

# Identifying Factors of Obesity in Papua New Guinea: A Descriptive Study

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## Abstract

Obesity and overweight are complex phenomena due to causes and consequences as these are the predisposing factors for developing lifestyle-related diseases. In the recent times, obesity and chronic diseases are being taken very seriously than ever before. Once upon a time, obesity was considered as a problem only in developed countries, now it is of a serious concern in low- and middle-income countries. In Papua New Guinea (PNG), a few studies have been conducted on obesity-related issues. However, there is not enough data on obesity to clearly understand about the leading contributing factors. Our research group designed this study to assess the influencing factors of obesity and as well as to identify the principal cause. It is a descriptive study, used structured and semi-structured interview and survey questionnaire. This study was conducted in the capital city of PNG, Port Moresby, and recruited 87 adults aged 30 - 50 years. According to interview and analysis findings, the contributing factors of obesity are less physical movement, unhealthy diet, lifestyle, cultural value system, low education and social system. Government strategies and initiatives are not strong enough to educate and motivate the community people. This study suggests developing an effective coordination among all stakeholders to ensure quality education and increase awareness to prevent obesity and its complications. The standard health policies and strategies are also recommended at the local, national and international level with strong commitment.

## Keywords

Obesity, Papua New Guinea, Factors, Cultural Value, Life Style

## 1. Introduction

Overweight (body mass index (BMI)  $\geq 25$ ) or obesity (BMI  $\geq 30$ ) [1] has been a growing

health issue in the world. The global obesity has dramatically changed between 1980 and 2013, with the proportion of adult obesity rising from 28.8% to 36.9% in men and 29.8% to 38.0% in women [2]. According to World Health Organization (WHO) estimates, the worldwide prevalence is more than doubled between 1980 and 2014 [1]. Since 1980, the rate has elevated 3-fold or more in the Middle East, the Pacific Islands, Australia and China [3]. The WHO also shows that obesity is increasing in the developing world at an alarming rate among the people who are of more than 115 million of those suffering from obesity-related complications. By 2030, these disorders will be the number one cause of death among underprivileged people [3]. A recent study published in *The Lancet* found that now two-thirds of people with obesity live in developing countries [2]. Therefore, obesity is related more of a burden to developing than developed countries, and a significant public health concern.

The association between obesity and a series of adverse health outcomes are also remarkable. There are many studies, which attract the attention of health professionals nationwide about obesity, that are highly associated with cardiovascular disease, diabetes mellitus, arthritis, high-risk pregnancy, some types of cancer, depression and increase mortality [4] [5] [6] [7]. WHO also alerts that in the future, the burden of obesity and diabetes will affect developing countries, and projected as the incidence of diabetes run into hundreds of million within the next 2 decades [8]. About the interrelation between obesity and malnutrition, a group of researchers have stressed on the paradoxical coexistence of adult obesity with childhood malnutrition [9]. So, the issue of malnutrition in childhood, whether acting as a predisposing factor to later obesity is difficult to evaluate due to the lack of future cohorts in developing countries. A serious attention is needed sooner to halt the increasing prevalence of obesity in developing countries.

Overall, obesity reflects energy imbalance, closely related to dietary intake and energy expenditure [10]. A recent Lancet series identified physical inactivity as a major contributor to death and disability [11]. The global growths in obesity prevalence, along with high mortality attributed to obesity, have led to forecasts of lowered future life expectancy [12]. As in developed countries, factors influencing obesity are mostly lifestyle or dietary [13] due to advance technology whereas in the developing countries obesity is being influenced by transition and adaptation of western lifestyle by dwellers and the rapid change of dietary pattern [14]. Media, economic boom, and high-tech related factor are influencing obesity in developed countries [15], whereas in the developing countries, obesity is seen as a crossover issue at most. Over the last three decades, particularly in developing regions, several studies showed the similar results as obesity prevalence has been influenced by a sedentary lifestyle, demographic changes, geographic patterns, socio-economic and environment factors [16] [17] [18] [19]. However, there are not enough empirical researches conducted on the determinants of obesity in developing world. So, it is particularly important to identify the factors that influence the prevalence of obesity in developing countries.

In general, modernization of the lifestyle in Papua New Guinea (PNG) has taken place since World War II [20]. Although in PNG, obesity does not have any valid statistics

available, but it has been reported that obesity is also being influenced by nutritional transition [21] and urbanization or westernization [22] as a normal crossover producer of developing countries. Even so, in PNG, most people use changes brought by so-called western lifestyle as a platform to gain self-cultural ambition since the country is culturally oriented. Due to the tradition and type of cultural value or belief system of the country, people think as being tubby or overweight is healthy with a mentality that fat people are rich or wealthy in the society.

In most studies, the main focuses were on one particular factor and tried to explain how that factor contributed to obesity and missed identifying the foremost contributor to obesity within the factors themselves. The purpose of this study is to examine the factors contributing to obesity and identify the leading factor within all factors as being the major cause of obesity in PNG.

## 2. Methods

### 2.1. Sample and Sampling

The samples were collected in Port Moresby, the capital city of PNG and the Suburbs. As this is a descriptive study, the maximum possible numbers of samples were decided based on the allocated research period. Theory-based and the snowball sampling was chosen. The researcher relied on his own established networks, and connections and selected a friend as the first subject, the friend introduced his or her friend to the researcher as the second subject, and the process continued until the targeted sample is reached to be considered that covered all kinds of population. The recruitment of the participants was done through the informal network. To achieve theoretical maturation, the study has aimed to interview up to 100 participants of age between 30 and 50, male/female, single/married, living alone/living with family and friend, educated/uneducated, employed/unemployed, formal/informal, high/low income, city/rural of the four regions (*Highland, Momesa, Island and Southern*) of PNG who are working and living in Port Moresby and the Suburbs, and willing to participate in the survey. The reason for setting age range was that obesity is usually an issue of working population, increases after 30 years old. Life expectancy of PNG is 60 years old for male and 65 for female [23]. In addition, the reasons for adopting this sampling method and choosing the capital city are that people in PNG do not belong to companies and/or organizations, and community administrative system is not strong to reach them easily. Moreover, in the countryside, there are many tribes. Therefore, it is difficult to capture the population smoothly.

### 2.2. Methods and the Contents of the Survey

This study used structured and semi-structured interview and survey questionnaire. The interview was conducted one on one, and it takes about 30 to 60 minutes of their time during March to April 2014. The questionnaire was developed in August 2013 by the researchers based on Pender's Health Promotion Model [24], literatures review, and researchers' discussion regarding PNG culture and lifestyle. The questionnaire was

tested with some selective participants in PNG through email communication before finalization. With the specific feedback and recommendations, the questionnaire was revised. During the interview, noninvasive measurements including height, weight and abdominal circumference were chosen, and BMI was calculated to assess the magnitude of overweight and obesity. Invasive measurements including blood sugar, cholesterol and triglyceride were excluded because of the difficulty of taking blood sample. All factors were categorized into five main groups as environmental (working environment & stationary position, rural urban migration, diet information, residential area, obligation, family, social network, employment), behavioral (taste preference, food choice, eating style, activity, substance intake, junk food, soft drinks), biological (gender and genes), cultural value system (leader, wealth, gaining respect), and general thoughts about obesity and government policies, plus demographic data. Questions were formulated according to the factors.

### **2.3. Statistical Analyses**

The contents were analyzed by descriptive statistics. The results from the semi-structured interview were described, and the factors associated with obesity were extracted. Then, consideration was made through combining with descriptive statistics and the results of the interview. The questions asking medical diagnosis and biological factors regarding family history of obesity-related diseases were eliminated because of inaccuracy of the data. In environmental factors, employer's strategies related to health were very limited; therefore, those answers were not analyzed. Additionally, all subjects reported that the church doctrine forbid alcohol intake; as a result, the question category of alcohol-use was not analyzed.

### **2.4. Ethical Consideration**

Approval was obtained from the ethics committee of Hiroshima University, Japan. The participants were advised that their involvement in the study was completely voluntary, and they may choose to withdraw at any time without fear of prejudice or penalty. The survey was anonymously conducted with data collected from the participants are kept strictly confidential and promised not to use outside of this study. After the information was compiled, the original demographic data and answers were sworn to be destroyed. The identity of the participants remained anonymous.

## **3. Results**

During the research period, 87 subjects of the projected population were recruited and successfully interviewed except one subject who withdrew before the completion due to time factors. Therefore, data from 86 subjects were valid and analyzed (valid response rate: 98.9%). All subject interviewed was able to read the questionnaire by themselves.

### **3.1. Sample Description: Demographic Information**

The demographic data of subjects are presented in **Table 1**. The table showed that there

**Table 1.** Demographic characteristics of this study.

Items		N	%
Gender	Male/Female	49/37	57.0/43.0
Age	Range 30 - 49	Mean $\pm$ SD	33.79 $\pm$ 2.72
Marital status	Single/Married	38/48	44.2/55.8
Living arrangements	Living alone	37	43.0
	Living with family	48	55.8
	Living with friends	1	1.2
Working status	Working/Not working	47/39	54.7/45.3
Types of job (N = 47)	Office	20	42.5
	Field	1	2.1
	Informal Sector	26	55.3
Economic status	Below average	49	57.0
	Average	33	38.4
	Above average	4	4.6
Educational qualification	Grade 10 or lower	46	53.5
	Grade 10 or above (11 & 12)	20	23.3
	Diploma	7	8.1
	Bachelor Degree	13	15.1

Economic status: below average = around minimum wage (2000 PGK) per month, average = around 6994 PGK, and above average = around 11,476 PGK per month

were more male (57.0%), married (55.8%), living with family (55.8%), working (54.7%), below-average-economic status (57.0%), and education of grade 10 or lower (53.5%) subjects participated. Reflecting the country's situation in this study, 45.3% of the subjects were not working. The subjects who were overweight (BMI  $\geq$  25) were 77 (89.5%).

## 3.2. Contributing Factors of Obesity

### 3.2.1. Environmental Factors

**Table 2** includes physical activity. Since business activities are limited, most people work in informal sectors (55.3%) such as selling betel nuts on streets, or as a taxi driver in PNG. Working environment is very different from developed countries. In 47 works, the majority (76.6%) of subjects reported physical activity was very limited because of job pattern, for example, selling nuts in standing and/or sitting in the same place, and commuting means was mostly automobiles because they felt danger walking outside. Daily shopping is available in neighborhood; therefore, 68.6% of subjects reported by less walk.

### 3.2.2. Eating Style and Taste Preference (Table 3)

PNG's eating habits and daily foods are also different from the developed countries.

**Table 2.** Environmental factors and physical activity patterns.

Items	N (%)
<b>Physical involvement at work (N = 47)</b>	
Very often/often	11 (23.4)
Rarely	2 (4.3)
Not often/not at all	34 (72.3)
<b>Means of going and returning from work (N = 47)</b>	
Walking	8 (17.0)
By bus/car/bike	39 (83.0)
By bicycle	0 (0.0)
<b>Leisure time and body use (N = 86)</b>	
Working at the back yard	47 (54.7)
Watching TV	28 (32.6)
Doing nothing	10 (11.6)
Playing computer games	1 (1.2)
<i>Means of going for shopping</i>	
By car/bike/bus	21 (24.4)
Walking	59 (68.6)
Others	6 (7.0)
<b>Involvement in physical exercise (yes)</b>	52 (60.4)
<i>Type of exercise</i>	
Go for walk	47 (54.7)
Running	1 (1.2)
Go playing	1 (1.2)
Others	3 (3.5)
<b>Afternoon walk habit (yes)</b>	80 (93.0)
<b>Engagement in sports activities (yes)</b>	29 (33.7)

More than 80% reported that they ate when they felt hungry or at any time. Taste is difficult to assess. When showed structured categories in the questionnaire, 77.9% of subjects pointed high salt and fat taste. Including “very greasy”, more than 80% eat high-fat food.

The daily food item is also limited, and most people eat chicken. Therefore, more than 30% reported their favorite food as chicken and chips, which taken every day. Including “thrice/twice a week”, almost all subjects eat same food frequently. Quantity of the food amount is also self-reported, and over 60% of subjects chose “average”.

Limited numbers of fast food restaurants are available in PNG. When we showed the categories, 68.6% chose restaurant’s foodstuffs more than twice a week. Around 40% of subjects chose “sleep” after overeating.

**Table 3.** Eating style and taste preference assessed in this study.

Items	N (%)
<b>Eating style</b>	
Eat when feeling hungry	42 (48.8)
Eat any time	31 (36.0)
Eating thrice a day	13 (15.1)
<b>Common dishes prepared at home (Family's taste)</b>	
High salt & fats	67 (77.9)
Very greasy	5 (5.8)
Low salt & less fat	11 (12.8)
Low fat	2 (2.3)
Don't know	1 (1.2)
<b>Favorite Food</b>	
Chicken & chips	26 (30.2)
Lamb flaps	13 (15.1)
Beef stew	13 (15.1)
Lamp chops	9 (10.5)
Fish	7 (8.1)
Chicken stew	3 (3.5)
Pork	1 (1.2)
Others	14 (16.3)
<b>Frequency of eating favorite food</b>	
Every day	34 (39.5)
Twice a week	44 (51.2)
Thrice a week	7 (8.1)
Not applicable	1 (1.2)
<b>Quantity of food eating daily</b>	
Average	52 (60.5)
More food	33 (38.4)
Less food	1 (1.2)
<b>Frequency of visit fast to food restaurant</b>	
Every day	23 (26.7)
Twice a week	33 (38.4)
Thrice a week	3 (3.5)
Once a month	26 (30.2)
Not applicable	1 (1.2)
<b>Activity after overeating</b>	
Go for walk	40 (46.5)
Sleep	33 (38.4)
Watching TV	9 (10.5)
Do some work on computer	3 (3.5)
Others	1 (1.2)

### 3.2.3. Soft Drinks

**Table 4** shows high consumption of soft drinks in PNG, most subjects (97.7%) reported that they loved drinking soft drinks containing higher calories. Regarding the daily consumption of soft drinks, 79.1% reported that they loved buying 500 ml of soft drinks, while only 10.5% took 350 ml. There are 1 liter and 1.5 liter soft drinks available in PNG, but none of the subjects reported drinking of 1.5 liter. In PNG, the alternative option of soft drink is very limited. Water at shops was not being purchased as frequently as Coca-Cola due to poor taste and people's thoughts as buying water is wasting money.

Thirteen subjects of higher health consciousness reported that they took zero calorie drinks. A custom to read the nutritional label on the soft drinks provided awareness of the high calorie; however, only 26.7% read it. The reason of this unread label was expressed differently. About half of them (46.5%) said that they could not read the nutritional label because they did not understand the meaning.

### 3.2.4. Cultural Value System (Table 5)

Cultural value system is one of the major influential factors of people's behavior. The 98.8% of subjects evaluated a leader by their physical outfit, capital, knowledge/skills, properties, and a good speaker. There are many reasons observed why a leader should be big and strong in society, almost all subject said, "keeping the community in order and peace". Wealth is also related to body outfit. The majority (97.6%) answered that fat and people with obesity are the symbols of wealth. It is very interesting that reasons of becoming fat are being respected and felt beautiful. Oppositely, being skinny represents less respected, powerless and discrimination such as being thought about having HIV/AIDS. When asked a level of respect of a fatty person, 100% of subjects marked very respectful or respectful.

**Table 4.** Drinking tendency of soft drinks observed in this study.

Items	N (%)
Types of soft drinks taken most of the time	
Fanta/Pepsi/Coca-Cola/Sprite	84 (97.7)
Fruits juices	2 (2.3)
Amount of drinks per day (ml × times)	
350 ml	9 (10.5)
500 ml	68 (79.1)
1 L	9 (10.5)
Knowledge of soft drink sugar content (yes)	18 (20.9)
Take zero calories drinks (yes)	13 (15.1)
Reading the nutritional label on the soft drinks (yes)	23 (26.7)
<i>(Reason not reading nutritional level)</i>	
Never thought about this	23 (26.7)
Read but don't understand the nutritional content	40 (46.5)



**Table 5.** The influence of cultural value system estimated in this study.

Items	N (%)
<b>Leader</b>	
<i>Interpreting community leader</i>	
All of them (physical outfit, capital, knowledge/skills, properties, public speaker)	85 (98.8)
<i>Why need big and strong leader</i>	
Powerful man to control	2 (2.3)
Keeping community in order	80 (93.0)
All of them (for community safety, protection against enemies, powerful man to control, keeping community in order)	3 (3.5)
<b>Wealth</b>	
<i>Why rich people are always fat in PNG</i>	
Showing wealth through body outfit	45 (52.3)
Fatness as a sign of richness	39 (45.3)
<i>How rich person can be told</i>	
Properties owned	2 (2.3)
All of them (by looking at their body, type of cloth worn, capital power, properties owned)	83 (96.5)
<b>Gaining respect</b>	
<i>Why people want to become fat</i>	
Want to be respected	47 (54.7)
Want beautiful body	38 (44.2)
<i>Treatment of skinny people in PNG</i>	
All of them (less respected, discriminated, powerless, isolated, missing out on community events)	82 (95.3)
None of them	4 (4.7)
Zero and one scored answers were deleted.	

### 3.2.5. General Thoughts about Obesity

Interesting discrepancy was found that although the subjects connected people with obesity to power, beauty, and attractiveness, they (95.3%) responded differently that obesity was a health problem when asked. Moreover, the subjects could be able to list the negative aspects of people with obesity (Table 6).

### 3.2.6. Government Strategies

When asked their government strategies regarding obesity, all subjects except one answered “no strategies conducted” and “no concern”. Subjects of 36.0% replied about the reason that obesity was generally accepted. Nevertheless, again 100% of subjects answered that health education regarding obesity is strongly needed in PNG.

**Table 6.** General thoughts about obesity of the adult people of Papua New Guinea.

Item	N (%)
What can you say about fat people?	
They are healthy	0 (0.0)
They look beautiful	62 (72.1)
They look attractive	24 (27.9)
They look strong and powerful	0 (0.0)
Is obesity a health problem?	
Yes	82 (95.3)
No	4 (4.7)
Why is obesity a health problem? (n = 82)	
Because it makes people grow old very fast	36 (43.9)
Because it reduces the life span of people	31 (37.8)
Because it puts people in danger of other life style disease	13 (15.9)
Because body fat makes people inactive in doing things	2 (2.4)

#### 4. Discussion

In fact it is very difficult to conduct this research in PNG. The illiteracy rate (35.8%) of this country is yet high as reported in 2015 [25]. We are lucky enough to get the people who can read well and understand our questionnaire. However, it is still very difficult to get suitable answers since the questionnaire was developed by the researchers from developed country. Even though a researcher from PNG is included in this study, we need to know more about their culture and social systems. Our study result is limited to only an urban city of PNG.

When we look at dietary facts in PNG, most people don't have the specific time for eating. They like high-fat foods with high salt and very greasy. Some people even like to sleep after overeating. There is a limited choice of daily food items, and it is difficult to have vegetables and many kinds of cooked dishes. Therefore, many people eat frequently chicken, lamb, beef and chips. Lack of proper knowledge is also a big issue in PNG. They cannot easily understand the meaning of nutritional label and ignore to read it. Many people don't know the right calorie intake and mal-effects of a large amount of soft drinks and greasy food. They love soft drinks of high calories except a few those like zero calorie drinks or bottle water. They think purchasing of a water bottle is a kind of wastage of money. The eating and drinking habit is strongly rooted in their culture and probably related to water safety. Since no government involvement is observed, health education is mostly missing. This is the biggest part of unhealthy population.

Majority of the people in PNG noticed that they have limited physical activities due to their traditional working environment. Most of the time they work in standing/or sitting position at the same place. Lots of people mentioned that they don't have enough

recreational facilities and physical involvement at work. Their usual commuting modes are automobiles except a few those like walking. They expressed their notions, as they feel insecure to walk outside. Even people are not too much motivated to use the bicycle to ensure physical movement also. In PNG, the social systems are not safe for outdoor walking or cycling, and the working environment is reflecting different from developed countries.

The cultural value system is the most influencing factor on people's perception and behavior in PNG. Mass people commented that a leader would be evaluated by physical strength and vocal capacity. They think the big and strong leader can keep the community in right order. The fat person is very much respectful in the society of PNG. The perception regarding fat people is looking beautiful and attractive also. In contrast to this concept, the skinny people in the society treated as less respected, discriminated, powerless and isolated. Sometimes skinny people are toughened as having HIV/AIDS and missing out from community events. However, there is a bit contradictory statement from this community. Although most of the people in PNG are in favor of obesity, at the same time, they also commented as obesity or overweight is a health problem. It could be explained as it's due to low literacy and knowledge gap.

There are several important limitations in our study. We couldn't collect accurate data regarding the family or genetic factors related to obesity. And we couldn't include samples from all corners of PNG due to geographical constraints and weak administrative system that limits wider reflection. In this study, we investigate the factors of obesity in PNG. Even though fewer statistics are available in PNG, as well as other developing countries, obesity-related chronic diseases are increasing [26]. Short life expectancy, people describe "sudden death/unknown cause of death in 50 s" is assumed that undiagnosed cardiovascular diseases could be hidden. A number of studies revealed the relationship between obesity and developing chronic diseases [4] [5] [6] [27]. Ultimately, increasing chronic diseases in PNG could be expected on the basis of overweight and obesity. However, as a multifactorial chronic disease, factors influencing obesity can be seen at a broader perspective with factor variation among developed and developing countries.

Health policies are very weak and no standard strategies in PNG as like as the other developing countries. This is the biggest issue to improve the health system. Even so, the church community is strong there. It is wise to use this community system for motivating the people with the necessary information. The Lancet series 2011 mentioned, "The obesity epidemic will be not reversed without government leadership" [28]. High-level political commitment, more national leadership from countries and the international organizations such as the United Nations will be essential to solve this great challenge of the global obesity and need to provide global leadership to develop the health policies and standard strategies [29].

In summary, the cultural value system is a giant influencing factor in PNG. The safety is a major issue because fights and conflicts are the daily stuff. In order to maintain safety and peace, strong male leadership is requested. Therefore, safety and stability

may relate to this issue. In addition, because of infectious diseases such as HIV/AIDs are still a major health issue in PNG [30], people are afraid of being observed as having those diseases, which also drives people being fat.

## 5. Recommendation

Further researches are needed to be conducted in the other parts of PNG, including rural area and involving a large number of samples. To increase health awareness, engaging with schools and churches, teaching might bring better combination of food habit and study. Special attention needs to be given to the increasing prevalence of obesity in developing countries with some sort of preventive measures to reduce its complications. Nevertheless, the most important phenomena is education to raise public awareness with clear message that physical and mental strength is different from obesity.

## Conflict of Interest

The authors declare that they have no conflicts of interest.

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