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Original article

Validación de la escala de barreras para la detección del cáncer de próstata en varones nahuas

Validation of the barriers scale for prostate cancer screening in Nahua men

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Resumen

Introducción: El cáncer de próstata es un problema de salud pública. Estudios relacionados indican la falta de instrumentos adaptados a la lengua originaria que permitan medir las barreras para la detección del cáncer de próstata.

Objetivo: Diseñar y validar una escala de barreras para la detección del cáncer de próstata en varones nahuas pertenecientes a pueblos originarios de la Sierra Nororiental del estado de Puebla.

Metodología: Estudio progresivo transversal de cinco etapas: 1) diseño del instrumento, 2) validación de jueces, 3) traducción e interpretación en lengua náhuatl, 4) prueba piloto y 5) análisis estadístico multivariado.

Resultados: Se diseñó un instrumento con 18 afirmaciones. El análisis de factores principales encontró la existencia de cinco factores que explican el 71.805 % de la varianza total, con un valor $p < .001$, así como un alfa de Cronbach de .840.

Discusión: Los resultados coinciden con otras investigaciones, al demostrar que la intención de los varones para realizarse las pruebas de detección prostática está condicionada, entre otras causas, por la actitud y la falta de comunicación asertiva por parte del personal de salud.

Conclusiones: Se obtuvo un instrumento válido y confiable que mide las barreras para la detección del cáncer de próstata en varones de pueblos originarios de Puebla. Esta herramienta permitirá el desarrollo de la enfermería basada en la evidencia aplicada en poblaciones vulnerables.

Palabras claves: Estudio de validación, neoplasias de la próstata, barreras de comunicación, población indígena, salud de los pueblos indígenas.

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Abstract

Introduction: Prostate cancer is a public health problem. Related studies indicate the lack of instruments adapted to the native Nahuatl language to measure barriers for prostate cancer detection.

Objective: To design and validate a barriers scale for the detection of prostate cancer in Nahua men belonging to native peoples of the northeastern highlands of the state of Puebla.

Methodology: Progressive cross-sectional five-stage study: 1) design of the instrument, 2) validation by judges, 3) translation and interpretation into the Nahuatl language, 4) pilot test, and 5) multivariate statistical analysis.

Results: An instrument with 18 statements was designed. The principal factor analysis found the existence of five factors that explain 71.805% of the total variance, with a p-value of < .001; as well as a Cronbach's alpha of .840.

Discussion: The results coincided with other research, demonstrating that the intention to undergo prostate screening tests is conditioned, among other things, by the attitude and lack of assertive communication on the part of the health personnel.

Conclusions: A valid and reliable instrument that measures the barriers for prostate cancer detection in men of the native towns of Puebla was obtained. This tool will allow the development of evidence-based nursing applied to vulnerable populations.

Keywords: Validation Study, Prostatic Neoplasms, Communication Barriers, Indigenous Population, Health of Indigenous Peoples.

Introduction

Prostate cancer is a public health problem1. In Mexico, it is the deadliest disease among men, reporting 9.8 deaths for every 100 thousand men[2,3], one of the most affected groups being native peoples[4]. 289 873 native men have been accounted for only in the state of Puebla, they are characterized by not having health care within their reach, which limits the early detection of this disease[5,6].

Based on studies that cover prostate cancer detection barriers, it has been shown that said hurdles are linked to a priori categories that generate perceptions, attitudes, and beliefs, including fear, dread, modesty, machismo, ignorance, shame, and misguided beliefs associated with the lack of male health prevention culture in their native language, which can be exacerbated by age, their sociodemographic, economical, and educational situation, as well as by social practices[7-10]. This makes it clear that a better way to change the willingness of male individuals to get tested to detect the presence of prostate cancer is through acknowledging said factors, not only in the person being treated, but also in health care providers.

In this sense, according to the existing scientific literature, there are only tools

that focus on the symptoms[11], living quality[12], and functional evaluation to treat patients with this pathology[13], as well as on the measurement of the beliefs, attitudes, and expertise associated with benign prostatic hyperplasia[14], but not to measure the discerned barriers to prevent this disease. There are even less tools translated to their native language which would allow to identify the hurdles that limit the acceptance of undergoing early detection testing.

It has been shown that there are risk factors for benign prostatic hyperplasia and prostate cancer among the native peoples of Tabasco, Mexico, which is why it is suggested for nursing professionals to carry out promotional activities for healthy lifestyles that involve the male worldview[4].

This is how the design and validation of a tool that measures the discerned barriers for the detection of prostate cancer among Nahua men, which, on one hand, helps recognize the fears, ambiguities, worries, and priorities presented by men belonging to native peoples. On the other hand, it helps health providers in recognizing and raising awareness among citizens about the importance of prostate cancer screening to promote informed decision-making among Nahua men about the different ways to timely detect this disease, therefore improving patient satisfaction and resutls[15-19].

Given the above, on the understanding that the delay in timely detection is not only exclusive to men, but also to the healthcare team[20], which is why the importance of designing and validating a barriers scale in the Nahuatl language for prostate cancer detection among men belonging to native peoples of the northeastern highlands of the state of Puebla, Mexico is clear.

Methodology

The design was a progressive cross-sectional[21] five-stage study: 1) design of the instrument, 2) validation by judges, 3) translation and interpretation into the Nahuatl language, 4) pilot test, and 5) multivariate statistical analysis. These stages are described below:

1) **Design of the instrument:** this stage consisted of the search of scientific literature[22] about studies related to barriers for prevention and the different types of clinical evaluation that identify prostate cancer through a PICOT question (delimited to the phenomenon, result, and type of study). To do this, the stages of PRISMA[23] methodology were followed. The EBSCO, SCOPUS, and PUBMED databases were used to select quantitative and qualitative research no older than five years through a search string (Prostatic Neoplasms AND Prostate-Specific Antigen AND Barriers to Access of Health Services AND Communication Barriers AND Men AND Indigenous Population (Public Health) OR Health of Indigenous Peoples AND Digital Rectal Examination) in English and Spanish, with free access to the full text. This stage aimed to clarify the ontological and epistemological aspects of the study construct, which facilitated the recognition of the basic elements of what the barriers to prostate

cancer detection are, as well as how they are understood among men; this allowed for the proposal of a series of affirmative statements, resulting in the first version of the tool.

2) **Validation by judges:** the second stage consisted of recruiting a linguistics expert and 16 judges, who performed, respectively, a linguistics and content analysis of each of the statements of the tool. The judges answered to the following inclusion criteria: being nurses specialized in the care of patients with prostatic hyperplasia (malignant and benign), doctors in touch with male population from native peoples, chemists, and expert anthropologists; all of them with a PhD and belonging to the National System of Researchers (SNI). The invitation was sent via email, where a 15-days feedback period for the judges was established.

The content analysis by the judges aimed to evaluate each of the questions separately: the expert identified if the items were related or not to what was supposed to be measured, using a Likert-type scale as a response format, where 0 = definitely not related, 1 = not related, 2 = not sure of the relationship, the items need further review, 3 = related, but small modifications are needed, and 4 = extremely related, no alterations needed. The validation of the tool was done using the item validity index (IVI) and content validity index (IVC), where positive scores close to one mean a better content validity24. These analyses allowed for the changes suggested by experts on each of the items, which resulted in the final Spanish version of the tool.

3) **Nahuatl translation and interpretation:** the third stage consisted of the translation of the Spanish version of the tool into the native Nahuatl language, done by one of the authors of the tool who, besides being a nurse, is a certified native language interpreter and translator by the Native Language Institute (INALI). Then, the tool was sent for translation analysis to three judges characterized by their belonging to a native town of the northeastern highlands of the state of Puebla, knowing the culture, language, and being certified as interpreters and translators by the INALI in Mexico, to reach a syntax consensus. The invitation was sent via email and an eight-day period for the experts to send their feedback was established. Subsequently, the analysis was done according to the observations made by the judges with the aim of defining the version of the tool in the native Nahuatl language.

The tool used by Nahuatl translators to evaluate each of the questions was a Likert-type scale where five possible response options were presented: 0 = definitely not translated, 1 = not properly translated, 2 = I am unsure of the translation, it needs to be reviewed, 3 = it is well translated with only minor observations, and 4 = it is well translated and has no observations.

4) **Pilot test:** the fourth stage consisted consisted of the application of the tool in March of 2024 through convenience sampling of 30 men belonging to a native town of the northeastern highlands of the state of Puebla with the following inclusion criteria: being over 40 years old, Nahuatl speakers, no diagnosis of

benign prostatic hyperplasia or prostate cancer. Additionally, a considered exclusion criterion was being men who spoke the TL Nahuatl variant due to changes in pronunciation and meaning of the words. The goal of this stage was to understand comprehensibility, response time, and handling in the target population. This allowed for changes in the wording of some items to obtain the definitive version of the tool translated into Nahuatl.

5) **Multivariate statistical analysis:** the fifth stage was characterized by the application of the definitive version of the tool translated into Nahuatl in the months of April to June of 2024 through convenience sampling to a sample calculated through power analysis, with a statistical power of .90, an effect size of .25, and a significance level of .05. The result was n = 230 males belonging to a native town of the northeastern highlands of the state of Puebla that met the same inclusion and exclusion criteria as the pilot sample. In their homes, they were administered the *Barriers for Prostate Cancer Detection* tool with a Likert-type scale with five possible response options, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. In this stage, the data obtained were processed in the SPSS version 27 statistical program to obtain the exploratory factor analysis, as well as the reliability of the instrument through the Cronbach's alpha coefficient and, complementarily, McDonald's omega coefficient, also known as Jöreskog's rho, which is recommended as a more accurate measure of reliability[25].

It is important to highlight that all the men of the study, in all of the research stages, gave their informed consent, which was written in Nahuatl. Their participation was also verbally clarified and explained to them in their native language; they and two witnesses were given a copy of their informed consent. This was done in accordance with the General Health Law on Research in Mexico[26]. This was also endorsed by bioethics and research committees belonging to a higher education institution of the state of Puebla.

Results

Below are the results according to the stages suggested in the design:

1) **Design of the instrument:** this stage resulted in the clarification of the construct that was going to be measured based on 10 selected studies (table 1) that covered the selection criteria. Their analysis allowed for the definition of the barriers for prostate cancer screening as all those beliefs that interfere in the knowledge and preventive behavior related to prostate cancer, where the following was identified:

- **Internal stigmas (IS)**, referring the meanings that men give to prostate cancer prevention procedures, including macho conceptions that cause feelings of fear, dread, and shame, as well as thoughts related to the violation of their masculinity.
- **External stigmas (ES),** referring to the care provided by the healthcare professional regarding prostate cancer prevention, contribute to the delay in

Table 1. Selected studies

Author	*Year*	*Country*	*Title*
Sánchez SK, Cruz SM, Rivas AV, Pérez CM.	2021	Mexico	Prevalence of Prostate Cancer Risk Factors and Symptoms in Indigenous People in Tabasco.
Mbugua RG, Karanja S, Oluchina S.	2021	Kenya	Barriers and Facilitators to Uptake of Prostate Cancer Screening in a Kenyan Rural Community
Paredes AAM, Shishido S.	2022	Peru	Perception and disposition to digital rectal examination in the prevention of prostate cancer
Baratedi WM, Tshiamo WB, Mogobe KD, McFarland DM.	2020	Sub-Saharan Africa	Barriers to Prostate Cancer Screening by Men in Sub-Saharan Africa: An Integrated Review.
Miller DB, Tyrone HC, Weidi Q.	2020	USA	Prostate cancer screening in Black men: Screening intention, knowledge, attitudes, and reasons for participation.
King OM, Arber A, Faithfull S.	2019	Trinidad and Tobago	Beliefs contributing to delays in prostate cancer diagnosis among Afro-Caribbean men in Trinidad and Tobago.
Durães OPS, Vinicius CMS, Andrade BH, Marques BRR, Barbosa RA, Maiada SV.	2019	Brazil	Prostate cancer: knowledge and interference in the promotion and prevention of the disease.
Opondo CO, Onyango PO, Asweto CO.	2022	Kenya	Effect of Perceived Self Vulnerability on Prostate Cancer Screening Uptake and Associated Factors: A Cross-Sectional Study of Public Health Facilities in Western Kenya
Charles BF, Henry LG, Moen K, John ME.	2019	Tanzania	Knowledge, Perceived Risk and Utilization of Prostate Cancer Screening Services among Men in Dar Es Salaam, Tanzania.
Méndez TJM.	2019	Mexico	Body borders and male identity. Experiences of research and conceptual reflections in the study of heatlth

Source: Author´s own elaboration.

the acceptance of prostate screening.

The aforementioned resulted in the first version of the instrument with 13 statements distributed into two dimensions: male stigmas (internal stigmas), and the care regarding sexual and reproductive health (external stigmas).

2) **Validation by judges:** in this stage, 10 evaluations were received, enough for the analysis according to the suggested methodology[27]. Based on the observations of the experts, changes were done to the wording and presentation order of all the statements of the tool, as well as the incorporation of five questions that address the emotions of fear and shame, the stigma of rectal examination within the social circles of the person, communication on the part of the healthcare professional and the organic-functional structure of the place providing medical care, resulting in a total of 18 items, which allowed for a better understanding of the item, as well as the final Spanish version of the tool, with an acceptable IVC[21] equal to .910 (table 2).

3) **Translation and interpretation in Nahuatl language:** this procedure had two rounds with three translators to ensure a better understanding and interpretability of the ideas in each of the tool's sentences, which allowed for a pilot version of the tool translated into Nahuatl.

4) **Pilot Test:** this allowed for the recording of a 15-minutes filling time per participant and ensured the total understanding of the items by the respondents through the modification of some words, situating the instrument in the cultural

Table 2. Content validity analysis by judges

Ítem	*J1*	*J2*	*J3*	*J4*	*J5*	*J6*	*J7*	*J8*	*J9*	*J10*	*IVI*
1	4	4	4	4	4	3	4	4	2	3	0.90
2	4	4	4	3	4	3	4	4	2	3	0.87
3	4	4	4	4	4	3	4	4	2	3	0.90
4	4	4	4	4	3	2	4	2	4	3	0.85
5	4	4	4	3	4	3	2	4	4	4	0.90
6	4	4	3	4	4	3	3	4	4	4	0.92
7	4	4	4	4	4	2	4	4	4	3	0.92
8	4	4	4	4	4	3	3	4	2	4	0.90
9	4	4	4	4	2	3	3	4	3	4	0.87
10	4	4	4	4	4	3	4	3	4	4	0.95
11	4	4	4	4	4	3	4	3	3	4	0.92
12	4	4	4	4	4	2	4	4	4	4	0.95
13	4	4	4	4	4	2	4	4	4	3	0.92
14	4	4	4	4	4	3	4	4	3	4	0.95
										CVI	**0.91**

Source: Author´s own elaboration. Note: Jn: Judges´ Numbering; IVI= Item Validity Index; IVC: Content Validity Index.

context experienced by the men.

5) Results of multivariate statistics: these showed, through Bartlett's Test of Sphericity (x^2 = 568.74; p = .001) and the Kaiser-Meyer-Olkin adequacy test (KMO = .627), significant correlations between the items, and a good relationship between the variables of the tool. Additionally, factor analysis using the principal components method and VIRAMAX rotation found the existence of five factors (dimensions) that explain 71.805% of the total variance (table 3 and figure 1).

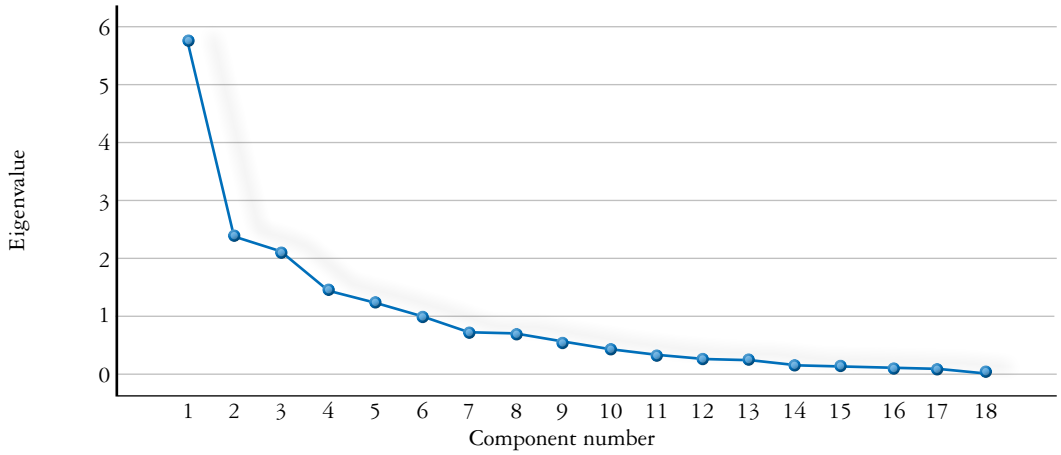
The first dimension refers to the beliefs,

Table 3. Explained variance considering the first five items with Varimax rotation.

	Initial Eigenvalues			*Rotation Sums of Squared Loadings*		
Component	*Total*	*% of variance*	*% cumulative*	*Total*	*% of variance*	*% cumulative*
1	5.709	31.714	31.714	4.119	22.884	22.884
2	2.377	13.205	44.919	3.174	17.633	40.517
3	2.126	11.812	56.731	2.328	12.936	53.453
4	1.462	8.12	64.851	1.842	10.231	63.684
5	1.252	6.953	71.805	8.121	8.121	71.805

Extraction Method: Principal Component Analysis.

Figure 1. Scree plot.



feelings, and attitudes related to prostate detection (items 1-3, 5, 9, and 10); the second dimension corresponds to the creation of trust environments (items 8 and 12-15); the third dimension addresses the anticipatory conditions of preventive behavior (items 4, 6, and 7); the fourth dimension refers to accessibility for prostate evaluation (items 16 and 17), and the fifth dimension identifies healthcare experiences (items 11 and 18) (table 4).

Moreover, it was identified that questions 5, 8, and 12-15 had to be recoded by reversing their

Table 4. Rotate component matrix

Question	Component				
	1	2	3	4	5
1. Do you think that a digital rectal exam for prostate cancer detection makes you less of a man?	0.543	0.378	0.474	-0.119	0.106
2. Do you think that a digital rectal exam for prostate cancer detection is a procedure that alters your sexual identity?	0.757	0.135	0.509	-0.008	0.09
3. Would you feel embarrassed if a digital rectal exam was performed for prostate cancer detection?	0.704	0.064	0.245	-0.161	0.115
4. Would you be afraid of knowing the results of the prostate cancer screening test?	0.321	-0.023	0.771	0.107	0.1
6. Do you consider the preparation, technique, and emotional readiness required by the doctor for the digital rectal exam important?	-0.34	-0.106	0.771	-0.201	-0.001
7. Should only men with a history of prostate cancer undergo screening tests for prostate cancer?	0.253	0.088	0.518	0.34	-0.331
9. If your friends or family knew you were undergoing prostate cancer screening, would you feel ashamed and stop visiting the doctor, health center, or clinic?	0.887	0.07	-0.039	0.241	-0.062
10. If your coworkers knew you were undergoing prostate cancer screening, would they mock you, and would you stop visiting the doctor, health center, or clinic?	0.778	-0.036	-0.101	0.303	-0.265
11. Based on previous experiences with the doctor or another healthcare professional, would you refuse to undergo prostate cancer screening?	0.329	0.467	0.408	0.151	-0.469
16. Do the operating hours of your clinic prevent you from attending consultations to evaluate your prostate health?	0.128	0.007	0.03	0.805	0.071
17. Does the distance to your clinic prevent you from attending consultations to evaluate your prostate health?	0.049	0.069	-0.023	0.797	0.055
18. Does the administrative bureaucracy at your clinic make it difficult to access consultations for prostate health evaluation?	-0.02	0.206	0.075	0.217	0.868
5. Would you be willing to allow a digital rectal exam to evaluate your prostate health?	0.731	0.319	-0.066	0.138	-0.234
8. Would you undergo prostate screening even if no one in your family has done so?	0.59	0.603	0.071	0.154	0.127
12. Has the doctor explained clearly what prostate cancer is?	0.161	0.725	-0.34	0.175	-0.111

13. Does the doctor speak to you in your native language when explaining what prostate cancer is?	0.043	0.839	0.095	0.035	-0.16
14. Does the doctor make you feel comfortable to express any doubts related to prostate cancer?	0.206	0.796	0.09	0.095	0.253
15. Does the doctor's attitude give you confidence to undergo prostate screening or detection tests?	-0.035	0.624	0.004	-0.219	0.285

Note: Rotation method: Varimax with Kaiser normalization.

response form to obtain a better interpretation of the results, where higher scores indicate a higher perceived barrier. This happened prior to the conversion of the results of the tool to an index from 0 to 100.

Finally, the reliability of the instrument was determined through Cronbach's alpha and McDonald's omega coefficients, obtaining values considered acceptable: .840 and .844, respectively.

Discussion

The goal of the present study was to design and validate a barriers scale for prostate cancer detection in men belonging to native peoples of the northeastern highlands of the state of Puebla, Mexico.

The validation and standardization carried out by the judges allowed to ensure an internal consistence of the barriers tool for prostate cancer detection. This happened after changing the wording of the items, as well as the addition of five statements that delved into structural barriers, which coincides with the research carried out in Medellin, Colombia[13] and the National Institute of Cancer of Mexico City[11], which shows that the intention to undergo prostate detection can be conditioned by the access to healthcare services, as well as the attitude and lack of assertive attitude from the people that work in these places, which can be a hurdle for the promotion of healthy lifestyles in native peoples of the northeastern highlands of the state of Puebla.

Regarding the pilot results, they differed from those obtained in the study conducted by the National Cancer Institute of Mexico City[11], with no item comprehension problems being found, which suggests that the prior review performed by a linguistics expert and judges ensure the understanding by the participant population. Additionally, this difference is due to the present study beginning with the design and not with the cultural adaptation of the tool.

According to the results of the factor analysis, the barriers that limit prostate screening among men belonging to native peoples are mainly determined by beliefs, feelings, trust, anticipatory conditions, and attitudes related to prostate detection, which are predictors for having a good preventive behavior or not, as well as the accessibility of prostate detection of these men regarding the experience of receiving healthcare, a situation similar to that obtained from Colombian men[14], where one of the main dimensions measured as a barrier that limits prostate evaluation is the attitude that the participating men have towards the medical exam and the disease.

The internal consistency of the scale was good. Additionally, a significative correlation between the items was obtained, which explains the statements of this scale not being similar. This can ensure that each

of the statements of the tool are measuring vastly different aspects, which complement each other in a very specific way to measure the variable of barriers for prostate cancer detection. This is consistent with the study carried out in the National Cancer Institute of Mexico City[11], where the tools obtained an acceptable internal consistency.

Finally, one of the limitations is that this tool is only applicable to the Nahuatl population of the northeastern highlands of the state of Puebla, as the existing language variants in other states of the Mexican Republic change in terms of writing and communication. Therefore, it is suggested to make adaptations, based on this tool, to the native languages of the communities where it is necessary to know the barriers for prostate cancer detection.

Conclusions

A legitimate and reliable instrument that measures the barriers for the screening of prostate cancer in Nahua men belonging to native peoples of the northeastern highlands of the state of Puebla. This instrument will allow the development of evidence-based nursing applied to vulnerable populations, as well as the coverage of the worries and priorities of the men, which can ease the development of positive attitudes towards prostate screening. Finally, we recommend continuing the development and adaptation of this instrument through new research and more native languages to allow us to know the barriers for prostate cancer detection, specifically in men belonging to native peoples.

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