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# Factors Associated with Postpartum Haemorrhage amongst Primigravidae Women; the Case of Two Hospitals within the Bamenda Health District

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## Abstract

**Background:** Approximately 830 women die from pregnancy-related conditions daily with 99% of these maternal deaths occurring in low resource countries. Primary postpartum haemorrhage (PPH) accounts for 25.7% of maternal deaths in Africa. In Cameroon, postpartum hemorrhage remains the leading cause of maternal death, with little information on the primigravidae population compared to multigravida or multiparity. **Objective:** The aim of this study was to assess the factors associated with postpartum haemorrhage amongst primigravidae women giving birth in two hospitals within the Bamenda Health District. **Methods:** This study was a multicentric, non-randomized cross-sectional descriptive and analytic study. Of the 221 women interviewed regarding their willingness to participate in the study, 197 consented. Quantification of blood loss was done by visual estimate and with the assistance of the pathfinder international wall chart for visual estimation of blood loss. Data was collected using a structured questionnaire and analyzed using SPSS version 23. A P-value of <0.05 used to determine association between variables was considered statistically significant. **Results:** The prevalence of postpartum hemorrhage in primigravidae was 7.1%. The risk factors of postpartum hemorrhage were: induction of labour (P-value < 0.01), duration of labour (P-value < 0.01), augmentation (P-value < 0.05), mode of delivery (P-value < 0.01), and macrosomia (P-value < 0.01). The main causes of PPH were uterine atony and obstetrical lacerations (P value < 0.01). Management was mostly by the use of non-pharmacological and pharmacological measures. The main adverse outcomes were shock and severe anaemia, with one case of nearmiss recorded.

No maternal death was recorded. **Conclusion:** The prevalence of postpartum hemorrhage amongst primigravidae was high. The main causes of post-partum hemorrhage were uterine atony and obstetric lacerations. PPH was associated with uterine hypotonia, retained products and genital lacerations. No maternal mortality was recorded. These findings highlight the pressing need for good quality em ergency obstetric care and the availability of more accurate techniques of postpartum blood loss measurement. Secondly, hospitals need blood banks to manage patients with severe hemorrhage.

## Keywords

Postpartum Hemorrhage, Primigravidae, VEBL, Maternal, Death, BHD

## 1. Introduction

### Background

Some 358,000 women die each year at childbirth, mostly in developing countries. Severe bleeding in the postpartum period is the leading cause of maternal mortality, accounting for about 35% of all maternal deaths worldwide [1]. More than half of all maternal deaths occur within 24 hours of giving birth, most commonly from excessive blood loss (postpartum haemorrhage). These deaths have a major impact on the lives and health of the families affected. Developing countries continue to experience higher numbers of maternal deaths compared to developed countries [2].

Postpartum hemorrhage (PPH) is a life-threatening event involving severe bleeding during and after the third stage of labour. PPH is one of the most common obstetrical complications, affecting up to 18% of deliveries. Every year about 14 million women around the world suffer from PPH [3].

In some studies across the world, the prevalence of PPH in primiparous women is shown to vary greatly, ranging between 0.79% and 24.4%. For example; 0.79% in Asia (Israel) [4], 7% in Sweden [5] and 10% in Scotland, USA [6].

In Sub Saharan Africa (Nigeria), the prevalence PPH in Primiparous woman is 24.4% [7]. In Cameroon, some studies give a 3.5% and 1.1% prevalence in primips [8] [9] and 23.6% in general after vaginal delivery [10]. PPH accounts for 35% - 55% of peripartum maternal deaths worldwide [11].

Traditionally, early PPH is defined as blood loss exceeding 500 ml within 24 h after vaginal delivery, or blood loss exceeding 1000 ml following cesarean section (CS) [12].

PPH may cause short- and long-term maternal morbidity, including acute renal failure, hypovolemic shock, consumptive coagulopathy, disseminated intravascular coagulation (DIC), blood transfusion related complications, or hysterectomy leading to loss of childbearing potential [13] [14]. Approximately 12% of women who survive a PPH event will suffer from anemia [14]. The most common cause of PPH is uterine atony, *i.e.* failure of the uterus to contract ade-

quately after birth, responsible for 70% - 90% of all PPH cases [12] [15] [16]. Postpartum hemostasis is based on powerful and prolonged hormonally mediated contractions that decrease the blood flow to the placental bed [17] [18].

The major risk factors for PPH include over-distended uterus (*i.e.* macrosomia, multiple gestations, hydramnios, etc.), prolonged or precipitous labor and chorioamnionitis [12]. Nevertheless, atonic PPH occurs in more women without known risk factors than those with identifiable risk factors [19] [20]. Additional causes of PPH include genital tract trauma (cervix, vagina or perineum); retained placental tissue; uterus inversion, or ruptured uterus [12] [16] [21].

The different causes of PPH can be explained by the 4T's theory:

- Tone (uterine atony),
- Trauma (including genital tract trauma, uterine rupture and uterine inversion, causing 20% of all cases),
- Tissue (retained placental products or blood clots, accounting for 6% - 10% of all cases),
- Thrombin (coagulation abnormalities, accounting for 1% of all PPH cases) [21] [22]. Predicting PPH by risk factors is difficult because two-thirds of women who have PPH actually manifest no risk factors [23]. In addition to over-distended uterus, predisposition to uterine muscle exhaustion consists of prolonged labour or rapid labour; functional/anatomical distortion of the uterus as in fibroid uterus, or placenta previa and chorioamnionitis.

Induction of labour and prolonged treatment with oxytocin were found to be independent risk factors for PPH [24]. Some factors associated with significant risk for PPH are placental abruption, placenta previa, multiple pregnancy and obesity [25].

Different preventive interventions have been studied as part of the active management approach, including the administration of uterotonic agents after delivery, early cord clamping and controlled cord traction of the umbilical cord [26] [27] [28]. The American College of Obstetricians and Gynecologists (ACOG), the World Health Organization (WHO) and the International Federation of Gynecologists and Obstetricians (FIGO) have published recommendations and guidelines for active management of the third stage of labour (AMTSL) [19] [29] [30] [31] [32] [33]. Studies on long-term complications of PPH are limited and include mainly the risk of recurrent PPH and infertility due to the life-saving techniques used to manage the event [34] [35] [36] [37]. PPH in a previous pregnancy is a major risk factor for recurrent PPH in a subsequent pregnancy, although scarce data exist [37]. There exist a significant reduction in the proportion of women conceiving after a CS in their first pregnancy complicated by PPH [38]. Despite marked improvements in prevention and management, early PPH remains a significant contributor to maternal morbidity and mortality both in developing countries and in high resources areas [30]. The lack of prenatal care (LOPC) characterizes some traditional and religious societies has already been identified to be associated with adverse obstetric outcomes and specifically as an independent risk factor for perinatal mortality [39]. This study aims to as-

sess the factors associated with PPH in primigravidae. Identifying risk factors may improve prevention and management practices of one of the major causes of maternal mortality.

## 2. Material and Method

### 2.1. Study Design

This study was a cross sectional multicentric, non-randomized, descriptive and analytic study.

### 2.2. Study Area and Setting

The study was carried out in two hospitals within the BHD of the North-West Region of Cameroon. Precisely; the Regional Hospital Bamenda (RHB) and the Medicalized Health Centre Nkwen (MHCN). The choice of this District was based on the fact that it is a cosmopolitan area, has the highest records in terms of deliveries, easy accessibility within the District, as well as for security reasons vis-a-vis the socio-political climate of the Northwest Region.

### 2.3. Study Period

This study was carried out over a period of three months; from the 31st December 2017 to 31st March 2018.

### 2.4. Study Population

This study was a hospital based study carried out in two randomly selected hospitals (through balloting) within the Bamenda Health District of the in North-West Region. The study was limited to primigravidae women giving birth within these facilities.

### 2.5. Selection Criteria

#### 2.5.1. Inclusion Criteria

- All primigravidae women giving birth within the two health facilities in the BHD.
- All primigravidae women giving birth within the study setting who consent to participate in the study.

#### 2.5.2. Exclusion Criteria

- All multigravidae women giving birth within the study setting.
- All primigravidae women giving birth within the study setting who refused consent or assent to participate in the study.
- All primigravidae women within the study setting on anticoagulant therapy.

### 2.6. Sampling Method

A consecutive non-probability sampling method was used to enroll all those who met the inclusion criteria into the study.

### Sample Size Estimation

This was calculated using the Lorentz formula:

$$s = z^2 \left[ p(1-p) \right] / d^2$$

where;

- $s$ = minimum sample size required.
- $z$ = degree of precision corresponding to 95% CI (1.96).
- $p$ = an estimate of the proportion of the study (prevalence).
- $d$ = degree of accuracy (5% margin of error).

  Confidence interval = 5%, Therefore $d$ = 0.05.
- Confidence level = 95%.

  Predicted proportion ($p$) = 10% (mean prevalence of PPH in primips in some Sub Saharan Africa countries) [7] [8] [9].
- Therefore $s = (1.96)^2(0.1)(1 - 0.10)]/(0.05)^2 = 138.3$

  Therefore, a minimum of 138 persons was required to carry out the study.

## 2.7. Study Procedure

### 2.7.1. Participant Enrolment

- Recruitment of participants was done by the principal investigator and research assistants.

### 2.7.2. Quantification of Blood Loss

- Quantification of blood loss was done by Visual estimation (VEBL) and/or sometimes direct collection of blood through a standard measuring jar with caesarean deliveries: this was done through the following procedures; blood loss was measured from the time of delivery until the mother was transferred to postnatal care (averagely about 4 hours duration). Immediately after the cord was clamped and cut, the blood collection was started with the use a flat bedpan under the buttocks for a woman delivering on a bed, or bowl for a woman delivering on a delivery table, or graduated measuring jar/cylinder for CS deliveries. In all scenarios, soiled sheets with blood were assessed with the aid of standard charts. Two methods were employed in order to improve upon the reliability of the results.

## 2.8. Data Collection

The data collection tools consisted of a standardized questionnaire and an observational guide. These consisted of questions on socio-demographic characteristics of the study participants and questions on obstetric events related to PPH. The questionnaire was pre-tested on randomly selected individuals from the Labour room and Post-natal unit of St Patrick Medicalized Health Centre—Binshua, Nkambe District, found about 68 km from the study site. These individuals did not participate in the main study. Pre-testing of the questionnaire was to assess clarity/understandability, ambiguity, reliability, sensitivity of the subject matter and for acceptability.

The data was collected through a face to face interview conducted by the re-

searcher and other trained collectors like health personnel schooled on the study subject. The study subject was explained to the participants and all those who meet up with the inclusion criteria recruited, questioned and their form filled. Recruitment was from the Labour and delivery room of the selected health facilities.

Collected data was inputted into a data entering sheet on Microsoft Excel 2016 from where it was retrieved and analyzed using SPSS 23.

### 2.9. Data Analysis

The questionnaire was checked for completeness and consistency, and the data were entered into the statistic software Epi Info version 7 for different analysis. In addition, the software Microsoft excel was used to design the different tables and figures for the presentation of the result. Descriptive statistics (frequencies, mean and standard deviation) were used to tabulate and describe the data. Chi-Squared test was used for comparisons of categorical variables. A P-value $< 0.05$ was considered statistically significant.

### 2.10. Ethical Consideration

- A protocol was written, corrected by supervisors before it was then defended in front of a jury assigned by the faculty. Corrections made thereafter.
- Ethical clearance was then applied for and obtained from the Institutional Ethics Committee for Research on Humans of the University of Bamenda.
- An authorization was obtained from the Director/CMO of the different Hospitals and as well from the Regional Delegation for Public Health for North West Region before the start of data collection in the different health facilities.
- Informed consent. A detailed information of the study procedure was made known to the participants and consent obtained. Participation in the study were entirely voluntary and participants had the right to withdraw from the study at any time without any consequence regarding their future care in the hospital.
- Confidentiality, names of participant were not collected during the study as only codes were used so as to ensure confidentiality of information.
- Benefits, participants benefited from knowledge on PPH (primary or secondary), risk factors and prevention counselling.
- The investigator also educated the participants on the basics of PPH and its management and answered any questions the participants had.
- Results of this study will be made available to health authorities. The information might then be used in the improvement of the quality care and policy making, as far as PPH is concern.

## 3. Results and Discussion

### 3.1. Results

During the study period, 221 clients were approached; 210 consented to the

study, 3 (minors) either denied assent or consent and 8 did not consent at all to the study. 11 were therefore excluded giving a respondent rate of 95.02%.

Of the 210 who consented to the study; 2 (0.95%) refused exposing their pads after delivery for VEBL. These 2 clients were excluded from further study leaving us with 197 participants. Reasons for exclusion here was because, results of total EBL were inconclusive, meaning further investigations had to be done to determine if they had PPH or not. This was beyond the scope of the study (Figure 1).

#### 3.1.1. Socio-Demographic Data of the Study Population

Table 1 presents the socio-demographic data of the study population. From the table, with regards to age, majority of the respondents were those of age 20 - 30 years (69.0%), followed by those aged > 30 years (24.4%) and the least were those aged < 20 years (6.6%).

For marital status, 73.6% of the respondents were married, while 24.9% were single. A small proportion of 1.5% indicated their marital status as others (either widows or widowers).

Table 1. Socio-demographic characteristics of participants.

| Characteristic | Sampled size (N) | Percentage (%) |
|---|---|---|
| **Age (Years)** | | |
| <20 | 13 | 6.6 |
| 20 - 30 | 136 | 69.0 |
| >30 | 48 | 24.4 |
| **Total** | 197 | 100.0 |
| **Marital status** | | |
| Married | 145 | 73.6 |
| Single | 49 | 24.9 |
| Others | 3 | 1.5 |
| **Total** | 197 | 100.0 |
| **Level of education** | | |
| University education | 81 | 41.1 |
| High school | 60 | 30.5 |
| Secondary education | 36 | 18.3 |
| Primary education | 20 | 10.1 |
| **Total** | 197 | 100.0 |
| **Religion** | | |
| Christian | 188 | 95.4 |
| Muslims | 9 | 4.6 |
| **Total** | 197 | 100.0 |

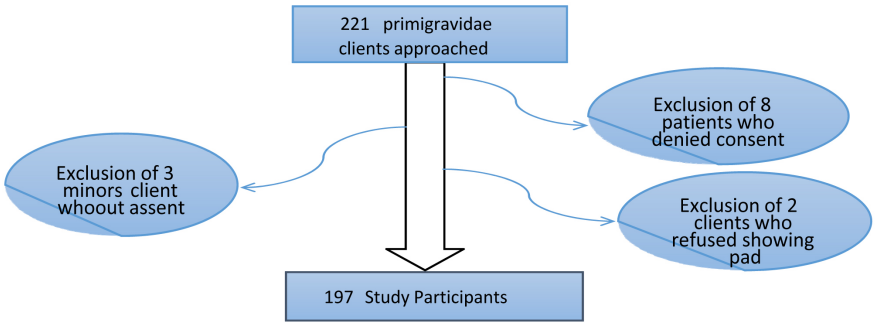


**Figure 1.** Flow chart showing study participants recruitment.

For level of education, majority of the respondents giving birth in the two hospitals within the BHD had attained university education (41.1%), 30.5% had attained High school education and 18.3% had attained Secondary school education. The least in this category of respondents were those who had attained Primary school and this stood at 10.1%. With respect to religion, 95.4% of the respondents were Christians, while 4.6% were muslim faithful.

**Figure 2** presents the occupational status of the respondents of the two hospitals in the BHD. Majority of the respondents were unemployed (37.6%), 35.0% admitted that they were employed and 27.4% were students.

**Figure 3** is a bar chat which shows the different divisions of origin of the respondents. From the figure below, 44.7% of the population originated from Mezam, 8.9% from Momo, 6.8% from Boyo, 6.3% from Bui, 5.3% from Donga Mantung, 3.3% from Ngoketungia Division, 1.6% from Menchum Division and 5.3% from others (out of the NW Region).

**Figure 4** is a pie chat indicating the family income levels of the respondents. From the figure, 45.7% had no defined income, 27.4% had irregular incomes and 26.9% had regular incomes.

### 3.1.2. Prevalence of PPH in the BHD

1) Prevalence of PPH

**Table 2** indicates the prevalence of PPH as per the study. From the table, out of 197 participants, 14 cases of Postpartum Haemorrhage (PPH) were diagnosed, with a prevalence of 7.1% of the total sampled size.

2) PPH According to the Socio-Demographic Characteristic

**Table 3** below presents the results that were obtained when the prevalence of PPH was computed with the socio-demographic data of the respondents of the study area.

It shows that prevalence of PPH according to age were dominated by those of the ages 20 - 30 years (57.1%), followed by those aged > 30 years (28.6%) and those aged < 20 years were the least with a valid percentage of 14.3%. The result shows that there is no significant association between PPH prevalence and ages of the respondents.

Still from **Table 3** with regards to marital status, 71.4% of respondents with PPH were married, while 28.6% were single. The result also indicates that there

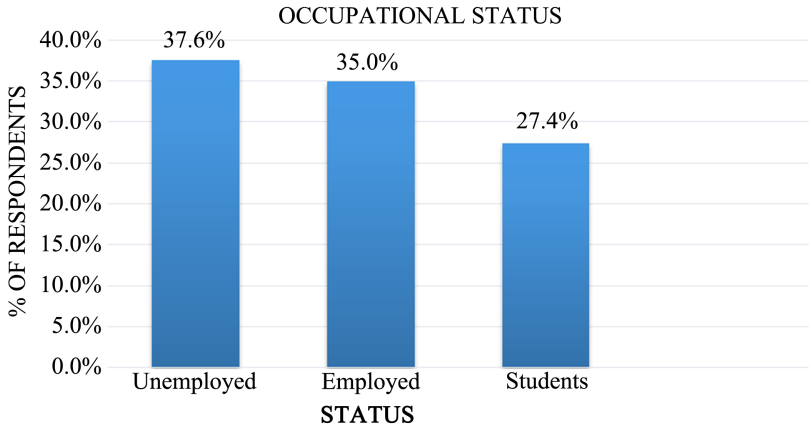


**Figure 2.** Occupational status of participants.

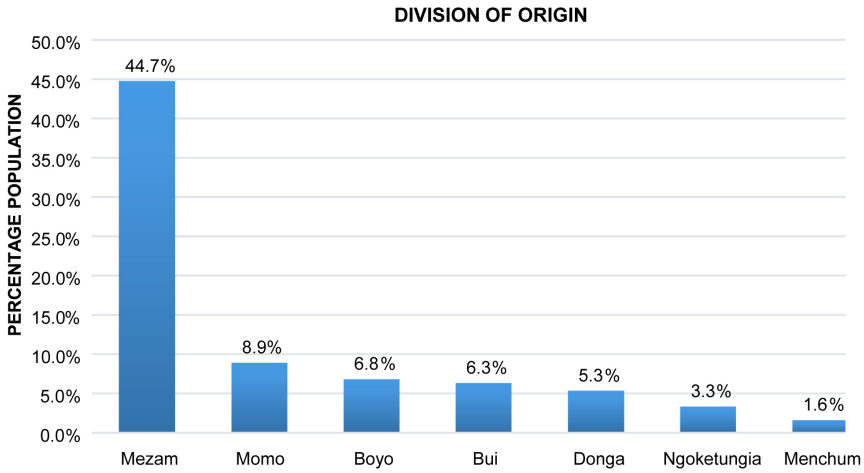


**Figure 3.** Division of origin of participants.

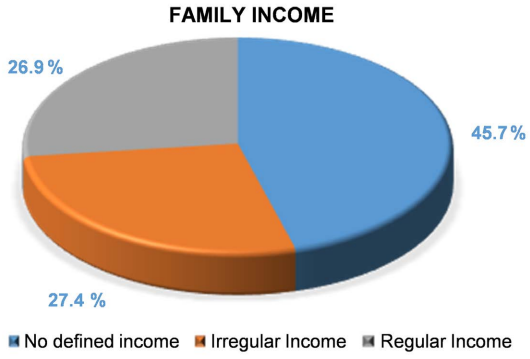


**Figure 4.** Family income of participants.

**Table 2.** Prevalence of PPH.

| Variable | N | % |
|---|---|---|
| **PPH** | 14 | 7.1 |
| **No PPH** | 183 | 92.9 |
| **Total** | **197** | **100.0** |

**Table 3.** Prevalence of PPH computed with the socio-demographic data of the respondents of the study area.

| Variable | PPH (n = 14) | No PPH (n = 183) | Pearson Chi-Square | P value |
|---|---|---|---|---|
| **Age (Years)** | | | | |
| <20 | (14.3%) | (6.0%) | | |
| 20 - 30 | (57.1%) | (69.9%) | 1.77 | 0.413 |
| >30 | (28.6%) | (24.1%) | | |
| **Total** | **(100%)** | **(100%)** | | |
| **Marital status** | | | | |
| Married | (71.4%) | (73.8%) | | |
| Single | (28.6%) | (24.6.6%) | 0.322 | 0.851 |
| Others | (0.0%) | (1.6%) | | |
| **Total** | **(100%)** | **(100%)** | | |
| **Education Status*** | | | | |
| Primary school | (21.4%) | (9.3%) | | |
| Secondary school | (42.9%) | (16.4%) | 10.14 | 0.017 |
| High school | (7.1%) | (32.2%) | | |
| University | (28.6%) | (42.1%) | | |
| **Total** | **(100%)** | **(100%)** | | |
| **Religion** | | | | |
| Christian | (100.0%) | (95.1%) | 0.721 | 0.396 |
| Muslims | (0.0%) | (4.9%) | | |
| **Total** | **(100%)** | **(100%)** | | |

is no significant association between PPH and marital status at probability level $P \leq 0.05$.

According to educational status of the respondents with PPH, majority were those who had attained secondary education (42.9%), followed by those who had attained university education (28.6%) and those who had attained primary education (21.4%). The least in this category were those who had attained high school education (7.1%). There was a significant association between respondents with PPH and educational status at 5% probability with a Pearson Chi-Square of 10.14 and a P-value of 0.017.

According to occupational status, 42.9% of respondents with PPH were employed, 35.7% were unemployed and 21.4% were students. Finally, with regards to religion, all of those who had PPH were Christians (100%). These results were not significant at 5% probability.

3) Prevalence of PPH According to Health Facility

Table 4 below presents the prevalence of PPH according to the two different health facilities in the BHD. It shows a prevalence of 8% in MHCN with a 38.1% study population, compared to 6.6% in the RHB with a 61.9% respondent population.

4) Number of Antenatal Care (ANC) and Gestational Age at Booking

Table 5 below indicates the relationship that exists between PPH with antenatal care and gestational age of the respondents of two hospitals in BHD.

From the table, out of the 197 respondent who attended ANC, 25.9% attended less than four ANC, while 74.1% had at least four ANC as recommended by WHO. For respondents who had PPH, 28.6% had less than 4 ANC's, while 71.4% had a minimum of 4 ANCs. There was no significant relationship between number of ANC and PPH at a probability of $P \leq 0.05$.

With regards to "gestational age at booking" of the respondents, for those who had PPH, 76.9% booked at 12 - 24 weeks, followed by those who booked at <12 weeks (15.4%) and then >30 weeks (7.7%). The mean gestational age at booking was 15.6 weeks, maximum 41 weeks and minimum 8 weeks with a standard deviation of 4.57. There was a significant association between PPH and gestational age at booking at 1% probability level with Pearson Chi-Square value of 14.42 and a P-value of 0.01.

Table 4. Prevalence of PPH according to health facility.

| Health Area | POPULATION (n = 197) | PPH (n = 14) | No PPH (n = 183) |
|---|---|---|---|
| **MHCN** | 75 (38.1%) | 6 (8%) | 69 (92%) |
| **RHB** | 122 (61.9%) | 8 (6.6%) | 114 (93.4%) |
| **Total** | **197 (100%)** | **14 (100%)** | **183 (100%)** |

Table 5. Number of antenatal care visits and gestational age at booking of participants.

| Variable | PPH (n = 14) | No PPH (n = 183) | Pearson Chi-Square | P value |
|---|---|---|---|---|
| **N° of ANC Attended** | | | | |
| **<4** | 4 (28.6%) | 41 (25.7%) | 0.057 | 0.812 |
| **≥4** | 10 (71.4%) | 136 (74.3%) | | |
| **Total** | **14 (100%)** | **183 (100%)** | | |
| **Gestational age at booking**** | | | | |
| **<12** | 2 (15.4%) | 18 (10.0%) | | |
| **12 - 24** | 10 (76.9%) | 162 (90.0%) | 14.42 | 0.001 |
| **>30** | 1 (7.7%) | 0 (0.0%) | | |
| Total | **14 (100%)** | **183 (100%)** | | |

** Significant at 1% probability ($P \leq 0.01$), N°: Number.

### 3.1.3. Risk Factors Associated to PPH in the Study Area

1) Labour and Child Birth

Table 6 below presents a comparative analysis between respondents with PPH and those without PPH using the variables: induction of labour, duration of labour in hours, augmentation of labour with oxytocin and the methods of delivery.

Out of the 197 women giving birth at the two hospitals within the BHD, 13 (6.6%) had induction of labour. Among the 13 women, 7 (53.8%) had PPH, while 6 (46.2%) had no PPH. This result was significant at $P \leq 0.01$ with a Pearson Chi-Square ($X^2$) value of 46.06.

For duration of labour, those with labour duration < 12 hours (71.4%) were more likely to developed PPH as compared to those with labour durations 12 - 24 hours (21.4%) and >24 hours (7.2%). There was a significant relationship between PPH and duration of labour with a Pearson Chi-Square ($X^2$) value of 31.13 and a P-value less than 0.001.

Table 6. Labour and delivery history of participants.

| Variable | PPH (n = 14) | No PPH | Pearson Chi-Square | P value (n = 183) |
|---|---|---|---|---|
| **Induction of labour**** | | | | |
| Yes | 7 (50.0%) | 6 (3.3%) | 46.06 | <0.001 |
| No | 7 (50.0%) | 177 (96.7%) | | |
| **Total** | **14 (100%)** | **183 (100%)** | | |
| **Duration of labour**** | | | | |
| <12 | 10 (71.4%) | 27 (15.1%) | 31.13 | <0.001 |
| 12 - 24 | 3 (21.4%) | 151 (83.8%) | | |
| >24 | 1 (7.2%) | 2 (1.1%) | | |
| **Total** | **14 (100%)** | **183 (100%)** | | |
| **Augmentation with Oxytocin*** | | | | |
| Yes | 9 (64.3%) | 50 (32.2%) | 5.91 | 0.015 |
| No | 5 (35.7%) | 124 (67.8%) | | |
| **Total** | **14 (100%)** | **183 (100%)** | | |
| **Method of delivery**** | | | | |
| NVD | 8 (57.1%) | 148 (80.9%) | 53.37 | 0.001 |
| CS | 2 (14.3%) | 35 (19.1%) | | |
| Vacuum | 3 (21.4%) | 0 (0.0%) | | |
| Forceps | 1 (7.2%) | 0 (0.0%) | | |
| **Total** | **14 (100%)** | **183 (100%)** | | |

** Significant at 1% probability ($P \leq 0.01$), * Significant at 5% probability ($P \leq 0.05$). NVD: Normal Vagina Delivery, CS: Caesarean section.

For respondents with PPH, 64.3% had augmentation of labour with oxytocin, while 35.7% did not have any augmentation of labour. There was significant association at 5% probability level (P-value = 0.015) with a Pearson Chi-Square ($X^2$) value of 5.91. Thus, this result shows that pregnant women with labour augmentation with oxytocin are more likely to develop PPH.

Among the women who had PPH, majority delivered through NVD (57.1%), followed by CS (14.3%) and Vacuum (21.4%). The least in this category of means of delivery with PPH was Forcep which stood at 7.1%. There was significant association at 1% probability level (P-value ≤ 0.001) with a Pearson Chi-Square ($X^2$) value of 53.37. Thus, this result shows that women with NVD are more likely to develop PPH (Table 7).

2) Risk Factors According to Socio-Demographic Characteristic and Health Area

The table below indicates the Pearson Chi-square values gotten when a bivariate analysis was done between the risk factors (hypertensive disorder, induction of labour, augmentation of labour with oxytocin, retain products, Echography findings, duration of labour, method of delivery and birth weight) and socio-demographic characteristics of the study area (Table 8).

From the bivariate analyses above, a number of risk factors emerged as significant determinants when compared with HF. The results show that induction of labour, Echography findings and Labour duration had a significant association with HF at 1% probability level and there was also a significant relationship between HA and birth weight at 5% probability level.

Table 7. Hypertensive disorders, retain products, tears and lacerations associated with PPH.

| Variable | PPH (n = 14) | No PPH | Pearson Chi-Square | P value (n = 183) |
|---|---|---|---|---|
| **Hypertensive disorder**** | | | | |
| Yes | 0 (0.0%) | 12 (6.6%) | 13.99 | 0.001 |
| No | 14 (100.0%) | 171 (92.3%) | | |
| **Total** | 14 (100.0%) | 183 (100.0%) | | |
| **Tears or lacerations** | | | | |
| Yes | 8 (57.1%) | 77 (42.1%) | 1.203 | 0.273 |
| No | 6 (42.9%) | 106 (57.9%) | | |
| **Total** | **14 (100.0%)** | **183 (100.0%)** | | |
| **Retained products*** | | | | |
| Yes | 4 (28.6%) | 17 (9.3%) | 5.08 | 0.024 |
| No | 10 (71.4%) | 166 (90.7%) | | |
| **Total** | **14 (100.0%)** | **183 (100.0%)** | | |

** Significant at 1% probability (P ≤ 0.01); * Significant at 5% probability (P ≤ 0.05).

**Table 8.** Risk factors according demographic characteristic and health facility.

| Variable | Hypertensive Labour | Induction Products | Augmentation Findings | Retained Duration | Echography Findings | Birth Weight | Method of Delivery | Birth Disorder |
|---|---|---|---|---|---|---|---|---|
| Health Facility | 2.45 | 8.91** | 7.53 | 2.64 | 13.48** | 14.60** | 6.76 | 9.88* |
| Age | 16.86** | 2.17 | 8.69* | 4.66 | 11.02 | 10.37* | 12.50 | 39.03** |
| Marital status | 0.56 | 3.48 | 6.02* | 1.45 | 4.16 | 17.49** | 3.94 | 2.78 |
| Education | 4.26 | 5.64 | 0.81 | 7.56 | 16.31 | 24.19** | 21.92** | 45.12** |
| Religion | 12.26** | 0.67 | 0.01 | 1.07 | 16.41** | 1.35 | 1.44 | 19.52** |
| Occupation | 3.01 | 2.57 | 4.34 | 2.32 | 5.27 | 5.33 | 4.79 | 16.45* |

** Significant at 1% probability ($P \leq 0.01$), * Significant at 5% probability ($P \leq 0.05$).

Significant associations could also be observed at 1% probability levels between the risk factors: hypertensive disorder and birth weight; and age of the respondents. The results further show that duration of labour and augmentation of labour with oxytocin had a significant relationship with age.

Also, labour duration has a significant relationship with marital status at 1% probability, likewise augmentation too at 5% probability.

Birth weight, method of delivery and duration of labour were all found to be significantly associated with education level at 1% probability.

Hypertensive disorders, echography findings and birth weight also had a significant association with religion at 1% probability level. Significant relationship at 5% probability could also be noted between birth weight and occupation.

#### 3.1.4. Management of PPH in Primigravidae within the Study Setting

12 (85.7%) of case management began with non-pharmacological methods. All the cases had a pharmacologic management e.g. IM or IV oxytocin and a systematic administration of sublingual or Intra rectal Misoprostol to all parturient at the level of the RHB. 2 (14.3%) of PPH cases had a blood transfusion and 1 (9.1%) had a measure surgery without hysterectomy. There was no case management that led to a hysterectomy (**Figure 5**).

#### 3.1.5. Outcomes

Of the 14 participants who were diagnosed with primary PPH, 10 (71.4%) had a normal recovery. Four (28.6%) had hypovolemic shock, 3 (21.4%) were transfused whole blood, 1 (7.1%) had a major surgery, and zero maternal dead as seen on **Table 9**.

### 3.2. Discussion

The aim of this study was to assess the factors associated with postpartum haemorrhage in primigravidae women giving birth in two hospitals within the Bamenda Health District, Cameroon.

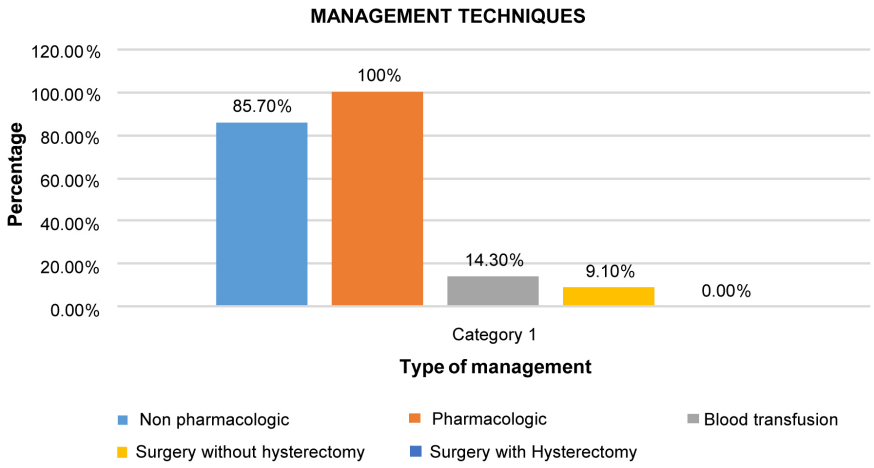


**Figure 5.** Management approaches of PPH in primigravidae within the study setting.

**Table 9.** Outcomes.

| H/F | Normal | Hypovolemic | Blood | Major | Death Recovery shock transfusion Surgery |
|---|---|---|---|---|---|
| **(N = 14) %** | 10 (71.4%) | 4 (28.6%) | 3 (21.4%) | 1 (7.1%) | 0 |

### 3.2.1. Prevalence of Primary PPH

The prevalence of primary PPH amongst primigravidae women giving birth within the two hospitals in the BHD was 7.1%. This prevalence is less than the 10% and 24.4% reported in Scotland, USA and Nigeria respectively [6] [7]. This shows that there is a significant decrease in the prevalence of postpartum hemorrhage in primigravidae within our study setting. A lower prevalence of 0.8% was reported by some researchers in Soroka University Medical Centre, Israel [4]. Also, a 3.5%, and 1.1% prevalence was reported in some studies conducted in Yaounde (Central Hospital and Gynaco-obstetric and Paediatric Hospital) Cameroon [8] [9]. However, a similar prevalence of 7.0% was obtained in Sweden [5]. These differences in prevalence of PPH is probably due to the methods used in quantifying blood loss after delivery, the setting of these studies and the inclusion of only singleton gestations (exclusion of multiple gestations) and primiparous women in others.

Comparatively, the prevalence of PPH in this study was found to higher in MHCN Nkwen 8% than in the RHB with 6.6%. This could be due to the fact that, RHB a tertiary and University teaching hospital has a better technical platform; (human resource, infrastructure and equipment) and the systematic administration of Misoprostol postpartum to all parturient.

Above all, Visual evaluation of blood loss could lead to an underestimation of postpartum blood loss by 89% [29]. The clinical importance of this underestimation cannot be overemphasized as it could explain why PPH is still associated with a high maternal morbidity and mortality worldwide because of late intervention strategies [28].

### 3.2.2. Aetiologies of PPH and Risk Factors

1) Uterine Atony

Uterine atony was the most common cause of PPH in 8 (57.1%) cases. This value was lower than the 70% reported by Naama *et al.* [4] and the 62.5% reported by Halle-Ekane *et al.* in Bonassama [10]. This difference could have come from the fact that, the study populations just as the setting are different. That is, primiparous and primigravidae women respectively. However, this is higher than that of Sango *et al.* in HGY where uterine atony accounted for 51.06% of cases of primary PPH. On the other hand, our result was comparable to the 60.7% obtained in Nigeria [7]. Uterine atony remains a major public health issue as it is the main cause of primary postpartum hemorrhage. The risk factors associated with uterine atony were: multiple gestation, augmentation, induced labour, prolonged labour and macrosomia as documented in other studies [4] [5] [6] [7].

2) Trauma

Obstetrical lacerations were among the primary cause of PPH in 57.1% of cases as compared to 7.7% and 37.7% in Naama B. *et al.* and Halle-Ekane *et al.* respectively [4] [10] study. Genital tract trauma at delivery was associated with a Pearson Chi square 1.0203 and a P value of 0.273. Uterine rupture, cervical and vaginal tears and perineal tears are all associated with an increased blood loss at normal vaginal delivery.

No case of episiotomy was associated with primary PPH in this study population. The risk factors for obstetric laceration were precipitate labour and macrosomia or breech deliveries.

3) Tissue

Retained products accounted for 28.6% of PPH cases. This is less than the 48.3% reported by Sheiner *et al.* [40] and the 62.3% reported by Halle-Ekane *et al.* in Bonassama [10]. However, this is higher than that of Magann *et al.* where uterine atony accounted for 37.1% of cases of primary PPH [35]. Our selective participants of primigravidae as opposed to the general (multips and primips) and primiparous population respectively in the other studies might have accounted for the difference, likewise the study setting. Retained product had a significant association with PPH at 5% probability.

4) Thrombin

Coagulation defects which could be acquired or congenital bleeding diatheses may be associated with thrombocytopenia and/or hemostatic defects. Acquired causes include severe preeclampsia, HELLP syndrome, abruptio placentae, fetal demise, amniotic fluid embolism, and sepsis. Consumptive coagulopathy may develop in women with severe hemorrhage. However, none of the above was recorded within the study duration.

### 3.2.3. Management Approaches

Different measures were applied in the management of PPH cases. In most of them, more than one measure was applied. Majority of the times, non-pharma-

cologic management (uterine massage, manual uterine review, etc.) always preceded any other. 85.7% of case management began with non-pharmacological methods. All the cases had a pharmacologic management e.g. IM or IV oxytocin and a systematic administration of Misoprostol to all parturient at the level of the RHB. 14.3% of PPH cases had a blood transfusion. This is less than the 54% reported in the WOMAN trial [41]. This can be due to the non-availability of a blood bank in some health facilities and the involvement of only primigravidae in our study. 9.1% had a measure surgery without hysterectomy. There was no case (0.00%) with management that led to a hystectomy. This was less than the 3.5% and 2.5% reported in some studies in the US [24] [41].

Initial management of postpartum hemorrhage included fundal massage, placement of large bore intravenous lines and bladder catheter, crystalloid infusion, administration of uterotonic agents, and transfusion of blood products as needed.

Secondary management then followed whenever these measures did not control hemorrhage. This included the following sequence of interventions: assessment for and repair of lacerations (if present), removal of retained placenta, clot and/or fetal membranes.

Laparotomy was indicated for management of uterine atony unresponsive to more conservative interventions or if intraabdominal hemorrhage was suspected.

Hysterectomy came as a last resort, but was not delayed in women who had disseminated intravascular coagulation and require prompt control of uterine hemorrhage to prevent death.

#### 3.2.4. Maternal Outcomes

Of the 14 participants who were diagnosed with primary PPH, 10 (71.4%) had a normal recovery. Four (28.6%) had hypovolemic shock, 3 (21.4%) were transfused whole blood, 1 (7.1%) had a major surgery, and 0.0% died. The prevalence of hypovolemic shock due to severe PPH was higher than the 7.1% reported in Hopital General Yaoundé [23]. The 0.0% maternal death recorded in this study is high and doubles the 0.7% reported in Hopital General Yaoundé [23] because the latter study was carried out in a tertiary center with better facilities and trained personnel. Other reasons which could account for the low mortality in this study was; early referral, and selected primigravidae population.

### 3.3. Study Limitation

This study was carried out in an urban setting and in two hospitals within the Bamenda Health District; thus, the results could not be generalized to the whole population of the Region nor the District. However, it gave an insight into the problem.

We used a consecutive non-probability sampling method. Which means the condition was not evenly distributed in our sampled participants. This could have under or overestimated our results.

Our study was carry out in a secondary and tertiary level facilities. This may

have underestimated our results since these centers have a better technical platform than many others.

VEBL was the method used in the quantification of blood loss. This method is very subjective as has been shown to underestimate blood loss by 40% to 50% compared to objective/laboratory measurements.

## 4. Conclusions

The prevalence of PPH in primigravidae women was 7.1% in two hospitals in the BHD. This value was considered high given that approximately 1 out of every 14 participants in our sample population had PPH.

PPH in primigravidae women was associated with uterine hypotonia, retained products, genital lacerations, labour induction, duration, mode of delivery, macrosomia, fibroids and multiple gestation, as these were very significant risk factors (at 5% probability ($P \leq 0.01$) recognized in our study population. The main causes of post-partum hemorrhage were uterine atony and obstetric lacerations.

## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

## References

[1] Lu, M.C., Fridman, M., Korst, L.M., *et al*. (2005) Variations in the Incidence of Postpartum Hemorrhage across Hospitals in California. *Maternal and Child Health Journal*, **9**, 297-306. https://doi.org/10.1007/s10995-005-0009-3

[2] Sheldon, W.R., Blum, J., Vogel, J.P., *et al*. (2014) Postpartum Haemorrhage Management, Risks, and Maternal Outcomes: Findings from the World Health Organization Multicountry Survey on Maternal and Newborn Health. *BJOG*, **121**, 5-13. https://doi.org/10.1111/1471-0528.12636

[3] Callaghan, W.M., Kuklina, E.V. and Berg, C.J. (2010) Trends in Postpartum Hemorrhage: United States, 1994-2006. *American Journal of Obstetrics & Gynecology*, **202**, 353.e1-353.e6. https://doi.org/10.1016/j.ajog.2010.01.011

[4] Naama, B., Ruslan, S., *et al*. (2014) Risk Factors for Early Postpartum Haemorrhage in First Vaginal Deliveries, and Obstetrical Outcomes in Subsequent Pregnancy. *The Journal of Maternal-Fetal and Neonatal Medicine*, **28**, 932-937.

[5] Sara, A., Hernandez, S., Palmsten, K. and Brian, T. (2014) Patterns of Recurrence of Postpartum Haemorrhage in a Large Population Based Cohort. *American Journal of Obstetrics and Gynaecology*, **210**, 229.e1-8.

[6] Fullerton, G., Danielian, P.J. and Bhattacharya, S. (2013) Outcomes of Pregnancies Following Postpartum Haemorrhage. *BJOG: An International Journal of Obstetrics and Gynaecology*, **120**, 621-627. https://doi.org/10.1111/1471-0528.12120

[7] Olowokere, A.E., Adekeye, O.A., Ogunfowokan, A., Ologunju, O.E. and Irinoye, O.O. (2013) The Prevalence, Management and Outcomes of Primary Postpartum Haemorrhage in Selected Healthcare Facilities in Nigeria. *International Journal of Nursing and Midwifery*, **5**, 28-34. https://doi.org/10.5897/IJNM12.011

[8] Tebeu, P.M., Inoussa, N., Phillippe, N., Paul, T.T., Fomulu, N., *et al*. (2011) Outcome of Delivery in Nulliparous Teenagers Aged Less the 17 Years: The Cameroon

University Centre Hospital Experience. *Open Journal of Obstetrics and Gynaecology*, **1**, 47-52. https://doi.org/10.4236/ojog.2011.12010

[9] Dupont, J., Anny-Nadege, N., Julius, S., Celestine, N. and Kasia, J.M. (2013) Pregnancy Outcomes at Advanced Maternal Age in a Group of African Women in Two Teaching Hospitals in Yaoundé, Cameroon.

[10] Halle-Ekane, E., Emade, F.K., Bechem, N.N., *et al*. (2016) Prevalence and Risk Factors of Primary Postpartum Haemorrhage after Vaginal Deliveries in the Bonassama District Hospital, Cameroon. *International Journal for Tropical Disease and Health*, **13**, 1-12. https://doi.org/10.9734/IJTDH/2016/23078

[11] Khan, K.S., Wojdyla, D., Say, L., *et al*. (2006) WHO Analysis of Causes of Maternal Death: A Systematic Review. *The Lancet*, **367**, 1066-1074. https://doi.org/10.1016/S0140-6736(06)68397-9

[12] Pope, R., Ohel, I., Holcberg, G. and Sheiner, E. (2011) Bleeding during Pregnancy. A Comprehensive Guide. Springer, New York.

[13] Humaira, N., Iram, S., Anisa, F. and Aziz, U.N. (2008) Maternal Morbidity and Mortality Due to Primary PPH—Experience at AYUB Teaching Hospital Abbottabad. *Journal of Ayub Medical College Abbottabad*, **20**, 59-65.

[14] AbouZahr, C. (2003) Global Burden of Maternal Death and Disability. *British Medical Bulletin*, **67**, 1-11. https://doi.org/10.1093/bmb/ldg015

[15] Filippi, V., Ronsmans, C., Campbell, O.M., *et al*. (2006) Maternal Health in Poor Countries: The Broader Context and a Call for Action. *The Lancet*, **368**, 1535-1541. https://doi.org/10.1016/S0140-6736(06)69384-7

[16] Walfish, M., Neuman, A. and Wlody, D. (2009) Maternal Haemorrhage. *British Journal of Anaesthesia*, **103**, i47-i56. https://doi.org/10.1093/bja/aep303

[17] Lees, M.H., Hill, J.D., Ochsner, A.J., *et al*. (1971) Maternal Placental and Myometrial Blood Flow of the Rhesus Monkey during Uterine Contractions. *American Journal of Obstetrics & Gynecology*, **110**, 68-81. https://doi.org/10.1016/0002-9378(71)90219-5

[18] Khan, R.U. and El-Refaey, H. (2006) A Textbook of Postpartum Hemorrhage: A Comprehensive Guide to Evaluation, Management and Surgical Intervention. FOGSI,

[19] Prendiville, W.J., Elbourne, D. and McDonald, S. (2009) Active versus Expectant Management in the Third Stage of Labour. *Cochrane Database of Systematic Reviews*, No. 2, CD007412. https://doi.org/10.1002/14651858.CD000007.pub2

[20] Mathai, M., Gumezoglu, A.M. and Hill, S. (2007) WHO Recommendations for the Prevention of Postpartum Haemorrhage. WHO, Geneva.

[21] Koh, E., Devendra, K. and Tan, L.K. (2009) B-Lynch Suture for the Treatment of Uterine Atony. *Singapore Medical Journal*, **50**, 693-697.

[22] Mukherjee, S. and Arulkumaran, S. (2009) Post-Partum Haemorrhage. *Obstetrics, Gynaecology and Reproductive Medicine*, **19**, 121-126. https://doi.org/10.1016/j.ogrm.2009.01.005

[23] Akins, S. (1994) Postpartum Hemorrhage. A 90s Approach to an Age-Old Problem. *Journal of Nurse-Midwifery*, **39**, 123S-134S. https://doi.org/10.1016/0091-2182(94)90070-1

[24] Sheiner, E., Sarid, L., Levy, A., *et al*. (2005) Obstetric Risk Factors and Outcome of Pregnancies Complicated with Early Postpartum Hemorrhage: A Population-Based Study. *Journal of Maternal-Fetal and Neonatal Medicine*, **18**, 149-154. https://doi.org/10.1080/14767050500170088

[25] Stones, R.W., Paterson, C.M. and Saunders, N.J. (1993) Risk Factors for Major Ob-

stetric Hemorrhage. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, **48**, 15-18. https://doi.org/10.1016/0028-2243(93)90047-G

[26] Begley, C.M., Gyte, G.M.L., Devane, D., *et al*. (2011) Active versus Expectant Management for Women in the Third Stage of Labour. *Cochrane Database of Systematic Reviews*, No. 2, CD007412. https://doi.org/10.1002/14651858.CD007412.pub3

[27] Festin, M.R., Lumbiganon, P., Tolosa, J.E., *et al*. (2003) International Survey on Variations in Practice of the Management of the Third Stage of Labour. *Bulletin of the World Health Organization*, **81**, 286-291.

[28] McDonald, S. (2003) Physiology and Management of the Third Stage of Labour. In: Fraser, D.M. and Cooper, M.A., Eds., *Myles Textbook for Midwives*, Churchill Livingstone, Edinburgh.

[29] Prendiville, W.J., Harding, J.E., Elbourne, D.R. and Stirrat, G.M. (1988) The Bristol Third Stage Trial: Active versus Physiological Management of Third Stage Labour. *British Medical Journal*, **297**, 1295-1300. https://doi.org/10.1136/bmj.297.6659.1295

[30] Mathai, M., Gumezoglu, A.M. and Hill, S. (2007) Saving Women's Lives: Evidence-Based Recommendations for the Prevention of Postpartum Haemorrhage. *Bulletin of the World Health Organization*, **85**, 322-323.

[31] International Confederation of Midwives (ICM) and International Federation of Gynaecologists and Obstetricians (FIGO) (2003) Management of the Third Stage of Labour to Prevent Postpartum Haemorrhage (Joint Statement).

[32] Beckmann, C.R.B., Herbert, W., Laube, D., *et al*. (2013) Obstetrics and Gynecology. Lippincott, Williams & Wilkins, Philadelphia.

[33] Mousa, H.A. and Alfirevic, Z. (2014) Treatment for Primary Postpartum Haemorrhage. *Cochrane Database of Systematic Reviews*, No. 2, CD003249. https://doi.org/10.1002/14651858.CD003249.pub3

[34] Combs, C.A., Murphy, E.L. and Laros, R.K. (1991) Factors Associated with Postpartum Hemorrhage with Vaginal Birth. *Obstetrics & Gynecology*, **77**, 69-76.

[35] Magann, E.F., Evans, S., Hutchinson, M., *et al*. (2005) Postpartum Hemorrhage after Vaginal Birth: An Analysis of Risk Factors. *Southern Medical Journal*, **98**, 419-422. https://doi.org/10.1097/01.SMJ.0000152760.34443.86

[36] Hall, M.H., Halliwell, R. and Carr-Hill, R. (1985) Concomitant and Repeated Happenings of Complications of the Third Stage of Labour. *British Journal of Obstetrics and Gynaecology*, **92**, 732-738. https://doi.org/10.1111/j.1471-0528.1985.tb01456.x

[37] Ford, J.B., Roberts, C., Bell, J.C., *et al*. (2007) Postpartum Haemorrhage Occurrence and Recurrence: A Population-Based Study. *The Medical Journal of Australia*, **187**, 391-393. https://doi.org/10.5694/j.1326-5377.2007.tb01308.x

[38] Fullerton, G., Danielian, P. and Bhattacharya, S. (2013) Outcomes of Pregnancy Following Postpartum Haemorrhage. *British Journal of Obstetrics and Gynaecology*, **120**, 621-627. https://doi.org/10.1111/1471-0528.12120

[39] Abu-Ghanem, S., Sheiner, E., Sherf, M., *et al*. (2012) Lack of Prenatal Care in a Traditional Community: Trends and Perinatal Outcomes. *Archives of Gynecology and Obstetrics*, **285**, 1237-1242. https://doi.org/10.1007/s00404-011-2153-x

[40] Shakur, H., Elbourne, D., Gülmezoglu, M., *et al*. (2010) The Woman Trial (World Maternal Antifibrinolytic Trial): Tranexamic Acid for the Treatment of Postpartum Haemorrhage: An International Randomised, Double Blind Placebo Controlled Trial. *Trials*, **11**, 40. https://doi.org/10.1186/1745-6215-11-40

[41] Marshall, A.L., Durani, U., Bartley, A., *et al*. (2017) The Impact of Postpartum Hemorrhage on Hospital Length of Stay and Inpatient Mortality: A National Inpatient Sample-Based Analysis. *American Journal of Obstetrics & Gynecology*, **217**, 344.e1-344.e6. https://doi.org/10.1016/j.ajog.2017.05.004