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Migration & Self-Rated Health: Comparing Occupational Cohorts in California & Spain (MICASA and ITSAL Projects)

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Abstract. International migration is a growing global phenomenon. The magnitude of the global population living outside their countries of origin substantiates the value of considering potential public health issues and their population-wide burden. As migration has yet to be generally accepted as an exposure in and of itself, and encompasses a wide range of experiences and health effects, a measure of overall health is well suited for this research. This study compares self-rated health between two independently collected occupational cohorts as part of the ITSAL study in Spain and the MICASA study in Mendota, California, USA. We observed greater gender balance in the MICASA sample than the ITSAL sample, where there was a substantial male majority. Mexican-born workers in the MICASA sample tended to be older, less educated, and more likely to work in agriculture than their Moroccan-born counterparts in the ITSAL study. We also observed a higher prevalence of poor self-rated health in the MICASA sample compared to the ITSAL sample. Differences may be due to sampling and data collection issues, cultural issues and the subjectivity of self-rated health as an outcome, as well as actual health differences. Further research is needed to determine common and distinct migration-related public health issues.

Keywords. Immigrant Workers, Occupational Health, Self-Reported Health, Epidemiology, Spain, United States

1. Introduction

Global migration is a growing phenomenon. In 2010, 214 million people were reported to be living outside their countries of birth [1]. As an incorporated group, these international migrants would comprise the 5th largest country in the world [2]. Motivations for leaving one's country of origin are complex, as are the resulting health implications. The sheer number of international migrants makes the potential burden of related public health issues important to consider.

Immigration may impact infectious disease, chronic disease, and health care access, as well as occupational injury and illness. Health implications of migration are commonly studied from the perspective

of receiving nations, with protective outcomes among newly-arrived foreign-born individuals, followed by declining health with time in the host country [3-5]. The initial health advantages of immigration are often attributed to protective cultural factors and selective migration (the healthy immigrant effect) [5, 6]. A person's age at the time of migration is also of issue, with the health of those who migrate as pre-adolescents or adolescents differentiated from that of those who migrate at later stages of development, and more closely resembling the health of native-born individuals in the host country [4]. Given migration's magnitude and complicated relationship with health, research in this area is critical.

Migration is often attributed to an

imbalance of resources, from land and natural resources to job opportunities, underemployment and economic strength. This article utilizes the United Nations definition of migrant workers as people who are paid for services in states in which they are not nationals [7]. Such migrant workers are abundant, sending roughly \$414 billion in remittances in 2009, \$307 billion of which went to developing countries [8]. This population is especially relevant in a public health context because of the potential impact of occupational exposures. Differences in work exposures may exist between host and sending societies, and between foreign-born and native-born workers within host countries. The volume and diversity of experiences of migrant workers make public health research in these populations both interesting and important.

Self-rated health is a measure of general health that has been associated with mortality in various studies across cultures and populations [9-12]. Participants rank their health on a Likert scale, and responses are dichotomized into good and poor health. The measure is subjective, and is generally associated with sex and age. Existing literature has found females and older individuals tend to report higher proportions of poor health than their male and younger counterparts, respectively [9]. The measure is also valuable because of its quick and cost-effective collection, making it assessable in a variety of research settings.

Comparative studies of migratory trends provide an opportunity to determine if the impacts of migration have commonalities across migrant streams, and if so, which factors are specific to individual country relationships, host and sending societies, and which factors are observed in multiple settings. Previous studies have looked at the specific comparison between North Africa-Europe migration and Mexico-USA migration, as well as migration experiences in host countries across Europe [13, 14]. Guendelman et al. found similar trends in birth outcomes in North Africa-Europe migration and Mexico-USA migration. Bollini et al. reported an association between immigrant integration policy and birth outcomes across Europe. These studies take immigration to be an exposure in and of itself, and add to existing immigration research by comparing outcomes across situations. This type of work remains uncommon and is an area of powerful potential in the field.

Spain is of particular interest in migration studies due to the rich migrant history and transformation in the past decade from a country of net emigration to one of net immigration [15, 16]. California is also a prime location for immigration research as the state's southern border makes up part of the most crossed international border in the world [17], and one out of every four Californians are foreign-born [18]. In the interest of parallelism and building on comparative migration research, this analysis compares Moroccan-born workers in Spain and Mexican-born workers in California.

Occupational health is often explored epidemiologically through occupational cohorts, defined as samples of workers from the same field and/or professional organizations with similar exposures. Ultimately, experts in the field have noted that, "the choice of occupational cohort will be influenced by research objectives, and inevitably will be determined by the availability of data necessary for cohort enumeration,

exposure assessment, and health outcome evaluation" [19]. Migration-related variables are not universally collected in occupational datasets, so the design and analyses conducted in this study have been guided by the use of available, comparable data to optimize progress in an emerging field.

The goal of this study is to assess self-rated health in occupational cohorts of Moroccan-born workers in the Immigration, Work and Health (ITSAL) study and Mexican-born workers in the Mexican Immigration to California: Agricultural Safety and Acculturation (MICASA) study. Hypotheses tested examine the variability of poor self-rated health by gender, age, age at migration, and occupation to allow for optimally unbiased comparison of health status across migratory trends, with the aim of identifying appropriate next steps in research and optimal public health planning.

2. Methods

This study presents a comparison of two independently collected samples of foreign-born workers – one of Mexican-born workers in Mendota, California, USA, and the other of Moroccan-born workers in four cities across Spain (Barcelona, Huelva, Madrid and Valencia).

2.1 Data Collection

The MICASA project studies a longitudinal occupational cohort of farm workers in Mendota, California. Exposures of interest include acculturation, smoking, and other occupational and environmental health issues potentially relevant to the health of this population.

Stratified area probability sampling was used with census block as the primary sampling unit [20-22]. A household enumeration procedure identified all dwellings in randomly selected census blocks and individuals residing in these dwellings. Further details of the methodology is submitted elsewhere for publication [23]. Eligible individuals were 18-55 years old, residing in Mendota at the time of baseline interviews (2006-2007), living in a household with at least one person who worked in agriculture a minimum of 45 days in the previous year, who self-identified as Mexican or Central American, and consented to participate in the study. Interviews were conducted with a 70% household response rate.

Research objectives and methods were explained to potential participants in Spanish. Individuals choosing to participate in the study provided written consent in Spanish. The study was approved by the University of California, Davis, Institutional Review Board. Data presented here were collected as part of the second wave of the study between 2008 and 2010. The survey tool used for the follow-up interview included standardized, validated scales, focusing on sociodemographics, residential conditions and exposures, smoking, occupational history and exposures, and a variety of specific and holistic health measures. At follow-up, 640 individuals were interviewed, of which 424 (66%) were Mexican-born.

The ITSAL project studies immigration, work and health in Spain. Data presented here are from a cross-sectional

sample taken 2008-2009 (wave 1) that utilized a 74-item questionnaire to assess sociodemographics, the migration process, occupational and economic variables, employment conditions, working conditions, occupational risk prevention activities, participation in trade unions, physical and mental health, and overall evaluation of individuals' experiences working in Spain.

Quota sampling was used to construct a sample of 2,434 foreign-born workers, with quotas set by nationality, gender, and area of residence in Spain [20-22]. Moroccan-born individuals (n=625) living in Barcelona, Huelva, Madrid or Valencia (four Spanish cities with high proportions of for-

informational letter explaining their rights and guaranteeing individual confidentiality. Participation was voluntary, with consent implied by completion of the survey [25].

2.2 Measures

The following variable definitions were used for both samples: sex, age (categorical – 18 to 30, 31 to 40, 41+ years old), age at migration (categorical – under 13, 13 to 17, 18+ years old), education (at most primary, secondary, post secondary), and work experience in agriculture (yes, no).

Self-rated health was used as an outcome in both samples.

Table 1. Sociodemographic profile of Mexican-born and Moroccan-born samples, overall and by gender.

	All			Female			Male		
	Moroccans in Spain	Mexicans in CA (Mendota)	p	Moroccans in Spain	Mexicans in CA (Mendota)	p	Moroccans in Spain	Mexicans in CA (Mendota)	p
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Total	625	424		98	239		527	185	
Sex			<0.001						
Female	98 (16)	239 (56)							
Male	527 (84)	185 (44)							
Age			<0.001			<0.001			<0.001
18-30	329 (53)	74 (17)		55 (56)	48 (20)		214 (41)	26 (14)	
31-40	214 (34)	131 (31)		28 (29)	80 (33)		186 (35)	51 (28)	
41+	74 (12)	219 (52)		14 (14)	111 (46)		60 (11)	108 (58)	
Age at Migration			0.196			0.053			0.002
<13	44 (7)	24 (6)		12 (12)	15 (6)		32 (6)	9 (5)	
13-17	82 (13)	72 (17)		16 (16)	28 (12)		66 (13)	44 (24)	
18+	489 (78)	328 (77)		67 (68)	196 (82)		422 (80)	132 (71)	
Education			0.001			0.016			<0.001
At most primary	315 (50)	232 (55)		38 (39)	120 (50)		273 (52)	112 (61)	
Secondary	216 (35)	98 (23)		39 (40)	57 (24)		177 (34)	41 (22)	
Post-secondary	85 (14)	38 (9)		17 (17)	30 (13)		76 (14)	8 (4)	
Ag Work			<0.001			<0.001			<0.001
Yes	117 (19)	374 (88)		10 (10)	189 (79)		107 (20)	185 (100)	

oreign-born residents) were interviewed. Inclusion criteria consisted of living in Spain for at least one year and working in Spain for at least three months (professional athletes, artists, graduate students and business executives were excluded), not being a Spanish citizen or married to a native Spaniard, and adequate Spanish language abilities for interview participation. Interviews were conducted with a 55.8% response rate [24]. All selected individuals within the inclusion criteria were invited to participate in the study and given an

Participants in both studies were asked to rate their health. Responses were dichotomized into good health or poor health, as is standard in research with this outcome [6, 9].

In the MICASA study, the question read, "Would you say that in general your health is..." with the following possible responses: excellent, very good, good, fair, and poor. Excellent, very good, and good were combined to represent good health, and fair and poor categories were grouped to represent poor health. In the ITSAL study, the question read,

Table 2. Poor self-rated health profile of Mexican-born and Moroccan-born samples, overall and by gender.

	All			Female			Male		
	Moroccans in Spain	Mexicans in CA (Mendota)	p	Moroccans in Spain	Mexicans in CA (Mendota)	p	Moroccans in Spain	Mexicans in CA (Mendota)	p
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Total	87 (14)	178 (42)		21 (12)	103 (43)		66 (13)	75 (41)	
Sex			<0.001						
Female	21 (21)	103 (43)							
Male	66 (13)	75 (41)							
Age			<0.001			<0.001			<0.001
18-30	37 (11)	20 (27)		10 (18)	14 (29)		27 (13)	6 (23)	
31-40	29 (14)	47 (36)		7 (25)	31 (39)		22 (12)	16 (31)	
41+	20 (27)	111 (51)		4 (29)	58 (52)		16 (27)	53 (49)	
Age at Migration			0.028			0.088			0.105
<13	1 (2)	10 (42)		0 (0)	7 (47)		1 (3)	3 (33)	
13-17	7 (9)	30 (42)		0 (0)	13 (46)		7 (11)	17 (39)	
18+	78 (16)	138 (42)		21 (31)	83 (42)		57 (14)	55 (42)	
Education			0.001			0.587			0.005
At most primary	315 (50)	103 (44)		11 (29)	54 (45)		34 (12)	49 (44)	
Secondary	216 (35)	31 (32)		5 (13)	20 (35)		20 (11)	11 (27)	
Post-secondary	85 (14)	26 (68)		5 (29)	13 (43)		12 (16)	3 (38)	
Ag Work			<0.001			<0.001			<0.001
Yes	12 (14)	164 (44)		2 (20)	89 (47)		10 (9)	75 (41)	

“How would you rate your health right now?” with the following possible responses: very good, good, fair, poor, and very poor. Very good and good categories were joined to represent good health, and the fair, poor and very poor were merged to represent poor health.

2.3 Analysis

Comparisons were made between the samples overall and with respect to self-rated health. Variables of interest included sex, age, age at migration, education, and work experience in agriculture. Chi-square tests were done to assess significant differences. Log-binomial models [26-29] were constructed to obtain prevalence ratios and respective 95% confidence intervals for poor self-rated health, stratified by sex and adjusted for age. All analyses were completed with SAS version 9.2 (SAS Institute Inc., Cary, NC, USA).

3. Results

The two samples differ significantly by sex, age, education and experience working in agriculture (Table 1). The Mexican-born sample was gender balanced, while males

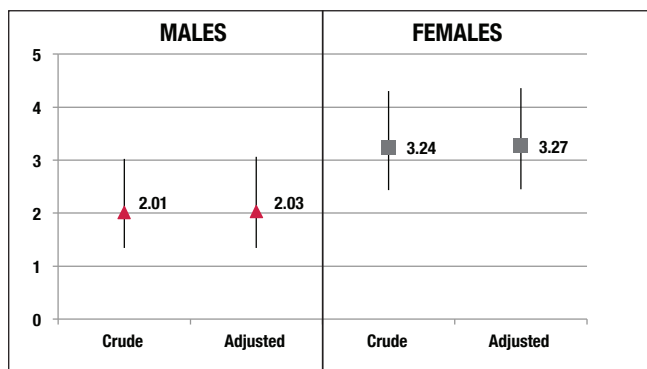
comprised 84% of the Moroccan-born sample. Individuals in the Mexican-born sample were significantly older (41 vs. 31 years old), less educated, and more likely to have worked in agriculture than their Moroccan-born counterparts ($p < 0.001$). We observed these same differences among males and females independently. Additionally, among men, a larger proportion of Mexican-born individuals immigrated before age 18.

Differences also existed between the samples according to self-rated health (Table 2). Overall, 42% of Mexican-born participants reported poor health compared to 14% of Moroccan-born participants. This was seen in every stratum by age, age at migration, education, and agricultural work overall, and remained significant when stratified by gender, with the exception of age at migration and education in females.

Expected trends in self-rated health by gender (greater proportion of females than males reporting poor health) [6, 9] are stronger in the Moroccan-born than Mexican-born participants. Expected trends in self-rated health by age (increased poor health with age) are observed overall and stratified by gender in both the MICASA and ITSAL samples.

Each potential confounder examined above was considered

when constructing log-binomial models to calculate prevalence ratios. Significant differences in poor self-rated health prevalence between Moroccan-born and Mexican-born were observed by sex and by age in both sexes separately. Significant differences in poor health prevalence were not observed between the samples according to age at migration after stratifying by sex. Poor self-rated health prevalence did vary significantly in males, but the number of Mexican-born males was small in the post-secondary strata (n=5). Significant poor self-rated health differences were also observed by experience in agriculture, but the number of Moroccan-born with agricultural experience was small (n=2 females, n=10 males). Therefore, age at migration, education and agricultural work were excluded from consideration in the models. The final model (Figure 1) stratifies by sex and adjusts for age.



*Note: Reference group: Moroccan-Born.

Figure 1. Prevalence ratios and 95% CI of poor self-rated health in Mexican-born (MICASA) vs. Moroccan-born (ITSAL) workers, by gender.

In age-adjusted models, Mexican-born women were twice as likely as Moroccan-born women to report poor self-rated health, and Mexican-born men were more than three-times as likely to report poor self-rated health as Moroccan-born men (Figure 1).

4. Discussion

The differences in demographics and self-rated health between these two samples are notable. The higher prevalence of poor self-rated health in the MICASA study may be accounted for in part by differences in the distribution of sociodemographic characteristics or agricultural work experience between the two samples, subjectivity of self-rated health and cultural differences, actual differences in health, or any combination of these factors.

The sociodemographic differences observed may result from distinct sampling and data collection methods or from actual differences in the source populations. The Mexican-born sample included higher proportions of women, older individuals, males who migrated after age 18, individuals with little formal education, and individuals with agriculture work experience compared to the Moroccan-born sample.

Quota sampling was used in Spain across four urban areas. Gender balanced quotas were the aim, but investigators had difficulty completing sufficient interviews with Moroccan

women to achieve this goal. Cultural issues, as well as potential gender imbalances in the source population for the sample are possible explanations. Additionally, convenience sampling limits the generalizability of findings to the source population. However, sampling across four cities in Spain adds to the knowledge of Moroccan-born workers in Spain as a whole and is a reasonable trade-off for the less rigorous sampling methods.

In contrast, a sampling frame was constructed in Mendota, CA, and a representative random sample was taken of the town's population [23]. The representativeness gained by this approach is advantageous over the ITSAL study, while the specificity of the town's population limits the generalizability of the results to farm workers living in Mendota or potentially in other comparable California Central Valley farming communities.

Selection bias may have been introduced by language restrictions established as eligibility criteria in the ITSAL project. It is possible that Moroccan-born workers who speak Spanish were not representative of the general population of Moroccan-born workers in Spain.

Regardless of the sources of the demographic differences, poor self-rated health is generally understood to be more prevalent in females than males, with age, and lower levels of education [9]. However, even when prevalence ratios were calculated and stratified by gender and adjusted for age, Mexican-born individuals in the MICASA sample reported poorer general health than Moroccan-born individuals in the ITSAL sample. The lower education level among Mexican-born participants would be expected to increase the prevalence of poor self-rated health, so this may account for some of the discrepancy in the ratios. While models were adjusted for age, ratios adjusted for other possible confounders could not be calculated due to model convergence concerns.

The differences in the prevalence of poor self-rated health between the MICASA and ITSAL samples may have resulted from the subjectivity of the measure. Latino populations are understood to somatize emotional issues into physical health concerns, and such cultural impacts on the concept of health may play a role in the differences seen between these two samples [30-32]. Research has shown a positive relationship between poor self-rated health and mortality among US Latinos as a whole, as well as those living in the US for at least 10 years [33]. At baseline interview in the MICASA study (two to four years before the data analyzed here were collected), study participants had lived in the US 15.5 years on average. Thus, it is plausible here that such an association may hold.

Self-rated health has been used as an overall health assessment. This construct has been associated with morbidity and mortality and validated across cultures and communities [9, 10, 34-36]. However, self-rated health's associations remain to be researched with more specific health measures. In addition, self-rated health's inherent subjectivity cannot be discounted when considering potential explanations.

True differences in health status between the samples may also explain differences observed in poor self-rated health prevalence in this study. Self-rated health, while subjective, is a valid health measure with implications for mortality, if

not also for decreased health-related quality of life. The public health implications of such a difference in health status across populations could be substantial and are important for policy planning as well as future research.

Comparative research would do well to continue exploring health effects across migrations, distinguishing commonalities as well as factors unique to individual situations. Such an understanding will be valuable to immigration health research, as well as public health planning, to ensure optimal health outcomes in our increasingly mobile world.

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