My Community My Weight: Neighbourhood environmental and socio-cultural factors associated with overweight and obesity among the urban poor in Accra, Ghana

Abstract

Health outcomes including low birth weight, obesity and hypertension have been found to be influenced by neighbourhood environmental and socio-economic factors particularly in economically deprived communities. This study examines the influence of community environmental and socio-cultural factors on overweight and obesity among residents of Ga-Mashie in Accra, Ghana. Among the problems reported in the community were high crime (23.8%) and lack of trust among community members (57.2%). Overweight (23.9%) and obesity (20.5%) were highest among those who reported lack of community physical activity space(s) and also among those who perceived their body size to be larger than the community ideal body size (24.8% and 47.1% respectively). Social cohesion (close-knit community), level of crime and access to community physical activity space(s) were found to have a significant influence on overweight and obesity. The results reveal overweight and obesity as outcomes of a complex interaction between individuals, their behaviours and their community.

Introduction

The population and health literature indicates that the places people interact with directly or indirectly affects individual and population health outcomes (Stevenson et al, 2009) as a result of the complex interrelationship between the characteristics of people and the context within which they live (Cummins et al, 2007). Health outcomes and health related behaviours that have been found to be influenced by context include mortality, low birth weight, smoking, obesity and chronic diseases.

The rising prevalence of obesity the world over has been attributed to a number of factors including genetic susceptibility, obesogenic lifestyle behaviours (increasing caloric intake and decreasing physical activity) and recently, the influence of environmental factors. Even though obesity is a complex disease with multiple causes including polygenic, metabolic, psychosocial and environmental influences (Huot et al, 2004; Bouchard 1994, 1991), Cohen et al (2006) argue that the increase in the prevalence of obesity in the US is not due to genetics or physiology because no significant mutations or changes in human anatomy have occurred in the past two decades. Cohen-Cole and Fletcher (2008) indicate that genetic explanations are unlikely to explain the rapid rise in obesity over a relatively short period of time.

Recent findings from research suggests that the epidemic of obesity being currently experienced the world over is largely attributable to changes in the environment that promotes obesogenic lifestyle behaviours (Stern et al, 2010; Cohen-Cole and Fletcher, 2008). The problem is further compounded among the urban poor as the environment in which they live and the conditions under which they live within these environments constitute a major risk for obesity and NCDs (Pawar et al, 2010).

Even though there is a growing consensus that environmental factors are key determinants of obesity, the environment obesity relationship is understudied in most of the African especially among the urban poor among who the prevalence of obesity is rising. The aim of this study is to investigate the influence of neighbourhood socio-environmental factors on obesity among residents of an urban poor community in Accra, Ghana. The study explores the both the direct and indirect relationship between the neighbourhood socio-environmental factors and obesity among this population.

Methodology

Settings: The study is being conducted in two urban poor communities (James Town and Ussher Town) also known as Ga-Mashie in Accra, Ghana.

Sampling and sample size: The two communities were selected purposively as they represent typical urban poor communities in Accra. A two-stage sampling procedure was used to select respondents. The first stage involved the systematic sampling of enumeration areas (EAs)[1] (8 in James Town and 16 in Ussher Town) from a total of 24 EAs in James Town and 48 EAs in Ussher Town. A household listing exercise was be carried out in the selected EAs and the resulting household listing served as the sampling frame for the selection of households. The second stage of the sampling involved a systematic sampling of 40 households out of the total number of households listed from each of the selected EAs in the two communities. All individuals identified to be eligible[2] from the household roster in the selected households were interviewed. The analysis is based on a sample of 589 eligible individuals who responded to the survey and had complete information on all the variables.

Design: This research is a cross-sectional study which employed mostly quantitative data collection and analysis techniques. Primary data was collected at the community, household and individual levels using structured survey instruments.

Anthropometric measures: Body mass index (BMI) which is the outcome variable for the study was categorised into overweight and obese using the standard WHO cut-off points. The respondents BMI were calculated from their weight and height which were taken using standard procedures[3].

Statistical analysis: The data was explored using descriptive tools such as means, frequencies and percentages. The association between the predictor variable and the outcome variables

[1] To allow for easy canvassing for purposes such as census enumeration and other national surveys the Ghana Statistical Service (GSS) has subdivided communities into smaller units called enumeration areas (EAs).

[2] Males (15-59 years) and females (15-49 years) who have been part of the household for at least 6 months were considered eligible.

[3] Weight was recorded to the nearest 1 kilogram using a calibrated Seca scale with respondents dressed in light clothing while height was recorded to the nearest 0.1 of a centimetre with respondents standing upright in the Frankfort horizontal position.

were examined using the chi-square test. Multinomial logistic regression analysis was used to investigate the influence of the independent variables on the dependent variable.

Preliminary results

Community environmental characteristics

About 5 in 6 (85.1%) of the respondents reported that there is a physical activity space in their community and close to half (48.6%) reported that the nearest physical activity space is within a 5 minute walk from where they lived while a little under a quarter (23.3%) reported that the nearest physical activity space is between 6 to 10 minutes walk from where they lived (Table 1). About a third (36.2%) of the respondents rated their community to be very conducive for engaging in physical activity while about five percent of them said their community was not at all conducive for physical activity. About half (46.35) of the respondents agreed that their community is a close-knit one while about a quarter (25.5%) also reported their disagreement with the notion that their community is close-knit. Respondents generally indicated that crime was a problem in their community with about a quarter (23.8%) reporting a high (5 on a scale of 1 (low) to 5 (high)) crime level. Similarly, about 2 in 5 of the respondents disagreed that there is trust among community members.

Socio-behavioural characteristics of respondents

About two-fifth (43.6%) of the respondents indicated that there are no physical activity groups and in their community and an almost equal proportion (44.1%) also indicated that they do not belong to any community physical activity (Table 1). Only 12.2% of the respondents were members of a community physical activity group. With regards to their involvement in leisure time physical activity, more than 3 in 5 (6.1%) of the respondents reported that they did not engage in leisure time physical activity in the last seven days immediately preceding the survey. Only 13.4% of the respondents reported spending their leisure time engaging in highly active activities. About a third (34.3%) of the respondents perceived themselves as having a smaller body size compared to the community perceived ideal body size while 45.2% of them

said their body size is the same as the community ideal. About 1 in 5 (20.5%) indicated that their body size is larger than the community ideal body size. About half (50.6%) of the respondents indicated that they have been living in the community since birth. A little less than a quarter (23.4%) have been living in the community for less than 10 years while a little over a quarter (26.0%) have lived in the community for ten or more years.

Socio-economic and demographic characteristics of respondents

The mean age of the respondents was 31.10 (± 10.63) years. There were slightly more female (52.8%) respondents in the sample that there were male (47.2%) respondents (Table 1). While about two in five (41.3%) of the respondents were not in union (married or living together with a partner) another two in five (41.45) were in union and 17.3 were formerly in a union. Only 5.3% of the respondents had up to tertiary level of education and 4.4 % had no formal education. Close to a quarter (23.8%) were not working, about 2 in 5 were either engaged in selling or provision of services and a little more than a quarter (27.7%) were engaged in manual jobs.

Community environmental characteristics, individual socio-behavioural characteristics and obesity

The results suggest that the community environmental characteristics do not have a direct significant association with overweight and obesity. The relationship may be an indirect one which stems from the interaction individuals have with their community. Even though statistical significance was not achieved with regards to the association between the community environmental characteristics and obesity, some interesting patterns emerge. Overweight (23.9%) and obesity (20.5%) were found to be more common among those who indicated that there is no physical activity space in the community (Table 2). Overweight was more common among respondents who see their community as not very conducive (29.5%) or not at all conducive (25.8%) for engaging in physical activity. Obesity was highest (24.7%) among respondents who disagreed that their community is close-knit. Similarly those who disagreed that there is trust among community members recorded the highest percentage

(20.3%) of obese people. There was a commensurate increase in the percentage of obese respondents as community crime level increased from 1 to 4.

Overweight (12.5%) and obesity (4.2%) were less common among respondents who were part of a community physical activity group but more common among those who were not part of a community physical activity group (22.3% and 19.6% respectively). Obesity was highest (22.6%) among those who reported that there is no physical activity group in the community. There was in inverse relationship between leisure time physical activity and obesity such that those who did not engage in any physical activity in their leisure time had the highest percentage (24.4%) of obese people while those who had very active leisure times had the lowest percentage (6.3%) of obese people. Close to half (47.1%) of those who perceived their body size to be larger than the community ideal body size were obese and about a quarter (24.8%) of them were overweight as well. Obesity was lowest (12.3%) among respondents who have been living in the community for less than ten years and highest (22.9%) among those who have lived in the community for ten or more years.

The results from the multivariate analysis reflect findings at the bivariate level. In the first model (Table 3 Model 1), almost all the community variables except level of crime did not show a statistically significant influence on obesity even though these community variables explained about 9% of the variation in overweight and obesity. Inclusion of the socio-behavioural variables (Table 3 Model 2) did not only improve the model (the percentage of the variation in overweight and obesity explained by the predictor variables increased from 9.3% to 31.5%) but also saw some of the community variables having a statistically significant influence on obesity. Compared to those who said there is no physical activity group in the community, those who belonged to a community physical activity group were less likely to be overweight (OR=0.393) or obese (OR=0.107). Compared to those who perceived their body size to be smaller than the community ideal body size, respondents who perceived themselves to larger than the community ideal body size were significantly more likely to be overweight or obese (OR= 4.091 and 18.231 respectively) and those who perceived themselves as having the same body size as the community ideal were about 2.4 times more likely to be obese. Those who

have been living in the community for less than 10 years were less likely (OR=0.358) to be obese compared to those who have been living in community since they were born.

Controlling for the demographic and socio-economic characteristics of the respondents in model 3 revealed a further improvement in the model (Table 3). All together, community characteristics, individual socio-behavioural, demographic and socio-economic characteristics explained more than half (R^2= 55.4%) of the variation in overweight and obesity. The results also reveal some findings that are contrary to expectation. For instance, respondents who reported that the nearest community physical activity space was within a 5 minute walk or between a 6-10 minute walk from where they lived were significantly more likely (OR=2.868 and 3.430 respectively) to be obese compared to those who reported that there is no physical activity space in the community. Also, those who strongly disagreed that their community is close-knit were less likely to be overweight and this was observed in both model 2 and model 3 (OR= 0.337 and 0.256 respectively). Level of crime (level 3 on a scale of 1 (low) to 5 (high)) in the community was associated with about a three (OR=2.863) times higher chance of being obese. Those who perceived their body size to be the same as the community ideal body size were about 3 times more likely to be obese compared to those who perceived their body size to be smaller than the community ideal. Similarly, respondents who perceived their body size as being larger than the community ideal were about 4 times more likely to be overweight and about 31 times more likely to be obese. Each additional increase in age was associated a higher chance of being overweight (OR= 1.062) or obese (OR= 1.100) and being female was associated with a higher of being overweight (OR= 3.037) and even though statistical significance was not achieved, being female was also associated an increased likelihood of being obese (OR= 29.865). Compared to those who were not working, those who were involved in sales or the provision of services were about 3 times more likely to be overweight.

Next steps

The next stage of this study will explore the spatial dimension of the neighbourhood characteristics and obesity relationship. Point data on physical activity space(s) and the location of respondents will be collected using Geographic Positioning System (GPS) technology. The

spatial distribution of obesity in relation to the distribution of community physical activity spaces will be explored using spatial techniques like exploratory spatial data analysis (ESDA) in Open Geoda. Geographically Weighted Regression (GWR) analysis will also be performed depending on the degree of significant spatial autocorrelation obtained from the ESDA. The contribution of variables at the different levels (community, household and individuals levels) will be investigated using multilevel analysis.

References

1. Stevenson, A., Pearce J., Blakely, T. and Ivory, V. 2009. Neighbourhood and health: a review of the New Zealand Literature. New Zealand Geographer, 65: 211-221.
2. Cummins, S., Curtis, S. Diez-Roux, A.V. and Macintyre, S. 2007. "Understanding and representing 'place' in health research: A relational approach" Social Science & Medicine, 65: 1825-1838.
3. Huot, I., Paradis, G., and Ledoux M. 2004. Factors associated with overweight and obesity in Quebec adults. International Journal of Obesity, 28: 766-774.
4. Bouchard, C. .1994. Genetics of obesity: overview and research direction in the genetics of obesity. Bouchard, C.B. [Editor]. Boca Raton, FL: CRC Press, pp 223-233.
5. Bouchard, C. 1991. Current understanding of the etiology of obesity: genetic and non-genetic factors. American Journal of Clinical Nutrition, 53: 1561S-1565S.
6. Cohen, D. A., Finch, K.B., Bower, A. and Sastry, N. 2006. Collective efficacy and obesity: the potential of social factors on health. Social Science & Medicine, 62: 769-778.
7. Stern, R., Puoane, T. and Tsolekile, L. 2010. An Exploration into the determinants non-communicable diseases among rural-to-urban migrant in peri-urban South Africa. Preventing Chronic Disease, Public Health Research, Practice and Policy 7(6). Available at http://www.cdc.gov/pcd/issues/2010/nov/09_0218.htm. Accessed on 27th/October/2011.
8. Cohen-Cole, E. and Fletcher, J.M. 2008. Is obesity contagious? Social networks vs. Environmental factors in the obesity epidemic. Journal of Health Economics, 27: 1382-1387.

9. Pawar, A.B., Bansal, R.K. Bharodiya, P., Panchal, S., Patel, P.B. Padariya, P.K. and Patel, G.H. 2010. Prevalence of Hypertension Among Elderly Women In Slums of Surat City. National Journal of Community Medicine, 1(1):39.

Table 1: Percentage distribution of community characteristics, socio-behavioural, demographic and socio-demographic characteristics of respondents

Community socio-environmental characteristics		
Variable	**Percent (%)**	**Number (N)**
Presence of physical activity space		
Yes	85.1	501
No	14.9	88
Access to nearest physical activity space*		
≤ 5 minutes	48.6	286
6-10 minutes	23.3	137
≥10 minutes	13.2	78
Rating of community for PA		
Very conducive	36.2	213
Somewhat conducive	42.4	250
Not very conducive	16.1	95
Not at all conducive	5.3	31
Close knit community		
Strongly agree	19.4	114
Agree	46.3	273
Disagree	25.5	150
Strongly disagree	8.8	52
Crime level in community		
1 (Low)	13.6	80
2	19.9	117
3	21.6	127
4	21.2	125
5 (High)	23.8	140
Trust among community members		
Strongly agree	7.8	46
Agree	35.0	206
Disagree	40.2	237
Strongly disagree	17.0	100
Socio-behavioural characteristics of respondents		
Membership in community physical activity group		
Yes	12.2	72
No	44.1	260
No physical activity group in community	43.6	257
Leisure time physical activity		
Very active	13.4	79
Moderately active	25.5	150
Not at all active	61.1	360
Individual weight relative to community ideal weight		
Smaller	34.3	202

Same	45.2	266
Larger	20.5	121
Length of stay in community		
< 10 years	23.4	138
≥ 10 years	26.0	153
Since birth	50.6	298
Demographic and socio-economic characteristics of respondents		
Mean age		
Sex		
Female	52.8	311
Male	47.2	278
Marital status		
Not in union	41.3	243
Currently in union	41.4	244
Formerly in union	17.3	102
Highest level of education		
No education	4.4	26
Primary	17.0	100
Middle/JSS	44.8	264
Secondary/SSS	28.5	168
Higher	5.3	31
Occupation		
Not working	23.8	140
Professional/Technical/Managerial/Clerical	9.0	53
Sales/Services	39.6	233
Manual	27.7	163
Total	**100.0**	**598**

* Limited to presence of a physical activity space in the community. Percentage does not up to 100.

Table 2: Community socio-environmental characteristics, individual socio-behavioural characteristics and obesity

Variable	Percentage		P-value
	Overweight (%)	Obese (%)	
Presence of physical activity space			0.449
Yes	20.6	18.8	
No	23.9	20.5	
Access to physical activity space			0.579
≤ 5 minutes	21.7	17.5	
6-10 minutes	21.2	21.9	
≥10 minutes	15.4	17.9	
No physical activity space in community	23.9	20.5	
Rating of community for physical activity			0.131
Very conducive	21.1	16.4	
Somewhat conducive	17.2	24.0	
Not very conducive	29.5	11.6	
Not at all conducive	25.8	19.4	
Close knit community			0.242
Strongly agree	22.8	20.2	
Agree	22.0	15.4	
Disagree	21.3	24.7	
Strongly disagree	11.5	19.2	
Crime level in community			0.554
1 (Low)	21.3	16.3	
2	22.2	17.1	
3	22.8	21.3	
4	19.2	26.4	
5 (High)	20.0	13.6	
Trust among community members			0.669
Strongly agree	26.1	17.4	
Agree	24.3	18.4	
Disagree	18.1	20.3	
Strongly disagree	19.0	18.0	
Membership in community physical activity group			0.001
Yes	12.5	4.2	
No	22.3	19.6	
No physical activity group in community	22.2	22.6	
Leisure time physical activity			0.000
Very active	17.7	6.3	
Moderately active	15.3	12.7	
Not at all active	24.2	24.4	
Individual body size relative to community ideal			0.000
Smaller	16.8	6.9	
Same	22.6	15.4	

Larger	24.8	47.1	
Length of stay in community			0.034
< 10 years	18.1	12.3	
≥ 10 years	26.8	22.9	
Since birth	19.5	20.1	
Total	**21.1**	**19.0**	

Table 3: Community environmental factors, individual characteristics (socio-behavioural, socio-economic and demographic) and obesity

Variable	Model 1 Odds ratio (standard error)		Model 2 Odds ratio (standard error)		Model 3 Odds ratio (standard error)	
	Overweight	Obese	Overweight	Obese	Overweight	Obese
Access to community PAS						
≤ 5 minutes	1.005 (0.341)	0.859 (0.357)	1.127 (0.356)	1.228 (0.402)	1.740 (0.402)	2.868 (0.493)*
6-10 minutes	1.180 (0.379)	1.126 (0.387)	1.368 (0.393)	1.524 (0.439)	2.033 (0.709)	3.430 (0.545)*
≥ 10 minutes	0.632 (0.448)	0.743 (0.444)	0.645 (0.460)	0.910 (0.491)	0.982 (0.513)	1.999 (0.598)
No physical activity space (RC)	1.000	1.000	1.000	1.000	1.000	1.000
Rating of community for PA						
Very conducive	0.616 (0.826)	0.719 (0.577)	0.637 (0.545)	0.705 (0.622)	0.533 (0.607)	0.796 (0.730)
Somewhat conducive	0.549 (0.519)	1.057 (0.554)	0.509 (0.532)	0.854 (0.602)	0.418 (0.591)	0.838 (0.708)
Not very conducive	1.114 (0.537)	0.520 (0.622)	0.362 (0.549)	0.436 (0.667)	0.684 (0.613)	0.270 (0.789)
Not at all conducive (RC)	1.000	1.000	1.000	1.000	1.000	1.000
Close knit community						
Strongly disagree	0.329 (0.840)	0.361 (0.524)	0.337 (0.541)*	0.763 (0.538)	0.256 (0.600)*	0.483 (0.673)
Disagree	0.869 (0.502)	1.036 (0.340)	1.000 (0.351)	1.141 (0.389)	0.907 (0.402)	0.614 (0.708)
Agree	0.699 (0.449)	0.849 (0.296)	0.910 (0.306)	0.659 (0.361)	0.808 (0.350)	0.270 (0.789)
Strongly agree (RC)	1.000	1.000	1.000	1.000	1.000	1.000
Trust among community members						
Strongly disagree	0.832 (0.161)	1.107 (0.514)	0.848 (0.474)	1.329 (0.573)	1.000 (0.000)	1.397 (0.688)
Disagree	0.742 (0.526)	1.136 (0.467)	0.634 (0.430)	0.937 (0.527)	0.676 (0.487)	0.869 (0.632)
Agree	1.153 (0.120)	1.348 (0.476)	0.983 (0.429)	1.130 (0.534)	0.940 (0.490)	0.821 (0.642)
Strongly agree (RC)	1.000	1.000	1.000	1.000	1.000	1.000
Community Crime level						
1 (Low)	1.129 (0.377)	1.213 (0.420)	0.987 (0.389)	0.932 (0.471)	0.888 (0.437)	1.394 (0.544)
2	1.212 (0.333)	1.323 (0.375)	1.166 (0.345)	1.151 (0.417)	1.059 (0.393)	1.005 (0.507)
3	1.468 (0.327)	1.752 (0.357)	1.512 (0.339)	1.948 (0.397)	1.722 (0.390)	2.863 (0.492)*
4	1.263 (0.340)	2.434 (0.348)*	1.206 (0.351)	1.962 (0.389)	1.169 (0.394)	2.299 (0.477)
5 (High) (RC)	1.000	1.000	1.000	1.000	1.000	1.000

Table 3 continued

Variable	Model 1		Model 2		Model 3	
	Odds ratio (standard error)		Odds ratio (standard error)		Odds ratio (standard error)	
	Overweight	Obese	Overweight	Obese	Overweight	Obese
Membership in community physical activity group						
Yes			0.393 (0.422)*	0.107 (0.659)*	0.800 (0.505)	0.222 (0.938)
No			1.026 (0.243)	0.928 (0.269)	0.978 (0.274)	0.789 (0.331)
No community PAG (RC)			1.000	1.000	1.000	1.000
Individual body size relative to community ideal						
Smaller (RC)			1.000	1.000	1.000	1.000
Same			1.497 (0.258)	2.399 (0.344)*	1.444 (0.291)	2.981 (0.407)**
Larger			4.091 (0.337)***	18.231 (0.385)***	4.328 (0.377)***	30.924 (0.466)***
Length of stay in community						
< 10 years			0.723 (0.291)	0.358 (0.356)**	0.812 (0.331)	0.337 (0.430)*
≥ 10 years			1.886 (0.267)*	1.389 (0.303)	1.517 (0.301)	0.810 (0.375)
Since birth (RC)			1.000	1.000	1.000	1.000
Age					1.062 (0.016)***	1.100 (0.020)***
Sex						
Female					3.037 (0.311)***	29.865 (0.470)
Male (RC)					1.000	1.000
Marital status						
Not in union (RC)					1.000	1.000
Currently in union					1.974 (0.342)	1.544 (0.417)
Formerly in union					1.992 (.430)	2.643 (0.501)
Leisure time physical activity						
Very active					1.842 (0.476)	0.732 (0.794)
Moderately active					0.888 (0.340)	1.079 (0.415)
Not at all active (RC)					1.000	1.000

Table 3 continued

Variable	Model 1 Odds ratio (standard error)		Model 2 Odds ratio (standard error)		Model 3 Odds ratio (standard error)	
	Overweight	Obese	Overweight	Obese	Overweight	Obese
Occupation						
Not working (RC)					1.000	1.000
Professional/Technical/Managerial/Clerical					2.762 (0.561)	1.704 (0.703)
Sales/Services					3.358 (0.421)**	1.643 (0.476)
Manual					2.121 (0.447)	0.807 (0.537)
Highest level of education						
No education					2.475 (0.829)	0.203 (1.245)
Primary					2.634 (0.697)	0.725 (0.969)
Middle					0.906 (0.652)	0.446 (0.911)
Secondary					1.350 (0.652)	0.461 (0.913)
Higher (RC)					1.000	1.000
Model characteristics						
Significance (P-value)	0.327		0.000		0.000	
Nagelkerke R^2	0.093		0.315		0.554	
AIC	1107.8		1286.76		1188.19	
BIC	1331.1		1588.87		1661.06	

* p<0.05 **p<0.01 ***p<0.001