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Maternal tobacco smoking among pregnant Palestinian women: risk for women and newborns

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Abstract

Aim: To investigate the prevalence and the patterns of maternal smoking during pregnancy and to address specific adverse pregnancy outcomes among women in the north of the West Bank, Palestine. **Methods:** In a cross-sectional study, 2066 pregnant women from the north of the West Bank were recruited to complete a self-administered questionnaire modified from the Pregnancy Risk Assessment Monitoring System. **Results:** Of the 1853 pregnant women who participated in this study, 8.1% were current smokers (7.2% waterpipe and 3.7% cigarettes), and 11.9% were former smokers (10.9% waterpipe and 2.8% cigarettes). Most of the current smokers (67.5%) and former smokers (78.5%) smoked daily. Pregnant smokers and former smokers were more likely than non-smokers to be exposed to second hand smoke at home, and were more likely to identify as refugees (p value <0.05). The logistic-regression model revealed that current smokers during pregnancy were more likely than nonsmokers to have increased gestational blood lipids and blood pressure, increased blood pressure before pregnancy, premature birth and low birth weight in the newborn (P value < 0.05). Former smokers were more likely than nonsmokers to have increased gestational blood lipids and at least one abortion case (P value <0.05). **Conclusion:** This study presents tobacco use during pregnancy as a particularly important public health problem. The high rate of maternal smoking during pregnancy and its adverse outcomes on both the mother and the child indicate the urgent need to develop continued and effective cessation strategies. Prevention programs should focus on refugee women, who are at highest risk of smoking.

Keywords: pregnancy, smoking, waterpipe, preterm, Palestine, refugees

تدخين التبغ بين الأمهات الفلسطينيات الحوامل ، خطر على النساء والأطفال حديثي الولادة

الهدف: التحقق من انتشار ونمط تدخين الأم أثناء الحمل وتحديد بعض الاضرار المرتبطة بالتدخين اثناء الحمل بين النساء الحوامل في شمال الضفة الغربية ، فلسطين.

الطريقة: في دراسة مستعرضة ، تم استقطاب 2066 من النساء الحوامل من شمال الضفة الغربية ، فلسطين لملء استبيان ذاتي الإدارة.

النتائج: من بين 1853 امرأة حامل شاركت في هذه الدراسة ، كانت 8.1% مدخنات حاليات (7.2% الشيشة و 3.7% سجائر) ، و 11.9% مدخنات سابقات (10.9% الشيشة و 2.8% سجائر). معظم المدخنات الحاليات (67.5%) والمدخنات السابقات (78.5%) يدخنون بشكل يومي. كانت النساء الحوامل المدخنات اثناء الحمل والمدخنات السابقات أكثر عرضة من غير المدخنات للتعرض للتدخين السلبي في المنزل. كشف نموذج الانحدار اللوجستي أن المدخنات الحاليات أثناء الحمل كانوا أكثر عرضة من غير المدخنات لزيادة الدهون في الدم وزيادة ضغط الدم اثناء الحمل ، وزيادة ضغط الدم قبل الحمل ، وجود أطفال ذوي وزن منخفض عند الولادة ، والخدج (القيمة). $P < 0.05$ كان المدخنات السابقات أكثر عرضة من غير المدخنات لارتفاع دهون الدم في الحمل ولديهن حالة إجهاض واحدة على الأقل قيمة. $(P < 0.05)$

الخلاصة: تعرض هذه الدراسة استخدام التبغ أثناء الحمل كمشكلة صحية عامة ذات أهمية خاصة. يشير المعدل المرتفع لتدخين الأم أثناء الحمل والنتائج السلبية على كل من الأم والطفل إلى الحاجة الملحة لتطوير استراتيجيات الإقلاع المستمرة والفعالة. يجب أن تركز برامج الوقاية على اللاجئات ، اللاتي يتعرضن لأعلى المخاطر في هذا الصدد.

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Introduction

The increasing prevalence of tobacco smoking and its co-morbidities globally led to the initiation of many studies discussing this subject (World Health Organization, 2007). Tobacco smoking poses additional risks and threats for women, especially pregnant women, compared to men (Holland, 2015; McAfee & Burnette, 2014; Smit et al., 2019). Studies carried out among different ethnic groups have consistently revealed that maternal smoking affects the mother's health (Tettamanti, Ljung, Mathiesen, Schwartzbaum, & Feychting, 2016). It is among the leading preventable causes of adverse maternal and pre-and post-natal outcomes (Gutvirtz, Wainstock, Landau, & Sheiner, 2019; Murin, Rafii, & Bilello, 2011; Olds, Henderson, & Tatelbaum, 1994; Zheng et al., 2016). Maternal second hand smoke (SHS) and light active smoking have been associated with significant reductions in birth weight and head circumference of neonates (Al-Sheyab, Al-Fuqha, Kheirallah, Khabour, & Alzoubi, 2016; Luciano et al., 1998). Women who smoke are more likely to have a preterm delivery, which is the leading cause of death, disability, and disease among newborns (Benjamin-Garner & Stotts, 2013; Leybovitz-Haleluya, Wainstock, Landau, & Sheiner, 2018). Additionally, maternal smoking is considered a major predictor of childhood morbidity and mortality (Benjamin-Garner & Stotts, 2013; Dietz et al., 2010). Mothers who are exposed to SHS while pregnant are more likely to have babies with lower birth weights (Control, 2009; Nematollahi et al., 2018). Moreover, babies whose mothers smoke during pregnancy, as well as babies who are exposed to SHS after birth, are more likely to die from Sudden Infant Death Syndrome (SIDS) than babies who are not exposed to cigarette smoke (Control, 2009; Dietz et al., 2010).

Multiple factors contribute to a prevalence in smoking among women (Kaufman & Augustson, 2008; Lopez, Collishaw, & Piha, 1994; Pampel, 2006; Torres & O'Dell, 2016; World Health Organization, 2007). Socioeconomic status (Wewers et al., 2012) and educational level (Kandel, Griesler, & Schaffran, 2009) are strong predictors of nicotine use in women. Tobacco companies and cigarette markets target women who are highly educated, young, and successful (Daou, Bou-Orm, & Adib, 2018; Jawad, McEwen, McNeill, & Shahab, 2013). They market women who smoke as strong, independent, sexy, and attractive (Kaufman & Augustson, 2008; Khalil et al.,

2013). As a result, women in developing countries are at higher risk of disease and early death, as their economic and political status in society rises, leading them to smoke more often (Lopez et al., 1994; Pampel, 2006; World Health Organization, 2007). Clinical evidence suggests that women are more susceptible to anxiety disorders, and as a result, tend to smoke in order to cope with stress, more so than men (Torres & O'Dell, 2016). In addition, cessation programs have not always focused on continued cessation, as most of the health attention given to pregnant women is fetus-centered, with little attention to the psychosocial factors behind maternal tobacco use (Greaves & Jategaonkar, 2006).

Among Palestinians, smoking plays a direct role in the incidence of lung cancer (Palestinian Central Bureau of Statistics, 2012). Despite the knowledge of health problems associated with smoking tobacco, its prevalence continues to increase in developing countries (Ghrayeb, Mohamed Rusli, Al Rifai, & Mohd Ismail, 2013), particularly in the West Bank (Palestinian Central Bureau of Statistics, 2012). The prevalence of smoking in Palestine has typically been higher among adult males (40.7%) than adult females (3.2%), which is consistent with other countries in the region (World Health Organization, 2009). However, tobacco smoking among women has become an increasing problem in the West Bank over the last decade (Palestinian Central Bureau of Statistics, 2012). Moreover, waterpipe smoking has recently been considered culturally and socially acceptable among Palestinian women (Tucktuck, Ghandour, & Abu-Rmeileh, 2017). In addition to concerns over the rising rates of active smoking among women, there is an existing epidemic of SHS. SHS is a major threat to the respiratory health of Palestinian children. In addition, SHS may lead to sudden death in certain cases among infants, which accounted for 4.6% of infant mortality in the Palestinian territories in 2012 (Palestinian Central Bureau of Statistics, 2012). While the rate of tobacco use continues to be a growing problem among Palestinians in general and specifically women, research has not fully investigated maternal smoking during pregnancy and its complications among Palestinians. The increasing prevalence of tobacco use and its link to negative behaviors and adverse health outcomes for Palestinian women and children requires great attention. Awareness of these problems can contribute to improving the effectiveness of

smoking cessation programs and decreasing the risk of potential consequences. This study aimed to investigate the prevalence and patterns of maternal smoking during pregnancy, and to address specific adverse outcomes among pregnant women in the north of the West Bank, Palestine. Specific objectives were to determine the prevalence and the factors that contribute to smoking with regards to cigarettes and waterpipes among pregnant women, and to establish an association between maternal behaviours and its effects on the child.

Materials and methods

Study design and setting

A cross-sectional study was conducted across health care clinics between September 2019 and January 2020 in the north of the West Bank, Palestine, to determine the prevalence and risks associated with maternal tobacco smoking among pregnant Palestinian women.

Population, sample size, and sampling technique

There are six governorates in the north of the West Bank, with a population totaling 1,121,239. 51.9% are adults between the ages of 18–70 years (50.9% males and 49.1% females) (Palestinian Central Bureau of Statistics, 2018). In order to give adult subjects an equal opportunity to participate in this study, the study area was stratified into six strata (governorates). Each stratum was then divided into five substrata: north, south, central, east, and west. To minimize selection bias, a proportional sample size was chosen based on the population size in each substrata (150 to 387 subjects), and then based on the number of clinics in each geographical area. Pregnant women who attended healthcare clinics in each substratum were recruited to participate in this study via local TV channels, flyers, social media, and public announcements. The research team resided in each clinic for at least 2 weeks; 7 days/week from 8 am to 5 pm, in order to allow a variety of subjects to participate. Once the research team determined that the subject met the inclusion criteria, to minimize selection bias, every third pregnant woman was chosen to participate in the study (N=2066).

Study tool

A self-administered questionnaire, modified from the Pregnancy Risk Assessment Monitoring

System (PRAMS) (Centers for Disease, 2016), was used. The questionnaire was translated into Arabic, as it is considered the official native language in Palestine, and back translated to English. Due to the stigma surrounding tobacco smoking among women, a pilot study was conducted to test recruitment and consent rates. The questionnaire was revised to achieve high validity and precise results. It was divided into four sections, including a) socio-demographics, b) practices and patterns of tobacco smoking, in the form of cigarettes and waterpipe, c) knowledge, attitudes, and motivations behind tobacco use during pregnancy, and d) special adverse outcomes of maternal tobacco smoking.

Operational definitions

A current smoker was defined as any woman who smoked cigarettes and/or waterpipe during their pregnancy. A former smoker was defined as any tobacco user who had quit smoking cigarettes and/or waterpipe during or before their pregnancy. A non-smoker was defined as any woman who had not smoked cigarettes and/or waterpipe in their lifetime. A Palestinian refugee was defined as any person whose normal place of residence was Palestine during the period from June 1946 to May 1948, who lost both their home and means of livelihood as a result of the 1948 conflict (United Nations Relief and Work Agency, 2018b), and who live in one of 19 camps in the West Bank.

Data analysis

Statistical Package for the Social Sciences (SPSS) (version 22, IBM Corporation) was used. A multinomial logistic regression analysis was conducted to evaluate the relative risk by generating the odds ratios (OR) and 95% confidence intervals (CI). A p-value of less than 0.05 was considered statistically significant.

Ethical consideration

The study was carried out in accordance with the ethical standards of the Declaration of Helsinki. Approval was obtained from the Institutional Review Board at An-Najah National University prior to the start of the research. All study participants freely accepted to participate in the study. Due to the stigma surrounding women's use of cigarettes in the West Bank, confidentiality was maintained in all written and oral communications; the questionnaire was

anonymous and did not include any questions that could lead to personal identification.

Results

General characteristics

A sample of 2,066 pregnant women from the north of the West Bank were recruited to complete a self-administered questionnaire. The response rate was high (92%). Partially-filled questionnaires that are filled with less than 50% of the questions were discarded (48 questionnaires). The final sample size consisted of 1,853 pregnant women, ranging between 15-47 years of age, with a mean age of 27.4 years. 765 (42.1%) women lived in an urban area, 955 (52.5%) women lived in a rural area, and 99 (5.4%) women were refugees. Most participants (85.1%) were unemployed, and 53.1% had an undergraduate degree or higher (Table 1).

Table 1
Socio-demographic characteristics of all participants

	n (%)
Residency	
City	765 (42.1)
Village	955 (52.5)
Refugee Camp	99 (5.4)
Educational level	
High school or less	857 (46.9)
Undergraduate or more	970 (53.1)
Current Job	
Unemployed	1561 (85.1)
Employee	273 (14.9)
Marital Status	
Married	1818 (98.6)
Widow	13 (0.7)
Divorced	12 (0.7)
Mean age \pm SD	27.4 \pm 5.9

Prevalence, patterns, initiation age, and motivations of tobacco smoking among pregnant women

The prevalence of current maternal tobacco smoking during pregnancy was 8.1%. The prevalence of waterpipe smoking was higher, at 7.2%, compared to cigarette smoking at 3.7%. Moreover, 11.9% of participants were former smokers (10.9% for waterpipe and 2.8% for cigarettes) (Table 2). The

majority of former smokers (74.6%) quit smoking in the first trimester. The mean initiation age for cigarette smoking was 20.33 years, and 22.49 years for waterpipe. The majority of both current smokers (67.5%) and former smokers (78.5%) smoked cigarettes on a daily basis. On the other hand, only 16.8% of current smokers and 33.3% of former smokers smoked waterpipe on a daily basis or several times per week (33.6% and 43.8%; respectively). Most pregnant women recorded an exposure to SHS to cigarettes (63.6%) while 38.2% recorded an exposure to waterpipe smoking at home, and 74.5% were exposed to SHS from other places. Although most smokers were knowledgeable about the harmful effects of smoking on their health (92.7%) and the health of their fetus (90.8%), only 56.6% thought to quit smoking. The most frequent motives for smoking among pregnant women included an addiction to nicotine (48.8%), to relieve stress (41.0%), pressure from husband (31.1%), or because smoking is now socially acceptable for women (20.1%). Most of the former smokers (64.8%) quit smoking because they knew the side effects of tobacco smoking, while 34.1% of them quit smoking due to socioeconomic factors. Only 24.4% quit because they had a disease that forced them to quit (Table 2).

Table 2
Prevalence, patterns, initiation age, and motivation of smoking tobacco among pregnant women

Exposure	Current n (%)	Former smokers n (%)
Cigarette smoking	69 (3.7)	51 (2.8)
Waterpipe smoking	134 (7.2)	201 (10.9)
Tobacco smoking (cigarettes and/or waterpipe)	151 (8.1)	222 (11.9)
Cigarette second hand smoke at home	1179 (63.6)	
Water pipe second hand smoke at home	707 (38.2)	
Second hand smoke at work or any place other than home	1380 (74.5)	

Pattern of use	Daily n (%)	Several times/week n (%)	Several times/month n (%)	Several times/pregnancy n (%)

Current cigarette smokers	44 (2.4)	15 (0.8)	3 (0.2)	5 (0.3)
Current waterpipe smokers	20 (1.1)	40 (2.2)	34 (1.8)	30 (1.7)
Cigarette former smokers	74 (4.0)	12 (0.6)	8 (0.4)	NA
Water pipe former smokers	86 (4.6)	114 (6.2)	56 (3.0)	NA
Exposure to cigarette second hand smoke	856 (46.2)	42 (2.3)	15 (0.8)	3 (0.2)
Exposure to water pipe second hand smoke	401 (21.6)	108 (5.8)	41 (2.2)	3 (0.2)
Motivations and knowledge				
I smoke because I'm addicted to nicotine			153 (48.4)	
I smoke because smoking has become socially acceptable			63 (20.1)	
I smoke to relieve stress			128 (41.0)	
I smoke to lose weight			11 (3.6)	
I smoke because one of my parents smokes			39 (12.7)	
My husband motivates me to smoke			96 (31.1)	
I smoke because my friends offered me tobacco before			73 (23.5)	
I smoke to feel stronger and for prestige			22 (7.1)	
One day, I thought to quit smoking			159 (56.6)	
I know smoking is harmful to my health			290 (92.7)	
I know the harmfulness of smoking is higher when I'm pregnant			285 (90.8)	
I know smoking is harmful to my fetus' health			285 (90.8)	
I read the medical warnings on the pack of the cigarette			232 (77.3)	
Motivation to quit smoking				
I did not like it			34 (39.1)	

I know the side effects of it	57 (64.8)
It is expensive	30 (34.1)
It is socially unacceptable	30 (34.1)
I have a disease that forced me to quit	21 (24.4)
Mean initiation age of cigarettes smoking ±SD	20.33±3.11
Mean initiation age of waterpipe smoking ±SD	22.49±4.92

NA: Not Available

Association between smoking and adverse outcomes

For participants, increased blood pressure (8.0%), increased blood sugar (4.3%), and increased blood lipids (2.2%) were higher during pregnancy than before pregnancy (1.9%, 0.9%, and 1.3% respectively) (Table 3). Moreover, 25.5% of participants had at least one abortion; 14.2% had at least one child with a low birth weight (<2500 grams); 2.6% had at least one stillbirth; 1.6% had at least one child that died immediately after birth; and 2.7% had at least one preterm birth (Table 3).

Table 3

Maternal and children's adverse outcomes for all participants

Maternal and fetus or newborn outcomes	n (%)
High blood pressure	
Before pregnancy	35 (1.9)
During pregnancy	146 (8.0)
Diabetes mellitus	
Before pregnancy	17 (0.9)
During pregnancy	78 (4.3)
Increased blood lipids	
Before pregnancy	23 (1.3)
During pregnancy	40 (2.2)
At least one abortion case in the first five months of pregnancy	468 (25.5)
At least one preterm case	50 (2.7)
At least low birth weight baby (<2500 grams)	208 (14.2)
At least one baby born dead	47 (2.6)
At least one baby died immediately after birth	30 (1.6)
At least one child died before 5 years of age	9 (0.5)

The logistic-regression model revealed that women who smoke during pregnancy were more likely than non-smokers to have increased gestational blood lipids (OR: 5.109, P-value: 0.001) and blood pressure (OR: 2.767, P-value: <0.001), as well as increased blood pressure before pregnancy (OR: 2.88, P-value: 0.047). They were also at a higher risk than non-smokers of having infants with low birth weights (OR: 1.66, P-value: 0.048), and having preterm infants (OR: 2.959, P-value: 0.011). Former smokers were more likely than non-smokers to have increased gestational blood lipids (OR: 4.639, P-value: 0.001). They were also more likely to have at least one abortion case (OR: 1.429, P-value: 0.047). Pregnant women who smoked were more likely than non-smokers to be exposed to SHS at home (OR: 9.138) and in public (OR: 2.838), while former smokers were more likely to be exposed to SHS only at home (OR: 2.838) (P-value <0.001). Former smokers were generally younger (OR: 0.96, P value 0.002) and more educated (OR: 1.47, P-value 0.016) than non-smokers. Women who smoked were more likely to be refugees (OR: 2.13, P-value 0.008), while smokers and former smokers were less likely to live in a rural area (OR: 0.423, P-value <0.001). Moreover, the majority of smokers and ex-smokers were employed, in comparison to non-smokers (P-value: <0.001) (Table 4).

Table 4
Multinomial logistic regression for risk of maternal tobacco smoking

Current smoker*		Odds ratio	95% Confidence interval	P value
Age		1.030	0.998-1.063	0.062
Gestational diabetes	Yes	0.751	0.351-	0.518
	No	Reference group	1.788	
Diabetes before pregnancy	Yes	0.695	0.116-	0.691
	No	Reference group	4.162	
Gestational lipidemia	Yes	5.109	2.0333-	0.001
	No		13.030	

		Reference group		
Lipidemia before pregnancy	Yes	2.010	0.586-	0.267
	No	Reference group	6.896	
Gestational high blood pressure	Yes	2.767	1.614-	<0.001
	No	Reference group	4.747	
High blood pressure before pregnancy	Yes	2.880	1.016-	0.047
	No	Reference group	8.162	
Bleeding during pregnancy	Yes	0.970	0.491-	0.930
	No	Reference group	1.918	
At least one child was born dead	Yes	1.481	0.550-	0.437
	No	Reference group	3.989	
At least one low birth weight infant	Yes	1.664	1.006-	0.048
	No	Reference group	2.755	
At least one preterm infant	Yes	2.959	1.288-	0.011
	No	Reference group	6.799	
At least one child died before the age of 5 years	Yes	0.603	0.062-	0.663
	No	Reference group	5.877	
At least one child died immediately after birth	Yes	2.746	0.990-	0.052
	No	Reference group	7.617	
At least one abortion case	Yes	1.379	0.912-	0.127
	No	Reference group	2.085	
Exposure to second	Yes	9.138	3.543-	<0.001
	No		23.567	

hand smoke at home		Referen ce group			
Exposure to second hand smoke outside the home	Yes	4.810	2.059-	<0.00	
	No	Referen ce group	11.237	1	
Education level	High school or less	1.238	0.850-	0.266	
	Undergraduate or more	Referen ce group	1.804		
Residency	Village	0.423	(0.292-	<0.00	
	Camp	2.138	0.611)	1	
	City	Referen ce group	(1.216- 3.758)	0.008	
Working status	Unemployed	0.301	(0.206-	<0.00	
	Employed	Referen ce group	0.440)	1	
Former smokers					
Age		0.967	0.939-	0.994	0.022
Gestational diabetes	Yes	1.601	0.787-	3.254	0.194
	No	Referen ce group			
Diabetes before pregnancy	Yes	2.324	0.595-	0.225	
	No	Referen ce group	9.079		
Gestational lipidemia	Yes	4.639	1.888-	0.001	
	No	Referen ce group	11.400		
Lipidemia before pregnancy	Yes	1.170	0.294-	0.157	
	No	Referen ce group	4.662		
Gestational high blood pressure	Yes	1.089	0.605-	0.776	
	No	Referen ce group	1.959		
High blood pressure	Yes	0.293	0.035-	0.254	
	No		2.419		

before pregnancy		Referen ce group			
Bleeding during pregnancy	Yes	1.149	0.654-	0.630	
	No	Referen ce group	2.017		
At least one child was born dead	Yes	0.897	0.290-	0.580	
	No	Referen ce group	2.777		
At least one low birth weight child	Yes	1.381	0.440-	0.067	
	No	Referen ce group	4.333		
At least one preterm baby	Yes	1.920	0.825-	0.130	
	No	Referen ce group	4.465		
At least one child died before the age of 5 years	Yes	0.635	0.071-	0.685	
	No	Referen ce group	5.704		
At least one child died immediately after birth	Yes	1.381	0.440-	0.580	
	No	Referen ce group	4.333		
Exposure to second hand smoke smoking at home	Yes	2.838	1.780-	<0.00	
	No	Referen ce group	4.526	1	
Exposure to second hand smoke outside the home	Yes	1.466	0.956-	0.079	
	No	Referen ce group	2.247		
At least one abortion case	Yes	1.429	1.005-	0.047	
	No	Referen ce group	2.032		
Education level	High school or less	0.68	0.497-	0.016	
	Undergraduate or more	Referen ce group	0.930		

Residency	Village	0.46	(0.34-	<0.00
	Camp	1.378	0.623)	1
	City	Referen	(0.787-	0.26
		ce	2.415)	
		group		
Working status	Unemploye	0.47	(0.332-	<0.00
	d	Referen	0.675)	1
	Employed	ce		
		group		

*Reference groups are non-smokers

Discussion

There were several remarkable findings that are reported in this study. First, we found higher prevalence of maternal smoking during pregnancy (8.1%) compared to previous research in the West Bank. The lack of previous research was one of the most salient constraints in predicting a change in the prevalence of maternal smoking during pregnancy and its associated risks in this area. Therefore, we compared our results with the percentage of women who smoked between 15-29 years of age in the West Bank (1.4%) in 2010 (Palestinian Central Bureau of Statistics, 2013), as well as the 15-65 age group (4.0%) (Palestinian Central Bureau of Statistics, 2012). Second, the prevalence of maternal waterpipe smoking during pregnancy surpassed the prevalence of cigarette smoking during pregnancy, suggesting that waterpipe smoking should be considered as dangerous as cigarette smoking with regards to current statistics. Moreover, most of the pregnant smokers and former smokers smoked on a daily basis or several times per week. Nearly half of the participants who smoke think they are addicted to nicotine, although more than half have a desire to quit smoking. Half of the smokers quit smoking in the first trimester after learning they were pregnant. Given these results, we recommend that primary health care systems should work on providing prevention, treatment, and recovery support services for pregnant female smokers and former smokers.

Personal factors such as knowledge, risk perception, attitudes, motivation, and social influence could influence both smoking and the desire to quit smoking (Radley et al., 2013). Although the majority of pregnant women in this study were knowledgeable about the dangers smoking poses on their health and the health of their fetuses, a significant number of women continued to smoke during pregnancy. Previous literature focuses on developing countries,

alternative factors have also been noted to explain the increase in smoking among women in general. This may also apply to the current situation among pregnant women in the West Bank (Kaufman & Augustson, 2008; Lopez et al., 1994; Pampel, 2006; Torres & O'Dell, 2016; World Health Organization, 2007). In agreement with previous studies, the results of this study showed that the majority of pregnant women smoked as a coping mechanism for stress, and refugee women in particular were more likely to smoke than women living in urban or rural areas (Greaves & Jategaonkar, 2006; Lopez et al., 1994; Pampel, 2006; Torres & O'Dell, 2016; World Health Organization, 2007). Palestinian refugees who were displaced from the Palestinian area after the war in 1948 to other Palestinian areas have lived in camps in the West Bank (19 camps) and Gaza (8 camps) since 1949. They suffer from common daily life stressors, including; high rates of unemployment, low income, poverty, poor infrastructure, and high population density (United Nations Relief and Work Agency, 2018a). They are at an increased risk of violence, abuse, exploitation, and neglect across the region. The results from this study are consistent with several previous studies with different age groups in the West Bank (Basma Damiri, 2019; Basma Damiri, Salahat, & Aghbar, 2018; Massad et al., 2016). Refugees may be particularly vulnerable to psychoactive substance use for different reasons, including coping with traumatic experiences, and social and economic inequality (Basma Damiri, 2019; Basma Damiri, Sayeh, Odeh, & Musmar, 2018). Refugees have a higher propensity to transgress laws and social norms than individuals living in rural and urban areas. With the increasing number of refugees in the Middle East due to political conflict, more studies and attention should be paid to this vulnerable group. Early intervention could be vital to directing a pregnant refugee woman's life path away from high-risk behaviors such as smoking during pregnancy. Other factors include family and social-peer pressure. Around one-third of the pregnant women in the present study started as a result of pressure from their husbands. It is known that smoking is more acceptable for married women than single women within eastern culture. This could also explain the late initiation age for cigarette smoking (20.3 years) and waterpipe smoking (22.5 years) among Palestinian women, compared to men (12-14 years) (Basma Damiri, Salahat, et al., 2018; Basma Damiri, Sandouka, Janini,

& Yaish, 2019; Massad et al., 2016). The results of this study support those of previous studies in which highly educated and employed women were more likely to smoke tobacco (Daou et al., 2018; Jawad et al., 2013; Kandel et al., 2009; Kaufman & Augustson, 2008; Khalil et al., 2013; Wewers et al., 2012). These results indicate that the social and cultural norms that have traditionally prevented Palestinian women from smoking are weakening, especially for educated and employed women, rendering smoking among women as socially acceptable (Abu Shomar, Lubbad, El Ansari, Al-Khatib, & Alharazin, 2014; WHO, 2007).

It is well established that maternal smoking is a major predictor of adverse maternal and pre and post-natal outcomes (Benjamin-Garner & Stotts, 2013; Dietz et al., 2010; Murin et al., 2011; Nematollahi et al., 2018). Smoking exerts harmful effects during every stage of pregnancy (Jauniaux & Burton, 2007). There is a consensus in the literature regarding the role of maternal smoking during pregnancy in higher preterm birth rates and low birth weights (Benjamin-Garner & Stotts, 2013; Kharkova, Grjibovski, Krettek, Nieboer, & Odland, 2017; Kondracki & Hofferth, 2019; Moore, Blatt, Chen, Van Hook, & DeFranco, 2016; Pereira, Da Mata, Figueiredo, de Andrade, & Pereira, 2017; Sema et al., 2019; Sun et al., 2019; Zheng et al., 2016). The most vulnerable window for smoking behavior during pregnancy is late in the first trimester and early in the second trimester (Kondracki & Hofferth, 2019). In addition, cessation of smoking before or during the first trimester may be regarded as an effective means of harm reduction (Lumley et al., 2009; Raisanen et al., 2014; Yan & Groothuis, 2015). Mothers who quit smoking or reduced their smoking intensity in this period bore infants of the same weight as those infants of non-smokers, while smoking cessation in the fourth month or at any time beyond was associated with substantially lower infant birth weights (Moore et al., 2016; Yan & Groothuis, 2015). The multinomial logistic regression results of this study revealed the detrimental effects of smoking during pregnancy on selected mothers and their fetuses. The results of this study showed that being a smoker during pregnancy increased the risk of low birth weight and preterm birth, while former smokers were at higher risk of preterm birth compared to non-smokers, as supported by previous studies. Premature or low birth weight accounted for 44% of child deaths in Palestine (United Nations International Children's Emergency,

2011). Low birth weight is correlated with multiple additional health concerns, ranging from low oxygen level at birth to increased risk for diabetes, hypertension (Knop et al., 2018), and intellectual and developmental disabilities (Takeuchi et al., 2018). Further investigation on the relationship between maternal smoking and premature or low birth weight in Palestinian infants is recommended.

Smoking during pregnancy also increases the risk of complications. Pregnant women who smoke could develop physiological dyslipidemia (Abuhandan et al., 2012; Bizon & Milnerowicz, 2017; Dathan-Stumpf et al., 2019; Vrijkotte et al., 2012). The results of this study demonstrated that both smokers and former smokers were around five times more likely to develop dyslipidemia, compared to non-smokers. Women who were active smokers were more likely to be at risk for high blood pressure before and during pregnancy, thereby exposing them to a higher risk of cardiovascular disease. The increasing prevalence and frequency of tobacco smoking during pregnancy indicates that the response by society and the healthcare system with regards to this epidemic is inadequate. More attention should be given to smoking during pregnancy and its link to adverse health effects on pregnant Palestinian women and infants.

Exposure to SHS is an important public health burden. The high rate of smoking among males in Palestine may contribute to a large number of women and children being exposed to SHS (Abuelaish, Seidenberg, Kennedy, & Rees, 2013). Studies conducted in the Gaza Strip have found associations between low birth weight and infant mortality with SHS (Abuqamar, Coomans, & Louckx, 2011; Abusalah et al., 2012). Most of the pregnant women in this study were exposed to SHS at home and at work. Smokers and former smokers were at higher risk of exposure to SHS, and they were also at higher risk of adverse maternal and child outcomes than non-smokers. This calls for particular attention to pregnant women who smoke through counseling and health education. Moreover, enacted and enforced comprehensive smoke-free policies, which prohibit smoking in enclosed public places, are strongly recommended to protect non-smokers in general and pregnant women in particular.

Strengths and limitations

This is the first study conducted to investigate tobacco smoking among pregnant women in the West Bank, Palestine. The results of this study have important clinical implications, which support the benefits of smoking cessation before or during the first trimester. Nonetheless, several limitations should be considered when interpreting the data. While this is a representative sample of adults in the northern West Bank, it does not necessarily represent the general Palestinian population. It provides a framework surrounding the situation of tobacco smoking, the patterns and the behaviors among women in a Palestinian context. In light of the high rates of cigarette and waterpipe smoking among pregnant women across different areas, more research is needed, especially in the southern West Bank. The lack of prior research studies among pregnant women was the greatest constraint when attempting to predict a change in smoking prevalence and its associated risks. In addition, due to the stigma surrounding tobacco smoking for women, an anonymous self-report behavioral survey was used. Self-report questionnaires, which are generally used for computing smoking statistics, provide underestimated outcomes compared to the actual smoking prevalence, especially among women and adolescents (Park, Kim, Nam, & Hong, 2014; Wong, Shields, Leatherdale, Malaisson, & Hammond, 2012).

Conclusion

The findings of this study showed that the prevalence of maternal active and SHS was high among pregnant Palestinian women, indicating their heightened risk for complications during pregnancy and child birth. The study found that being a smoker during pregnancy increased the risk of preterm birth and low birth weight. In addition, gestational dyslipidemia was associated with current and previous smoking. Although most women were knowledgeable about the risks associated with smoking on themselves and their fetus, a significant number continued smoking. Moreover, despite high cessation rates during pregnancy, it was previously demonstrated that high postpartum relapse rates still exist (Greaves & Jategaonkar, 2006). The findings of this study suggest a need to further integrate tobacco smoking prevention strategies and treatment into services offered to pregnant women, especially refugee women, in the West Bank. This demonstrates the critical importance of pursuing cessation

strategies as part of a comprehensive approach, and its direct benefits in terms of reducing morbidity and mortality. Since pregnancy is often a time when women have more frequent contact with the healthcare system, healthcare providers must focus on smoking cessation among pregnant women (Yan & Groothuis, 2015). Based on the findings of the current study, we recommend counseling interventions, health education, and social support programs that promote continual attempts to quit smoking as a means of harm reduction. Future studies need to be conducted to tackle some of the above variables independently.

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Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest. No funding was received for this study.

Ethical Approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of University's Research Ethics Board, the American Psychological Association (APA, 2010) and with the 1975 Helsinki Declaration.

Informed Consent

Informed consent was obtained from all participants.

Availability of data and materials

Most data generated or analyzed during this study are included in this manuscript. Other data that support the findings of this study and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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