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ORIGINAL ARTICLE

Poor housing, good health: a comparison of formal and informal housing in Johannesburg, South Africa

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Abstract
Objectives This study aimed to investigate the relationship between housing, demographic, socio-economic, social factors and health, in poor urban communities in Johannesburg, South Africa.
Methods Data were drawn from a survey of 1,427 households in Johannesburg. The outcome health variable was a composite measure of chronic ill-health. Housing variables included type of housing, tenure and access to services. Multivariate regression analysis assessed the relationship between housing and health, after adjustment for demographic, socio-economic and social factors.
Results The prevalence of chronic health problems was 25.1% (95% CI 22.8–27.6%). Factors independently associated with the risk of chronic ill-health among household heads included older age (OR, 3.06 [2.37–3.95]), female gender (OR, 2.83 [2.01–3.97]), long-term residence (OR, 2.01 [1.10–3.67]), unemployment (OR, 0.49 [0.36–0.67]), and living in formal housing (OR, 0.66 [0.45–0.98]).
Conclusions The health of the household heads residing in informal housing was significantly better than in formal housing. Explanations for this counter-intuitive finding include the fact that the informal housing dwellers were younger and recent migrants (the 'healthy migrant' phenomenon). Policy implications of the results are identified.

Keywords Johannesburg · South Africa · Housing · Urban health · Health promotion · Informal settlements

Introduction

Health inequalities in urban areas are of particular and growing concern (Wilkinson and Marmot 2003). A range of physical, social and economic determinants influence the health of city residents. The recent UN-Habitat and WHO joint publication 'Hidden Cities: unmasking and overcoming health inequities in urban settings' observed how in many contexts the speed and scope of urbanisation have challenged national and local governmental capacity to provide the infrastructure and services which are essential for health promotion (WHO 2010). Consequently, while cities are uniquely situated to provide services and opportunities to enhance the quality of life of their residents, in reality large sections of urban populations typically remain characterised by poor physical environments, with substandard and overcrowded housing, inadequate water supply, sanitation and waste disposal, food insecurity and poor access to transport infrastructure (WHO 2010). Insecure livelihoods and stressful social environments can also contribute to worse health outcomes for the urban poor (Todd 1996).

This paper belongs to the special issue "Housing for health promotion".

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In South Africa, Johannesburg is a city of 3.2 million people (Statistics South Africa 2004) and forms part of the Gauteng city region, which is expected to grow to 14 million inhabitants by 2015, putting the region in the top 15 biggest urban areas in the world (South African Cities Network 2006). Diversity and inequality are defining characteristics of Johannesburg where social and economic divisions of a spatial nature have been based on race, class, gender, national origin and age. Half of the households in Johannesburg earn below a national minimum of R1600 per month (c. US $200) and almost 20% of inhabitants are not accommodated in formal housing (City of Johannesburg 2005).

The end of apartheid presented the City of Johannesburg with an opportunity for restructuring itself from a divided apartheid city to a more inclusive city (Beall et al. 2000). Not only did apartheid cause an unequal and inefficient system of municipal government, it also left a huge backlog in basic services and infrastructure provision in poor areas (Beall et al. 2000). Poverty and unemployment, urban violence, insecure housing tenure, a high prevalence of HIV/AIDS, chronic diseases and food insecurity are some of the critical human development issues faced by the residents of the city. The urban poor, residing in certain pockets of the city such as informal settlements and inner city areas, are particularly vulnerable and struggle to gain access to services and opportunities to improve their livelihoods.

Recent literature on housing and health has highlighted the complexities of the association, and that the traditional convergence between inequalities in housing, socio-economic status and health, can no longer be assumed (Dunn 2002). The greater part of research on urban health inequalities has focused on comparing the urban poor with their wealthier counterparts. While it has been observed that health inequalities exist even between and within poor communities, few studies have been conducted in this area (Todd 1996). This type of study is of particular relevance in Johannesburg, where poverty is multifaceted.

Strategies to address poverty in Johannesburg have included efforts to provide housing, regularize tenure and upgrade services, with attention given primarily to informal settlement residents. There is a widespread assumption that health and well being is better for formal housing residents than informal housing residents. The objective of this study was to test this assumption.

Methods

Setting and sample

The Johannesburg Poverty and Livelihoods Study comprised an in-depth survey of the most deprived areas of Johannesburg (De Wet et al. 2008). The City of Johannesburg is divided into 109 electoral wards that form part of a total of 420 wards in the Gauteng province. The Gauteng report of the *Provincial Indices of Multiple Deprivation for South Africa 2001* (Noble et al. 2006) was used to identify the most deprived wards in each of the seven administrative regions of Johannesburg (Noble et al. 2006). The selected wards were: Ivory Park, Diepsloot, Riverlea, Doornkop, Phiri/Senoane, Alexandra, Jeppestown, and Orange Farm. In each ward, 100 'stands' (administratively demarcated plots of land) were selected using systematic sampling methods prior to the actual interviews by the team leaders in each of the selected wards. All households on each stand were included in the survey. Households were defined as 'a social and economic unit consisting of one or more people who contribute money, goods or labour for the common good of the unit, usually share groceries and frequently eat together.' The definition included members who returned on weekends (e.g. people who work or study elsewhere). Six hundred and ninety-five stands were sampled, consisting of 1,721 households. The response rate was 83% (1,427 households). The average number of households per stand varied between 1.12 and 5.20 in the different wards. The study was ethically and implemented approved by the University of Johannesburg in 2008.

Data collection

The survey questionnaire consisted of three parts. Part 1 captured information about all the households on the stand and identified the members of these households (completed by one respondent per stand). Part 2 was a household level questionnaire and captured detailed information about each household and its members (completed by one respondent per household). Part 3 was an individual level questionnaire with the respondent being the person who completed the household questionnaire. The respondent had to be an adult member of the household, preferably the head of the household. The data in this analysis relates to household heads, whose health is of key importance for the household, as they often represent the primary income earners. Heads of household were self-defined as the person who is in charge of key decisions about the matters affecting the household. Data were collected by a local research organisation, the Community Agency for Social Enquiry (CASE). Each face-to-face interview took between 60 and 90 min to complete. Interviewers were trained prior to the study and received a training manual introducing the project, explaining the fieldworker roles and responsibilities and describing the fieldwork procedures (CSDA 2007).

Table 1 Demographic, socio-economic, housing, social and health characteristics of the households in the study population ($N = 1,474$) (Johannesburg Poverty and Livelihoods Study, Johannesburg, South Africa 2008)

	% Formal ($N = 866$ HHs)	% Informal ($N = 408$ HHs)	% Overall ($N = 1,474$)
Demographic			
Age of household head			
18–29	13.2	26.3	19.0
30–49	46.9	59.3	51.4
50+	39.8	14.4	29.6
Single male households			
No	90.2	78.1	85.7
Yes	9.8	21.9	14.3
Sex of household head			
Male	61.3	70.7	64.8
Female	38.7	29.3	35.2
South African household head			
No	78.0	20.4	12.9
Yes	92.2	79.6	87.1
Number of persons per household			
1–3	46.4	74.1	33.4
4+	53.6	25.9	66.6
Length of residence in current dwelling			
<18 months	14.6	25.4	18.9
>18 months	85.4	74.6	91.1
Socio-economic			
Education of household head			
Primary or less	29.0	28.0	29.3
Secondary or more	71.0	72.0	70.7
Employment of household head			
Unemployed	54.0	42.5	48.8
Employed	46.0	57.5	51.2
Food security of household			
Food secure	35.3	34.2	34.6
Food insecure	64.5	65.8	65.4
Housing characteristics			
Housing type			
Formal	N/A	N/A	62.1
Informal	N/A	N/A	37.9
House ownership			
No	32.5	31.3	33.5
Yes	67.5	68.7	66.5
Overcrowding			
≤2 persons per bedroom	60.3	59.3	59.9
>2 persons per bedroom	39.7	41.7	40.1
Access to services (water on stand, toilet on stand, electricity)			
No	29.1	52.9	39.8
Yes	70.9	47.1	60.2
Social			
Feel neighbourhood is safe			
No	46.5	37.6	44.1
Yes	53.5	62.4	55.9

Table 1 continued

	% Formal ($N = 866$ HHs)	% Informal ($N = 408$ HHs)	% Overall ($N = 1,474$)
Trust people in the neighbourhood			
No	37.1	33.3	36.5
Yes	62.9	66.6	63.5
Social support (at least one person to count on in event of problem)			
No	38.8	50.0	43.4
Yes	61.2	50.0	56.6
Social participation (household head active in at least one organisation/club)			
No	54.7	61.8	58.0
Yes	45.3	38.2	42.0
Health of household head			
No chronic health conditions	68.0	85.3	74.9
At least one chronic health condition	32.0	14.7	25.1

Demographic, socio-economic, housing and social measures

The questionnaire included information on demographic variables (age, gender, nationality, marital status, place of origin and length of residence of household members), socio-economic variables (educational attainment, employment status, livelihood activities, remittances and savings, ownership of consumer goods and food security in the past month). Food security was assessed using the Household Food Security Access Scale (HFIAS) (Coates et al. 2006). Social variables included perceived levels of trust and safety in the local community, perceived levels of support ('If there are really serious problems, are there people who could help you?), group membership, caring responsibilities and perceptions of crime and violence.

Housing measures included type of housing (formal/informal), levels of overcrowding, tenure status and access to electricity, water and sanitation facilities.

Health outcomes

Self-reported health status was collected by asking household members if, in the last year, they had been diagnosed by a health practitioner as having high blood pressure, diabetes, TB, asthma, heart condition or stroke. The binary answers were collated into a composite measure of chronic health.

Statistical analysis

All analyses were conducted using Stata 10, using the survey commands which take into account the effect of the sampling strategy and sampling weights. Descriptive statistics showing the frequencies of demographic (age, sex, nationality, household size and length of residence of household head), socio-economic (educational attainment, employment status of household head and food security of household), housing (housing type, house tenure, overcrowding, access to services), social (perception of safety, levels of trust, social support and social participation) and health (chronic health problems of the household head) characteristics of the study population are presented, overall and by type of housing (formal or informal). Bivariate analyses were conducted between the health outcome and demographic, socio-economic, housing and social determinants. Percentages of study participants with at least one chronic health problem are shown for each category of these variables, and odds ratios, their 95% confidence intervals and p values are presented. Multivariate regression analyses were conducted progressively, taking into account the hierarchical relationships between determinants. Demographic variables were introduced in Model 1, socio-economic variables in Model 2, housing variables in Model 3 and social variables in Model 4. All determinants whose association reached significance with a p value <0.05 were included in subsequent multivariate models.

Results

Descriptive results

Descriptive results are presented in Table 1. Overall the study was conducted in a population characterised by poor educational achievement, high levels of unemployment and food insecurity, and female household headship.

37.9% of household heads in the study resided in informal housing. Formal housing was defined as any brick structure, and so free standing houses and back yard brick rooms were included. Informal housing is corrugated iron

Table 2 Bivariate associations of demographic, socio-economic, housing and social variables with health of the household head in the study population (Johannesburg Poverty and Livelihoods Study, Johannesburg, South Africa 2008)

Variables	% of the sample	% Unhealthy household heads[a]	Univariate ORs (95% CI)	*p* value
Demographic				
Age of household head				
18–29	19.0	5.0	1	
30–49	51.4	18.6	4.38 [2.43–7.89]	
50+	29.6	48.9	18.33 [10.33–32.52]	<0.01
Single male households				
No	85.7	26.7	1	
Yes	14.3	8.6	0.26 [0.14–0.48]	<0.01
Sex of household head				
Male	64.8	16.0	1	
Female	35.2	41.6	3.75 [2.78–5.05]	<0.01
South African household head				
No	12.9	20.6	1	
Yes	87.1	25.7	1.33 [0.86–2.06]	0.19
Number of persons per household				
1–3	58.4	20.8	1	
4+	41.6	31.1	1.71 [1.32–2.23]	<0.01
Length of residence of household head in current dwelling				
<18 months	19.0	8.4	1	
>18 months	81.0	28.9	4.44 [2.76–7.16]	<0.01
Socio-economic				
Education of household head				
Primary or less	29.3	33.3	1	
Secondary or more	70.7	21.3	0.54 [0.41–0.72]	<0.01
Employment of household head				
Unemployed	48.8	35.2	1	
Employed	51.2	15.4	0.33 [0.26–0.44]	<0.01
Food security of household				
Food secure	34.6	19.4	1	
Food insecure	65.4	28.8	1.69 [1.26–2.27]	<0.01
Housing characteristics				
Housing type				
Formal	62.1	32.0	1	
Informal	37.9	14.7	0.36 [0.26–0.51]	<0.01
House ownership				
No	33.5	20.3	1	
Yes	66.5	27.7	1.51 [1.15–1.96]	<0.01
Overcrowding				
≤2 persons per bedroom	59.9	25.7	1	
>2 persons per bedroom	40.10	25.1	0.96 [0.73–1.27]	0.80
Access to services (water on stand, toilet on stand, electricity)				
No	13.2	14.6	1	
Yes	86.8	26.9	2.15 [1.36–3.40]	<0.01
Social				
Feel neighbourhood is safe				
No	44.1	26.2	1	
Yes	55.9	25.0	0.94 [0.72–1.22]	0.63

Table 2 continued

Variables	% of the sample	% Unhealthy household heads[a]	Univariate ORs (95% CI)	*p* value
Trust people in the neighbourhood				
No	36.5	26.6	1	
Yes	63.5	24.9	0.91 [0.69–1.21]	0.53
Social support (at least one person to count on in event of problem)				
No	43.4	22.1	1	
Yes	56.7	28.2	1.38 [1.07–1.79]	0.01
Social participation (household head active in at least one organisation/club)				
No	58.0	23.1	1	
Yes	42.0	28.9	1.35 [1.04–1.75]	0.02

[a] Unhealthy household heads have at least one of the following chronic health problems diagnosed by health practitioner in the past year: high blood pressure, diabetes, TB, asthma, heart condition, stroke

structures in back yards and in informal settlements. Table 1 compares the physical, demographic, social and health characteristics of households living in formal and informal housing. Reported levels of overcrowding and ownership were similar, but access to services was much scarcer among household heads residing in informal housing. In terms of the demographic profile, informal housing residents were younger, lived in smaller households, were less likely to be South African, and more likely to be male. The informal housing contains significantly more recent migrants with a quarter having arrived in the last 18 months. Socio-economic variables like education, employment, food insecurity were similar in the two groups. Social determinants were broadly similar, with a greater degree of trust reported in the informal communities, and higher perceptions of support and group membership among formal housing residents.

Bivariate analyses

The results of bivariate analyses are presented in Table 2. Among demographic variables, increasing age, female headship, larger or non-single households, and long-term residency were associated with worse health outcomes. All socio-economic variables (poor education, unemployment and food insecurity) were associated with poor health. Among housing characteristics, formal housing, house ownership and access to services were associated with poorer health. Lastly, having someone to turn to in the event of a problem and group membership were associated with poorer health outcomes.

Multivariate analyses

Demographic, socio-economic, housing and social variables were entered sequentially to build a cumulative logistic regression model (Table 3). Age, female headship and length of residence remained significant in Models 1–4. Among the socio-economic variables only unemployment remained statistically significant in Models 3–4. Among housing characteristics, only the distinction between formal and informal housing remained significant, and none of the social variables introduced in Model 4 retained statistical significance. In Model 4, after adjustment for other variables, informal housing was associated with reduction in the odds of poor health of 0.66 [0.45–0.98].

Discussion

This study sought to describe the relationship between health and its determinants among the poorest communities in Johannesburg, with a particular focus on the associations with housing characteristics. While it is important to note that the study findings are cross-sectional and, therefore, the direction of causality cannot be ascertained, some interesting observations can be made. In bivariate analyses, a number of associations confirmed conventional results regarding the determinants of health. Worse health outcomes were associated with increasing age, female household headship, larger households, low levels of education, unemployment and food insecurity. However, surprisingly, long-term residence, residing in formal (rather than informal) housing, house ownership and indicators of social integration were associated with worse health. These findings were repeated in the multivariate analysis, with informal housing and short-term residence emerging as protective factors for health.

These findings confirm a more complex association between health and housing, particularly in the context of chronic health problems, rather than infectious diseases. The results also suggest a phenomenon of 'healthy movers' (or migrants). Indeed, the cluster of variables associated with better health outcomes are typical of migrants who, on

Table 3 Multivariate associations between health of the household head and demographic, socio-economic, housing and social variables in the study population (Johannesburg Poverty and Livelihoods Study, Johannesburg, South Africa 2008)

	Model 1	Model 2	Model 3	Model 4
Demographic				
Age of household head				
18–29	1	1	1	1
30–49	3.32 [2.57–4.30]	3.22 [2.52–4.12]	3.02 [2.35–3.89]	3.06 [2.37–3.95]
50+	11.05 [6.62–18.47]			
Single male households				
No	1			
Yes	0.74 [0.37–1.49]			
Sex of household head				
Male	1	1	1	1
Female	2.69 [1.92–3.76]	2.81 [2.03–3.90]	2.82 [1.99–3.98]	2.83 [2.01–3.97]
Number of persons per household				
1–3	1			
4+	1.14 [0.82–1.58]			
Length of residence in current dwelling				
<18 months	3.16 [1.53–6.54]	2.32 [1.28–4.24]	1	1
>18 months			2.01 [1.09–3.69]	2.01 [1.10–3.67]
Socio-economic				
Education of household head				
Primary or less		1		
Secondary or more		1.01 [0.72–1.41]		
Employment of household head				
Unemployed		1	1	1
Employed		0.51 [0.38–0.68]	0.51 [0.37–0.69]	0.49 [0.36–0.67]
Food security of household				
Food secure		1		
Food insecure		1.40 [0.99–1.96]		
Housing characteristics				
Housing type				
Formal			1	1
Informal			0.67 [0.45–1.00]	0.66 [0.45–0.98]
House ownership				
No			1	
Yes			1.14 [0.83–1.55]	
Access to services (water on stand, toilet on stand, electricity)				
No			1	
Yes			1.26 [0.88–1.80]	
Social				
Social support (at least one person to count on in event of problem)				
No				1
Yes				1.11 [0.80–1.55]
Social participation (household head active in at least one organisation/club)				
No				1
Yes				1.01 [0.72–1.42]

arrival to Johannesburg, are more likely to settle in rented informal housing, to have resided in their current housing for shorter periods of time, and to be less integrated in the social fabric of their host communities (Gilbert and Crankshaw 1999). The 'healthy migrant' argument contends that domestic or international migrants represent a

selectively healthier group healthy as compared to their peers in their area of origin and are thus more likely to be protected against the poor physical conditions of the areas they move to (Lu 2008). The healthy mover argument applies primarily to migration which responds to 'pull' factors (characteristic of a productive urban centre such as Johannesburg) rather than 'push' (i.e. repulsion) factors, as in a 'push' situation even the 'weaker' individuals and families are often forced out of their area of origin. This study could, therefore, imply that migrants are healthier than their host counterparts. The limited evidence available in the South African context is compatible with these findings. In the RENEWAL study conducted in 2008, the majority (82%) of migrants in informal settlements believed that there were more diseases in the place where they presently live, compared to their previous place of residence, in contrast with 59% of migrant residents in the inner city (Vearey et al. 2008). Some international studies have suggested that migrants might lose their health advantage if they stay where they are, rather than moving to areas of the city which are better in terms of physical environmental characteristics (e.g. housing, water and sanitation) (Cunningham et al. 2008; Ronellenfitsch and Razum 2004).

Conclusion and policy implications

This study highlights that a linear relationship between housing and health cannot be assumed, particularly in urban contexts where inequality is rife. For the purposes of health promotion, the complex relationship needs to be understood within its wider and evolving social context.

In terms of policy, this study reiterates the need for broad-based (rather than selective) interventions to address health inequalities, because they reflect a complex physical and social environment (Satterthwaite 1993). The call for multisectoral decentralised approaches towards planning interventions and participation by the communities involved, therefore continues to remain relevant (Harpham and Tanner 1995). The UN-Habitat and WHO report on urban health inequities also reaffirms that the internationally recognised mandate for health promotion can only be achieved by a plurality of partnerships, including different levels of government (with particular leadership provided by local government), nongovernmental organizations, the private sector and the community (WHO 2010). Intersectoral collaborations are crucial for the gathering of evidence resources through research and for the advancement of successful health promotion policies.

With regard to the link between migrants and health, there is concern that these 'advantaged' individuals maintain their better health and related lifestyles. Health promotion programmes could effectively target recent internal and international migrants to try to protect them from gaining 'unhealthy' habits of local populations and to provide equitable access to health care. However, many of these migrants are hidden in backyard shacks where access is particularly difficult. The physical environment of these informal settlements needs improvement, especially in relation to water, sanitation, waste removal and access to safe fuels. And, of course, efforts are needed to improve the health of indigenous populations.

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