

“Changes in health-related selectivity and modes of incorporation of Mexican migrants since the beginning of the 21<sup>st</sup> Century.”

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## ABSTRACT

The current Era of heightened immigration enforcement has likely challenged immigrants' modes of incorporation. Scholars have also predicted a deterioration of the immigrant health advantage as the epidemiological and nutrition transitions continue to unfold in sending countries. We examine changes in the selectivity and adaptation of Mexican immigrants in smoking and proxies of central adiposity. To assess changes in selection, we compare recently-arrived migrants –using the 1999-2016 cross-sections of the U.S. National Health and Interview and National Health and Nutrition Examination Surveys– with Mexican residents –using the 2000-2012 cross-sections of the Mexican National Health and Nutrition Surveys. To assess changes in adaptation, we compare indicators across duration of stay, comparing synthetic cohort and “truer” immigration cohorts. Preliminary results suggest that health-related selection is not deteriorating in smoking but slightly on proxies of central adiposity. Modes of incorporation in these two types of indicators are likely worsening over time.

**Keywords:** health; wellbeing; immigrant incorporation or adaptation; context of reception; context of emigration; selectivity; Mexico; United States.

## **Introduction.**

Over the last few years, the climate surrounding immigration in the United States has evidently hardened considerably, in ways perhaps not seen since at least the early-mid 20<sup>th</sup> Century (see Kanstroom 2007; Ngai 2014). Rhetoric, politics, and immigration policies and practices have seemingly become entrapped in a cycle in which they feed off each other (Andreas 2000; Chavez 2013), resulting in continuously harsher design and implementation of immigration policies, particularly those related to enforcement, which began hardening gradually three decades ago, accelerating further in the 1990s, and more rapidly since 2006 (despite some Obama-Era reprieves), arriving to the much-heightened levels we see today (see Massey and Pren 2012).

Rhetoric and changing immigration-related policies and practices can and do bleed into social policy (Pedraza and Zhu 2015; Pedraza, Nichols and LeBrón 2017) and everyday life experiences (Abrego 2014; Dreby and ebrary Inc. 2010; Menjívar and Lakhani 2016) in ways that have made for a much more difficult context of reception for immigrants and their descendants (Waters and Gerstein Pineau 2015). This has in turn likely shaped the selectivity (Orrenius and Zavodny 2005) of migration and, even more clearly and importantly, the modes of incorporation of immigrants and their descendants (Hatzenbuehler et al. 2017; Philbin et al. 2018). This can occur by way of the direct stress and anguish on people's lives (see Goosby, Cheadle and Mitchell 2017), or as a byproduct of the effects of the changing context of reception on the fundamental causes of disease (Phelan, Link and Tehranifar 2010).

Such shifting context of reception calls for a broad empirical examination of the manner in which immigrant health has evolved throughout the so-called current Era of rising immigration enforcement (at least as far as data availability and comparability allow). This examination is also relevant to continue evaluating whether the so-called Hispanic Health

Paradox (HHP) is showing signs of decay as predicted by scholars even before the height of the current Era (Goldman 2016; Hummer and Hayward 2015) due to changes in the composition of incoming and existing immigrants in terms of risk factors of health – indeed partly due to the context of reception in the United States, but also to continued epidemiological changes in Mexico. As such, important to consider changes in selection as well as in modes of incorporation (inasmuch as possible, net of selection).

In this paper, we thus examine temporal shifts in self-selection and the modes of incorporation of Mexican migrants over time with the presumption that the general context of reception has continuously overall worsened over the three major periods examined (1999-2005, 2006-2010, 2011-2016), chosen due to coincide with policy shifts (pre-crisis and pre- mass deportation Era; crisis and height of deportation Era; and reacceleration of anti-immigrant sentiment, respectively). We examine several risk factors and markers of cardiovascular and cardiometabolic chronic health as an attempt to assess whether the stress and anguish potentially caused by anti-immigrant sentiment is somatizing in important risk factors or outcomes of chronic physical health.<sup>1</sup> We use data from both sides of the border, the 1999-2016 National Health and Nutrition Examination Study (NHANES) in the US and the 2000 and 2006 (and, in the next version of this paper, 2012 and 2016) National Health and Nutrition Surveys (ENSA/ENSANUT) in Mexico.

To assess selectivity, we compare outcomes among recently-arrived Mexican immigrants (with less than 1 year in the country) with those of comparable individuals in Mexico (for now,

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<sup>1</sup> Because of increasing concern by scholars and survey statisticians that the current anti-immigrant climate is possibly increasing selective undercoverage of undocumented migrants, and as said climate has also directly and indirectly resulted in a large outflow of Mexican immigrants and their families back to Mexico (e.g., Masferrer and Roberts 2012), we will also attempt to indirectly address these forms of selective attrition (as the data at hand do not allow for a direct examination of them), for instance by testing for the robustness of our results to these artifacts.

we only show age-adjusted descriptives, but will use matching and regression techniques as described below to make more precise comparisons), examining shifts over time. We look at several outcomes that are either risk factors or markers of cardiometabolic health, including: smoking, obesity, and waist circumference.<sup>2</sup> Because of the examination of immigrants relatively soon after their arrival, it is unlikely that the bulk of these conditions were driven by their experience in the U.S. and, as such, should be more indicative of selectivity (for similar approaches, see Bostean 2013; Riosmena, Kuhn and Jochem 2017; Riosmena, Palloni and Wong 2013; Ro and Fleischer 2014; Ro, Fleischer and Blebu 2016). Prior work has, by and large, assessed whether health selectivity exists, focusing less on whether it varies over time (for an exception on obesity, see Ro and Fleischer 2014).

Likewise, work has focused less on understanding changes in immigrant adaptation in health (for an exception on smoking trends, see Bostean, Ro and Fleischer 2017). To assess changes in modes of incorporation from initial (presumably, health-selective) conditions, we study shifts in the association between duration of stay and the same health-related outcomes<sup>3</sup> (using, later on, height and pre-migration smoking as falsification tests for cohort effects and examining post-migration smoking as well, along with weight changes). We do this using typical synthetic migration cohort analyses (e.g., comparing migrants surveyed in the same year with different durations of stay or ages at immigration, see footnote 3) as well as for truer migration

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<sup>2</sup> Future versions of the paper will also examine height (as a measure of childhood nutritional conditions), divide smoking histories into pre- and post-migration, as well as assess biomarkers of physiological dysregulation including glycosylated hemoglobin, glucose, blood pressure, HDL cholesterol, triglycerides, c-reactive protein, and self-reported chronic conditions.

<sup>3</sup> Future versions of the paper will include the use of age at immigration in addition to/instead of duration of stay given its larger relevance in structuring modes of incorporation {see Rumbaut, 2004 #1785; Van Hook, 2018 #2802}. This examination will be done using restricted-use NHANES data, where duration of stay is provided in exact years (unlike the public version, which only offers intervals). Currently, we have access to the publicly available 1999-2010 NHANES and are amending our proposal to include additional years.

cohorts by piecing together (incomplete but informative) trajectories across different survey cycles over age-time for immigrating at similar times/ages.

In future versions of this paper, we will also examine different counterfactuals to which compare this experience to. We will use Non-Hispanic (NH) whites to assess “assimilation into mainstream” types of tests (see Riosmena et al. 2017), while we will use data from Mexico to assess no-migration/homeland dissimilation counterfactuals (Jiménez and Fitzgerald 2007; Riosmena et al. 2017). Finally, we compare the experience of immigrants to those of U.S.-born individuals of Mexican origin to assess how summary indicators of the assimilation of subsequent generations of descendants evolved over time.

## **DATA AND METHODS**

We use data from six cross-sections (1999-2000 through 2015-2016) of the continuous National Health and Nutrition Examination Survey (NHANES). The National Health and Nutrition Examination Survey (NHANES) is a repeated, cross-sectional study conducted annually by the National Center for Health Statistics (NCHS). Unlike other research conducted by the NCHS, the NHANES combines interviews and surveys with physical examinations to provide rich biomarker and anthropomorphic data in combination with self-reported health status. Each cross-sectional survey cycle of the NHANES examines a nationally representative sample of approximately 5,000 respondents throughout the United States.

The NHANES, carried out by the National Center for Health Statistics, is a nationally representative survey of the noninstitutionalized resident civilian U.S. population. NCHS uses a four-stage probability sampling design that consists of the primary sampling unit (PSU), which consists mostly of individual counties in the United States, then segments within each county,

followed by households, and finally individuals. Each survey cycle consists of roughly 10,000 participants from approximately 15 counties. The survey consists of two components – an in-home questionnaire for a sampled adult (78-84% response rates across cycles) and an accompanying physical examination in a mobile examination center (MEC, 75-80% response rates), where health professionals collected biomarkers and anthropometric measures. Using MEC data, we examine important markers of chronic health, including inflammation and cardiometabolic risk indicators and risk factors (shown and defined in Table 1). We will also examine allostatic load, a composite index of cumulative biological risk (Seeman et al. 2001) based on all indicators. We examine several outcomes to test for the consistency of results and provide a broader, more robust view of barrio effects.

NHANES oversamples particular groups to obtain reliable estimates that can be weighted to reflect these subgroups in the larger population. In the 1999-2006 survey period (4 survey cycles) NHANES oversampled persons of Mexican American origin. In the 2007-2010 survey period (2 survey cycles) NHANES oversampled persons of Hispanic origin more broadly (in both, African Americans were also oversampled). CDC/NCHS (2011) recommends only analyzing Mexican Americans for analyses of specific national origin Hispanic groups in pooled NHANES analyses. This design also allows for an examination of barrio effects on health over a broader range of neighborhoods across the country and of neighborhood concentrations. For some of our contrasts, we also examine the association between coethnic concentration and health among U.S.-born non-Hispanic Blacks and U.S.-born non-Hispanic whites, and only use individuals surveyed in micro- or metropolitan areas. This selection yields sample sizes of 3,191 for U.S.-born Mexicans and 4,307 for foreign-born Mexicans, 7,244 for non-Hispanic Blacks, and 16,795 for non-Hispanic whites.

Outside of demographic information related to biological sex, age, racial/ethnic identity, nativity status, and the like, the current study utilizes several health measures based on said biomarker, anthropometric, and self-reported data.

Self-reported health conditions included are: hypertension diagnosis, use of medication for hypertension, diabetes diagnosis, use of medication for diabetes, coronary heart disease diagnosis, history of stroke, lifetime asthma diagnosis, presence of chronic bronchitis, and lifetime cancer diagnosis. All questions related to diagnoses are dichotomous – respondents who report ever having a particular diagnosis are marked in the positive, while all others receive a mark for the negative. All questions related to medication use are reserved for individuals reporting a relevant health condition (e.g. only those with a positive diabetes diagnosis were asked if they use medication to manage said diabetes).

To provide counterfactuals for self-selection and modes of incorporation, we use the Mexican 2000 National Health and 2006 National Health and Nutrition Surveys (ENSA and ENSANUT, respectively). The adult ENSANUT 2006 is a nationally representative sample of the Mexican population aged 20 and older; it includes around 45,000 individuals in each survey, of whom ca. 10,000 randomly selected individuals provided blood samples {for more details on the survey's methodology, see \Barquera, 2010 #2211}.

In addition to self-reported ever and current smoking status, we use body mass index and waist circumference based on anthropometric measures.<sup>4</sup> In addition to using the typical obesity

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<sup>4</sup> In addition, we will also include systolic and diastolic blood pressure, triglyceride levels, fasting glucose levels, glycosylated hemoglobin levels, c-reactive protein, unspecified hemoglobin levels, and high density lipoprotein (HDL) levels in future versions of the paper to measure cardiometabolic health more directly, and not only its risk factors.



cutoff of 30 kg/m<sup>2</sup>, we dichotomized waist circumference into less and more risky levels, defined by a threshold of 88 cm. (34.6 in.) for women and 102 cm. (40.15 in) for men.

## **PRELIMINARY RESULTS.**

Table 1 shows results for some initial selectivity tests, also depicted in Figure 1. Overall, it is clear that self-selection in smoking is not worsening while that related to central adiposity (i.e., obesity, high waist circumference) is likely increasing (see Goldman 2016; Hummer and Hayward 2015).

Table 2 and 3 show some results for synthetic and truer duration “effects” (assuming, in the case of cohort measures that attrition due to selective undercoverage, return migration, and mortality is not at play, something we will assess further in the full paper). Overall, despite the general trend towards lower smoking in both the United States and Mexico, we observe a clear deterioration in smoking and central adiposity measures using both synthetic and truer cohort perspectives.<sup>5</sup>

## **REFERENCES.**

Abrego, L.J. 2014. *Sacrificing families: Navigating laws, labor, and love across borders*: Stanford University Press.

Andreas, P. 2000. *Border games: Policing the U.S.-Mexico divide*. Ithaca: Cornell University Press.

Bostean, G. 2013. "Does selective migration explain the Hispanic paradox? A comparative analysis of Mexicans in the US and Mexico." *Journal of immigrant and minority health* 15(3):624-635.

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<sup>5</sup> Future versions of the paper will assess whether this deterioration is true in terms of increasing smoking initiation and lower cessation *after* immigration (see Riosmena et al. 2017). For central adiposity measures, we will attempt to look at age-specific trajectories or otherwise examine major weight changes in the NHANES data.

Bostean, G., A. Ro, and N.L. Fleischer. 2017. "Smoking trends among US Latinos, 1998–2013: The impact of immigrant arrival cohort." *International journal of environmental research and public health* 14(3):255.

Chavez, L. 2013. *The Latino threat: Constructing immigrants, citizens, and the nation*: Stanford University Press.

Dreby, J. and ebrary Inc. 2010. "Divided by borders Mexican migrants and their children." Pp. xxi, 311 p. Berkeley: University of California Press,.

Goldman, N. 2016. "Will the Latino Mortality Advantage Endure?" *Research on aging* 38(3):263-282.

Goosby, B.J., J.E. Cheadle, and C. Mitchell. 2017. "Stress-Related Biosocial Mechanisms of Discrimination and African American Health Inequities." *Annual Review of Sociology*(0).

Hatzenbuehler, M.L., S.J. Prins, M. Flake, M. Philbin, M.S. Frazer, D. Hagen, and J. Hirsch. 2017. "Immigration policies and mental health morbidity among Latinos: a state-level analysis." *Social Science & Medicine* 174:169-178.

Hummer, R.A. and M.D. Hayward. 2015. "Hispanic older adult health & longevity in the United States: Current patterns & concerns for the future." *Daedalus* 144(2):20-30.

Jiménez, T.R. and D. Fitzgerald. 2007. "Mexican assimilation: A temporal and spatial reorientation." *Du Bois Review: Social Science Research on Race* 4(2):337-354.

Kanstroom, D. 2007. *Deportation nation: Outsiders in American history*: Harvard University Press.

Masferrer, C. and B. Roberts. 2012. "Going Back Home? Changing Demography and Geography of Mexican Return Migration." *Population Research and Policy Review* 31(4):465-496.

Massey, D.S. and K.A. Pren. 2012. "Unintended Consequences of US Immigration Policy: Explaining the Post-1965 Surge from Latin America." *Population and Development Review* 38(1):1-29.

Menjívar, C. and S.M. Lakhani. 2016. "Transformative effects of immigration law: Immigrants' personal and social metamorphoses through regularization." *American Journal of Sociology* 121(6):1818-1855.

Ngai, M.M. 2014. *Impossible Subjects: Illegal Aliens and the Making of Modern America-Updated Edition*: Princeton University Press.

Orrenius, P.M. and M. Zavodny. 2005. "Self-selection among undocumented immigrants from Mexico." *Journal of Development Economics* 78(1):215-240.

Pedraza, F. and L. Zhu. 2015. "The "Chilling effect" of America's new immigration enforcement regime." *Pathways*:13.

Pedraza, F.I., V.C. Nichols, and A.M. LeBrón. 2017. "Cautious citizenship: the deterring effect of immigration issue salience on health care use and bureaucratic interactions among Latino US citizens." *Journal of health politics, policy and law* 42(5):925-960.

Phelan, J.C., B.G. Link, and P. Tehranifar. 2010. "Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications." *Journal of health and social behavior* 51(1\_suppl):S28-S40.

Philbin, M.M., M. Flake, M.L. Hatzenbuehler, and J.S. Hirsch. 2018. "State-level immigration and immigrant-focused policies as drivers of Latino health disparities in the United States." *Social Science & Medicine* 199:29-38.

Riosmena, F., R. Kuhn, and W.C. Jochem. 2017. "Explaining the immigrant health advantage: Self-selection and protection in health-related factors among five major national-origin immigrant groups in the United States." *Demography* 54(1):175-200.

Riosmena, F., A. Palloni, and R. Wong. 2013. "Migration selection, protection, and acculturation in health: A bi-national perspective on older adults." *Demography* 50:1039-1064.

Ro, A. and N. Fleischer. 2014. "Changes in health selection of obesity among Mexican immigrants: a binational examination." *Social Science & Medicine* 123:114-124.

Ro, A., N.L. Fleischer, and B. Blebu. 2016. "An examination of health selection among US immigrants using multi-national data." *Social Science & Medicine* 158:114-121.

Waters, M.C. and M. Gerstein Pineau. 2015. "The integration of Americans into American society." *Washington, DC: National Academies of Sciences, Engineering, and Medicine*.

Table 1. Age-standardized prevalence of risk factors for recently-arrived Mexican migrants and Mexican residents, along with estimates of the ratio between the two groups, by period.

	A. Foreign-born Mexicans with less than 5 years in U.S. (NHANES)			B. Mexican residents (ENSA/ENSANUT)		Ratio A/B (selectivity estimate)		
	1999-2004	2005-2010	2011-2016	2000	2006	1999-2004	2005-2010	2011-2016 <sup>ii</sup>
Ever smoked.	0.343	0.316	0.215	0.138	0.099	2.481	3.178	2.160
Currently smokes.	0.360	0.173	0.173	0.223	0.195	1.614	0.883	0.883
Times drank 5+ alcoholic drinks over last 30 days.	0.418	0.475	N/A	0.311	0.180	1.344	2.634	N/A
BMI 30+ kg/m <sup>2</sup> .	0.231	0.293	0.528	0.242	0.287	0.955	1.022	1.838
High waist circumference. <sup>i</sup>	0.399	0.592	0.623	0.423	0.460	0.943	1.287	1.354
High glucose <sup>iii</sup>   prev. diagnosed w/diabetes.	0.147	0.158	0.158	N/A	0.254	1.000	0.620	0.620
High triglycerides. <sup>iv</sup>	0.405	0.497	0.304	N/A	0.305	1.000	1.631	0.996
Low HDL cholesterol. <sup>v</sup>	0.375	0.369	0.447	N/A	0.769	1.000	0.480	0.581

Notes: <sup>i</sup>  $\geq 102$  cm. in men,  $\geq 88$  cm. in women; <sup>ii</sup> Comparison with 2006 while 2012 ENSANUT data are processed.

Figure 1. Ratio of age-standardized prevalence of smoking and central adiposity proxies for Mexican immigrants with less than 5 years in U.S. (NHANES) by Mexican residents (ENSA/ENSANUT) by period of interview, adults ages 20+.

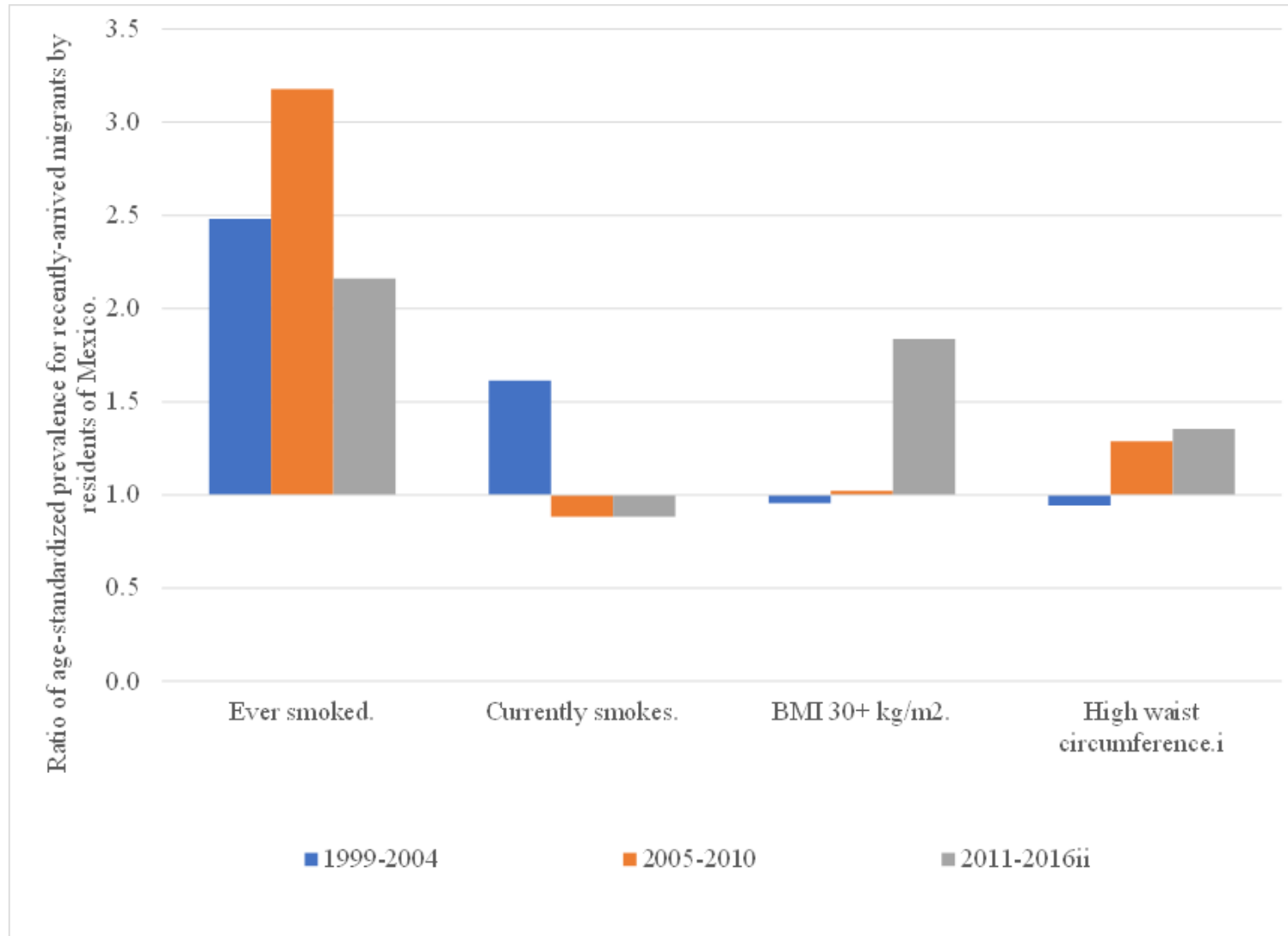


Table 2. Age-standardized prevalence of risk factors for Mexican migrants by duration of stay and period of interview.

	1999-2004				2005-2010				2011-2016			
	< 5	5 - 9	10 - 14	15+	< 5	5 - 9	10 - 14	15+	< 5	5 - 9	10 - 14	15+
Ever smoked.	0.343	0.419	0.398	0.356	0.316	0.350	0.329	0.308	0.215	0.404	0.303	0.211
Currently smokes.	0.360	0.539	0.683	0.627	0.173	0.453	0.408	0.616	N/A	0.452	0.555	0.598
Times drank 5+ alc. drinks last 30 days.	0.418	0.349	0.390	0.479	0.475	0.425	0.415	0.454	N/A	N/A	N/A	N/A
BMI 30+ kg/m <sup>2</sup> .	0.231	0.337	0.363	0.355	0.293	0.306	0.380	0.413	0.528	0.337	0.471	0.394
High waist circumf. <sup>i</sup>	0.399	0.544	0.507	0.522	0.592	0.608	0.702	0.717	0.623	0.570	0.584	0.536

Notes: <sup>i</sup>  $\geq 102$  cm. in men,  $\geq 88$  cm. in women.

Figure 2. Age-standardized prevalence of (a) smoking and (b) central adiposity proxies for Mexican immigrants by duration of stay and period of interview, 1999-2016 NHANES, adults ages 20+.

Note: leftmost panel within each figure pertains to 1999-2004 period, center panel within each figure pertains to 2005-2010 period, and rightmost panel pertains to 2011-2016 period. Each point within each curve represents a measurement at a particular duration of stay, namely 0-4, 5-9, 10-14, and 15+ years. See Table 2 for estimates.

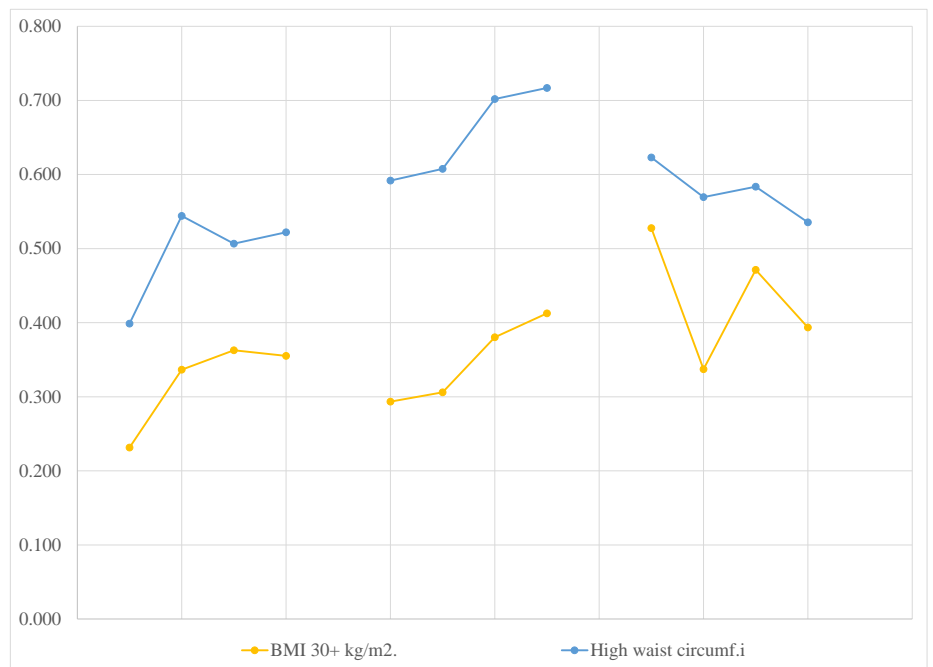
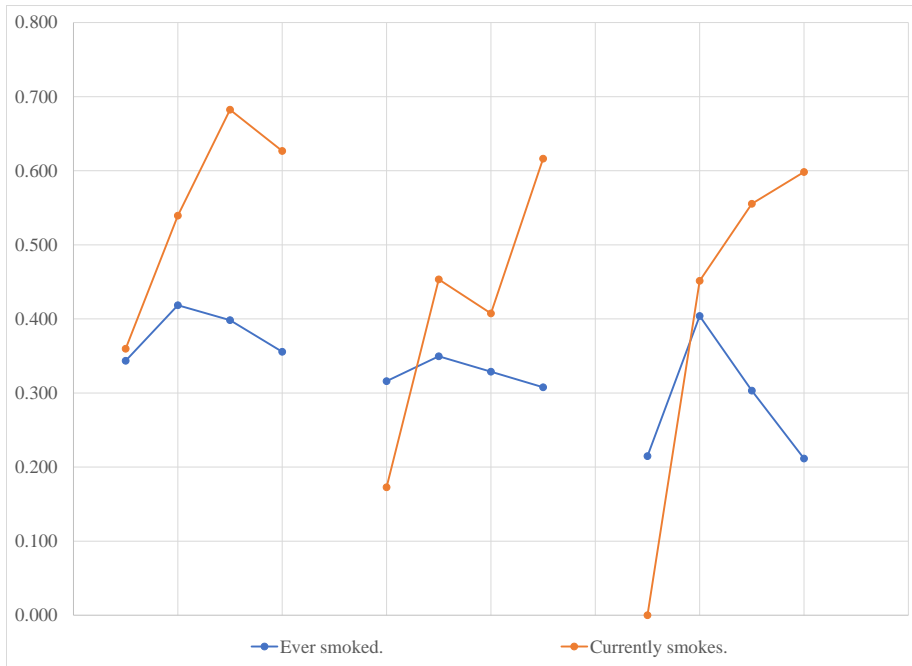


Table 2. Age-standardized prevalence of risk factors for Mexican migrants by duration of stay and cohort of arrival.

	1999-2004				2005-2010	
	< 5	5 - 9	10 - 14	Grad.	< 5	5 - 9
Ever smoked.	0.343	0.350	0.303		0.316	0.404
Currently smokes.	0.360	0.453	0.555		0.173	0.452
Times drank 5+ alc. drinks last 30 days.	0.418	0.425	N/A		0.475	N/A
BMI 30+ kg/m <sup>2</sup> .	0.231	0.306	0.471		0.293	0.337
High waist circumf. <sup>i</sup>	0.399	0.608	0.584		0.592	0.570

Notes: <sup>i</sup>  $\geq 102$  cm. in men,  $\geq 88$  cm. in women.



Figure 2. Age-standardized prevalence of (a) smoking and (b) central adiposity proxies for Mexican immigrants by duration of stay and period of arrival (i.e., immigration cohort), 1999-2016 NHANES, adults ages 20+.

Note: left panel within each figure pertains to 1999-2004 immigration cohort and right panel within each figure pertains to the 2005-2010 cohort. Each point within the same curve represents a measurement at a particular duration of stay, namely 0-4, 5-9, and (for the 1999-2005 cohort only) 10-14. See Table 3 for estimates.

