Re-examining the selection and acculturation effects on immigrants' health: An analysis of overweight among immigrants in France and Spain

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ABSTRACT

Recent studies on immigrants' health shed light on the importance of selection and acculturation processes, but also point out differences according to the country of origin. We study how differences in overweight between natives and immigrants can vary according to birthplace, country of arrival, acculturation, and socioeconomic status. Based on national health interview surveys in Spain and France, we use probit estimations and a Blinder-Oaxaca type of decomposition adequate for binary data model to distinguish the part of the overweight difference that is explained by individual characteristics from the part explained by differences in coefficients. Our results show a 'healthy immigrant effect' for men in Spain but a higher likelihood of being overweight among women immigrants regardless of the country of arrival. Our results suggest that birthplace and acculturation as measured by citizenship status are the main explanation for these effects. Our decomposition results reveal that the difference of overweight prevalence between women natives and immigrants is mainly explained by differences in coefficients indicating a specific pattern of immigrant overweight.

Keywords: Migration, obesity, international comparisons, social health inequalities

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INTRODUCTION

There is today vast evidence of a specific effect of migration on health: immigrants and minority ethnic groups have a different health status to natives (Gushulak et al. 2010), which can only partly be explained by differences in socioeconomic characteristics (Jusot et al. 2009). Differences between natives and migrants vary in direction and intensity according to health dimension and migrant group. In Europe, migrants present lower risks of cancer, higher risks of maternal and perinatal health problems, and a higher prevalence of diabetes which varies between groups (Rechel et al. 2013). In France, results based on subjective health self-assessments show health inequalities related to immigration in favour of natives (Jusot et al. 2009).

The literature on the social determinants of health (Shaw et al. 1999) points to selection and acculturation as decisive factors in explaining differences between natives and migrants. According to the 'healthy migrant effect', the migration process represents first a selection that would select immigrants with better health status than natives. The acculturation process hypothesis states that changes may result during the time of residence, from continuous contact with the host country culture, and alter immigrants' health and health behaviours.

In the literature on immigrants' mental health, acculturation is generally presented according to an acculturation stress effect, according to which initial cultural differences between origin and new cultures can affect newcomers' mental health which progressively diminishes (Berry 1980). In the literature on obesity and risky behaviours, acculturation is mostly presented as a counter effect to an initial healthy immigrant effect, and many US and Canadian studies have indeed shown that recent immigrants are healthier (less obese) than previous immigrants, who have since converged with natives' standards (Antecol and Bedard 2006, McDonald and Kennedy 2004, 2005, Jusot et al. 2009, Goel et al. 2004).

However, the consequences of these selection and acculturation processes are not uniform. They may vary in direction and intensity across health dimensions according to origin, and characteristics of immigrants (Leung 2014, Kaushal 2009). While several studies focused either on the role of the country of origin or on the role of the destination country, no study has so far combined these two approaches to explain differences in health between immigrants and non-immigrants as well as among immigrants. Understanding what is relevant to the birthplace or to the country of arrival can inform policymaking decisions regarding immigrants. Our study represents a first attempt to address this issue, through the comparison of immigrants in two European countries, France and Spain.

In our study, we focus on immigrant overweight, for three reasons. Firstly because overweight prevalence is common and increasing in immigrants' origin countries as well as destination countries. Secondly, because overweight is socially unequally distributed in developed as well as in developing countries. Thirdly because it is linked with individual behaviours that may be culturally specific to the country of origin and the country of arrival, and subject to acculturation processes.

According to the World Health Organization obesity is 'an abnormal or excessive fat accumulation that may impair health' (WHO 2012). It results from a caloric imbalance, i.e. a combination of excess caloric intake and physical inactivity (Koplan and Dietz 1999). During the last two decades of the twentieth century, large increases in overweight and obesity prevalence have been witnessed in developed as well as in developing and intermediate countries. The worldwide prevalence of obesity doubled from 1980 to 2014 (WHO 2014a, WHO 2015), and the number of overweight now exceeds the number of undernourished people in the world for the first time in history (Popkin 2008). North Africa and the Middle East, from which a significant part of current immigrants to Europe originate, report particularly high overweight prevalence. The overweight prevalence rates among women in Morocco (respectively Tunisia) increased from 56 per cent (62.9 per cent) in 2010 to 59 per cent (66.5 per cent) in 2014 (WHO 2014b). In Egypt, women overweight increased from 63.4 per cent to 68.2 per cent during the same period (Ng et al. 2013).

The obesity epidemic raises public health, financial sustainability of health systems, and equity issues (Finkelstein et al. 2005, 2009). Obesity affects the health of populations (obesity has a direct effect on co-morbidities such as diabetes, high blood pressure and ischemic diseases), but it does not affect every social group identically. In developed countries, the condition is more prevalent among lower socioeconomic groups, and among men as opposed to women. Developing countries show the reverse socioeconomic and gender gradients, obesity being more frequent among the better off (Monteiro et al. 2004) and among women, who present nearly twice the obesity prevalence of men in North Africa (WHO 2014b).

Canadian and US studies have investigated overweight in immigrants and have shown that newly arrived immigrants show lower overweight prevalence than natives, but then progressively converge to native standards over time (McDonald and Kennedy 2005 on Canada; Antecol and Bedard 2006 and Goel et al. 2004 on the US). These trends are not homogeneous and vary across countries of origin and individual levels of education. While Hispanic immigrants and less-educated immigrants experience an increase in obesity prevalence, Asians and White immigrants, as well as more-educated immigrants, experience slight or no increase at all (Kaushal 2009). While a large part of these studies address the US, where overweight prevalence is particularly high, few studies have investigated European countries which present a growing obesity prevalence (WHO 2014b, Sassi 2009).

We study two Western European countries, France and Spain, which host large groups of immigrants from common origins, which differ in terms of obesity distribution and prevalence, and for which there exist survey data on obesity, socioeconomic and immigration status. France has a long history of hosting immigrants, and Spain turned in the 1980s from an emigration to an immigration country, in line with the rapid economic growth which followed its integration to the European Union (Castles and Miller 2009). Nevertheless, both countries present comparable rates of immigrants and are now hosting large immigrant groups from North Africa (Arslan et al. 2015). Information on immigrant health across Europe remains scarce (Rechel et al. 2012), and only a few studies have addressed overweight in North African immigrants. Besides, the presence of North African immigrants in both countries makes possible a comparison of overweight among immigrants from common origins in different destination countries. The comparison of North African immigrant health between an old country of immigration and a recent one will help understand acculturation processes and contribute to public health policies addressing obesity and immigration.

This paper is structured as follows. In Section 2, we describe the Spanish and French surveys and report the associated descriptive statistics. Then we explain in Section 3 the empirical framework used to identify the determinants of being overweight and develop the decomposition method for binary data models. Section 4 reports the econometric results, and Section 5 concludes.

DATA

Our empirical analysis employs two representative population-country datasets from national general population health interview surveys from France and Spain.

We used the French 'Enquête Santé et Protection Sociale (ESPS)', collected by the 'Institute for research and information in health economics (IRDES)' in 2006, 2008 and 2010. This sample represented 21,204 individuals and is representative for France across the period. For Spain, we used the 'Encuesta Nacional de Salud' in 2006/2007 and in 2009. Both waves are used in our analysis and are representative of the Spanish population. The Spain sample includes 51,666 individuals.

A common and convenient definition refers to immigrants as individuals born abroad with a foreign nationality. In this study, we defined immigrants as individuals born in a foreign country other than their country of residence, without taking into account nationality at birth since this is not included in the Spanish questionnaire. In the case of France, we excluded 677 French foreign-born individuals, in

order not to confuse current North African immigrants with ethnic French born in former North African French colonies, who moved to France after decolonisation. From this definition we derive a dichotomous immigration status variable which distinguishes immigrants and natives.

Our second variable of interest is acculturation. From the point of view of economics, acculturation has been defined as the process by which an immigrant invests in human capital after arrival and over the years, in order to cope with local context, such as the labour market characteristics, compensating for inappropriate initial dotation, non-transferability or discrimination (Borjas 2014). It is mostly a 'bridging the gap' process, where acculturation is measured as a 'rate of convergence in economic outcomes between immigrants and natives in the post immigration period' (Borjas 2014). This process is often assessed as 'assimilation' in the literature (Leung 2014). Borjas' definition can be easily extended to social capital and health capital.

Nevertheless, there is neither a common definition, a unified analytical framework, nor a measurement tool of acculturation across other social sciences (Thomson 2009), where acculturation broadly refers to a complex interaction process during which changes in values, beliefs, attitudes and behaviours, can lead to contrasting outcomes, such as assimilation, separation, integration or marginalisation, according to Berry's conceptual work (Berry 2003).

Population health studies on immigrants' and ethnic minorities' health have relied on a large array of measurements to study acculturation (Thomson 2009, Salant 2003). Various ad hoc acculturation scales have been introduced (Cuellar 1995, Marin 1987, Suinn 1992) but all need specific surveys and questionnaires, so cannot be calculated from general population surveys. In the latter, most studies rely on length of residence, more rarely on documentation status or first/second generation information, or language fluency.

Since length of residence cannot be calculated from most of our samples (only the French 2006 questionnaire includes such questions), we choose citizenship status as a proxy for acculturation. It follows the paper of Mikolajczyk et al. (2007) where citizenship status is used to study acculturation in Latino adolescents. As naturalisation is not granted automatically but results from individual resolve and initiative, it represents an investment in human capital (it simplifies administrative access to the labour market, social commodities, and enables participation in collective choices through voting rights) and a bridging process with natives' rights and endowments across time. Only the French 2006 survey collected length of stay and citizenship status and showed a strong relationship between them. While 51.5 per cent of immigrants were non-naturalised; 75 per cent of the most recently arrived were non-naturalised (less than 10 years of residency: the naturalisation process requires 5 years' residency in France and 10 in Spain).

We therefore measure acculturation from a dichotomous variable which differentiates lower acculturation level (foreigners non-naturalised) from higher acculturation level (naturalised). Other studies have, as we did, relied on a dummy variable to account for acculturation; from low to high acculturation groups from an acculturation scale (Mikolajczyk 2007), or recent vs. ancient immigrants from length of residence (Abraido-Lanza 2005).

Countries of origin have been grouped so as to identify immigrants from Morocco, Algeria and Tunisia as 'North African immigrants'. Among the five European countries who host large numbers of North

African immigrants (Belgium, France, Italy, Spain, The Netherlands), only the French and the Spanish data would allow us to precisely identify North African immigrants[4].

We use self-reported weight and height[5] to calculate Body Mass Index (BMI) and identify overweight[6]. BMI is the most common measure to assess overweight and obesity. It stands as weight (in kilograms) divided by squared height (in metres squares). We make use of the World Health Organization (WHO) BMI thresholds[7] to identify as 'overweight' individuals with a BMI which equals or exceeds 25. We dropped outliers with a BMI below 16.5 and higher than 50[8]. Our dependent variable is a dichotomous variable equal to 1 if the individual BMI is equal to or higher than 25 and 0 otherwise.

We use the following set of variables as control: age categories (18–30, 30–40, 40–50, 50–60, 60–70, and 70–75, with 18–30 year olds as a reference group); education groups (primary-, secondary- and tertiary-educated[9]); marital status (single, married, divorced and other with single as a reference group); occupational category (manual worker, executive, employee, intermediate and other with manual workers as a reference group); labour force status (employed, unemployed, student, retired, homemaker and other with employed as a reference group); and survey year dummies.

[TABLE 1 HERE]

Descriptive statistics are displayed in Table 1. After the restrictions on age and BMI and after dropping outliers and non-responders, our working pooled sample includes 53,475 individuals representative for France (15,327) and Spain (38,148) for a period between 2006 and 2010. Among them, 4,830 (9 per cent) are immigrants; 3,348 (6.3 percent of our sample) have a foreign citizenship; and 1,482 (2.8 per cent of our sample) are naturalised. The decomposition of immigrants within countries between non-naturalised and naturalised reveals that in France 49 per cent (626/1275) of immigrants are naturalised compared to 24 per cent in Spain (856/3555). This could be explained by the migration history of the twentieth century in Europe where France has a long tradition of country of immigration whereas Spain was mostly a country of emigration and became a country of immigration only in the 1980s (Cornelius et al. 2004, Castles and Miller 2009). In France, 74 per cent of immigrants arrived more than 11 years ago, whereas the figure is 28.8 per cent in Spain (OECD 2012). This longer duration of stay explains that many more immigrants are integrated and naturalised in France compared to Spain. France and Spain show opposite patterns in terms of immigrants overweight. French natives' overweight prevalence (42.2 per cent) is lower than immigrants' (50.5 per cent for non-naturalised or

[4] In Belgium and Italy data, continent of origin (Africa, America, Europe etc.) is reported instead for confidentiality reasons except for those largest immigrant groups (e.g. Tunisians and Romanians in Italy). Dutch datasets remained inaccessible due to data privacy regulation.

[5]Self-reported weight and height could be subject to measurement bias. It is usually common to find that the perception of weight and height deviated from objective measures. In particular, weight tends to be underestimated, whereas height is generally overestimated for both genders. In this segment of the literature, some authors developed a strategy to correct this bias either by correcting the threshold of obesity (Dauphinot et al. 2009), by predicting deviations between self-reported and measured weight and height (Antecol and Bedart 2006), or by deriving lower or upper bound obesity rates (O'Neill and Sweetman 2013). However, these corrections do not eliminate systematic errors (Plankey et al. 1997), and a strong correlation is found between measured and self-reported values (Niedhammer et al. 2000); empirical results in particular about social determinants of obesity are identical as either self-reported or measured BMI is used (Antecol and Bédart 2006).

[6]We are aware that BMI is a partial indicator to measure obesity because it does not distinguish between bones, muscles and fat. BMI could lead to a misclassification of obesity principally for men and among specific ethnic groups (Burkhauser and Cawley 2008). Because in our dataset no other alternative measure of fatness is available, we make use of self-reported height and weight to calculate obesity prevalence.

[7] http://apps.who.int/bmi/index.jsp?introPage=intro_3.html

[8] 16 individuals in France and 22 in Spain, which represents respectively 0.1 and 0.05 per cent of the initial samples.

[9] The classification of education differs a bit between Spain and France; we thus used the classification reported in Table A.1 in the appendix to obtain homogenous categories.

50.3 per cent for naturalised). In Spain, on the contrary, natives are more overweight (52.5 per cent) than immigrants (45.8 per cent for non-naturalised and 48.2 per cent for naturalised).

[TABLE 2 HERE]

Table 2 reports overweight distribution according to individual characteristics, by country of destination (France versus Spain), gender (women versus men) and immigration status (natives, foreigners who are non-naturalised immigrants, naturalised immigrants). There exists an education gradient in overweight. The higher the educational level, the lower is the percentage of overweight. Among the lower educated, natives are more often overweight than immigrants, except for native French women. Among those more highly educated, natives are less overweight than immigrants. Age is also correlated with overweight, as higher prevalence of overweight is associated with ageing individuals. The situation of North African immigrants varies with gender. North African immigrants show higher overweight prevalence than natives amongst women, and lower prevalence amongst men.

EMPIRICAL STRATEGY

The analysis follows a two-stage pathway. We first study absolute cross country immigrant health from a pooled French plus Spanish sample; we then investigate within France and Spain the role of acculturation on relative differences between natives and immigrants by explaining which is subject to sociodemographic or coefficients differences.

We estimate the following Probit model:

$$O_{i,g,s} = \beta_{g,s} X_{i,g,s} + \varepsilon_{i,g,s}$$

where $O_{i,g,s}$is a dummy variable reporting a BMI over 25 in group g, by gender s. Documented disparities between genders, as well as descriptive statistics displayed in the preceding section, justify splitting analysis between women and men (Jusot et al. 2009, Khlat et al. 1998, Khlat and Courbage 1995). $X_{i,g,s}$ is a vector of observable characteristics referring to age, education, marital status, labour force status, occupation and immigration status as commonly used in social determinants of health literature (Marmot and Wilkinson 1999; Dunn and Dyck 2000). $\beta_{g,s}$ is a vector of parameters to be estimated and $\varepsilon_{i,g,s}$ is a standard error term. French and Spanish samples differ in size. In the estimations we use calibrated sample weights calculated so as to equalise the sum of French sample weights and sum of Spanish sample weights.

This methodology allows us to estimate a probabilistic model of being overweight for immigrants (versus natives) by gender that controls for observable characteristics. To investigate immigrants' differences in overweight between immigrants' and natives, we apply a Blinder-Oaxaca type decomposition which allows the attribution of part of the observed difference to differences into characteristics or differences into coefficients (Blinder 1973; Oaxaca 1973). Thus, the previous model could be divided into 2 groups: natives (subindices n) versus immigrants (subindices i).

$$\text{Natives: } \bar{O}_{n,s} = \beta_{n,s} \bar{X}_{n,s}$$

$$\text{Immigrants: } \bar{O}_{i,s} = \beta_{i,s} \bar{X}_{i,s}$$

The decomposition consists of differencing the two previous equations:

$$\bar{O}_{n,s} - \bar{O}_{i,s} = [(\bar{X}_{n,s} - \bar{X}_{i,s})\beta_{n,s}] + [(\beta_{n,s} - \beta_{i,s})\bar{X}_{i,s}]$$

As explained previously, the difference in overweight between immigrants and natives can be decomposed by the first bracket devoted to differences in characteristics (age, education etc.) between immigrants and natives. The second bracket is related to differences in coefficients, meaning

that two individuals with the same characteristics observe different impacts of explanatory variables on overweight.

This linear decomposition could be biased if $O_{i,g,s}$ is a binary data variable and can lead to bias in estimators and thus into decomposition results. We apply the methodology of Fairlie (1999, 2005) which consists of deriving the decomposition method for binary data.

In applying this method, our model could be re-written as $O_{i,g,s} = F(\beta_{g,s}\, X_{i,g,s})$ where F is the cumulative distribution function from the standard normal distribution:

$$\bar{O}_{n,s} - \bar{O}_{i,s} = \left[\sum_{N_s=1}^{N_s=N_{n,s}} \frac{F(\beta_{n,s}.X_{n,s})}{N_{n,s}} - \sum_{N_s=1}^{N_s=N_{i,s}} \frac{F(\beta_{n,s}.X_{i,s})}{N_{i,s}} \right] + \left[\sum_{N_s=1}^{N_s=N_{i,s}} \frac{F(\beta_{n,s}.X_{i,s})}{N_{i,s}} - \sum_{N_s=1}^{N_s=N_{i,s}} \frac{F(\beta_{i,s}.X_{i,s})}{N_{i,s}} \right]$$

where N_s corresponds to the size of the sample by gender and $N_{i,s}$ and $N_{n,s}$ correspond to the sample size of immigrants and natives by gender, respectively. As previously, the first bracket is devoted to explaining the observed difference in overweight by difference in characteristics, whereas the second bracket is linked to unexplained differences, meaning the differences in coefficients principally.

All estimations were estimated as STATA software, and Probit estimates are expressed as marginal effects with robust standard errors.

RESULTS

Table 3 presents the pooled probit estimation results where France and Spain are considered all together. In the first two columns, we distinguish only French and Spanish immigrants. In the two last columns, we identify North Africans amongst immigrants.

[TABLE 3 HERE]

In men (column 1), when controlled for sociodemographic characteristics, Spanish natives (reference group) appear the most likely to be overweight, followed by immigrants in Spain, immigrants in France and then French men natives. Differences between residence countries appear stronger than between natives and immigrants. Immigrants in Spain are 2.8 per cent less likely to be overweight than Spanish natives, and immigrants and natives in France are respectively 10.4 per cent, and 12.4 per cent less likely to be overweight. This result suggests a 'healthy immigrant effect' or 'leaner immigrant effect', in Spain where immigrants are always less overweight than natives.

In women (column 2), immigrants present a higher probability to be overweight as compared to natives. French natives are 4.7 per cent less likely to be overweight than their Spanish counterparts, while immigrants have a 3 per cent higher probability to be overweight in Spain and 4.9 per cent in France. These results suggest that a 'healthy immigrant effect' exists only for men and not for women. Immigration policies may have played a role there. In Europe, male immigration has long been labour market oriented, whereas female immigration was associated with family reunification policies (Cornelius et al. 2004, Castles and Miller 2009). Therefore, the immigration selection targeted mainly the physically fitter men, but not women. Secondly, as will be discussed later, a number of immigration countries, including countries in North Africa, present high overweight prevalence in women (Ng et al. 2013).

By distinguishing immigrants coming from North Africa and those coming from the rest of the world (columns 3 and 4), our results confirm our previous ranking excepting that North African men immigrants are among the top less overweight (column 3) whereas North African women immigrants are among the top more overweight individuals compared to Spanish natives (column 4). These results have been confirmed by Khlat and Courbage (1995), who found a 'healthy immigrant effect' in France

for North African immigrants, mainly for men than women. The prevalence of overweight that affect many more women than men in North Africa explains the absence of 'healthy immigrant effect' for women.

Table 4 reports estimations separately for France (columns 1 to 4) and Spain (columns 4 to 8), and split between naturalised immigrants and non-naturalised (foreigners).

[TABLE 4 HERE]

In France, men immigrants are not significantly different to natives in terms of overweight prevalence (columns 1 and 2). However, women immigrants are 9 per cent more overweight than French natives. This average effect has been crossed with region of origin and with naturalisation status. Estimation results in column 4 show a higher positive coefficient for naturalised immigrants, as compared to foreigners, and for North Africans, as compared to other immigrants.

In France, naturalised North Africans women are 16.6 per cent more likely to be overweight than natives, whereas non-naturalised North Africans are 12.6 per cent more. In Spain, same patterns are observed among women (columns 7 and 8). These results confirm that women immigrants are more inclined to experience overweight than men, in particular when their duration of stay is relatively high (see Antecol and Bedard 2006).

Results on North Africans are in line with those of Jusot et al. (2009) which showed detrimental self-health status in North African immigrants, in France. They also confirm the results of Martin-Fernandez et al. (2012) who found a higher propensity for being overweight among immigrants from Middle Eastern and North African parental origin, in Paris. From Canadian data, McDonald and Kennedy (2005) found that North African/West Asian immigrants tend to be more overweight in time, and surpassed natives after 12 years residence, but this effect affected many more men than women. Acculturation in diet and physical activity had been assumed, but McDonald and Kennedy (2005) provided another explanation, pointing to ethnic communities and native population interactions.

Contrary to France, North African men immigrants in Spain reported 3.6 per cent less probability of being overweight than natives (column 5). This effect appears to stem from foreign-born non-naturalised immigrants and particularly for those coming from North Africa (column 6). They are 14.6 per cent less likely to be overweight compared to Spanish natives, confirming the 'leaner immigrant effect' for newly arrived men immigrants in Spain. It indeed confirms the migration selection hypothesis in recent immigrants, and the deterioration of immigrants' health status over time (Antecol and Bedard 2006, McDonald and Kennedy 2005, Jusot et al. 2009).

[TABLE 5 HERE]

Table 5 reports the decomposition results derived from the non-linear method developed by Fairlie (2005). Results on men in France and Spain (columns 1 and 3) suggest that the difference in overweight prevalence between natives and immigrants is equally due to differences in characteristics and differences in coefficients.

The 'leaner immigrant effect' shown previously for Spain (Table 3, column 3) is by 48 per cent due to differences in sociodemographic characteristics such as age, education, marital status, labour force and professional status between natives and immigrants. Immigrants in Spain are younger, more highly educated, and more at work compared to native people (Table 1). Because of the overall positive difference in overweight prevalence, by applying the same characteristics of natives to immigrants in Spain, immigrants' overweight should increase and converge with that of Spanish natives men. The remaining 52 per cent is due to difference in coefficients, i.e. immigrant men with same sociodemographic characteristics do not have the same likelihood of being overweight than do native men in Spain.

In women, the decomposition shows very different results according to host country (columns 2 and 4). In France (column 2), we observe a negative difference (-10 per cent) in overweight probability, meaning that, on average, native women are less overweight (36.2 per cent) than immigrants (46.2 per cent). The decomposition reveals that 87.1 per cent of this difference is explained by differences in coefficients vs. only 12.9 per cent by differences in characteristics. Thus, in France, policies focussing on immigrant population might be more effective in reducing overweight than policies targeting social inequalities. In Spain, the overweight likelihood of natives is higher (43.2 per cent) than immigrants (38.9 per cent). This is explained by the selection process in term of characteristics (age, education, socioeconomic status etc.) related to immigration. Therefore, differences in sociodemographic characteristics strongly contribute (164.43 per cent) to this difference in percentage and differences in coefficients have an opposite contribution (-64.4 per cent). Because of the positive overall difference in overweight between native and immigrant women in Spain, a convergence process (through acculturation or assimilation effect) consisting of applying the characteristics of natives to immigrants would increase the probability of immigrant women to be overweight by 164 per cent. However, for women native vs immigrant with the same characteristics, women immigrant have a 64 per cent probability of having a lower BMI than natives. Therefore, it would be much more effective in overweight reduction to implement policies which focus on immigrant women instead of focusing of social inequality.

CONCLUSION

In this study, we explored the social determinants of overweight among immigrants in two countries of Western Europe: France, a long-standing immigration country, and Spain, a recent immigration country, which both host large communities of North African immigrants, and face distinct nutrition traditions and obesity standards. We investigated healthy and unhealthy immigration effects, by gender, by studying the effects on overweight of birthplace, host country and acculturation.

In line with other studies (Khlat and Courbage 1995, Jusot et al. 2009), we show evidence of strong gender differences in the process linking migration and health. The effect of migration is stronger and globally detrimental among women compared to men. Gender differences in migrant effects reflect the gendered selectivity of immigration policy in Europe, and the gender differences of overweight prevalence in source countries.

In agreement with the gender specificity, our study shows birthplace effects across countries of arrival. North African immigrants, who are one of the most populous source of immigrants in France and Spain, show an ‘overweight migrant effect’ in women. In men, we identified a ‘leaner migrant effect’ only in Spain for those recently arrived.

We show, through the naturalisation status of immigrants, evidence of acculturation processes, which vary across countries of arrival, among men. Our results confirm previous North American studies (Antecol and Bedard 2006, McDonald and Kennedy 2004, 2005) that had shown existence of a ‘healthy immigrant effect’ through an immigrant selection effect first and then a detrimental acculturation effect in time.

In terms of policy intervention, our decomposition results show that, for women, generalised social welfare policies aiming to reduce social inequalities would have limited effect. However, public health policies specific to women immigrants, in particular toward those with a predisposition towards obesity (North African immigrants in particular), will be much more efficient in reducing their overweight prevalence.

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Table 1: Summary statistics over France and Spain

	France			Spain		
	Natives %	Immigrants %		Natives %	Immigrants %	
		Foreigners %	Naturalised %		Foreigners %	Naturalised %
BMI<25	57.8	49.5	49.7	47.5	54.2	51.8
BMI>=25	42,2	50,5	50,3	52,5	45,8	48,2
Men	39,9	47,6	43,6	45,2	46,1	38,8
Women	60,1	52,4	56,4	54,8	53,9	61,2
Age 18–30	14,1	12,9	6,7	13,4	29,7	12,7
Age 30–40	20,6	27,7	23,2	21,7	34,3	26,6
Age 40–50	22,6	22,7	25,4	24,1	21,5	34,9
Age 50–60	20,4	19,3	25,2	18,4	8,4	14,6
Age 60–70	14,8	11,1	13,3	14,9	4,7	7,8
Age 70–75	7,5	6,3	6,2	7,5	1,4	3,3
Primary/No	17,6	38,8	22,5	35,9	22,5	17,9
secondary	52,8	39,9	47,9	36,9	52,2	48,5
Tertiary	29,6	21,3	29,6	27,1	25,3	33,6
Single	16,7	17,6	10,4	27,1	36,9	27,1
Married	55,5	58,1	66,5	60,5	53,1	58,1
Divorced	9,2	10,5	13,6	6,6	8,0	11,6
Other	18,7	13,9	9,6	5,8	2,0	3,3
Executive	12,8	7,4	11,0	8,3	4,2	8,5
Employee	31,5	28,8	31,8	20,6	20,5	23,1
Intermediate	21,5	10,9	16,9	9,3	3,8	9,6
Manual worker	22,9	37,9	30,7	14,2	19,6	15,7
Other	11,3	14,9	9,6	47,5	51,9	43,1
In work	62,0	53,8	61,5	56,1	66,1	63,4
Unemployed	8,1	17,4	11,7	8,8	14,4	13,7
Student	1,6	3,2	1,0	3,6	2,7	2,5
Retired	20,7	12,0	14,9	16,0	4,4	6,5
Housewife	5,2	10,5	6,9	13,5	11,2	12,1
Other	2,4	3,1	4,2	2,0	1,3	1,8
North Africa		28,2	32,9		11,0	12,1
Other Africa		13,9	15,0		3,2	1,6
Europe		43,0	33,1		34,8	32,2
Asia		11,1	13,9		3,5	3,0
America		2,9	4,3		46,7	49,8
Other		0,9	0,8		0,9	1,2
Total	14052	649	626	34593	2699	856

Source: Enquete Santé Protection Sociale, Encuesta Nacional de Salud

Table 2: Distribution of overweight among immigrants and natives by demographic and socioeconomic characteristics for France and Spain

		BMI>=25 (%)											
		France						Spain					
		Women			Men			Women			Men		
		Natives	Immigrants		Natives	Immigrants		Natives	Immigrants		Natives	Immigrants	
			Foreigners	Naturalised		Foreigners	Naturalised		Foreigners	Naturalised		Foreigners	Naturalised
EDUCATION	Primary	54,5	60	68,6	64,5	64,2	61,8	61,8	47,2	55,6	71,6	53,5	66,7
	Secondary	36,8	43,7	44	52,8	55,6	54,5	37	36,5	39	60,3	53,5	65,2
	Tertiary	23,7	24,1	36,6	41,3	43,6	46,4	26	36,9	31,7	58,7	55,7	55,2
AGE	Age 18–30	22,9	31,4	27,3	27,2	30,3	30	21,2	28,5	31,1	35,5	38,5	43,8
	Age 30–40	29,5	34,5	45,3	40,6	51,4	40	29,5	35,4	34,7	59	53,7	65,5
	Age 40–50	32,3	46,8	45,5	49,8	64,7	50	37,2	45,9	38	67,8	63	58,3
	Age 50–60	42,3	52,5	54,4	60,3	54,5	60	54	54,2	48,1	73	72,5	80,4
	Age 60–70	47,2	63,3	48,9	68,9	69	63,9	65,6	63,5	48,8	74,4	66,7	61,5
	Age 70–75	55,6	90,9	68,2	65,7	73,3	76,5	67,4	76,5	55	74,9	60	100
MARITAL STATUS	Single	25,8	34,4	33,3	35,9	39,6	37,5	27,7	29	23,4	49,4	43,9	51
	Married	37,6	43	47,1	57,5	63,6	55,5	46,3	43,5	44,5	71,3	59,3	70,2
	Divorced	38,1	53,7	56,9	48,7	51,9	40,7	38,8	42	40,5	61,1	67,1	48
	Other	38,4	55,6	51,4	50,4	55,6	73,9	66,5	59,5	56,5	72	100	60
LABOUR FORCE STATUS	In work	30,6	39,7	44	46,8	55,6	50,6	33,6	35,8	36,5	63,2	53,1	63,6
	Unemployed	36,9	49,1	42,1	41,7	53,3	45,7	39	41,8	30,8	58,5	60,5	57,7
	Student	14,4	0	0	13,1	30	66,7	13,3	17,1	40	25,5	6,5	36,4
	Retired	50,4	77,8	54,9	68,5	73,3	73,8	65,8	66,7	48,3	74,7	67,2	70,4
	Housewife	43,9	51,6	62,5	53,3	33,3	33,3	56	43,3	50	74,4	100	50
	Other	49,7	57,1	66,7	60,1	53,8	50	53,5	37,5	45,5	64,6	55,6	75
OCCUPATION	Executive	24,9	14,8	19,2	48,3	38,1	65,1	25	17,9	27	63,3	54,1	63,9
	Employee	38,5	51,6	50,3	48,4	66,7	42,3	34,8	36,9	34,6	62,9	55,8	50
	Intermediate	28	32,4	45	50,7	58,8	37	27,3	28,3	37,3	58,6	36	51,6
	Manual worker	47,1	47,1	54,1	52,5	57,4	55,7	47,5	38,3	52,5	65,5	49,4	63
	Others	38,9	42,9	51,5	54,6	58,3	63	52,2	41,7	41,6	64,3	57,4	67,3
ORIGIN	North Africa		50,6	54		54,9	47,3		45,9	63,5		45,4	67,3
	Other Africa		55,7	52,8		41,4	48,8		38,7	12,5		49,1	100
	Europe		42,2	46,2		61,4	74		33,5	35,1		55,9	62
	Asia		32,4	38,1		57,9	37,8		30,6	30,8		44,4	69,2
	America		23,1	27,3		66,7	50		41,7	38,8		56,9	58,7
	Other		0	25		100	0		33,3	28,6		41,7	66,7

Source: Enquete Santé Protection Sociale, Encuesta Nacional de Salud

Table 3: Probit estimation of being overweight pooled over France and Spain

Pooled model with ponderation Marginal effect	(1) Men overweight	(2) Women overweight	(3) Men overweight	(4) Women overweight
Natives*Spain	REF	REF	REF	REF
Natives*France	-0.124*** (0.014)	-0.047*** (0.012)	-0.124*** (0.014)	-0.047*** (0.012)
Immigrants*France	-0.104*** (0.024)	0.049** (0.022)		
Immigrants*Spain	-0.028** (0.014)	0.030** (0.012)		
Immigrants*North Africa*France			-0.140*** (0.038)	0.115*** (0.038)
Immigrants*North Africa*Spain			-0.101*** (0.034)	0.087** (0.039)
Immigrants*Other*France			-0.085*** (0.029)	0.024 (0.025)
Immigrants*Other*Spain			-0.016 (0.015)	0.025* (0.013)
Age[18–30]	REF	REF	REF	REF
Age[30–40]	0.132*** (0.013)	0.054*** (0.013)	0.132*** (0.013)	0.054*** (0.013)
Age[40–50]	0.200*** (0.013)	0.092*** (0.013)	0.200*** (0.013)	0.093*** (0.013)
Age[50–60]	0.254*** (0.013)	0.188*** (0.014)	0.253*** (0.013)	0.189*** (0.014)
Age[60–70]	0.255*** (0.016)	0.219*** (0.016)	0.255*** (0.016)	0.221*** (0.016)
Age[70–75]	0.219*** (0.020)	0.234*** (0.020)	0.218*** (0.020)	0.235*** (0.020)
No education/Primary education	REF	REF	REF	REF
Secondary education	-0.029*** (0.010)	-0.109*** (0.008)	-0.030*** (0.010)	-0.109*** (0.008)
Tertiary education	-0.090*** (0.012)	-0.173*** (0.010)	-0.091*** (0.012)	-0.172*** (0.010)
Single	REF	REF	REF	REF
Married	0.091*** (0.010)	0.056*** (0.009)	0.092*** (0.010)	0.056*** (0.009)
Divorced	-0.013 (0.017)	0.028** (0.014)	-0.013 (0.017)	0.027* (0.014)
Other	0.084*** (0.016)	0.091*** (0.013)	0.084*** (0.016)	0.092*** (0.013)
In work	REF	REF	REF	REF
Unemployed	-0.022 (0.014)	0.034*** (0.012)	-0.021 (0.014)	0.033*** (0.012)
Student	-0.167*** (0.025)	-0.145*** (0.021)	-0.166*** (0.025)	-0.145*** (0.021)
Retired	0.055*** (0.017)	0.033** (0.014)	0.055*** (0.017)	0.032** (0.014)
Housemaker	-0.033 (0.064)	0.046*** (0.010)	-0.029 (0.063)	0.044*** (0.010)
Others	0.012 (0.025)	0.083*** (0.025)	0.012 (0.025)	0.082*** (0.025)
Manual worker	REF	REF	REF	REF
Executive	-0.021 (0.015)	-0.103*** (0.016)	-0.022 (0.015)	-0.104*** (0.016)
Employee	0.002 (0.013)	-0.027** (0.011)	0.001 (0.013)	-0.028** (0.011)
Intermediate	-0.025* (0.014)	-0.071*** (0.014)	-0.025* (0.014)	-0.072*** (0.014)
Other	0.011 (0.011)	0.004 (0.011)	0.011 (0.011)	0.003 (0.011)
Time dummies	YES	YES	YES	YES
Observations	23.398	30.077	23.398	30.077
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 4: Probit estimation of being overweight for France and Spain separately

France vs Spain Marginal effect	(1) France Men overweight	(2) France Men overweight	(3) France Women overweight	(4) France Women overweight	(5) Spain Men overweight	(6) Spain Men overweight	(7) Spain Women overweight	(8) Spain Women overweight
Natives	REF	REF	REF	REF	REF	REF	REF	REF
Immigrants	0.024		0.090***		-0.036***		0.046***	
	(0.023)		(0.020)		(0.013)		(0.013)	
Immigrants*North Africa*Naturalised		-0.048		0.166***		0.023		0.167**
		(0.053)		(0.048)		(0.065)		(0.076)
Immigrants*North Africa*Non-naturalised		0.023		0.126**		-0.146***		0.082*
		(0.053)		(0.056)		(0.039)		(0.046)
Immigrants*Other*Naturalised		0.031		0.078**		-0.001		0.012
		(0.039)		(0.033)		(0.030)		(0.024)
Immigrants*Other*Non-naturalised		0.049		0.059*		-0.031*		0.050***
		(0.037)		(0.032)		(0.016)		(0.015)
Age[18–30]	REF	REF	REF	REF	REF	REF	REF	REF
Age[30–40]	0.119***	0.119***	0.063***	0.062***	0.138***	0.138***	0.046***	0.047***
	(0.024)	(0.024)	(0.020)	(0.020)	(0.012)	(0.012)	(0.014)	(0.014)
Age[40–50]	0.192***	0.192***	0.079***	0.079***	0.201***	0.200***	0.104***	0.106***
	(0.024)	(0.024)	(0.020)	(0.020)	(0.012)	(0.012)	(0.015)	(0.015)
Age[50–60]	0.265***	0.265***	0.151***	0.152***	0.236***	0.235***	0.223***	0.225***
	(0.023)	(0.023)	(0.022)	(0.022)	(0.012)	(0.012)	(0.015)	(0.015)
Age[60–70]	0.279***	0.278***	0.145***	0.146***	0.223***	0.222***	0.271***	0.274***
	(0.033)	(0.033)	(0.031)	(0.031)	(0.015)	(0.015)	(0.017)	(0.017)
Age[70–75]	0.216***	0.215***	0.189***	0.191***	0.211***	0.210***	0.252***	0.255***
	(0.041)	(0.041)	(0.037)	(0.037)	(0.018)	(0.018)	(0.021)	(0.021)
No education/Primary education	REF	REF	REF	REF	REF	REF	REF	REF
Secondary education	-0.043**	-0.041**	-0.092***	-0.092***	-0.031***	-0.032***	-0.119***	-0.118***
	(0.019)	(0.019)	(0.015)	(0.015)	(0.010)	(0.010)	(0.009)	(0.009)
Tertiary education	-0.131***	-0.129***	-0.159***	-0.158***	-0.058***	-0.060***	-0.180***	-0.180***
	(0.024)	(0.025)	(0.018)	(0.018)	(0.012)	(0.012)	(0.011)	(0.011)
Single	REF	REF	REF	REF	REF	REF	REF	REF
Married	0.084***	0.085***	0.053***	0.053***	0.093***	0.094***	0.061***	0.060***
	(0.020)	(0.020)	(0.017)	(0.017)	(0.010)	(0.010)	(0.010)	(0.010)
Divorced	-0.020	-0.019	0.040*	0.039*	-0.008	-0.008	0.010	0.010
	(0.029)	(0.029)	(0.023)	(0.023)	(0.018)	(0.018)	(0.016)	(0.016)
Other	0.094***	0.094***	0.070***	0.070***	0.059**	0.059**	0.099***	0.098***
	(0.022)	(0.022)	(0.020)	(0.020)	(0.026)	(0.026)	(0.017)	(0.017)
In work	REF	REF	REF	REF	REF	REF	REF	REF
Unemployed	-0.026	-0.024	0.046**	0.045**	-0.023*	-0.023	0.022	0.023*
	(0.025)	(0.025)	(0.020)	(0.020)	(0.014)	(0.014)	(0.014)	(0.014)
Student	-0.171***	-0.171***	-0.121***	-0.120***	-0.168***	-0.169***	-0.143***	-0.142***
	(0.062)	(0.062)	(0.045)	(0.045)	(0.025)	(0.025)	(0.023)	(0.023)
Retired	0.086**	0.087***	0.061**	0.060**	0.011	0.010	0.042**	0.042**
	(0.034)	(0.034)	(0.026)	(0.026)	(0.016)	(0.016)	(0.017)	(0.017)
Housewife	-0.066	-0.060	0.061***	0.060***	0.027	0.025	0.030***	0.029***
	(0.082)	(0.082)	(0.020)	(0.020)	(0.077)	(0.077)	(0.011)	(0.011)
Others	0.040	0.042	0.096***	0.094**	-0.033	-0.034	0.069**	0.069**
	(0.040)	(0.040)	(0.037)	(0.037)	(0.027)	(0.027)	(0.029)	(0.029)
Manual worker	REF	REF	REF	REF	REF	REF	REF	REF
Executive	-0.020	-0.021	-0.114***	-0.114***	-0.012	-0.013	-0.079***	-0.080***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.016)	(0.016)	(0.019)	(0.019)
Employee	0.007	0.006	-0.034**	-0.033**	-0.004	-0.004	-0.020	-0.020
	(0.025)	(0.025)	(0.016)	(0.016)	(0.013)	(0.013)	(0.014)	(0.014)
Intermediate	-0.016	-0.017	-0.083***	-0.083***	-0.041**	-0.042**	-0.054***	-0.055***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.016)	(0.016)	(0.018)	(0.018)
Other	0.030	0.029	-0.032	-0.033	0.017	0.017	0.018	0.017
	(0.022)	(0.022)	(0.022)	(0.022)	(0.011)	(0.011)	(0.013)	(0.013)
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6187	6187	9140	9140	17211	17211	20937	20937
Robust standard errors in	*** p<0.01, ** p<0.05, * p<0.1							

Table 5: Decomposition Results for the probability of being overweight

VARIABLES	(1) France Men overweight	(2) France Women overweight	(3) Spain Men overweight	(4) Spain Women overweight
N	6187	9140	17211	20937
Natives	5605	8447	15635	18958
Prob(Natives)	0,513	0,362	0,637	0,432
Immigrants	582	693	1576	1979
Prob(Immigrants)	0,555	0,462	0,558	0,389
Difference	-0,042	-0,100	0,0794	0,0433
Explained part %	40,10	12,90	48,11	164,43
Unexplained part %	59,90	87,10	51,89	-64,43

APPENDIX

Table A.1: Comparability of education variable within and between countries

COMPARABILITY OF EDUCATION MEASURE		France		Spain	
		Level of education (2006)	Highest diploma obtained (2008 & 2010)	Level of education (2006/2007)	Level of education (2009)
EDUCATION	Primary education / no diploma	51: Rien, aucun diplôme, autodidacte 2 : Maternelle, primaire, Certificat d'étude (CEP)	01 : Aucun diplôme 02 : CEP (certificat d'étude primaires)	03 = Estudios primarios o equivalentes	02= Estudios primarios incompletos (ISCED 1) 03= Educación primaria o equivalentes (ISCED 1)
	Secondary education	03 : 1er cycle, 6ème, 5ème, 4ème, 3ème, technique, jusqu'à CAP et BEP 04 : 2nd cycle, 2nde, 1ère, terminale, Bac technique (BT), Baccalauréat	03 : Brevet des collèges, BEPC, brevet élémentaire 04 : CAP, BEP 05 : Baccalauréat technologique ou professionnel 06 : Baccalauréat général	04 = Enseñanza general secundaria 1ª Etapa 05 = Enseñanza Profesional de grado medio 06 = Enseñanza general secundaria 2ª Etapa	04= Educación secundaria de primera etapa (ISCED 2) 05= Estudios de Bachillerato (ISCED 3) 06= Enseñanzas profesionales de grado medio o equivalentes (ISCED 3)
	Tertiary education	05 : Etudes supérieures au Bac	07 : Bac+2 (1er cycle universitaire, Deug, BTS, DUT...) 08 : Supérieur à Bac+2 (2nd et 3ème cycle universitaire, diplôme d'ingénieur, de grande école...)	07 = Enseñanzas Profesionales Superiores 08 = Estudios Universitarios o equivalentes Primer Ciclo 09 = Estudios Universitarios o Equivalentes Segundo Ciclo	07= Enseñanzas profesionales de grado superior o equivalentes (ISCED 5B) 08= Estudios universitarios de 1 y 2 ciclo o equivalentes(ISCED 5A) 09= Doctorado o equivalente (ISCED 6)