



Effect of Hypertensive Disorders of Pregnancy on Maternal Health Outcomes at Primary Health Care Centers in Gaza Strip – Palestine

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors have directly and sufficiently participated in all stages of the study including the planning, execution, analysis and manuscript preparation. Both authors have read and approved the final version prior to submission.

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ABSTRACT

Aims: To identify the possible effects of hypertensive disorders of pregnancy (HDP) on maternal health outcomes of women attended primary health care centers (PHCCs) in Gaza Strip – Palestine.

Study Design: A cross-sectional comparative design.

Place and Duration of Study: The study was conducted at 6 PHCCs from August 2016 to May 2017.

Methodology: Two groups of 215 hypertensive mothers and 215 normotensive mothers in the last pregnancy were recruited by 3-stage stratified random sampling technique. A detailed questionnaire filled through face to face interviews in addition to medical records revision in 2017. Pearson's Chi-square and t-tests were used to compare the outcomes between the two groups.

Results: HDP in 215 women were classified as pregnancy-induced hypertension (n = 153, 71.2%) and chronic hypertension (n = 62, 27.8%). The mean age of HDP women was 28.8 ± 6.8 years. About 40.9% live in refugee camps; 23.7% had gravida ≥ 7; 54.6% had BMI > 30 and 21.9% had a

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history of twice or more abortions. Only 20% of HDP women received preconception care. Cesarean section and assisted delivery were significantly higher among hypertensive mothers (37.2% and 26.9%) compared with non-hypertensive (16.3% and 8.4%) respectively ($P = 0.001$). Incidence of preeclampsia/eclampsia, antepartum hemorrhage and postpartum hemorrhage, were significantly higher among HDP women (29.3%, $P = 0.001$; 14%, $p=0.001$; 7%, $P = 0.003$ respectively) while no significant differences in abruptio placenta (0.9%; $P = 0.25$), placenta previa (0.5%, $P = 0.75$) HELLP syndrome (0.9%, $P = 0.24$) were found between the two groups. 20.9% mothers with pregnancy-induced hypertension were not recovered and developed chronic hypertension.

Conclusion: Women with HDP are at higher risk to have adverse maternal outcomes compared to normotensive women in GS. Preconception care, early diagnosis and prenatal follow-up would improve maternal and fetal prognosis.

Keywords: Hypertensive disorders of pregnancy; maternal health; obstetric profile.

1. INTRODUCTION

Hypertensive disorders of pregnancy (HDP), including preexisting hypertension and pregnancy-induced hypertension (PIH), is one of the leading causes of pregnancy associated morbidity and even mortality. Globally, hypertension affects 10 percent of all pregnant women [1], noting that the same findings (10%) was observed in Gaza strip (GS) in Palestine [2]. HDP is generally defined as a diastolic blood pressure of 90 mmHg or more, and/or systolic blood pressure of 140 mmHg or more and classified into: chronic hypertension, gestational hypertension and preexisting hypertension with superimposed preeclampsia [3].

Interestingly, nowadays there are an active debate about the current blood pressure cut off of 140/90 mm Hg which was set by the American College of Obstetrics and Gynecology (ACOG)-issued practice bulletin of 2019, the 2013 Task Force and the guidelines prompted by the International Society for the Study of Hypertension in Pregnancy (ISSHP). Sisti and Colombi (2019) stated "the evidence on which the current cut-off is based is scarce and not updated. We propose the application of the 2017 American College of Cardiology/American Heart Association (ACC/AHA) guidelines on pregnant women and defining preeclampsia with the new 130/80 blood pressure cut-off" [4]. Such debate is very useful in determining what is better for the maternal and newborn outcomes: the old higher or the new lower cut-off?. However, several studies are needed to investigate the effect of new lower cutoff on the incidence of preeclampsia [5].

The severe hypertension in pregnancy is associated with worse maternal and fetal outcomes and had an important role in defining

the outcomes [6]. Maternal outcome could be chronic hypertension, preterm delivery, cesarean delivery, postpartum hemorrhage, disseminated intravascular coagulation, placental disorders, eclampsia, renal failure, cerebrovascular accidents and maternal death [7].

In GS, the total number of newly registered pregnant women during 2014 was 39546, 10% of them had hypertension in pregnancy. The incidence of chronic HTN ranged from 1 to 5% from all pregnancies and PIH varies between 2-7%. The neonatal mortality was increased from 12.0 (2008) to 23.3 per 1000 live birth, amongst the main causes was preterm birth which accounted for 39%, some of these are related to hypertension in pregnancy [2].

A World Health Organization survey conducted in 29 countries shows that the incidence of HDP was 2.7%, of which the pre-eclampsia was the highest (2.16%). The most prevalent maternal outcomes were chronic HTN (12.06%) and maternal deaths were higher with women with eclampsia (3.66%) and women with preeclampsia (0.43%) [8].

A study conducted in Ethiopia, among the women with hypertension shows that 6.6% of patients with renal failure, 12.4 with HELLP syndrome, 35.5% with preeclampsia, chronic hypertension 4.1%, 12.4% with gestational hypertension and 7.4% with postpartum hemorrhage [9].

Worldwide, HDP is responsible for about 18% of maternal mortality, with an estimated 62000 – 77000 deaths per year [10]. In Egypt, a center based cross-sectional study shows that among all deliveries 8.2% were preterm birth, 43.9% of them linked to HTN [11]. Also there is a significant increase in the risk of cardiac

malformations associated with chronic hypertension in pregnancy [12]. The low birth weight (less than 2500 gm) incidence was 10.6% among women without pre-eclampsia/eclampsia, 34.3% among women with pre-eclampsia and 44.6% among women with eclampsia [8]. The intrauterine growth restriction was detected in 10% of the fetuses of preeclampsia patients [13].

Unfortunately, in Gaza strip, till the time of the study there are no enough data about the possible effect of HDP on pregnant women. In other words, this study is considered as the first baseline study in GS that aimed to explore the possible adverse outcomes associated with HTN in pregnancy.

2. METHODOLOGY

2.1 Geographical Context

GS is a narrow piece of land lying on the Mediterranean Sea in the South-West of Palestine; it is 40 km long and 9 km wide with an area of 360 square kilometers. The total population of GS is around 2 million which considered one of the highest densities in the world. Two thirds of the GS population is refugees (66.8%) who live in crowded permanent camps and receive basic health care services through United Nations Relief and Works Agency for Palestine Refugees (UNRWA).

2.2 Research Questions

1. What are the possible adverse effects of hypertension in pregnancy on maternal outcome?
2. Do the demographic variables affect the presence or the severity of maternal adverse outcomes in women with HTN in pregnancy?
3. Do the obstetric profile variables affect the presence or the severity of maternal outcomes in women with HTN in pregnancy?

2.3 Hypothesis

The higher blood pressure during pregnancy the more adverse maternal outcomes.

2.4 Study Design and Sampling Technique

To achieve the objectives of the study, a comparative analytical cross-sectional design was used. A sample consisted of two groups.

First group included 215 women who either had chronic hypertension before pregnancy or women who developed pregnancy-induced hypertension after 20 weeks of gestation in the recent pregnancy. Second group included 215 women without hypertension in the recent pregnancy.

Any woman with other comorbidities such as diabetes mellitus or heart disease was excluded from the study.

The study was conducted at 6 UNRWA's primary health care centers (PHCCs) distributed across GS from August 2016 to May 2017.

To calculate a representative sample, Raosoft sample size calculator (soft program) was used. The following parameters were considered; maximum acceptable percentage points of error (confidence interval 5%) with confidence level 95% and Power 80%. The calculation indicated that the representative sample should be at least 175 participants for each group with total of 350 participants and based on 1:1 ratio. However, to reinforce representativeness and the statistical power, the researcher increased the sample size to 430 participants, 215 participants for hypertensive group and 215 for non-hypertensive group.

In order to recruit the participants, three successive sampling steps were followed. First, GS was stratified into three geographical areas, north, middle and south. Then 6 PHCCs were randomly selected from 21 PHCCs. These were 2 from the North (Rimal and Sabra health centers), 2 from the Middle (Nuesirat and Dier balah health centers) and 2 from the South (Maan and Khan-Younis health centers).

Then, the sample size for each PHCC was considered according to the proportionate population coverage. Finally, the pregnant women registered with each PHCC were selected using simple randomization technique (Table 1).

2.5 Statistical Analysis

Statistical analysis had been done using the Statistical Package for Social Sciences Software (SPSS) version 22.0. The results were expressed as mean values \pm standard deviations and proportions, as appropriate. Chi square and t-test were used and P values equal or less than 0.05 is considered statistically significant.

Table 1. Stratified proportional distribution of subjects according to geographical area in 2016-17

Health Center	HDP women per center Total N**	Proportionate percentage %	Proposed HDP women N	Proposed non-HDP women N	Total
Sabra - north	144	10.6	23	23	46
Rimal - north	213	15.6	34	34	68
Nuesirat - middle	246	18	38	38	76
D. Balah - middle	153	11.2	25	25	50
Maan - south	267	19.6	42	42	84
KYounis - south	339	25	53	53	106
Total	1362	100%	215	215	430

Table 2. Sociodemographic and economical characteristics of pregnant women in 2016-17

Variable	Hypertensive		Non-hypertensive		χ^2	P
	N	%	N	%		
Age (at last delivery)					9.174	0.008
20 years old and less	21	9.8	19	8.8		
21– 35 years	148	68.8	173	80.5		
More than 35 years	46	21.4	23	10.7		
Age at marriage					0.996	0.80
18 years and less	58	27.0	61	28.4		
19 – 20 years	60	27.9	51	23.7		
21 – 24 years	70	32.6	75	34.9		
25 years and above	27	12.6	28	13.0		
Residence area					7.068	0.02
City	79	36.7	76	35.3		
Village	48	22.3	71	33.0		
Camp	88	40.9	68	31.6		
Mother education level					4.005	0.26
Below secondary	56	26.0	45	20.9		
Secondary	79	36.7	76	35.3		
Diploma	14	6.5	24	11.2		
University and higher	66	30.7	70	32.6		
Employment					0.028	0.50
Yes	19	8.8	20	9.3		
No	196	91.2	195	90.7		
Total monthly income (USD)*					0.197	0.90
Less than 300	100	46.5	100	46.5		
From 300 to 600	82	38.1	85	39.5		
Above 600	33	15.3	30	14.0		
Family Size					20.018	0.001
3 members and less	77	35.8	49	22.8		
From 4 to 6	75	34.9	121	56.3		
7 members and more	63	29.3	45	20.9		

*United States Dollar

3. RESULT

All 430 pregnant women completed the interviews. The hypertensive group consisted of 153 (71.2%) of mothers with pregnancy-induced

hypertension and 62 (27.8%) with chronic hypertension (before 20 weeks of gestation). The comparative group consisted of 215 women with normal blood pressure in the last pregnancy.

3.1 Sociodemographic and Economical Information

The mean age at last delivery for all pregnant mothers was 28.2 ± 6.1 ($\mu \pm SD$) years, 28.8 ± 6.8 for hypertensive and 26.2 ± 5 for non-hypertensive. The age at last delivery of most study participants was between 21-35 years. It is noticed that 21.4% of hypertensive women were aged more than 35 years compared with only 10.7% of the non-hypertensive (Table 2). The mean age at marriage for all studied pregnant was 20.8 ± 3.5 years, hypertensive- 20.8 ± 3.7 and non-hypertensive 20.3 ± 3 , with no

significant differences between the two groups in marital age. However, it was noticed that (27.9%) of hypertensive women get married at age group of 19-20 years compared with 23.7% of non-hypertensive women (Table 2). Regarding the residency area, table 1 shows that 40.9% of women with HTN live in refugee camps in GS compared with 31.6% of non-hypertensive women with significant differences ($P = 0.02$). No statistical differences were found between the hypertensive and non-hypertensive groups regarding education, ($P = 0.26$), employment ($P = 0.50$) and total monthly income ($P = 0.91$).

Table 3. Obstetric and medical information of the participants (N = 430)

Variable	Hypertensive		Non-hypertensive		χ^2	P
	N	%	N	%		
Gravidity						
Primigravida	63	29.3	42	19.5	26.398	0.001
From 2 to 3	44	20.4	83	38.6		
From 4 to 6	57	26.6	64	29.8		
7 and more	51	23.7	26	12.1		
Parity						
Para one	75	34.9	50	23.3	28.765	0.001
From 2 to 3	47	21.9	94	43.7		
From 4 to 6	61	28.3	58	26.9		
7 and more	32	14.9	13	6.0		
Past history of abortion						
Never	119	55.3	152	70.7	11.412	0.003
Once	49	22.8	36	16.7		
Twice and more	47	21.9	27	12.6		
Interval between births (months)						
Less than 24 months	47	33.6	62	37.6	4.185	0.12
From 24 to 48 months	41	29.3	55	33.3		
More than 48 months	52	37.1	48	29.1		
Preconception care						
Yes	43	20.0	49	22.8	0.497	0.48
No	172	80.0	166	77.2		
Antenatal care early registration (< 14 weeks)						
Yes	161	74.9	151	77.3	1.167	0.27
No	54	25.1	64	22.7		
Antenatal care visits						
3 and less	7	3.2	18	8.4	5.138	0.02
4 and more	208	96.7	197	91.6		
Body mass index						
Normal (<18.5)	32	14.9	119	55.6	74.367	0.001
Overweight (25-29.9)	66	30.5	66	30.5		
Obese (> 30)	117	54.6	30	13.9		

United States Dollar

3.2 Obstetric Profile

The obstetric profile (Table 3) shows that 63 (29.3%) of hypertensive respondents and 42 (19.5%) of non-hypertensive were primigravida, while 51 (23.7%) of hypertensive had seven and more gravida compared with only 26 (12.1%) for non-hypertensive. Gravidity mean for hypertensive group and non-hypertensive group were 4.3 ± 3.2 and 3.5 ± 2.4 respectively with significant statistical differences ($P = 0.001$).

In contrast, 94 (43.7%) of non-hypertensive were para 2-3 compared with only 47 (21.9%) for the hypertensive. On the other hand, 32 (14.9%) of hypertensive pregnant women had seven or more parities while only 13 (6.0%) for non-hypertensive ($P = 0.001$). Past history of abortion indicated significant differences between the two groups ($P = 0.003$); hypertensive mothers had a history of twice or more abortions higher than non-hypertensive (21.9%, 12.6%) respectively.

Table (3) also indicates that only 92 (21.4%) of the total number of the mothers received preconception care (PCC). Interestingly, non-hypertensive mothers who get pregnant after PCC were slightly higher than hypertensive (22.8% and 20.0% respectively) despite that they were at higher risk for adverse pregnancy outcomes.

Consistently, the non-hypertensive mothers who registered for early ANC (up to 13 weeks of gestation) were higher than those of hypertensive (77.3% and 74.9% respectively). However, the antenatal visits mean of hypertensive group ($\mu = 8.06$) was higher than the mean of non-hypertensive ($\mu = 6.6$) with a significant difference ($P = 0.02$).

Table (3) shows clearly that the percentage of hypertensive mothers who were obese and overweighted were 54.6% and 30.5% respectively compared with only 13.9% and 30.5% of non-hypertensive mothers with a high significant difference ($P = 0.001$).

3.3 Maternal Outcomes

Cesarean section (CS) and assisted delivery were more common among hypertensive mothers (37.2% and 26.9%) compared with non-hypertensive (16.3% and 8.4%) respectively. On the other hand, spontaneous normal vaginal delivery (SNVD) was significantly higher among non-hypertensive (75.3%) than hypertensive

(35.9%) with p -value = 0.001 (table 4). About 29.3% of mothers with HTN had preeclampsia/eclampsia. About 14% of hypertensive mothers suffered from APH in comparison with only 2.8% of non-hypertensive mothers ($P = 0.001$). Moreover, 7% of hypertensive compared with 1.4% of non-hypertensive mothers had PPH ($P = 0.003$).

About 2.3% of hypertensive and 0.9% of non-hypertensive had abruptio placenta (p -value = 0.255) while 0.5% of both groups had placenta previa ($P = 0.75$). However, only 2 cases (0.9%) of hypertensive mothers had HELLP syndrome ($P = 0.249$). The systolic blood pressure (SBP) mean was 122.1 mmHg among hypertensive and 106.7 among non-hypertensive, while the diastolic was 81.3 and 68.8 respectively with $P = 0.001$.

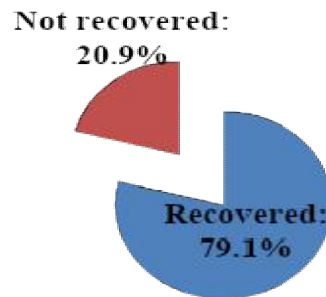


Fig. 1. Recovery rate from pregnancy-induced-hypertension.

Fig. 1 shows that 79.1% ($n=121$) of the diagnosed mothers with PIH ($n = 153$) were recovered while 20.9% ($n=32$) were not recovered; knowing that, there are 62 cases with chronic hypertension and 215 without hypertension.

4. DISCUSSION

This study aimed to identify the possible effect of pregnancy hypertension on maternal health among women attended UNRWA's health care services in Gaza governorates. Generally, our study indicated that mothers with hypertension in pregnancy are still at increased risk for developing adverse pregnancy outcomes in comparison to mothers without hypertension. The socio-demographic analysis pointed out higher numbers of hypertensive women aged 35 years or more, lived in refugee camps and had lower education levels compared with the non-hypertensive. This resulted in higher risk for

Table 4. Comparison of maternal clinical outcomes between the two groups

Variable	Hypertensive		Non-hypertensive		χ^2	P
	N	%	N	%		
Mode of delivery						
Spontaneous normal vaginal delivery	77	35.9	162	75.3	67.289	0.001
Cesarean section	80	37.2	35	16.3		
Assisted delivery	58	26.9	18	8.4		
Preeclampsia/eclampsia						
No	152	70.7	215	100.0	73.815	0.001
Yes	63	29.3	0	0.0		
Antepartum hemorrhage						
No	185	86.0	209	97.2	17.462	0.001
Yes	30	14.0	6	2.8		
Postpartum hemorrhage						
No	200	93.0	212	98.6	8.350	0.003
Yes	15	7.0	3	1.4		
Abruptio placenta						
No	210	97.7	213	99.1	1.307	0.22
Yes	5	2.3	2	0.9		
Placenta previa						
No	214	99.5	214	99.5	0.000	0.75
Yes	1	0.5	1	0.5		
HELLP syndrome						
No	213	99.1	215	100.0	2.009	0.24
Yes	2	0.9	0	0.0		
Systolic/Diastolic blood pressure ($\mu \pm SD$)						
Systolic	122.1 \pm 8.2		106.7 \pm 4.9		23.684*	0.001
Diastolic	81.3 \pm 5.9		68.8 \pm 4.7		24.356*	0.001

*Independent t-test

adverse maternal and newborn outcomes. These findings are congruent with Fayed et al., 2017 who found that the advanced maternal age was associated with increased risk of preterm and CS deliveries. Adu-Bonsaffoh et al. [14] found a statistical relationship between increased age and adverse pregnancy outcomes. Islam [15] indicated that mothers aged ≥ 35 years were at increased risks of spontaneous abortion, preeclampsia, cesarean section delivery, prolonged labor, and gestational diabetes compared with adult mothers aged 20–34 years. Eljedi [16] reported that refugee camps environment in GS is characterized by overcrowdedness, poor infrastructure, high unemployment rate and lack of health services. All had a strong negative impact on Palestinian women health and quality of their life. Suleiman [17] conducted a prospective case-control study in Jordan and found that women with low

educational level at higher risk for HTN in pregnancy.

Regarding the obstetric profile, our results demonstrated that the hypertension during pregnancy was significantly positively associated with higher gravity and parity, increased BMI, and multiple past history of abortion. These results are consistent with the findings of a study conducted in Ethiopia to determine the factors associated with hypertension during pregnancy. Ayele et al. [18] found that age of mothers > 30 years, BMI >30 mg/kg² and multi gravid were significant factors for pregnancy induced hypertension. Saxena et al. [19] and Zhang [20] found that PIH is more common in women of high maternal age, multiple pregnancies and obese. A retrospective study conducted in Tanzania found that mothers with five gravidity and more at higher risk to have fetomaternal

morbidity and mortality in developing countries [21]. In contrast to our findings, Sajith et al. [22] found that the incidence of hypertension in pregnancy was highest among primigravidae. This might be explained by other studies which found that both multigravida and primigravidae are at higher risk to have adverse pregnancy outcomes if associated with extreme ages (less than 18 or higher than 35 years old) [22,23]. Moreover, our study indicated that no statistically significant differences were found between the two groups regarding preconception care, early registration for antenatal care and the interval between births.

Regarding the outcomes, our study showed that HTN in pregnancy can cause a range of adverse pregnancy outcomes and premature pregnancy termination. In other words, both Cesarean Section and assisted delivery (induction) were significantly higher among hypertensive compared with non-hypertensive (p -value = 0.001). We found the main first four causes of early pregnancy termination among hypertensive mothers were preeclampsia/eclampsia (28.3%), APH (17.4%), deterioration of fetal status (17.1%) and previous scar (16%) respectively. These findings are consistent with many studies; that Kheir et al. [23] found that 98.5 % of hypertensive pregnant women were delivered by caesarean section and 43% of them were carried out as an emergency procedure; Hassan [24] showed that 82.19% of hypertensive mothers had cesarean section; Bouzari et al. [25] indicated that the induction of labor and Cesarean section were more prevalent (40.4%) among hypertensive and preeclampsia.

Regarding preeclampsia/eclampsia, APH and PPH, our findings showed relatively higher incidence rates compared with other studies (29.3%, $P = 0.001$; 14%, $P = 0.001$; 7%, $P = 0.003$ respectively) with statistical significant differences for hypertensive mothers. Kheir et al. [23] found that among 3168 deliveries gives a prevalence of 2.17% HTN during pregnancy; of these, (21.7%) and (4.3%) had preeclampsia and eclampsia respectively. Hassan [24] indicated that 60% of mothers had gestational hypertension, 28.6% pre-eclamptic toxemia and 4.1% eclampsia. Muti et al. [26] found that the prevalence of PIH, preeclampsia and eclampsia were 19.4 %, 1.7 % and 0.3 % respectively. WHO cross-sectional multi-countries survey showed that the incidence of hypertensive disorders of pregnancy was 2,7% (8542 from a total 313030 women in database), chronic

hypertension, pre-eclampsia and eclampsia are 0.29%, 2.16% and 0.28% of all deliveries respectively [8]. Also, Gongora & Wenger [27] found that Preeclampsia/eclampsia was occurred in 3% to 5% of all pregnancies. Also, Prude et al. [13] found that the preeclampsia incidence of 2.31% and about 10% of all observed cases progressed to eclampsia. Mikami, et al. [28] found the prevalence of APH was 1.2% among hypertensive pregnant women while Kramer et al. [29] indicated that among 8,571,209 deliveries, 25,906 (3.0 per 1000) were complicated by severe PPH (P for yearly trend = 0.0001). These higher incidence rates of preeclampsia/eclampsia, APH and PPH in our study compared with other studies might be attributed the fact that most of our participants live permanently in refugee camps in GS with scarcity of health resources and severe deficiency of basic life needs which negatively affected their health. Moreover, different methodology, sample size, sample type and criteria for diagnosis may contribute to these variations.

Consistently, the incidence of abruptio placenta, placenta previa and HELLP syndrome is still relatively higher in our study compared with other findings. However, no statistical differences were found between the hypertensive and non-hypertensive mothers in these variables. Tikkanen [30] found that the prevalence of placental abruption is lower in the Nordic countries (0.38–0.51%) compared with the USA (0.6–1.0%) and around 0.4–1% of pregnancies are complicated by placental abruption. Bako et al. [31] found that was statistically significant occurrence of placental abruption among hypertensive women ($P = 0.001$, $RR = 2.60$ and $OR = 14.07$) compared with placenta previa, while Mihu et al. [32] found that the HELLP syndrome incidence was 0.17-0.85% of all pregnancies.

Finally, 79.1% of the diagnosed mothers with PIH were recovered while 20.9% were not. This rate of recovery is slightly lower than the rate of Mikami et al. [33] who found that 90% of PIH patients in Japan recovered from hypertension and Benschop [34] found that 14% among 200 PIH women in Netherlands had sustained hypertension after delivery. It is concluded that remaining 20% of our sample sustaining chronic hypertension after delivery is considered a big challenge for the health care system in Palestine and a heavy burden on the family and community.

5. CONCLUSION

In conclusion, the findings of the study demonstrated that hypertension in pregnancy is an important and challenging public health problem in GS. Women with HDP are at higher risk to have adverse maternal and pregnancy outcomes (More CS and assisted deliveries, pre/eclampsia, antepartum and postpartum hemorrhage) compared to women without hypertension. Moreover, placental abruption, placenta previa and HELLP syndrome still register high incidence rates among hypertensive women in GS compared with other countries. Adopting a national policy to improve the maternal healthcare in primary, secondary and tertiary levels in addition to expansion of preconception and antenatal care are crucial keys to reduce adverse pregnancy outcomes and improve maternal and fetal prognosis.

CONSENT

Both authors declare that 'written informed consent was obtained from all participating women for publication of this study (ethical code: phrc/rc/136/16).

ETHICAL APPROVAL

The ethical approval and the administrative permission to conduct the study were obtained from Helsinki Committee for Ethical Approval at the Palestinian Ministry of Health and from UNRWA Health Department in Gaza field. Then all study phases have been performed in consistent with 1964 Declaration of Helsinki and its later amendments (Ethical code: PHRC/RC/136/16).

COMPETING INTERESTS

The authors have declared that no competing interests exist.

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