



## **Mexican Health and Aging Study (MHAS)**

### **Linked Data Files**

### **Version 3**

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## **I. Introduction**

This following document describes the content of the available linked data sets of the Mexican Health and Aging Study (MHAS) and the process to obtain the data.

Although most of the MHAS data is available through the website ([www.MHASweb.org](http://www.MHASweb.org)) to any registered user, other MHAS datasets are linked, and are available only under specific contractual conditions. Additional information on the linked data files can be obtained from a special section of the MHAS website; documentation for many of these files is also available upon request. We encourage researchers to review this document to see if any of the linked data files will meet their research needs.

All the linked data sets are intended for exclusive use of the approved users listed in the Confidentiality Agreement form (*Form 7*). If there are any questions about any of the data sets contact the MHAS team ([info@mhasweb.com](mailto:info@mhasweb.com)).

## II. Study Description<sup>1</sup>

The 2001 baseline survey of the Mexican Health and Aging Study (MHAS) is a national representative survey of individuals born prior to 1951, that is, the population aged 50 or older as of the year 2001. The sample for the MHAS baseline was selected from residents of both rural and urban areas, from the National Employment Survey (Encuesta Nacional de Empleo, ENE), carried out by the INEGI (Instituto Nacional de Estadística y Geografía) in Mexico.

In 2012, a follow-up visit was planned to include all the age-eligible subjects from the 2001 and 2003 surveys and a new sample of individuals from the 1952-1962 birth cohorts as well as their spouses/partners regardless of age (MHAS, 2013). Another follow-up survey was successfully fielded in 2015, three years after the third wave. A fifth wave of data was also collected in 2018. Similar to the MHAS 2012 protocol, in 2018 a new cohort was added of representative adults born between 1963-1968. The 2018 survey response rate was 84.7%.

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<sup>1</sup> Wong R, Michaels-Obregon A, Palloni A. Cohort Profile: The Mexican Health and Aging Study (MHAS). *Int. J. Epidemiol.* 2017 Apr 1;46(2):e2. PMID: 25626437. First published online: January 27, 2015. doi: 10.1093/ije/dyu263.

### III. Data sets content

The linked datasets are created by the MHAS team to answer specific research questions. The team considers the feasibility of the linkage, the importance of the research questions that can be answered, and the willingness to have the linked files available to all users. The MHAS has created the following linked files:

- Community-level characteristics
- Mortality data
- *Seguro Popular* enrollment
- Historical data on air pollution
- Literacy rates
- Social programs enrollment, including *Progres/Oportunidades*, *70+ Pension*, and *Seguro Popular*

The following is a description of the contents of each data set.

#### A. Community-level characteristics

In order to extend the analysis that the users can perform with the MHAS data and the availability of external data, the MHAS team combined information with two sources of data at the community-level; the 2000 Mexican Census of Population and Dwellings and the 2002 Directory of Public Health Sector Facilities. The linkage was performed using the community's numerical identifiers. The characteristics of the community included in the data sets add important information for studies on the behavior of individuals.

The following databases were used to create this linked file<sup>2,3</sup>:

- 1) The household-level file of the Mexican Health and Aging Study (MHAS/ENASEM) 2001.

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<sup>2</sup> Upon request, the MHAS team will provide the descriptive file "*MHAS 2001 Community Linkage – Public Release.pdf*", that includes the content of the final linked data file.

<sup>3</sup> Upon request, the MHAS team will provide the descriptive file "*MHAS 2012 Community Linkage – Public Release.pdf*", that includes the content of the final linked data file.

- 2) The household-level file of the Mexican Health and Aging Study (MHAS/ENASEM) 2012.
- 3) The community-level file of the 2000 Mexican Census of Population and Dwellings, provided by INEGI.
- 4) The community-level file (ITER) of the 2010 Mexican Census of Population and Dwellings, provided by INEGI.
- 5) The 2002 Directory of Public Health Sector Facilities, provided by the Mexican Ministry of Health.
- 6) The 2013 Directory of Public Health Sector Facilities, provided by the Mexican Ministry of Health.

## **B. Mortality data**

Although the MHAS design enables the analysis of mortality at the individual level, a set of mortality linked-files was constructed to enhance the analysis and to allow municipality and community level comparisons.

Two groups of data sets were constructed: a set including the linkages of death counts by cause and a set including the linkages of death counts grouped as violent or non-violent. The mortality-linked files include mortality registries at the municipality (*municipio*) and community (*localidad*) level.

### a) Linkages with death counts by cause

The MHAS files were linked at the individual level to the mortality registries to include the number of deaths by cause. The linkage was done at municipality level (*municipio*). The death counts set of linked data per wave (2001-2018), one for each year of mortality counts from 1998 to 2020. The observations in each file correspond to the number of completed interviews in each wave.

The following databases were used to create this linked file<sup>4</sup>:

- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) of each wave.
- 2) The Death causes (DEFUN) administrative registers series from 1998-2020, provided by the Mexican Ministry of Health.

b) Linkages with violent and non-violent death counts

The violent and non-violent death counts set of linked data includes 6 files, one for each wave of the MHAS (2001, 2003, 2012, 2015, 2018 and 2021). The files were linked at the individual level to the mortality registries to include i) the number of deaths classified as violent or non-violent, ii) the violent and non-violent death rates and iii) the State and Municipality population. The death counts at municipality (*municipio*) and state (*entidad*) level were used; each observation was linked to the mortality registries from 1998 to 2020.

The following databases were used to create this linked file<sup>5</sup>:

- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) of each wave.
- 2) The Death causes (DEFUN) administrative registers series from 1998-2020, provided by the Mexican Ministry of Health.
- 3) The municipality-level files (ITER) of the 2000, 2010 and, 2020 Mexican Census of Population and Dwellings, provided by INEGI.

### **C. Seguro Popular enrollment**

*Seguro Popular* is a social protection policy designed to provide access to health insurance and regular and preventive medical care to uninsured Mexicans. The linked

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<sup>4</sup> Upon request, the MHAS team will provide the descriptive file “*MHAS Death Counts Linkages.pdf*”, that includes the content of the final linked data file.

<sup>5</sup> Upon request, the MHAS team will provide the descriptive file “*MHAS Violent and Non-violent Linkages.pdf*”, that includes the content of the final linked data file.

data set allows extending the research on health insurance coverage by incorporating the Seguro Popular coverage at the state level over time.

This linked file was created at the individual level to link data from the *Seguro Popular* to each wave of the MHAS (2001, 2003, and 2012). From *Seguro Popular*, the linkage was done at state level (*entidad*); including, for each observation, i) the number of enrollees to the *Seguro Popular*, ii) the population estimates from National Population Council (CONAPO) and INEGI, and iii) the percentages of enrolled population to Seguro Popular using CONAPO and INEGI's population.

The following databases were used to create this linked file:

- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) 2001, 2003 and 2012.
- 2) The state-level file of the 2002-2012 cumulative enrollees to the Seguro Popular, provided by the National Committee of Health Protection of the Ministry of Health<sup>6</sup>.
- 3) The state-level population projections from 2002-2012, provided by the National Population Council (CONAPO).

The description of this linked file is included in the document: "*MHAS 2001 Seguro Popular linkages.pdf*" which can be found in the MHAS website.

#### **D. Historical data on air pollution**

A set of linked files were created linking the MHAS to data on air pollutants including particulate matter or particulate pollution, such as PM<sub>10</sub> (10 micrometers or less) and PM<sub>2.5</sub> (2.5 micrometers or less), ozone level (O<sub>3</sub>) and nitrogen dioxide levels (NO<sub>2</sub>). The data was collected by monitoring networks in Mexico from 2007-2015 and it was linked to the MHAS 2012 at the locality level.

The linkage was completed using data from the Mexican National Air Quality Information System (*Sistema Nacional de Información de Calidad de Aire*, SINAICA) of the National

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<sup>6</sup> Upon request, the MHAS team will provide a descriptive file that includes the content of the final linked data file.



Institute of Ecology and Climate Change (*Instituto Nacional de Ecología y Cambio Climático*, INECC).

The following databases were used to create this linked file:

- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) 2012.
- 2) The locality-level files of the Mexican National Air Quality System (SINAICA) from 2007-2015, provided by the National Institute of Ecology and Climate Change (INECC).

### **E. Literacy rates**

We have state-level data on literacy rates across census years (1910, 1921, 1930, 1940, 1950, 1960, 1970, 1980, and 1990) that we linked to MHAS data by state of birth (variable a2 in 2001, aa3a\_12 in 2012, aa3a\_15 in 2015, and aa3a\_18 in 2018). We are interested in using the entire MHAS sample including respondents that entered in any wave. The merge would then require merging 2001 Section A, 2012 Section AA, 2015 Section AA, and 2018 Section AA to the master follow-up file, identifying which variable represents state of birth and then merging the state level literacy rates information to the master follow-up file by state of birth.

The following databases were used to create this linked file:

- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) 2012-2018.
- 2) The state-level literacy rates by state of birth from Historical Census 1910-1990.

## **F. Social program enrollment, including *Progresa/Oportunidades*, *Seguro Popular*, and *70+/Pension***

One linked file was created at the individual level using the MHAS 2001 to include Social Programs Administrative data of the number of individuals registered at the municipality level. The social programs included in the file are *Progresa/Oportunidades*, *Seguro Popular*, and *70+/Pension*. *Progresa/Oportunidades* is a program of the Mexican *Secretaría de Desarrollo Social*, which grants resources to Mexicans to improve their nutrition, health and education. *Seguro Popular* is a social protection policy designed to provide access to health insurance and regular and preventive medical care to uninsured Mexicans. *70+/Pension* is a pension program for older adults which provides economic support and social protection.

The following databases were used to create this linked file:

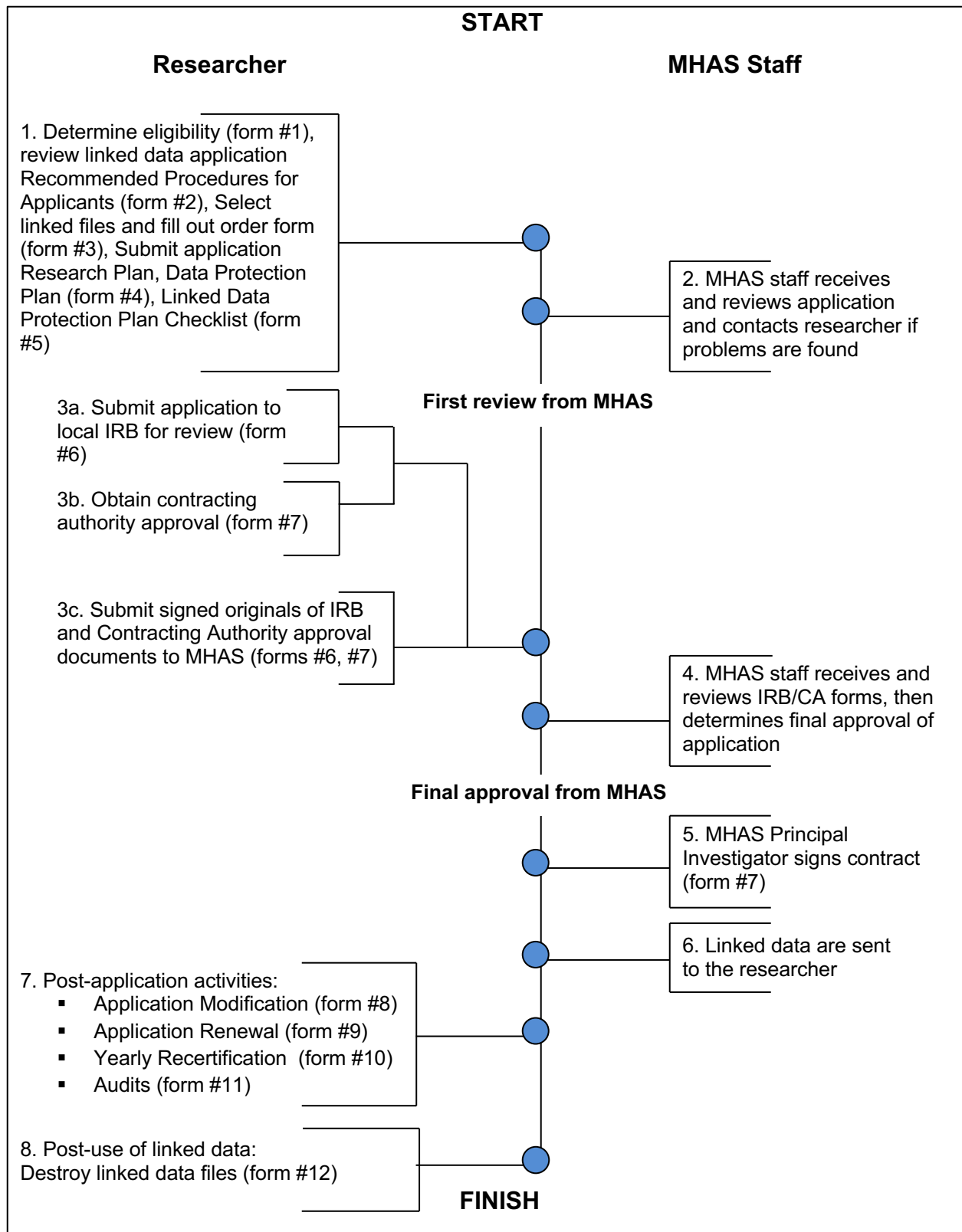
- 1) The individual-level files of the Mexican Health and Aging Study (MHAS/ENASEM) 2001.
- 2) The state-level file of the *Seguro Popular* (public health insurance) 2002-2012, provided by the National Population Council (CONAPO)<sup>7</sup> and INEGI.
- 3) The municipality-level affiliates to social programs *Progreso/Oportunidades* from 1997-2012, *70+/Pension* from 2007-2012, and *Seguro Popular* from 2004-2012.
- 4) The locality-level affiliates to *Progreso/Oportunidades* from 1997-2012 and *70+/Pension* from 2007-2012.

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<sup>7</sup> Upon request, the MHAS team will provide a descriptive file that includes the content of the final linked data file.

## IV. Procedure to Obtain Access to the Linked Data Files

Figure 1. Process to obtain MHAS linked data files



## **A. Application overview**

The figure above describes the process to obtain the linked MHAS data. The following is a brief description for each step in the process.

### Preliminary Steps

- 1) After reviewing this document and the available data files, a researcher needs to review Form 1 for eligibility requirements. Researchers are recommended to begin the process by reviewing the application forms and procedures (Form 1). If the researchers find the necessary data, they should submit a preliminary application package, Forms 1 to 5, including a short research proposal and a data protection plan, and a data protection plan checklist.
- 2) After the application is received, the MHAS group will review the application. If problems are found with the application, the group will contact the researcher to resolve the issue. Once the review is complete the group will issue the “FIRST APPROVAL” for the project and will assign a project number.

### Final Review

- 3) After the application is complete, Form 6 needs to be forwarded to the researcher’s institutional IRB for review and approval. If “FINAL APPROVAL” is granted the researcher and the MHAS representative will sign the linked data agreement (Form 7), and the researcher will need to submit a signed original of IRB and Contracted Authority approval documents to the MHAS group.
- 4) MHAS staff will then review the submitted forms, and will determine final approval of the application.
- 5) The MHAS representative will sign the contract.
- 6) Access to the linked data will be given to the researchers.

### Post-Application Activities

- 7) If the institutional or physical circumstances of the researchers change, such as if new persons are added to the project or there is a department/institution change, they should contact the MHAS to modify the agreement. To report any change,

they should use Form 8. Additionally, Form 9 must be used every year to recertify the project. Also, if the researchers need to continue with analysis of the data after the expiration date of the initial agreement, they will need to submit Form 10. Finally, the MHAS group will complete periodic audits to all ongoing projects to ensure that all conditions of the agreement are being met.

#### Post-Use of Linked Data

- 8) After the contractual agreement expires, researchers will need to destroy the data files and submit Form 12.

#### **B. Publications**

The linked contractual agreement specifies that researchers will need to inform MHAS of any papers, publications, or presentations based on this linked data set. Researchers will need to send the publication list in PDF format to [info@mhasweb.com](mailto:info@mhasweb.com). We also ask the linked data users to include the following acknowledgement in their written work: “This analysis uses data from the MHAS (Mexican Health and Aging Study). The MHAS is partly sponsored by the National Institutes of Health/National Institute on Aging (grant number NIH R01AG018016) in the United States and the Instituto Nacional de Estadística y Geografía (INEGI) in Mexico. Data files and documentation are public use and available at [www.MHASweb.org](http://www.MHASweb.org)” as well as the reference to the corresponding linked data files.