Determinants of Low Back Pain among Operating Room Nurses in Gaza Governmental Hospitals

Yousef Aljeesh[1], Samer Al Nawajha[2]

1. Health consultant. Islamic University of Gaza
2. Manager at Nasser Hospital-Gaza

Abstract: *Globally, Low Back Pain (LBP) comprises a significant occupational hazard in nursing profession. This study aimed to identify determinants of LBP among operating room nurses at Governmental hospitals in Gaza governorates. The design of this study is a quantitative, descriptive, analytical, cross-sectional one. To ensure validity of the instrument; face, content and criterion related validity were carried out and to test reliability of the instrument; small scale reliability test and Cronbach's Alpha coefficient were carried out. The study population consisted of 159 nurses who represented all the target population. The researcher used a self-constructed, self administered questionnaire. In total, 143 respondents completed the questionnaire with a response rate of 89.9%. Different statistical procedures were used for data analysis including cross tabulation, percentages, mean and Chi square test. The results revealed that the overall prevalence of low back pain among operating room nurses was 70.6%. The prevalence of pain was 68.2% among males and 78.8% among females. The highest complaint of low back pain (100.0%) was reported among those who have a long work experience (23 – 36 years). The prevalence of LBP was 82.8% among those who have body mass index (BMI) more than 30. There were no significant differences between (gender, years of experience and BMI) and LBP distribution. Prolonged time standing during surgery was the main risk factor for low back pain (67.1%), followed by work overload (65.0%), lifting and transferring patients (62.9%). The study concluded that work related LBP was high among operating room nurses which might affect work quality, productivity and the quality of nurses life.*

Key wards: Low back pain,Determinants,Operating room nurses, Gaza hospitals

Introduction

Work related musculoskeletal disorders (WRMSDs), in particular low back pain (LBP), pose a major health and socioeconomic problem in modern society. Globally, the prevalence of musculoskeletal

conditions among nursing staff, according to Smith, et al. 2004 reached 70% in 2004 while the percentage for lumbar spine pain was 56.7% (Roupa, *et al*. 2008). It has been shown that 60–80% of the general population suffers from low back pain at some time during their lives. Among nurses the lifetime prevalence was found to be slightly higher, varying between 56% and 90% (Maul, *et al*. 2003). In the hospital environment, nurses are known to be a high risk group because of patient lifting and other postural requirements of their job.

Several studies have focused on the prevalence and risk factors of low back pain among nurses, while other studies have highlighted the problem among physiotherapists. An estimated 12% of nurses leave the profession annually because of back injuries, and over half of them complain of chronic back pain, lifting and moving patients manually has been identified as a high risk activity. Moving or lifting patients in bed was perceived to have precipitated 61% of the low back pain episodes and 60% of the lost workdays (Nelson, 2006). One study showed that 18% of nursing personnel stopped working because of low back pain (Maul, *et al*. 2003) and nurses have six times higher prevalence of back trouble in comparison with other professions (Dawson, *et al*. 2007). In 1990, the estimated cost of back pain ranged from 50 to 100 billion dollars annually in the United States which reflect productivity, recruitment and retention of nurses (Nelson, 2006). The prevalence of LBP among physical therapy professionals in Gaza Strip is 56.9% (Masoud, 2008). Nurses' compensation for back injury comprises 56.4% of all indemnity costs and 55.1% of all medical costs. El Astal in 2010 showed that the prevalence of musculo-skeletal pain was 68.7% among laboratory technicians in Gaza Governmental hospitals. In one Australian state, nurse back injury claims attributed 2.39 million dollars expenditure in one financial year (Dawson, *et al*. 2007). In 1986, Arad et al. in a study carried out at the Royal North Hospital of Australia amongst 1033 nurses, found an 87% incidence and a 42% prevalence for lower back pain (Roupa *et al*. 2008). In operating room (OR), lifting heavy things such as surgical trays and patients contribute to the development of back pain among OR nurses, also remaining in wanted posture during a long surgery, twisting, assuming some positions can contribute to LBP. Concerning Governmental hospitals in Gaza Strip there are

several factors leading to low back pain among OR nurses due to occupational hazards. The shortage of staff among nurses in Gaza hospitals specifically in operating room place the nurses in a critical position facing low back pain problems. In OR particularly, to the best of my knowledge; no one take this problem in consideration in the past and present in Gaza strip. It is considered a very important because it is incorporated within effective service and efficiency. Moreover, back pain among OR nurses position them in a very tiredness regarding effective work; increasing incidence lead to increasing prevalence especially in OR nurses. this study highlights the determinants underpinned by causes and management strategies, which will help in developing the nurses especially in OR, and limiting the occurrence of burnout. The purpose of this study is to understand the determinants of low back pain among operating room nurses in Gaza Governmental hospitals.

Materials and subjects
Study design
    The design of this study was a quantitative descriptive, analytical cross-sectional one. This design was chosen because it is the useful design and it is less expensive and enables the researcher to meet the study objectives in a short time.

Target population and setting of the study
    The target population consists of all OR nurses who are currently working in operating departments in Gaza Governmental hospitals.

    All registered nurses working at Gaza Governmental hospitals in operating room (Males and Females) between age 22- 60 years old and having LBP since he/she received the job were included in the study. The total number of OR nurses in Gaza Governmental hospitals is 167 nurses, 159 of them were eligible in the study, and 8 were excluded (7 pregnant and 1 have LBP before getting the job). The study was carried out at Gaza Governmental hospitals including: (Al Shifa, European, Aqsa Martyrs, Crescent Alamaraty, Kamal Adwan, Ophthalmic, Abu Yousef Al Najjar, Nasser medical complex and Beit Hanoun hospital).

Tool of the study
    A structured self-administered questionnaire was distributed to (159) OR nurses who were working in Governmental hospitals with

response rate 89.9% (143). The data was collected by the researcher himself to avoid any possible bias. Questionnaire was developed with closed- ended questions (yes or no). A four point Likert scale was used (1= Seldom, 2= Quite often, 3= Very often, and 4= Always). Data entry was done by using statistical package for social sciences (SPSS) and EXCELL software.

To ensure the validity of the questionnaire, two statistical tests were applied. The first one is Criterion-related validity (Spearman test) and the second one is structure validity (Spearman test) (table 1)

Validity and reliability of the questionnaire

Table (1): The correlation coefficient between each paragraph in the field and the whole field

No.	Statement	Pearson coefficient	*P-value*
1	Sustained trauma during work	0.569	0.011
2	Uncomfortable chairs	0.643	0.001
3	Prolonged time sitting in surgery that need sitting	0.567	0.005
4	Prolonged time standing	0.601	0.002
5	Sudden movements	0.449	0.032
6	Bending and twisting	0.800	0.000
7	Lifting heavy objects	0.535	0.012
8	Work overload	0.546	0.007
9	Wearing high heel shoes during work	0.654	0.002
10	Unsuitable posture during work	0.563	0.019
11	Working environment (light, ventilation, heat, noise and crowded)	0.653	0.002
12	Lifting and transferring patients	0.662	0.001
13	Positioning a patient	0.514	0.012
14	Holding an extremity during a prep procedure	0.593	0.003

To ensure the reliability of the instrument, Cronbach's alpha coefficient technique was used (table 2).

Table (2): Cronbach's alpha for reliability to ensure the reliability of the instrument

Part	section	No. of Items	Cronbach's Alpha
Part 2	characteristics of Low Back Pain (LBP)	8	0.742
Part 4	Risk factors of LBP	14	0.773
Part 5	Work environment characteristics	13	0.752
Part 6	Knowledge regarding safety measures to avoid LBP during work	11	0.743
	Total	**46**	**0.763**

Results

The study population consisted of 143 operating room nurses, 110 (76.9) were males and 33 (23.1%) were females, their age ranged between 22 to 58 years, mean age was 33.7 and standard deviation 9.59, about 110 (76.9) of the study population were married.

Table (3): Distribution of study population according to socio-demographic characteristics

Variables		Number (No.)	Percentage (%)
Age (Years)	22 - 30	73	51.0
	31 – 40	25	17.5
	41 – 47	29	20.3
	48 – 58	16	11.2
	Total	143	100.0
	mean = 33.7		**SD= 9.6**
Gender	Male	110	76.9
	Female	33	23.1
	Total	143	100.0
Marital status	Single	30	21.0
	Married	110	76.9
	Divorced	3	2.1
	Total	**143**	**100.0**
Experience years in OR	2 – 8 years	97	67.8 %
	9 – 15 years	26	18.2 %
	16 – 22 years	13	9.1 %
	23-36 years	7	4.9 %
	Total	**143**	**100.0**

The majority 97 (67.8%) of the participants had 2-8 experience years in operating room (Table 3).

As shown in Table (4), the mean of height of the study population was 172.2 cm with a standard deviation 9.4, 41 (28.7%) of the study sample had a height of 166 cm and less, 56 (39.2%) were 167-176 cm, 40 (28.0%) were 177-186 cm and 6 (4.2%) were 187 and above. The mean of weight of the study population was 78.3 kg with a standard deviation 12.4. Thirty two (22.4%) of the study sample had a weight of 67 kg and less, 39 (27.3%) were 68-78 kg, 41 (28.7%) were from 79-89 kg and 31 (21.7%) were 90 kg and above. The mean of BMI of the study population was 26.6 kg with a standard deviation of 4.5. The highest group represented a pre-obese group (25 – 29.9) and it represented 63 (44.1%) of the study population, 54 (37.8%) were from 18.5-24.9 (normal) and 1 (0.7%) were more than 40.

Table (4): Distribution of study population according to height, weight and BMI

| Variables	Category	Frequency	%	Mean	SD
Height (cm)	166cm and less than	41	28.7	172.2 cm	9.4
	167 – 176 cm	56	39.2		
	177 – 186 cm	40	28.0		
	187cm and above	6	4.2		
	Total	**143**	**100.0**		
Weight (kg)	67kg and less than	32	22.4	78.3 kg	12.4
	68-78 kg	39	27.3		
	79-89 kg	41	28.7		
	90 kg and above	31	21.7		
	Total	**143**	**100.0**		
Body Mass Index (BMI)	18.5 and Less than (Underweight)	1	0.7	26.6 kg	4.5
	18.5-24.9 (Normal)	54	37.8		
	25-29.9 (Pre-obese)	63	44.1		
	30-34.9 (Obese class I)	17	11.9		
	35-39.9 (Obese class II)	7	4.9		
	40 and more (Obese class III)	1	0.7		
	Total	**143**	**100.0**		

Prevalence of low back pain
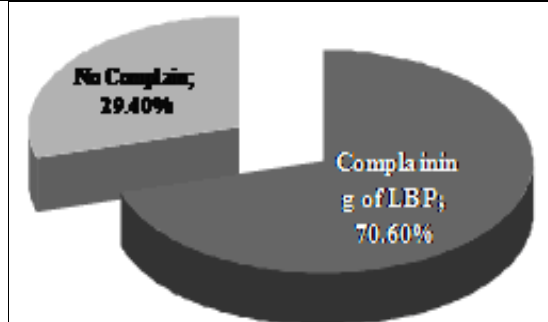
Fig. (1) Prevalence of low back pain among the study population
Gender and low back pain

Table (5) shows that males accounted for 75 (68.2%) of LBP in comparison with females 26 (78.8%), which indicated that the prevalence of LBP is higher among the females. There were no statistical significant differences between gender and LBP among OR nurses, as Chi square value = 1.37 and *P*-value = 0.241.

Table(5):Gender and low back pain among the study population (n=143)

Gender	Yes		No		Total	
	Frequency	% Within gender	Frequency	% Within gender	Frequency	%
Male	75	68.2	35	31.8	110	100.0
Female	26	78.8	7	21.2	33	100.0
Total	101	70.6	42	29.4	143	100.0
	Chi square = 1.37			*P*-value = 0.241		

Years of experience and low back pain

Table (6): Years of experience and low back pain

Years of experience	Complain of LBP				Total	
	(N) Yes		(N) No			
	Frequency	% within group	Frequency	% within group	Frequency	%
2-8 years	63	64.9%	34	35.1%	97	100.0
9-15 years	22	84.6%	4	15.4%	26	100.0
16-22 years	9	69.2%	4	30.8%	13	100.0
23-36 years	7	100.0	0	0.00	7	100.0
Total	101	70.6	42	29.4	143	100.0
Chi square = 6.884				*P*- value = 0.076		

As indicated in Table (6), the highest experience group complaining of LBP was the group who has been employed for 23 – 36 years where it represented 100.0% within group, followed by experience group from 9 – 15 years which represented 84.6%. There was no statistical significant difference between years of experience and LBP as Chi square = 6.88, *P* value = 0.076.

Table (7): Relationship between low back pain and body mass index
Table 7, illustrates that the highest percentage 24 (82.8%) of the study participants had the highest BMI 30 and more complaining of LBP. However, there is no statistical significant difference between BMI in relation to LBP (Chi square = 3.95, *P*-value = 0.138).

BMI category	Complain of LBP				Total	
	Yes		No			
	Frequ-ency	% within group	Frequ-ency	% within group	Frequ-ency	%
Less than 25	40	72.7%	15	27.3%	55	100.0%
25 – 29.9	37	62.7%	22	37.3%	59	100.0%
30 and more	24	82.8%	5	17.2%	29	100.0%
Total	101	29.4	42	70.6	143	100.0%
Chi square = 3.956				*P*-value = 0.138		

Risk factors of low back pain among operating room nurses
Figure (2) showed that prolonged time standing during surgery is the main risk factor leading to low back pain (67.1%), followed by work overload (65%), lifting and transferring patients 62.9%, lifting heavy objects and bending and twisting (58.7% each), while the least risk factor is sustained trauma during work (16.1%) followed by wearing high heel shoes during work (23.1%) and uncomfortable chairs (32.9%).
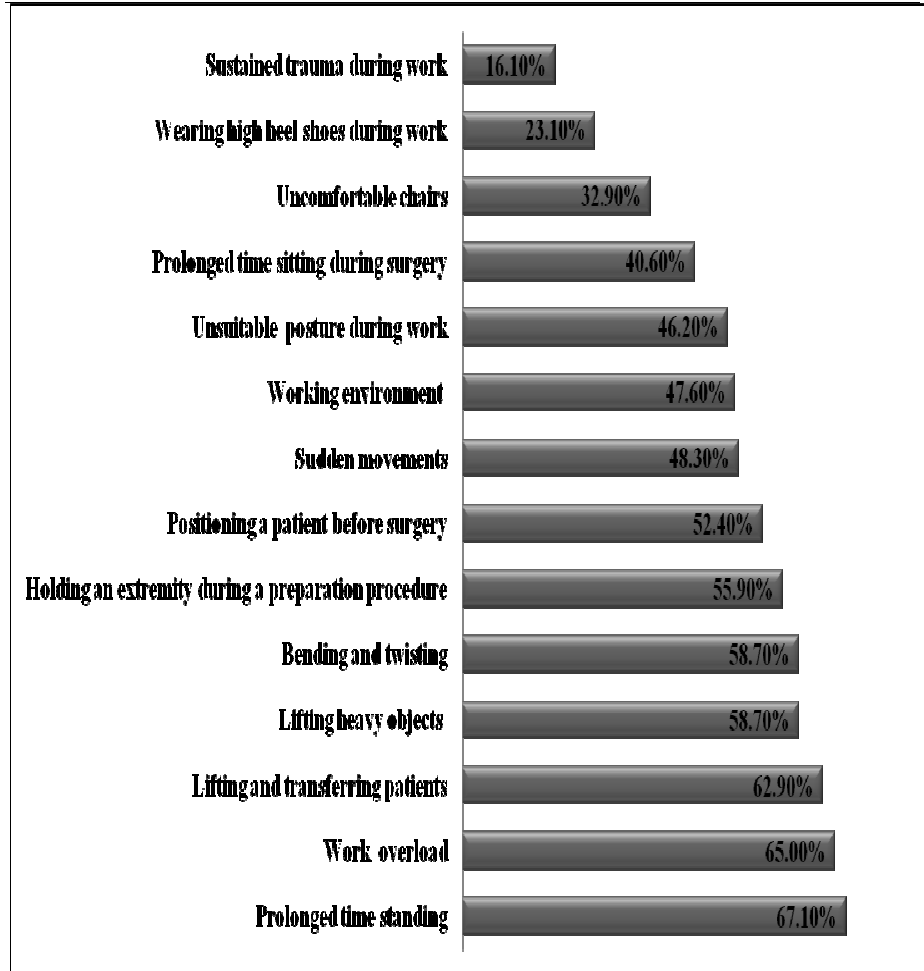
Fig. (2): Risk factors of low back pain among operating room nurses

Discussion

The present study results showed that the prevalence of low back pain is 70.6%. This result is consistent with the result of Maul, et al. (2003) who showed that the prevalence of LBP among nurses employed by a large university hospital in Switzerland varied from 73% to 76%. In addition, Sikiru and Hanifa, (2010) showed that the prevalence of low back pain within the last 12 months was 73.53% among nurses in a typical Nigerian Hospital. Also this result is higher than the results of Masoud, (2004) who showed that the prevalence of LBP among physiotherapists were between 56.2% and 56.9%. However the high prevalence of this study among operating room

nurses could be attributed to the needed effort from operating room nurses during their work such as bending, twisting, lifting and long standing.

There were no statistical significant differences between gender and LBP among OR nurses. This finding is inconsistent with the results of the National Health Interview Survey, (2002), which showed that females' workers are affected by LBP more than males. In contrast, this finding is inconsistent with Helliovaara, *et al.* (1989) who showed that males and females are affected equally. The congruent between these results could be attributed to the differences in anatomical built up and physiological functions that make females more susceptible to LBP than males such as pregnancy and delivery. Also it could be attributed to the fact that females can't tolerate working in major surgical operations that require long standing and some postures during work.

The highest experience group complaining of LBP was the group who have been employed for 23 – 36 years and it represents 100.0% within the groups. This result is attributed to the fact that; as the years of experience increase, the possibility of LBP increase as well. However, there was no statistical significant difference between years of experience and LBP as Chi square = 6.88, *P* value = 0.076. In contrast this finding is inconsistent with the results of June and Cho, (2010) who showed that nurses with 2 - 4 years of working experience in intensive care units had the greatest probability of back pain. In addition, Tinubu, *et al.* (2010) showed that nurses with > 20 years of clinical experience are about 4 times more likely to develop WRMSDs.

There was also no statistical significant difference between BMI in relation to LBP, (Chi square = 3.95, *P*-value = 0.138). This result is consistent with the result of Noorloos, *et al.* (2008) who showed that there was no statistical significant between increased risk for the onset of LBP with the increase of BMI. In contrast, this finding is inconsistent with the results of Halalsheh, *et al.* (2000) who showed that the differences were statistically significant for the BMI of the female and male complaining of LBP and the obese patients were the highest risk of developing LBP. Nevertheless, it seems that obesity

worsens the symptoms of an existing low back pain. This fact was clearly demonstrated by McGoey, *et al.* (1990) who found that among the morbidly obese, 88% had most days of the month chronic musculoskeletal pain which was severe enough to interfere with the daily activities. There were preliminary studies which suggest that weight reduction might have favorable effects on LBP, so, patients with affected weight bearing joints should not only be encouraged to lose weight, but also should be given the means to do so by dietary instructions and monitoring of their progress.

Regarding risk factors of LBP, prolonged standing, inappropriate posture, lifting and moving patients were the most common risk factors in this study. Surgeries however require prolonged time for standing with surgical team to concentrate during surgery and to be alert when assisting and giving the team surgical instruments. No one can deny that there are surgical operations overloaded in Gaza hospitals. Moreover some of hospitals in Gaza Strip have surgical team specialists which are not available in other hospitals, and this creates a work overload and over stress on nurses. Findings are supported by Tsauo, *et al.* (1998) who showed that inappropriate posture during work, transfer of patients and moving of equipments are the most important risk factors of nurses to get LBP. Also these findings are inconsistent with the results of Sikiru and Hanifa, (2010) who showed that 66.67% of the LBP cases believed that their LBP was related to their work, while 40 (13.33%) and 60 (20.00%) associated their back pain with domestic and previous trauma respectively. In addition, these results also have some variability with the results of Abdul Samad, *et al.* (2010) who showed that the main task reported to contribute to LBP in schools teachers in the Klang Valley, Malaysia were lifting loads (28.0%), prolonged sitting (25.2%), followed by prolonged standing (23.4%).

Conclusion

The overall prevalence of LBP was 70.6%, and LBP was 68.2% among male and 78.8% among female operating room nurses. The study revealed that 82.8 % participants having a BMI (30 and more) complaining of LBP, but there are no statistically significant differences between them. Sixty seven of the participants reported that

prolonged time standing was a dominant risk factor in the work place, followed by work overload, lifting and transferring patients, lifting heavy objects, bending and twisting. About sixteen percent 16.1% of participants reported that sustained trauma during work was the lowest risk factor followed by wearing high heel shoes and using of uncomfortable chairs.

Recommendations

A health education program based on the National Institute for Occupational Safety and Health (NIOSH) should be established at primary and secondary levels for operating room staff about measures that should be taken to prevent low back pain. Solutions must be established by policy makers to decrease the prevalence of low back pain episodes.

References

1. Abdul Samad, N., Samad, A., Abdullah, H., Moin, S., Tamrin, S., and Hashimand, Z. (2010): "*Prevalence of Low Back Pain and its Risk Factors among School Teachers*", American Journal of Applied Sciences 7 (5): 634-639, 2010. ISSN 1546-9239 Department of Community Health, Faculty of Medicine and Health Science, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia.

2. Dawson, A.P., McLennan S.N., Schiller S.D., Jull G.A., Hodges, P.W., and Stewart S. (2007): "*Interventions to prevent back pain and back injury in nurses: asystematic review*". http://www.journals.bmj.com/cgi/reprintform.com. Accessed 27May 2010.

3. El Astal, E. (2010): "*Determinants of musculoskeletal pain among Governmental hospitals laboratory technicians in Gaza Governorates*". Master thesis. AlQuds University. AlQuds

4. Halalsheh, M., Tarawneh, M., Mahadine, Z. (2000): " *The Association of Low Back Pain with Obesity in One of the Primary Health Care Centers*", Bahrain Medical Bulletin, Vol. 22, No. 1, March 2000.

5. Heliovaara, M., Sievers, K., Impivaara, O., Maatela, J., Knekt, P., Makela, M., Aroma, A. (1989): " *Discriptive study and public health aspect of low back pain*", Ann Med; 21:327-33.

6. June, K., and Cho, C. (2010): "*Low back pain and work-related factors*

among nurses in intensive care units". Journal of Clinical Nursing. Volume 20, Issue 3-4, pages 479–487, February 2011.

7. Masoud, F. (2008): "*Prevalence and risk factors of low back pain among physical therapy professionals in Gaza Strip*". Master thesis, Islamic University. Gaza.

8. Maul, I., Laubli, T., Klipstein, A., Krueger, H. (2003): " *Course of low back pain among nurses employed by a large university hospital in Switzerland* " a longitudinal study across eight years", Journal of Occupational and Environmental Medicine, (60),497–503.

9. McGoey, Deitel, M., Saplys, R., et al. (1990): " *Effect of Weight Loss on Musculo-Skeletal Pain*", 72B:322-3.

10. Nelson, A. (2006): " Safe patient handling and movement", Springer Publishing Company, Inc. New York, NY 10036–8002. USA.

11. Noorloos, D., Tersteeg, L., Tiemessen, J., Hulshof, C., and Monique, W. (2008): "*Does body mass index increase the risk of low back pain in a population exposed to whole body vibration?*", Coronel Institute of Occupational Health, Academic Medical Center (AMC), Universiteit van Amsterdam, Research Institute AmCOGG. http://www.sciencedirect.com/science.

12. Roupa, Z., Vassilopoulos, A., Sotiropoulou, P., Makrinika, E., Noula, M., Faros, E., Marvaki, Ch. (2008): " *The problem of lower back pain in nursing staff and its effect on human activity"*. Health science journal(HSJ), (2), issue 4. pp:219-225.

13. Sikiru, L., Hanifa S. (2010): "*Prevalence and risk factors of low back pain among nurses in a typical Nigerian hospital*" Afr Health Sci. March; 10(1): 26–30. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2895788.

14. Tsaue, J., Chen, M., and Wang, J. (1998): "*Risk Factors For Low Back Pain Among Nurses*", School of physical therapy, College of medicine. National Taiwan University, Taipei, Taiwan, R.O.C. JPTA R.O.C (1998; 23(2):90-97).

15. Tinubu, B., Mbada, C., Oyeyemi, A., Fabunmi, A. (2010): " *Work-Related Musculoskeletal Disorders among Nurses in Ibadan, South-west Nigeria: a cross-sectional survey*", http://www.biomedcentral.com/1471-2474/11/12.

16. United states department of health and human services. summary health statistics for U.S. adults. (2002), National Health Interview Survey, (2002): " *Vital and Health Statistics Series*" 10, No. 222, www.cdc.gov/nchs/data/series/sr_10/sr10_222.pdf, accessed: Oct. 7, 2010.

17. WHO Obesity: preventing and managing the global epidemic. Report of a WHO Consultation. WHO Technical Report Series 894. Geneva: World Health Organization, 2000.