

## Impact of the High Risk Pregnancy Approach (HRPA) on Maternal Mortality in Low Income Countries

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### Abstract

A high-risk pregnancy (G.A.R.E.) is one where one or more factors expose the mother and/or fetus to a very high probability of morbidity or mortality before, during or after delivery. The best management of this type of pregnancy requires scrupulous compliance with the so-called G.A.R.E. approach, which is an essentially preventive method. To assess the impact of the G.A.R.E. approach on maternal mortality in order to determine whether this approach can significantly reduce current maternal death rates, a prospective and analytical study was conducted at the Central Hospital of Yaoundé over a period of 10 months, from February to November 1998. During the study, 96 parturient were received and followed up until postpartum, in the G.A.R.E. service and 2647 deliveries were also registered at the Main Maternity Hospital, for a total of 2743 deliveries. Greater multiparity was the most encountered risk, at 29.17%. Complications from abortion were the most common causes of death at 28.57%. The successful application of the GARE approach could reduce the maternal mortality ratio by up to 53.57 per cent.

**Keywords:** Pregnancy; Risk; Maternal Mortality; Yaoundé; Childbirth

### Introduction

Among the events that can make a family happy, the occurrence of a pregnancy figures prominently, especially when it normally ends with the child birth, a source of joy and happiness. However, every minute that passes, a woman dies from pregnancy-related complications (WHO, 2019), in other words, every year worldwide, at least 500,000 women die from pregnancy-related causes. Moreover, nearly 99% of these deaths occur in developing countries and among these, African countries have the highest maternal mortality rates, going as far as 239 deaths per 100,000

live births in some rural areas, compared to an average rate of 12 per 100,000 live births in developed countries [1].

According to the Demographic and Health Survey (EDS, 2005) in Cameroon, the maternal mortality ratio is 762 deaths per 100,000 live births (EDS, 2011). A rate that was still largely high and hinted at the country's inability to achieve global development number 5, which was to reduce maternal mortality by  $\frac{3}{4}$  in 2015. Much must be done to reverse the trend and it is precisely for this reason that we undertook this work, which remains actual, and would like to specify the current importance of a preventive method, the approach of the HRPA.

A High Risk Pregnancy (HRP) is one where one or more factors expose the mother and/or the foetus to a very high probability of morbidity or mortality before, during or after childbirth, and even later on to possible sequels. These risk factors may be related to the history, whether general or gynecologic, or even related to the current pregnancy. They are therefore determined by the classic stages of anamnesis, clinical and paraclinical medical observation [2].

The High Risk Pregnancy approach is a way of conceiving and practicing obstetrics, which is essentially preventive. It consists of selecting HRP and having them closely monitored by specialists, if necessary in a reference centre: normal or lower-risk pregnancies can be monitored peripherally by non-specialists. Thus, everything happens as on a pyramid where the top is made up of general hospitals and specialists taking care of a few cases most at risk, while the base, which is wider, takes care of the other cases which are in besides all the most numerous. This makes it possible, by distributing tasks more effectively, to better take charge of HRP to detect and treat any complications early, in order to reduce maternal mortality. The number of specialists is not enough and this help also to reduce their work.

It is perfectly accepted that a pregnancy which is not or poorly monitored, especially when it is at high risk, constitutes a materno-foetal concern, and this study, considering the lack of specialist will like to insist on this proposed solution by raising awareness on the evaluation the impact of the High Risk Pregnancy (HRPA) approach on maternal mortality.

## Material and Methods

This was a prospective and analytical study at the Yaounde Central Hospital on two groups of women. The sampling was consecutive and not exhaustive. The studied population derived from women followed in a standardized way at the HRPA clinic, as well as the HRP not followed or followed by other services of prenatal consultations, but who gave birth at the Yaounde Central Hospital.

Were included as cases, all women who agreed to be followed until delivery by the HRPA and to give birth at the Yaounde Central Hospital. We interviewed, examined and followed them according to the HRPA approach from their referral until delivery.

Included as controls were all HRP not tracked by us. We also followed at the Main Maternity, the deliveries of these women who were at risk but who had not done their prenatal consultations at the HRPA clinic, and who constituted the second group.

The collection material consisted of a technical sheet tested beforehand, as well as the patient's notebooks and files. At each visit, the history of any new complaints as well as the physical examination were carried out. Paraclinical examinations such as blood grouping, blood count, haemoparasites, cytobacteriological examination of urine, stool examination, syphilitic serology, obstetric ultrasound (if indicated) were also carried out. Anti-malarial prophylaxis as well as iron, folic acid and calcium supplementation, a visit rate of once a month until 28 weeks of amenorrhea, then once every two weeks until 36 weeks and finally once a week until delivery.

## Data analysis

The data was collected using the patients' medical files, their prenatal consultation notebook, as well as a technical sheet tested beforehand. These data were then analyzed using SPSS version 2.0 software. The chi-square test was used to look for intervariable associations and the Student test to measure the differences between the means of the two groups (cases and controls).

## Results

### General characteristics of the sample

During the study, we received and followed until postpartum, 96 parturients in the HRPA clinic.

At the same time, 2,647 deliveries were also recorded at the Main Maternity Unit, for a total of 2,743 deliveries. Among the 2647 deliveries by women followed elsewhere and occurring at the Main Maternity during our study period, there were 918 HRPA.

The general incidence of HRPA was 36.97%. The 35 to 39 age group was the most represented, at 30.21%. 53 patients, or 52.21%, were over 30 years old, while adolescents (age < 20) represented 8.33% of cases. More than half of the cases (55.21%) were either nulliparous or grand multiparous. Grand multiparity (Table 1) was the most common risk (29.17%), followed by inadequate pelvis (18.75%) and history of cesarean section (13.54%).

Factors	Number of cases	percentage
Grand multiparity	28	29,17%
Borderline or narrowed pelvis	18	18,75%
Prior caesarean section	13	13,54%
Adolescence (<20 years old)	10	10,42%
Bad obstetrical history	10	10,42%
Twin pregnancy	9	9,38%
Obesity (>90kg)	9	9,38%
Hypertension in pregnancy	8	8,33%
Age >40 years old	8	8,33%
Elderly primiparous (>30 years old)	8	8,33%
Young primiparous (<20 years old)	7	7,29%
Rhesus negative	7	7,29%
History of difficult childbirth	7	7,29%
Repetitive abortion ≥3	5	5,21%
History of postpartum hemorrhage	5	5,21%
Others	28	29,18%
Total	96	

**Table 1:** Frequency of the main risk factors in the women followed by us.

We found the same risks in the two groups, but in slightly different proportions: the differences being statistically significant ( $z > 1.96$ ) on the one hand for adolescents and young primiparae who are greater in the second group, and on the other hand for inadequate pelvis, obesity, elderly primiparae, Rhesus negatives, ovarian cysts in pregnancy ( $P < 0.05$  for all these cases) which were numerous in the case group (Table 2).

Factors	Number of cases	percentage
Adolescence (<20 years old)	313	34,10%
Grand multiparity	271	29,52%
Young primiparous	178	19,39%
Prior caesarean section	94	10,24%
hypertension in pregnancy	83	9,04%
Twin pregnancy	73	7,95%
Bad obstetrical history	63	6,86%
Headquarters	42	4,58%
Age >40 years old	31	3,38%
Borderline or narrowed pelvis	21	2,29%
Others	157	15,37%
Total	918	

**Table 2:** Frequency of the main risk factors in women followed elsewhere.

The most important causes of death were, in order (Table 3): abortion complications (28.57%), eclampsia (21.43%) and haemorrhage (17.86%). In addition, apart from death from choriocarcinoma and death from unknown cause, all the other deaths, i.e. 26 out of 28 (i.e. 92.86%) of deaths, could be prevented.

Causes	Number	percentage
Complication of abortions	8	28,57
Eclampsia	6	21,43
Ante and postpartum hemorrhage	5	17,86
Puerperal infection	3	10,74
Medical complication	3	10,71
Ectopic pregnancies	3	10,71
Uterine rupture	2	7,14
Choriocarcinoma	1	3,57
Cause unknown	1	3,57
Total	28 deaths	

**Table 3:** Causes of maternal deaths during the study period.

Maternal morbidity was dominated in our study group by (Table 4) perineo-vaginal lacerations (14.58%), premature ruptures of membranes (10.42%), caesareans sections and perpartal hypertension. Two of our patients presented with seizures.

	Number	percentage
Perineal tear or episiotomy	14	14,48%
Premature rupture of membranes	10	10,42%
caesarean section	9	9,38%
Per partum hypertension	7	7,29%
Pre-eclampsia	5	5,21%
Eclampsia	2	2,08%
Induction/stimulation	3	3,13%
Third trimester hemorrhage	2	2,08%
Instrumental birth	2	2,08%
Postpartum hemorrhage	1	1,04%
Rupture of the collar	1	1,04%
Difficult delivery	1	1,04%
Post term	1	1,04%
Total	96 cases	

**Table 4:** Elements of maternal morbidity.

It emerges from this study that the correct application of our approach by the prenatal consultation services could make it possible to reduce maternal mortality by 53.57% (Table 5).

	Number	Percentage (%)
Death on HRP	15	53,57
Others	13	46,43
Total	28	100

**Table 5:** Relative importance of deaths on HRP.

The calculation of  $X^2$  according to Fisher’s method revealed that  $X^2 = 4.71 > 3.84$ . So the difference is significant with  $P < 0.05$ .

The relative risk estimate OR greater than 1, which means that not being followed by our approach increased the risk of maternal mortality. Moreover, the calculation of the association coefficient of YULE gave us according to Gentilini  $Q=1$ . Which was therefore between 0.70 and 1. So there was a very strong statistical link between maternal mortality and non-monitoring by our approach. The estimate of the attributable risk RA according to G. Breart (1988) was equal to 100%. This means, statistically speaking, that if the deaths linked to non-monitoring by our approach were eliminated, the maternal mortality rate would be reduced. The 15 deaths observed in the GAREs not followed by our approach represented 53.57% of all maternal deaths (Table 5).

**Discussion**

**Limits of our study**

We have adopted consecutive sampling at the HRP clinic. In addition, not all HRP go to the hospital. Those who were followed at home until delivery were therefore not analyzed by this study. Among the HRP who went to the hospital and were referred to the HRP clinic, there were some who did not meet the conditions of acceptability as cases (exclusion and inclusion criteria). In our study, the age group of 35 to 39 years was the most represented, whereas in Saucedo., *et al.* [3]. The 15 to 19 and 25 to 29 age groups were the most represented. The pauciparous (55.21%) were more numerous than the nulliparous and multiparous, which is consistent with the Saucedo., *et al.* (2013).

**Risk factors**

In the first group that was followed by us, the main risk factor was grand multiparity (29.17%). But in the second group, on the other

hand, the most frequent factor was adolescence (34.10%). There were, in relative values, fewer adolescents followed in the GARE service than those followed elsewhere, and this was statistically significant ( $p < 0.05$ ). Similarly, there were statistically significantly more cases for women followed in the HRP clinic concerning the following factors: inadequate pelvis, obesity (> 90 kilograms), negative Rhesus and ovarian cyst on pregnancy. It appears that apart from adolescence, the percentages tend to be higher in the HRP clinic where each patient generally had several risks. This could make it clear that the absence of death among the women followed by us is really linked to the approach to monitoring them and not to the absence of risk. The low proportion of adolescent girls among the women followed by us could even simply reflect the fact that they are generally not followed at all, because they often have unwanted pregnancies that they sometimes hide until the last trimester. The preponderance of the “high multiparity” and “adolescence” factors in the two groups is consistent with the findings of other authors [3,4].

**The causes of maternal deaths**

The main causes of death recorded were in order: complications of criminal abortions (28.57%), eclampsia (21.43%), third trimester or postpartum hemorrhage (17.86), puerperal infection (10.71%), uterine ruptures (7.14%). The first three causes are identical to those of Say., *et al.* [4], hemorrhage coming after eclampsia in his series. Most deaths (92.86%) were preventable, a conclusion also drawn by Say., *et al.* [4] for whom 95.97% of deaths could be avoided.

**Maternal mortality rate and incidence of HRP**

Our study objectified a maternal mortality rate of 984.18 deaths per 100,000 live births. This rate, which is higher than the rate of [5] which was 365 in this same institution in 2009, is related to the idea that maternal mortality is increasing in our environment.

We think that in addition, this rate would be increased by the increase in costs at the Main Maternity Unit. Childbirth costs, for example, have increased from 6,000 in 1995 to 30,000 CFA francs in 2021. This increase would force many patients to come to the Main Maternity Unit only when they cannot do otherwise. That is to say when they are carriers for example of a HRP and therefore cannot give birth in a peripheral maternity ward. Moreover, the fact that the incidence of HRP during childbirth was 39.99% compared to

28% in 2015 (Kamgaet al., 2017), is in favor of this idea. As there is more risk of dying on HRP than on normal pregnancy, the increase in the incidence of HRP leads to an increase in maternal mortality.

### Importance of deaths on HRP

Deaths on HRP accounted for 53.57% of all deaths; but, when we do not consider deaths from complications of the first trimester of pregnancy (which are the result of criminal abortions, ectopic pregnancies and choriocarcinoma), we realize that 93.75% of deaths are the prerogative of HRP. This importance goes hand in hand with data from a study where all serious complications such as maternal mortality are due to high-risk pregnancies [6].

Our study made it possible to estimate the current impact of the HRP approach on maternal mortality. Its proper application by the prenatal consultation services whose patients give birth at the Main Maternity could, in fact, reduce the maternal mortality rate to 53.57% of its value in this institution. Throughout the duration of our study, which was 10 months, there were no deaths during pregnancy followed by the HRP approach. However, the absence of this approach in the group of women followed elsewhere was concomitant with a maternal mortality rate as high as 1630.43 deaths per 100,000 live births. The difference between these two death rates was statistically significant ( $p < 0.05$ ). Moreover, the estimated relative risk (Odds Ratio) was infinitely large. Thus failure to follow this same approach clearly increases the risk of maternal mortality. In addition, there was (according to the calculation of the YULE association coefficient which gave a value between 0.70 and 1), a strong statistical link between not being followed by this approach and maternal mortality. In the same vein, the percentage of attributable risk was 100%, attesting (according to Breart, 1988) that if the deaths linked to non-monitoring by the HRP approach were eliminated, the mortality rate maternal would be reduced by 100%, within the HRP, these deaths on HRP having been entirely the fact of the women followed elsewhere [7,8].

### Conclusion

In the light of these data, it is clear from our study that the proper application of the HRP approach will improve the future of pregnancy in our country, with the help of other measure like family planning. The strategy for the fight against maternal mortality must therefore not forget the HRP approach, specially in low income countries where specialists are few.

### Summary

A High Risk Pregnancy (HRPA) is one in which one or more factors expose the mother and/or the foetus to a very high probability of morbidity or mortality before, during or after childbirth. The best management of this type of pregnancy requires scrupulous compliance with the so-called HRP which is essentially a preventive method. To assess the impact of the HRP on maternal mortality in order to know if this approach can significantly reduce the current maternal death rates, a prospective and analytical study was conducted at the Central Hospital of Yaounde over a period of 10 months, from February to November 1998. During the study, 96 parturients were received and followed up until postpartum, at the HRP Program and 2,647 deliveries were also recorded at the Main Maternity, making a total of 2,743 deliveries. Grand multiparity was the most encountered risk, with 29.17%. Complications from abortions were the most common cause of death at 28.57%. Proper application of the HRP approach could, in fact, reduce the maternal mortality rate by up to 53.57%.

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