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Perceptions of the causes of obesity among normal weight, overweight and obese Indonesian women: a mixed methods approach

Ismi Irfiyanti Fachruddin[1,2], Judhiastuty Februhartanty[2*], Saptawati Bardosono [1], Helda Khusun[2] & Anthony Worsley[3]

[1]*Nutrition Department, Faculty of Medicine, Universitas Indonesia/ Dr Cipto Mangunkusumo General Hospital, Jakarta, Indonesia;* [2]*Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON)/ Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Jakarta, Indonesia;* [3]*Institute of Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Australia.*

ABSTRACT

Introduction: Overweight and obesity (OW/OB) among adults is a public health concern in Indonesia. While OW/OB is generally attributed to consumption in excess of expended energy, understanding the perceptions of the causes of obesity among OW/OB individuals may provide insights for developing appropriate obesity-reduction interventions. **Methods:** This study used a mixed methods approach, comprising a quantitative online survey and in-depth interviews. The online "International Families and Food Survey" was conducted in 2014 by Global Market Insite (GMI) to elicit response of Indonesian women to 12 likely causes of obesity, based on a 5-point rating ranging from 'definitely disagree' to 'definitely agree'. A total of 377 respondents aged 18-49 years from Jakarta participated, comprising 221 normal weight (NW) and 156 OW/OB based on World Health Organization (WHO) cut-offs. Additional 16 informants who fulfilled the inclusion criteria were recruited for in-depth interviews to gather further insights on causes of obesity. Logistic regression was conducted to assess the likelihood of socioeconomic factors in predicting "agreement on the likely causes of obesity". **Results:** The online survey showed that the NW and OW/OB respondents provided quite similar rating response to each of the likely causes of obesity. Unmarried and middle socioeconomic status (SES) respondents were significantly more likely to agree on the perceived causes of obesity, compared to married and high SES. In-depth interviews revealed OW/OB informants attributed obesity to environmental factors, compared to individual factors attributed by NW informants. **Conclusion:** Use of mixed methods approach provided insights for the development of obesity-reduction interventions among Indonesian adult women.

Keywords: Indonesia, obesity, overweight, women, perception on obesity causes

INTRODUCTION

The prevalence of overweight and obesity (OW/OB) has escalated worldwide. In 2014, more than 1.9 billion adults, aged 18 years and older, were overweight with higher prevalence in women (15.0% women versus 11.0% men) (WHO, 2015). Of these, over 600 million were obese.

*Corresponding author: Dr. Judhiastuty Februhartanty
SEAMEO RECFON, Jl. Salemba Raya 6, Central Jakarta, 10430, Indonesia.
Tel: +628129260634, Fax: +62-21 3913933
Email: judhiastuty@yahoo.com; jfebruhartanty@seameo-recfon.org

The worldwide prevalence of obesity more than doubled between 1980 and 2014 (WHO, 2015).

Asian countries have also experienced increases in OW/OB prevalence. The increase in prevalence in China over the last 20 years was 400% (Asia Pacific Cohort Studies Collaboration, 2007). Malaysia experienced a three-fold increase in obesity prevalence among adults, from 4.4% in 1996 to 14.0% in 2006 (Khor, 2012). Likewise, OW/OB prevalence among adults in Vietnam more than doubled from 1992 to 2002 (2.0% to 5.7%) (Tuan, Tuong & Popkin, 2008). In Indonesia, OW/OB among adults have become a serious public health problem (Kemenkes RI, 2007; Kemenkes RI, 2010; Kemenkes RI, 2013). The National Basic Health Survey reported that approximately 13.5% of adults (ages ≥18 years) were overweight and 15.4% were obese, with the prevalence being higher among women in urban areas, and in individuals with higher education (Kemenkes RI, 2013). This situation is likely to worsen considerably unless preventive measures are taken.

Being OW/OB is the consequence of consumption of energy in excess of expenditure (Kazaks & Stern, 2013). This imbalance between food consumption and physical activity is influenced by an individual's health behaviour and environmental factors (Kazaks & Stern, 2013). An individual's health behaviour is, in turn, affected by psychological and physical capabilities that include having the necessary knowledge and skills (Michie, van Stralen & West, 2011). People's thoughts (or cognitions) have a direct influence on behaviour (Kazaks & Stern, 2013). As part of individual's cognition, perception plays an important role. Perception is a "process by which individuals organise and interpret their sensory impressions in order to give meaning to their environment" (Robbins & Judge, 2013). According to Passer & Smith (2009), "how people perceive a situation determines a different reaction and each reaction creates a different outcome". Understanding the perceptions of OW/OB people themselves about the factors leading to obesity may increase our understanding on how they may respond to weight-reduction interventions.

The rapid increase in the prevalence of OW/OB among adults has led to the development of large-scale prevention strategies (Aronne *et al.*, 2009). However, for population-level prevention strategies to be effective, they need to be accepted and supported by the general population, which, in turn, requires an understanding of the perceptions, beliefs and attitudes held within the affected community (Lombard, Deeks & Teede, 2009).

Several studies have investigated people's perceptions of the causes of OW/OB (Dryer & Ware, 2014; Jiménez-Cruz *et al.*, 2012; McFerran & Mukhopadhyay, 2013). Some have reported that people's perceptions about obesity are associated with their own body mass index (BMI), and OW/OB individuals tend to be more aware of the likely causes of obesity (Oksel, Gündüzoğlu & Topçu, 2015; Wang & Coups, 2010). However, psychological factors, such as the perceived control of body weight (Jiménez-Cruz *et al.*, 2012) and personal and social influences, have been less extensively studied. Few studies have compared the perceptions about the cause of obesity between OW/OB and normal weight (NW) subjects (Dryer & Ware, 2014; Oksel *et al.*, 2015; Wang & Coups, 2010). Such comparisons are useful for designing appropriate obesity-reduction intervention programmes that provide a comprehensive understanding of an individual's views regarding obesity (Nissen & Holm, 2015).

The present study comprised two objectives, namely (1) to analyse data obtained from the International Food and Families (IFF) online survey conducted in 2014 by Global Market Insite (GMI) on the perceptions of the causes of obesity

among Indonesian women with NW and OW/OB; and (2) to interview in-depth, eligible women in order to obtain further insights on women's perceptions of the causes of obesity.

MATERIALS AND METHODS

This study employed a mixed methods study design, in which the quantitative on-line survey preceded the qualitative study.

On-line survey

Study design and respondents

The data from the IFF online survey conducted in 2014 by GMI was used in this study. The GMI is an online market research company that carried out the IFF survey in Australia, China, Singapore, Vietnam and Indonesia for Deakin University, Australia. A large number of questions were posed in The Families and Food Survey (FFS) (Worsley *et al.*, 2017). The FFS database provided a convenient sample of volunteers who fulfilled the inclusion criteria of being adults aged 18–64 years who were the main household food providers. The latter was ascertained via a screening question "Who does the food shopping in your household?". Respondents who did not self-identify as food providers were excluded from the survey. Potential respondents were sent an email inviting them to participate (Worsley & Ridley, 2014a; Worsley & Ridley, 2014b). The FFS data was used with permission of the principal investigator of the online survey (Professor Tony Worsley).

This report focused on the findings of the perceptions of the Indonesian respondents on the causes of obesity. The online survey included 377 Indonesian women from Jakarta and West Java, aged 18–49 years. Out of the total, 221 women had NW while 156 women were classified as OW/OB based on BMI derived from self-reported height and weight. The BMI categories were based on the Asia Pacific Classification System (NW: 18.5–22.9 kg/m^2; OW/OB: ≥23.0 kg/m^2) (WHO Expert Consultation, 2004). All respondents had access to the Internet and were predominantly university graduates.

The respondents were asked to provide information on demographic characteristics, including age, education, marital status and household income, as well as their current body weight and height. The respondents were also requested to provide their ratings on a list of 12 likely causes of obesity. They were asked to rate their perceptions as to whether they agreed or disagreed with each of the items on a 5-point scale, ranging from 1 = Definitely not a cause of obesity; 2 = Not a cause of obesity; 3 = Not sure/neutral; 4 = A cause of obesity; 5 = Definitely a cause of obesity.

Data analysis

SPSS for windows version 20 was used to analyse the response from the online participants. The 5-point scale reliability was determined by using Cronbach's alpha to measure the internal consistency, that is, how closely related the items were as a group. The Cronbach's alpha for the likely causes of obesity was acceptable at 0.721. The logistic regression was conducted to assess the likelihood of the socioeconomic factors of the respondents in predicting the outcome of obtaining ratings of "1-3" and "4-5", namely "disagree" and "agree" with the likely causes of obesity provided.

In-depth interviews

Informants and conduct of interviews

The informants were recruited from among women aged 18–49 years who were studying or working in Universitas Indonesia and living in Jakarta or its surrounding areas. Jakarta was chosen out of convenience as the study site for the face-to-face interviews. The first informant was knowingly selected while the rest were recruited using the snowball sampling technique. A total

of eight OW/OB and eight NW subjects were recruited. The interviews were held in a place with minimum noise. The interviews were audio-recorded with the permission of the informants. Each interview lasted approximately 60 mins. Two informants with some incomplete information were contacted via short message service and phone calls for additional interviews for clarification of their responses.

The in-depth interviews were focused on exploring the women's perceptions of the causes of obesity. The questions covered included concerns about their body weight and the steps they took to control their weight. Each interview commenced with the introduction of the researcher to the participants followed by an explanation about the study aims and activities. All the participants gave their consent to be included in the interview. Pictures related to the causes of obesity were used as interview tools.

Data analysis

A thematic data analysis of the interview data was performed according to Ulin & Robinson (2005). A preliminary analysis was conducted in the field during data collection for each interview. All the recorded in-depth interviews were transcribed verbatim. Repeated readings of the transcripts and listening to audio recordings by the researcher achieved data familiarisation. Development of codes and arrangement of the initial codes into a provisional set of themes was performed, followed by discussions with the research team to check for potential themes within the data against coded extracts and the complete dataset. The themes were refined to ensure that they accurately discriminated each other and conveyed the key messages from the interviews. Finally, the themes that emerged between the NW and OW/OB groups were compared. All processes were documented on Microsoft Word and Microsoft Excel.

Ethical considerations

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. All procedures involving human subjects were approved by the Deakin University HEAG-H (Online Survey) and Ethical Committee of the Faculty of Medicine Universitas Indonesia (Qualitative study - Number 1069/UN2.F1/ETIK/2015). Written informed consent was obtained from all subjects.

RESULTS

Characteristics of respondents and informants

The sociodemographic characteristics of the online respondents (N=377) and in-depth interview informants (n=16) are shown in Table 1. There were 156 NW/OB and 221 NW respondents with no significant differences in their sociodemographic characteristics. Almost all the respondents (92.8%) had university level education (bachelor degree or higher), while more than half of them were married and ranged in age from 30-49 years.

The in-depth interview informants comprised 16 Indonesian women, of whom eight were NW and eight OW/OB. These informants were recruited because they had similar socioeconomic characteristics as the online respondents who were aged 19-49 years and mostly had university level education.

Online survey analysis

Respondents' ratings of the likely causes of obesity

The ratings of the respondents for the 12 likely causes of obesity are shown in Table 2. Based on the 5-point scale, a high proportion (exceeding 80.0%) of the respondents, regardless of their BMI status, rated either a 4 or 5, thereby perceived to "agree" or "definitely agree", with each of the following likely causes of obesity: eating oversized servings of foods; lack of physical activity

opportunities; people did not exercise enough; over-consumption of sugar sweetened drinks; regular consumption of fast foods; people were not aware of the dangers of obesity.

In contrast, ratings of either 1 or 2, indicating agreement with "definitely not a cause or not a cause of obesity" were accorded by at least 30.0% of the respondents, regardless of their BMI to: lack of safe cycling and walking paths. There was a sizable percentage (about 25.0-35.0%) of both NW and OW/OB respondents who expressed "not sure" (rating=3) for these likely causes of obesity: modern technology; lack of safe cycling and walking paths; promotion of unhealthy foods and low prices of unhealthy foods.

Logistic regression analysis

The logistic regression analysis showed that among the socioeconomic factors included in the study, two were significant with ratings of "4-5", that is "agree" with the likely causes of obesity provided (Table 3). First, being unmarried was 1.77 times significantly more likely (95% CI: 1.10-2.83; p=0.018) than being married for rating agreement with the causes of obesity. Also, respondents from the middle socioeconomic status (SES) were 1.84 times more likely

Table 1. Socioeconomic characteristics of the online survey respondents (N=377) and in-depth interview informants (n=16), who were classified according to body mass index (BMI)[†]

Characteristics	*Online respondents*				*In-depth interview informants*	
	Total (n = 377)	*Normal weight (n = 221)*	*Overweight/ Obese (n = 221)*	*p*[‡]	*Normal weight (n = 8)*	*Overweight/ Obese (n = 8)*
	%				n	
Age				0.451		
19–29 years	41.4	43.0	39.1		4	4
30–49 years	58.6	57.0	60.9		4	4
Education level				0.252		
school	7.2	5.9	9.0			
university	92.8	94.1	91.0		8	8
Marital status				0.428		
not married	40.8	42.5	38.5		4	4
married	59.2	57.5	61.5		4	4
Socioeconomic status (SES)[§]				0.095		
low	34.5	33.5	35.9			
middle	34.0	30.8	38.5			
high	31.6	35.7	25.6			
Working status						
not working					6	1
working					2	7

[†]Body mass index (BMI) categorised as normal weight (NW: 18·5–22.9 kg/m^2); overweight and obese (OW/OB: ≥23.0 kg/m^2) based on WHO Expert Consultation (2004)

[‡]Chi-square test; significance p<0.05

[§]SES was defined based on tertiles of wealth index score (household ownership of assets) (MOH Indonesia, 2013)

Table 2. Ratings (%) of the likely causes of obesity among the online survey respondents (N=377) according to BMI status[†]

Likely causes of obesity[‡]	*Normal weight (n = 221)*					*Overweight/Obese (n = 156)*				
	5-point scale[§]					*5-point scale*[§]				
	1 (%)	*2 (%)*	*3 (%)*	*4 (%)*	*5 (%)*	*1 (%)*	*2 (%)*	*3 (%)*	*4 (%)*	*5 (%)*
1. Modern technology	11.3	11.3	35.3	30.3	11.8	6.8	6.8	26.2	41.2	19.0
2. Lack of safe cycling and walking paths	13.1	17.2	33.5	31.2	5.0	16.0	15.4	34.0	26.9	7.7
3. Promotion of unhealthy foods	6.8	6.8	26.2	41.2	19.0	7.1	11.5	25.6	38.5	17.3
4. Low prices of unhealthy food	5.4	10.0	26.7	38.8	19.9	6.4	7.7	23.1	37.8	25.0
5. Eating over-sized servings of foods	6.5	4.1	6.3	30.8	58.4	0.6	1.3	4.5	33.3	60.3
6. Lack of physical activity opportunities	1.4	2.7	11.8	48.9	35.3	0.6	5.8	9.6	47.4	36.5
7. People do not exercise enough	2.3	3.2	4.1	47.1	43.4	0.6	2.6	7.1	40.4	49.4
8. Over-consumption of sugar sweetened drinks	0.9	5.4	2.3	38.0	53.4	1.3	3.8	4.5	35.9	45.5
9. Regular consumption of fast foods	1.8	2.7	8.6	34.8	52.0	2.6	4.5	10.3	34.0	48.7
10. People are not aware of the dangers of obesity	0.5	3.2	10.9	46.6	38.9	1.3	4.5	12.8	44.9	36.5
11. Lack of will power	5.0	5.4	29.0	42.5	18.1	4.5	6.4	23.7	37.8	27.6
12. Lack of availability of healthier foods	7.7	12.2	25.3	35.3	19.5	9.0	12.2	23.1	35.9	19.9

[†]Body mass index (BMI) categorised as normal weight (NW: 18·5–22.9 kg/m^2); overweight and obese (OW/OB: ≥ 23.0 kg/m^2) based on WHO Expert Consultation (2004)

[‡]Likely causes of obesity provided in the online survey

[§]5-point rating scale consists of: 1 = Definitely not a cause of obesity, 2 = Not a cause of obesity, 3 = Not sure/neutral, 4 = A cause of obesity, 5 = Definitely a cause of obesity; reliability analysis of the 5-point rating scale: Cronbach alpha: 0.721; variance: 34.77%

(95% CI: 1.10-3.07; p=0.019) of rating agreement with the causes of obesity, than the high SES counterparts. The logistic regression analysis revealed that, compared to the NW, the OW/OB women showed no significant difference in rating agreement with the causes of obesity.

Individual vs environmental causes of obesity

Out of the 12 likely causes of obesity provided to the online respondents, seven were arbitrarily classified as "individual factors", indicating that these are actions or conditions that empower an individual to act in combating obesity. The remaining five causes of obesity were classified as "environmental factors" indicating they were beyond an individual's control, being more influenced or driven by industry, the government or other external parties.

Figure 1a and Figure 1b portray the perception response of the NW and OW/OB respondents towards the individual and environmental factors, respectively, as the likely causes of obesity. Overall, the NW and OW/OB respondents showed similar responses towards each of the individual and environmental factors as likely causes of obesity. The individual factor "over-consumption of sugar sweetened drinks" was ranked by most of the NW (91.4%) and OW/OB (90.4%) respondents as the most likely cause of obesity. Consuming "over-sized servings of foods" was also highly perceived as an individual level factor of obesity (89.1% NW and 93.6% OW/

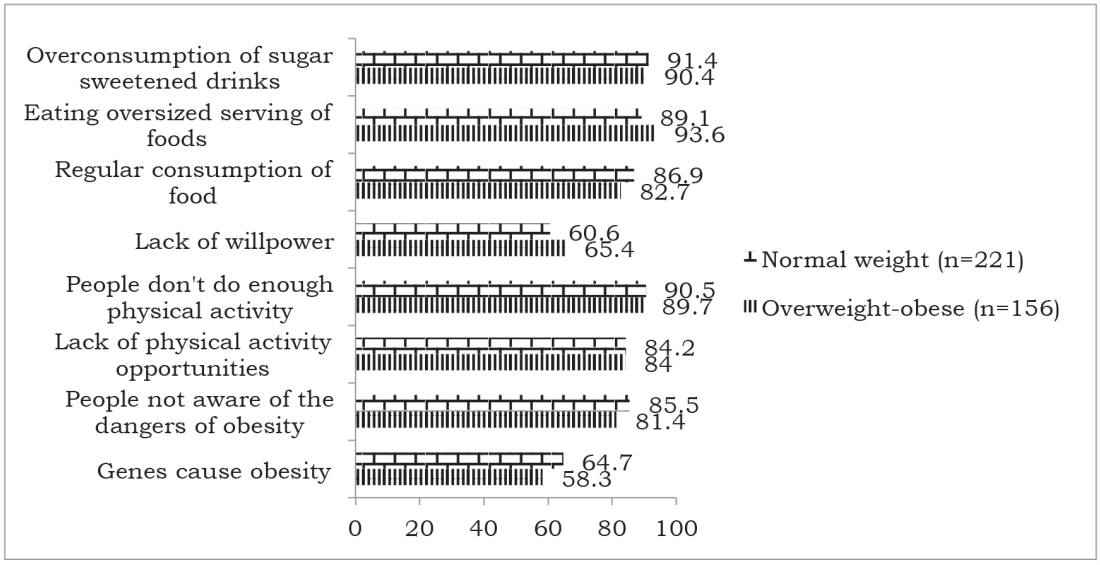
Table 3. Logistic regression analysis showing the likelihood (odds ratio) of socioeconomic factors in predicting "agreement with the likely causes of obesity" among the online respondents (N=377)

Socioeconomic factors	*Agreement with the likely causes of obesity*[†]		
	Odds ratio	*95% CI*	*p*
Body mass index			
Overweight/obese	0.91	0.59–1.39	0.682
Normal weight (Reference)			
Age			
19–29 years	0.91	0.57–1.45	0.701
30–49 years (Reference)			
Education	0.679	0.29–1.56	0.363
School			
University (Reference)			
Marital status	1.77	1.10–2.83	0.018*
Not Married			
Married (Reference)			
Socioeconomic status (SES)[‡]	1.05	0.61–1.82	0.844
	1.84	1.10–3.07	0.019*
Low			
Middle			
High (Reference)			

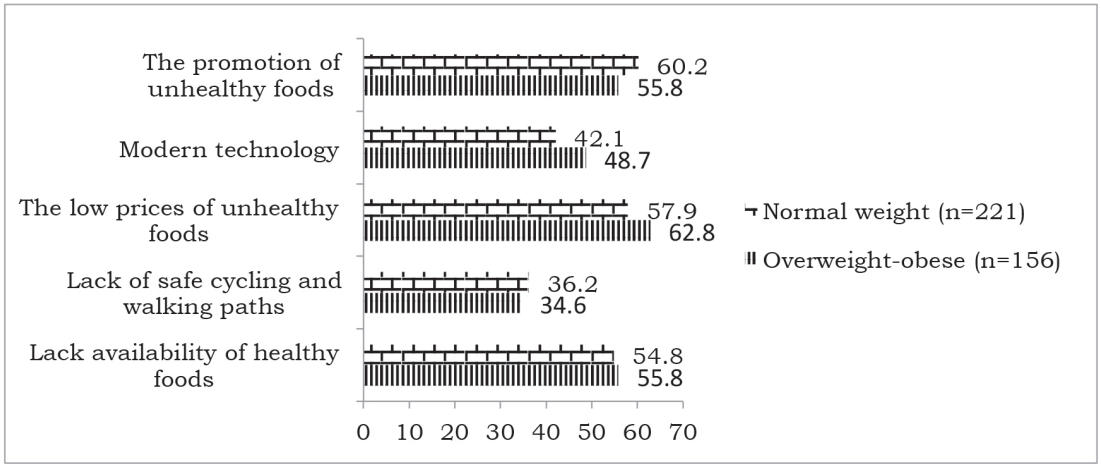
[†]Based on the respondents' ratings, whereby ratings were recoded as "disagree" (1-3) and "agree" (4-5) with the 12 likely causes of obesity based on the 5-point rating scale: 1 = Definitely not a cause of obesity, 2 = Not a cause of obesity, 3 = Not sure/neutral, 4 = A cause of obesity, 5 = Definitely a cause of obesity

[‡]SES was defined based on tertiles of wealth index score (household ownership of assets) (MOH Indonesia, 2013)

*p<0.05



(a)



(b)

Figure 1. (a) Distribution (%) of response to individual factors and (b) environmental factors as likely causes of obesity, among the online respondents (n=377) according to NW vs OW/OB status

OB). Physical inactivity and the lack of opportunities for the conduct of physical activity were also perceived by NW and OW/OB as important individual factors leading to obesity.

In general, lower percentages of the NW and OW/OB respondents attributed obesity to environmental factors. Among the environmental factors, "promotion of unhealthy foods" ranked high as a cause of obesity (60.2% NW and 55.6% OW/OB), while "low prices of unhealthy food" was also perceived as an important environmental factor leading to obesity (57.9% NW and 62.8% OW/OB).

Table 4. Individual and environmental factors perceived as causes of obesity by informants of in-depth interviews

	Individual Factors	*Environmental Factors*
Normal Weight Group	• Over-consumption of fatty food, salty food, high calorie food, fast food, soda, junk food, sweet beverages, sugar, sweet food • Over-consumption of calories • Over-consumption of meat, less vitamins and fibre • Skipping breakfast • Regular snacking habit • Extreme dieting • Lack of physical activity • Too much sitting • Stress • Lack of willpower • Genetic factors	• Lack of availability of healthy food • Frequent hanging out with friends
Overweight/ Obese Group	• Over-consumption of food • Consumption of sweet food, sugar, junk food, sweet beverages • Regular snacking habit • Unhealthy eating patterns such as eating late after 10 pm • Lack of physical activity • Stress • Lack of willpower • Too much sleeping • Metabolic factors • Genetic factors	• Lack of availability of healthy foods • Frequent meetings with clients at cafés • Frequent hanging out with friends • Lack of support from friends • Use of modern technology

Analysis of in-depth interviews

Perceived causes of obesity

The factors identified by the informants as the probable causes of obesity were classified as individual level and environmental causes of obesity. NW informants identified more individual factors whilst OW/OB informants tended to attribute obesity to environmental factors (Table 4). NW informants said that consuming more sugary and fatty foods, over-consumption of food and eating larger portions of food were causes of obesity of individuals.

> *"The composition of food is not really good. For example, the fat is too much because there is too much meat or there are less vitamins and fibre. Also, there are less vegetables and fruits"* (NW, 25 years old, married, working)

> *"The types of food consist more of fat, especially fast food which is high calorie and high fat, which certainly will cause obesity"* (NW, 29 years old, unmarried, working)

Metabolic factors and stress were also stated as the causes of obesity.

> *"The metabolism in each person is different, for example although my physical activity is less, my food consumption is also less, but if I eat certain foods like chocolate or milk, tomorrow my body weight will increase"* (NW, 26 years old, unmarried, working)

"Stress could also, lead to obesity; sometimes if we feel stressed we eat too much and it can make us obese" (OW/OB, 31 years old, unmarried, working)

NW women stated that extreme dieting and snacking habits might cause obesity.

"Going on extreme diets by drastically reducing the portion of food consumed triggers severe hunger pangs, which causes one to consume more food than previously, leading to an increase in body weight" (NW; 28 years old, married, unemployed)

"Always snacking. Like snacking while watching TV, if we run out a snack we then take another snack" (NW, 24 years old, unmarried, working)

Skipping breakfast and a lack of physical activity may cause obesity.

"Breakfast could cause obesity if too much is eaten. Sometimes, I avoid breakfast and I only drink milk" (NW, 25 years old, married, working)

"Eating patterns and a lack of physical activity also can lead to obesity; it happens if we are too lazy to move but we eat too much" (NW, 37 years old, unmarried, working)

"What we eat and what we do physically is not balanced. We eat too much food, but we do not do enough physical activity" (OW/OB, 29 years old, unmarried, unemployed)

When shown a set of pictures of street filled with fast food restaurants, predominantly individual factors were considered to be important by NW women.

"If an individual wants to be on a diet, they can and not be influenced by their environment" (NW, 22 years old, unmarried, unemployed)

"If we sit too much for too long. Such as if we sit in front of computer. I do not think this is good as we can become fatter" (NW, 31 years old, married, working)

Compared with NW women, their OW/OB counterparts identified more environmental factors as causes of obesity. Some of these were not mentioned by the NW women, such as frequent meeting with clients at cafés, no support from friends and modern technology.

"One of my friends said because she often had meetings at hotel, the variation of food is less. It is difficult to find healthy food, and it can influence our body weight later" (OW/OB, 27 years old, married, working)

One overweight woman stated that the increasing prevalence of obesity was the result of modern technology.

"One impact of current technology is that we are not required to move physically. As a result, people become fatter because they are becoming lazier to move" (OW/OB, 21 years old, unmarried, working)

Several overweight women also remarked that their friends did not support them and that their working environment contributed to their obesity.

"For instance, she has a friend named XX, and they always hang out and eat together. Suddenly, she wants to be on a diet, but XX says you do it by yourself. Even then, XX still always asks her to hang out together and have

lunch or dinner together, although XX knows that she is on a diet. This kind of friend has a great influence and does not offer support. This makes it difficult to diet" (OB/OB, 25 years old, unmarried, working)

"We cannot avoid meetings. Nowadays, meetings always take place at coffee shops, and they take a long time. We often drink something sweet and we stay out longer" (OW/OB, 27 years old, married, working)

One item that was not included in the options for causes of obesity in the online survey, was provided by married NW women and an overweight woman. This was the influence of children in the selection of foods. It was mentioned in the in-depth interviews of the older, married NW and the overweight women. A married, obese woman commented:

"For example, when my children want to eat at a fast food restaurant, and I am compelled to follow my children's wishes, even though I know that this food causes me to gain body weight" (OW/OB, 34 years old, married, unemployed)

The results of the interview from both the groups revealed that most sources of obesity information came from the Internet. Experiences of friends and information from personal trainers were also mentioned as other sources of information about obesity.

"...from my personal trainer. At that time, there was a nutritionist from the fitness centre where I took the programme. He told me everything: which foods to avoid or eat in limited amount, the portions that needed to be decreased, and the alternatives" (OW/OB, 28 years old, unmarried, working)

"If we are asked to hang out, by boyfriend or friend, we cannot refuse. Of course if we go out, it is impossible not to eat outside" (NW, 30 years old, married, working)

DISCUSSION

The online response regarding the likely causes of obesity showed close similarities between NW and OW/OB respondents. Both groups recorded high ratings of agreement for several likely causes of obesity. In contrast, findings from the in-depth interviews showed qualitative differences, in that NW informants identified more individual factors as causes of obesity, compared to OW/OB informants, who tended to attribute obesity to environmental factors.

Obese people tended to believe that societal responsibility, such as high cost of food, had contributed to the increased prevalence of obesity (Brady, 2016; Dryer & Ware, 2014; Okonkwo & While, 2010). This study also indicates that the perceived causes of obesity described by the informants were more complex than simply a 'dietary' versus 'exercise' theory. The lack of willpower and of support from friends, frequent meeting with clients at café, hanging out with friends and modern technology were also perceived as causes of obesity. Several other factors are also known to contribute to a person's weight, including family history and genetics, the metabolism of the individual, as well as behaviour and habits (Kazaks & Stern, 2013; Dryer & Ware, 2014).

The in-depth interviews raised the influence of children in the selection of food among older and married NW and OW/OB informants. This is consistent with the finding among Australian parents (Venn *et al.*, 2007). While the informants were aware that the consumption of fast foods was a cause of obesity, they could not resist the pressures resulting from the dietary

preferences of their children (Michie *et al.*, 2011).

Several factors are important in "shaping up of, and sometimes distorting, common perceptions" about obesity. These include the sources of information related to obesity, such as the Internet, (which is the main source of information), followed by the individual's own history of being obese, the experiences of friends and previous weight-reduction practices. (Covic, Roufeil & Dziurawiec, 2007; Robbins & Judge, 2013).

Limitations of study

Since this study relied on self-reported information, body weight and height might be wrongly estimated, rendering computation of NW, OW/OB incorrect. The anonymous nature of the questionnaire might have assisted in reducing this bias. The use of pictures as a tool in the in-depth interview to stimulate recall might have biased or influenced the responses of the subjects. Finally, the respondents of the online survey and the informants for the in-depth interviews were recruited from different locations, although the inclusion criteria in both studies were similar.

CONCLUSION

The study revealed that Indonesian women with NW and OW/OB attributed obesity to different factors. While NW women identified individual factors, OW/OB subjects tended to attribute obesity to environmental factors. The results of this study may be used for drawing up weight-management strategies or obesity-control programmes. Such interventions should include increasing the awareness and the empowerment of Indonesian women who seek information about obesity. The knowledge of how individual and environmental factors interact with each other may stimulate changes in the eating behaviour of OW/OB women, which is important in weight-management programmes. Future research should also cover wider geographical, social and cultural contexts, especially among Indonesian women of the low economic status, in order to gauge perceptions on the causes of obesity across a wide spectrum of the Indonesian society.

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Authors' contributions

FII, contributed to the conception and design of the work, obtained and analysed the data, compiled the first draft of the manuscript, was involved in the critical revision of the draft and approved the final draft; FJ, BS, KH and WA all contributed to the conception and design of the work, obtained and analysed the data, were involved in the critical revision of the draft and approved the final draft.

Conflict of interest

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