ORIGINAL ARTICLE

HOUSING INFRASTRUCTURE AND QUALITY OF LIFE OF *ORANG ASLI* AND NON-*ORANG ASLI* POPULATIONS IN KUALA LANGAT SELANGOR

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ABSTRACT

We investigated the association between housing conditions with a primary focus on basic housing infrastructure and WHOQOL BREF score among the Orang Asli and non-Orang Asli populations. A cross-sectional study was conducted between August 2014 and May 2015 among the Orang Asli and non-Orang Asli populations in Kuala Langat, Selangor. Sampling of the population was done through multistage sampling while eligible respondents participated conveniently. The socio-demographic information collected consisted of age, ethnicity, marital status, educational level, and employment status. Basic housing infrastructure variables including the types of housing unit, wall construction material, availability and types of toilet, availability of electricity, source of water supply, and availability of garbage collection facilities were obtained. Among the Orang Asli respondents, having the pour type of toilet in the house was significantly (p=0.003) associated with a reduction in the physical health domain score by 0.36 (95% CI: -0.61,-0.12). Conversely, having no toilet in the house and living in a semi-detached house had significantly (p=0.023 and p=0.026 respectively) increased the social relationships domain score by 0.81 (CI: 0.11, 1.51) and 3.90 (CI: 0.47, 7.34) respectively. Unavailability of garbage disposal facilities was found to be significantly (p<0.001) associated with a reduction in the environmental domain score by 0.70 (95% CI: -1.05, 0.35). This study have added to the evidence that housing programs of the Orang Asli population need to be further strengthened and supported by a range of policies and practices that address the critical intervention points for more potential health gains.

Keywords: *Orang Asli, non-Orang Asli population, Quality of Life, basic amenities and infrastructure.*

INTRODUCTION

Worldwide, the indigenous people appear to remain in the margin of a society that is indicated as being economically poor, less educated, dying at a younger age, and generally in worse health than the rest of the population[1]. This scenario has resulted in huge inequalities in health between the indigenous and non-indigenous populations[2]. The root cause of poor health was found to be multi-factorial. Factors such as educational shortcomings, poverty, shared crowded households, and harsh environmental conditions[3] subsequently contributed to a lower quality of life as compared to the general population.

It has also been widely acknowledged that the living conditions of indigenous communities are considered poor[4] and detrimental to health. There are clear and strong evidence that the housing infrastructure of the indigenous people is inadequate[5] and does not meet basic public health needs. A complex mix of political, economic, social, and physical factors underlies the poor living conditions[6] which in turn may have subsequent effects to their health and quality of life.

Without an exemption, the indigenous people of Peninsular Malaysia, or literally known as *Orang Asli* are also experiencing similar patterns of the above-mentioned disparities that resulted in poorer health status as compared to the mainstream population. The total population of *Orang Asli* is 178,197 throughout Peninsular Malaysia, comprising of merely 0.6% of Malaysia's total population[7]. Initially thought to be homogenous, they are heterogenous in terms of being psycho-cultural and ethno-linguistic as part of the different types of ethnics[8].
Despite diverse and comprehensive development programmes embarked by the government in an effort to uplift the life of *Orang Asli*, the socioeconomic and health statuses of these minorities continue to lag behind those of the general population[9].The incidence of poverty among *Orang Asli* in 2014 was as high as 34.0 % as compared to only 0.6% of the national incidence of poverty[10]. Furthermore, health indicators for the *Orang Asli* are persistently below the national indicator expectation and have hardly reached the national population achievement[11].

Housing is a key social determinant of health[12] and has long been one of the core areas in public health research[13]. Although housing may seem beyond the scope of the health sector, there is a long-standing relationship between public health and housing[14]. Within the field of public health, housing policy is regularly cited as a determinant of both health and health inequalities[13] and as a means by which inequalities may be tackled[15]. The relationship between appropriate housing, good health, wellbeing and quality of life is well established[16]. Access to appropriate housing has been proven to promote physical and mental wellbeing, particularly for vulnerable populations, like Indigenous community[16,17]. Therefore, the quality of one's life and provisions of basic amenities and infrastructures in one's living place are indisputably closely interrelated. As noted by the World Health Organization (WHO), Quality of Life (QOL), defined as 'an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards as well as concerns[18], are used as an indicator to measure perceptions on housing and basic infrastructures.

In Malaysia, Ong et al.[19] revealed that while there were only few houses built using modern industrial materials such as planks, beams, bricks, and mortar, there were still houses built in the native style using plant materials obtained from the surrounding forests. Besides that, treated water supply and electricity still did not cover 100.0% of the *Orang Asli* villages in Malaysia. There were only 545 (63.0%) *Orang Asli* villages (out of 852 villages) that have been provided with electricity and 619 villages (71.0%) out of 852 villages have received safe water supply[11]. Since most of the *Orang Asli* communities are located close to rivers which are considered essential, water from the streams is used for most of their daily activities, including for defecating as well as to clean themselves. Hartini and Mohamed Kamel[20] highlighted that due to the absence of proper toilet facilities, the *Orang Asli* children were frequently found to defecate indiscriminately in the bushes near their houses. Ironically, despite stand pipes being provided in the village, some of them still used unsafe sources of drinking water from nearby rivers[20].

Nevertheless, despite evidence demonstrating associations between poor housing and poor health outcomes among the indigenous people elsewhere, no study has yet addressed the functional status of housing infrastructure and associations with QOL among the *Orang Asli* community in Malaysia. The present study aims to fill these gaps of information by investigating and comparing the association of housing infrastructures with the QOL score between *Orang Asli* and non-*Orang Asli* populations in the Kuala Langat district.

METHODS

Study design and study area

A comparative cross-sectional and community-based study was carried out between August 2014 and May 2015 among 625 *Orang Asli* and 637 non-*Orang Asli* communities in Kuala Langat, Selangor, Malaysia. There were 15 villages of *Orang Asli* and 28 villages of non-*Orang Asli* involved in this study. Kuala Langat district which is located 67 km from Kuala Lumpur consists of nine sub-districts with a total population of 220,214[7]. The major ethnic groups are Malay (49.0%), Chinese (31.0%), Indian (15.0%), and a minority of Orang Asli. The main sub-tribes of *Orang Asli* residing in Kuala Langat are the Mah Meri and Temuan. Their settlement are specific for different tribes; for example, the Mah Meri sub-tribe mainly resides at the coastal area such as in Pulau Carey and Tanjung Sepat and they are involved in the fishery activity. On the other hand, the Temuan sub-tribe settlement is mainly at the fringe area and are involved in agricultural activity.

The sampling method used for both population was multistage sampling. In the first stage, cluster sampling was used, whereby the cluster of Orang Asli respondents were chosen from 15 Orang Asli villages and the cluster of non-Orang Asli respondents were chosen from 28 non-Orang Asli villages. Subsequently, stratified sampling was applied in order to determine the number of respondents from the households within each group, where it would be in accordance with the proportionate to population size (PPS) method. Next, convenience sampling method was carried out in each of the living quarters to capture the household sample. Inclusion criteria included being Malaysian, age ≥ 18 years old, and free from mental illnesses. The exclusion criteria were those who refused to participate.

Study instrument

A set of questionnaire was used to collect the data on (A) socio-demographic (age, ethnicity, level of education, marital status, employment status, and household income); (B) Quality of Life using the Malay validated WHOQOL-BREF questionnaire[21] and (C) basic amenities which included type of housing unit, type of material wall construction, availability of toilet in the house, type of toilet, availability of electricity in the house, source of water supply, and availability of garbage collection facilities. The Malay validated WHOQOL-BREF questionnaire[21] which is an abbreviated version of the WHOQOL-100 assessed the participant's

feelings about his/her life for the past two weeks. It contains 24 questions assessing four main domains of the quality of life; namely physical health (7 items), psychological health (11 items), social relationships (3 items), and environment (8 items). There are also items to measure the overall QOL and general health each. Scoring from the WHOQOL-BREF questionnaire was transformed to the 0-100 scale format based on guidelines for the transformation of raw WHOQOL-BREF score[22]. The end result gave scores in the transformed 0-100 scale format for each of the four domains in the quality of life.

Statistical analysis

The statistical analysis was conducted using the SPSS programme version 19.0. For descriptive analyses, mean with standard deviation (SD) and median with inter-quartile range (IQR) were used to describe the characteristics of the respondents as well as WHOQOL-BREF scores for continuous data depending on the normality of data, whereas frequency and percentage were used for categorical data. Multiple linear regression analysis was conducted to determine the variables that were associated with each of WHOQOL-BREF domain.

Ethical statement

This study was approved by the National Medical Research Ethics (NMRR-14-246-19720) and UKM Research Ethics Committee (FF-2-14-121). Permission was also obtained from the Department of *Orang Asli* Development (JAKOA), Ministry of Rural and Regional Development Kuala Lumpur. At every municipal of the villages, several meetings were held with the heads of villages (*Ketua Kampung* and *Tok Batin*) to provide information about the objectives and protocols of the study. All respondents consented to join this study and a written informed consent was obtained.

RESULTS

Socio-demographic characteristics of respondents

One thousand two hundred and sixty-two respondents (625 *Orang Asli* and 637 non-*Orang Asli*) with a mean age of 38.9 (12.92) years and 39.7 (12.71) years for non-*Orang Asli* and *Orang Asli* populations respectively participated in this study. The response rates are 73.0% for the *Orang Asli* and 85.0% for the non-*Orang Asli* respondents. The age of all respondents ranged from 18 to 85 years old. Although both communities were from the same district and considered close to each other, notable differences in the socioeconomic and educational status were observed (Table 1). With regard to the *Orang Asli*, half of them (49.3%) attained primary school as their highest educational attainment, while 18.9% were found to have no formal education. Only a minority of them reached tertiary education (3.2%). Poverty prevails in the *Orang Asli* communities in which the median household income was RM 650.00 and most of them were self-employed (fishermen and farmers). With regard to the non-*Orang Asli* respondents, almost half of them completed secondary school as their highest educational attainment while another half (44.0%) reached tertiary education. The majority of the non-*Orang Asli* respondents (66.0%) were involved in the paid job sector. Table 1 shows the general characteristics of the respondents.

Basic amenities and infrastructures

With regard to the *Orang Asli*, most of the houses were of the single-storey concrete detached houses that have replaced the old-fashioned bamboo and wooden houses. However, there were few houses with temporary made-shift huts (2.7%) made of bamboo, rattan, and used planks. The majority of the houses (98.2%) had piped water supply and electricity (93.6%). Although 91.2% had toilet facility, half of the toilets were of the pour type (57.6%). The majority of the *Orang Asli* respondents (78.7%) still practiced burning or burying of their garbage as a means of garbage disposal since garbage collection facilities were not available.

Majority of the non-*Orang Asli*'s houses (71.0%) were mainly built of timber and concrete and all the houses (100%) had toilet facilities and received treated water and electricity. However, almost half (41.3%) of the non-*Orang Asli* houses were not provided with proper garbage disposal facilities and thus burning or burying of their domestic garbage were still practiced. Basic amenities and infrastructure characteristics for the respondents are as in Table 2 below.

WHOQOL-BREF score of respondents

Table 3 below indicates that the *Orang Asli* had significantly lower QOL scores compared to the non-*Orang Asli* population in all WHOQOL-BREF domains. There are significant differences between the *Orang Asli* and non-*Orang Asli* population in the mean score of overall quality of life (QoL) (p=0.001), general health (p<0.001), psychological health (p<0.001), social relationships (p<0.001), and environment domain (p<0.001) with higher mean score obtained by the non-*Orang Asli* population in all domains. This clearly explains that the health related quality of life (HRQoL) for the non-*Orang Asli* population is higher than of the *Orang Asli* population as shown by the mean score for each of the four domains.

Table 4 shows the multiple linear regression analysis conducted to identify variables that uniquely predicted each domain of the WHOQOL-BREF. However, none of the basic housing infrastructure variables among the non-*Orang Asli* population appear in this analysis. Thus, the table shows the characteristics that may predict the WHOQOL-BREF domain only among the *Orang Asli* population. This study disclosed that using pour type of toilet as compared to flush toilet as the reference group significantly (p=0.003) associated with a reduction in physical health score among the *Orang Asli* respondents by 0.36 point (95% CI: -0.61,-0.12). With regard to social relationships domain, *Orang Asli* respondents living in semi-detached houses with single-detached house as reference group and having no toilet in the house with having flush toilet as reference group significantly (p=0.026 and p=0.023 respectively) increased the social relationship domain score by 3.90 (95% CI: 0.47, 7.34) and 0.81 point (95% CI: 0.11, 1.51) respectively. However, absence of garbage collection facilities in the housing area with garbage facility available as reference group significantly (p<0.001) reduced the score for the environment domain by 0.70 point (95% CI:-1.05,-0.35). None of the housing variable seems to affect psychological health domain.

Table 1 General characteristic of the respondents

Characteristics	Population *Orang Asli* n (%)	Non-*Orang Asli* n (%)
Age (years)		
Mean *(sd)	38.9 *(12.92)	39.7 *(12.71)
Gender		
Male	246 (39.4)	304 (47.7)
Female	379 (60.6)	333 (52.3)
Ethnicity		
Orang Asli tribe - Temuan	378(60.5)	-
- Mah Meri	243(38.9)	-
- Semai	3(0.5)	-
- Jakun	1(0.2)	-
Malay	-	512(80.4)
Chinese	-	83(13.0)
Indian	-	37(5.8)
Others	-	5(0.8)
Marital status		
Currently married	473 (75.7)	482 (75.7)
Never married/ Divorced/ Widow	152 (24.3)	155 (24.3)
Educational attainment		
No schooling	116 (18.6)	6 (0.9)
Primary	308 (49.3)	47 (7.4)
Secondary	181 (29.0)	304 (47.7)
Tertiary	20 (3.2)	280 (44.0)
Occupational status		
Not working	225 (36.0)	116 (18.2)
Government worker	14(2.2)	254 (39.8)
Private worker	68(10.9)	167(26.2)
Self employed	312 (49.9)	101 (15.9)
Household Income		
Median income (IQR)**	RM 650 (500, 900)	RM 3,000 (2,000, 5,000)

*** inter-quartile range*

Table 2 Basic amenities & infrastructure characteristics of respondents

Variable	Population	
	Orang Asli n (%)	*Non-Orang Asli* n (%)
Housing type		
Single-detached house	587 (94.0)	286 (44.9)
Semi-detached house	2 (0.3)	38 (6.0)
Terrace house	18 (2.9)	274 (43.0)
Apartment	1 (0.2)	35 (5.5)
Shop house	0	4 (0.6)
Makeshift Hut	17 (2.7)	0
Construction material of wall		
Brick	326 (52.2)	452 (71.0)
Plank	83 (13.3)	31 (4.9)
Brick & plank	204 (32.6)	154 (24.2)
Others (bamboo, zinc, *attap*)	12 (1.9)	0
Toilet availability		
Yes	570 (91.2)	637 (100.0)
No	55 (8.8)	0
Types of toilet		
Flush	209 (33.4)	541 (84.9)
Pour	360 (57.6)	96 (15.1)
Own made pit	1 (0.2)	0
Availability of electricity		
Yes	585 (93.6)	637 (100.0)
No	18 (2.9)	0
Source of water supply		
Treated piped water (SYABAS)	614 (98.2)	637 (100.0)
Clean water (rain/well/rivers)	11 (1.8)	0
Garbage collection facilities		
Available	133 (21.3)	374 (58.7)
Not available	492 (78.7)	263 (41.3)

DISCUSSION

To the best of our knowledge, this is the first local study which has attempted to provide information on the QOL score with association to basic amenities and housing infrastructures and to compare the results between the *Orang Asli* and non-*Orang Asli* populations residing in the same district. The interconnectedness between poor housing infrastructure and lower quality of health is well documented in this study.

The present findings reaffirm that the quality of life (QOL) of the *Orang Asli* is still lagging behind compared to the non-*Orang Asli* population after decades of Malaysia's independence. This is evident by the findings and analyses of this study that revealed higher WHOQOL-BREF score in all of the four domains as well as the overall quality of life (QOL) and general health of the non-*Orang Asli* population. This could be explained by factors such as better housing infrastructures and facilities as well as environmental conditions among the non-*Orang Asli* communities compared to the *Orang Asli* communities. The remarkably higher socioeconomic status represented by higher educational level and household income among the non-*Orang Asli* as compared to the *Orang Asli* communities verifies that apart from health conditions, other social factors such as educational back ground, income, and occupational status are responsible in determining one's quality of life. Hence, it is crucial to tackle the root cause of social determinants factors such as uplifting the educational attainment, strengthening of economic assistance as well as to facilitate job creation for this underprivileged community.

Table 3 Association of WHOQOL-BREF domain score between *Orang Asli* and non-*Orang Asli* populations

WHOQOL- BREF domain	Population			
	Orang Asli Mean (sd)	*non-Orang Asli* Mean (sd)	*t-test (df)*	*p*-value
Overall QoL	3.48 (0.69)	3.82 (0.69)	-8.73	**0.001**
General Health	3.54 (0.70)	3.74 (0.65)	-5.33	**<0.001**
Physical health	58.21 (10.1)	58.95 (9.97)	- 1.30	0.190
Psychological health	59.6 (10.94)	63.43 (10.62)	- 6.39	**<0.001**
Social relationship	71.10(16.26)	74.80 (14.6)	- 4.29	**<0.001**
Environment	57.0 (12.10)	63.94 (12.61)	- 9.96	**<0.001**

This finding is consistent with the quality of life survey that was conducted among Australian aborigines and their non-aborigine counterpart which revealed similar findings, where the aborigines reported lower quality of life in almost all of the WHOQOL-BREF health domains[23]. Similarly, another comparative study among the New Zealand general population and their indigenous people revealed that the Maori and Pacific people self-rated themselves lower than the rest of the general population of New Zealand[24]. Another similar study looking at the association between housing conditions and health status among minorities of the Rome ethnic group in Europe consistently highlighted that the lack of access to basic amenities for living such as having drinkable water, indoor bath facility, and electricity affected the quality of life (QOL) by decreasing their general health status[25]. This result is also in line with one local study that measured the quality of life (QOL) among *Orang Asli* in Perak by using the Weighted Quality Life index as an indicator of wellbeing where the *Orang Asli* respondents were moderately satisfied with the provisions of electricity and water supply as well as appropriate housing infrastructure, with index values of 55.9% and 61.4% respectively[26].

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Table 4 Multiple Linear Regression for WHOQOL-BREF domains with association to basic housing infrastructure among *Orang Asli* populations (n=625)

Orang Asli populations			
Characteristics	**β(95%CI)**	***t***	***p*-value**
Physical health			
Pour toilet[1]	-0.36 (-0.61,-0.12)	-2.939	0.003
Social relationships			
Semi-detached house [2]	3.90 (0.47,7.34)	2.230	0.026
No toilet in house[1]	0.81 (0.11,1.51)	2.277	0.023
Environment			
No garbage facility[3]	-0.70 (-1.05,-0.35)	-3.953	< 0.001

Reference group: [1]flush toilet; [2]single-detached house; [3]garbage facility available

A community-based study in remote Australia looking at the impact of housing conditions on children's health proved that provisions of modern housing that emphasised on effective removal of human waste and adequate clean water supply appeared to be remarkably contributing to a reduction in skin infections among children[27] causing a significant impact on their quality of life.

Multiple linear regression analysis clearly demonstrated that having pour type of toilet against flush toilet was significantly associated with a reduction in the physical health score among the *Orang Asli* respondents. This finding was consistent with another local study which reaffirmed that absence of proper toilet in the house was proven to be significant risk factors of soil-transmitted Helminthiasis (STH) (*OR* = 2.40; 95% *CI* = 1.30, 4.82; *p* = 0.003) among *Orang Asli*

children[28] which will definitely lower their health status. Although there is scarce evidence on usage of type of toilet with association to QOL, this finding warrants involvement of multidisciplinary experts such as engineers, social scientists, behaviour change experts, public health professionals and, vitally the people to change for the betterment of their own health.

Unfortunately, we observed that even some of the modern single-detached houses which equipped with flush toilet facility were unusable due to broken parts and was left unrepaired. The low level of educational attainment among the *Orang Asli* in this study might have contributed to the lack of knowledge on how to maintain and keep their house infrastructure functions well. In addition, although provided with an improved basic house infrastructure but not accompanied by the improvement in educational and employment status will result in many did not afford the repairs and maintenance of the house.

Our findings disclosed that unavailability of garbage disposal facilities in the residential area of the *Orang Asli* respondents was significantly associated with a reduced score in the environment domain. One previous study had consistently pointed out that having a regular and organized rubbish disposal is an important factor in determining community health[29]. It can be easily understood that accumulation of waste due to absence of effective management of rubbish disposal may lead to contamination of the living areas with infected materials which will further result in diseases caused by various parasitic[30,31] as well as non-parasitic infections such as vector borne diseases and high prevalence of vermin and pests[32]. This clearly explains the underlying poor health that will subsequently affect their quality of life. Having mention that, health promotion and education must not be forgotten as an important tool to enhance awareness, change behaviour and create environment that support good health practices[33] in the community. Based on our observation, the main current practice of disposing waste is through open burning or a small pit dug at the backyard of the houses that may lead to conditions for disease outbreak as well as environmental pollution.

Interestingly, as contrary to common belief, this study disclosed that having no toilet in the house was associated with a significant increase in the social relationships score. The most likely explanation to this was because sharing of toilets with the nearby houses or neighbours helped to build better social cohesions, enhanced the spirit of togetherness, and thus resulted in higher social relationships score. Likewise, the *Orang Asli* respondents who lived in semi-detached houses against single-detached houses significantly had higher scores in the social relationships domain. This is possibly due to the structure of semi-detached house that promotes better social interaction as compared to living in a single-detached house. This finding coherently indicates the strong affinity and holdings toward culture and heritage practice among the *Orang Asli*[34].

Limitations of the study

First of all, as this is a cross-sectional study design, it limits our ability to confirm the causal relationships between the QOL score and the basic amenities and infrastructure factors. Secondly, the study sample consisted of respondents who were being conveniently sampled, thus selection bias might have occurred and gave impact on the study findings. Thirdly, as interview sessions were conducted in the majority of the *Orang Asli* respondents due to illiteracy and difficulty in comprehending the questions, there might be a higher occurrence of interviewer bias from the interviewer as well as from the respondents. Finally, the study findings cannot be generalized to the population of Selangor because the sampling method used was of non-random sampling. However, we have tried our best to minimize the selection bias by conducting cluster sampling followed by stratified sampling in the study design.

CONCLUSIONS

In summary, the findings from this study reaffirmed that the *Orang Asli* people in Kuala Langat, Selangor had lower quality of life (QOL) compared to the mainstream population as evidenced by the lower WHOQOL-BREF score in all domains. The association between lack of basic housing infrastructures among the *Orang Asli* respondents with lower WHOQOL-BREF score has been well-documented in this study. This study findings highlighted the importance of provisions of appropriate basic housing infrastructures among the *Orang Asli* population that are still lacking as compared to the general population. Therefore, policy implementation should be emphasised as part of a comprehensive and holistic strategy for the development of the *Orang Asli* through socio-economic, housing infrastructures, and public health interventions. Strong political commitment, inter-sectorial coordination, and adequate financing are required in order to eliminate the social and health disparities in the *Orang Asli* population.

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