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Original Article

Functional Dependency in Mexico: Measurement Issues and Policy Challenges

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Abstract

Background: Different definitions have been used to measure functional dependency (FD) in Mexico. This study aims to explore if different definitions of FD lead to low consistency between the estimations of its prevalence. Accurate estimations of FD are useful to estimate the potential demand for long-term care (LTC) services in the country.

Methods: A literature review including documents with estimations on the number or prevalence of dependents in Mexico with national representativeness between 2000 and 2019 was performed as well as estimations of different definitions of FD, using the National Study on Health and Aging in Mexico (ENASEM).

Results: There is a lack of consensus on the definition of FD. Among the most frequently used terms to define FD are "disability" and "dependency." The heterogeneity of definitions results in a wide range of estimations of the demand for LTC. Methodological choices can lead to important differences in FD prevalence estimations. Results from ENASEM 2001 show that FD prevalence could range from 13% to 35% in people 60+; sex prevalences also vary when using different ways to measure FD.

Conclusion: Besides the highlighted issues in calculating FD in the population, Mexico should consider broadening the assessment of FD, including people with dementia and younger populations. Although the literature search is not systematic, it helps exemplifying the current issues when measuring FD in Mexico. A consensual definition of dependency is required to have a more accurate estimated demand for LTC. Having good data sources is not enough when dissimilar estimations of an indicator like dependency result from the same study. Wide heterogeneity in estimations of dependency could be an obstacle to inform public policies during the construction of a care system in Mexico.

Keywords: Functional Capacity, Disability, Long-term Care, Measurement, Metrics, Mexico

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Key Messages

Implications for policy makers

- Results highlight the importance of having information on functional dependency (FD) but also a consensus definition on how to measure it.
- Policy-makers should understand the policy implications of using different measurements definitions for FD.
- Long-term care (LTC) policies should consider people in need of services outside the group of older people.
- Despite the methodological issues arising from different definitions, the increasing demand for LTC services calls for a coordinated public policy response.

Implications for the public

Results shows that addressing the situation of long-term care (LTC) needs in Mexico requires an urgent and comprehensive response. The article highlights that evidence-based policy-making is required; considering the results would give a more accurate sense of the magnitude of the problem in the country. A consensus definition will not only help with this definition of the problem, but also increase transparency to the population. The country should move towards the implementation of a LTC system to provide services to this increasing demand.

Background

Population aging in Mexico is happening at a fast pace. According to the latest United Nations estimates,[1] the percentage of people over the age of 60, which was 5.4% in 1950, has doubled (11.2% in 2020) and will double again in the next 30 years (22.6% in 2050). This age group is projected to constitute almost 40% of the population in 2100, with the "oldest-old" (aged 85+) experiencing the fastest growth rates. Population aging, together with the burden of the life-course socio-economic disadvantage and chronic diseases are the perfect cocktail to boost the rates of disability and functional dependency (FD) in a given population cohort.[2-6]

Understanding long-term care (LTC) needs in the Mexican population is crucial in the context of rapid aging with high

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rates of chronic diseases. LTC refers to activities carried out by others so that people who have had a significant and permanent loss of intrinsic capacity can maintain a level of functional capacity consistent with their basic rights, fundamental freedoms and dignity.[7] The definition stresses the need to measure levels of FD as a potential estimation for the LTC demand.

Mexico is among the few countries in Latin America and the Caribbean with data available to estimate the prevalence of FD at the national level.[8] Statistics and information are fundamental during the design and implementation of evidence-based public policies.[9] Despite this advantage (the country has several databases that allow estimating indicators of disability and FD), the lack of consensus for the definition and a standard methodology to measure FD may lead to inaccuracy when informing stakeholders and decision-makers. The question "How many dependents are there in Mexico?" is currently difficult to answer. The biggest problem does not seem to be the lack of data, but the absence of a standard definition, which may lead to multiple possible answers.

Therefore, our study aims to answer how many dependents are there in Mexico and to explore how different definitions of FD lead to high or low consistency between estimations of its prevalence.

Methods

Literature Review

The analysis was carried out using documents that allowed developing a profile of FD in Mexico. We searched within online academic databases (PubMed and Google Scholar), and Google, to also span "grey literature," such as reports from public and private institutions. For the search, key terms "Mexico," "dependency," "functionality" and "activities of daily life" were considered, including both documents in Spanish and English, from the year 2000 to information published in September 2019.

The following inclusion criteria were considered: (*i*) document reporting statistics on the number or prevalence of dependents in Mexico; (*ii*) data with national representativeness; (*iii*) statistics on people living in the Mexican territory. Consequently, articles published before the year 2000,[10,11] those reporting information based on samples without national representativeness,[12-14] and studies on the population of Mexicans living abroad were excluded.[15,16] The first round of search yielded 27 documents. A new search stage was carried out to complete the list using the snowball sampling methodology, looking for new documents that could meet the criteria within the bibliographic references of each of the documents on the initial list.[17] The final list included 32 documents and considers articles in academic journals, theses, and books.[6,8,18-46]

Given that most of the selected document used the National Study on Health and Aging in Mexico (ENASEM) as their primary source of information (26 out of 32), the list was contrasted with the report publications reported by the ENASEM website (under the "Functionality" area), to ensure that no relevant information was missing.[47] ENASEM is a longitudinal study with national representation for adults 50 years of age and older in Mexico, intended to analyze health and social determinants in the aged population. It started in 2001, and the last round of available data was collected in 2015.Once the documents were selected, each one was analyzed, and its information systematized, extracting reference, source of the data, the population of analysis, dependency-related concepts used, definition or instrument used to measure dependency, and results (prevalence or number of dependents).

ENASEM Estimations

As a complement to the literature review, an empirical exercise is shown, using data from the ENASEM. Different ways to estimate FD are proposed, to exemplify that, despite being able to calculate a number, the methodological choices faced by researchers generate different results that are not whimsical when used to make policies. Seven FD definitions are measured, based on two dimensions: type of activity (basic activities of daily living, BADL vs instrumental activities of daily living, IADL), and type of limitation (difficulty vs help to perform activities).

- Definition 1: difficulty or inability to perform at least one BADL
- Definition 2: Help to perform (from spouse or other) at least one BADL
- Definition 3: difficulty or inability to perform at least one IADL
- Definition 4: Help to perform (from spouse or other) at least one IALD
- Definition 5: difficulty or inability to perform at least one BADL or one IADL
- Definition 6: help to perform (from spouse or other) at least one BADL or one IADL
- Definition 7: difficulty or inability OR help to perform (from spouse or other) at least one BADL or one IADL

The list of activities are extracted directly from the survey's questionnaire and include:

- BADL: walking, bathing, eating, getting in and out of bed, using the toilet
- IADL: preparing a hot meal, shopping, taking medication, managing money.

Results

Based on the literature review, we find that there are three main factors driving the answers to the question "how many dependents are there in Mexico?":

1. The approach used to measure FD: disability (BADLs, IADLs) or other disease-related concepts (frailty, dementia)
2. The definition of the age groups (60+, 65+, 70+, 75+)
3. The data source (ENASEM, National Survey on Health and Nutrition [ENSANUT], others)

The reviewed documents use different terms to define FD. The term "disability" is the one more often associated with dependency, along with other concepts related to functionality (dependency, capacity, impairment). We recognize the International Classification of Functioning (ICF) conceptual framework for disability, but none of the included documents

refered to a ICF classification, so the definition of disability is limited to the "activity" domain of such framework.[48]

Table shows that dependency prevalence reported by different studies range between 2% and 75% of the study population. The wide range of estimations for dependency is explained by the difference in data sources, concepts, and population of analysis. The table shows a lack of a consensus on how to measure FD. Researchers have to make several methodological decisions that contribute to the heterogeneity of the results reported around a single indicator (ie, FD prevalence): the set of activities to consider, the criteria for defining dependency, and finally, the way in which results are reported.

This wide range of results hold even when looking at studies using the same data source (see Supplementary file 1 for a summary of studies[3,13,19,2021,28,34,36] using the ENASEM). These methodological choices required to calculate FD are shown in Figure 1.

Researchers must decide whether to calculate basic and instrumental limitations separately (versus, for example, building an index with both), and which questions to use in each case. As shown in Supplementary file 1, most have chosen to use the Katz index for BADLs and the Lawton and Brody index for IADL. Despite these coincidences, differences are observed in the type of activities used (eg, including difficulties in toileting and dressing as activities). When looking at the criterion to define dependency, most studies choose to construct a binary variable, based on the reported limitations to carry out some of the selected activities. In this case, the differences arise when trying to define what constitutes a limitation: reporting difficulty, requesting help, or answering the inability of carrying out the activity. Moreover, when reporting the results, studies usually use the prevalence of limitations in BADL and IADL. Additionally, studies present other indices,[20,22,35,42] calculate the incidence,[39,44] or report the number of dependents.[8] Studies also differ in whether they include figures for the overall population and/ or separate the estimates by sex and age.

Finally, the definitions previously proposed were calculated using the ENASEM 2001.[47] These seven definitions present potential alternatives for measuring FD, although as can be checked in Supplementary file 1, other alternatives have been adopted by researchers using the ENASEM (including dressing, the use of continence, among others). Figure 2 shows that age prevalences for people 60+ differ considerably when using one definition or another.

Prevalences range from 13.5% (definition 1) to 21.27% (definition 7). These numbers imply an estimation of the total number of people 60+ with FD ranging from 913 000 to almost 1.5 million people, based on the number of people 60+ in the 2000 census (6 948 457).[49]

However, the subestimation of the problem is not the only issue arising when using different definitions. Other dimensions of the analysis can be affected too. For example, Figure 3 shows the ratio of men/women FD prevalence using the same seven definitions.

In this case, conclusions can drastically differ depending on the definition used. Results are particularly sensitive to the inclusion of difficulty to perform IADL. Policy recommendations using one or another definition can have huge impacts on certain groups, even though policy-makers decide to adopt an "evidence-based" approach.

Discussion

Results show the methodological choices researchers must face when dealing with measuring FD in a country with rich datasets available. They also highlight how the lack of a definition creates a problem when trying to use these results for policy-making.

A first issue relates to the theoretical definition of FD. The problem of what FD means is evident when trying to measure the concept, but also notions more semantically distant — such as frailty, cognitive impairment, or dementia— were found in studies. Different theoretical frameworks for disability/dependency lead to different ways of measuring, and consequently, different estimates of FD. According to

Table. Summary of Results From the Analysis of Selected Documents

Data Sources	ENASEM, ENSANUT, ENUT, Oportunidades Program database, Population and Housing Census
Concepts Used to Define FD	Disability/BADL disability /IADL disability Mobility/Mobility limitations Dependency/Funtional dependency/Care dependency Funcionality/Functionality limitation/Functional ability/Functional performance /Functional impairment/Functional problem Need for help (problem/difficulty to perform) BADL/IADL
Other Related concepts Used	Frailty Cognitive impairment/Cognitive functionality Dementia
Population of Analysis	50+; 60+; 65+; 70+; 80+
Range of Results	FD prevalence (all studies): 2%-74.8% Total number of people with FD (all studies): 2.8-8.5 millions FD prevalence by age groups: 50+: 10.7%-62%, 60+: 3%-26.9%, 65+: 3.3%-24%, 70+: 30.9%-44%, 80+: 37.5%-44%

Abbreviations: ENASEM, National Study on Health and Aging in Mexico; ENSANUT, National Survey on Health and Nutrition; ENUT, National Survey on the Use of Time; FD, functional dependency; IADL, instrumental activities of the daily living; BADL, basic activities of the daily living.
Authors elaboration based on[6,8,18-46].

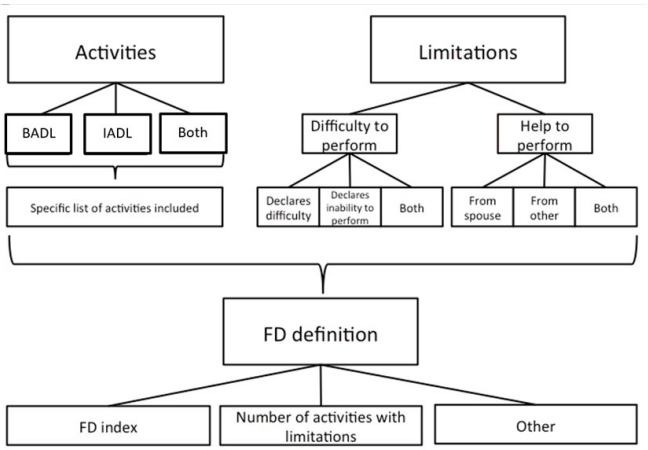

Figure 1. Decision Tree for Calculating FD Using the ENASEM. Abbreviations: ENASEM, National Study on Health and Aging in Mexico; FD, functional dependency; IADL, instrumental activities of the daily living; BADL, basic activities of the daily living.

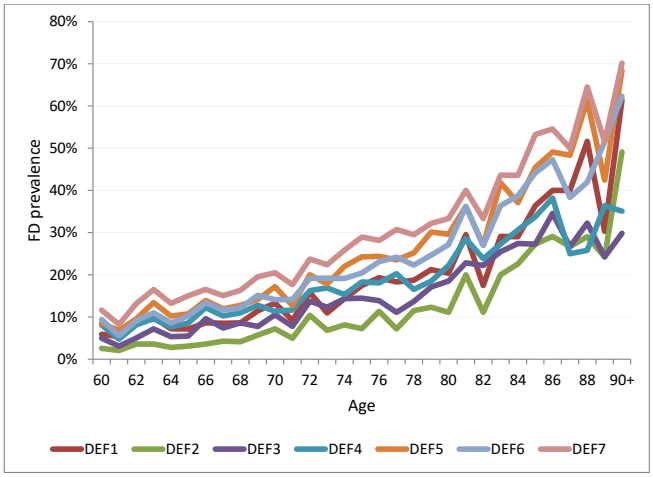

Figure 2. FD Age-Prevalences (60+) for Several Definitions Using the ENASEM 2001. Abbreviations: ENASEM, National Study on Health and Aging in Mexico; FD, functional dependency.

our results, the definition based on help to perform at least one BADL can be seen as a lower bound for the estimation of FD in the Mexican population because it is consistently the lower prevalence across the age range. This example shows the problem of lacking a definition of FD from a policy perspective.

This finding raises another question, regarding the extent of the definition, in particular, whether people with dementia should be considered dependents in Mexico. The inclusion of mental health problems and dementia is an important topic to be considerer when establishing a national definition for FD, as well as when defining elegibility in a LTC system. Many LTC systems have moved into including dementia as an explicit component in their FD definitions,[50-52] as well as countries in Latin America, such as Uruguay and Chile.[53-55]

Second, a discussion on the target population of the analysis and the policy regarding FD is needed. On the one hand, although all studies focus on calculating dependency in the elderly population, several age thresholds were used. Interestingly, the reviewed documents generally assume that dependency and age are linked *vis-a-vis*. As already pointed out, there is a practical problem that researchers face when defining "old people" using chronological age as a criterion.[56-58] For measuring dependency and especially from a decision-making perspective, the issue is relevant since the lack of definition for "older people" adds to the lack of definition for "dependency," exacerbating the problems of comparability of studies and quantification of the problem. On the other hand, restricting the target population to older people ignores the fact that there are dependents who do not belong to this age group, and that they could represent a significant share of the dependents. For example, estimates for Chile show that about 40% of dependents are under 65 years of age[59]; in Uruguay, more than 60% of the LTC system beneficiaries are younger than 60 years.[60] This topic is relevant, particularly considering that the country has surveys and information to include these populations into the analyses. For example, the ENSANUT, asks questions on difficulty to perform activities of daily living in children, adolescents, and adults.[61]

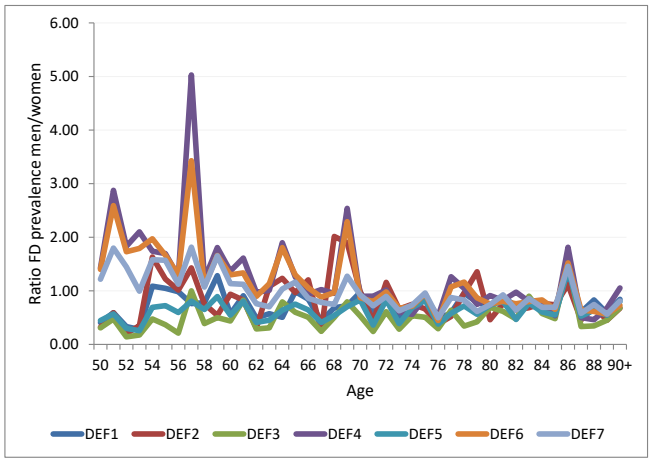

Figure 3. Sex Ration of FD Prevalences for Several Definitions Using the ENASEM 2001. Abbreviations: ENASEM, National Study on Health and Aging in Mexico; FD, functional dependency.

Third, researchers should consider the data sources when presenting and interpreting their results. The Mexican case is important for other countries because it illustrates the relevance of having more and better information (solving the first-order problem of data scarcity), but also highlights the importance of moving towards a single definition and measurement tool (solving the second-order problem of a lack of standard measurement for FD). This step has been key for countries that have recently implemented and reformulated their LTC systems, such as Germany and South Korea.[50,51,62] In Mexico, the availability of the ENASEM is crucial to allow research about dependency. However, it is not enough to answer pending public policy questions because of the lack of consistency obtained from studies using the same data source (eg, ENASEM). Also, the magnitude of FD in nursing homes and other institutions is a key figure currently lacking and it might cause underestimation of the people with FD when considering only community dwelling population. Creating a national registry for institutionalized people should be among the first actions towards a LTC system in Mexico.

Finally, the study gives interesting insights but also has some limitations. Although we used a standardized search process, it does not constitute a systematic review. The methodological difficulty of carrying out systematic reviews in areas such as care dependency and FD comes from the diversity of terms and definitions.[63] For instance, a medical subject heading (MeSH) term for care or FD has not been included yet. On the other hand, although the list of articles may not be exhaustive, the objective of the analysis — showing how the diversity of definitions, databases, and measurement instruments can be an obstacle to the generation of public policies — is achieved.

Conclusion

This study found that variations in the estimated magnitude of the dependents within the same country could be due to: (*i*) the definition or concept used; (*ii*) how this concept is operationalized (measurement tool); (*iii*) the age of the population of analysis and; (*iv*) the data source.

The article poses a question that, at first glance, seems relatively simple: how many dependents are in Mexico? Based on the various studies reporting statistics of dependency in Mexico, we found multiple answers, and their wide heterogeneity represents a serious challenge to advance in the construction of policies in the area. For example, if we select the Mexican population aged 65+ today—roughly 13.8 million[64]—, the number of people who could potentially require LTC services varies between 2.8 and 8.5 million. This enormous range of results represents a huge problem to design policies and prioritize the discussion around LTC in the country.[65] Using a lower-bound estimation to calculate the potential demand for LTC services could result in 5.5 million people failing to access services.

Finally, our study reveals a series of challenges for Mexico in terms of measuring dependency and generating a LTC system. In this context, our results emphasize the importance of adopting a consensus standard definition of dependency for the country. This implies several challenges that need to be addressed. First, the need to advance in the elaboration of national definitions and instruments to measure dependency at national level. This will reduce the current discretion of researchers when defining FD, as well as the problems derived from different methodological choices needed to measure FD.[66]

The existence of multiple estimations for the number of dependents in the country hinders the identification of the problem and, consequently, the proposal of solutions. To obtain more accurate estimates of LTC needs at the country level, Mexico needs to move forward from measurements based exclusively on the ENASEM. As noted above, the survey is an important source of information for calculating dependency, but, from a public policy perspective, it has the limitation of being restricted exclusively to older people. On the other hand, its longitudinal nature makes it an important source of information for the study of the dynamics and changes of dependency, but not for the estimation of dependency prevalence, except for the 2001 baseline, and waves with sample refreshments (2012 and 2018).[47]

In the coming years, Mexico, like other countries, will be facing the challenge of measuring the demand for care services and responding accordingly. We emphasize the need of using consensus-based definitions to collect future data that allows the estimation of FD in older adults as well as in other populations (eg, children and people with dementia) and the periodic updating of the situation of dependents in the country, as a way to advance in the use of evidence-based policy-making.

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Ethical issues

No ethical review was required for the research. The analyses were carried out using publicly available aggregated data.

Competing interests

Authors declare that they have no competing interests.

Authors' contributions

PVD and EGB devised the project and conceived the idea. PVD performed the search and generated the list of articles and performed the data analysis. All authors read and approved the final manuscript.

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Supplementary files

Supplementary file 1. Summary of Methodological Decisions Taken to Calculate Dependency Using ENASEM.

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