BMC Public Health

RESEARCH Open Access

Examining the nexus between housing conditions and health outcomes in Palestinian society: a mixed-method investigation

Oqab Jabali[1*], Abed Alkarim Ayyoub[2], Shaden Jabali[3] and Munther Saeedi[1]

Abstract

Background Palestinian health conditions are exacerbated by high housing density, overcrowding, moisture issues, poor air circulation, poverty, limited health services, and housing insecurity, leading to chronic illnesses and mental health challenges. This study aims to explore the intricate connection between housing conditions and health outcomes, particularly focusing on the psychological, mental, and physical well-being of Palestinians.

Methods The study employs a mixed-method approach, combining quantitative surveys and qualitative interviews. A structured questionnaire, developed based on expert discussions and previous research, assesses health indicators across the three domains. Descriptive statistics and Stepwise Multiple Regression techniques are used for data analysis. Additionally, ten structured interviews are conducted to provide qualitative insights into the detrimental impacts of housing conditions on health.

Results The quantitative analysis reveals significant associations between housing characteristics and health outcomes. Participants residing in smaller households, with higher family incomes, and in private homes report better health across all domains. Urban residents generally exhibit better health outcomes compared to rural or refugee camp dwellers, highlighting disparities in resource accessibility. Moreover, stability in residential environments positively correlates with overall well-being. Qualitative findings underscore the negative impact of cramped living conditions, poor building supplies, and military occupation/ conflict on mental and physical health.

Conclusion The study emphasizes the interconnectedness of socio-demographic factors with health outcomes among Palestinians. It highlights the crucial role of family dynamics, socioeconomic status, housing type, residential environment, and the political situation—particularly its impact on housing security and stress levels—in determining physical, mental, and psychological well-being. Addressing structural inequalities and promoting equitable access to resources and opportunities are essential steps towards improving health outcomes in Palestinian society. The study's findings can inform policy development for Palestinians, addressing structural inequalities and improving healthcare, housing affordability, and socioeconomic opportunities, with future research utilizing longitudinal designs and cross-cultural comparisons.

*Correspondence:
Oqab Jabali
oqab.jabali@najah.edu

Full list of author information is available at the end of the article

Keywords Housing conditions, Housing insecurity, Overcrowding and health risks, Palestinian health disparities, Palestinian refugee camps

Background

Housing is a dynamic force that shapes the everyday experiences and life trajectories of its occupants. The significance of housing is a cornerstone in the complex fabric of human well-being, impacting not just the actual shelter it offers but also the general health and well-being of people living in communities [1]. The importance of housing as a health determinant is becoming more and more evident as societies change and become more urbanized [2].

The fundamental function of housing is to provide a habitable and secure environment, but its impact extends much further [3]. A house is more than a physical structure; it is a site of control, autonomy, socialization, and a source of social identity and status; the home provides a secure base for fostering self-confidence and social identity [4]. The design, construction, and maintenance of homes can significantly impact health outcomes and contribute to or mitigate social disparities. In order to foster healthier and more equitable communities, it is essential to understand these intricate interplays.

Housing and health are influenced by a multitude of elements, ranging from community features to interior environmental quality [5]. A neighborhood's affordability [6], accessibility [7], and social cohesion [8] are just as important factors in ensuring adequate housing as physical structures [1]. Another important component is housing stability, the capacity to create a stable life trajectory in one's current location [9]. This reduces uncertainty and anxiety, fosters mental tranquility, and permits the emergence of a sense of belonging and connection [10].

However, poor quality housing can have a negative impact on health and wellbeing [11]. It has been reported that mold and moisture, extremely cold temperatures indoors all lead to negative mental health consequences [12–15]. Besides, inadequate services in a home can lead to mental health issues such as allergies, respiratory issues, and general symptoms like headaches and exhaustion [5, 7]. Environmental factors such as dust, pests, pollution, indoor allergens, chemicals, and noise can significantly impact health, especially in low-income nations where housing quality may not adequately shield residents from such external conditions [7]. Overcrowding in homes and a lack of personal space can lead to poor physical health, increased infectious diseases, higher mental health rates, reduced school performance, and interpersonal conflicts [7, 16, 17].

An individual's living environment has a significant impact on their health and health inequality [1–2]. Pollution and noise have been connected to a number of harmful health effects [18]. On the other hand, mental health problems and emotional distress can be exacerbated by an inappropriately constructed environment [1]. Furthermore, accidental injuries, infectious diseases, physical inactivity, and overall deaths are all prevalent in neighborhoods with low incomes [1].

The Palestinian health situation

The health of the Palestinian population is significantly influenced by housing conditions, with substandard housing environments and overcrowded living situations contributing to a variety of health issues. The occupied Palestinian territories, particularly Gaza, experience high housing density, with one person per room in the West Bank and two per room in Gaza on average [20]. Overcrowding, moisture, and poor air circulation are common features of many Palestinian homes. Empirical studies conducted in West Bank refugee camps show statistically significant correlations between poor housing conditions and respiratory ailments, such as tonsillitis, coughing, ear infections, and the common cold [20–23]. In a Gaza refugee camp, another study found a strong correlation between housing conditions and the prevalence of gastrointestinal disorders, such as diarrhea and intestinal parasites, highlighting the impact of poor living conditions on physical health [19].

Housing insecurity is another critical factor, as the Israeli occupation has led to the confiscation and demolition of many Palestinian homes, causing extensive displacement and uncertainty for families [24]. The resulting insecurity, combined with limited economic resources, has been shown to adversely affect both physical and mental health outcomes. For instance, studies in Palestinian refugee camps in Lebanon found that chronic illnesses were negatively correlated with family assets, while mental health challenges, such as depression, were positively associated with cramped living conditions, fewer household possessions, and an increased likelihood of chronic and acute illnesses [23].

The socio-political context of Israeli occupation exacerbates these health challenges, as restrictions on movement and exposure to violence have been associated with elevated rates of mental health issues among Palestinians, including depression and PTSD [25]. In Gaza, more than half of secondary-aged children exhibit PTSD symptoms, with over 90% of children in refugee camps reporting experiences of fear, threat, or insecurity at some point in their lives [24, 26, 27]. This ongoing trauma, compounded by housing insecurity, contributes to the high prevalence of mental health challenges across all age groups.

Access to healthcare infrastructure is further compromised by the occupation. In the West Bank and Gaza, Palestinians often face inadequate health resources, leading to referrals to hospitals in Israel or East Jerusalem. This process involves navigating the Israeli permit system, which imposes financial burdens, travel costs, and prolonged waiting times, all contributing to significant emotional stress [23]. Furthermore, frequent water and electricity shortages in the Palestinian territories disrupt healthcare services, causing dire consequences for both physical and mental health outcomes [23, 28].

Frequent water and electricity shortages in Palestine have a significant and detrimental impact on the healthcare system, severely hindering the delivery of essential services. The ongoing political situation and restrictions on infrastructure, particularly in areas like Gaza and the West Bank, make the effects of these shortages even more pronounced. Healthcare facilities, which are already facing a lack of resources, struggle with frequent power cuts that disrupt medical equipment, lighting, and the refrigeration of essential medications and vaccines. As a result, surgeries are delayed, critical care is compromised, and patients are placed at risk due to inadequate treatment options [24, 25].

Similarly, water shortages in the region create difficulties for sanitation and hygiene in healthcare facilities. The lack of reliable access to clean water means that healthcare providers cannot maintain basic hygiene standards, which increases the risk of infections, particularly for vulnerable populations such as children, the elderly, and individuals with compromised immune systems. Limited water availability also affects the daily operations of clinics and hospitals, contributing to overcrowding and unsanitary conditions that further deteriorate health outcomes [28].

In addition to the physical consequences, these shortages also have a significant psychological impact. The constant uncertainty regarding the availability of essential services such as water and electricity generates chronic stress, contributing to worsening mental health conditions among the population. This stress is particularly impactful in areas that are already suffering from displacement and poverty. Healthcare workers, too, face immense stress and burnout due to the limitations of resources, which further reduces the overall quality of care. For individuals already suffering from mental health conditions, such as anxiety and depression, these environmental stressors worsen their symptoms and overall well-being, further compounding the mental health crisis in the region [25, 27].

The indiscriminate violence has targeted civilian infrastructure, including schools and hospitals, exacerbating Gaza's fragile health and education systems [29]. Schools, vital for maintaining normalcy in times of conflict waged by the Israeli occupation, have been destroyed, leaving children without access to education [30], while damaged hospitals have struggled to provide care, contributing to a worsening health crisis [31, 32]. The destruction extends to essential services such as electricity and water supply, further deteriorating living conditions [33]. This disruption has heightened the risk of disease outbreaks, compounding the already severe humanitarian crisis [34].

The water supply in shelters, currently at a mere 8.8 L per person per day, falls drastically short of the international minimum standards, exacerbating the already dire situation [35]. Additionally, the region faces a critical power deficit of over 200 MW daily, severely limiting the ability to support essential sanitation and water treatment systems, further jeopardizing public health and well-being [36].

The widespread destruction of Gaza's neighborhoods and the collapse of public services have left its cities and towns struggling to maintain even the most basic living conditions. The deterioration of health infrastructure has resulted in a significant rise in disease incidence, particularly waterborne illnesses, which are fueled by poor sanitation. Overcrowding in shelters, with as many as 18,000 people living in close quarters, further exacerbates the health risks, violating fundamental humanitarian standards and increasing vulnerability to both physical and mental health issues [35].

All in all, Palestinian health outcomes are influenced by housing density, overcrowding, moisture, and poor air circulation, with variations across housing types, including permanent housing, semi-permanent housing, and refugee camps. Studies in refugee camps have linked substandard housing to various ailments, including tonsillitis, coughing, ear infections, and the common cold. Poverty in Palestinian refugee camps is associated with adverse health outcomes, with chronic illnesses negatively connected to family assets and positively correlated with water leakage. Limited health services and housing insecurity, violence, and movement restrictions excreted by the Israeli occupation contribute to mental health challenges.

The literature on health has primarily focused on the relationship between poor housing and diseases, mental health, and long-term conditions. However, there is a gap in studies that consider psychological, mental, and physical well-being in relation to housing. This study aims to explore the impact of housing conditions on health and well-being in Palestinian society using a survey approach. The research investigates three domains: Psychological Well-Being, Mental Health Outcomes, and Physical Health Outcomes. It aims to identify how housing conditions affect people's sense of belonging, physical, mental, and psychological health. Factors such as family size, housing types, family income, place of residence, and

tenancy length are considered to provide a comprehensive understanding of the complex relationship between housing and health outcomes. The researchers aim to answer these questions:

1 What is the extent to which socio-demographic factors impact the health outcomes of Palestinians?
2 Are there statistically significant differences in residents' perceptions of their houses positively impacting their health within the three domains: Psychological Well-Being, Mental Health Outcomes, and Physical Health Outcomes?

For the purpose of gaining qualitative insights, the researchers conducted structured interviews with ten couples from different backgrounds to support quantitative findings. Through this method, specific housing challenges could be explored in more detail, thus contributing to a deeper understanding of how housing affects health.

1 Do you think that housing conditions negatively affect your physical health? how? Mention an example or two?
2 Do you think housing conditions negatively affect your mental health? how? Mention an example or two?
3 Do you think that housing conditions negatively affect your sense of belonging within Palestinian society? how? Mention an example or two?

Methods

Data analysis

The analysis used descriptive statistics including means and standard deviations and the Stepwise Multiple Regression techniques to examine the explore the impact of housing on health and well-being.

Thematic analysis was employed to qualitatively examine the data. Ten participants were carefully selected to ensure diverse demographic representation across variables such as household size, income level, housing type, geographic location, and political area. This diversity facilitated the inclusion of a broad range of perspectives. Thematic analysis provided a structured framework for identifying, analyzing, and presenting patterns within the data. By following a systematic process involving data familiarization, initial coding, theme development, and iterative refinement, the researchers ensured a rigorous and transparent approach. This method allowed for a nuanced understanding of how housing conditions affect personal well-being, distilling complex participant experiences into cohesive and insightful themes.

Study tools

The current mixed-method study employed quantitative and qualitative approaches. Qualitatively, a researcher, who is GP, interviewed ten participants about the detrimental impacts of housing conditions on their health. The ten interviewees were purposively selected from the survey participants to ensure a diverse representation of housing conditions and health experiences. The selection criteria were based on variations in housing type, place of residence, and reported health outcomes, which were identified through the survey responses.

The purposive sampling approach was designed to capture a range of perspectives, particularly from individuals living in different housing situations (e.g., private homes, refugee camps, etc.) and across varying socio-demographic backgrounds. This method was intended to allow for a more in-depth exploration of the relationship between housing conditions and health outcomes.

Quantitatively, a survey was structured to examine the impact of housing on health and well-being, focusing on demographic factors such as household size, income level, housing type, political divisions, and residence duration.

Survey instrument development and expert consultation

The survey instrument was developed through a multi-step process to ensure validity, relevance, and cultural appropriateness within the Palestinian context. We consulted a panel of experts from An-Najah National University, with interdisciplinary expertise in public health, social sciences, epidemiology, and housing studies, to identify key variables and refine the questions. An extensive literature review on housing and health interrelations—particularly in low-resource settings and politically conflicted or occupaied regions—guided the selection of survey questions.

Pre-testing and sample selection

The survey was pre-tested with a pilot group resembling the target population to assess clarity, cultural sensitivity, and relevance, with minor adjustments made based on this feedback. For the main study, we employed a stratified and purposive sampling approach to ensure diverse representation across various housing situations and socio-demographic backgrounds. A total of [30] participants completed the survey, offering a broad perspective on housing-related health experiences in the Palestinian context.

Site and location selection

The study covered a range of locations within the occupied Palestinian territories and areas within the Green Line, capturing differences in housing conditions and health outcomes. This diversity allowed us to include

urban, rural, and refugee camp settings, each with distinct housing characteristics impacting health. The study excluded Gaza due to the ongoing conflict and logistical challenges, which presented substantial barriers to data collection. As a result, the research was conducted in the West Bank and areas within the Green Line, where field access and data collection processes were more practicable.

Sample identification and recruitment

We used purposive sampling to select participants representing various socio-economic backgrounds, housing types, and geographic locations. Recruitment was supported through community outreach, local health clinics, and community organizations, with local leaders identifying households willing to participate. Participants provided informed consent, affirming their understanding and voluntary participation in the study.

Survey timeline

Quantitative data collection occurred over four months, from October 2023 to January 2024, allowing time for face-to-face administration by trained field researchers across the selected sites. This approach ensured inclusivity, especially in areas with limited internet access, contributing to the reliability of the data.

Table 1 The characteristics of the participants' residency ($n = 394$)

Demographic-variables	Level	*N*	%
Number of people living in the house	1—3	72	18.3
	4—6	167	42.4
	More than 6	155	39.3
Family income level	Low(less than 2000 NIS	78	19.8
	Moderate (2100–4000)	183	46.4
	High (more than 4000).	133	33.8
Type of house	Private house	163	41.4
	Private apartment	55	14
	Family house	61	15.5
	Family apartment	32	8.1
	Leased house:	40	10.2
	Leased apartment:	43	10.9
Place of residence	City	137	34.8
	Village	208	52.8
	Refugee Camp	49	12.4
Political area	Area A	235	59.6
	Area B	66	16.8
	Area C	62	15.7
	Green line areas	31	7.9
Duration of current residence	Less than a year	16	4.1
	2–4 years	55	14
	5–7 years	37	9.4
	8–10 years	34	8.6
	More than 10 years	252	64
Total		394	100

The questionnaire

The questionnaire structure includes three domains: Physical Health Outcomes, Mental Health Outcomes, and Psychological Well-Being Outcomes. Ten items per domain are used to evaluate the impact of housing on health indicators. Respondents rate their agreement using a five-point Likert scale. The questionnaire was developed after discussions with experts and a review of previous research on housing's impact on health. Eight specialized arbitrators examined the pool of 42 items, assessing their correlation with the overall number. In line with empirical literature, a correlation threshold of 0.60 or higher was used to ensure sufficient internal consistency and construct validity [37]. This threshold helps to eliminate items that do not significantly contribute to the reliability and specificity of the tool, thus supporting the development of a concise and focused instrument. For this study, the tool was limited to 30 items (10 per domain) to maintain practicality and user engagement, while still ensuring comprehensive coverage of the construct domains. Additionally, items without significant differences between quartiles were excluded to enhance the tool's discriminatory power, in accordance with psychometric testing guidelines [38].

Housing conditions were assessed using both subjective and objective measures. Subjectively, participants were asked to evaluate how their housing impacted their psychological, mental, and physical well-being. Objectively, housing conditions were analyzed through key variables detailed in Table 1, including type of house, place of residence, family income, and political area. These variables served as predictors in the regression analyses to identify their relationships with health outcomes across the three domains. This dual approach provided a comprehensive understanding of housing conditions and their impact on residents' well-being.

Factorial validity and reliability were applied, as indicated in Table 2, to ascertain whether the instrument was suitable for measuring the variables under examination. The survey items demonstrate a strong association with the construct, as evidenced by high factor loadings (most above 0.70), explained variance, and reliability measures. In other words, all associated items were included in the analysis rather than focusing solely on those with the highest factor loadings. While reliability assures consistent and stable findings over time and under various settings, validity ensures that the scale's items appropriately reflect the theoretical construct being measured. In the end, 23 items were analyzed.

The factor analysis results provide significant new information about the overall scale and the domains of

Table 2 Results of factor analysis for questionnaire domains along with overall scale

Domain	Item	Factor Loadings			Variance	Cronbach's α
Physical Health	A3)I perceive a positive effect on my overall physical health due to my housing.	0.947			0.332	0.91
	A4)The safety features in my home positively influence my well-being.	0.915				
	A1) The quality of my housing has a positive impact on my respiratory health.	0.908				
	A7) The structural integrity of my home is beneficial for my physical health.	0.853				
	A2) I feel that my home environment contributes to a lower risk of injuries.	0.836				
	A5)The physical layout of my home promotes a healthy and active lifestyle.	0.815				
	A6) I believe that my housing situation supports a healthy and well-balanced life.	0.782				
	A9) The overall design of my home positively impacts my ability to maintain a healthy lifestyle.	0.771				
	A10) I believe that the features in my home have a positive effect on my overall physical well-being.	0.712				
Psychological Well-being	A27) My housing situation supports my engagement in community activities and events.		0.907		0.257	0.88
	A25) The cultural diversity in my neighborhood enhances my social experiences.		0.892			
	A26) I am satisfied with the social and recreational opportunities available in my community.		0.876			
	A24) I have developed meaningful relationships with neighbors and community members.		0.87			
	A30) I am involved in community initiatives and contribute to the well-being of my neighborhood.		0.847			
	The overall atmosphere in my community positively impacts my social well-being.		0.713			
	A22) I feel a sense of community and belonging in my neighborhood.		0.682			
	A23) The social interactions within my community positively influence my overall well-being.		0.66			
	A28) I feel a sense of pride and identity in my neighborhood.		0.628			
Mental health	A16)I feel a sense of peace and calmness in my home.			0.748	0.165	0.86
	A18) I am satisfied with the level of privacy and personal space my housing provides.			0.691		
	A20) The overall atmosphere in my home contributes to a positive mental health experience.			0.647		
	A19) I feel a positive connection between my housing and my overall mood.			0.636		
	A15)The environment in my home promotes relaxation and tranquility.			0.604		
Total					0.754	0.92

physical health, psychological and well-being, and mental health on the questionnaire. Items A3, A4, and A1 show substantial factor loadings in the Physical Health domain, suggesting a strong correlation with the underlying construct. With a Cronbach's alpha coefficient of 0.91, which indicates strong internal consistency, these items together account for 33.2% of the variance in physical health. Item A27, A25, and A26 demonstrate strong factor loadings in the Well-Being domain, indicating a strong correlation with the Well-Being construct. With a Cronbach's alpha coefficient of 0.88, indicating strong internal consistency, these items collectively account for 25.7% of the variation.

Item A16 stands out in the Mental Health domain with the highest factor loading, suggesting a strong association between it and Mental Health. With a Cronbach's alpha coefficient of 0.86, these items together explain 16.5% of the variance, indicating acceptable internal consistency. With a Cronbach's alpha coefficient of 0.92, the entire scale exhibits good internal consistency overall and accounts for 75.4% of the variance across all constructs. These results highlight the validity and reliability of the questionnaire items in evaluating the overall physical, mental, and well-being outcomes.

Research population and sample

As shown in Table 1 below, the study involved 394 participants, with 42.5% living in families of 4 to 6 people and 39.2% with larger families. The majority had moderate monthly family income (46.4%), followed by high income (33.8%). Most lived in private houses (41.4%), while smaller percentages lived in family houses (15.5%), family apartments (8.1%), leased houses (10.2%), or leased apartments (10.9%). The majority lived in villages (52.8%), followed by cities (34.8%) and refugee camps (12.4%). Most participants resided in Area A (59.6%), which includes major urban centers and areas under full Palestinian Authority control. A smaller proportion of participants

lived in Area B (16.8%), which is primarily made up of mixed Palestinian-Israeli control, where the Palestinian Authority has civil authority, but security matters are controlled by Israel. Additionally, 15.7% of participants were from Area C, which is under full Israeli military and civilian control, and includes both urban and rural communities. The remaining 7.9% of participants were from the Green Line areas, which are areas within the 1948 borders of Israel. The majority of participants (64%) had been residing in their current location for more than 10 years, with smaller percentages residing for 2–4 years (14%), 5–7 years (9.4%), 8–10 years (8.6%), and less than a year (4.1%). Ten participants were randomly chosen for the interviews.

Results

Quantitative results

Results of first question "What is the extent to which socio-demographic factors impact the health outcomes of Palestinians?"

All the studied physical health outcomes among the participants were significantly associated with their family monthly income, type of housing, place of residence, and residential location based on political and administrative divisions (p-value < 0.001) as shown in Table 3.

The results indicated that participants who lived in households with four to six individuals reported the highest mean physical health score (M: 3.85, SD: 0.96), closely followed by those who lived in smaller homes with one to three members (M: 3.79, SD: 1.05). In a similar vein, the greatest mean score for mental health was recorded by those living in homes with 4–6 people (M: 3.79, SD: 1.02), however those in households with 1–3 members also reported better mental health outcomes (M: 3.8, SD: 1.1). In addition, participants' mean score for psychological health was greatest (M: 3.55, SD: 0.91) for families with 4–6 persons, and it was closely followed by those in smaller homes (M: 3.53, SD: 1.14).

In analyzing the impact of family income on health-related parameters, it was observed that participants from households with higher incomes exhibited superior health outcomes across all domains. Specifically, individuals from families with high income levels reported the highest mean physical health score (M: 4.29, SD: 0.53), followed by those with moderate incomes (M: 3.75, SD: 0.97), and finally, those with low incomes (M: 2.64, SD: 1.18). Similarly, for mental health, participants from high-income families displayed the highest mean score (M: 4.17, SD: 0.72), with moderate-income participants following suit (M: 3.62, SD: 1.07), and low-income participants reporting comparatively lower scores (M: 2.65,

Table 3 Health mean scores and Standard deviations by demographics

Demographic- variables	Level	Physical Health		Mental Health		Psychological Health	
		M	SD	M	SD	M	SD
Number of people living in the place	1—3	3.79	1.05	3.8	1.1	3.53	1.14
	4—6	3.85	0.96	3.79	1.02	3.55	0.91
	More than 6	3.53	1.16	3.34	1.18	3.18	1.05
Family income level	Low(less than 2000 NIS	2.64	1.18	2.65	1.16	2.65	1.06
	Moderate (2100–4000)	3.75	0.97	3.62	1.07	3.4	0.98
	High (more than 4000).	4.29	0.53	4.17	0.72	3.84	0.79
Type of house/ apartment	Private house	4.24	0.56	4.14	0.72	3.78	0.79
	Private apartment	4.16	0.61	4.15	0.6	3.84	0.7
	Family house	3.94	0.85	3.77	0.93	3.6	0.94
	Family apartment	2.67	1.09	2.63	1.16	2.67	1
	Leased house:	2.76	1.04	2.64	1.1	2.63	0.97
	Leased apartment:	2.48	1.19	2.38	1.13	2.39	1.01
Place of residence	City	4.13	0.74	4.04	0.84	3.79	0.84
	Village	3.79	0.97	3.69	1.04	3.41	0.97
	Refugee Camp	2.19	0.92	2.13	0.93	2.25	0.89
Political Area	Area A	3.71	1.06	3.57	1.11	3.34	0.99
	Area B	4.09	0.72	4.05	0.78	3.73	0.77
	Area C	3.05	1.29	2.96	1.29	2.88	1.22
	Green Line areas	4.21	0.48	4.31	0.6	4.19	0.52
Duration in current residence	Less than a year	3.1	1.24	2.98	1.16	2.84	1.15
	2–4 years	4.07	0.84	3.83	1.02	3.58	0.95
	5–7 years	3.01	1.17	3.04	1.28	2.77	1.08
	8–10 years	3.22	1.23	3.16	1.24	3.13	1.1
	More than 10 years	3.84	0.99	3.76	1.04	3.53	0.97

SD: 1.16). Likewise, in terms of psychological health, individuals from high-income households demonstrated the highest mean score (M: 3.84, SD: 0.79), followed by those from moderate-income households (M: 3.4, SD: 0.98), and finally, those from low-income households (M: 2.65, SD: 1.06).

According to an analysis of the effect of housing type on health, participants living in private houses had the greatest mean physical health score (M: 4.24, SD: 0.56), closely followed by those living in private apartments (M: 4.16, SD: 0.61). In a similar vein, those who resided in their own houses had the best mean score (M: 4.14, SD: 0.72) for mental health, while those who did so in private flats also showed higher results (M: 4.15, SD: 0.6). In addition, those who lived in private houses had the highest mean score (M: 3.78, SD: 0.79) for psychological well-being, but those who lived in private apartments showed similar psychological well-being (M: 3.84, SD: 0.7).

When comparing health indicators across different residential settings, individuals in cities showed the highest mean scores for physical health (M: 4.13, SD: 0.74), mental health (M: 4.04, SD: 0.84), and psychological health (M: 3.79, SD: 0.84), indicating potential advantages of urban living. Participants in villages exhibited slightly lower mean scores across all health dimensions, with means of 3.79 (SD: 0.97) for physical health, 3.69 (SD: 1.04) for mental health, and 3.41 (SD: 0.97) for psychological health, suggesting a disparity in health outcomes compared to urban areas. Conversely, individuals residing in refugee camps consistently displayed the lowest mean scores for physical health (M: 2.19, SD: 0.92), mental health (M: 2.13, SD: 0.93), and psychological health (M: 2.25, SD: 0.89), highlighting the unique challenges faced by this population and the importance of addressing their specific health needs.

Individuals who lived in Green Line areas (M: 4.21, SD: 0.48) and Area B participants (M: 4.09, SD: 0.72) had the greatest mean physical health scores, respectively, whereas those in Area C reported the lowest mean (M: 3.05, SD: 1.29). In a similar vein, individuals in Area B had the greatest mean score (M: 4.05, SD: 0.78) for mental health, while those in Area C had the lowest (M: 2.96, SD: 1.29). Participants' mean score for psychological health was highest (M: 4.19, SD: 0.52) in Green Line areas and lowest (M: 2.88, SD: 1.22) in Area C.

In comparison to participants who had lived in their current location for shorter periods of time, those who had been there for more than ten years consistently reported higher mean scores across physical health (M: 3.84, SD: 0.99), mental health (M: 3.76, SD: 1.04), and psychological health (M: 3.53, SD: 0.97). On the other hand, people who had lived somewhere for shorter periods of time—more specifically, less than a year or 5–7 years—showed poorer mean scores in all areas of health. These results highlight the significance of stability and continuity in residential environments for general well-being, as they may indicate a relationship between longer residence times and better health outcomes.

To answer the second question (Are there statistically significant differences in residents' perceptions of their houses positively impacting their health within the three domains: Psychological Well-Being, Mental Health Outcomes, and Physical Health Outcomes?), the researchers used Stepwise Multiple Regressions to analyze the relationship between several predictor variables and the three domains.

First: physical health

Table 4 reveals a robust relationship between housing type, place of residence, family income, and political area with physical health outcomes. type of house has a

Table 4 Regression analysis results predicting physical health (PH)

Model	Predictors	B	t	*P*	F	*P*	*R*	R^2
1	(Constant)	4.703	62.124	< 0.001	249.133	< 0.001	0.623	0.389
	Type of house	-0.375	-15.784	< 0.001				
2	(Constant)	5.552	48.049	< 0.001	192.604	< 0.001	0.704	0.496
	Type of house	-0.321	-14.306	< 0.001				
	Place of residence	-0.559	-9.143	< 0.001				
3	(Constant)	4.456	21.239	< 0.001	153.045	< 0.001	0.735	0.541
	Type of house	-0.27	-11.751	< 0.001				
	Place of residence	-0.451	-7.398	< 0.001				
	Family income	0.36	6.143	< 0.001				
4	(Constant)	4.513	21.585	< 0.001	118.629	< 0.001	0.741	0.55
	Type of house	-0.262	-11.41	< 0.001				
	Place of residence	-0.447	-7.393	< 0.001				
	Family income	0.404	6.705	< 0.001				
	Political area	-0.105	-2.758	< 0.001				

a Dependent Variable: PH1

negative coefficient of -0.262 (t = -11.41, p <.001), indicating that certain types of houses are associated with lower levels of Physical Health 1. Place of residence also has a negative coefficient of -0.447 (t = -7.393, p <.001), suggesting that individuals residing in certain locations experience poorer physical health outcomes. On the other hand, family income has a positive coefficient of 0.404 (t = 6.705, p <.001), indicating that higher family income levels are associated with better Physical Health. Additionally, political area has a negative coefficient of -0.105 (t = -2.758, p <.001), implying that individuals residing in certain political areas may experience lower Physical Health compared to those in other areas.

The study results Table 4 show that individuals in smaller households may have better physical health outcomes compared to larger ones. Lower family income levels are associated with poorer health outcomes, while higher incomes may have better access to resources. Housing quality, stability, and autonomy may positively influence physical health. Cities have better health outcomes than villages or refugee camps. Political divisions in residential locations, such as those under Palestinian Authority or Green Line control, also impact health disparities. Longer residence durations are associated with better health outcomes.

Second: mental health (MH)

In Table 5 below, the regression analysis indicates that type of house (B = -0.289, t = -11.323, p <.001) and place of residence (B = -0.429, t = -6.204, p <.001) both have significant negative correlations with mental health. Additionally, family size showed a significant negative correlation with mental health (B = -0.146, t = -2.561, p <.05). However, family income demonstrated a significant positive correlation with mental health (B = 0.278, t = 4.27, p <.001). Overall, the models displayed strong explanatory power for MH, with R2 values ranging from 0.36 to 0.488. Political divisions in residential locations, such as those under Palestinian Authority or Green Line control, also impact health disparities. Longer residence durations are associated with better health outcomes.

In areas under Palestinian Authority control, for instance, there may be greater challenges related to the availability of health services due to restrictions on mobility, limited healthcare funding, and strained infrastructure, particularly in rural or refugee camp settings. The political instability in these areas often results in limited access to specialized medical care and basic services such as water, electricity, and waste management, which in turn exacerbates health outcomes, including mental health issues related to uncertainty and displacement, residents in the Green Line areas, which are under Israeli control, face a different set of challenges. While these areas may have more access to healthcare facilities and better infrastructure, there can still be health disparities due to factors like restricted movement, socioeconomic status, and the impact of policies that limit access to health services for Palestinians. These residents may face psychological stress from the proximity to ongoing political Israeli occupation, as well as health issues related to limited resources and support systems.

Third: psychology and well-being (WB)

These results in Table 6 demonstrate significant correlations between various demographic predictors and psychological well-being (SW), as indicated by the regression models. Type of House (Model 1): The analysis in Model 1 reveals a substantial negative correlation between the type of house and psychological well-being. Specifically, individuals residing in certain types of houses, such as leased accommodations or family houses, report lower levels of psychological well-being compared to those in

Table 5 Regression analysis results predicting mental health (MH)

Model	Predictors	B	t	*P*	F	*P*	*R*	R^2
1	(Constant)	4.618	56.86	< 0.001	220.672	< 0.001	0.6	0.36
	Type of house	-0.379	-14.855	< 0.001				
2	(Constant)	5.452	43.239	< 0.001	162.982	< 0.001	0.674	0.455
	Type of house	-0.325	-13.299	< 0.001				
	Place of residence	-0.549	-8.23	< 0.001				
3	(Constant)	4.592	19.604	< 0.001	119.767	< 0.001	0.692	0.48
	Type of house	-0.286	-11.132	< 0.001				
	Place of residence	-0.465	-6.821	< 0.001				
	Family income	0.282	4.317	< 0.001				
4	(Constant)	4.87	18.972	< 0.001	92.745	< 0.001	0.699	0.488
	Type of house	-0.289	-11.323	< 0.001				
	Place of residence	-0.429	-6.204	< 0.001				
	Family income	0.278	4.27	< 0.001				
	Family size	-0.146	-2.561	< 0.05				

a Dependent Variable: MH

Table 6 Regression analysis results predicting psychological well-being (SW)

Model	Predictors	B	t	*P*	F	*P*	*R*	R^2
1	(Constant)	4.178	52.191	< 0.001	136.021	< 0.001	0.508	0.258
	Type of house	-0.293	-11.663	< 0.001				
2	(Constant)	4.91	38.828	< 0.001	102.825	< 0.001	0.587	0.345
	Type of house	-0.246	-10.031	< 0.001				
	Place of residence	-0.482	-7.208	< 0.001				
3	(Constant)	4.254	17.929	< 0.001	73.748	< 0.001	0.602	0.362
	Type of house	-0.216	-8.304	< 0.001				
	Place of residence	-0.418	-6.056	< 0.001				
	Family income	0.215	3.25	< 0.001				

a Dependent Variable: SW

private houses or apartments. Type of House and Place of Residence (Model 2): Model 2 extends the analysis to include both the type of house and the place of residence as predictors. The results indicate significant negative correlations with psychological well-being for both factors. This suggests that not only the type of housing but also the specific location of residence, such as living in villages or urban areas, significantly influences psychological well-being. Type of House, Place of Residence, and Family Income (Model 3): Model 3 further expands the analysis to include family income as a predictor. Significant correlations with psychological well-being are observed for all three variables. Lower family income levels are associated with reduced psychological well-being, emphasizing the impact of socioeconomic status on overall well-being in addition to housing and residential factors.

In short, the study underscores the interconnectedness of various demographic factors with overall health outcomes, including physical, mental, and psychological well-being. It suggests that individuals in smaller households tend to exhibit better physical health outcomes, possibly due to factors like reduced stress and better access to resources within the household. Conversely, lower family income levels are associated not only with poorer physical health but also with reduced psychological well-being, indicating a broader impact of socioeconomic status on health and life satisfaction. Housing quality and stability emerge as crucial factors influencing both physical and psychological well-being, with certain types of residences, such as private houses or apartments, being linked to better health outcomes. Moreover, the study highlights the role of residential location, with urban areas generally exhibiting better health outcomes than rural or refugee camp settings, possibly due to disparities in infrastructure and access to healthcare resources.

Qualitative results

A thorough examination of the effects of housing conditions on psychological, mental, and physical well-being is shown in Table 7. It draws attention to the detrimental impacts on mental health of cramped living quarters, pollution, privacy issues, and a lack of natural light.

For the interviews, the researchers selected ten participants from diverse backgrounds to ensure a wide range of perspectives. The participants were chosen based on key demographic variables. In terms of household size, two participants were from households with 1–3 people, four participants from households with 4–6 people, and four participants from households with more than 6 people. Regarding income levels, three participants were from low-income families (earning less than 2000 NIS), four from moderate-income families (earning between 2100 and 4000 NIS), and three from high-income families (earning more than 4000 NIS). Housing types varied, with three participants living in private houses, two in family homes, one in a leased house, and four in apartments, including both private and family apartments. In terms of location, three participants resided in cities, five in villages, and two in refugee camps. Additionally, the participants were selected from different political areas: five from Area A, two from Area B, and three from Area C. This diversity in participant backgrounds ensured the interviews captured a wide array of experiences, providing valuable data for analysis.

Discussion

The main findings of the study revealed several significant associations between residential characteristics and health outcomes. Firstly, individuals living in households with four to six members exhibited the highest mean scores for physical, mental, and psychological health, closely followed by those in smaller households with one to three members. Secondly, higher family income levels were consistently associated with better health outcomes across all domains, with individuals from high-income households demonstrating superior scores compared to those with moderate or low incomes. Thirdly, participants residing in private houses generally reported better health outcomes compared to those in private apartments. Furthermore, individuals living in urban areas

Table 7 Participants' responses in structured interviews

No.	Mental concerns	Physical concerns	Psychological concerns
1	"Yes, our mental health suffers as a result of our small living space. Restricted space contributes to tension and claustrophobia, which causes anxiety disorders."	"Indeed, living in small living places negatively affects our physical well-being. Sustaining a healthy respiratory system is difficult in places with inadequate ventilation and room."	"Housing problems can cause communities with strong ties to become disrupted, which can have an impact on social cohesion and bonds."
2	"Definitely, poor quality building materials cause noise pollution, which has a detrimental effect on mental health. Continuous noise exposure has been linked to increased discomfort and poor sleep."	"Yes, the frequent blackouts of electricity have an impact on our physical well-being. Our ability to safely prepare and store food is disrupted by inconsistent power, which has an adverse effect on our general health causing nausea, vomiting, or diarrhea."	"Inadequate housing can result in a state of homelessness which makes people feel alone and excluded."
3	"There is no doubt that a lack of privacy brought on by poor home design affects mental health. Persistent encroachment of one's personal space has the potential to worsen disorders like social anxiety and increase stress levels."	" The ongoing military presence exacerbates the general climate of fear, which has a negative impact on my family's emotional and mental health."	"Excessive housing expenses or unaffordable living circumstances can lead to financial strain, which can affect social well-being as people may find it difficult to satisfy essential demands."
4	"It is true that lack of natural light in our homes affects mental health. Seasonal Affective Disorder (SAD) is one disorder that can be exacerbated by inadequate sun exposure."	"Since our housing is constructed with substandard materials such as asbestos, moisture and mold can cause lung and respiratory disease like, fibrosis, cancer and asthma. "	"Poor housing might make it more difficult to get a good education, which reduces chances of interacting with people and moving up in society."
5	"Yes, mental health is impacted by the instability brought on by the occasional disputes and fights in our community. Living in unstable surroundings might make people feel more anxious and make depressive symptoms worse."	"Yes, there is a risk of physical injuries arising from unstable living conditions due to political instability, especially during Israeli incursions into our villages and camps. "	"Unhealthy living circumstances can exacerbate social injustices by lowering general well-being and causing health issues. "
6	"Absolutely, our housing's insufficient safety precautions have an impact on mental health. Persistent worries about security and safety might worsen mental health disorders including post-traumatic stress disorder (PTSD) and elevate tension."	"Stress and mental health problems are further aggravated by routine security inspections and disturbances from neighboring forces."	"Housing problems in some communities may be linked to increased crime rates, causing security issues that affect locals' quality of life."
7	"There's no doubt that having little access to natural areas has a detrimental effect on mental health. An absence of natural settings might worsen anxiety and depressive symptoms and raise stress levels."	"Lack of clean water can lead to bacterial and parasite infections, posing a risk to physical health, sanitation, hygiene, and gastrointestinal issues, and can also cause waterborne diseases like ameba."	"Moving to poor housing can result in social stigma, which excludes people and makes it difficult for them to feel like they belong to society as a whole."
8	"Yes, mental health is impacted by inadequate insulation. Uncomfortable room temperatures might affect one's overall state of mind and psychological well-being by causing sleep difficulties and increased agitation."	"In our locality, healthcare services are not accessible as quickly as they should be, negatively affecting our overall physical well-being and leading to things like heart attacks or strokes."	"A lack of recreational facilities in the neighborhood would limit social interaction and civic engagement chances."
9	"Yes, our housing's inadequate ventilation has a detrimental effect on our mental health. Fatigue and cognitive function are additionally impaired by poor air quality, which can aggravate diseases like Attention Deficit Hyperactivity Disorder (ADHD)."	"We live in close proximity to industrial areas, exposing us to environmental pollutants that negatively affect our health and cause chronic obstructive pulmonary disease, for example."	"Disparities in housing can act as barriers to social advancement, rendering it challenging for people to get better jobs and engage effectively in society."
10	"It appears that living close to industrial regions affects mental health. Stress levels may rise as a result of worries about possible health risks, pollution, and the general state of the environment, which may increase depression."	"In fact, the absence of proper waste disposal mechanisms in our community contributes to the deterioration of sanitary conditions and poses a threat to our physical health leading to cholera and diarrhea."	"Insufficient infrastructure in my limits or impedes community participation."

tended to have higher mean scores for physical, mental, and psychological health compared to those in villages or refugee camps, highlighting potential advantages of urban living. Moreover, participants in areas designated as Green Line areas or Area B showed better health outcomes compared to those in Area C. Lastly, individuals who had resided in their current location for more than ten years consistently reported higher mean scores across all health dimensions, indicating the potential benefits of stability and continuity in residential environments for overall well-being.

Contextualizing the study's findings within the Palestinian context involves taking into account a range of socio-political and economic aspects. First, studies

like [19, 28] have shown that Palestinians prefer larger families, and this preference is reflected in the higher reported mean scores for physical, mental, and psychological health among those residing in four to six-person households. This choice highlights the importance of support systems and cohesive families in Palestinian society, which enhances general well-being. Furthermore, people who live in private homes report better health outcomes than those who rent, a finding corroborated by research like [23].

The impressions of one's physical and mental well-being are positively impacted by the stability and security that private dwelling affords. Disparities in health outcomes between refugee camps, villages, and urban areas are a reflection of larger realities that have been clarified by [23] that investigated the impact of living conditions on health outcomes among Palestinian refugees in Lebanon, who have been living in camps for over 60 years. The study found that 31% of individuals had chronic illnesses, 24% had acute illnesses, and 55% reported psychological distress. Poor housing conditions, such as water leakage and substandard construction materials, were linked to both physical and mental health problems. Generally, urban areas have better access to resources and healthcare services. The importance of political and economic variables on health inequalities is further demonstrated by the disparity in health outcomes between areas under Israeli occupation and those under Palestinian sovereignty, as noted by [25].

The study reveals that factors such as living conditions, place of residence, family income, and household size significantly influence Palestinians' mental health and housing choices. These factors can lead to poorer mental health outcomes. Palestinians prefer their own homes or apartments for stability and autonomy, while leased ones may not provide the same comfort. Socio-economic disparities, such as urban areas offering better living conditions and access to resources, can also contribute to poor mental health outcomes. Higher family income can provide better access to healthcare and education, while lower income levels can lead to financial stress.

The psychological well-being of Palestinians is influenced by socio-economic and cultural factors, including house type, residence, and socio-economic status. Family-centered living arrangements in urban areas can improve well-being, while rural or refugee camp environments may face overcrowding and limited resources. Higher income levels provide financial stability, while lower-income households may face financial stressors and inadequate housing.

Living in cramped quarters has a detrimental physical impact on one's general health, particularly respiratory health when there is insufficient ventilation. Blackouts of electricity become a real threat since they make it unsafe to produce and store food, which has an effect on people's health in general. These results agree with [19–21]. The continued military presence adds another level of physical health hazards and fosters a fear-based environment that is detrimental to mental and emotional health [24]. Furthermore, houses built with substandard supplies, such asbestos, directly endanger respiratory health and may result in conditions like asthma, cancer, and fibrosis.

Mental health issues can be exacerbated by cramped living quarters, poor building supplies, noise pollution, inadequate home design, lack of privacy, inadequate daylight exposure, and military conflict like the Israeli occupation. These issues can lead to stress, anxiety, sleep hygiene, and worsen conditions like Seasonal Affective Disorder (SAD). Such outcomes agree with those of [23–24].

Our study's findings on the link between mental health issues and housing conditions are supported by existing research, which demonstrates that factors like cramped living spaces, poor building materials, noise pollution, lack of natural light, and exposure to occupation/ conflict significantly heighten stress and mental health challenges. Overcrowding, a common issue in refugee camps and densely populated urban areas, is associated with increased stress and anxiety due to limited personal space and increased interpersonal tensions, which aligns with studies showing that overcrowded conditions elevate risks for both physical and mental health issues, particularly in low-income areas [7, 16]. The houses in these camps are typically built extremely close to one another, leaving little room for ventilation, sunlight, or privacy. Unlike in villages, where homes are often spaced farther apart, camp dwellers face significant challenges related to interpersonal tensions, lack of personal space, and an overarching sense of confinement. Female respondents in these camps frequently cited privacy issues, while male respondents were more likely to report feelings of claustrophobia stemming from the dense housing arrangements. Additionally, the lack of green spaces and exposure to environmental degradation exacerbated stress levels for camp residents.

Additionally, inadequate building materials and poor housing construction further diminish indoor comfort, creating additional strain on mental health by exacerbating physical discomforts like respiratory problems and reducing overall well-being [5, 11]. Research also highlights the role of environmental noise from urban congestion and nearby conflict zones in disrupting sleep and impairing overall sleep hygiene. Participants from urban areas frequently cited traffic noise, industrial activity, and general congestion as significant sources of stress, while those in rural villages and refugee camps highlighted other unique challenges. For example, camp dwellers reported heightened exposure to noise from overcrowded

living arrangements and communal spaces, whereas city-dwellers emphasized pollution-related noise as a primary concern. These findings align with studies linking noise pollution to adverse psychological outcomes, such as irritability, mental fatigue, and heightened stress. For urban residents, the relentless exposure to city noise aggravates these issues, while for those in refugee camps, the close proximity of homes amplifies interpersonal conflicts and communal disturbances, further disrupting sleep. Such context-specific insights underscore the need for targeted interventions addressing the distinct sources of environmental noise stress in different housing contexts [1, 18].

Moreover, inadequate natural light exposure is associated with Seasonal Affective Disorder (SAD) and depressive symptoms, a finding echoed in the literature on the importance of natural light for mental health. In densely populated urban and refugee settings, buildings often lack design considerations for light exposure, which has been shown to exacerbate depressive symptoms and reduce resilience, particularly during winter months [12, 15].

Finally, military Israeli occupation—an ongoing challenge for Palestinian communities—contributes to chronic trauma, anxiety, and fear, worsening pre-existing mental health issues. Studies consistently demonstrate that prolonged exposure to violence, displacement, and insecurity leads to elevated rates of depression, PTSD, and other mental health challenges, particularly in children and adolescents [25, 27].

The reviewed literature focuses on community instability, military occupation/ conflicts, physical injuries, and mental health difficulties in order to illustrate the complex relationship between housing conditions, health, and societal dynamics [25]. Along with reflecting the additional strains and difficulties brought on by the Israeli occupation in Area C, it also draws attention to the difficulties associated with security inspections and disruptions, which can lead to stress and mental health problems [24]. Housing-related issues significantly affect social cohesiveness, leading to homelessness, alienation, and marginalization. Inadequate infrastructure also hinders community participation. Community health issues are influenced by politics and security, causing anxiety and despair. Housing problems cause financial hardship, disturb communities, and increase desocialization rates. The complex relationship between housing conditions and health and societal dynamics highlights the need for improved housing solutions.

Conclusion

In conclusion, the study examined the complex interactions that exist between different sociodemographic characteristics and Palestinians' health outcomes. The results emphasized how important family dynamics, socioeconomic status, kinds of housing, residential environments, and political situations are in determining one's physical, mental, and psychological well-being.

First, families with four to six members reported the highest mean scores across physical, mental, and psychological health dimensions, suggesting that household composition plays an influential role in overall well-being. Research supports the idea that family unity and support networks contribute positively to health outcomes, especially in high-stress contexts. Thus, fostering strong family bonds may be key to enhancing general well-being, as cohesive family relationships have been shown to promote resilience, reduce stress, and improve coping strategies, particularly in socio-economically challenged communities. Second, family income was crucial because people from wealthier households had better health outcomes in every category. On the other hand, people with lower incomes showed significantly worse health measures, underscoring the impact of financial stability on health.

A significant contributing factor was also the kind of housing, with private home and apartment occupants having better health outcomes than those in rental units. Furthermore, compared to people living in rural areas or refugee camps, residents of cities typically performed better on health evaluations, highlighting the importance of living circumstances and resource accessibility. Residents of specific regions tend to have poorer mental, physical, and psychological well-being, possibly due to differences in infrastructure and resources.

The study underscores the profound negative impact of housing conditions on both physical and mental health outcomes. Living in cramped quarters not only compromises physical health, especially respiratory health due to inadequate ventilation and potential exposure to hazardous materials like asbestos, but also poses risks related to food safety during blackouts. The presence of military occupation/ conflict further exacerbates physical health hazards and contributes to a fear-based environment detrimental to mental and emotional well-being. Additionally, substandard housing conditions, including poor building supplies and inadequate design, exacerbate mental health issues such as stress, anxiety, and sleep disturbances.

Overall, the study's findings highlight the complex relationship between health disparities and the Palestinian context, stressing the need to address structural injustices and support laws that provide equal access to opportunities and resources for all Palestinians.

Strengths

The study uses a comprehensive analytical approach to examine socio-demographic factors, including household composition, income levels, housing type, residential

settings, and political contexts, to understand the complex relationship between these variables and health outcomes among Palestinians. While the large sample size enhances the reliability of our findings, the generalizability to the broader Palestinian population is limited by the purposive sampling approach, which specifically targets key socio-economic and demographic groups. The study also examines multiple health dimensions, recognizing the multifaceted nature of health determinants. It employs a robust mixed-method framework, using regression analysis to explore the relationships between predictor variables and health outcomes.

Limitations

The cross-sectional form of the study makes it more difficult to determine the causal links between the predictor variables and the health outcomes. Bias and errors may be introduced by the self-reported data used in health evaluations. Structural factors that could affect the results, like environmental exposures and healthcare service accessibility, might not be taken into consideration.

Practical implications

The study's findings can guide policy development to address structural inequalities and improve healthcare, affordable housing, and socioeconomic opportunities for Palestinians. Targeted health interventions, particularly for vulnerable populations like low-income families and refugee camp residents, can mitigate health disparities. Community engagement in health program design and implementation can enhance effectiveness and promote community ownership. Advocacy efforts to raise awareness of health disparities and advocate for equitable healthcare access can also address systemic health barriers.

Recommendations for future research

Future research could take into account using longitudinal designs to investigate the causal links between sociodemographic characteristics and health outcomes over time, building on the findings of the current study. Furthermore, using qualitative techniques like focus groups and interviews can offer greater insights into Palestinians' perspectives of health and their actual experiences with it. Additionally, cross-cultural awareness can be strengthened through comparison studies between Palestinian and Israeli societies, which can illuminate the specific role of Israeli policies in shaping housing conditions and health inequalities within Palestinian communities. Lastly, evidence-based practice and policy creation can be influenced by carrying out intervention studies to assess how well targeted health interventions improve health outcomes among vulnerable populations.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-21830-4.

Supplementary Material 1

Acknowledgements

The researchers sincerely thank every member of the university personnel for giving their valuable time to complete the survey. We deeply appreciate An-Najah National University's permission to carry out our research study inside its academic community. Our aim has been accomplished in large part thanks to the institution's collaboration and support.

Author contributions

OJ: Conceptualization, Investigation, Methodology, Writing- Original draft preparation, Writing- Reviewing and Editing final draft. AA: Data curation and analysis, Investigation, Validation. SJ: Investigation, Data collection, and Validation. MS: Data collection, Reviewing and Editing final draft.

Funding

None.

Data availability

Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

The research was approved by the Deanship of Scientific Research, Faculty of Humanities, and language Centre director, and all experiments followed guidelines. Informed consent was obtained from all subjects. The An-Najah Institutional Review Board (IRB) endorsement confirms the study's compliance with ethical principles from the 1964 Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Language Center, Faculty of Humanities and Education Sciences, An-Najah National University, Nablus, Palestine
[2]Psychology and Counseling Department, Faculty of Humanities and Educational Sciences, An Najah National University, Nablus, Palestine
[3]Palestinian Ministry of Health, Ramallah, Palestine

Received: 12 February 2024 / Accepted: 6 February 2025
Published online: 11 February 2025

References

1. Borrell C, Novoa AM, Perez K. Housing conditions, health and health inequalities. Front Environ Health. 2023;1:1080846. https://doi.org/10.3389/fenvh.2022.1080846.
2. Swope CB, Hernández D. Housing as a determinant of health equity: a conceptual model. Soc Sci Med. 2019;243:112571. https://doi.org/10.1016/j.socscimed.2019.112571.
3. Palacios J, Eichholtz P, Kok N, Aydin E. The impact of housing conditions on health outcomes. Real Estate Econ. 2021;49:1172–200. https://doi.org/10.1111/1540-6229.12317(4).
4. Karjalainen PT. House, home and the place of dwelling. Scandinavian Hous Plan Res. 1993;10(2):65–74.
5. Hernández D, Phillips D, Siegel EL. Exploring the housing and household energy pathways to stress: a mixed methods study. Int J Environ Res Public Health. 2016;13:916. https://doi.org/10.3390/ijerph13090916.

6. Singh A, Daniel L, Baker E, Bentley R. Housing disadvantage and poor mental health: a systematic review. Am J Prev Med. 2019;57:262–72. https://doi.org/10.1016/j.amepre.2019.03.018.
7. Lawrence RJ. Housing for health promotion. Int J Public Health. 2011;56:577–8. https://doi.org/10.1007/s00038-011-0307-z.
8. Reyes A, Novoa AM, Borrell C, Carrere J, Pérez K, Gamboa C, Daví L, Fernández A. Living together for a better life: the impact of cooperative housing on health and quality of life. Buildings. 2022;12:2099. https://doi.org/10.3390/buildings12122099
9. Woodhall-Melnik J, Hamilton-Wright S, Daoud N, Matheson FI, Dunn JR, O'Campo P. Establishing stability: exploring the meaning of 'home' for women who have experienced intimate partner violence. J Hous Built Environ. 2017;32(2):253–68.
10. Gustafsson K, Krickel-Choi NC. Returning to the roots of ontological security: insights from the existentialist anxiety literature. Eur J Int Relat. 2020;26:875–95. https://doi.org/10.1177/1354066120927073.
11. Rolfe S, Garnham L, Godwin J, et al. Housing as a social determinant of health and wellbeing: developing an empirically-informed realist theoretical framework. BMC Public Health. 2020;20:1138. https://doi.org/10.1186/s12889-020-09224-0.
12. Arundel R, Li A, Baker E, Bentley R. Housing unaffordability and mental health: dynamics across age and tenure. Int J Hous Policy. 2022;27:1–31. https://doi.org/10.1080/19491247.2022.2106541.
13. Solar O, Irwin A. A conceptual framework for action on the social determinants of health: social determinants of health discussion paper 2 (policy and practice). Geneva: World Health Organization; 2010.
14. Braubach M, Jacobs DE, Ormandy D. Environmental burden of disease associated with inadequate housing. Copenhagen: WHO Europe; 2011.
15. Liddell C, Guiney C. Living in a cold and damp home: frameworks for understanding impacts on mental well-being. Public Health. 2015;129(3):191–9.
16. Pollack C, Egerter S, Sadegh-Nobari T, Dekker M, Braveman P. Issue brief 2: Housing and Health. Where we live matters to our health: the links between Housing and Health. Robert Wood Johns Foundation (2008). Available online at: https://folio.iupui.edu/bitstream/handle
17. Nieuwenhuijsen MJ. Influence of urban and transport planning and the city environment on cardiovascular disease. Nat Rev Cardiol. 2018;15:432–38. https://doi.org/10.1038/s41569-018-0003-2.
18. Orsetti E, Tollin N, Lehmann M, Valderrama VA, Morató J. Building resilient cities: climate change and health interlinkages in the planning of public spaces. Int J Environ Res Public Health. 2022;19:1355. https://doi.org/10.3390/ijerph19031355.
19. Rosenthal F. A comparison of Health Indicators and Social Determinants of Health between Israel and the Occupied Palestinian territories. [Internet]. 2020 Aug 20. [cited 2021 Apr 09]. Available from: https://www.tandfonline.com/doi/full/https://doi.org/10.1080/17441692.2020.1808037
20. Al-Khatib IA, Ju'ba A, Kamal N, Hamed N, Hmeidan N, Massad S. Impact of housing conditions on the health of the people at Al-Ama'Ri Refugee Camp in the West Bank of Palestine. Int J Environ Health Res. 2003;13:315–26.
21. Al-Khatib IA, Tabakhna H. Housing conditions and health in Jalazone Refugee Camp in Palestine. East Mediterr Health J. 2006;12(1–2):144–52.
22. Filfil M. The housing environment and women's health: The case study of Ramallah Al-Tahta. Institute of Community and Public Health. (Master thesis) Birzeit University, West Bank, Palestine. 2000.
23. Habib R, Seyfert K, Hojeij S. Health and living conditions of Palestinian refugees residing in camps and gatherings in Lebanon: a cross-sectional survey. Lancet. 2012;380(Supplement 1):3–25. https://doi.org/10.1016/S0140-6736(13)60189-0.
24. World Health Organization. Health conditions in the occupied Palestinian territory, including east Jerusalem, and in the occupied Syrian Golan. 2023. Retrieved from: https://apps.who.int/gb/ebwha/pdf_files/WHA76/A76_15-en.pdf
25. Marie M, Bataat M. Health Care Access difficulties of Palestinian patients in the Context of Mental Health: A literature review study. J Psychiatry Mental Disord. 2022;7(2):1062. https://doi.org/10.21203/rs.3.rs-167116/v1.
26. World Health Organization. Health conditions in the occupied Palestinian territory, including east Jerusalem, and in the occupied Syrian Golan. 2022. Available from: https://apps.who.int/gb/ebwha/pdf_files/WHA75/A75_26-en.pdf
27. Farah R. A report on the psychological effects of overcrowding in refugee camps in the West Bank and Gaza strip. International Development Research Center (IDRC). 2000. Available from: http://www.arts.mcgill.ca/MEPP/PRRN/Farah.html
28. Al-Khatib IA, Arafat RN, Musmar M. Housing environment and women's health in a Palestinian refugee camp. Int J Environ Health Res. 2005;15(3):181–91. https://doi.org/10.1080/09603120500105950. PMID: 16134481.
29. Abed Alah M. Echoes of conflict: the enduring mental health struggle of Gaza's healthcare workers. Confl Health. 2024;18(1):21. https://doi.org/10.1186/s13031-024-00577-6.
30. Abu Alkas D, Al-Mughrabi N, Lewis A, Salem S. (2024, May 14). Gazans strive to study as war shatters education system. Reuters. Retrieved from https://www.reuters.com/world/middle-east/gazans-strive-study-war-shatters-education-system-2024-05-13/
31. Ahmed K, Gayle D, Mousa A. (2024, March 29). 'Ecocide in Gaza': Does scale of environmental destruction amount to a war crime? The Guardian. Retrieved from https://www.theguardian.com/environment/2024/mar/29/gaza-israel-palestinian-war-ecocide-environmental-destruction-pollution-rome-statute-war-crimes-aoe
32. Asi Y, Mills D, Greenough PG, Kunichoff D, Khan S, Hoek JVD, Scher C, Halabi S, Abdulrahim S, Bahour N, Ahmed AK, Wispelwey B, Hammoudeh W. Nowhere and no one is safe': spatial analysis of damage to critical civilian infrastructure in the Gaza Strip during the first phase of the Israeli military campaign, 7 October to 22 November 2023. Confl Health. 2024;18(1):24. https://doi.org/10.1186/s13031-024-00580-x.
33. Gangat SA, Islam Z, Nchasi G, Ghazanfar S, Muzzamil M, Abbas S, Khan AR, Essar MY. Impact of ongoing conflict on the mental health of healthcare workers in Palestine. Int J Health Plann Manag. 2022;37(3):1855–9. https://doi.org/10.1002/hpm.3416.
34. Yerushalmy J. (2023, October 17). Crisis in Gaza: Why food, water and power are running out. The Guardian. Retrieved from https://www.theguardian.com/world/2023/oct/17/crisis-gaza-why-food-water-power-running-out
35. Al-Jadba G, Zeidan W, Spiegel PB, Shaer A, Najjar TA, S., Seita A. UNRWA at the frontlines: managing health care in Gaza during catastrophe. Lancet. 2024. https://doi.org/10.1016/s0140-6736(24)00230-7).
36. Rantissi T, Gitis V, Zong Z, Hankins N. Transforming the water-energy nexus in Gaza: a systems approach. Global Challenges. 2024. https://doi.org/10.1002/gch2.202300304.
37. Nunnally JC, Bernstein IH. Psychometric theory. 3rd ed. New York: McGraw-Hill; 1994.
38. DeVellis RF. Scale Development: theory and applications. 4th ed. Sage; 2016.

Publisher's note