Assigning lifetime occupation domains for older Mexicans: MHAS-O*NET linkage protocol

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Abstract

Objective. We developed a MHAS (Mexican Health and Aging Study) and O*NET (Occupational Information Network) linkage to allow global researchers using MHAS data to assign lifetime occupation domains for older Mexicans. **Materials and methods.** Three bilingual raters independently matched 440 records with 132 unique occupation codes from the 2012 MHAS. We used a modified Delphi technique to reach agreements. To assess reliability, we compared the distribution of observations between the MHAS file and the MHAS-O*NET linked file across five job categories (upper white collar, lower white collar, upper blue collar, low blue collar, and agriculture/fishing/forestry). The Institutional Review Board at the University of Texas Medical Branch reviewed and approved the research (IRB # 21-0268). **Results.** Using the developed 1:1 MHAS-O*NET linkage, consistency between MHAS and O*NET was 97.4% across the five job categories. **Conclusion.** This MHAS-O*NET linkage will allow researchers to analyze the association between lifetime occupation and multiple dimensions of health, functionality, and retirement determinants for a low-middle income country with a large proportion of workers in the informal sector.

Keywords: aging; health of the elderly; occupations; Mexico

Resumen

Objetivo. Desarrollar un vínculo de datos entre el Estudio Nacional de Salud y Envejecimiento de México (Enasem) y la Red de Información Ocupacional (O*NET) para que investigadores alrededor del mundo puedan utilizar los datos de la Enasem con dominios de ocupación asignados para la ocupación principal durante la mayor parte de la vida laboral de los adultos mayores mexicanos. **Material y métodos.** Tres evaluadores bilingües asignaron de forma independiente 440 registros con 132 códigos de ocupación únicos en la Enasem 2012. Se utilizó una versión modificada de la técnica Delphi para llegar a acuerdos. Para evaluar la confiabilidad del vínculo, se comparó la distribución de las observaciones entre el archivo de la Enasem y el archivo vinculado Enasem-O*NET de acuerdo con cinco categorías de ocupación (cuello blanco superior, cuello blanco inferior, cuello azul superior, cuello azul bajo y agricultura/pesca/silvicultura). La Junta de Revisión Institucional de la Rama Médica de la Universidad de Texas revisó y aprobó el estudio (IRB # 21-0268). **Resultados.** Utilizando el vínculo 1:1 Enasem-O*NET desarrollado, la consistencia entre Enasem y O*NET fue de 97.4% entre las cinco categorías de ocupación. **Conclusión.** Este vínculo Enasem-O*NET permitirá a los investigadores analizar la asociación entre la ocupación durante la mayor parte de su vida laboral y múltiples dimensiones de

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los determinantes de la salud, la funcionalidad y la jubilación para un país de ingresos bajo/medios con una gran proporción de trabajadores en el sector informal.

Palabras clave: envejecimiento; salud del anciano; ocupaciones; México

This Mexican Health and Aging Study (MHAS) and Occupational Information Network (O*NET) linkage protocol describes the process developed to assign lifetime occupation domains for older Mexicans using two established data sources from the United States and Mexico. We used the reported main occupations during the working life of participants in the MHAS and linked these occupation codes to the O*NET dataset. The O*NET dataset has detailed information on job characteristics. Researchers have used O*NET occupation data to link with levels of physical function for individuals with disabilities[1] and to examine the associations between work exposures and chronic diseases.[2] Recently, the O*NET dataset was linked with the U.S. Health and Retirement Study (HRS) data to examine longitudinal trajectories of cognitive function associated with multifaceted mental work demands.[3,4] A Brazilian study also used O*NET job ability components to investigate occupation-associated cognitive reserve.[5] In order to use and interpret the linked data between O*NET and other datasets, developing the process to construct the linkage between datasets is a priority. However, sparse linkage protocols between O*NET occupational components and aging data from the United States and other countries are currently available to global users.

Many low-middle-income countries (LMIC) have large informal labor markets and high poverty rates among older adults. In LMIC, older adults working in informal sectors work for a longer period than older adults in formal labor markets, who often have an early or predetermined retirement age. Retirement from informal work is often fluid; entering and exiting the informal labor force multiple times is common in middle age and old age. LMIC data sources thus provide a unique opportunity to analyze occupation and multifaceted skills acquired during working life for formal and informal workers, occupation trajectories, and determinants of retirement. The detailed occupation characteristics from O*NET can be used to analyze a wide variety of topics, including the interrelation between occupation and health status, cognitive decline, lifetime earnings, environmental exposures and health trajectories, and economic security in old age.

Additionally, researchers have found that longer-held jobs with occupational complexity and cognitively demanding tasks are positively associated with cognitive functioning in old age.[6,7] The linkage of datasets with longitudinal aging information and detailed job descriptions is therefore needed to investigate the association between occupation and cognition for workers in formal and informal sectors. The linkage of MHAS and O*NET offers a powerful data tool for the examination of topics where occupation is a potentially important determinant of health and aging.

To take full advantage of the ample occupation information provided in O*NET for LMIC, this MHAS-O*NET linkage protocol provides detailed procedures conducted to match occupation data between MHAS and O*NET. We further compared the percentage of individuals across job categories between MHAS and the resulting MHAS-O*NET to evaluate the reliability of the developed 1:1 MHAS-O*NET linkage. We provide a detailed MHAS-O*NET linkage protocol so that global researchers may better understand the value of using the combined MHAS and O*NET data to assign lifetime occupation domains for older adults.

Materials and methods

Data sources

Mexican Health and Aging Study (MHAS)

MHAS is a nationally representative longitudinal household survey conducted in 2001, 2003, 2012, 2015, 2018, and 2021. The MHAS survey collects information on socio-demographic characteristics, health, income, wealth, migration history, and other topics for persons aged 50 and over and their spouses in Mexico.[8] MHAS was originally designed to prospectively analyze the impact of disease on health, function, and mortality for older adults living in Mexico. The MHAS survey protocol and instruments were designed to be highly comparable to the U.S. HRS,[9] with adaptations to capture features of the Mexican social and economic context and culture.[10]

*Occupational Information Network (O*NET)*

O*NET allows for career and job exploration through several categories, including a selection of career clusters.

Approximately 923 jobs are divided into 16 career clusters, which are defined as occupations "in the same field of work that require similar skills."[11] The O*NET dataset is updated on a regular schedule and comprises a variety of descriptors for each job.[10] O*NET is particularly useful due to its data value, a data point that reflects job demands (range 0-7, where higher value represents higher demands).[1,11] Job abilities are considered across cognitive, physical, psychomotor, and sensory classifications.

Coding of lifetime occupations in MHAS

To achieve the objective of linking MHAS and O*NET, we first performed data checking to assess how MHAS participants were assigned occupation codes, also checking the completeness of the occupation code variable. We used the MHAS 2012 wave because this wave has detailed information about respondents' lifetime occupation, including responses to the open-ended questions that provide more details about said occupation.

Information about respondents' lifetime occupation complemented information from the closed-ended questions in MHAS and the variable containing the occupational codes classified by the *Instituto Nacional de Estadística y Geografía* (INEGI), Structure of the Mexican Classification of Occupations 2012.[12]

We used information collected in the MHAS 2012 wave for data on lifetime occupation, defined as the occupation that the participant reported as held for the longest time.[10] We checked the completeness of the 3-digit lifetime occupation codes assigned by INEGI for each participant in MHAS (figure 1). MHAS 2012 had a total sample of 15 723 respondents, including follow-up respondents and a refreshed sample added in 2012. Of these, 8 529 respondents (54.2%) had an INEGI code for their lifetime occupation. For consistency, we cross-checked each respondent's reported lifetime occupation in 2012 with the previous 2001 and 2003 waves. When the 2012 lifetime occupation differed from previous waves, we checked which lifetime occupation was held for more years of work, using responses to the question
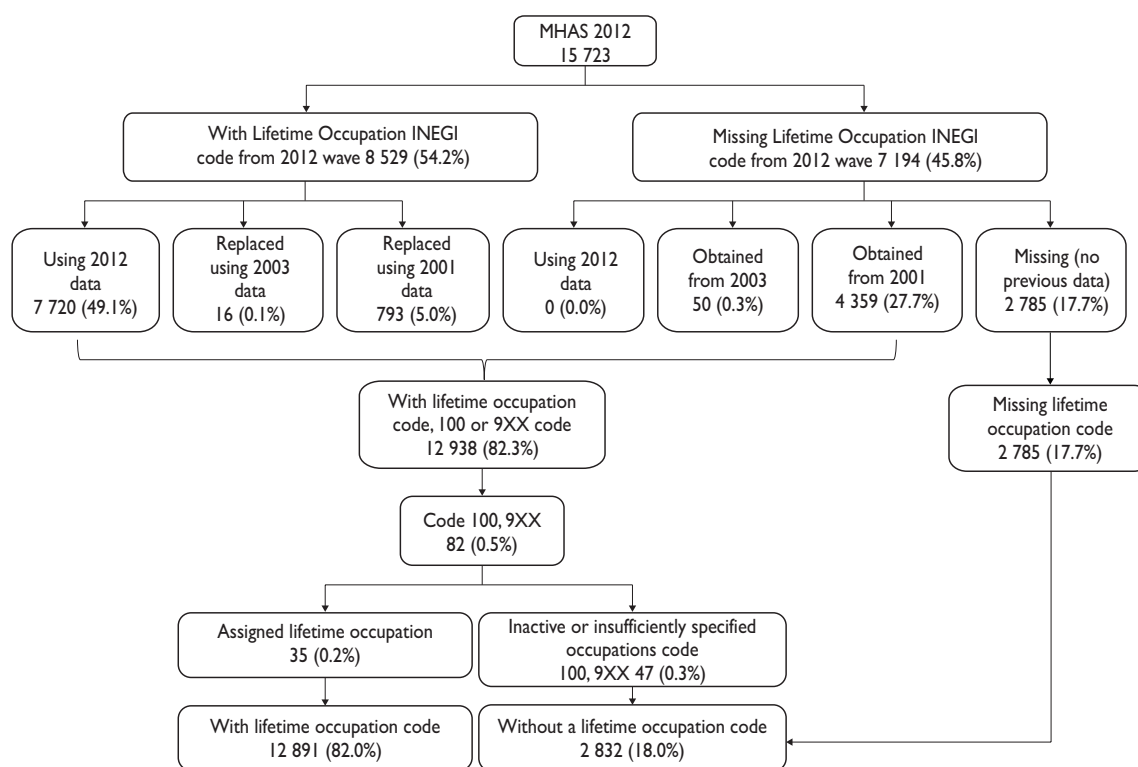
MHAS: Mexican Health and Aging Study
INEGI: *Instituto Nacional de Estadística y Geografía*

Figure 1. Lifetime Occupations Data Coding Process in Mexican Health and Aging Study (MHAS). Mexico, 2012

"How many years have you worked (or did you work) doing these activities or job?". We re-assigned the 2012 lifetime occupation codes if the respondent spent more years in the lifetime occupation reported in 2001 (793 cases or 5%) or 2003 (16 cases or 0.1%). For the 7 194 cases with missing lifetime occupation in MHAS 2012 (45.8% of the total sample), we used lifetime occupation reported in 2001 or 2003, provided that the codes were consistently reported in both waves. When there was discrepancy between 2001 and 2003 lifetime occupation, we again chose the occupation held for more years. We were unable to assign a code for new study participants added in 2012 with missing lifetime occupation, as their occupation data were not available from any of the previous waves (2 785 cases or 17.7% of the total sample).

Among INEGI occupation codes, the code 100 refers to individuals who are inactive or out of the labor force. Codes 990, 991, 992, and 999 refer to insufficiently specified occupations. In the total sample of 12 938 cases, there were 82 cases with codes 100 or 9XX (990, 991, 992, and 999) that had an unspecified INEGI code; therefore, we used additional information about lifetime occupation from questions in the MHAS questionnaire, including the open-ended questions.[10] We assigned lifetime occupation for 35 of the 82 cases, but we were unable to assign codes to 47 cases, resulting in a total sample of 12 891 cases with a lifetime occupation code. The frequency of the identified MHAS lifetime occupation codes for the total sample of 12 938 cases is reported in our data repository.[10]

For the 2 785 missing cases (17.7%) and the 47 unassigned cases with codes 100, 990, 991, 992, or 999 in MHAS 2012, we checked another question ("What is your reason for not working?") and identified possible answers: household chores, retired, old age, sick or temporarily disabled, unable to work for the rest of their life, cannot find work, and other. For the linkage, we considered household chores as an occupation particularly relevant for respondents who worked at home with no pay. We identified the sample (n= 2 832, including 2 785 plus 47 cases with codes 100 or 9XX) as new respondents and follow-up respondents[10] to demonstrate the assignment process used for cases with codes 100 and 9XX. For follow-up respondents, information was retrieved from MHAS 2001 or 2003 when responses to the question in MHAS 2012 were missing. We used additional information to assign occupation codes to 955 cases for new respondents and 1 312 cases for follow-up respondents, a total of 2 267 out of 2 832 cases, with 30 (0.2%) cases with a 9XX code and 535 (3.4%) cases without a lifetime occupation code. After completing these steps, we successfully assigned lifetime occupation to 15 158 respondents or 96.4% of the MHAS 2012 sample.

MHAS and O*NET linkage process

The MHAS 2012 survey had 132 unique occupation codes. We randomly selected three to four cases for each unique occupation code to represent observations with a diversity of sex and education levels, resulting in a total of 440 MHAS records. To match each MHAS occupation code with the corresponding O*NET code, the project lead (first author) generated detailed matching instructions to ensure a consistent matching process. The research team trained three bilingual raters to independently assign a corresponding O*NET occupational code for each of the 132 occupation codes in MHAS. We used the first 20 cases to calibrate the matching procedures across the three raters. We conducted a total of six matching rounds over six months. Raters spent an average of 18.1 hours, 12.5 hours, and 14.5 hours, respectively, with an overall average of 15 hours each to complete the matching code assignment of 440 cases.[10]

Linkage components

Raters matched occupation codes between MHAS and O*NET using the (a) 3-digit INEGI occupation code,[12] according to the characteristics of the job reported by the participant in MHAS, (b) job descriptions of primary occupational activities provided in the INEGI catalog for each 3-digit occupation code, (c) open-ended answers provided by the participant in MHAS to describe the activities in their main lifetime occupation, and (d) place where the job was typically performed as reported by the respondent (e.g., street, office). For the O*NET occupation codes, the three raters first collectively identified the key words for each INEGI code with components (a)-(d) using the search engine in the O*NET online catalog system. Raters then used the job description from (b) as the initial source to select key words and the open-ended answer from (c) and location from (d) as secondary source to complement the job list with any additional key word when needed (table I). The key words were at least four-words long with a limit of 50 characters restricted by the search function in the O*NET search engine online system 1.

Linkage procedure

Once the raters determined the final keywords associated with each INEGI code, each rater independently proceeded to select the occupational codes in O*NET. The linkage procedure was as follows: (1) the rater entered the defined keywords into the jobs search engine of O*NET;*

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 * Located at https://www.onetonline.org/find/

Table I
Examples of Mexican Health and Aging Study occupational codes and survey variables (job description, open-ended answer and place of work) and final selected keywords. Mexico, 2012

INEGI code	720	417
Job description	traveling sales people	agricultural and livestock foremen and related occupations
Open-ended answer	buy or sell used clothes	supervise agriculture activities
Work location	flea market lot	agriculture farmland
Keywords	traveling sales people	agricultural livestock foremen

INEGI: *Instituto Nacional de Estadística y Geografía*

(2) when the O*NET search engine generated a list of potential jobs, the rater reviewed each job option using the order from top to bottom of the output list until the rater could confidently select one that best captured the job description provided in the MHAS; and (3) when this selection was made, each rater captured the corresponding O*NET Standard Occupational Classification (SOC) code. Raters each submitted their code selections to the project lead. We used a modified Delphi technique[13] to reach matching agreement with at least two raters agreeing on the same O*NET SOC code. The three raters and team of four investigators discussed reasons for each of the cases with differences, and O*NET SOC codes were reconsolidated among raters. Each meeting to resolve inconsistent SOC codes lasted one to two hours. Table II provides the original matching results (0, 67, and 100% agreements among three raters) before implementing the modified Delphi technique to resolve conflicts of selected O*NET SOC codes among raters.

Classification of white/blue collar jobs

The purpose of using white/blue collar job classifications for the full sample (N=15 123) was primarily for quality checking of the developed 1:1 MHAS-O*NET occupation linkage (table III), because the linkage was initially developed based on the sub-sample (n=440). These five white/blue collar job classifications were based on similar job aspects defined in previous studies using the MHAS data,[10,14] including upper white collar, lower white collar, upper blue collar, lower blue collar, and agriculture/fishing/forestry. Upper white collar comprises jobs such as executives and supervisors; lower white collar com-

prises jobs such as administrative support personnel; upper blue collar comprises jobs in maintenance; lower blue collar comprises jobs in informal activities, such as repair and factory work. The category of agriculture, fishing, farming, and hunting is straightforward and is considered as a separate job cluster.[10,14]

Based on the INEGI codes in the MHAS 2012, we first categorized each INEGI code into one of the five job classifications and then calculated the sample size of each category. We then assigned an O*NET SOC code to each INEGI code using the developed 1:1 linkage (table III). Then we assigned each O*NET SOC code into one of the five job classifications again and calculated the sample size of each category as well. We subsequently compared the sample sizes across the five job categories for both the INEGI codes and the O*NET codes to examine if jobs were consistently categorized or if there were significant changes in sample sizes in each category. We expected this quality verification process would find similar (or approximately the same) frequency distributions for the five job categories between INEGI and O*NET SOC codes, if the 1:1 linkage (table III)[8] worked as expected by accurately translating occupations from MHAS to O*NET.

Results

MHAS and O*NET linkage

Of the 440 cases selected from MHAS 2012, the raters returned with 33 cases (7.5%) that had more than one O*NET SOC code. For these 33 cases, we first determined the final 1:1 matching O*NET SOC code based on the closest description in the Mexican Catalog of Occupations and the O*NET code description. We then chose a more general job description in O*NET that better fit the respective MHAS code. We avoided choosing O*NET SOC codes that were previously matched with other MHAS codes to ensure each MHAS code had a unique O*NET SOC code. Our research team spent two hours 26 minutes to resolve these 33 cases (15 cases with two O*NET codes, 12 cases with three O*NET codes, and six cases with four O*NET codes). Table III shows the final 1:1 MHAS-O*NET matching codes.

Assigning codes to homemakers

There is no O*NET SOC code for homemakers. Thus, for the MHAS code 100 assigned to homemakers, we searched for the closest corresponding O*NET SOC codes. The open-ended responses for the code 100 were reviewed. The composite of two O*NET SOC codes, 39-9011.01 (nannies) and 37-2012.00 (maids and

Table II
Original agreement across raters prior to implementing modified Delphi technique.
Mexican Health and Aging Study. Mexico, 2012

Round	Number of cases	Date, time of the meeting	0%	67%	100%
1^	20	2021, Sept 2, 13:00 - 14:00	4	12	4
1	20	2021, Sept 22, 13:00 - 14:00	2	7	11
2	50	2021, Oct 8, 14:00 - 15:00	3	20	27
3	50	2021, Oct 22, 13:00 - 14:00	8	20	22
4	100	2021, Nov 9, 12:00 - 13:00	20	44	36
5*	100	2021, Nov 23, 11:00 - 12:30	-	-	-
5*	100	2021, Dec 15, 11:00 - 12:30	30	37	26
6*	120	2022, Jan 20, 13:00 - 14:30	-	-	-
6*	120	2022, Jan 24, 15:00 - 16:00	37	50	29

Calibration round. *The number of cases matched in rounds 5 and 6 do not add to the total number of cases assigned. The cases not matched in round 5 and 6 had codes 100 or 9XXs with insufficient information for raters to match them with O*NET. For example, round 5 had a total of 100 cases, but we were only able to match 93 cases.
Rounds 5 and 6 took two meetings to complete the modified Delphi technique process to reach agreements.
O*NET: Occupational Information Network

housekeeping cleaners), were assigned to capture the job contents of the MHAS code 100. We adopted this convention to include homemakers so that researchers may average the scores corresponding to skills and other occupational dimensions in these two O*NET SOC codes (39-9011.01 and 37-2012.00) to assign the corresponding scores for MHAS homemakers. We included individuals identified as homemakers in the 'lower blue collar' category.

Classification of white/blue collar jobs

Table IV[11] shows the numbers of each category identified by the MHAS codes and the O*NET SOC codes using the final 1:1 matching (table III). Overall, 14 731 of 15 123 (97.4%) cases were assigned into the same types of jobs between the MHAS codes and the O*NET SOC codes using the 1:1 MHAS-O*NET matching.

Discussion

The main goal of this protocol was to assign each occupation code in the MHAS a corresponding job code in the O*NET so that future research may take advantage of the detailed characteristics provided by the O*NET occupation data. The developed 1:1 MHAS-O*NET linkage will allow researchers to examine the association between multiple occupational characteristics and aging in Mexico. Our research team conducted thorough and systematic procedures to match the occupation codes between MHAS and O*NET and compared percentages of assigned job types using the developed

1:1 MHAS-O*NET linkage. Our consistency-checking results showed 97.4% consistency between MHAS and O*NET occupation codes when using the generated 1:1 MHAS-O*NET match to categorize jobs, implying a high reliability of our MHAS-O*NET linkage.

The developed 1:1 MHAS-O*NET linkage will allow global MHAS users to incorporate the extensive job characteristics available in the O*NET repository to the corresponding MHAS job records. Given the richness of the data available in both the MHAS and O*NET, we expect that a variety of research questions related to occupation and the associated health and trajectories of aging will be examined, including physical, mental, and emotional health associated with occupation demands over Mexicans' lifespans. Our protocol produced a unique and valuable linkage. The value of this protocol lies in its contribution to the understanding of occupation-related lifespan aging. Users can select and apply our developed 1:1 MHAS-O*MET linkage at the levels of each researcher's individual interest (e.g. importance) and can be applied to any other characteristics of occupation component available in the O*NET database. Our developed 1:1 MHAS-O*NET linkage does not limit to the use of importance values in O*NET.

There are some limitations of this work, including that the job variables collected in O*NET may not be completely or perfectly applicable with jobs in the Mexican context. Researchers should keep this in mind when comparing job demands between high-income and low-middle-income countries.[15] Though the level of job skills may differ across cultures or countries, we

Table III
FINAL MATCH BETWEEN THE MEXICAN HEALTH AND AGING STUDY (MHAS)
AND O*NET OCCUPATION CODES. MEXICO, 2012

MHAS Code	O*NET Code	Total Cases	MHAS Code	O*NET Code	Total Cases	MHAS Code	O*NET Code	Total Cases
100	37-2012.00	2	417	11-9013.00	16	553	53-2011.00	2
	39-9011.00	1	419	45-2093.00	92	554	53-5021.00	10
110	11-9041.00	66	510	35-1012.00	13	555	45-2091.00	3
111	43-9111.00	3	511	47-1011.00	2	559	53-3033.00	10
112	19-2031.00	12	512	51-1011.00	13	610	11-9111.00	51
113	29-1214.00	122	513	51-1011.00	2	611	11-3121.00	60
114	19-1023.00	3	514	51-1011.00	22	612	11-3071.00	15
115	29-1131.00	11	515	51-1011.00	1	613	11-9041.00	8
116	23-1011.00	50	516	47-1011.00	24	614	51-9061.00	9
117	43-3031.00	90	517	49-1011.00	3	615	39-9032.00	2
118	21-2011.00	1	518	51-1011.00	6	616	39-1014.00	19
119	21-1012.00	13	519	51-1011.00	49	618	33-9032.00	8
120	17-3011.00	86	520	35-2015.00	504	619	43-1011.00	6
122	29-1299.01	131	521	47-5051.00	25	620	43-6014.00	382
123	29-2012.00	16	522	51-6052.00	412	621	41-2011.00	101
124	29-2056.00	7	523	47-2031.00	113	622	53-7065.00	82
125	13-1023.00	120	524	49-3021.00	385	623	43-4171.00	60
126	21-2011.00	4	525	51-9195.00	51	624	43-2021.00	16
129	43-9111.00	10	526	49-9071.00	613	625	43-5021.00	16
130	25-1081.00	38	527	49-2094.00	93	626	43-5032.00	17
131	25-2031.00	21	528	49-3093.00	18	627	43-6014.00	187
132	25-2022.00	48	529	49-9071.00	109	629	43-6011.00	8
133	25-2021.00	207	530	51-9111.00	31	710	41-4012.00	635
134	25-2011.00	36	531	47-5041.00	8	711	41-2031.00	508
135	25-2057.00	4	532	51-6041.00	150	712	53-3031.00	27
136	25-1121.00	37	533	51-7041.00	17	713	41-3021.00	96
139	25-1081.00	167	534	51-4031.00	75	719	41-4012.00	1
140	27-3023.00	8	535	51-9041.00	6	720	41-9091.00	211
141	27-2042.00	31	536	51-8093.00	3	721	41-9091.00	172
142	27-1013.00	12	537	53-7072.00	11	729	41-9091.00	58
143	27-3011.00	2	538	51-9041.00	22	810	35-3031.00	227
144	27-2011.00	7	539	51-4041.00	65	811	37-2012.00	28
146	39-9032.00	1	540	35-2021.00	102	812	37-2011.00	501
210	11-1031.00	6	541	47-5081.00	2	813	39-5012.00	55
211	11-1021.00	17	542	53-7064.00	26	814	41-2021.00	4
212	11-1021.00	187	543	51-9198.00	12	815	39-9011.00	43
213	19-3094.00	2	544	51-9198.00	27	819	43-4051.00	11
219	11-1011.00	6	545	51-9198.00	7	820	37-2012.00	1 520
410	45-2092.00	1 830	546	47-2061.00	85	820	39-9011.01	2 267
411	45-2093.00	134	547	47-3013.00	2	830	33-9032.00	174
412	45-2093.00	63	548	51-9198.00	9	831	55-3018.00	21
413	45-4011.00	23	549	49-9098.00	51	980	N/A	3
414	45-3031.00	1	550	53-7051.00	99	999	N/A	32
415	45-3031.00	45	551	53-4031.00	19			
416	45-2041.00	11	552	53-3053.00	405			

Total: Number of cases of each occupation code in MHAS 2012
O*NET: Occupational Information Network
Note: The MHAS data and documentation are available free of charge at the MHAS study website.[8] The linked MHAS-O*NET codes are also available at this site.

Table IV

NUMBER OF CASES BY FIVE JOB CLASSIFICATIONS ACCORDING TO MEXICAN HEALTH AND AGING STUDY (MHAS) AND O*NET SOC CODES USING 1:1 LINKAGE. MEXICO, 2012

	MHAS (INEGI code)	O*NET	Difference	%
Upper white collar	1 699	1 770	71	4.0
Lower white collar	869	686	183	21.1
Upper blue collar	2 209	2 249	40	1.8
Lower blue collar	8 131	8 216	85	1.0
Agricultural, fishing, forestry	2 215	2 202	13	0.6
Total	15 123	15 123	392	2.6

Note: 32 cases coded 9XX and three cases coded 980 were excluded from this analysis because those codes were not considered in the MHAS occupation classification.[11]
INEGI: *Instituto Nacional de Estadística y Geografía*
O*NET SOC: Occupational Information Network Standard Occupational Classification

assumed the essential job components remain similar. For example, regardless of economic or cultural context, the components of vendor jobs selling food on the street are largely similar, requiring the abilities to communicate and interact with customers, set up a vendor, purchase and cook ingredients, and process payments. Our developed 1:1 MHAS-O*NET linkage offers a practical way to examine the variation across occupations within a country, reflecting the heterogeneity of characteristics across occupations. Researchers should include additional variables in their models to capture the heterogeneity of occupations and job characteristics in the country context, such as rural/urban residence, formal/informal sector of employment, self-employed/salaried work, and work benefits, to minimize potential confounders when capturing information related to occupations. We suggest that future work incorporate our findings with occupation catalogs in other countries to expand the comparisons of occupational information globally beyond Mexico and the United States, similar to the efforts conducted to produce the international standard classification of occupations 2008 (ISCO-8).[16]

Regarding our treatment of homemakers, we did not include number of children or other contextual variables as part of the process to verify detailed information for the category homemaker, but as MHAS has rich information to inform household and/or childcare duties, users can decide what characteristics of the oc-

cupation they want to select for their specific research question. Users can also adapt the two O*NET codes we provided for homemakers with additional variables, including other responses related to household and/or childcare duties from MHAS. For example, users can decide to retain the combination of dimensions of the two (e.g., average the two values) or select one of the two (nannies or maids/housekeeping cleaners) to represent MHAS code 100 according to individual study purposes.

Our protocol was developed to generate the 1:1 MHAS-O*NET linkage of occupational codes that provides crucial preparation work for researchers to further examine the impact health and function in holding occupations over the life course. Future studies are encouraged to use the developed 1:1 match between MHAS and O*NET to incorporate multiple dimensions of occupations and further characterize influences of occupation on short-term or long-term aging and health for older adults across countries.

Acknowledgments

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