four categories: i) primary education (including those without qualification); ii) lower secondary education; iii) upper secondary education; iv) post-secondary education, university. The categories for each country were different and, taking into account the different educational system in the 3 countries, were grouped as indicated below:

Educational level	Italy	Germany	England
i) primary	Elementary school leaving certificate, no qualification	No professional qualification (and not in training), other	No qualification, other
ii) lower secondary	O-level, professional training	Apprenticeship (professional-internal training)	NVQ2, NVQ1, O-level equivalent
iii) upper secondary	College, A-level equivalent, higher school certificate	Training college (professional), technical college	NVQ3, A-level equivalent, higher education below degree
iv) post-secondary, university	Higher degree, degree, university diploma	University degree or equivalent	University degree or equivalent

Those still in training (e.g. apprentices, students) were considered as missing for this variable and excluded from the analysis.

Occupation. On the basis of their occupation respondents were classified as “blue collar” or “white collar”. White collar were those in administrative, managerial, professional and clerical occupations; blue collars were skilled or unskilled manual workers. Those still in training (apprentices, students) were considered as missing for this variable and excluded from the analysis.

Blood pressure measurements. The mercury sphygmomanometer was used for blood pressure measurements in Germany, while in England the Dinamap 8100 was used. The examination was conducted in study centres at the sampled points in Germany and at home in England. Both surveys had 3 measurements, taken after 5 minutes resting time, at 1-minute interval in England, 3-minute interval in Germany. The mean of the second and the third measurement was used in the analysis. According to recent international guidelines,hypertension was defined as a systolic blood pressure >=140 mmHg or a diastolic blood pressure >=90 mmHg or current use of antihypertensive medication (Guidelines Subcommittee 1999).

2.2 Statistical analysis

Data were merged and analysed in SPSS v10.1. Age standardisation was achieved by using the European population as a standard.

Multiple logistic regression was used to look at the association between self-assessed health (having a score below the median on SF-36 or SF-12 selected dimensions) and obesity adjusting for age, sex, social class (or education), smoking status and country. The analyses were also stratified by socioeconomic position.

3 RESULTS

Table 3.1 shows the age-standardised characteristics of the subjects included in this study by sex and country.

The percentage of current smokers was slightly higher in Germany than the other countries, for both sexes. About half of both men and women in England and Germany and almost two third in Italy were blue collar. The educational level appeared high overall in Germany and England than in Italy, with a higher percent having attained university qualification, while in England overall there were more people with primary educational level only than in the other countries.

Mean BMI and the prevalence of obesity were similar in England and Germany where height and weight had been measured as part of the health examination, with the prevalence of obesity slightly higher in Germany. In Italy, where BMI measurements were based on self-reports, the prevalence of obesity appeared much lower. This was true for both sexes and age groups (Figure 1).

Prevalence of hypertension was 49% in Germany and 44% in England among men and 41% and 37% among women respectively. The differences between the two countries were less marked at the extremes of the age range (20-29 and 70-79), as shown in Figure 2.

Table 3.1 Age-standardised characteristics of the subjects, by sex and country.

Country	Germany	England	Italy[b]
Mean age (SE)[a]	46.8 (0.18)	46.6 (0.13)	47.5 (0.14)
Men			
Smokers %:			
yes	40	32	34
ex	25	28	26
never	35	40	40
Blue collar %	50	51	60
Education %:			
university or equivalent	18	15	8
no qualification, other	12	30	23
Mean BMI (SE)[b]	26.7 (0.07)	26.3 (0.05)	25.3 (0.04)
Obese %[b]	18	16	7
Mean SBP (SE)	138 (0.5)	139 (0.2)	na
Hypertensive (BP≥140/90 or on medication)	49	44	na
Self-reported hypertension %[c]	21	4	12
Women			
Smokers %:			
yes	30	28	21
ex	12	22	12
never	58	50	67
Blue collar %	40	48	57
Education %:			
university or equivalent	10	10	7
no qualification, other	25	33	33
Mean BMI (SE)[c]	26.2 (0.09)	26.1 (0.06)	23.7 (0.05)
Obese %[c]	21	19	7
Mean SBP (SE)	135 (0.6)	134 (0.3)	na
Hypertensive (BP≥140/90 or on medication)	41	37	na
Self-reported hypertension %[d]	25	5	16

[a] Age 20-79.

[b] The Italian sample is a subsample of the total interviewed. Small differences may therefore be observed in some of the variables when compared to the official estimates.

[c] Germany and England: based on measured height and weight; Italy: based on self-reported height and weight.

[d] The question in England asked to define the problem, for those who said they had anything that troubled them over a period of time.

A set of mean scores on the eight dimensions of the SF-36 – SF-12 provided a 'health profile' for the whole population and subgroups of it. Figures 3-5 show the health profiles for men and women in the three countries, i.e. the mean scores and confidence intervals for each of the eight dimensions. On some dimensions a high proportion of individuals,

particularly among the youngest age group, had a maximum score (ceiling effect): this applied in particular to the dimensions Role Limitation (emotional) and Role Limitation (Physical). Some SF dimensions were highly intercorrelated, with a tendency for the mental dimensions and physical dimensions to correlate more closely within each other. Other similarities between the three countries were observed:

- Mean scores for women tended to be lower than for men on all dimensions;
- General health was the dimension showing the smallest differences in mean scores between men and women;
- For all dimensions, except mental health, mean scores declined by age. (Data not shown)

Moreover, mean scores tended to be lower among those from more disadvantaged socio-economic groups: they were lower among blue collar than white collar respondents and among those with primary education than those with university education. The SF-36/SF-12 profiles for English, German and Italian men and women by occupation and education is shown in Figures 6-11.

The relationship between the specific CVD risks (obesity and hypertension) and self-assessed health status was then investigated. Age was dichotomised (<40 and >=40 yr). Main scores on the eight dimensions among obese and non-obese men and women by country are shown in Figures 12-13. In men, those who were obese scored lower on most SF-36/SF-12 domains. The differences between obese and non-obese were more marked within each age group for the physical than the mental dimensions; in particular, Physical Functioning, and to a lesser extent General Health showed the largest differences between obese and non-obese. This picture was replicated among women, although in Italy the differences between obese and non-obese were marked on all mean scores.

Figures 14-15 show mean scores on the eight dimensions by hypertensive status in England and Germany (in Italy blood pressure was not measured and the results are therefore not comparable). Among younger men, both physical and mental dimensions did not show appreciable differences by hypertensive status: this was true in both countries. Among older men, those with hypertension scored lower on most SF-36 domains in England but not in Germany.

Among women, the main scores on the physical dimensions did not differ between hypertensive and non-hypertensive in Germany, while for the older age groups (both age

groups in England) those with hypertension tended to score lower on both physical and mental dimensions than those without hypertension.

These analyses show a relationship between measures of self-assessed health status and these factors considered separately. Logistic regression analysis was then applied to the data to look at the relation between health and these factors examined together. Four separate logistic regression models were fitted, the first category of the 4 dependent binary variables being a score below the median on SF-36 (or SF-12) physical functioning, general health, vitality and mental health. These dimensions were chosen to represent different aspects of the set of eight domains. The independent variables for each model were: sex, age, social class, smoking status, obesity and country.

Overall the models show a high degree of consistency, as shown in Table 3.2; the odds of being in relatively poorer health were higher in women than in men, increased with age (although the increase was not significant for mental health), were higher among obese people, current smokers and in people from lower socioeconomic status (blue collars). They also differed by country. Similar results were observed using educational level instead of social class (data not shown).

Table 3.2 Logistic regression models for health-related quality of life measures.

Odds ratios	SF Physical functioning[a]	SF General health[a]	SF Vitality[a]	SF Mental health[a]
Sex	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
Men	1	1	1	1
Women	1.79	1.18	1.62	1.63
Age groups	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
20-29	1	1	1	1
30-39	1.10	1.16	1.11	1.08
40-49	1.82	1.70	1.19	1.24
50-59	3.31	2.45	1.30	1.19
60-69	6.84	3.60	1.48	1.22
70-79	13.59	5.25	2.08	1.43
Smoking status	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
Never	1	1	1	1
Ex	1.23	1.22	1.22	1.38
Current	1.23	1.35	1.20	1.11
Social class	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
White collars	1	1	1	1
Blue collars	1.45	1.52	1.14	1.24
BMI (kg/m^2)	(p=0.00)	(p=0.00)	(p=0.05)	(p=0.02)
20-25 (desirable)	1	1	1	1
<20 (underweight)	1.03	1.15	1.00	1.08
>25-30 (overweight)	1.38	1.14	1.00	0.94
>30 (obese)	2.36	1.54	1.20	0.98
Country	(p=0.00)	(p=0.00)	(p=0.06)	(p=0.00)
England	1	1	1	1
Germany	0.98	1.11	0.93	0.96
Italy	0.24	1.06	0.97	0.82

[a] Cut-off is the median.

The next step consisted of fitting similar models to the subgroup of obese people only (BMI >30), with and without adjustment by social class. Before the inclusion of social class in the models, the odds of being in relatively poorer health for obese people showed significant differences by country (Table 3.3).

Table 3.3 Logistic regression models for health-related quality of life measures among obese people (adjusting for age, sex, smoking and country).

Odds ratios	SF Physical functioning[a]	SF General health[a]	SF Vitality[a]	SF Mental health[a]
Sex	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
Men	1	1	1	1
Women	2.25	1.22	1.78	1.67
Age groups	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.10)
20-29	1	1	1	1
30-39	1.08	1.13	1.17	1.10
40-49	1.81	1.62	1.29	1.13
50-59	2.97	2.36	1.53	1.23
60-69	7.50	3.35	1.66	1.28
70-79	10.97	3.91	2.22	1.67
Smoking status	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
Never	1	1	1	1
Ex	1.35	1.22	1.23	1.16
Current	1.35	1.51	1.35	1.28
Country	(p=0.00)	(p=0.00)	(p=0.06)	(p=0.00)
England	1	1	1	1
Germany	0.90	1.05	0.79	0.82
Italy	0.23	1.27	0.97	1.06

[a] Cut-off is the median.

Once social class was introduced in the models the differences between counties, with the exception of physical functioning, were no longer significant (Table 3.4).

Table 3.4 Logistic regression models for health-related quality of life measures among obese people (adjusting for age, sex, smoking, social class and country).

Odds ratios	SF Physical functioning[a]	SF General health[a]	SF Vitality[a]	SF Mental health[a]
Sex	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.00)
Men	1	1	1	1
Women	2.30	1.18	1.77	1.64
Age groups	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.13)
20-29	1	1	1	1
30-39	1.06	1.14	1.21	1.03
40-49	1.79	1.61	1.28	1.18
50-59	2.97	2.26	1.55	1.20
60-69	7.49	3.14	1.64	1.25
70-79	11.66	3.82	2.17	1.35
Smoking status	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.08)
Never	1	1	1	1
Ex	1.35	1.23	1.21	1.14
Current	1.34	1.44	1.31	1.24
Social class	(p=0.00)	(p=0.00)	(p=0.03)	(p=0.00)
White collars	1	1	1	1
Blue collars	1.26	1.56	1.15	1.29
Country	(p=0.00)	(p=0.08)	(p=0.06)	(p=0.09)
England	1	1	1	1
Germany	0.92	1.15	0.82	0.86
Italy	0.22	1.14	0.96	0.98

[a] Cut-off is the median.

Similarly, the differences between countries were not significant when running separate models for white collar and blue collar respondents (data not shown).

4 DISCUSSION

Overall, similarities in the self-assessed health status measured by SF-36/SF-12 emerged between the three European national surveys included in this study (England, Germany and Italy). All aspects of physical health were perceived worse as people got older, while this was less evident for mental health. Women tended to rate their health worse than men, as did those of lower socioeconomic status. These findings seem to support the notion of comparability of content of the SF-36 in different translations (Gandek & Ware 1998). It is important to note that the instrument used to measure self-assessed health status was not the same in all countries. The study assumes that SF-36 and a shorter version, the SF-12 are comparable, i.e. the SF-12 form would reproduce the average score for the eight scale profile with a high degree of comparability. That this may in fact be the case was demonstrated by the authors who constructed the SF-12, whereby the great majority of mean scores for the eight scales estimated from SF-12 were within 3 points of those from SF-36 (Ware et al 1996). Caution when comparing the two versions is nevertheless needed.

To analyse the influence of obesity (a major CVD risk factor) on health status, we compared the countries overall and subgroups on the basis of their socioeconomic characteristics. Information collected on the outcome of interest by HIS and HES showed some differences. In Italy BMI was calculated from self-assessed height and weight. Self-estimates tended to result in lower prevalence of obesity in this country than in England and Germany, where height and weight were directly measured. This confirms previous findings (Bolton-Smith et al 2000). For example a comparison made in Germany between the estimated and measured BMI showed that women systematically underestimated their weight (by 2 kg on average) and men overestimated their weight (by 2 cm on average). Similar discrepancies between estimated and measured BMI were also shown in Italy (Conti S, personal communication). Results from these studies indicate that ideally HES data should be used to assess height and weight and caution is needed when HIS data are used to estimate BMI in the population.

The differences between estimated and measured BMI showed an impact on self-assessed health status too: the differences in SF-36/SF-12 mean scores between obese and non-obese were more marked in Italy than in the other two countries, possibly indicating that perception of obesity is more directly linked to subjective assessment of health/quality of life than excessive BMI as calculated by measured height and weight.

People from low socioeconomic status also tended to perceive their health as poor. In fact the differences observed between countries among obese people were greatly reduced and no longer significant once differences in social class (or education) were taken into account.

One of the aims of this project was to verify the feasibility of analysing data from different surveys that collect data in an unstandardised way. A subset of data from these national surveys was merged. We demonstrated that the task of merging data collected in national health surveys is possible, but is currently subject to restrictions because of differences in the instruments used, phrasing of questions, protocols used for the measurements. As well as the differences noted above in the instrument used to measure health status, information on important socioeconomic determinants (such as social class and education) and risk factors (such as smoking) were collected in a non-harmonised fashion and had to be recorded into new variables. Although most of the differences in the original categorisation could be taken into account some differences observed between the countries could at least in part be spurious, due to the discrepancies in the definition of the original variables.

In conclusion, national health surveys are carried out to respond to internal needs, such as monitoring the health of the population and identifying trends over time in disease and risk factors. Using instruments that can enhance international comparability is a growing concern, as demonstrated by this and other projects in the framework of the EU Public Health Programme. Improving the quality of these instruments must remain an important, achievable goal at international level.

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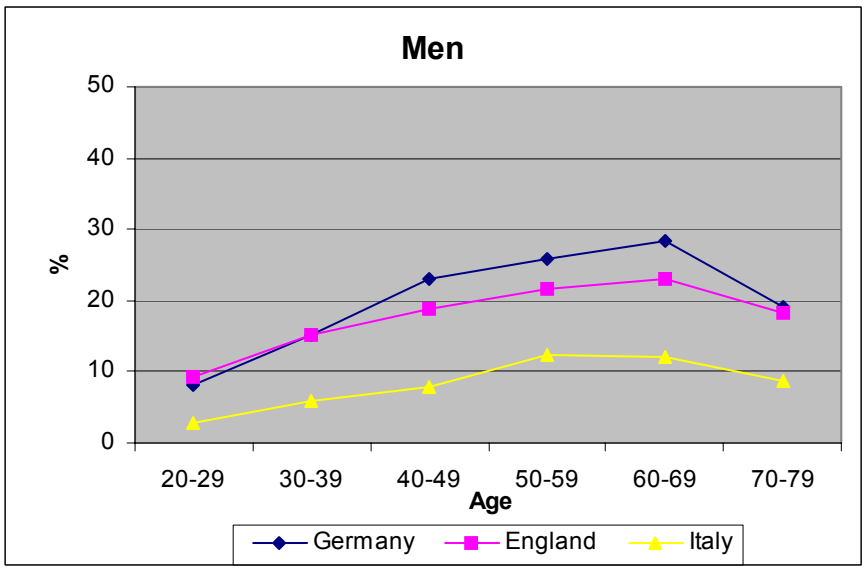
Figure 1 Prevalence of obesity, by age, sex and country



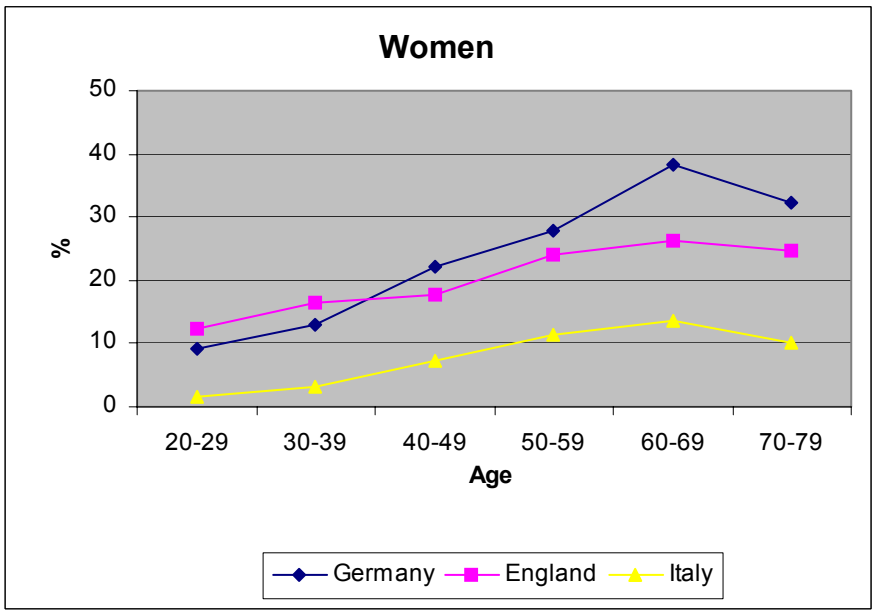
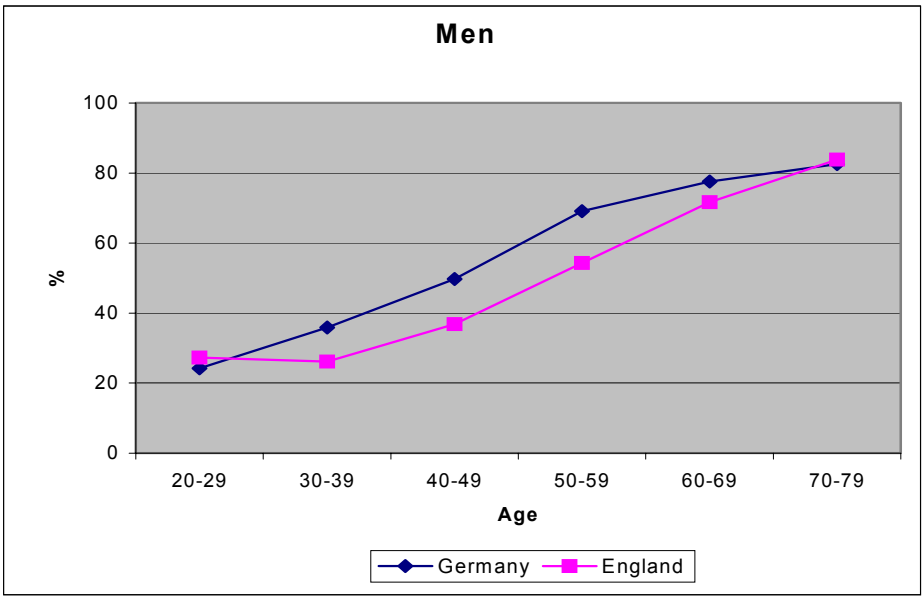


Figure 2 Prevalence of hypertension in England and Germany, by sex and age groups



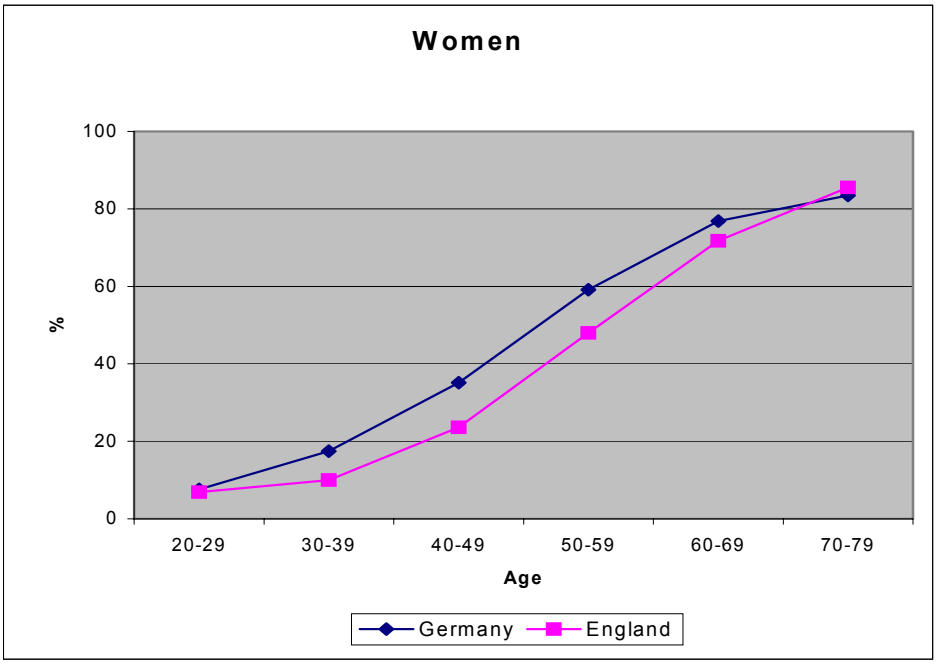


Figure 3 SF-36 health profile for men and women – England.

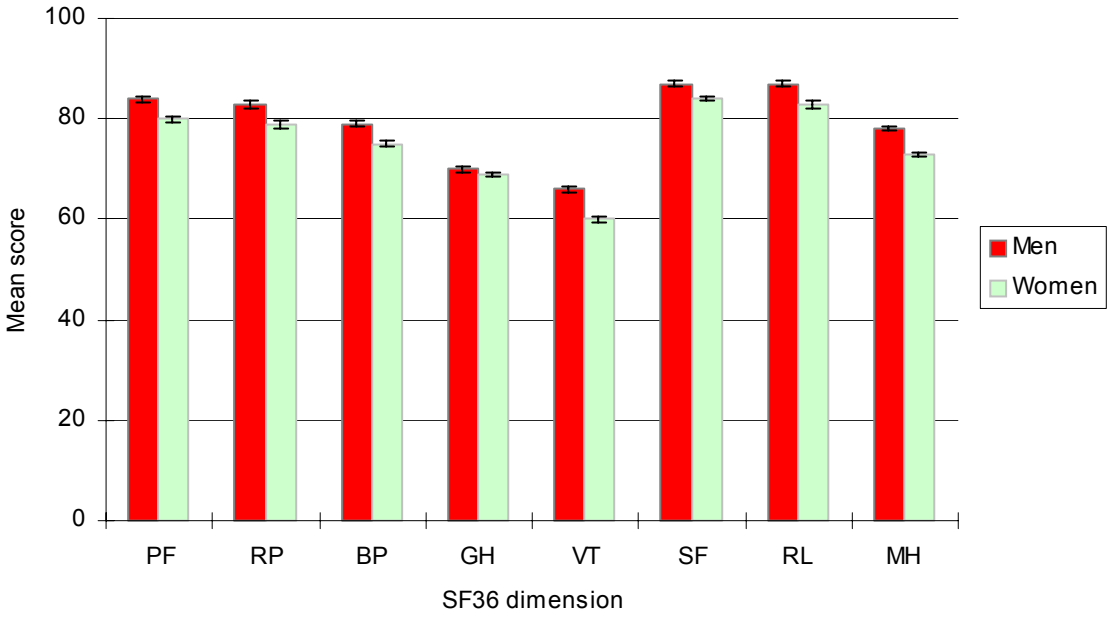


Figure 4 SF-36 health profile for men and women – Germany

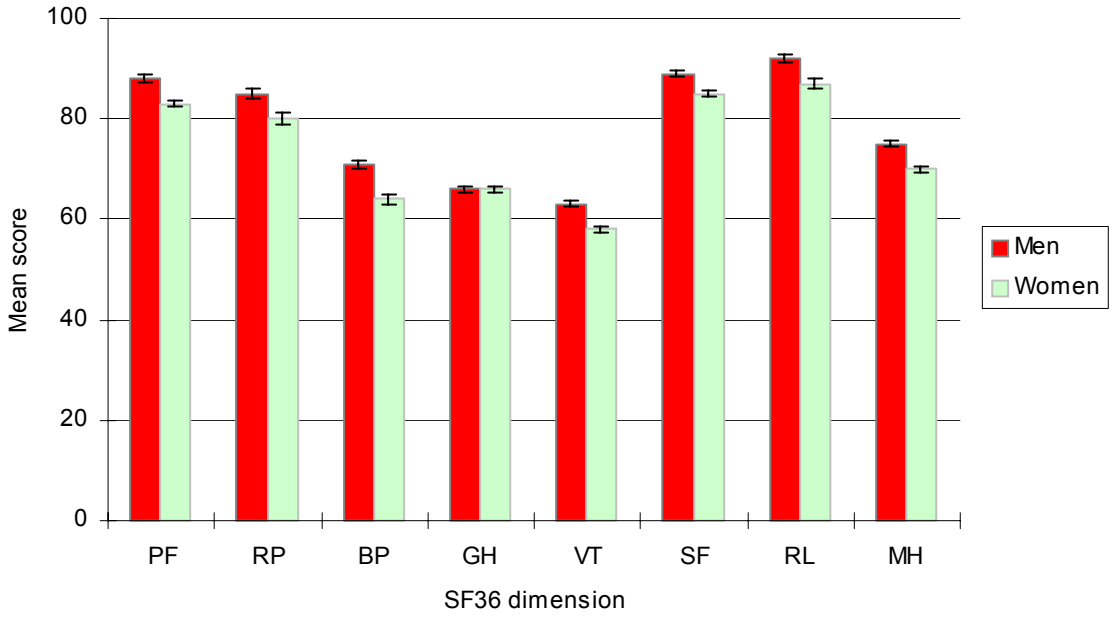


Figure 5 SF-12 health profile for men and women – Italy

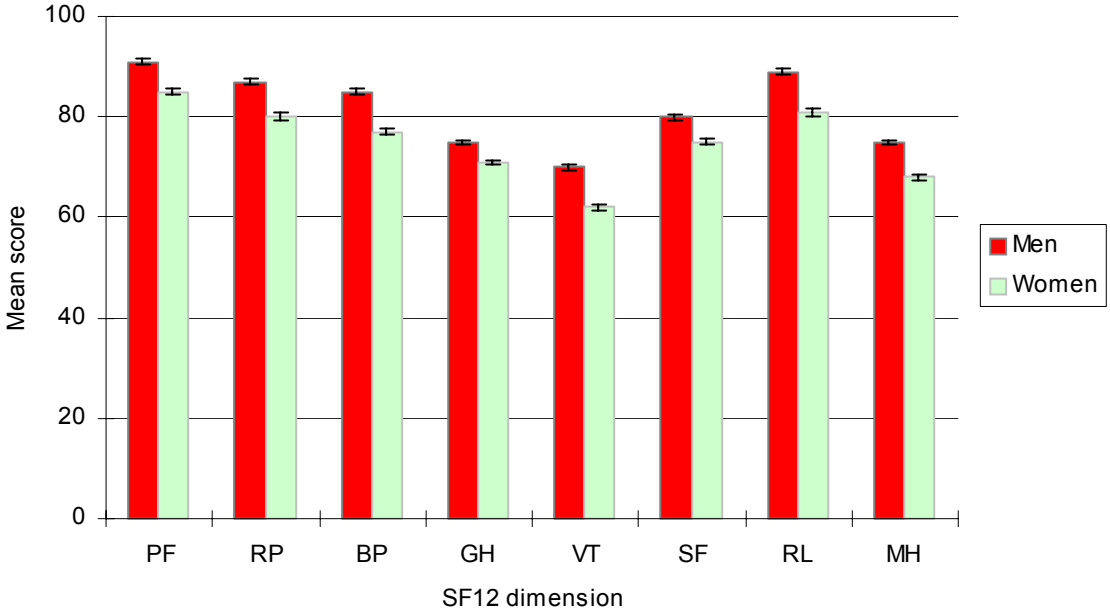


Figure 6 SF-36 health profile, by social class and sex – Germany

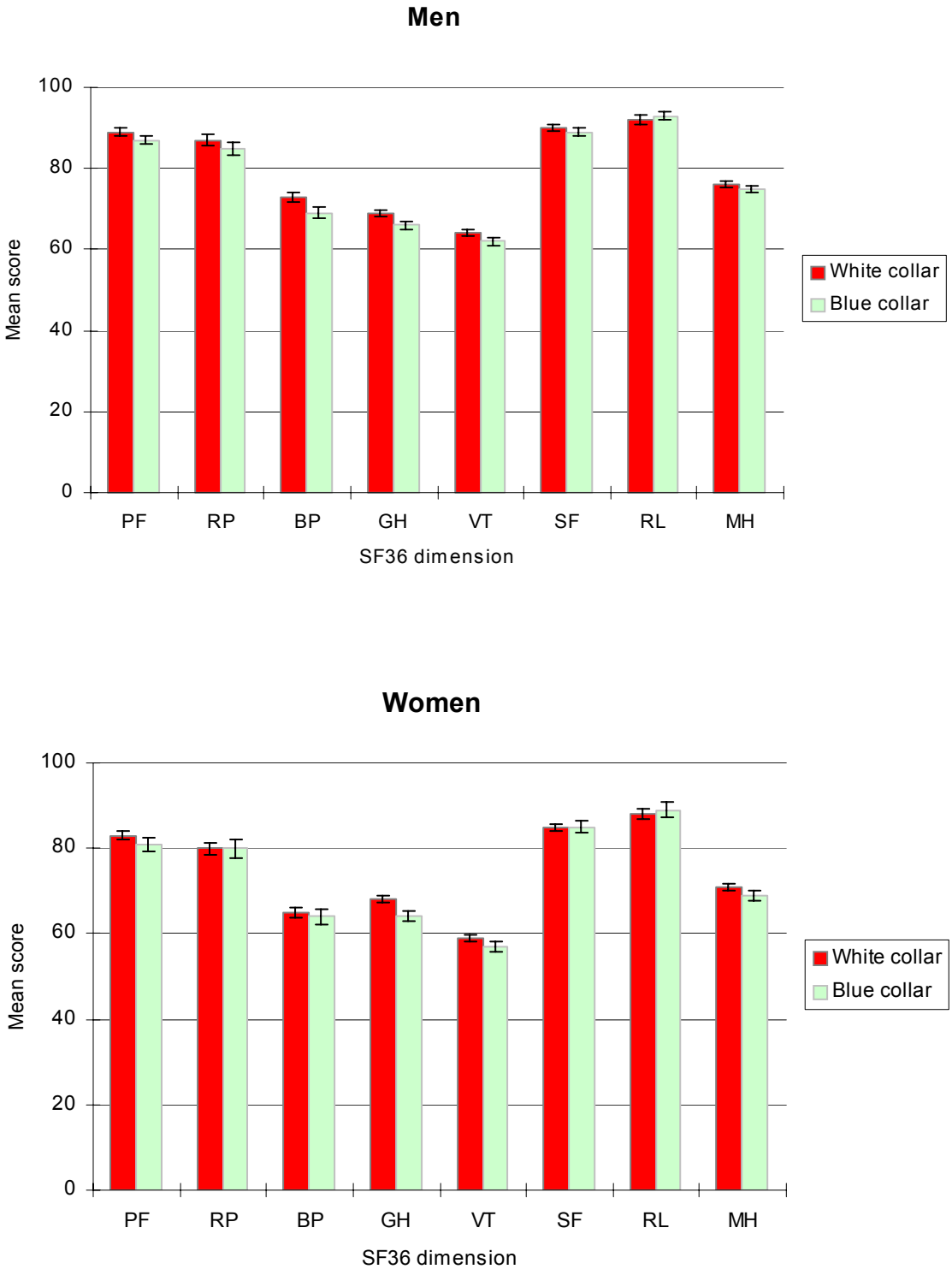


Figure 7 SF-36 health profile, by social class and sex – England

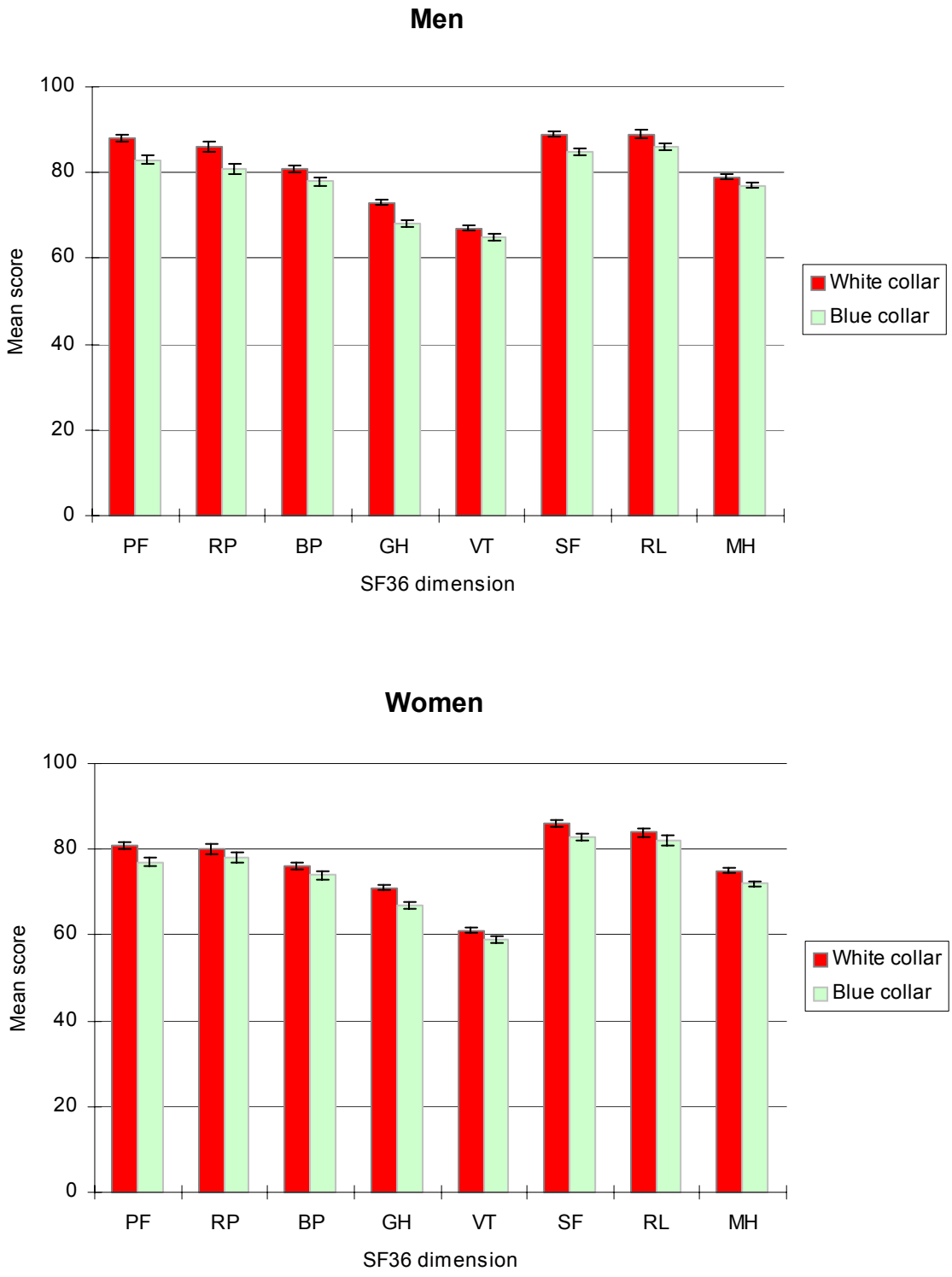


Figure 8 SF-12 health profile, by social class and sex – Italy

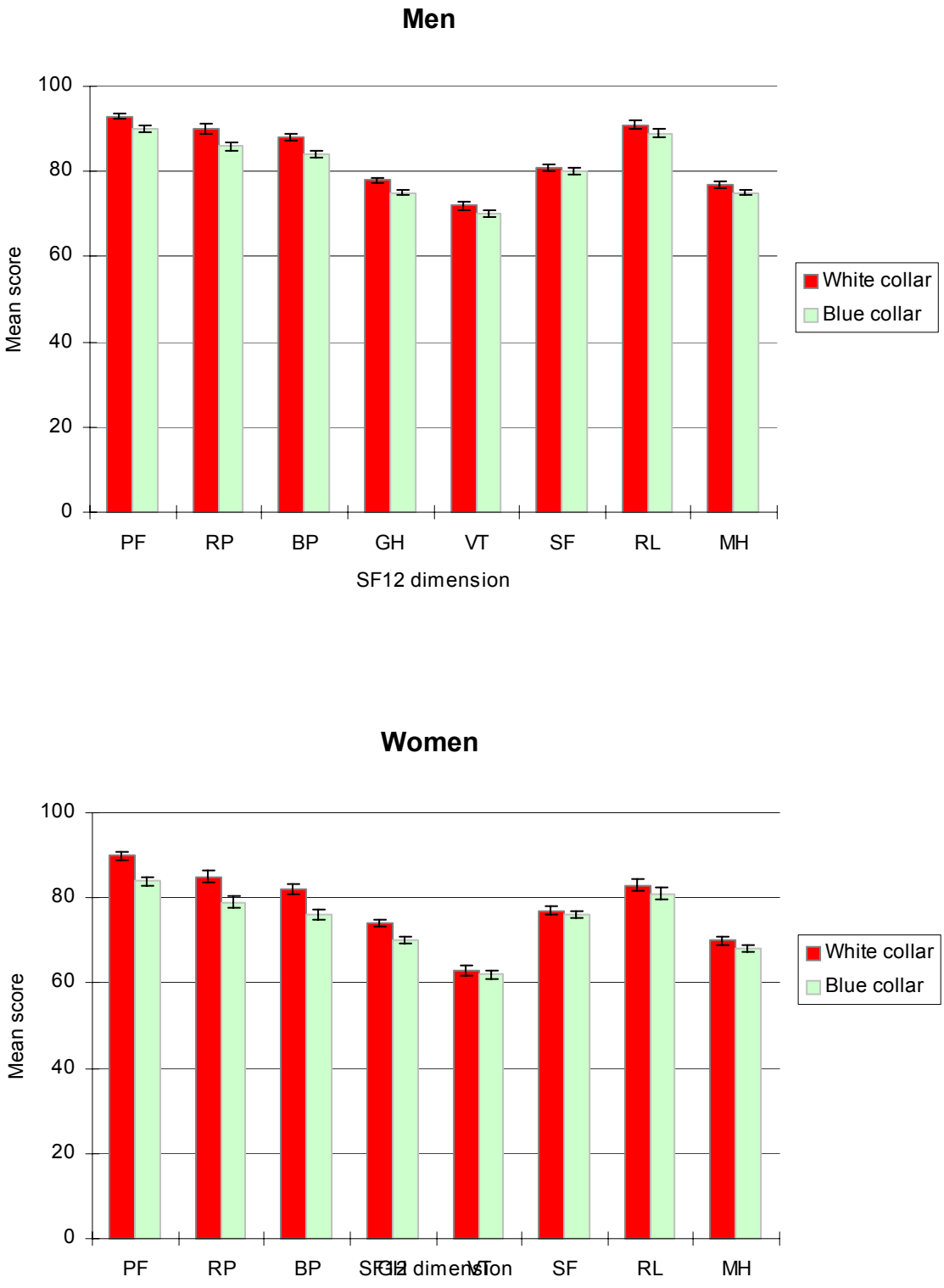


Figure 9 SF-36 health profile, by education and sex – Germany

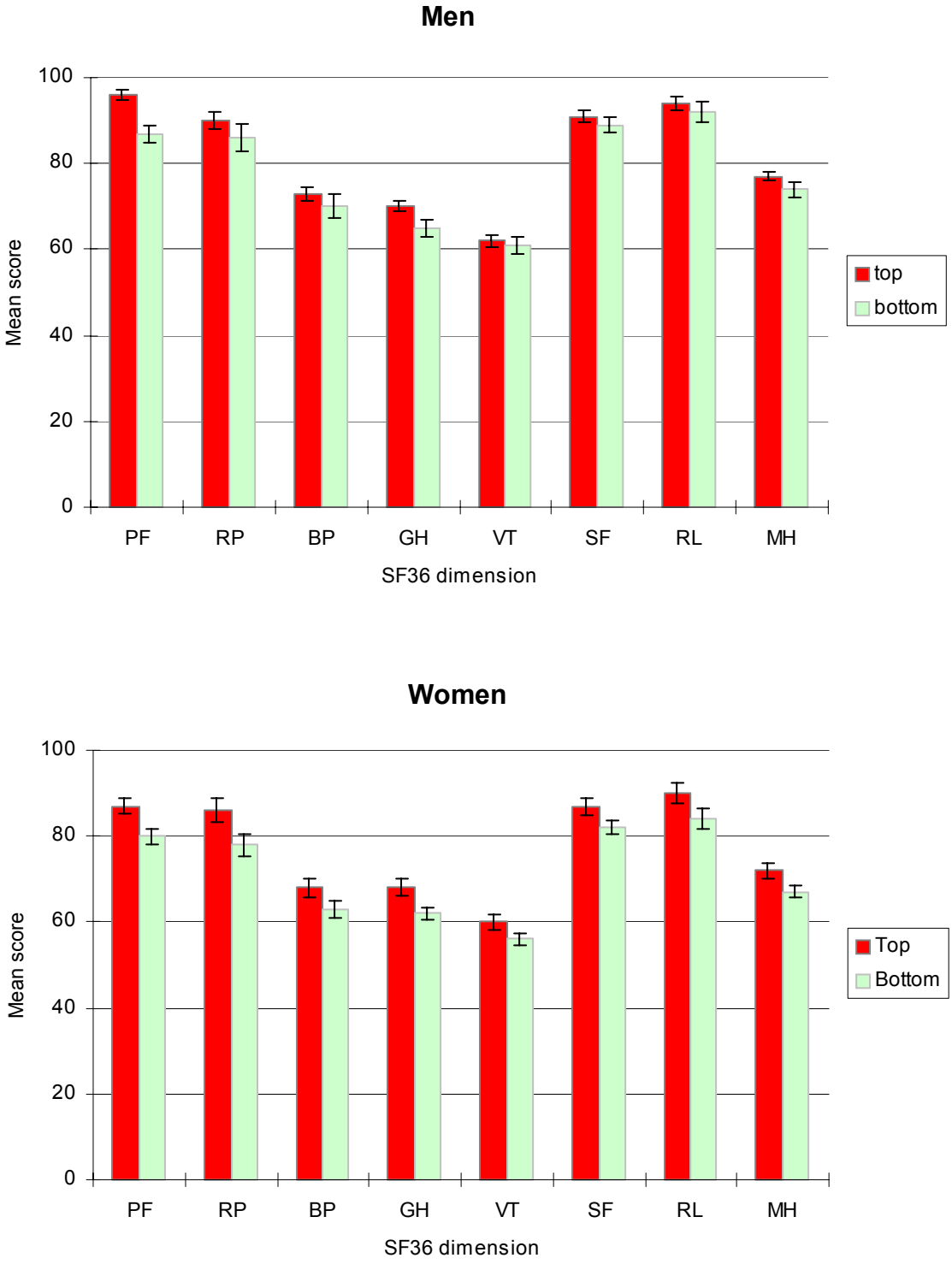


Figure 10 SF-36 health profile, by education and sex – England

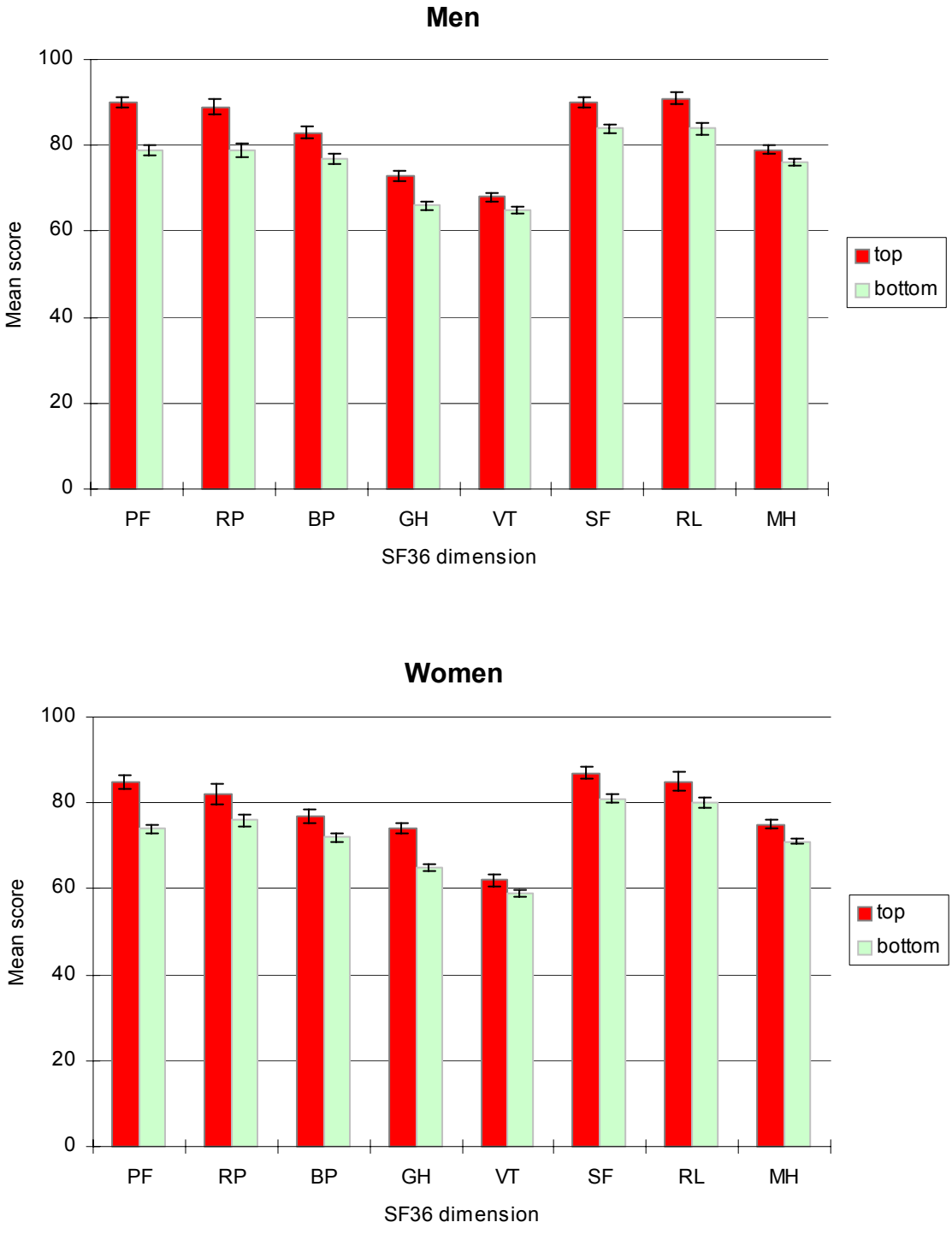


Figure 11 SF-12 health profile, by education and sex – Italy

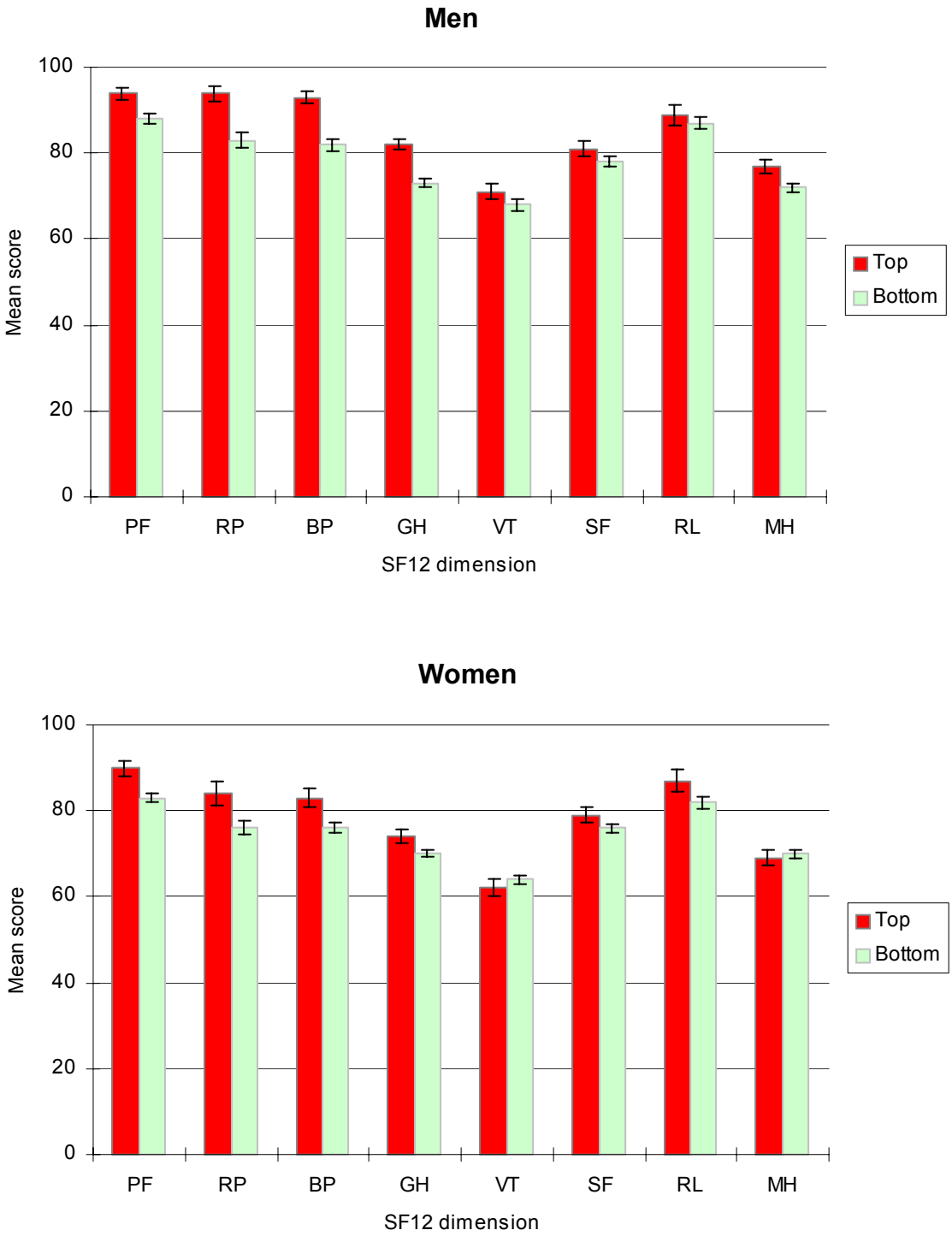


Figure 12 SF-36/SF-12 main scores, by obesity, age and country – men

Figure 13 SF-36/SF-12 main scores, by obesity, age and country – women

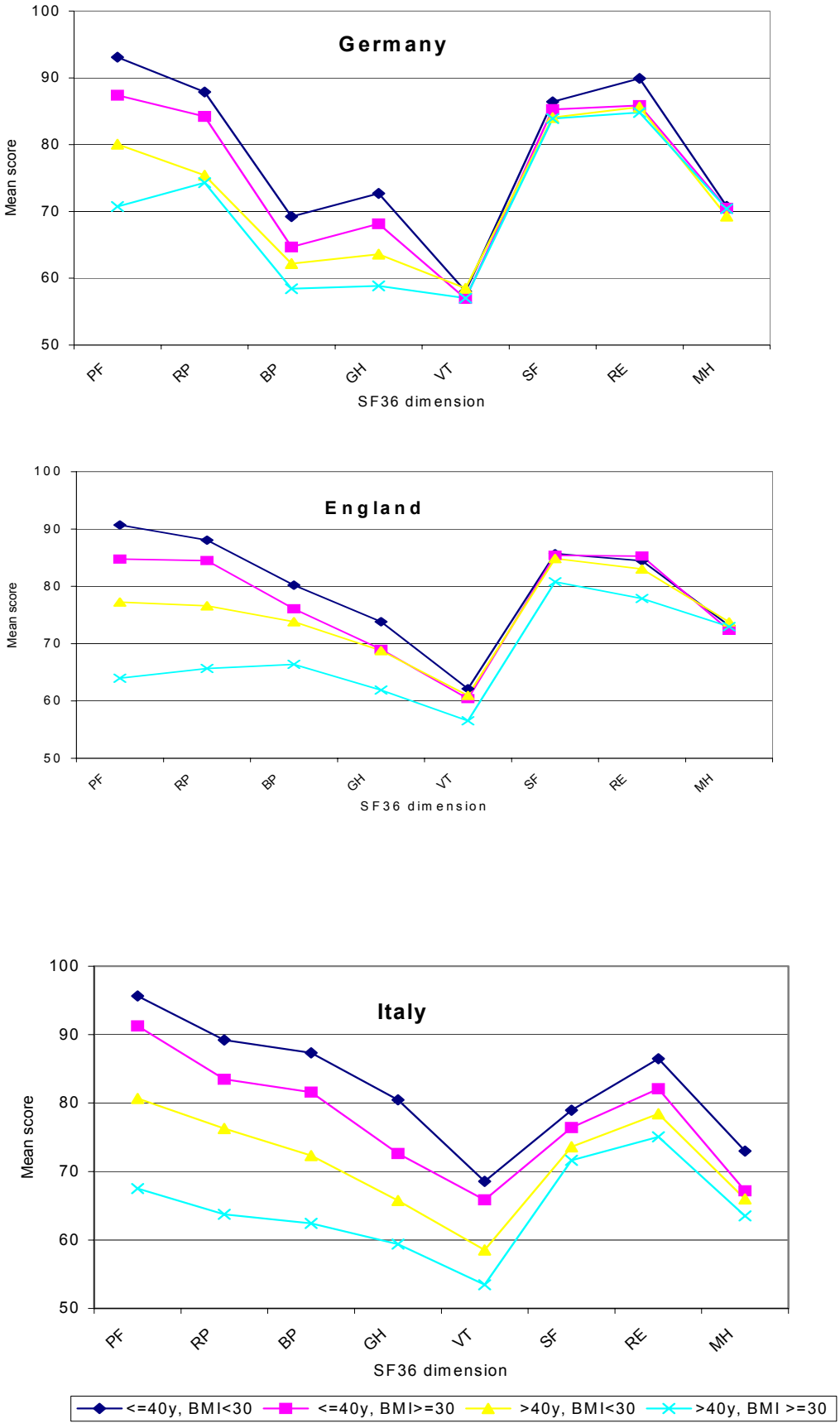


Figure 14 SF-36 main scores, by hypertension and age in Germany and England – men

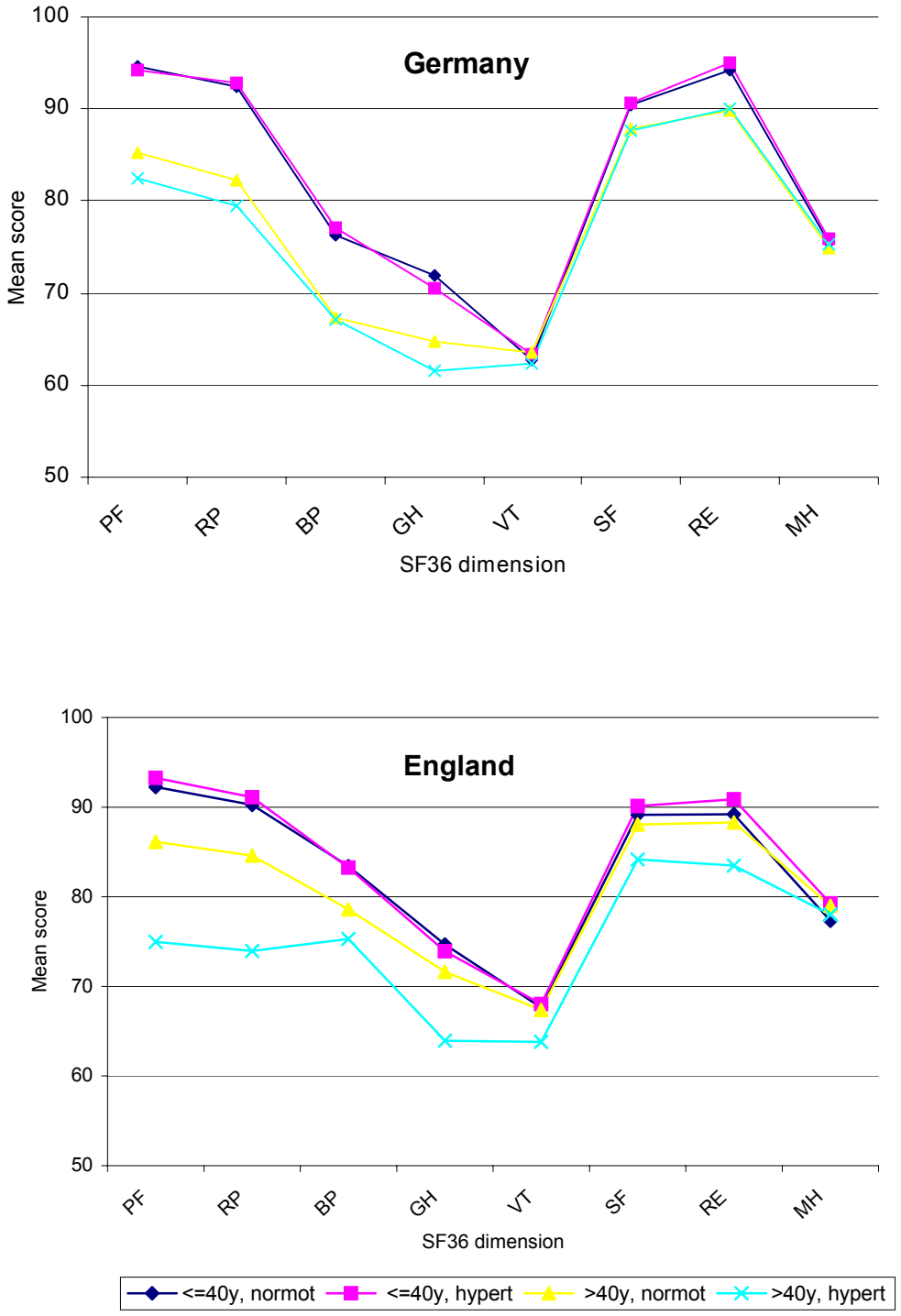


Figure 15 SF-36 main scores, by hypertension and age in Germany and England – women