ISSN: 2469-5858

Vargas JRA et al. J Geriatr Med Gerontol 2025, 11:159
DOI: 10.23937/2469-5858/1510159
Volume 11 | Issue 1
Open Access

Journal of
Geriatric Medicine and Gerontology

ORIGINAL ARTICLE

Gerontology: A Tool for Exploring Social Inequities in Health Across the Life Course

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Abstract

Social inequalities in health accumulate throughout people's life trajectories and negatively impact the iraging. To this end, an instrument was developed to measure them. The method used was the design and validation of an instrument that initially consisted of 100 items. It underwent expert validation, reducing it to 77 items, and concluded with an exploratory factor analysis that resulted in 11 latent ítems to measure the phenomenon. The results indicate that the questionnaire consisted of 11 items that explore the structural and intermédiate determinants of social inequalities in health across the lifecourse: material conditions, education, employment, violence, and nutrition. The analysis shows psychometric adequacy (KMO = 0.64, explained variance 65.97%).

For discussion, the instrument allows for the exploration of social inequalities in health across the life course that impact aging and is applicable in clinical and community settings. The conclusión reached in this validation is that the instrument is brief, useful, and relevant for exploring the phenomenon and can be used in settings such as research, gerontological policy design, and interventions.

Keywords

Social inequalities in Health, Life course, Social determinants, Gerontology

Introduction

Social inequities in health are unfair and preventable disadvantages that negatively affect people throughout their lives [1,2]. Solar and Irwin [3] mention that inequities are measured by social determinants of health, which are structural (educational level, occupation, social class, gender, race/ethnicity) and intermediate (material conditions, psychosocial circumstances, behavioral and biological factors, access to the health system, and social cohesion). Inequities are not only seen in socioeconomic aspects, but also in gender, the individual's place of residence, and aspects such as ethnicity. These inequities accumulate From childhood to oldage, significantly impacting quality of life and aging [4,5]. From the life course approach, it is mentioned that what the individual experiences in each of the stages of life (childhood, youth, adulthood and old age) are trajectories that impact the mental, physical and social health of people [6,7]. If a person is immersed in inequalities in their life trajectory, they may present pathological aging; however, the World Health Organization and the Pan American Health Organization seek to help the population reach the echelon of healthy aging, which they define as the continuous process of optimizing opportunities, maintaining functional capacity and well-being, but as mentioned, it depends on the social determinants accumulated in their trajectory [8]. There is a need for a diagnostic instrument to help us explore this phenomenon, which is why the "Social Inequalities in Health Over the Life Course" questionnaire was developed. It was designed to collect data on life course trajectories and the impact of social inequalities on health in older adults. It was validated by experts in the field to ensure its contextual and theoretical relevance.

Citation: Vargas JRA, García IFD (2025) Gerontology: A Tool for Exploring Social Inequities in Health Across the Life Course. J Geriatr Med Gerontol 11:159. doi.org/ 10.23937/2469-5858/1510159

Accepted: June 14, 2022: **Published:** June 16, 2022

To structure and reduce its items, an exploratory factor analysis was conducted, allowing for the identification of latent items in the study population.

Objective

To develop and valídate an instrument to explore social inequities in health across the life course, using a rigorous methodological process of peer review and exploratory factor analysis to reduce the Number of items and assess the psychometric quality of the instrument.

Methods

This instrument was derived From the research "Social Inequity in Health Across the Life Course and Healthy Aging in Older Adults in the Municipality of Sayula, Jalisco, Mexico in 2022" [9]. As a first step, the expert review process was carried out. This methodological process is functional to evaluate each of the instrument's questions, identifying that they are clear, coherent, and appropriate, focused on the study's objective and the dimensions to be explored. The experts are specialists in the subject, and the purpose of this review is to improve the instrument, to have validity in its content, to optimize the interpretation of the data and have that scientific legitimacy [10]. Initially, the instrument had 100 questions to explore social inequities in health throughout the life course; after going through the expert review process, 77 items remained. In a second step, an exploratory factor analysis was carried out to reduce the Number of questions and that with these analyses, the phenomenon to be investigated could be explored. Exploratory factor analysisis a statistical technique that explores the structure of a set of questions and its objective is to search for latent factors that explain the correlations between questions. The technique seeks to ensure that instruments have a design and validation, ítem reduction, identification of factors or dimensions, and an assessment of psychometric quality. This tool is for the rigorous development of instruments in social sciences [11]. From the 77 items that were available after this factor analysis, the instrument was reduced to 11 items, which are presented in the following results section.

Results

This research focused on developing a measurement instrument to explore social inequities in health, focusing on the life course, especially among older adults in a rural area of the State of Jalisco, Mexico. Items were taken from the Health, Well-being, and Aging Survey (SABE), the National Institute of Geography and Statistics [12], the Economic Commission for Latin America and the Caribbean (ECLAC), the National Health and Nutrition Survey (ENSANUT) [13], and Other authors such as Solar & Irwin; Oyola & De la Torre [14] and Peláez, et al. [15].

The instrument consisted of 77 items and explores social inequities in health, especially the structural determinants that include social position, education, occupation, income, gender, and ethnicity/race. Like wise, the intermédiate determinants comprised of the health system, material circumstances, social cohesion, psychosocial circumstances, and behavioral-biological factors, as mentioned, are given a life-course approach, encompassing childhood, youth, adulthood, and old age.

The instrument separated by determinant is seen in Table 1 and Table 2.

After developing this instrument, an exploratory factor analysis was conducted to identify latent factors. This analysis explores the set of common factors that explain the item responses [11].

This analysis is part of the multivariated imension reduction technique and operates under logical reduction, seeking to minimize the loss of information possible. That said, the reduction of this instrument continued to ensure that the information was not excessive or redundant during data collection [16].

Item distributions were reviewed as a preliminary step, as data reduction is still currently recommended [11]. When a relative frequency of responses below 5% was observed for an item, it was decided to eliminate it, given that it showed very high response homogeneity. The responses were dichotomized to divide the simple

Table 1: Structural determinants of social inequalities in health over the life course.

Structural Determinants	**Education** **1.** Number of years of schooling _____ **2.** During the first 15 years of your life, do you recall if there were financial difficulties in getting into or continuing school? *1) Yes 2) No* **3.** Did you have financial difficulties finishing your studies? *1) Yes 2) No*
Structural Determinants	**Gender** **4.** Sex of the interviewee. *1) Female 2) Male* **5.** Marital Status *1) Married 2) Single 3) Divorced 4) Common-law union 5) Widowed 6) Separated* **6.** Could you tell me how many live-born children you have had during your lifetime? *Number* _____ **7.** At what age did you have your first child, live-born or not? *Years* _____

Structural Determinants	**Place of Birth and Ethnicity** **8.** In which country, city, town, or municipality of the Republic? *A.* _____ **9.** Did you have to mígrate to a country? *1) Yes 2) No* **10.** How many years did you remain in that country? *Years* _____ **11.** Do you speak any indigenous dialects or languages? *1) Yes 2) No* **12.** From the time you were born until the age of 15, did you live in the country side, on a ranch, in a town, or in a villaje for more than 5 years? *1) Yes 2) No*
Structural Determinants	**Occupation** **13.** Did you have any work as a child? *1) Yes 2) No* **14.** How old were you when you did it? *Years* _____ **15.** Did that job have financial compensation (pay)? *1) Yes 2) No* **16.** Did you work From the ages of 18 to 30? *1) Yes 2) No* **17.** What is the main reason you have never worked? *1) Health problems 2) I didn't have financial need 3) I dedicated myself to taking care of my family 4) I Married very young 5) There were no job opportunities 6) My parents didn't let me 7) Don't know 8) No answer 9) Other _____ Specify* **18.** When you were young (18 to 30 years old), did you have difficulty finding employment? *1) Yes 2) No* **19.** When you were young (18 to 30 years old), did you have the opportunity to train to find a better job? *1) Yes 2) No* **20.** In your main job, are you (were you)? (Longest time in that job). *1) Laborer or non-agricultural employee. 2) Rural day laborer or field worker. 3) Boss, employer, or business owner (1 to 5 workers). 4) Boss, employer, or business owner (6 or more workers). 5) Self-employed. 6) Unpaid family worker. 7) Home maker (Go to question 30). 8) Unpaid non-family worker. 9) Piece worker. Other _____ Specify* **21.** How many hours a day did you dedicate to your main job? *Hours*_____ **22.** How many days a week did you work at your main job? *Days*_____ **23.** Do you currently have a need to perform any activity or job? *1) Yes Which one? _____ 2) No 3) I don'thave a need, but I perform.* **24.** Do you receive payment for that activity? *1) Yes 2) No Income*
Structural Determinants	**Income** **25.** During your first 15 years, were there financial hardships in your home? *1) Yes 2) No* **26.** During your first 15 years, was there a time when you didn't eat enough or were hungry? *1) Yes 2) No* **27.** Did your main job as an adult meet your and your family's financial needs? *1) Yes 2) No* **28.** At this stage of your (adult) life, did any people depend on your income? *1) Yes 2) No* **29.** At this stage of your life, do you receive income from... *1) Work 2) Retirement or pension 3) Relatives From another country 4) Relatives within the country 5) Rent or bank deposits 6) Welfare subsidy 7) Other _____* **30.** Is the monthly income you receive sufficient for your basic needs? *1) Yes 2) No* **31.** Do any people currently depend on this income? *1) Yes 2) No*

Note: Prepared by the authors.

Table 2: Intermediate determinants of social inequalities in health over the life course.

Intermediate Determinants	**Material Circumstances** **32.** When you were under 15 years old, do you remember if your home had the following? *Yes No* *Electricity* _____ _____ *Drinking water* _____ _____ *Sewer* _____ _____ *Bathroom* _____ _____ **33.** When you were under 15 years old, do you remember what you cooked with in your home? *1) Gas 2) Firewood 3) Electricity 4) Oil* **34**. When you were under 15 years old, do you remember what material most of the floor in your house was made of? *1) Dirt 2) Cement or Brick 3) Wood, tile, or Other coverings* **35.** Is the home you currently live in: *1) Owned 2) Rented 3) Borrowed* **36.** Does the home you live in have electricity? *1) Yes 2) No* **37.** Do the occupants of this home have piped water? *1) Yes 2) No* **38.** Does this home have drainage? *1) Yes 2) No* **39.** What material is most of the flooring in this home made of? *1) Dirt 2) Cement or Brick 3) Wood, tile, or Other flooring* **40.** How many rooms does this home have in total, not including the bathroom, kitchen, and hallways? *1) One room 2) Two rooms 3) Three rooms 4) More tan four rooms* **41.** Does this home have a cooking area? *1) Yes 2) No* **42.** Does this home have a bathroom (toilet)? *1) Yes, it has one inside the home. 2) Yes, it has one outside the home. 3) No.* **43.** Does anyone in this household own the following? *1) Bicycle 2) Motorcycle 3) Car 4) Truck* **44.** Do you have these appliances in your home? *1) Refrigerator 2) Washing machine 3) Microwave oven 4) Any radio listening device 5) Television 6) Computer, laptop, or tablet 7) Landline telephone 8) Cell phone 9) Internet 10) Pay TV service (Cable, satellite) 11) Paid internet movie, music, or video service 12) Video game console* **45.** What type of fuel isused for cooking? *1) Gas 2) Firewood 3) Electricity*
Intermediate Determinants	**Health System** **46.** Before the age of 15, do you remember having any illnesses? *1) Yes 2) No* **47.** When you were an adult, did you receive social security at your Current job? *1) Yes 2) No* **48.** What type of health insurance do you currently have? *1) IMSS 2) ISSSTE 3) Another public institution 4) None 5) Private insurance* **49.** Where did you last go when you felt sick? *1) IMSS 2) ISSSTE 3) Health Center 4) DIF 5) Private practice 6) No. Why?* _____ **50.** Did you complete all your medications? *1) Yes 2) No* **51.** Would you say your health is... *1) Excellent 2) Verygood 3) Good 4) Fair 5) Poor* **52.** Has a doctor ever told you if you have any of these illnesses? *1) Hypertension 2) Type 1 Diabetes 3) Type 2 Diabetes 4) Cancer 5) Osteoporosis 6) Depression 7) Lungdisease (asthma, bronchitis) 8) Heart problems 9) Heart attack, embolism, stroke, or thrombosis 10) Arthritis, osteoarthritis, or rheumatism 11) Other (Write which illness).* **53.** Do you take any medication to treat your illnesses? *1) Yes 2) No* **54.** Has a doctor ever told you if you have any nervous or psychiatric problems? *1) Yes 2) No 3) Don'tknow* **55.** Would you say your memory is currently good? *1) Excellent 2) Verygood 3) Good 4) Average 5) Poor* **56.** What type of device or technical aid do you use? *1) None 2) Cane 3) Wheelchair 4) Oxygen 5) Hearing aid 6) Glasses 7) Walker 8) Prosthesis 9) Other (Specify)*

Intermediate Determinants	**Behavioral and Biological Factors** **57.** How many full meals do youeat per day? *1) One 2) Two 3) Three or more 4) Somedays, some days off* **58.** Regarding your nutritional status, do you consider yourself well-nourished? *1) Yes 2) No* **59.** Did you consume alcoholic beverages in your youth? *1) Never (gotoquestion 80) 2) Sometimes 3) Frequently 4) Almos talways 5) Always* **60.** At what age did you start consuming alcoholic beverages? *Age* _____ **61.** How many years did you continue this consumption? *Years* _____ **62.** Currently, on how many days per week in the past three months, have you consumed alcoholic beverages (such as beer, wine, spirits, or Other beverages containing alcohol)? *1)*_____ *if you have consumed. 2) I have not consumed* **63.** How many glasses of wine, beer, spirits, or Other alcoholic beverages did you have on average per day? *1) Glasses of wine* |____|____| *2) Beers* |____|____| *3) Alcoholic beverages* |____|____| *4) Somedays, not others 5) None* **64.** Did you smoke as a teenager or Young adult? *1) No 2) Sometimes 3) Often 4) Almost always 5) Always* **65.** At what age did you start smoking? *Age*_____ **66.** Do you currently smoke? *1) No 2) Sometimes 3) Often 4) Almost always 5) Always* **67.** How many cigarettes per day? *Number*_____ **68.** In the last week, did you regularly do exercise or vigorous physical activities such as sports, jogging, dancing, or heavy lifting? *1) Less than 3 times a week 2) More than 3 times a week 3) Never*
Intermediate Determinants	**Psychosocial Circumstances** **69.** During your first 15 years of life, did your father live with you as part of your family? *1) Yes 2) No* **70.** Do you currently live alone or with someone? *1) Alone 2) With someone* **71.** No wtell me if they help you in any way. *1) Yes, with money 2) With services such as transportation, doing house work and yard work, etc. 3) Giving you things you need like food, clothing, etc. 4) Other 5) No* **72.** Is there any Other family member or friend From whom you receive help who does not live with you? *1) Yes What is your relationship? ___ 2) No* **73.** Were you a victim of abuse as a child? *1) Yes 2) No* **Psychosocial Circumstances** **69.** During your first 15 years of life, did your father live with you as part of your family? *1) Yes 2) No* **70.** Do you currently live alone or with someone? *1) Alone 2) With someone* **71.** Now tell me if they help you in anyway. *1) Yes, with money 2) With services such as transportation, doing house work and yard work, etc. 3) Giving you things you need like food, clothing, etc. 4) Other 5) No* **72.** Is there any Other family member or friend from whom you receive help who does not live with you? *1) Yes What is your relationship? ___ 2) No* **73.** Were you a victim of abuse as a child? *1) Yes 2) No*

Note: Prepared by the authors.

into two groups: subjects without the condition, and subjects with moderate and high conditions. Another step was to analyze the content validity of each ítem to determine a subset of items, from among all posible items, that would comprise the test version. The questions, i.e., their content, were examined for similarity or redundancy, ensuring that the questions were informed by theoretical knowledge of the field of study [16].

The questionnaire for this study was designed with indicators of social inequity in health across the life course, initially grouped into sub-indices for each life stage (childhood, adolescence, youth, adulthood, and old age). At the end of this process, the ítems to be submitted to the EFA were determined, and these were considered the social inequities in health across the life course in this study. In a first EFA, 38 components were tested, yielding a total explained variance of 11,958

Table 3: Exploratory factor analysis of social inequalities in health across the life course.

Componentes													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Economic deprivation in childhood	**0.671**												
Type of cooking fuel currently	**0.627**												
Receive training for a better job	**0.622**												
Years of schooling	**0.589**												
Being hungry in childhood	**0.534**												
Economic needs met through work in adulthood	**0.487**												
Housing with basic services for children	**0.454**												
Goods and services in housing today		**0.715**											
Type of flooring in the home currently		**0.676**											
Currently a victimof abuse		**0.674**											
Currently eating fewer tan three meals a day		**0.464**											
Taking medication			-0.881										
Diseases today			0.864										
Currently exercising			0.566										
Social security in employment				0.804									
Social security currently				0.784									
Consume alcoholic beverages currently					-0.664								
Migration					-0.636								
I smoked in my youth					-0.526								
Financial assistance From people living in your home						0.873							
Currently, you live alone or with someone						0.793							
Received pay at work in childhood							-0.788						
Work in childhood							0.665						
Victim of child abuse							0.406						
Economically dependent in adulthood								0.843					
Children born								0.792					
Main job in adulthood									0.588				
Need to perform current activity									-0.575				
Monthly income is sufficient for your needs									0.540				
Working from 18 to 30 years old									0.537				
Age at which I had my first child										0.714			
Family member who helps you with money										-0.584			
Place of birth										-0.409			
To pay or not to pay rent											0.718		
The father lived with you in childhood											0.413		
Receive support From an institution												-0.828	
Childhood illness													-0.776

Note: Prepared by the authors.

Table 4: Social inequities in health across the life course instrument.

Items	Respuesta
1. During your first 15 years, were there any financial hardships in your home?	*1) Yes 2) No*
2. What type of fuel is used for cooking?	*1) Gas 2) Firewood 3) Electricity*
3. When you were young (18 to 30 years old) did you have the opportunity to train to find a better job?	*1) Yes 2) No*
4. Number of years of schooling	*Years of schooling _____*
5. During your first 15 years, was there a time when you didn't eat enough or were hungry?	*1) Yes 2) No*
6. Did your primary job as an adult financially meet your needs and those of your family?	*1) Yes 2) No*
7. When you were under 15 years old, do you remember if your home had the following?	*Yes No* *Electricity _____ _____* *Drinking water _____ _____* *Sewage _____ _____* *Bathroom _____ _____*
8. Do you have these devices in your home?	*1) Refrigerator 2) Washing machine 3) Microwave oven 4) Any device or appliance to listen to the radio 5) Television 6) Computer, laptop or Tablet 7) Landline telephone 8) Cell phone 9) Internet 10) Pay televisión service (Satellite cable) 11) Paid movie, music or video service over the Internet 12) Video game console*
9. What material is most of the flooring in this home made of?	*1) Earth 2) Cement or Brick 3) Wood*
10. Have you recently been a victim of abuse?	*1) Yes 2) No*
11. How many complete meals do you eat a day?	*1) One 2) Two 3) Three or more 4) Some days yes and others no*

Note: Prepared by the authors.

for the first component and 8,111 for the second, for a cumulative variance of 20,068. Adding all 13 components, the total variance was 65,970. Seeking to increase the explained variance, 37 components were tested, performing a principal components analysis with Varimax rotation on the 37 items. A Kaiser-Meyer-Olk in sampling adequacy measure of 0.64 was found, indicating a value greater than 0.5, which indicates that factor analysis may be useful with the data.

The Bartlett test was significant at 1866.19; $p < 0.05$, indicating that factor analysis was useful for the data, and the variance in the first component was 12,203 and in the second 8,045, adding up to a cumulative explained variance of 20,248 between the first two components. The Percentage of explained variance of the 11 components was 65,975, so the latter result was chosen (Table 3).

After conducting this analysis, we arrive at an instrument composed of 11 items that explore social inequities in health across the life course (Table 4).

Discussion

Developing and validating the instrument to explore social inequities in health across the life course from a gerontological perspective is a significant advance in this area of knowledge for a broader understanding of the social determinants that impact aging. The methodological procedure implemented in the expert review and factor analysis facilitates ensuring the contextual and theoretical relevance of the instrument and reducing the ítems without compromising the importance of the content. The results once again make it evident that individuals' life trajectories are marked by adverse socioeconomic factors, inequality in material resources and education, and exposure to situations that place individuals at a disadvantage or vulnerability, such as abuse, which has an alarming cumulative impact on the health of older adults. This result is consistent with what Elder [6] and CEPAL [7] mention, who state that experiences at each stage of the life course are alarming determinants of health status in old age. The development of this instrument with only 11 items aims to achieve efficiency and applicability, saving time when administering it. It can be applied in clinical or community settings, especially as was the case in our context, with a rural population where resources or time to administer the instruments are sometimes lacking. The instrument's diverse dimensions are comprehensive, giving it a gerontological approach, and it reveals the most latent dimensions such as material conditions, education, employment, nutrition, violence, etc.

Limitations

One limitation is that our study was conducted in a rural area specifically among older adults, which may limit the generalization of the results to urban or socio cultural contexts. Although our final factor analysis achieved a significant reduction, there is a risk that it may have ignored significant dimensions that could benefit the analysis of social inequities in health across the life course in Other groups or regions.

Another limitation is that our study was cross-sectional, which prevents a causal relationship analysis between living conditions at each stage of the life course

and Current health status. Someitems may be biased due to the interpretation given by the participating subjects, especially when the older population is involved, as they must recall experiences or events that occurred years ago.

Conclusion

The instrument developed and validated in this research is a break through in innovation because it is easy to apply and allows us to analyze and identify social inequities in health across the life course, especially in older adults. Its development involved a rigorous process, making it suitable for use by health professionals, decision-makers, researchers, or educators interested in researching or promoting equitable and healthy aging. The instrument not only visualizes the disadvantages in subjects' life trajectories, but also provides a support for evaluating and generating gerontological interventions with a comprehensive approach (biopsychosocial and spiritual), that are inclusive and fair in any context. It is recommended that it be used and applied to other rural and urban populations, and it would be advantageous to apply it in longitudinal studies to determine its validity and broadly investigate the trajectories of inequality and their impact on health and aging.

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