Self-assessed health and mortality in migrant communities in Belgium

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Objectives

The aim of this study is to describe the contrasting patterns of mortality and health among the different migrant communities in Belgium. Using the health questions of the 2001 census and the mortality data of the register, we want to assess to what extent socioeconomic status accounts for ethnic differences in health outcomes and compare the association to the association observed for mortality. In addition, we investigate to what extent self-perceived health is a predictor of mortality in migrant populations in Belgium.

Background: diverging mortality and morbidity patterns in migrant groups

It is a well known fact that lower socio-economic status is related to higher mortality and morbidity. In recent years, this relationship has also been extensively documented for Belgium (Gadeyne and Deboosere 2002; Bossuyt, Gadeyne et al. 2004). The observed lower mortality level among adults of some Mediterranean migrant communities compared to the Belgian population is especially striking in this respect given their general lower socio-economic status (Deboosere and Gadeyne 2005). Lower mortality among adult migrants with low socio-economic status has been

widely reported for other countries as well (Courbage and Khlat 1996; Razum, Zeeb et al. 1998; Kouris-Blazos 2002; Palloni and Arias 2003; Palloni and Arias 2004) and has been conceived by many demographers and epidemiologists as a paradox (the "Hispanic paradox", the "Latino paradox" or the "Greek paradox").

However, low levels of mortality in migrant communities often appear to be accompanied by high levels of morbidity, poor health being reported in many migrant communities (Reyneveld 1998; Wiking, Johansson et al. 2004). In Belgium, the health surveys of 1997 and 2001 found poor health especially for Turks and Moroccans, the very same communities who have low mortality levels notwithstanding their socio-economic status.
The introduction of health questions in the Belgian census offers the opportunity to measure health for the total population and consequently permits the analysis of small subpopulations using a vast array of socio-economic covariates. Moreover, the possibility to link the census data to the population register creates a high quality database enabling the analysis of the relationship between health indicators and mortality through individually linked records.

Cultural and language biases or differences in health assessment according to cultural background are pinpointed as particular problems in self-reported health indicators and are often proposed as explicative factors for the observed differences in self-assessed health and age-adjusted mortality rates (Sadana 2002). These problems are often amplified in cross-national comparisons due to differences in the survey design, in question wording and in layout of the question form. In our study, this kind of measurement errors is reduced to a minimum as we compare populations of different national origin responding to an identical question form in the same survey.

Belgium is well suited to explore health differences by nationality thanks to the presence of a large and diverse migrant community, making up 16 percent of the population. The current analysis studies the self-assessed health and mortality patterns of the largest migrant communities (i.a. Italian, Spanish, Moroccan and Turk migrants) in comparison to the Belgian native population and to the migrants of the neighbour countries (French, Dutch and German migrants).

As the data are not well suited to investigate causal relationships, the analyses are necessarily descriptive. We are convinced however that proper descriptive analysis of valuable data can also contribute to a better understanding of reality. The introduction of health questions in the Belgian

census of 2001 has produced a large set of data that can add empirical evidence to theories developed in the literature based on other data.

Data: the 2001 census linked to register data

The data consist of a linkage between the 2001 census data an register data on mortality and emigration. In the 2001 Belgian census, self-assessed health is measured through the single question: "*How is your health in general? Very good, good, fair, poor, very poor.*" This question has been answered by 9,037,736 persons (response rate of 92%). In the current analysis, self-assessed health (SAH) has been dichotomized, very good or good health being opposed to all other answer categories (less than good health). In total, 2,266,391 or 25% of the respondents perceive their health as less than good.

The 2001 census data have been linked to register data on mortality and emigration between the 1st of October 2001 and the 1st of January 2004. Thanks to Statistics Belgium a direct individual link has been established with these register data. During the 27 month follow-up 195,843 deaths have been registered.

The census data cover the core socio-economic indicators, such as education and occupation. There is no information on income, but dwelling quality and comfort can be considered as a good proxy for wealth or accumulated income.

Persons are assigned an educational level according to the highest diploma they obtained. To do so, we use the basic ISCED classification but introduce an additional distinction between general, technical and vocational secondary education.

Occupation and activity status are introduced in the economically active age groups. The occupational variable in the census distinguishes manual workers from employees in the private sector, but not in the public sector (where everybody has the status of employee).

Migrant communities are defined in a very large sense as a function of nationality. All inhabitants with a foreign nationality are considered as being part of the migrant community. About 9% of the population has a non-Belgian nationality. Persons who acquired the Belgian nationality are

reclassified according to their nationality of origin. Children are classified according to the nationality of the head of household. According to this classification, 16% of the Belgian population can be considered as belonging to migrant communities.

The use of a unique source containing health measures, socio-economic variables and mortality registration for the total population avoids the classical numerator- denominator problem and minimizes the risk of artifactual differences between subgroups. The large number of respondents offers the possibility to analyse small subpopulations, reduces random fluctuation and enhances the consistency of research results. The population register guarantees that essential information such as exact date of birth, nationality, nationality at birth, date of registration in the register and eventual dates of emigration or death are very accurate.

Statistical analyses: methods

To get a general idea of differences in self-assessed health, we first compute the prevalence of less than good health by nationality of origin for men and women aged 5-79.

Next, logistic regression is applied to estimate odds ratios for 'less than good health' by nationality of origin controlled for socio-economic characteristics. In this stage, we use a more restrictive definition of nationality based on nationality at birth, a conservative but straight-forward criterion. Self-assessed health is dichotomized in good and less than good health. To evaluate the differences in self-assessed health properly, different research designs will be used, stratifying the study population by gender and age group (25-59 and 60-79). These separate analyses permit a better judgment of the impact of socio-economic status and allow us to include activity status (unemployment) as a control variable in the economically active age group (aged 25-59).

The socio-economic control variables consist of education, housing quality, occupation and activity status. For education, the highest level is used as reference category, whereas for the housing variable, owners of very high quality housing constitute the reference group. The occupational dimension gives only a partial idea of socio-economic status, employees of the private sector being used as reference group. For activity status, finally, persons who have a job represent the reference category.

These results of the logistic regression for self-assessed health are compared to the outcomes observed for mortality by nationality (controlled for socio-economic status).

In a final stage, we test the relationship between self-assessed health and mortality through the calculation of age-standardised death rates by category of the self-perceived health variable. The data do not allow us to plot these results by age and nationality as numbers are too small. As a consequence, a summary index has been calculated. First, age standardised mortality rates are computed by gender and health. The method of indirect standardisation is preferred as we are comparing relatively small groups. Belgian women in good health constitute the reference population and their age-specific mortality rates are applied to the age structure of all nationality groups in good health, giving the expected number of deaths for each of these groups. The ratio of the observed number of deaths and the expected number of deaths gives the standardised mortality ratio. By multiplying this ratio and the crude death rate of Belgian women in good health, a standardised mortality rate is obtained for each nationality and gender group in good health. The same procedure is applied for populations assessing their health as less than good at the time of the census. The ratio between the standardised mortality rate of the population in good health and the population in bad health gives a good summary measure of the "predictive power" of self-assessed health with regard to mortality.
In these calculations, the first three months of observation following immediately after the census have been excluded in order to eliminate from the analysis the relatively high mortality in the beginning of the observation period among those in very bad health.

Research Results

Figure 1 presents the proportion of persons in less than good health by age and by nationality of origin for men (figure 1.a) and women (figure 1.b). The chart is limited to Belgian men and women and to some of the most important migrant communities in our country.

The results show impressive health differences between the different migrant communities. The slopes by age and gender in figure 1a and figure 1b indicate a high internal consistency and stress the importance of the influence of health factors over the life course. In short, high prevalence of

poor health can be observed for all nationalities that are part of the typical labour migration, independently of their mortality rates.

Figure 1a: Proportion of persons in less than good health by age and by nationality of origin, men aged 5-79
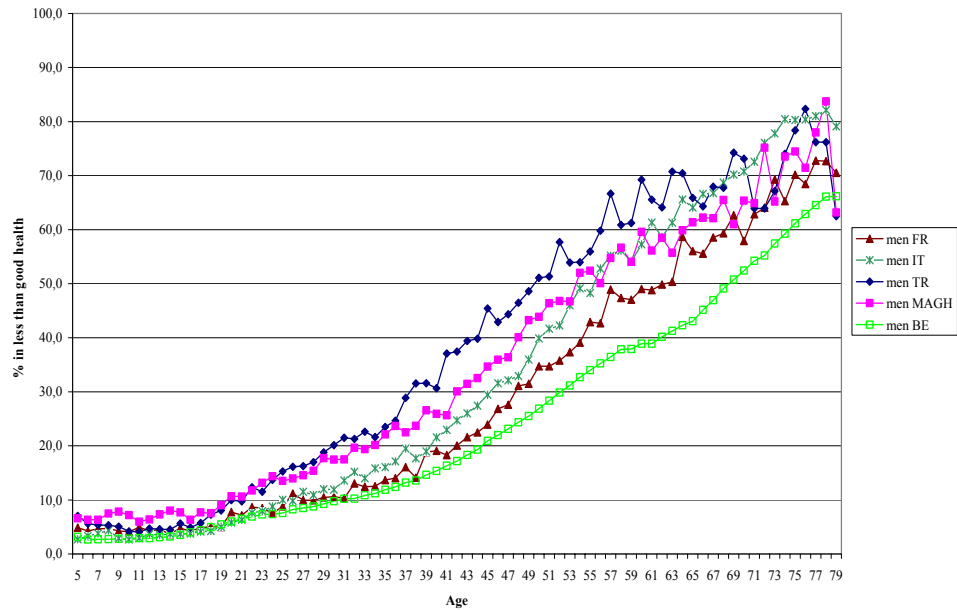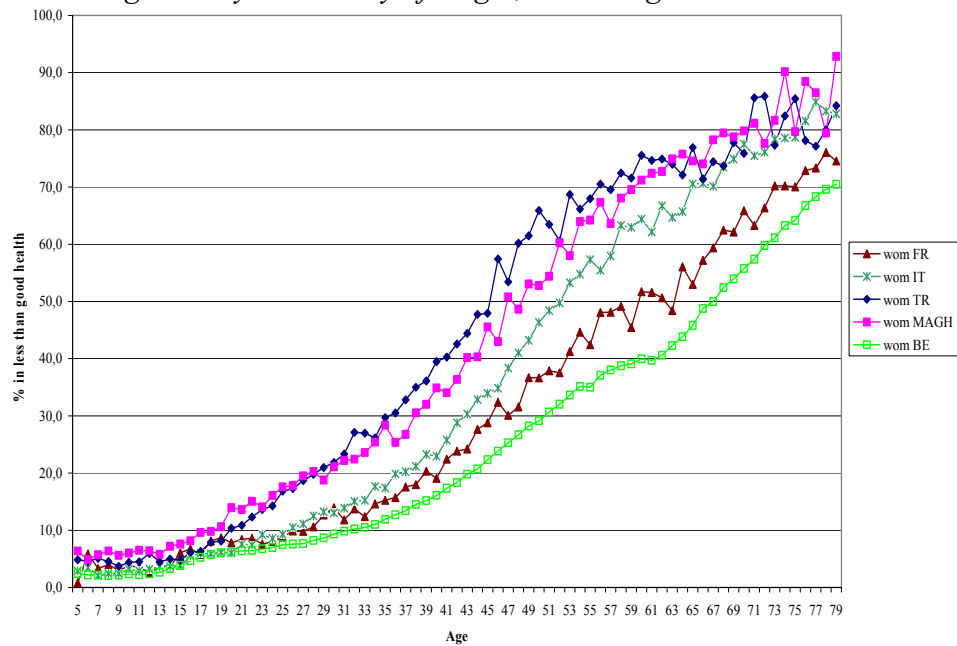

Figure 1b: Proportion of persons in less than good health by age and by nationality of origin, women aged 5-79

The results of the logistic regressions are presented in the tables below. Tables 1 and table 2 give the coefficients for the most important migrant communities in Belgium using the Belgian men or women as reference group.

For men and women aged 25-59, three models have been tested. The first one, the basic model, contains nationality of origin and age as a control factor. The second model introduces three additional control variables, all three indicators of socio-economic status (SES): educational level, housing quality and occupation. The third model, finally, controls for activity status as well.

In the tables below, we only present the coefficients for nationality of origin. The complete tables, including also the coefficients for age and for the socio-economic variables are presented in annex.

Table 1a: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), men aged 25-59

Nationality at birth	Number of persons	Basic model			Basic model + SES			Basic+SES+act.status		
		Exp(B)	CI (99%)		Exp(B)	CI (99%)		Exp(B)	CI (99%)	
			Lower	Upper		Lower	Upper		Lower	Upper
Germany & Luxemburg	12,471	1.07	1.01	1.14	1.08	1.02	1.15	1.12	1.05	1.19
Spain	13,870	1.32	1.25	1.39	1.02	0.97	1.08	1.01	0.95	1.07
France	35,767	1.28	1.23	1.32	1.02	0.99	1.06	0.99	0.96	1.03
United Kingdom	7,676	0.55	0.50	0.60	0.68	0.62	0.74	0.69	0.63	0.76
Greece	5,802	1.30	1.20	1.42	1.06	0.97	1.16	0.91	0.83	1.00
Italy	81,273	1.63	1.60	1.67	1.28	1.25	1.31	1.21	1.18	1.23
Netherlands	31,569	0.80	0.77	0.83	0.86	0.82	0.90	0.84	0.81	0.88
Turkey	24,644	2.67	2.57	2.77	1.65	1.58	1.71	1.20	1.15	1.25
Congo	4,651	0.53	0.46	0.60	0.50	0.44	0.57	0.38	0.33	0.44
Morocco	42,784	2.09	2.03	2.15	1.23	1.19	1.26	0.99	0.95	1.02
Poland	5,094	1.52	1.39	1.65	1.30	1.20	1.42	1.28	1.17	1.40
Portugal	6,445	1.80	1.67	1.94	1.09	1.01	1.18	1.28	1.18	1.39
Belgium	1,937,257	1.00			1.00			1.00		

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel

Table 1b: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), women aged 25-59

Nationality at birth	Number of persons	Basic model			Basic model + SES			Basic + SES + act.status		
		Exp(B)	CI (99%) Lower	Upper	Exp(B)	CI (99%) Lower	Upper	Exp(B)	CI (99%) Lower	Upper
Germany & Luxemburg	13,682	1.08	1.02	1.14	1.02	0.96	1.08	0.97	0.91	1.03
Spain	13,187	1.40	1.32	1.47	1.10	1.04	1.16	1.10	1.03	1.16
France	37,576	1.38	1.34	1.43	1.13	1.09	1.17	1.07	1.03	1.11
United Kingdom	6,428	0.66	0.60	0.73	0.79	0.72	0.87	0.70	0.64	0.77
Greece	4,758	1.68	1.54	1.84	1.36	1.24	1.49	1.31	1.20	1.44
Italy	64,068	1.87	1.83	1.92	1.50	1.47	1.54	1.43	1.40	1.47
Netherlands	28,456	0.85	0.81	0.88	0.85	0.81	0.88	0.78	0.75	0.82
Turkey	14,916	3.78	3.61	3.96	2.15	2.05	2.25	1.72	1.64	1.81
Congo	4,871	1.01	0.91	1.12	0.80	0.72	0.89	0.76	0.68	0.85
Morocco	23,709	3.19	3.07	3.32	1.80	1.73	1.87	1.48	1.42	1.54
Poland	7,449	1.70	1.59	1.82	1.50	1.39	1.60	1.38	1.28	1.48
Portugal	5,756	2.32	2.15	2.51	1.36	1.26	1.47	1.47	1.35	1.59
Belgium	1,833,128	1.00			1.00			1.00		

Source: Statistics Belgium, census 2001

Analysis: Interface Demography, Vrije Universiteit Brussel

The results of the logistic regressions are concordant with international studies showing that poor health among migrant communities is to a large extent attributable to low socio-economic status (Nazroo 1998; Lindström, Sundquist et al. 2001).

Among aged 25-59 (table 1.a), the health inequality for Moroccan men relative to Belgian men becomes insignificant in the third model containing statistical control for activity status. Similarly, the odds ratios among men of Portuguese, Italian or Turkish origin diminish considerably, to respectively 1.28, 1.21 and 1.20. We should be careful however with the interpretation of these results, especially regarding the control for activity status or unemployment because of the evident inverse relationship between health and unemployment.

Among women, the reduction of the odds ratios is less obvious. The status of unemployment has a different impact however on the health of married women, especially among some of the migrant communities.

The only thing we can conclude is that the residual health differences, i.e. the differences that remain significant after control for the socio-economic variables at hand, can also – at least partially – be explained by unobserved socio-economic factors.

The results for the population aged 60-79 are presented in table 2a for men and in table 2b for women. The third model, including activity status, has not been tested for the elderly as most respondents are retired. It is obvious however that the effect of unemployment can have lifetime lasting effects.

Table 2a: Odds ratios for less than good health by nationality of origin, controlled for age (model 1) and socio-economic status (model 2), men aged 60-79

Nationality at birth	Number of persons	Basic model			Basic model + SES		
		Exp(B)	CI (99%)		Exp(B)	CI (99%)	
			Lower	Upper		Lower	Upper
Germany & Luxemburg	3,769	1.25	1.14	1.36	1.37	1.26	1.50
Spain	3,985	1.54	1.42	1.68	1.14	1.04	1.24
France	8,271	1.49	1.41	1.59	1.36	1.28	1.45
United Kingdom	1,321	0.62	0.53	0.72	0.76	0.66	0.89
Greece	2,004	1.99	1.76	2.24	1.54	1.36	1.75
Italy	21,695	2.37	2.28	2.47	1.91	1.83	1.98
Netherlands	10,664	0.72	0.69	0.76	0.83	0.79	0.88
Turkey	2,980	2.62	2.37	2.90	1.82	1.64	2.02
Congo	286	0.87	0.63	1.19	1.13	0.82	1.56
Morocco	6,709	1.97	1.84	2.10	1.29	1.21	1.38
Poland	3,149	2.09	1.89	2.31	1.98	1.78	2.19
Portugal	863	1.71	1.43	2.05	1.35	1.12	1.63
Belgium	686,446	1.00			1.00		

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel

Table 2b: Odds ratios for less than good health by nationality of origin, controlled for age (model 1) and socio-economic status (model 2), women aged 60-79

Nationality at birth	Number of persons	Basic model			Basic model + SES		
		Exp(B)	CI (99%)		Exp(B)	CI (99%)	
			Lower	Upper		Lower	Upper
Germany & Luxemburg	6,806	1.21	1.13	1.29	1.22	1.14	1.31
Spain	3,751	1.63	1.49	1.78	1.26	1.15	1.38
France	13,157	1.47	1.40	1.55	1.37	1.31	1.44
United Kingdom	1,051	0.64	0.54	0.75	0.76	0.64	0.90
Greece	1,584	2.45	2.12	2.83	1.92	1.66	2.23
Italy	17,874	2.47	2.36	2.58	2.06	1.97	2.16
Netherlands	9,713	0.71	0.68	0.75	0.78	0.74	0.82
Turkey	1,603	3.68	3.15	4.30	2.61	2.23	3.05
Congo	252	1.88	1.34	2.65	1.78	1.25	2.52
Morocco	2,333	4.04	3.54	4.60	2.63	2.30	3.00
Poland	3,780	2.19	1.99	2.41	2.12	1.92	2.33
Portugal	716	2.40	1.94	2.96	1.80	1.45	2.23
Belgium	713,300	1.00			1.00		

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel

As with women in the younger age group, there clearly is a residual unexplained inequality in the older age group. This residual inequality can again be due to hidden socio-economic factors however.

Turning to the discussion on the role that cultural factors play in the assessment of health, there clearly is a lack of external criteria to calibrate responses and to measure the part of true health differences and the part of "cultural" judgement differences. Identifying comparable homogeneous groups across populations gives us a clue to evaluate the importance of the cultural factor versus the importance of a true underlying health component. This can also be achieved by controlling for socio-economic factors. The introduction of socio-economic control variables has the expected effect: health differences between nationalities clearly diminish and almost reduce to zero for some nationalities. This confirms the importance of socio-economic status as an intervening or as a basic factor in the health outcome.

Based on these research results, we cannot exclude the effect of cultural aspects on self-assessed health however. It would be surprising if there was no influence of cultural aspects at all. Perception and cognitive processes of health and psychological feelings are by definition shaped by a general state of mind. However, socio-economic aspects clearly dominate health inequalities: socio-economic status variables have a considerable impact on health inequalities by nationality of origin and residual inequalities are relatively minor.

The comparison of these outcomes with the patterns observed for mortality reveals some interesting facts. Turkish men and women, for instance, show the highest proportion of persons in less than good health but also have a lower mortality than the Belgian population. Similarly, Moroccan men show the lowest mortality rates after control for socio-economic status, but also have the second worst health, which is entirely explained by socio-economic variables however. Dutch men and women have good health and low mortality compared to the Belgian population and both groups are relatively insensitive to SES factors. French men and women have bad health and high mortality, both improving considerably after control for socio-economic factors (Deboosere and Gadeyne 2005).

To test the relationship between self-assessed health and mortality, we have calculated the ratio of the mortality rates of persons in good health and the mortality rates of persons in less than good health by gender and age. Mortality rates have been computed for 2002 and 2003, excluding the first two months after the census. The graph presenting these ratios gives a good

estimation of the complex relationship between self-assessed health and mortality by gender (figure 3).

Figure 3: Ratio of the mortality rates of persons in less than good health and mortality rates of persons in good health, men and women aged 18-99
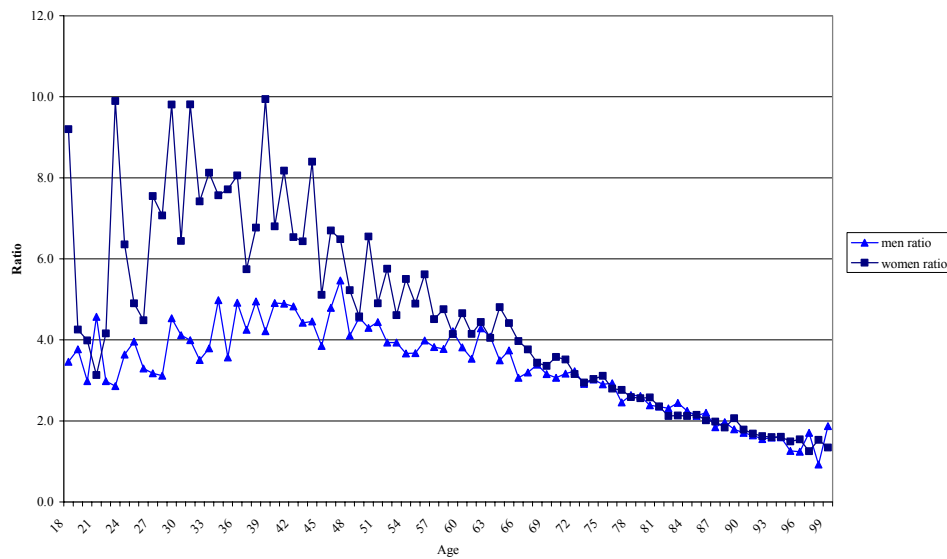
At younger age, self-perceived health clearly is a very strong predictor of mortality. Before the age of 72, the risk of dying is more than 3 times higher among persons with less than good health. Among women, results are more volatile, due to their lower mortality. But the predictability of self-perceived health is also much greater among women than among men, especially at younger age, between 18 and 45, but also after this age until 72 years.

This pattern is apparently in contradiction with the argument that women may be healthier than men, as evidenced by their lower mortality, but are more likely to report less-serious ailments. In fact, our data show that the number of women in bad health is only slightly higher than the number of men in bad health on specific ages, probably through gender-specific biological processes, and that these proportions only really diverge at older ages. Mortality among those in bad health is almost equal for men and women. The difference stems from men in good health showing a higher mortality than women in good health. The main problem probably arises from sudden causes of death among men in good health.

This conclusion suggests that it is probably incorrect to reduce differences in self-assessed health between men and women to problems of different perception. It seems much more probable that, taking into account gender-specific biological factors, men and women are not so different in assessing their health.

Mortality data by nationality are too small to plot the ratios of mortality rates by age and nationality of origin. As a consequence a summary measure has been calculated using the age standardised mortality rates by self-assessed health status. The summary index is presented in table 3. This table combines gender with nationality creating subgroups of gender and nationality in order to distinguish the gender-specific health status by nationality. The population in the table has been limited to the age group 6-71 years. Beyond the age of 71, the proportion of people in bad health is increasing rapidly as well as mortality and the difference between men and women in the "predictive" power of self-perceived health for mortality disappears. In addition, the very small number of older persons in some migrant groups makes the standardisation unreliable.
As described above, the summary index consists of the ratio of the indirectly standardised mortality rates of persons in good health and the indirectly standardised mortality rates of persons in bad health, constituting a good summary measure for the "predictive power" of self-assessed health for mortality. This ratio is then divided by the ratio observed for Belgian women. The results have to be interpreted with caution especially for groups with less than hundred deaths.

The overall picture is one of a very strong predictive force of self-assessed health for mortality even without including the first three months of observation immediately after the census and preserving an observation period of two years. Controlling for age, persons who declare to be in less than good health have a more than sevenfold larger risk of dying during the observation period than persons who declare to be in good health.

An interesting result is that the differences in predictive force between men and women reveal to be at least as important as the differences between nationality groups. In addition, the predictive force of poor self-assessed health for mortality appears to be inversely related to the proportion of the population in bad health.
A bad concordance between self-assessed health and mortality can result from people who declared to be in good health but who died during the observation period and to people who declared to be in less than good health but who survived. The occurrence of a large number of non-fatal health

conditions diminishes the relevance of self-assessed health as a predictor for mortality. Inversely, the occurrence of sudden death without a long health history probably explains the differences in pattern between men and women as illustrated partially in graph 3.

Table 3: Ratio of the indirectly standardised mortality rates of persons in less than good health and the indirectly standardised mortality rates of persons in good health, comparison to the ratio observed for Belgian women, by nationality and gender, men and women aged 6-71

Nationality of origin	(1)	(2)	(3)	(4)	(5)
women Portugal	26	4	280	66	6
women United Kingdom	24	6	186	29	3
women Greece	32	5	62	13	1
women Italy	521	7	79	11	1
women Belgium	19,410	10	102	11	1
women Germany	176	11	111	10	1
women Netherlands	240	10	101	10	1
women Spain	97	7	57	9	1
women France	396	10	86	8	1
men Netherlands	472	18	151	8	1
men Spain	209	19	143	7	1
men Poland	128	22	159	7	1
men Congo	49	24	165	7	1
women Poland	95	9	62	7	1
women Turkey	113	8	54	7	1
men United Kingdom	72	17	108	6	1
men Belgium	35,436	23	142	6	1
women Morocco	190	9	51	6	1
men France	616	24	135	6	1
men Portugal	58	21	112	5	1
men Italy	1,114	19	99	5	1
men Greece	94	20	89	5	0
men Germany	221	24	108	5	0
men Turkey	221	19	87	4	0
men Morocco	430	20	68	3	0
women Congo	36	13	41	3	0

(1) Total number of deaths in de period 2002-2003 of the censuspopulation aged 6 to 71 year (1/10/20(
(2) Indirect standardised mortality rate pro 10.000 persons in good health in the 2001 census
(3) Indirect standardised mortality rate pro 10.000 persons in less than good health in the 2001 census
(4) Ratio mortality in bad health compared to mortality in good health
(5) Ratio compared to ratio of Belgian women

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel

There is a clear gender pattern observed for all nationalities: women tend to show a better concordance between self-assessed health and mortality than men do, with the exception of women from Poland and Congo.

Self-assessed health among women of Portugal, Greece and Italy is even more predictive for mortality than among Belgian women. Men of these countries, on the contrary, are clustered on the opposite side of the distribution with a concordance that is worse than in the Belgian population. Men of these nationalities were among the first labour migrants after the Second World War. They probably combine bad general health due to hard labour conditions with heart failure in younger ages and a higher frequency of external causes of death.

Moroccan and Turkish men and women both show a relatively bad concordance inside their gender group, although Moroccan and Turkish women do not differ fundamentally from Belgian men.

Discussion

The apparent paradox of low mortality and high morbidity in immigrant populations is comparable to the findings for gender differences. Differences in predictive power do not mean that health assessment is better or worse. Realities simply overlap. Considering mortality as the "hard fact" and "self-assessed health" as the soft health fact is a popular, but erroneous approach. Both self-assessed health and mortality measure the same underlying general population health. Together they give a better picture of the health composition of a population. Cultural or language biases can be involved for a small fraction of the total difference in self-assessed health of some migrant populations.

In a recent article, Case and Paxson (2005) concluded that "*The hypothesis that sex differences in self-rated health can be entirely explained by sex differences in the distribution of conditions is confirmed. (…) The severity effects that disadvantage men are driven mainly by a small number of smoking-related conditions.*" Based on the analysis of our data, we are convinced that a parallel conclusion can be drawn for the migrant communities. Given the fact that measurement errors due to the questionnaire design or to the question wording occurring in cross-national comparisons are absent in this study, cultural influenced differences in self-assessed health appear to be minimal. Self-assessed health appears to be highly predictive for mortality, but clearly covers a different reality in different national groups. When controlling the predictive force of self-

assessed health for mortality, the differences between genders inside each nationality often appear to be more important than differences between some nationality groups.

We cannot compute the exact effect of cultural factors in the assessment of health, but the tabulation and analyses of the data in the Belgian census is rather confirming the importance of real health problems when people report poor health. Real health differences appear to explain the bulk of the difference when using a standardised survey tool The high proportions of persons in less than good health reflect a true poor health status among some migrant communities. The different patterns are probably the consequence of living and working conditions (SES) negatively influencing general health, and "cultural" based health behaviour (smoking, alcohol consumption, nutritional patterns and suicide), positively influencing mortality.

Self-assessed health can be used as one of the relative reliable indicators to detect real health problems inside migrant communities, even if they appear to have relatively modest mortality rates.

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Table A.1a: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), men aged 25-59 (full table)

	N	Basic model			Basic model + SES			Basic model + SES + act.status		
		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)	
			Lower	Upper		Lower	Upper		Lower	Upper
Nationality at birth										
Germany & Luxemburg	12,471	1.07	1.01	1.14	1.08	1.02	1.15	1.12	1.05	1.19
Spain	13,870	1.32	1.25	1.39	1.02	0.97	1.08	1.01	0.95	1.07
France	35,767	1.28	1.23	1.32	1.02	0.99	1.06	0.99	0.96	1.03
United Kingdom	7,676	0.55	0.50	0.60	0.68	0.62	0.74	0.69	0.63	0.76
Greece	5,802	1.30	1.20	1.42	1.06	0.97	1.16	0.91	0.83	1.00
Italy	81,273	1.63	1.60	1.67	1.28	1.25	1.31	1.21	1.18	1.23
Netherlands	31,569	0.80	0.77	0.83	0.86	0.82	0.90	0.84	0.81	0.88
Turkey	24,644	2.67	2.57	2.77	1.65	1.58	1.71	1.20	1.15	1.25
Congo	4,651	0.53	0.46	0.60	0.50	0.44	0.57	0.38	0.33	0.44
Morocco	42,784	2.09	2.03	2.15	1.23	1.19	1.26	0.99	0.95	1.02
Poland	5,094	1.52	1.39	1.65	1.30	1.20	1.42	1.28	1.17	1.40
Portugal	6,445	1.80	1.67	1.94	1.09	1.01	1.18	1.28	1.18	1.39
Belgium	1,937,257	1.00								
Age		1.07	1.07	1.07	1.07	1.07	1.07	1.05	1.05	1.05
Educational level										
No answer	67,641				2.87	2.79	2.96	2.19	2.13	2.26
No formal education	64,518				2.74	2.66	2.82	2.16	2.09	2.23
Primary education	201,521				2.80	2.74	2.87	2.28	2.23	2.34
Lower secondary professional education	214,374				2.31	2.26	2.37	2.07	2.02	2.12
Lower secondary technical education	214,155				1.97	1.92	2.01	1.86	1.81	1.90
Lower secondary education	127,956				2.14	2.09	2.19	1.89	1.84	1.94
Higher secondary professional education	186,631				1.98	1.93	2.03	1.82	1.77	1.87
Higher secondary technical education	301,464				1.55	1.52	1.59	1.52	1.48	1.55
Higher secondary education	191,408				1.69	1.65	1.73	1.55	1.51	1.59
Higher non academic	391,977				1.38	1.35	1.41	1.34	1.31	1.37
Higher academic	297,887				1.00			1.00		

Table A.1a: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), men aged 25-59 (full table – continued)

	N	Basic model			Basic model + SES			Basic model + SES + act.status		
		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)	
			Lower	Upper		Lower	Upper		Lower	Upper
Housing quality										
Tenant, low quality housing	60,095				2.58	2.51	2.65	2.31	2.24	2.38
Tenant unknown	406,876				1.62	1.60	1.65	1.54	1.51	1.57
Tenant, basic quality housing	381,083				1.42	1.40	1.45	1.39	1.37	1.42
Owner, low quality housing	385,736				1.30	1.28	1.32	1.28	1.26	1.31
Tenant, mean quality housing	18,659				2.84	2.71	2.97	2.16	2.06	2.27
Owner unknown	60,150				3.65	3.55	3.76	2.62	2.55	2.70
Tenant, high quality housing	217,834				2.61	2.56	2.66	1.99	1.95	2.03
Owner, basic quality houisng	164,799				2.11	2.07	2.16	1.75	1.71	1.79
Owner, mean quality housing	101,101				1.70	1.65	1.74	1.49	1.45	1.54
Tenant, very high quality housing	40,842				1.32	1.26	1.37	1.19	1.14	1.24
Owner, high quality housing	30,523				1.85	1.78	1.92	1.75	1.68	1.82
Owner, very high quality housing	391,834				1.00			1.00		
Occupation										
Tenured job, public sector	338,172				1.13	1.11	1.15	1.33	1.31	1.35
Non-tenured job, public sector	106,131				1.30	1.26	1.33	1.31	1.28	1.35
Manager	72,367				0.88	0.86	0.91	0.92	0.89	0.95
Manual worker, private sector	570,796				1.40	1.38	1.43	1.31	1.29	1.33
Self-employed	280,209				1.00	0.98	1.02	1.06	1.04	1.08
Helper self-employed	19,185				1.72	1.64	1.80	1.31	1.24	1.38
Household servers	2,299				1.93	1.71	2.18	1.50	1.32	1.71
Other or no statute	46,596				2.28	2.21	2.35	1.56	1.51	1.62
Not answered	284,166				1.62	1.59	1.64	1.36	1.33	1.38
Employee, private sector	539,611				1.00			1.00		
Activity Status										
Other	13,010							3.90	3.71	4.10
Jobseeking	121,920							3.12	3.07	3.18
Retitred	96,838							1.69	1.66	1.73
Does not work anymore	123,665							11.77	11.54	12.00
Working	1,904,099							1.00		
Nagelkerke Pseudo R		0.09			0.17			0.26		

Source: Statistics Belgium, census 2001

Analysis: Interface Demography, Vrije Universiteit Brussel

Table A.1b: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), women aged 25-59 (full table)

	N	Basic model Exp(B)	Confidence Interval (99%) Lower	Upper	Basic model + SES Exp(B)	Confidence Interval (99%) Lower	Upper	Basic model + SES + act.status Exp(B)	Confidence Interval (99%) Lower	Upper
Nationality at birth										
Germany & Luxemburg	13,682	1.08	1.02	1.14	1.02	0.96	1.08	0.97	0.91	1.03
Spain	13,187	1.40	1.32	1.47	1.10	1.04	1.16	1.10	1.03	1.16
France	37,576	1.38	1.34	1.43	1.13	1.09	1.17	1.07	1.03	1.11
United Kingdom	6,428	0.66	0.60	0.73	0.79	0.72	0.87	0.70	0.64	0.77
Greece	4,758	1.68	1.54	1.84	1.36	1.24	1.49	1.31	1.20	1.44
Italy	64,068	1.87	1.83	1.92	1.50	1.47	1.54	1.43	1.40	1.47
Netherlands	28,456	0.85	0.81	0.88	0.85	0.81	0.88	0.78	0.75	0.82
Turkey	14,916	3.78	3.61	3.96	2.15	2.05	2.25	1.72	1.64	1.81
Congo	4,871	1.01	0.91	1.12	0.80	0.72	0.89	0.76	0.68	0.85
Morocco	23,709	3.19	3.07	3.32	1.80	1.73	1.87	1.48	1.42	1.54
Poland	7,449	1.70	1.59	1.82	1.50	1.39	1.60	1.38	1.28	1.48
Portugal	5,756	2.32	2.15	2.51	1.36	1.26	1.47	1.47	1.35	1.59
Belgium	1,833,128	1.00								
Age		1.08	1.07	1.08	1.07	1.07	1.07	1.05	1.05	1.05
Educational level										
No answer	53,327				3.28	3.16	3.39	2.77	2.68	2.87
No formal education	55,670				3.16	3.06	3.27	2.60	2.51	2.70
Primary education	181,670				3.18	3.09	3.27	2.54	2.47	2.61
Lower secondary professional education	225,329				2.64	2.57	2.71	2.16	2.10	2.22
Lower secondary technical education	97,374				2.24	2.17	2.31	1.92	1.86	1.98
Lower secondary education	151,671				2.41	2.34	2.48	2.04	1.98	2.10
Higher secondary professional education	216,792				2.10	2.04	2.16	1.79	1.74	1.84
Higher secondary technical education	188,641				1.64	1.60	1.69	1.48	1.44	1.53
Higher secondary education	209,383				1.68	1.64	1.73	1.53	1.49	1.57
Higher non academic	536,123				1.33	1.30	1.36	1.28	1.24	1.31
Higher academic	188,356				1.00			1.00		

Table A.1b: Odds ratios for less than good health by nationality of origin controlled for age (model 1), socio-economic status (model 2) and activity status (model 3), women aged 25-59 (full table – continued)

	N	Basic model			Basic model + SES			Basic model + SES + act.status		
		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)	
			Lower	Upper		Lower	Upper		Lower	Upper
Housing quality										
Tenant, low quality housing	46,906				2.25	2.18	2.32	2.35	2.28	2.43
Tenant unknown	359,423				1.53	1.50	1.56	1.59	1.56	1.62
Tenant, basic quality housing	362,630				1.38	1.35	1.40	1.43	1.40	1.45
Owner, low quality housing	371,414				1.26	1.23	1.28	1.29	1.27	1.31
Tenant, mean quality housing	17,098				2.63	2.51	2.75	2.70	2.58	2.84
Owner unknown	46,287				3.50	3.39	3.61	3.38	3.28	3.49
Tenant, high quality housing	185,536				2.60	2.54	2.65	2.56	2.51	2.62
Owner, basic quality houisng	164,117				2.23	2.18	2.28	2.27	2.22	2.32
Owner, mean quality housing	106,261				1.82	1.77	1.86	1.84	1.79	1.88
Tenant, very high quality housing	41,135				1.43	1.38	1.49	1.40	1.34	1.45
Owner, high quality housing	26,903				1.66	1.59	1.73	1.79	1.72	1.87
Owner, very high quality housing	376,626				1.00			1.00		
Occupation										
Tenured job, public sector	295,892				1.16	1.14	1.18	1.44	1.42	1.47
Non-tenured job, public sector	189,368				1.12	1.10	1.15	1.25	1.23	1.28
Manager	17,162				0.89	0.84	0.94	1.01	0.95	1.07
Manual worker, private sector	268,516				1.32	1.30	1.34	1.18	1.16	1.20
Self-employed	154,034				0.94	0.92	0.96	1.00	0.98	1.02
Helper self-employed	52,930				1.01	0.98	1.04	0.99	0.96	1.02
Household servers	36,898				1.54	1.49	1.59	1.35	1.30	1.39
Other or no statute	86,385				1.72	1.68	1.76	1.41	1.37	1.44
Not answered	347,640				1.38	1.36	1.40	1.19	1.17	1.20
Employee, private sector	655,511				1.00			1.00		
Activity Status										
Other	41,657							1.89	1.84	1.95
Jobseeking	178,330							2.56	2.52	2.60
Retitred	82,644							2.07	2.03	2.12
Does not work anymore	363,419							3.61	3.57	3.66
Working	1,438,286							1.00		
Nagelkerke Pseudo R		0.11			0.18			0.23		

Source: Statistics Belgium, census 2001

Analysis: Interface Demography, Vrije Universiteit Brussel

Table A.2a: Odds ratios for less than good health by nationality of origin controlled for age (model 1)
and socio-economic status (model 2), men aged 60-79 (full table)

	N	Basic model			Basic model + SES		
		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)	
			Lower	Upper		Lower	Upper
Nationality at birth							
Germany & Luxemburg	3,769	1.25	1.14	1.36	1.37	1.26	1.50
Spain	3,985	1.54	1.42	1.68	1.14	1.04	1.24
France	8,271	1.49	1.41	1.59	1.36	1.28	1.45
United Kingdom	1,321	0.62	0.53	0.72	0.76	0.66	0.89
Greece	2,004	1.99	1.76	2.24	1.54	1.36	1.75
Italy	21,695	2.37	2.28	2.47	1.91	1.83	1.98
Netherlands	10,664	0.72	0.69	0.76	0.83	0.79	0.88
Turkey	2,980	2.62	2.37	2.90	1.82	1.64	2.02
Congo	286	0.87	0.63	1.19	1.13	0.82	1.56
Morocco	6,709	1.97	1.84	2.10	1.29	1.21	1.38
Poland	3,149	2.09	1.89	2.31	1.98	1.78	2.19
Portugal	863	1.71	1.43	2.05	1.35	1.12	1.63
Belgium	686,446	1.00					
Age		1.07	1.07	1.07	1.06	1.06	1.06
Educational level							
No answer	76,867				2.52	2.44	2.61
No formal education	49,692				2.41	2.32	2.50
Primary education	240,371				2.20	2.14	2.27
Lower secondary professional education	49,225				2.06	1.99	2.14
Lower secondary technical education	54,320				1.86	1.80	1.93
Lower secondary education	72,340				1.77	1.71	1.83
Higher secondary professional education	19,512				1.91	1.82	2.00
Higher secondary technical education	35,056				1.58	1.53	1.65
Higher secondary education	52,303				1.37	1.32	1.42
Higher non academic	58,382				1.28	1.23	1.32
Higher academic	52,296				1.00		

Table A.2a: Odds ratios for less than good health by nationality of origin controlled for age (model 1) and socio-economic status (model 2), men aged 60-79 (full table – continued)

	N	Basic model			Basic model + SES		
		Exp(B)	Confidence Interval (99%)		Exp(B)	Confidence Interval (99%)	
			Lower	Upper		Lower	Upper
Housing quality							
Tenant, low quality housing	45,704				1.84	1.78	1.91
Tenant unknown	174,703				1.43	1.39	1.46
Tenant, basic quality housing	162,098				1.32	1.29	1.35
Owner, low quality housing	120,901				1.23	1.20	1.26
Tenant, mean quality housing	9,022				1.99	1.87	2.11
Owner unknown	19,730				2.25	2.15	2.35
Tenant, high quality housing	53,602				1.86	1.80	1.92
Owner, basic quality houisng	41,389				1.67	1.61	1.72
Owner, mean quality housing	18,987				1.49	1.42	1.55
Tenant, very high quality housing	6,678				1.16	1.08	1.24
Owner, high quality housing	24,634				1.68	1.61	1.75
Owner, very high quality housing	82,916				1.00		
Occupation							
Tenured job, public sector	121,077				1.02	1.00	1.05
Non-tenured job, public sector	17,935				1.07	1.02	1.12
Manager	26,230				0.93	0.89	0.96
Manual worker, private sector	156,134				1.26	1.23	1.28
Self-employed	98,997				1.12	1.09	1.15
Helper self-employed	5,677				1.39	1.29	1.50
Household servers	937				1.43	1.20	1.71
Other or no statute	14,374				1.49	1.42	1.56
Not answered	195,214				1.26	1.24	1.29
Employee, private sector	123,789				1.00		
Nagelkerke Pseudo R		0.05			0.10		

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel

Table A.2b: Odds ratios for less than good health by nationality of origin controlled for age (model 1) and socio-economic status (model 2), women aged 60-79 (full table)

	N	**Basic model** Exp(B)	Confidence Interval (99%) Lower	Upper	**Basic model + SES** Exp(B)	Confidence Interval (99%) Lower	Upper
Nationality at birth							
Germany & Luxemburg	6,806	1.21	1.13	1.29	1.22	1.14	1.31
Spain	3,751	1.63	1.49	1.78	1.26	1.15	1.38
France	13,157	1.47	1.40	1.55	1.37	1.31	1.44
United Kingdom	1,051	0.64	0.54	0.75	0.76	0.64	0.90
Greece	1,584	2.45	2.12	2.83	1.92	1.66	2.23
Italy	17,874	2.47	2.36	2.58	2.06	1.97	2.16
Netherlands	9,713	0.71	0.68	0.75	0.78	0.74	0.82
Turkey	1,603	3.68	3.15	4.30	2.61	2.23	3.05
Congo	252	1.88	1.34	2.65	1.78	1.25	2.52
Morocco	2,333	4.04	3.54	4.60	2.63	2.30	3.00
Poland	3,780	2.19	1.99	2.41	2.12	1.92	2.33
Portugal	716	2.40	1.94	2.96	1.80	1.45	2.23
Belgium	713,300	1.00					
Age		1.08	1.07	1.08	1.06	1.06	1.07
Educational level							
No answer	88,707				2.75	2.59	2.92
No formal education	52,542				2.83	2.66	3.01
Primary education	281,999				2.51	2.37	2.66
Lower secondary professional education	74,997				2.20	2.07	2.33
Lower secondary technical education	26,104				1.86	1.74	1.98
Lower secondary education	93,635				1.95	1.84	2.07
Higher secondary professional education	30,257				1.80	1.69	1.92
Higher secondary technical education	17,769				1.54	1.43	1.64
Higher secondary education	43,656				1.43	1.34	1.52
Higher non academic	62,498				1.24	1.17	1.32
Higher academic	10,741				1.00		

Table A.2b: Odds ratios for less than good health by nationality of origin controlled for age (model 1) and socio-economic status (model 2), women aged 60-79 (full table – continued)

	N	Basic model Exp(B)	Confidence Interval (99%) Lower	Upper	Basic model + SES Exp(B)	Confidence Interval (99%) Lower	Upper
Housing quality							
Tenant, low quality housing	48,420				1.96	1.89	2.02
Tenant unknown	180,415				1.50	1.46	1.54
Tenant, basic quality housing	157,452				1.38	1.35	1.42
Owner, low quality housing	114,326				1.24	1.21	1.28
Tenant, mean quality housing	13,560				2.07	1.96	2.18
Owner unknown	22,133				2.46	2.35	2.57
Tenant, high quality housing	65,254				2.02	1.96	2.08
Owner, basic quality houisng	55,592				1.80	1.74	1.86
Owner, mean quality housing	21,763				1.49	1.43	1.56
Tenant, very high quality housing	6,246				1.20	1.12	1.29
Owner, high quality housing	29,056				1.72	1.66	1.79
Owner, very high quality housing	68,688				1.00		
Occupation							
Tenured job, public sector	64,935				1.12	1.09	1.15
Non-tenured job, public sector	17,524				1.05	1.00	1.10
Manager	4,258				0.87	0.80	0.95
Manual worker, private sector	103,018				1.14	1.11	1.16
Self-employed	62,065				1.05	1.02	1.08
Helper self-employed	39,885				1.08	1.04	1.11
Household servers	25,238				1.17	1.13	1.22
Other or no statute	36,750				1.18	1.14	1.22
Not answered	326,504				1.09	1.06	1.11
Employee, private sector	102,728				1.00		
Nagelkerke Pseudo R		0.06			0.10		

Source: Statistics Belgium, census 2001
Analysis: Interface Demography, Vrije Universiteit Brussel