琉球大学学術リポジトリ

[原著]Obesity-related impact on Quality of Life of adult healthy working population in the Republic of Palau

メタデータ	言語: English 出版者: 琉球医学会 公開日: 2015-04-23 キーワード (Ja): キーワード (En): Obesity, BMI, quality of life, workplace, Palau 作成者: Singeo, Singeru Travis Jr., Kondo, Tsuyoshi, Tanaka, Osamu, Fukuhara, Hiroshi, Michishita, Satoshi, Yakushi, Takashi, Kuba, Teizo, Nakamoto, Yuzuru メールアドレス: 所属:
URL	http://hdl.handle.net/20.500.12000/0002017768

Obesity-related impact on Quality of Life of adult healthy working population in the Republic of Palau

Singeru Travis Singeo Jr.[1)], Tsuyoshi Kondo[1)], Osamu Tanaka[2)], Hiroshi Fukuhara[1)], Satoshi Michishita[1)], Takashi Yakushi[1)], Teizo Kuba[1)] and Yuzuru Nakamoto[1)]

[1]*Department of Neuropsychiatry, Faculty of Medicine, University of the Ryukyus, Okinawa, Japan*
[2]*Department of Neuropsychiatry, School of Medicine Hirosaki University, Hirosaki, Japan*

(Received on October 3, 2012, accepted on October 24, 2012)

ABSTRACT

Aims: We aimed to investigate obesity-related impact on the quality of life of adult healthy working population in the Republic of Palau (ROP). **Method:** A cross sectional survey design using the WHOQOL-BREF with additional socio-demographic and lifestyle related questionnaires was conducted targeting health service affiliated employees including health and physical education teachers, nurses, social workers, health educators and public health staff. Employees from general occupations unaffiliated to health were also included in the survey. A total of 356 respondents completed the survey with 176 affiliated to health services and 180 from general occupations. The mean age was 42 (Range:18-68, SD=11.0). Self-reported height and weight were used to calculate respondents' body mass index (BMI) categorized in three levels: normal (18.5-24.9 kg/m^2); overweight (25-29.9 kg/m^2); and obese (30 kg/m^2>). **Results:** Over 80% of adult working Palauans targeted in the study are overweight or obese (Mean BMI=29.8). Increased BMI is associated with health-related quality of life of the population namely decreased health satisfaction ($p<.001$) and diminished body image ($p<.05$). However, perceived deterioration of physical health often accompanied by obesity was not found among the target population. Similarly, there was no significant difference in the BMI of the health service related group and their counterpart. **Conclusion:** The present findings have some implications for obesity prevention for working adults in ROP. In parallel with general prevention efforts to increase public awareness of the serious impact of obesity on physical health, immediate intervention that targets health service workers to increase obesity-related training and education and to establish concrete measures of weight reduction and management may need to be adopted to complement already existing efforts to combat the obesity epidemic in ROP. *Ryukyu Med. J., 32(1,2)13～22, 2013*

Key words: Obesity, BMI, quality of life, workplace, Palau

INTRODUCTION

The global threat of obesity and its accompanying non-communicable diseases affects both developed and developing countries. Generally with developing countries, limited health resources often prioritized for tertiary care exposes its population to the vulnerabilities of this epidemic. Current reports highlight a triple increase in developing countries within the last 20 years, particularly countries adopting a western lifestyle of increased sedentary activities and over reliance on cheap energy dense food[1)]. The Republic of Palau (ROP), a developing pacific island nation of approximately 20,000 people is faced with the overwhelming obesity epidemic[2)].

Just four decades earlier, Palauans were notably healthier largely because of subsistence livelihood, reliance on local diet and minimal exposure to development[3]. To date, ROP ranks within the top 10 of the world's most markedly obese populations where lifestyle-related diseases account for 73% of all deaths in 2002 and projection of overweight is expected to increase in both men and women over the next 10 years. The world health organization predicts an increase of 82% in men and 83% in women by 2015[4].

Genetic vulnerability[5-6]; modernization and adoption of western lifestyle[7]; urbanization and mechanization[8]; sedentary lifestyle and dietary changes[6,9], are all known factors associated with this alarming trend. Palauans are reported to live relatively inactive lives; often utilize motor vehicles and consume large quantities of carbohydrates from root plants (taro, tapioca, and sweet potatoes), imported white rice, pasta, beer, ice cream, soft drinks and chew betel-nut with cigarette. Moreover, life expectancy is notably short (men=68, women=75) with cardiovascular disease, cancer, cerebral stroke, injury and diabetes as the top five main causes of death[2]. Increasing body of research concerning Palauans document the negative physiological impact of obesity on morbidity and mortality although targeted population studies relative to prevention and intervention of obesity remains lacking. Possibly very few or no psycho-social and environmental studies have investigated the impact of obesity on subjective health or self-perceived quality of life of the Palauan people.

Effects of excess weight on the impairment of health-related quality of life (HRQOL) is well documented[10]. Obesity is known to negatively impact physical health, primarily its association with cardiovascular risks, type II diabetes, hypertension and muscular skeletal disorders[10,11]. Moreover, having excess weight has been shown to decrease the probability of reporting excellent health[12]. Nevertheless, because obesity is generally associated to development and modernization, a well regarded phenomenon, health costs relative to illness and diminished quality of life (QOL) may be undermined in a developing country like ROP.

HRQOL is a subjective measure of health purported to complement disease measures to determine a more accurate health status[13]. It is a cross-cultural concept defined by World Health Organization (WHO) 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 and concerns"[14]. Therefore, investigation of these factors (unique life goals, expectations, standards and concerns of the Palauan population) in the background of the looming obesity epidemic may provide an accurate depiction of this ever increasing problem. HRQOL is generally measured with generic or disease specific measurements. Generic HRQOL measurements are intended to provide information on general function and well-being with the advantage of allowing comparisons among different diseases or populations[10], whereas disease specific measurements are designed to identify HRQOL associated with specific health problems[15].

Similarly, social and economic related conditions such as gender, education, income and lifestyle factors are known determinant associated to obesity[16]. Of particular interests in this study is the difference in obesity prevalence and HRQOL between health service affiliate workers and employees of general occupations. Work-related factors such as job and position, job stress, and extended work have been reported to promote weight gain[17]. Intuitively health service jobs and positions with closer proximity and more exposure to health-related contents may protect employees from becoming obese. Conversely, farther proximity and less exposure to health related materials may elevate the risk of obesity among employees from general occupations.

The present study uses a generic measure of QOL, the WHOQOL-BREF to investigate two primary areas concerning the healthy adult working population in ROP: the first explores the general impact of obesity on HRQOL factors (overall QOL, health satisfaction, physical, psychological, social and environmental domain) as measured by the WHOQOL-BREF; the second observes primarily the comparative differences in HRQOL and obesity among health service affiliated employees and those employed in general occupations; and secondarily observes differences of related socio-demographic and lifestyle factors.

METHOD

Subjects

A cross-sectional survey was conducted in ROP with the WHOQOL-BREF and additional socio-demographic and health-related questionnaires. Purposive sampling method was adopted targeting health and physical education (PE) teachers and employees from various divisions of the bureau of public health and clinical services of the ministry of health (MOH). Similarly, employees from other institutions and work sites unrelated to health education, healthcare and promotion were also surveyed for comparative analysis.

The survey for health and PE teachers were completed during an annual health & PE teachers' conference held on August 29, 2011. During March 2011 the surveys for health employees including nurses, social workers, health educators, and other health personnel were distributed and collected from predetermined offices of the Palau memorial hospital, the country's main healthcare facility located in (Koror) the commercial center of ROP. A similar process was used with general occupations unaffiliated to health services, where surveys were distributed and collected from offices in Ngerulmud, the capital building of the national government and other public and private offices in Koror.

A total of 411 survey questionnaires were distributed to 117 health & PE teachers, 103 MOH employees and 191 employees from various general occupations. From the health and PE teachers' group 114 questionnaires were collected, whereas 86 were obtained from the MOH group and 183 from the general occupations group. A total of 383 questionnaires were collected (92% return rate) with 356 eligible for analysis after data cleaning process. Of the sample of 356 respondents included in the study 90 were health and PE teachers, 86 were MOH employees (collapsed into one group of 176 health affiliated employees) and 180 employees from various occupations unaffiliated to health services. Respondents identified as non-palauans (n=11) were excluded from the study because of limited sample size.

Study participation was voluntary and completely anonymous therefore respondents were instructed not to provide any revealing personal information thereby consent was given for completion of the survey questionnaire. These conditions along with the study description were clearly elaborated on the cover page of survey questionnaire.

Measures

BMI was calculated using respondents' self-reported height and weight in accordance to the WHO BMI classification[18] (18.5-24.9kg/ m^2=normal, 25-29.9kg/m^2=overweight or pre-obese I, 30-34.9kg/m^2=obese II and 35-39.9kg/m^2=obese III, and 40kg/m^2 above=obese IV). Because of sample size constraints, the highest three gradients (II, III, IV) were collapsed into one category labeled obese. Socio-demographic information including age, gender, residence, education and income were also collected. Similarly, lifestyle factors common among Palauans including chewing betel-nut with cigarette, alcohol use, soft drink consumption and physical activity were also reported. Particularly for the consumptive behaviors respondents were asked to report use, frequency and quantity. The inclusion criteria for these consumptive lifestyle behaviors primarily focused on whether respondents reported to engage in such lifestyle behaviors or not. Similarly for physical activity, type, duration, and frequency outside of the usual workday routine were reported, however the primary emphasis was on whether the respondent engaged in the activity or not.

The English version of the WHOQOL-BREF was used in this study, selected for its language appropriateness and minimal burden on respondents. It contains 26 items aggregated into four domains; physical, psychological, social, and environmental with two single items measuring overall QOL and health satisfaction. The physical domain includes seven questions concerning pain, medication, energy, mobility, sleep, activities and work. The psychological domain consists of six questions with respect to positive feeling, spirituality, thinking, body image, self esteem, and negative feelings; social domain includes three questions relative to personal relationship, sexual activity, and support. Finally environmental domain has eight questions on safety, environment, finance, information, leisure, home, services, and transportation. The instrument demonstrates good internal consistency with Cronbach alpha

values between .66 and .84.

Analysis

Descriptive statistical results of socio-demographic and lifestyle factors are presented based BMI and HRQOL factors. T-test and analysis of variance (ANOVA) were used to compare these factors. ANOVA and Analysis of co-variance (ANCOVA) were performed to compare differences in HRQOL factors by BMI categories. ANCOVA was also used to determine the differences of the individual items of psychological domain. A p value < .05 was considered statistically significant. All analyses were performed using SPSS version 13. Approval to conduct this study was obtained from the Epidemiological Research Ethics Committee of the University of the Ryukyus and the Palau institutional board for research studies.

RESULTS

Socio-demographic background and lifestyle factors based on BMI category are summarized in Table 1. The mean age is 42 (Range=18-68: SD=11.0), with gender distribution of 65% females (n=232) and 35% males (n=124). Over 80% (n=292) report living in an urban location with the remainder in rural areas. Almost 15% (n=51) report completing high school, while over 60% (n=219) have some college education however a small number report completing undergraduate and graduate studies. Reports of yearly income indicate that a little over 60% (n=226) of the respondents make less than $15,000 annually whereas under 30% fall within the income category of $15,000-$25,000. Self-reported height and weight used to determine BMI show that approximately 20% (n=66) maintain a normal BMI (18.5-24.9kg/m^2) while 35% (n=127) were overweight (25-29.9kg/m^2), and 46% (n=163) were obese (30 kg/m^2>). All observed BMI showed no indication of underweight among the respondents.

Table 2 shows an ANOVA and ANCOVA performed to compare differences in HRQOL by three levels of BMI. ANOVA revealed statistical difference in health satisfaction (p<.001) and psychological domain (p<.05). Similarly ANCOVA controlling for potential confounding effects of socio-demographic (age, gender, education, and income) and lifestyle factors found similar statistical difference in health satisfaction (p<.001) and psychological QOL (p<.05). To determine the specific component of psychological domain most associated to obesity, Table 3 highlights further analysis performed to compare individual facets scores of the psychological QOL and BMI. Among the individual facet scores, only body image (p<.001) was found to reflect the diminishing effect of psychological QOL and increased BMI.

Table 4 shows comparisons of BMI and HRQOL factors by socio-demographic and lifestyle factors. T-test revealed no significant statistical difference with BMI between health service affiliated employees and general occupations employees whereas social QOL (p<.01) was the only HRQOL factor found statistically significant between the two groups. Similarly, significant statistical difference in BMI was not found in any of the socio-demographic and lifestyle factors. However, significant statistical differences were found with all HRQOL factors (see table 4). Primarily, significant differences were found across all HRQOL factors; overall QOL (p<.01), health satisfaction (p<.01), physical QOL (p<.05), psychological QOL (p<.01), social QOL (p<.01), and environmental QOL (p<.01) between those who engage in some form of physical activity outside of daily work routine.

DISCUSSION

The association between overweight and obesity with decreased levels of HRQOL is well established[19-20]. Particularly with psychological well being, earlier studies have found obesity-related associations with compromised mental and emotional state[21] when assessed with generic and obesity specific measures[22] whereas other studies report BMI to be positively correlated with self-harm as well as borderline personality symptomatology[23]. It has also been suggested that obesity impairs the emotional health of some obese persons[24] mainly those with binge eating associations[25] and conditions such as chronic pain[26].

The present findings, however, observes increased body image dissatisfaction and diminished health satisfaction corresponding to elevated BMI,

Table 1 **Socio-demographic and lifestyle characteristics based on body mass index (BMI)**

	Total N=356	Normal 18.5-24.9 N=66 (18.5)	Overweight 25-29.9 N=127 (35.7)	Obese 30> N=163 (45.8)
	N (%)	N (%)	N (%)	N (%)
Gender				
Male	124 (34.8)	21 (31.8)	50 (39.4)	53 (32.5)
Female	232 (65.2)	45 (68.2)	77 (60.6)	110 (67.5)
Education				
High school	51 (14.3)	9 (13.6)	20 (15.7)	22(13.5)
Some college	219 (61.5)	42 (63.6)	73 (57.5)	104 (63.8)
Undergraduate	44 (12.4)	7 (10.6)	20 (15.7)	17 (10.4)
Graduate	36 (10.1)	6 (9.1)	12 (9.4)	18 (11.0)
Post graduate	6 (1.7)	2 (3.0)	2 (1.6)	2 (1.2)
Annual Income				
Below $15,000	226 (63.5)	46 (69.7)	77 (60.6)	103 (63.2)
15k-$24,999	102 (28.7)	15 (22.7)	39 (30.7)	48 (29.4)
$25,000 above	28 (7.9)	5 (7.6)	11 (8.7)	12 (7.4)
Residence				
Urban	292 (82.5)	56 (84.8)	105 (82.7)	131 (80.4)
Rural	64 (18.0)	10 (15.2)	22 (17.3)	32 (19.6)
Workplace				
Health related	176 (49.4)	31 (47.0)	63 (49.6)	82 (50.3)
General occupation	180 (50.6)	35 (53.0)	64 (50.4)	81 (49.7)
Cigarette with betel-nut				
Yes	228 (64.0)	38(57.6)	84(66.1)	106(65.0)
No	128 (36.0)	28(42.4)	43(33.9)	57(35.0)
Alcohol				
Yes	207 (58.1)	41(62.1)	73(57.5)	93(57.1)
No	149 (41.9)	25(37.9)	54(42.5)	70(42.9)
Soft drinks daily				
Yes	231 (64.9)	41(62.1)	86(67.7)	104(63.8)
No	125 (35.1)	25(37.9)	41(32.3)	59(36.2)
Extra physical activity				
Yes	237 (66.6)	47(71.2)	78(61.4)	112(68.7)
No	119 (33.4)	19(28.8)	49(38.6)	51(31.3)

in line with studies that have found little difference between obese and non-obese persons in terms of serious psychological disturbances but rather associations with negative body image and poor self-rated health[10,27]. Impaired body image with increased BMI is largely predominant among moderate to morbidly obese subjects[28], notable with almost 50% of our respondents. Our findings are further supported by a previous study that report higher likelihood of overweight persons to rate their health negatively than persons with normal weight[29].

Several studies have also pointed out that excess weight has the same effect size as poverty in predicting impaired physical and psychological HRQOL even when the presence of chronic

Table 2 **Comparisons of HRQOL by body mass index**

	Unadjusted[a]				Adjusted[b]			
	Normal N=66	Overweight N=127	Obese N=163	*p* value	Normal N=66	Overweight N=127	Obese N=163	*p* value
	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	
Overall QOL	3.9 (.71)	3.8 (.91)	3.7 (.83)	.516	3.9 (.71)	3.7 (.90)	3.7 (.83)	.704
Health satisfaction	3.7 (.79)	3.3 (.98)	3.1 (.98)	.001	3.7 (.79)	3.3 (.97)	3.1 .(98)	.001
Physical	61.0 (12.3)	58.8 (11.4)	60.6 (11.8)	.343	61.0 (12.3)	58.7 (11.4)	60.6 (11.8)	.310
Psychological	70.9 (10.5)	66.5 (11.5)	66.5 (12.7)	.028	70.9 (10.5)	66.3 (11.4)	66.5 (12.7)	.022
Social	75.5 (16.0)	72.8 (17.4)	73.9 (16.5)	.572	75.5 (16.0)	72.8 (17.5)	73.9 (16.5)	.874
Environmental	69.4 (14.6)	66.1 (15.4)	65.6 (15.3)	.211	69.4 (14.6)	66.0 (15.4)	65.6 (15.3)	.212

[a] Analysis of variance

[b] Analysis of covariance controlling for age, gender, education, income, and lifestyle factors.

Table 3 **ANCOVA of psychological domain and BMI controlling for age, gender, education, income, and lifestyle factors**

Psychological QOL	Normal N=66	Overweight N=127	Obese N=163	*p* value
	Mean (SD)	Mean (SD)	Mean (SD)	
Positive feeling	4.0(.73)	4.0(.75)	4.0(.75)	.880
Spirituality	4.3(,63)	4.2(.76)	4.2(.78)	.433
Thinking	3.7(.64)	3.6(.76)	3.6(.72)	.451
Body image	4.3(.71)	3.8(.88)	3.6(1.1)	.001
Self esteem	4.2(.74)	4.1(.78)	4.0(.84)	.275
Negative feeling	2.5(.93)	2.3(.82)	2.4(.75)	.238

conditions are considered[30-31]. The present study however could not determine any association between BMI and physical QOL with the target population. Howard et al.[32] report that there are socio-cultural and psychosocial influences on self-perception of body weight and physical health. It is probable for ethnicity and socio-cultural background of a population to influence perception of weight in relation to perceived physical health[33]. Palauans and other Pacific islanders are known to associate increased weight with social status and wealth[2,34], therefore potentially attenuates the lack of perceived deterioration in physical QOL found in this study.

The lack of perceived deterioration of physical QOL increases the threat of already escalated risks of type II diabetes, cardiovascular disease, as well as other related non-communicable diseases primarily in preventive and primary healthcare. Behavior change theory suggests that weight gain or excessive weight needs to be recognized as an issue before an individual is able to proceed on a pathway to achieving healthier weight[35].

The present findings may have some implications for intervention and prevention of the obesity epidemic in ROP. Firstly, the absence of perceived deterioration of physical QOL in relation to increased BMI may need to be addressed with regular and consistent educational campaigns that focus on increasing knowledge and awareness of the negative health impact of obesity to the working adult population in ROP.

Table 4 **Descriptive comparison of BMI and HRQOL factors by socio-demographic and lifestyle factors**

	BMI		Overall QOL		Health Satisfaction		Physical Domain		Psychological Domain		Social Domain		Environmental Domain	
	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*
Gender[a]		.714		.047		.124		.712		.586		.889		.764
Male	29.6(5.3)		3.7(0.9)		3.4(0.9)		59.7(11.8)		66.8(12.4)		73.7(16.8)		66.2(15.7)	
Female	29.9(6.3)		3.8(0.8)		3.3(1.0)		60.2(11.8)		67.6(11.8)		73.9(16.8)		66.7(15.0)	
Education[b]		.204		.603		.013		.433		.424		.661		.496
High school	30.0(5.8)		3.7(0.8)		3.5(0.9)		59.2(11.2)		65.6(12.6)		70.8(17.9)		64.4(18.9)	
Some college	29.8(5.9)		3.8(0.8)		3.4(0.9)		60.9(12.9)		67.9(12.7)		74.6(17.6)		66.6(15.6)	
Undergraduate	28.4(4.2)		3.6(1.0)		3.1(1.1)		58.5(7.3)		68.7(9.2)		74.4(15.4)		67.5(12.4)	
Graduate	31.5(7.8)		3.9(0.6)		2.9(1.0)		57.8(9.8)		64.6(10.1)		72.9(10.0)		65.8(10.0)	
Post graduate	27.8(5.8)		4.0(0.6)		3.7(0.5)		57.1(7.5)		68.1(8.2)		72.2(17.2)		75.5(6.7)	
Annual Income[b]		.738		.141		.097		.995		.794		.594		.084
Below $15,000	29.7(5.8)		3.7(.8)		3.4(.9)		60.1(12.5)		67.0(12.9)		73.2(17.6)		65.8(16.5)	
15k-$24,999	30.2(6.5)		3.7(.8)		3.1(1.1)		59.9(10.3)		67.6(10.2)		75.2(14.9)		66.3(12.6)	
$25,000 above	29.4(5.6)		4.1(.7)		3.4(1.0)		59.8(11.1)		68.6(10.7)		74.4(16.0)		72.7(11.5)	
Residence[a]		.738		.060		.664		.856		.131		.013		.095
Urban	29.8(6.2)		3.8(0.8)		3.3(1.0)		60.1(11.9)		67.8(12.2)		74.9(16.2)		67.1(15.1)	
Rural	29.6(4.7)		3.6(0.8)		3.4(0.8)		59.8(11.1)		65.3(11.1)		69.1(18.6)		63.6(15.4)	
Workplace[a]		.471		.134		.150		.154		.738		.007		.897
Health related	29.6(5.3)		3.7(0.9)		3.4(.9)		60.9(11.2)		67.1(11.9)		71.4(18.0)		66.6(15.1)	
General occupation	30.0(6.5)		3.8(0.8)		3.2(1.0)		59.1(12.3)		67.5(12.2)		76.2(15.1)		66.4(15.3)	
Cigarette with betel-nut[a]		.217		.023		.023		.032		.632		.958		.032
No	29.3(5.9)		3.9(0.8)		3.5(1.0)		61.7(11.0)		67.7(11.3)		73.8(16.8)		68.7(13.6)	
Yes	30.1(6.0)		3.7(0.8)		3.2(0.9)		59.0(12.1)		67.1(12.4)		73.9(16.7)		65.3(15.0)	
Alcohol[a]		.568		.053		.201		.002		.012		.132		.130
No	30.0(5.8)		3.9(0.8)		3.4(1.0)		62.2(11.5)		69.2(10.9)		75.4(16.0)		67.9(13.6)	
Yes	29.6(6.0)		3.7(.9)		3.3(1.0)		58.4(11.7)		66.0(12.6)		72.7(17.2)		65.5(16.2)	
Soft drinks[a]		.230		.113		249		.019		.462		.846		.540
No	30.4(6.8)		3.7(0.9)		3.2(1.0)		58.6(10.6)		66.7(11.8)		74.1(17.6)		65.8(15.4)	
Yes	29.5(5.4)		3.8(0.8)		3.4(1.0)		60.8(12.3)		67.7(12.1)		73.7(16.3)		66.9(15.1)	
Extra physical activity[a]		.641		.007		.007		.021		.002		.001		.001
No	30.0(6.2)		3.6(0.9)		3.1(1.0)		58.0(12.0)		64.6(12.7)		69.7(18.3)		62.3(16.2)	
Yes	29.7(5.8)		3.9(0.8)		3.4(1.0)		61.0(11.5)		68.7(11.4)		75.9(15.6)		68.6(14.3)	

[a] T-test,

[b] Analysis of variance

Secondly, the finding that health service affiliated group have equally elevated BMI compared to their counterpart may hint the importance of immediate intervention to simultaneously increase obesity related training and education, along with implementation of concrete measures for weight reduction and management to health service employees. Thirdly, the findings also highlight psychological concern particularly body image dissatisfaction. In light of this finding, general obesity prevention campaigns may be more informed to explore the use of use body image to promote and motivate working adults to adopt weight reduction and management measures. Finally, despite the lack of association between BMI and extra physical activity, the significant association between HRQOL is worth noting. Moreover, notably high percentage of the respondents already engage in some form of physical activity outside of work, a potential indication of health concern or perceived importance of physical activity, a protective behavior which may be used to complement future measures to reduce and/or manage weight gain.

This study has several limitations that must be considered. Firstly, its cross sectional design can only allow for correlational interpretation of its findings; thus follow up studies are needed to draw definitive and causal conclusion. Secondly, although the obesity prevalence in our sample represented the general population in Palau, the gender ratio of our subjects had grossly higher number of females while all the respondents were currently employed. Thirdly, there are recognized problems associated with the effectiveness of BMI in determining risks related to chronic diseases[36]. Furthermore, it has been found that self-reported measures are generally associated with over-reported height and under reported weight[37]. Nevertheless, it is notable that, in spite of the limiting factors surrounding self-reports and the use of BMI, our sample remains closely similar to the country's obesity profile. Moreover, chronic health conditions and commorbidities associated to obesity were not taken into account in this study. These unmeasured factors may also have impact on the current findings in this study. Finally, because of limited sample size and specific selection criteria of the study population, these findings may therefore only represent this population group thus more robust and general population studies are needed in the future to confirm the generalizability of these findings.

In summary, our findings in line with previous studies highlight an association of poor self-reported health and body image dissatisfaction with increased BMI. However, perceived deterioration of physical health often associated with obesity as reported in the literature was not confirmed in our study. Moreover, no significant differences were found in the BMI between health affiliated employees and general employees instead both groups were increasingly overweight or obese. These findings are notable in informing future obesity prevention and intervention for adult working Palauans. Finally, the nature of the study design requires further confirmation of these findings possibly with future trans-cultural studies that focus on problems associated with the subjective health of the Palauan people.

ACKNOWLEDGEMENT

We would like to thank all the respondents and key individuals from the Republic of Palau who willingly participated and assisted in this research endeavor. We are tremendously grateful for their kindness and support.

REFERENCES

1) Hossain P., Kawar B.and Nahas M.: Obesity and diabetes in the developing world - A growing challenge. New Engl J Med. 3:365, 2007.
2) Komatsu F., Kagawa Y., Kawabata T., Kaneko Y. and Ishiguro K.: Relationship of dietary habit and obesity to oxidative stress in Palauan people: compare with Japanese and Mongolian people. Current Aging Science. 2:214-222, 2009.
3) Hankin J., Reed D., Labarthe D., Nichaman M. and Stallones R.: Dietary and disease patterns among Micronesians. Am J Clin Nutr. 23: 346-357, 1970.
4) World Health Organization report, Facing the facts. 2002. http:// www.who.int/ chp/ chronic _disease_report/ Palau.pdf.
5) Neel J.: Diabetes mellitus: a thrifty genotype rendered detrimental by "progress"? Am J

Hum Genet. 14:353-362, 1962.
6) Zimmet P., Alberty K.G.M.M. and Shaw J.: Global and societal implications of the diabetes epidemic. Nature. 414:782-787, 2001.
7) Prentice A.: The emerging epidemic of obesity in developing countries. Int J Epidemiol. 35:93-99, (Doi:10.1093/ ije/ dyi272), 2006.
8) Cockram C.S.: The epidemiology of diabetes mellitus in the Asia-Pacific region. Seminar papers. Hong Kong Med J. 6:1, 2000.
9) Mayer-Davis E.J. and Costacou T.: Obesity and sedentary lifestyle: Modifiable risk factors for prevention of type 2 diabetes. Current science, current diabetes reports. 1:170-176, 2001.
10) Aguilar P.S., Munoz-Navarro S.R., Ramallo-Farina Y. and Trujillo-Martin M.M. Obesity and related quality of life in the general adult population of the Canary islands. Qual Life Res: 18:171-177, 2009.
11) Steinberger J. and Daniels S.R.: Obesity, insulin resistance, diabetes, and cardiovascular risk in Children. J Am Heart Assoc. 107: 1448-1453, (Doi:10.1161/ 01.CIR.0000060923. 07573.F2), 2003.
12) Ford E.S., Moriarty D.G., Zack M.M., Mokdad A.H. and Chapman D.P.: Self-reported body mass index and health-related quality of life: Findings from the behavioral risk factor surveillance system. Obes Res. 9:21-31, 2001 (Doi:10.1038/ oby.2001.4).
13) Skevington S.M., Lofty M. and O'Connel K.A.: The World Health Organization's WHOQOL-BREF quality of life assessment; psychometric properties and results of the international field trial, A report from the WHOQOL group: 2004.
14) WHOQOL Group. Development of the WHOQOL: Rationale and current status. Int J Mental Health. 23:24-56, 1994.
15) Le Pen C., Levy E., Loos F., Banzet M.N. and Basdevant A.: "Specific" scale compared with "generic" scale: a double measurement of quality of life in a French community sample of obese subjects. J Epidimiol Commun Health: 52:445-450, 1998.
16) Maclaren L.: Socioeconomic status and obesity. Epidemiol Rev: 29:29-48, 2007.
17) Caban A.J., Lee D.J., Fleming L.E., Gomez-Marin O., LaBlanc W. and Pittman T.: Obesity in US Workers: The national health interview survey, 1986 to 2002. Am J Public health. 95: 9, 2005.
18) World Health Organization: Obesity: Preventing and managing the global epidemic. Geneva: WHO 1998.
19) Ziebland S., Thorogood M., Fuller A. and Muir J.: Desire for the body healthy: Body image and discrepancies between self-reported and measured height and weight in a British population. J Epidemiol Community Health. 50:105-106, 1996.
20) Fontaine K.R., Barofsky I. and Cheskin L.J.: Predictors of quality of life for obese persons. J Nerv Ment Dis:185:120-2, 1997.
21) Sullivan M., Karlsson J., Sjöström L., Backman L., Bengtsson C., Bouchard C., Dahlgren S., Jonsson E., Larsson B., Lindstedt S., Näslund I., Olbe L. and Wedel H.: Swedish obese subjects (SOS)-an intervention study of obesity: Baseline evaluation of health and psychosocial functioning in the first 1743 subjects examined. Int J Obesity. 17: 503-512, 1993.
22) Fontaine K.R. and Barofsky I.: Obesity and health-related quality of life. Obes Rev: 2(3):173-182, 2001 (Doi:10.1046/j.1467-789x. 2001.00032.x).
23) Sansone R.A., Sansone L.A. and Fine M.A.: The relationship of obesity to borderline personality symptomatology, self-harm behaviors, and sexual abuse in female subjects in a primary medical care setting. J Pers Disord. 9:254-265, 1995.
24) Friedman M.A. and Brownell K.D.: Psychological correlates of obesity: Moving to the next research generation. Psychol Bull. 117:3-20, 1995.
25) Marcus M.D.: Binge eating and obesity. In: Brownell KD, Fairburn CG, eds. Eating Disorders and Obesity. New York: Guilford Press: 1995.
26) Barofsky I., Fontaine K.R. and Cheskin L.J. : Pain in the obese: Impact on health-related quality-of-life. Ann Behav Med. 19:408-410, 1998.
27) Doll H.A., Petersen S.E.K. and Stuart-Brown S.L.: Obesity and physical and emotional well being: Association between body mass index, chronic illness, physical and mental

components of the SF-36 questionnaire. Obes Res. 8. 2000.
28) Carr D. and Friedman M.: Is obesity stigmatizing? Body weight, perceived discrimination, and psychological well being in the US. J Health Soc Behave. 46: 244-259, 2005.
29) Ferraro K.F. and Yu Y.: Body weight and self-ratings of health. J Health Soc Behav. 36:274-284, 1995.
30) Kolotkin R.L., Crosby R.D. and Williams G.R.: Health-related quality of life varies among obese subgroups. Obes Res. 10:748-756, 2002 (Doi:10.1038/ oby.2002.102).
31) Fontaine K.R., Cheskin L.J. and Barofsky I. : Health related quality of life in obese persons seeking treatment. J Fam Practice. 43:265-270, 1996.
32) Howard J.N., Hugo G.J., Taylor A.W. and Wilson D.H.: Our perception of weight: socioeconomic and socio cultural explanations. Obes res clin pract: 2:125-131, 2008. (Doi:10.1016/ j.orcp.2008.03.003)
33) White M.A., O'Neil P.M., Kolotkin R.L. and Byrne T.K.: Gender, race, and obesity-related quality of life at extreme levels of obesity. Obes Res. 12:949-955, 2004.
34) Dowse G.K., Hodge A.M. and Zimmet P.Z.: Paradise lost: obesity and diabetes in Pacific and Indian Ocean populations. In: Progress in obesity research eds. A Angel, et al, London: John Libby and Co: 1994.
35) Prochaska J.O. and Norcross J.C.: Stages of change. Psychother. 38(4):4438, 2001.
36) Dalton M., Cameron A.J., Zimmet P.Z., Shaw J.E., Jolley D. and Dunstan D.W.: Waist circumference, waist-hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults. J Intern Med. 254:555-563, 2003.
37) Rowland ML. Self-reported weight and height. Am J Clin Nutr. 52: 1125-1133, 1990.