



Habitability and residential satisfaction in irregular settlements of Mazatlán: Preliminary psychometric properties of a scale

Habitabilidad y satisfacción residencial en asentamientos irregulares de Mazatlán: propiedades psicométricas preliminares de una escala

Karen Yedid Rodríguez Velarde¹  

Víctor Manuel Martínez García¹  

Yennifer Díaz Romero¹  

Pedro Antonio Valdez Lizárraga¹  

José de Jesús Reyes Machain¹  

Karla Karina Romero Valdez¹  

¹ Universidad Autónoma de Sinaloa, Vicerrectoría. Mazatlán, México.

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Corresponding Author: Víctor Manuel Martínez García 

ABSTRACT

Irregular settlements concentrate deficits in tenure, infrastructure and hazard exposure, yet the way their residents appraise their dwelling and neighbourhood cannot be inferred from those deficits. This instrumental study examined the preliminary psychometric properties of a residential satisfaction scale for irregular settlements, with ten items and two dimensions, Satisfaction with living in the settlement and Physical conditions of the dwelling, in the pilot survey of project FZ-HAB-0008 on the Factoriza UAS platform in Mazatlán. With a cross-sectional design, 20 cases out of a target of 100 were analysed while data collection remained open. Descriptive statistics, Cronbach's alpha, McDonald's omega total, an exploratory factor analysis and the Spearman correlation between dimensions were estimated. Internal consistency was acceptable for Physical conditions ($\alpha = .774$; $\omega = .815$) and moderate for Satisfaction ($\alpha = .687$; $\omega = .732$), with the reverse-worded items as the least coherent. With intermediate sampling adequacy ($KMO = .697$), parallel analysis suggested a single factor on which the eight positively worded items loaded, and the correlation between dimensions was moderate ($\rho = .417$). Residents felt part of their neighbourhood and rated their dwelling moderately well, but their intention to stay was the lowest rating. The flooding item behaved as a distinct facet of hazard exposure.

Keywords: irregular settlements; residential satisfaction; housing habitability; psychometric evidence.

RESUMEN

Los asentamientos irregulares concentran carencias de tenencia, infraestructura y exposición al riesgo, pero la valoración que sus habitantes hacen de su vivienda y su colonia no se deduce de esas carencias. Este estudio instrumental examinó las propiedades psicométricas preliminares de una escala de satisfacción residencial en asentamientos irregulares, de diez reactivos y dos dimensiones, Satisfacción con vivir en el asentamiento y Condiciones físicas de la vivienda, en el levantamiento piloto del proyecto FZ-HAB-0008 de Factoriza UAS en Mazatlán. Con diseño transversal, se analizaron 20 casos de una meta de 100, con el levantamiento abierto. Se estimaron descriptivos, alfa de Cronbach, omega total, análisis factorial exploratorio y la correlación de Spearman entre dimensiones. La consistencia interna fue aceptable en Condiciones físicas ($\alpha = .774$; $\omega = .815$) y moderada en Satisfacción ($\alpha = .687$; $\omega = .732$), con los reactivos inversos como los menos coherentes. Con una adecuación muestral intermedia ($KMO = .697$), el análisis paralelo sugirió un solo factor, en el que cargaron los ocho reactivos directos, y la correlación entre dimensiones fue moderada ($\rho = .417$). Los residentes se sintieron parte de su colonia y valoraron moderadamente su vivienda, pero su intención de permanecer fue la valoración más baja. El reactivo de inundación se comportó como una faceta propia de exposición al riesgo.

Palabras clave: asentamientos irregulares; satisfacción residencial; habitabilidad de la vivienda; evidencias psicométricas.

INTRODUCTION

Irregular settlements are one of the most widespread forms of housing production in Latin American cities. They arise from the occupation of land without regularization of tenure or prior provision of infrastructure, and in them families build their housing progressively with the resources available to them. A comparative study of informal settlements in metropolitan areas of Colombia and Mexico, which constructed housing quality indices through factor analysis, concluded that this quality depends on the internal conditions of the housing, the circumstances of its inhabitants, its location, including location in risk areas, and access to services, facilities, and infrastructure (Yescas Martínez y Contreras Ortiz, 2024).

In Mexico, housing policy in the early decades of this century privileged the mass production of social-interest housing, with small dwellings, developments far from urban centers, and insufficient services (Hernández Ilizaliturri et al., 2025). That supply did not reach all households, and part of the population resolved their housing through informality. Location has consequences for daily life: in Mexico City, residents of a peripheral housing development had much longer travel times than those of an informal community closer to the center and with a consolidated local commercial economy (Reyes, 2023). Informality, therefore, does not necessarily equate to a worse valuation of the place where people live.

Exposure to natural hazards is a critical dimension of habitability in irregular settlements, which frequently occupy flood-prone or difficult-to-urbanize land. In northwestern Mexico, the flood associated with tropical depression 19-E in 2018 in Culiacán affected neighborhoods of different income levels, but recovery was more difficult for low-income households and fragile construction (Mancera González, 2021). In informal settlements in Dhaka, Bangladesh, exposure to heat waves, floods, and waterlogging was very frequent and was associated with greater psychological stress, and socioeconomic disadvantages and poor housing conditions amplified health risks (Xunda et al., 2026).

Residential satisfaction allows us to understand how the inhabitants of these settlements value their housing and their neighborhood, beyond physical indicators. Recent literature shows that this valuation is not directly deduced from material deficiencies: in Manizales, Colombia, and Concepción, Chile, households relocated from informal settlements to social housing showed satisfaction levels different from those expected based on perceived deficits (Marín-Villegas et al., 2026). However, no brief instruments were identified that jointly measure satisfaction with living in the settlement and the valuation of the physical conditions of housing in irregular settlements of northwestern Mexico.

The FZ-HAB-0008 project of the Factoriza UAS platform aimed to study habitability and residential satisfaction in irregular settlements in Mazatlán. To this end, the Residential Satisfaction in Irregular Settlements Scale was designed, with 10 items organized into two dimensions: Satisfaction with Living in the Settlement and Physical Conditions of the Dwelling. This article reports the results of the preliminary data cut of the pilot survey. The general objective was to examine the preliminary psychometric properties of the scale in that cut. The specific objectives were, first, to describe residential satisfaction and the assessment of housing conditions reported by residents; second, to estimate the internal consistency of each dimension using alpha and omega coefficients; third, to explore the internal structure of the instrument through exploratory factor analysis; and fourth, to describe the relationship between the scores of the two dimensions. The project package does not record hypotheses, so the study has a descriptive and exploratory scope.

Residential satisfaction as a component of habitability

Residential satisfaction expresses the assessment that people make of their housing and its environment, and it is a central component of perceived habitability. Saleem and Alchalabi (2025) systematically reviewed 40 studies on the factors associated with residential satisfaction and grouped them into 12 categories that interact with each other, from functional and technical to cultural, psychological, and public policy categories, and they highlighted the quality of architectural design, environmental sustainability, and socioeconomic conditions. From the perspective of social sustainability, the review by Alaie et al. (2022) organized housing indicators into 5 dimensions—functional, semantic-perceptual, physical, environmental, and economic—that span the scale of the housing unit and that of the neighborhood.

In northwestern Mexico, studies with users of social housing have found moderate levels of satisfaction, associated with the housing complex where each dwelling is located (Valdivia Haro et al., 2023). In subsidized housing complexes in Guangzhou, greater satisfaction was associated with larger dwellings, well-equipped neighborhoods, close neighborly ties, and community activities

(Tang et al., 2024), and in the same city, one study with 1,568 questionnaires administered in 74 communities found that the perception of disorder in the environment was positively associated with the intention to move, whereas community attachment and satisfaction were negatively associated (Gu et al., 2025).

Satisfaction and rootedness in informal settlements

Satisfaction with living in an informal settlement is related to rootedness and sense of belonging, which can be high even under precarious material conditions. The review by Kamani Fard and Paydar (2024) on place attachment in urban environments indicated that social interaction and local characteristics expressing history and culture are associated with a stronger bond, and a systematic review of research on place attachment and behavioral intentions concluded that its dimensions do not behave in the same way regarding those intentions (Dang & Weiss, 2021). In the comparative study of Manizales and Concepción, satisfaction with the neighborhood and residential environment was significantly lower in Concepción, which the authors attributed mainly to more negative perceptions of safety, adaptability, and housing comfort (Marín-Villegas et al., 2026).

The dimension Satisfaction with living in the settlement of the instrument captures contentment with living in the colonia (R1), the consideration of the colonia as a good place to raise children (R2), the desire to move to another colonia if possible (R3, reverse-coded), the feeling of belonging (R4), and the intention to continue living in the colonia in the coming years (R5). It thus combines affective evaluations, belonging, and the intention to remain, which the literature distinguishes as related but non-equivalent aspects.

Physical conditions of the dwelling

The physical conditions of housing in irregular settlements depend on the progressive construction process and on location. The comparative study of Colombia and Mexico showed that the quality of informal housing is related to its internal conditions, to location in risk areas, and to access to services and infrastructure (Yescas Martínez and Contreras Ortiz, 2024). In the warm climates of the northwest, thermal comfort is an additional requirement: in Culiacán, residents of a social housing subdivision described their houses as very hot (Barraza-Bracamontes et al., 2022).

The Physical housing conditions dimension of the instrument captures protection against rain (R6), sufficient space for its inhabitants (R7), good condition of materials (R8), flooding during the rainy season (R9, reverse-coded), and the feeling of safety inside the home (R10). Four items refer to the dwelling itself, whereas flooding also depends on the location of the settlement and on neighborhood drainage, a difference that may be reflected in its statistical behavior.

Evidence of validity in the initial stage of a scale

The internal consistency of a dimension is usually estimated with Cronbach's alpha (Cronbach, 1951), which assumes equivalent loadings among items, and with McDonald's omega (McDonald, 1999/2013), which does not assume them; simulation studies have compared the performance of both coefficients under different data conditions (Malkewitz et al., 2023). Internal structure is explored with exploratory factor analysis, whose current recommendations require first verifying the adequacy of the data, deciding the number of factors with procedures such as parallel analysis, and treating reference values as guidelines rather than rules (Ferrando et al., 2022; Goretzko et al., 2021). Each dimension includes a reverse-worded item, and scales with items in both directions may show wording effects, because some people respond inconsistently to positive and negative items of the same dimension (Steinmann et al., 2022); identifying these responses may reduce such effects (García-Batista et al., 2021). From a cross-sectional design, relationships between dimensions should be understood as associations.

METHODS

Design

An instrumental, quantitative, non-experimental, cross-sectional study was carried out with a descriptive and exploratory scope. The data correspond to the survey LEV-0013, "Pilot irregular settlements · Residential satisfaction", from the FZ-HAB-0008 project of the Factoriza UAS platform, and to the frozen dataset DST-0016, with a cut-off date of June 17, 2026. The survey constitutes an independent sample and is the only one of the project.

Population, sample, and data cutoff

The population was defined as individuals aged 18 years or older living in irregular settlements in Mazatlán, Sinaloa. The settlements were selected by the project lead, so the selection was not probabilistic. According to the Factoriza record, 43 individuals opened the questionnaire and 20 completed it; no cases were excluded due to quality control, so 20 cases were analyzed (Table 2).

The analyzed cut is preliminary: it includes 20 cases out of a target of 100, and the survey remained open, in field status, as of the cut-off date. With 20 cases for 10 items, the ratio is 2.0 cases per item, lower than that considered adequate by the methodological literature for item factor analysis (Ferrando et al., 2022; Goretzko et al., 2021), so the factor analysis of this cut is presented as exploratory and preliminary.

Instrument

The Residential Satisfaction in Irregular Settlements Scale was administered; it consists of 10 items with a 5-point response format, ranging from Strongly disagree (1) to Strongly agree(5), organized into 2 dimensions of 5 items each: Satisfaction with living in the settlement (R1 to R5) and Physical conditions of the dwelling (R6 to R10). 2 items are reverse-worded, R3 and R9, and are recoded in the data matrix, so that a higher score indicates greater satisfaction and better conditions. Table 1 presents the code, dimension, text, and direction of each item.

Table 1. Structure of the instrument.

Code	Dimension	Item	Reverse-scored
R1	Satisfaction with living in the settlement	I feel happy to live in this neighborhood	No
R2	Satisfaction with living in the settlement	My neighborhood is a good place to raise children	No
R3	Satisfaction with living in the settlement	If I could, I would move to another neighborhood	Yes
R4	Satisfaction with living in the settlement	I feel part of this neighborhood	No
R5	Satisfaction with living in the settlement	I plan to continue living in this neighborhood in the coming years	No
R6	Physical conditions of the dwelling	My home protects me from the rain	No
R7	Physical conditions of the dwelling	My dwelling has space for the people who live in it	No
R8	Physical conditions of the dwelling	The materials of my home are in good condition.	No
R9	Physical conditions of the dwelling	My home floods during the rainy season.	Yes
R10	Physical conditions of the dwelling	I feel safe inside my home.	No

Note. Residential satisfaction scale for irregular settlements. 5-point response scale (Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree). Reverse-coded items are already recoded in the delivered matrix. Source: Factoriza UAS, project FZ-HAB-0008, survey LEV-0013, dataset DST-0016.

Procedure

Responses were collected through the survey questionnaire managed in Factoriza UAS, which records express informed consent online before the first item and does not collect identifying data. Factoriza UAS froze the DST-0016 dataset with a cryptographic fingerprint, generated the matrix with the reverse-coded items recoded, and produced the descriptive, internal consistency, and correlation analyses within each dimension (runs RUN-00078 to RUN-00082). The complementary analyses were run using the data file and item dictionary exported by the platform.

Data analysis

In a first stage, Factoriza UAS calculated the mean, standard deviation, skewness, kurtosis, and response percentages at the extreme values of each item; the internal consistency of each dimension using Cronbach's alpha (Cronbach, 1951), including the corrected item-total correlation and the alpha if the item was deleted; and Pearson correlations among the items of each dimension, with 95% confidence intervals via Fisher's transformation. In a second stage, the program `analysis_psicometrico.py`, version 1.0, was run in Python 3.13.16 (Python Software Foundation, 2026), with NumPy 2.5.3 (Harris et al., 2020), SciPy 1.18.1 (Virtanen et al., 2020), and pandas 3.0.5. The program applies fixed and declared procedures, without manual intervention in the calculations.

The program estimated McDonald's total omega (McDonald, 1999/2013) for each dimension from a one-factor model, without reverse-scoring the items. It also performed exploratory factor

analysis of the ten items on the Pearson correlation matrix, preceded by the global Kaiser-Meyer-Olkin measure of sampling adequacy (Kaiser, 1974) and the per-item measure (Lorenzo-Seva and Ferrando, 2021), and by Bartlett's test of sphericity (Bartlett, 1950), with the number of factors determined by parallel analysis (Horn, 1965) with 100 simulations, minimum residual extraction, and oblimin rotation, which is not applied when a single factor is retained. Finally, it estimated the relationship between the mean scores of the two dimensions using Spearman's coefficient and its 95% confidence interval, by means of Fisher's transformation with the Bonett and Wright standard error (2000). Reference values are treated as guidelines and not as decision rules (Ferrando et al., 2022). No item was eliminated, and confirmatory factor analysis was not performed, which is proposed as future work in an independent sample.

Ethical considerations

Participation was voluntary and anonymous. Factoriza UAS records express informed consent online and does not collect names, email addresses, or other identifying data, a relevant safeguard in settlements where the tenure situation may be sensitive.

Statement on the use of artificial intelligence

During the preparation of this manuscript, the Factoriza UAS platform was used for data management and for descriptive analyses, internal consistency analyses, and correlations between items; a Python analysis program with fixed and validated procedures was used for omega, exploratory factor analysis, and correlations between dimensions; and the Claude Opus language model (Anthropic) was used to run that program, assist in the literature search, draft the manuscript, and assemble the document from the results. The authors reviewed, corrected, and approved the entire text, verified each reference, and assume full responsibility for the content of the article.

Results

Sample composition

Table 2 summarizes the case flow. Of the 43 people who opened the questionnaire, 20 completed it and were analyzed, with no exclusions due to quality control. The 20 analyzed cases answered the 10 items.

Residential satisfaction and housing conditions

Table 3 and Figure 1 present the descriptive statistics. Physical housing conditions received, in general, higher ratings than satisfaction with the settlement. Protection from rain obtained the highest mean of the instrument (R6: $M = 3.90$, $SD = 1.25$), followed by sufficiency of space (R7: $M = 3.85$, $SD = 1.27$), good condition of materials (R8: $M = 3.75$, $SD = 1.29$), and feeling of safety inside the dwelling (R10: $M = 3.70$, $SD = 1.08$). The absence of flooding during the rainy season, in its recoded version, obtained $M = 3.65$ ($R9: SD = 1.39$), with the greatest dispersion of the instrument.

Table 2. Composition of the sample.

Indicator	Value
People who opened the questionnaire	43
Completed questionnaires	20
Cases excluded by quality control	0
Cases analyzed	20
Items	10

Note. Survey "Pilot Irregular Settlements - Residential Satisfaction" (LEV-0013); population: people aged 18 years or older living in irregular settlements in Mazatlán; territory: Mazatlán, Sinaloa, in settlements selected by the project lead. Dataset DST-0016, fingerprint 2bee099ecf9f7e72. Source: Factoriza UAS. Preliminary cutoff: $n = 20$ out of a target of 100, with data collection still open.

In Satisfaction with living in the settlement, sense of belonging obtained the highest mean (R4: $M = 3.65$, $SD = 0.93$), with a marked negative skewness (-1.35). Happiness with living in the neighborhood and its consideration as a good place to raise children shared a mean of 3.40 (R1: $SD =$

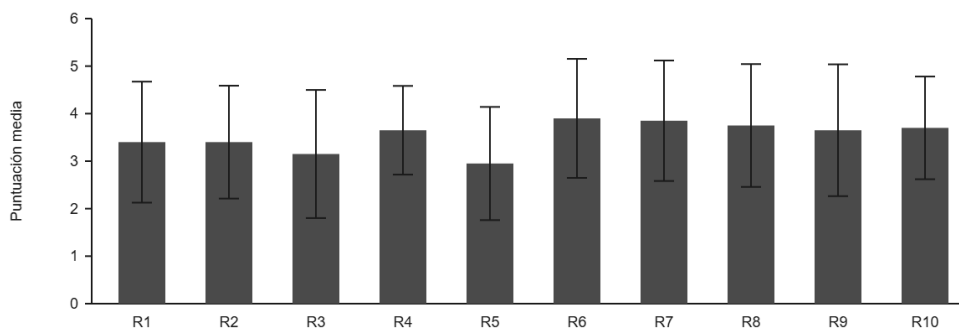
1.27; R2: SD = 1.19), and the absence of the desire to move to another neighborhood, recoded, was near the midpoint (R3: M = 3.15, SD = 1.35). The intention to continue living in the neighborhood in the coming years obtained the lowest mean of the instrument (R5: M = 2.95, SD = 1.19). Overall, this profile describes residents who feel part of their neighborhood and rate their housing moderately favorably, but whose intention to remain in the settlement is the weakest of the recorded ratings.

Table 3. Descriptive statistics of the items.

Item	M	OF	Skewness	Kurtosis	Floor	Ceiling
R1	3.40	1.27	-0.86	-0.12	15%	15%
R2	3.40	1.19	-1.10	0.60	15%	10%
R3	3.15	1.35	-0.30	-1.14	15%	15%
R4	3.65	0.93	-1.35	2.58	5%	10%
R5	2.95	1.19	-0.31	-0.93	15%	5%
R6	3.90	1.25	-1.40	1.32	10%	35%
R7	3.85	1.27	-1.24	0.85	10%	35%
R8	3.75	1.29	-0.94	0.14	10%	35%
R9	3.65	1.39	-0.87	-0.18	15%	35%
R10	3.70	1.08	-0.72	0.55	5%	25%

Note. N = 20. Floor and ceiling indicate the percentage of responses at the minimum and maximum values of the scale, according to Factoriza. The item-total correlation column is omitted from Factoriza's descriptive table, whose values do not match those in Table 4 because they are not calculated over the total of each dimension. Execution RUN-00078 of Factoriza UAS. Preliminary cut: n = 20 of a target of 100, with data collection open.

Figure 1. Mean scores per item with standard-deviation bars.



Descriptivos · N = 20 · ejecución RUN-00078

Note. N = 20. Scale from 1 to 5; reverse-scored items R3 and R9 are shown recoded. RUN-00078 execution by Factoriza UAS. Preliminary cut: n = 20 out of a target of 100, with data collection ongoing.

Internal consistency

Table 4 presents the item analysis by dimension calculated by Factoriza, and Table 5 presents the coefficients of the complementary program, whose alpha values match those of Factoriza. Physical conditions of the dwelling obtained acceptable internal consistency ($\alpha = .774$; $\omega = .815$). Protection against rain (R6: .803), safety inside the dwelling (R10: .732), and the condition of materials (R8: .688) were the most consistent items, whereas the recoded absence of flooding had a weak relationship with the dimension (R9: .219), and its removal would increase alpha to .847. The highest correlations were those of protection against rain with safety (R6 and R10: $r = .754$, 95% CI [.468, .897], $p < .001$) and with the condition of materials (R6 and R8: $r = .666$, 95% CI [.318, .856], $p = .001$), and none of the correlations for R9 had an interval that excluded 0.

Satisfaction with living in the settlement showed moderate consistency ($\alpha = .687$; $\omega = .732$). Considering the neighborhood a good place to raise children (R2: .728) and being content living in it (R1: .669) were the most consistent items, followed by the intention to remain (R5: .482) and belonging (R4: .303). The recoded absence of the desire to move to another neighborhood was barely related to the rest (R3: .129), and its removal would raise alpha to .778. The highest correlation was that of contentment with the intention to remain (R1 and R5: $r = .708$, 95% CI [.387, .876], $p < .001$), followed by that of contentment with considering the neighborhood a good place to raise children (R1 and R2: $r = .620$, 95% CI [.244, .834], $p = .004$) and that of the latter item with belonging (R2 and R4: $r = .560$, 95% CI [.157, .804], $p = .010$).

Table 4. Item analysis by dimension.

Dimension	Item	Corrected item-total r	α if the item is removed
Satisfaction	R1	.669	.523
Satisfaction	R2	.728	.502
Satisfaction	R3	.129	.778
Satisfaction	R4	.303	.687
Satisfaction	R5	.482	.619
Conditions	R6	.803	.640
Conditions	R7	.416	.776
Conditions	R8	.688	.682
Conditions	R9	.219	.847
Conditions	R10	.732	.680

Note. N = 20. Satisfaction = Satisfaction with living in the settlement; Conditions = Physical conditions of the housing. The corrected item-total correlation excludes the item itself from the total of its dimension. Cronbach's α for the complete dimension, with 5 items each: Satisfaction = .687 (execution RUN-00079); Conditions = .774 (RUN-00081). Source: Factoriza UAS, Tables 4 and 6 from the package, combined without modifying values. Preliminary cutoff: n = 20 of a target of 100, with data collection ongoing.

Table 5. Internal consistency by dimension.

Dimension	Items	n	α	ω
Satisfaction with living in the settlement	5	20	.687	.732
Physical conditions of the dwelling	5	20	.774	.815

Note. α = Cronbach's alpha; ω = McDonald's total omega from a single-factor minimum residual model, without reverse-scoring items. Complete cases per dimension. Source: own elaboration using analisis_psicometrico.py 1.0 (Python 3.13.16), dataset DST-0016_FZ_HAB_0008. Preliminary cut: n = 20 out of a target of 100, with data collection ongoing.

Internal structure

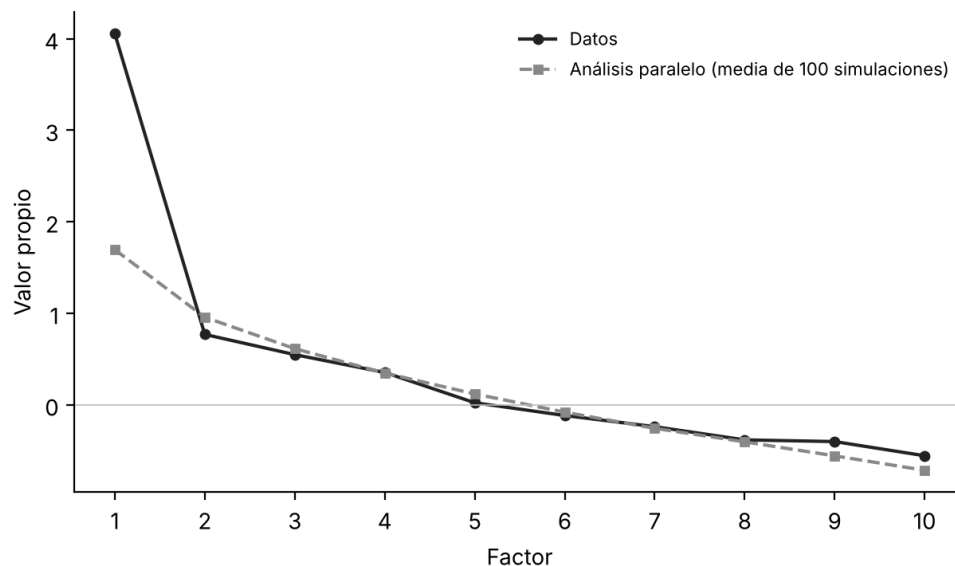
The adequacy of the data for factor analysis was intermediate. The overall Kaiser-Meyer-Olkin measure was .697, above the guideline reference of 0.60 used by the program (Kaiser, 1974), and eight of the ten items showed individual adequacy between .674 and .813, while R3 (.246) and R9 (.316) fell below the reference of .50 used by the program (Lorenzo-Seva and Ferrando, 2021). Bartlett's test of sphericity was significant, $\chi^2(45) = 102.50$, $p < .001$. Parallel analysis suggested a single factor (Figure 2), with a first eigenvalue clearly higher than those of the simulated matrices and the second below them, which accounted for 40.55% of the variance (Table 6).

In the loading matrix (Table 7), the items from both dimensions loaded on the same factor. The highest loadings corresponded to safety inside the home (R10: .898), protection against rain (R6: .886), and consideration of the neighborhood as a good place to raise children (R2: .769), and the others ranged between .541 (R4) and .658 (R1). The two reverse-coded items did not load on the factor: the absence of the desire to move to another neighborhood had a practically null loading and the opposite sign (R3: -.034), and the absence of flooding, an insufficient loading (R9: .206). With 2.0 cases per item, this solution is exploratory; it indicates that, in this sample, responses are organized around a general assessment of habitability rather than two separate dimensions.

Table 6. Variance explained by the factors.

Factor	Sum of squared loadings	% of variance	Cumulative %
1	4.05	40.55	40.55

Note. KMO = .697; Bartlett's test of sphericity: $\chi^2(45) = 102.50$, $p < .001$. Number of factors by parallel analysis: 1. Source: own elaboration with analisis_psicometrico.py 1.0 (Python 3.13.16), dataset DST-0016_FZ_HAB_0008. Preliminary cut: n = 20 out of a target of 100, with data collection still open.

Figure 2. Scree plot with parallel analysis.

Note. Eigenvalues of the reduced data matrix versus the mean of 100 simulated matrices of the same size (seed 2026). Source: own elaboration with analisis_psicometrico.py 1.0 (Python 3.13.16), dataset DST-0016_FZ_HAB_0008. Preliminary cutoff: n = 20 out of a target of 100, with data collection ongoing.

Relationship between dimensions

The Spearman correlation between the mean scores for Satisfaction with living in the settlement and Physical conditions of the housing, with 20 cases, was positive and moderate, $\rho = .417$, 95% CI [-.052, .735], $p = .068$, although its interval included zero. Since the analysis comprises a single pair of dimensions, the result is presented in the text and not in a table.

Table 7. Factor loadings of the exploratory factor analysis.

Item	Factor 1	h^2	MSA	Observation
R1	.658	.433	.709	
R2	.769	.592	.674	
R3	-.034	.001	.246	insufficient loading; opposite sign; low MSA
R4	.541	.293	.802	
R5	.608	.370	.731	
R6	.886	.786	.752	
R7	.547	.299	.720	
R8	.656	.431	.792	
R9	.206	.043	.316	Insufficient load; low MSA
R10	.898	.807	.813	

Note. Pattern matrix. Minimum residual extraction and oblimin rotation ($\gamma = 0$) on the Pearson correlation matrix; 20 complete cases. h^2 = communality; MSA = measure of sampling adequacy per item. All loadings are shown. Source: own elaboration with analisis_psicometrico.py 1.0 (Python 3.13.16), dataset DST-0016_FZ_HAB_0008. For readability, the dimension column is omitted: R1 to R5 correspond to Satisfaction with living in the settlement, and R6 to R10 to Physical conditions of the dwelling. With 20 cases per item, the solution is exploratory and preliminary. Preliminary cutoff: n = 20 of a target of 100, with data collection ongoing.

Discussion of results

The purpose of this study was to examine the preliminary psychometric properties of the residential satisfaction scale in irregular settlements in Mazatlán. The central result is that both dimensions showed moderate or acceptable internal consistency, which would improve without their reverse-scored items, and that the factor analysis suggested a single factor on which the eight directly worded items loaded. With 20 cases, these results are provisional: the simulation literature on alpha and omega has been developed with much larger samples (Malkewitz et al., 2023), and the factor analysis with two cases per item must be repeated with the final cut (Ferrando et al., 2022; Goretzko et al., 2021).

The behavior of the two reverse-coded items has different explanations. In the case of R9, flooding of the dwelling depends on the location of the settlement and on neighborhood drainage rather than on construction quality, so it can vary independently of rain protection, the condition of materials, or space. The literature on informal housing identifies location in risk zones as an inherent component of housing quality (Yescas Martínez & Contreras Ortiz, 2024), and the experience of Culiacán and Dhaka shows that exposure to flooding particularly affects low-income households (Mancera González, 2021; Xunda et al., 2026). R9 could constitute the core of a risk-exposure facet, rather than an indicator of the physical conditions of the dwelling.

In the case of R3, the desire to move to another neighborhood if possible is a conditional statement that can coexist with satisfaction and belonging: a person can feel part of their neighborhood and, at the same time, aspire to housing in better conditions. This pattern is compatible with one artifact associated with wording (García-Batista et al., 2021; Steinmann et al., 2022), but also with the distinction between the dimensions of place attachment and behavioral intentions (Dang and Weiss, 2021). The fact that the intention to continue living in the neighborhood obtained the lowest mean of the instrument, despite a relatively high sense of belonging, points in the same direction.

The finding of a single factor is consistent with the literature that understands residential satisfaction as an integrated assessment of housing and its environment (Alaie et al., 2022; Saleem and Alchalabi, 2025), and with the observation that satisfaction in informal settlements cannot be directly inferred from material deficiencies (Marín-Villegas et al., 2026). With 20 cases, however, it is not possible to distinguish between a true unidimensional structure and the inability of the sample to separate two correlated dimensions. The moderate correlation between the dimension scores, with an interval that includes zero, suggests that both share variance without being confounded, and the final cut should test the two-dimensional structure against that of a general factor.

CONCLUSIONS

The study fulfilled its objective within the scope permitted by a preliminary sample of 20 cases. The residential satisfaction scale in irregular settlements showed, in the pilot survey in Mazatlán, acceptable internal consistency in Physical conditions of the dwelling ($\alpha = .774$; $\omega = .815$) and moderate internal consistency in Satisfaction with living in the settlement ($\alpha = .687$; $\omega = .732$), with reverse-coded items being the least consistent in each dimension. Exploratory factor analysis, with intermediate sampling adequacy ($KMO = .697$), suggested a single factor on which the eight direct items loaded. Residents rated their dwelling moderately favorably and felt part of their neighborhood, but their intention to remain in it was the lowest-rated aspect.

The limitations are substantial. The sample of 20 cases, against a target of 100 and with 2.0 cases per item, renders all statistics unstable and does not allow reliable testing of the two-dimensional structure; the survey remained open, and of the 43 individuals who opened the questionnaire, only 20 completed it. The settlements were selected by the project manager, and no information is available on respondents or on tenure status. The study did not measure the physical conditions of dwellings or objective exposure to flooding, and its results pertain only to perception. The cross-sectional design precludes establishing dependency relationships, and no confirmatory factor analysis was performed.

These results lead to several decisions for the authors. First, R9 (flooding) should be reviewed to assess whether it should form part of a risk-exposure facet with additional items. Second, R3 (the desire to move to another neighborhood) and its relationship with the intention to stay should be reviewed. Third, the authors must decide whether the instrument will be presented as a general scale of perceived habitability or as two dimensions, a decision that must be made at the final cutoff. Fourth, the settlements, the irregularity criterion, and the origin of the items should be documented. None of these decisions was made in the present analysis, which retains the 10

original items.

Future lines of research include completing the survey to the planned target, repeating the exploratory factor analysis with the final sample, and then evaluating the 1-factor and 2-factor structures through confirmatory factor analysis in an independent sample. Combining the scale with flood risk records and with the land tenure status of each settlement would make it possible to compare residents' perceptions with their objective exposure. An instrument with documented validity evidence would provide the regularization and settlement improvement policy in Mazatlán with a measure of habitability as experienced by its inhabitants.

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CONFLICT OF INTEREST

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AUTHORSHIP CONTRIBUTIONS

Conceptualization: Karen Yedid Rodríguez Velarde
Data curation: Pedro Antonio Valdez Lizárraga
Formal analysis: Víctor Manuel Martínez García
Investigation: Karen Yedid Rodríguez Velarde
Methodology: Yennifer Díaz Romero
Project administration: Pedro Antonio Valdez Lizárraga
Software: Pedro Antonio Valdez Lizárraga
Supervision: Víctor Manuel Martínez García
Validation: Víctor Manuel Martínez García
Visualization: Yennifer Díaz Romero
Writing – original draft: Karen Yedid Rodríguez Velarde
Writing – review and editing: Yennifer Díaz Romero