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ANALYSIS OF RISK FACTORS FOR OBESITY IN WOMEN AGED 15-49 YEARS IN SOUTH AFRICA (THE DHS PROGRAM 2016)

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ABSTRACT

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Overweight and obesity can be interpreted as abnormal fat accumulation that can cause health problems. The average BMI (Body Mass Index) in adult women has also continued to increase. This study aims to identify the relationship between age, alcohol consumption, cigarette consumption, employment status, economic status, ethnicity and area of residence with the incidence of obesity in women aged 15-49 years in South Africa and determine the most influential factors on obesity. This study is a quantitative study with a design cross-sectional using secondary data from The DHS Program 2016. Respondents in this study were women aged 15 - 49 years in South Africa as many as 1158 people. The dependent variable in this study is the nutritional status of obesity which is classified as obese if BMI ≥25 kg/m2. While the independent variables are age, alcohol consumption, cigarette consumption, employment status, economic status, ethnicity, and area of residence. Data were analyzed by chi-square and logistic regression. The results showed that the factors associated with obesity were age, employment status and economic status (p-value <0.05). The most influential factor is adult age with a range of 25 - 49 years. Therefore, there is a need for behavioral changes in adult women 25-49 years in South Africa and national monitoring evaluation of multisectoral programs for obesity prevention in South Africa.

ABSTRAK

Kata Kunci:
obesitas,
faktor risiko,
wanita,
Afrika Selatan

Overweight dan obesitas dapat diartikan sebagai akumulasi lemak yang tidak normal yang dapat menimbulkan masalah kesehatan. Rata-rata BMI (*Body Mass Index*) pada wanita dewasa di Afrika Selatan terus mengalami kenaikan. Penelitian ini bertujuan untuk mengidentifikasi hubungan usia, konsumsi alkohol, konsumsi rokok, status pekerjaan, status ekonomi, etnik dan wilayah tempat tinggal dengan kejadian obesitas pada wanita usia 15 – 49 tahun di Afrika Selatan dan menentukan faktor yang paling berpengaruh pada obesitas. Penelitian ini adalah penelitian kuantitatif dengan desain *cross-sectional* menggunakan data sekunder The DHS Program 2016. Responden dalam penelitian ini adalah wanita usia 15 - 49 tahun di Afrika Selatan sebanyak 1158 orang. Variabel terikat dalam penelitian ini adalah status gizi obesitas yang diklasifikasikan menjadi obesitas apabila BMI ≥ 25 kg/m2. Sedangkan variabel bebasnya adalah usia, konsumsi alkohol, konsumsi rokok, status pekerjaan, status ekonomi, etnik, dan wilayah tempat tinggal. Data dianalisis dengan *chi-square* dan regresi logistik. Hasil penelitian didapatkan faktor yang berhubungan dengan obesitas adalah usia, status pekerjaan dan status ekonomi (p-value < 0,05). Faktor yang paling berpengaruh adalah usia dewasa dengan rentang 25 - 49 tahun. Oleh karena itu perlu adanya perubahan perilaku pada wanita dewasa 25 - 49 tahun di Afrika Selatan dan pengawasan serta evaluasi secara nasional pada program-program multisektoral untuk pencegahan obesitas di Afrika Selatan.

INTRODUCTION

Overweight and Obesity is defined as abnormal or excessive accumulation of fat that can cause health hazards (1). Obesity can cause diseases such as type 2 diabetes, heart disease, and some cancers (2). Obesity can also be a factor in infertility or a condition in which a person does not have the ability

to conceive or give birth (3). Overweight nutritional status in adults is characterized by a BMI of 25 kg/m2 and obesity of ≥30 kg/m2, which is obtained by calculating body weight in kilograms divided by height in meters squared (4). Positive trends in BMI were analyzed, and it was found that the prevalence tends to increase in adults in South Africa (5).

The World Health Organization (WHO) reports that approximately 1.9 million adults in the world aged ≥ 18 years are overweight, of which more than 650 million people are obese. It can be said that as many as 39% of adults (≥18 years) are overweight and 13% of adults are obese (6). The prevalence of obesity in adults since 1975 (10%) in South Africa continued to increase until the last report in the Global Health Observatory in 2016 reached 28.30%. A report from the NCD Risk Factor Collaboration (NCD-RisC) states that the average BMI for women in South Africa also continues to increase; until 2016, the average BMI for women was 29.59 kg/m2, which is an increase of around 12.53% by 1975 (7).

Obesity is often considered the result of excessive food intake or a lack of physical activity. This means that there are problems with the energy balance in the body that occur during certain periods (8). The energy disparity between calories in and calories creates an energy surplus that results in excess weight. This energy imbalance is the result of individual factors supported by other factors, such as socioeconomic and environmental factors (9).

Obesity is a public health problem that has continued to increase in all age groups over the last few years (10). Globally, more than 20% of women of reproductive age are estimated to be obese (11). Changes in age can affect hormone levels in both men and women, which is associated with changes in body fat distribution (12). In addition, a case-control study conducted on the adult age group in Indonesia reported a significant difference between physical activity and age in the obese and non-obese groups. This shows that age influences physical activity in adults and geriatrics (13).

One of the socioeconomic factors related to obesity is employment status. A cross-sectional study conducted on 200 health workers in Brazil showed that athletes who work onsessionnight had less sleep time, excess body weight, and a higher BMI and abdominal circumference than those who work during the day (14). A systematic review of research on obesity and socioeconomic status in low- and middle-income countries found that in low-income countries or countries with a low Human Development Index (HDI), socioeconomic status and obesity have a positive relationship (15).

A longitudinal study conducted on children aged 3 years to 15.5 years to examine the relationship between poverty and obesity showed that poverty that occurred before the age of 2 years was related to the risk of obesity that appeared at the age of 15.5 or adolescence in both boys. years, and women (16). Not much different from the situation in low- and middle-income countries, developed countries and high-income countries also have a fairly high prevalence of obesity. A study was conducted in 20 European countries with 34,814 participants from the European social survey data. The results of this survey showed that more than half of the European population is overweight and obese, with a prevalence of 53.1%. Estimates show that the highest prevalence of overweight survey participants is in the Czech Republic (45.2%), Hungary (43.7%), and Lithuania (41.7%). The highest prevalence of obesity was observed in Slovenia (20.8%), Estonia (19.7%), and England (19.2%)(17).

Other factors such as alcohol consumption (18), cigarette consumption (19), ethnicity (20), and area of residence (21) also contribute to the incidence of obesity. The aim of this study was to determine the relationship between age, alcohol consumption, cigarette consumption, employment status, economic status, ethnicity, and region of residence with the incidence of obesity in women aged 15–49 years in South Africa and to determine the factors that most influence obesity using secondary data by the DHS Program year 2016.

METHODS

This quantitative research is unobtrusive (non-reactive) (22)with a cross-sectional design using secondary data from The Demographic and Health Surveys Program (The DHS Program) on individual records. Data collection was conducted from January to March 2016 in nine provinces stratified into urban, agricultural, and traditional areas in

South Africa. One study consolidates evidence about the epidemiology of obesity into a conceptual model, hereinafter referred to as the global obesity transition, which is divided into four stages. This study explains that the prevalence of obesity has increased substantially over the past 40 years, namely in 1975, from less than 6% to 15% in 2016 among women. It is known that in stage 2 of the transition, there has been a large increase in prevalence among adults and the existence of socioeconomic differences between women. Many countries in Latin America and the Middle East, including South Africa, are in stage 2 of this obesity transition. This means that South Africa is one of the countries that needs to anticipate the development of obesity, one of which is researching the local contextual determinants of obesity in South Africa itself (23).

Populations from these studies were women aged 15-49 years who met the requirements for the standard individual questionnaire and special module on South African adult health (8,514 respondents). There were several stages in filtering the data used, namely, removing respondents with empty or incomplete data on the dependent variable and independent variables, and obtaining a total of 1,186 respondents. Then, related to the exclusion criteria, respondents who were pregnant were excluded from the research subject candidates, and a final sample of 1,158 respondents was obtained.

The independent variables of this study were the respondent's age (adolescents:15-19 years; young adults: 20-24 years; adults:25-49 years), alcohol consumption (yes/no), cigarette consumption (yes/no), employment status (yes/no), economic status (very poor, poor, middle, rich, very rich), ethnicity (African, white, colored, Indian/Asian, other), and region of residence (rural or urban). Dependent/dependent variable in this studies was nutritional status that classified into two, namely obese if the BMI is ≥25 kg/m^2 and not obese if the BMI is <25 kg/m^2.

Data analysis was performed using descriptive methods to determine the frequency distribution of respondents' obesity. Bivariate analysis with chi-square test was performed for mI know association independent variable/dependent variable and dependent variable/independent variable (24). Univariate

analysis was carried out to determine the influence of the independent variables, and the dependent variable (25) using the logistic regression test using the Backward WALD method was also used to determine the Odds Ratio (OR) value and the independent variable, which is the main influence on the dependent variable. Statistical analysis was carried out with a confidence interval (CI) of 95% (p <0.05) using the Statistical Product and Service Solutions (SPSS) 21 application.

RESULT

In total, 1,158 respondents were included in this study. Based on Table 1, of the total respondents, 719 (62.1%) women aged 15 – 49 years were obese, and 439 (37.9%) were not obese.

Bivariate Analysis

Respondent's Age

Based on Table 2, it is known that of the 80 women in the late teenage age category, there are 27 people or 33.8% of late teenage women who are obese, and there are 53 people or 66.3% of late teenage women who are not obese. Based on the young adult age category, of the 274 women, there were 143 people or 52.2% of young adults who were obese, and there were 131 people or 47.8% of young adult women who were not obese. Based on the adult age category, of the 804 women, 549 (68.3%) were obese, and 255 (31.7%) were not obese.

Based on the results of the chi-square test, a significance value of p-value of 0.000 < α (0.05) was obtained. This result means that there was a significant association between respondent age and obesity in women aged 15-49 years in South Africa in 2016.

Alcohol Consumption

As shown in Table 2, of the 1061 women who consumed alcohol, 661 (62.3%) were obese, and 400 (37.7%) were not obese. Of the 97 women who did not consume alcohol, 58 (59.8%) were obese and 39 (40.2%) were non-obese.

The chi-square test produced a p-value of 0.706 > α (0.05). This means that there was no association between alcohol consumption and obesity in women aged 15-49 years in South Africa in 2016.

Table 1. Frequency Distribution of Obesity in Women aged 15 – 49 years in South Africa in 2016

Variable	Amount (N)	Percentage (%)
Obesity	719	62.1
Not obese	439	37.9
Total	1158	100

Table 2. Relationship between Age, Alcohol Consumption, Cigarette Consumption, Employment Status, Economic Status, Ethnicity, and Region of Residence with Obesity in Women Aged 15 – 49 Years in South Africa in 2016

Variable		Nutritional status				Amount		p value
		Obesity		Not Obese				
		N	%	N	%	N	%	
Age	Late teens	27	33.8	53	66.3	80	100	0,000*
	Young adults	143	52.2	131	47.8	274	100	
	Mature	549	68.3	255	31.7	804	100	
Alcohol consumption	Yes	661	62.3	400	37.7	1061	100	0.706
	No	58	59.8	39	40.2	97	100	
Cigarette consumption	Yes	32	60.4	21	39.6	53	100	0.906
	No	687	62.2	418	37.8	1105	100	
Job status	Yes	239	71.8	94	28.2	333	100	0,000*
	No	480	58.2	345	41.8	825	100	
Economic status	Extremely poor	155	55.4	125	44.6	280	100	0,000*
	Poor	170	59.2	117	40.8	287	100	
	Intermediate	181	63.3	105	36.7	286	100	
	Rich	130	64.4	72	35.6	202	100	
	Very rich	83	80.6	20	19.4	103	100	
Ethnic	Africa	657	62.4	396	37.6	1053	100	0.777
	Fair skin	8	66.7	4	33.3	12	100	
	Colored	48	57.1	36	42.9	84	100	
	India/Asia	6	66.7	3	33.3	9	100	
Area of residence	Rural	341	59.7	230	40.3	571	100	0.114
	Urban	378	64.4	209	35.6	587	100	

Cigarette Consumption

Based on Table 2, of the 53 women who smoked, 32 (60.4%) were obese, and 21 (39.6%) were not obese. Based on the cigarette consumption category, of the 1,105 women who did not smoke, there were 687 people or 62.2% of women who were obese, and there were 418 people or 37.8% of women who were not obese.

The results of the chi-square test showed a significant p-value of $0.906 > \alpha(0.05)$. This result indicates that there was no association between cigarette consumption and obesity in women aged 15-49 years in South Africa in 2016.

Job status

Table 2 minexplainthat of the 333 women who work, 239 people or 71.8% of women are obese, and there are 94 people or

28.2% of women who are not obese. Based on the employment status category, of the 825 women who were not working, there were 480 people or 58.2% of the women who were obese, and there were 345 people or 41.8% of the women who were not obese.

The chi-squared test results showed a p-value of $0.000 < \alpha$ (0.05). This means that there was a significant association between employment status and obesity in women aged 15-49 years in South Africa in 2016.

Economic Status

Table 2 shows that of the 280 women in the very poor economic status category, there were 155 people or 55.4% of the women who were obese, and there were 125 people or 44.6% of the women who were not obese. Based on the economic status category, of the 287 women in

the poor category, there were 170 people or 59.2% of the women who were obese, and there were 117 people or 40.8% of the women who were not obese. Based on economic status in the middle category, of the 286 women, 181 people or 63.3% of women were obese, and there were 105 people or 36.7% of women who were not obese. Based on economic status in the rich category, of the 202 women there were 130 people or 64.4% of women who were obese, and there were 72 people or 35.6% of women who were not obese.

Based on the results of the chi-square test, a p-value of $0.000 < \alpha$ (0.05) was obtained. This result means that there was a significant association between economic status and obesity in women aged 15-49 years in South Africa in 2016.

Ethnic

Table 2 shows that of 1053 women of African ethnicity, there were 657 people or 62.4% of women who were obese, and there were 396 people or 37.6% of women who were not obese. Based on ethnic categories, of the 12 women with white ethnicity, there were 8 people or 66.7% of women who were obese, and there were 4 people or 33.3% of women who

were not obese. Based on the colored ethnic category, of the 84 women there were 48 people or 57.1% of women who were obese, and there were 36 people or 42.9% of women who were not obese. Based on the Indian/Asian ethnic category, out of 9 women, 6 people or 66.7% of women were obese, and 3 people or 33.3% of women were not obese.

Based on the results of the chi-squared test, a significance value of p-value of $0.777 > \alpha$ (0.05) was obtained. This indicates that there was no association between ethnicity and obesity in women aged 15-49 years in South Africa in 2016.

Area of Residence

Table 2 explainthat of 571 women living in rural areas, 341 (59.7%) were obese, and 230 (40.3%) were not obese. Based on the area of residence in the urban category, of the 587 women, 378 (64.4%) were obese, and 209 (35.6%) were not obese.

Chi-square statistical test results: p-value $0.114 > \alpha$ (0.05). This means that there was a non-significant relationship between the region of residence and obesity in women aged 15-49 years in South Africa in 2016.

Table 3. Risk Factors that Influence Obesity in Women Aged 15 – 49 Years in South Africa in 2016

Variable		*p-value*	OR	95% CI for Exp B	
				Lower	**Upper**
Age	Young adults	0,000	0.274	0.167	0.450
	Mature	0,000*	0.554	0.415	0.738
Job status	Yes	0.036	0.732	0.547	0.979
Economic status	Extremely poor	0,000	0.370	0.212	0.645
	Poor	0.002	0.408	0.234	0.711
	Rich	0.011	0.486	0.274	0.848
	Very rich	0.019	0.500	0.280	0.891

Univariate Analysis

Based on the results of the statistical analysis in Table 3 using the chi-square test, the variables included in the logistic regression analysis were age, employment status, and economic status. The binary logistic regression test using the Backward Wald method was performed in five steps and took out several variables, namely alcohol consumption, cigarette consumption, ethnicity, and region of residence, and obtained the most dominant variable, which was a risk factor for obesity in

women aged 15–49 years in South Africa in 2016, namely the age of respondents in the adult category (25 – 49 years) with an OR value of 0.554 (p<0.05).

DISCUSSION

This research showed that of 1158 women aged 15 – 49 years in South Africa in 2016, 719 (62.1%) were obese. This shows that more than half of the participants had a BMI ≥25 kg/m2. As many as 68% of South African

women are overweight or obese, of whom 20% fall into the severe obesity category. It has been reported that the diet of South Africans has changed to sweet, high-fat, and salty foods, and physical activity has also decreased (26). Previous research on obesity in men and women aged ≥15 years in South Africa revealed that approximately 56.6% of women were overweight or obese, and 42% were abdominal obese. This result is known to be higher than that of male respondents; only 29.2% were overweight or obese and 9.2% had abdominal obesity (27).

Based on the frequency distribution of obesity incidents, the distribution of obesity among women aged 15-49 years in South Africa in 2016 occurred mostly in adults (68.3%), followed by young adults (52.2%) and late adolescents (33.8%). . The results of statistical tests with chi-square tests revealed that age was one of the factors associated with obesity in women aged 15 – 49 years in South Africa in 2016 (p-value <0.05). These results are in line with a study that revealed that age is associated with an increased risk of overweight/obesity in women aged 15-49 years in Dar es Salaam, Tanzania (28). Other research conducted in Xinjiang Province, China, also revealed a relationship between age and the incidence of overweight and obesity in the northwestern region of China (29).

The results revealed that the distribution of obesity in women aged 15–49 years was spread among the group of women who did not work, namely around 480 people. The chi-square test results showed that there was a significant relationship between employment status and obesity (p <0.05). These results are in line with research that uses data from the 2014 Kenya Demographic and Health Survey (KDHS). Women aged 15–49 years in Kenya who do not work have a significant relationship with the incidence of overweight and obesity (30). However, these results differ from those of the studies conducted in Korea between 2010 and 2015. Research explains that obesity levels increase among female workers with longer working hours and women who work night shifts (31). Research conducted in Italy also showed the same results, namely that female workers on night shift 1-2 times per week were 1.5 – 1.6 times more likely to be overweight than female workers on day shifts (32). Working overtime or working on night shifts is associated with various behaviors, including dietary habits and activity patterns, for example, lack of physical activity, increased food intake (33), and lack of sleep, and if this continues, it will negatively affect metabolism, such as obesity (34).

The results revealed that the frequency distribution of obesity in women aged 15–49 years in South Africa in 2016 was spread among 181 women with middle economic status. The chi-square test results revealed that there was an association between economic status and obesity in women aged 15 – 49 years in South Africa in 2016 (p <0.05). This finding is in line with a systematic review that concluded that there was an association between socioeconomic status and obesity in men and women(15). According to the Assistant Director of the University of Colorado Population Center, obesity and socioeconomics have a reciprocal relationship. Obesity can increase with a nation's economic development, but socioeconomic status can also increase obesity (35).

Based on the results of statistical tests using binary logistic regression, the factor with the most significant effect on the incidence of obesity in women aged 15 – 49 years in South Africa in 2016 was age, where adult age (p-value 0.000 < 0.05) had an OR value of 0.554. This means that adult women aged 25 – 49 years have a 0.554 times greater risk of obesity. In line with research on the population of women of childbearing age in the Dar es Salaam area, Tanzania, the results of the study revealed that the risk of overweight/obesity is more common in women aged 35–49 years, with a prevalence Ratios (PR) 1.59. This means that adult women aged 35–49 years have a 1.59 times risk of becoming overweight or obese (28).

There are several reasons for the development of obesity in adults. Food choices that are high in fat, sugar, or salt and contain little nutrition and high energy can be risk factors for obesity (36). Adults have more opportunities to choose what they eat. Health factors, taste, price, and travel time to a shop selling food/grocery stores (37). Lifestyle changes that lead to inactivity contribute to obesity in adults. An unhealthy environment is a threat that may cause disease (38). The environment also contributes to the incidence of obesity among adults. The modern environment makes it difficult for people to be active enough to make healthy food choices. As time passes, lifestyle, technology, and entertainment choices

increasingly lead to less active activities in both developed and developing countries (36).

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the previous discussion, the results of this study concluded that age, employment status, and economic status have a significant relationship with obesity in women aged 15–49 years in South Africa in 2016. The risk factor that most influenced the incidence of obesity in this study was the age of the respondent, namely the adult category (25 – 49 years). Adult women aged 25–49 years have a 0.554 times greater risk of obesity.

Suggestion

Based on these conditions, it is necessary to change behavior, especially among women in South Africa aged 25–49 years, by increasing knowledge about obesity, implementing dietary guidelines, and increasing physical activity. National supervision also needs to be carried out by the government on multi-sector programs to prevent obesity, such as implementing a tax on sugar, nutritional labeling on food packaging, and regulations regarding the advertising of foods high in sugar and fat.

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