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Beyond severe acute maternal morbidity: a mixed-methods study on the long-term consequences of (severe pre-) eclampsia in rural Tanzania

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Abstract

Objectives: To explore the long-term (perceived) consequences of (severe pre-)eclampsia in rural Tanzania.

Methods: Women were traced for this mixed-methods study 6-7 years after the diagnosis of (severe pre-) eclampsia. Demographic and obstetric characteristics were noted, and blood pressure was recorded. Questionnaires were used to assess physical and mental health. The qualitative part consisted of semi-structured interviews (SSI). A reference group consisted of women without hypertensive disorders of pregnancy.

Results: Of 74 patients, 25 (34%) were available for follow-up, and 24 were included. Five (20%) had suffered from (pre-)eclampsia twice. Hypertension was more common after (pre-)eclampsia than in the reference group (29% vs 13%). Thirteen women (56%) had feelings of anxiety and depression, compared to 30% in the reference group. In SSIs, experiences during the index pregnancy were explored, as well as body functions, reproductive life course and limitations in daily functioning, which were shown to be long-lasting.

Conclusions: Women who suffered from (severe pre-)eclampsia may experience long-term sequelae, including hypertension, depression and anxiety. Women lack information about their condition, and some are worried to conceive again. To address their specific needs, a strategy along the continuum of care is needed for women following a complicated pregnancy, starting with a late postnatal care visit six weeks after giving birth.

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Keywords: eclampsia, blood pressure, mental health, Tanzania

Introduction

Hypertensive disorders of pregnancy (HDP), mainly (severe pre-)eclampsia, are the second most common cause of direct maternal morbidity worldwide (1) and can lead to long-term complications, such as cardiovascular disease (2, 3). Research conducted in high-income countries (HICs) showed that former (pre-)eclamptic women had significantly higher scores on anxiety and depression, had more cognitive problems when completing everyday routines and more reduced quality of life, than women with normotensive pregnancies (4-7). In addition, former (pre-)eclamptic women were found to report more symptoms related to posttraumatic stress disorders (PTSD), several years postpartum (8). Depression was more common (9, 10), and at six weeks postpartum present in 21% of (pre-)eclamptic women in a Tanzanian hospital (11). Studies on lasting effects after (pre-)eclampsia, or severe acute maternal morbidity (SAMM) in general (12), in low-and middle-income countries (LMICs) are rare. Usually, follow-up is limited to one year (10, 11, 13-17), or four years in one qualitative study (17). Recently, a large study from Brazil reported a higher risk of health problems in women after SAMM compared to a control group, one to five years later (18). Tanzania is a low-income country (LIC) in sub-Saharan Africa, with a maternal mortality ratio of 524 per 100,000 live births (19). As in other LICs, there are limited physical, financial and human resources in clinical care, in particular in rural areas (20, 21). At the same time, there are few mental health services (22). Hence, chronic maternal physical and mental morbidity may substantially differ from HICs, in terms of prevalence as well as impact. This exploratory study therefore aims to bridge the gap of knowledge regarding long-term effects of (pre-)eclampsia in a low-resource setting.

Methods

This is a mixed-methods study of a cohort of women who were treated in Ndala Hospital for (severe pre-)eclampsia in 2011 and 2012, using a concurrent embedded design with the answers to questionnaires guiding interviews (23). The inclusion criteria and definitions used for severe pre-eclampsia and eclampsia have been reported elsewhere (23). Demographic and obstetric characteristics were retrieved from case record forms (CRFs), and questionnaires were used to assess physical and mental health. Blood pressure was taken. Quantitative results were compared with a reference group of women without HDP. The qualitative part consisted of semi-structured interviews (SSIs).

Setting

This study was conducted between March and May 2018 in the villages surrounding Ndala (up to 70 km), a rural area of Nzega and Uyui districts in Tabora region of Western Tanzania (24, 25). The majority (90%) of the area's inhabitants of mainly Nyamwezi and Sukuma ethnic groups are involved in farming and animal husbandry (25). Tabora has some of the poorest demographic indicators in Tanzania. The highest rate of male illiteracy in the country is found here (34%) (26). In Western Tanzania, the total fertility rate is 6.7, the highest in the country. There is a patriarchal societal structure, and more than a quarter of married women are in a polygamous relation (26). In

2011 and 2012, severe pre-eclampsia and eclampsia complicated 0.8% and 1.6% of births in Ndala Hospital (23, 25).

Participants

The original study sample consisted of 80 women who were treated (severe pre-)eclampsia in 81 pregnancies in Ndala hospital between July 2011 and December 2012 (23). Their residential areas were identified through their hospital records.

Since the incidence of hypertension and depression varies and is unknown for our population, we included women with normotensive pregnancies as a reference group to enable contextualisation. Women with uncomplicated births in 2011 and 2012 were identified through admission books and patient files of Ndala Hospital. Since few hospital files could be retrieved and finding patients took too much of the research effort, most of the women in the reference group were recruited through the local school, announcements in the local church and mosque, and using snowball sampling. Participants were approached by the research team (two local motorbike drivers/translators, a global health student and RRK).

Only women over 18 years were included. Women with severe mental disabilities, for whom participation constituted more than a minor burden and women who had delivered fewer than six weeks before the interview were excluded. Furthermore, in the group of women with former (severe pre-)eclampsia, those who had experienced (severe pre-)eclampsia again in a subsequent pregnancy, less than a year before the interview, were excluded because we aimed to examine long term effects. In the reference group of women, HDP in a previous pregnancy was an exclusion criterion.

Quantitative data collection and analysis

Women's blood pressure was measured using an electric sphygmomanometer (Microlife® BP A1 Easy). Hypertension was diagnosed when blood pressure was above 140/90mmHg at two measurements (during one interview visit) or when the woman was on treatment with antihypertensive drugs. Demographic and past reproductive history, such as age, education and number of children, were noted in the CRF. A standardised Swahili translation of the EuroQol EQ5D questionnaire was used to obtain a basic physical and mental health profile. The questionnaire records participants' evaluation of their current health concerning mobility, self-care (e.g. washing and dressing), usual activities (e.g. work, school, household chores), 'pain or discomfort' and 'anxiety or depression'. Each dimension has three levels: no, some or extreme problems (27). A validated Swahili translation of the patient health questionnaire (PHQ-9) was used to screen for depression. The questionnaire incorporates DSM-IV criteria for depression into a brief tool for screening, diagnosing, monitoring and measuring the severity of depression (28). The tool categorises depression as mild, moderate, moderately severe and severe. Questionnaires were administered verbally by the research team. No formal sample size calculation was done, because this is an exploratory study with no measure of effect size. Of the 74 that were included in the original study, all women that could be traced were eligible for the quantitative analysis. For the reference group, approximately the same number as the original sample of women was aimed at. Data was managed in Microsoft Excel. Descriptive statistics were calculated with Epi Info 7®. Because

of the small sample size and risk of selection bias, no statistical hypothesis was tested.

Qualitative data collection and analysis

SSIs with women who had experienced pre-eclampsia or eclampsia were conducted at their homes or another location chosen by the participant where privacy could be ensured (e.g. a private room in the antenatal clinic or under a tree near their homes). Answers to the EQ-5D and PHQ-9 questionnaires, as well as the Swahili translation of the SF-12 functional status questionnaire, were used to structure the SSIs. Women who indicated to have physical or psychological complaints were asked what they thought had caused these complaints and for how long these had been present. Complaints that participants described as having started due to the near-miss event in 2011 or 2012 were considered to be perceived long-term sequelae. In addition, confirmatory questions were asked to get more insight into the likelihood that complaints were related to the near-miss event. All SSIs were conducted, in 15 cases with the help of a native Swahili interpreter (RRK) and in 2 cases of a research assistant native in Swahili and Nyamwezi. The translations of the 15 interviews in Swahili were verified by the research assistant using audio recordings. SSIs lasted between 30 and 90 minutes and took 52 minutes on average. Analysis was initiated during data collection and continued throughout the study in order to identify emerging issues which could be addressed in subsequent interviews. Later interviews were adapted, and the first two interviewees were visited a second time to ask additional questions. The number of interviews was determined by the possibility to achieve sufficiently varied and in-depth insights whilst being feasible with the limited resources in terms of time and budget. ATLAS.ti 8 was used as data manager and analysis software. Recorded interviews were transcribed in English. Some quotations were also copied in the local language in order to obtain the precise wording. Thematic content analysis was used to identify and compare patterns across (horizontal analysis) and within (vertical analysis) transcripts (29). Using deductive and inductive coding, a coding scheme was developed and used to code the entire dataset (29). In the last stage, selective coding was conducted in order to identify core categories (overarching themes) (29). Emergent findings were discussed between the two field analysts (global health student and RRK) and the local research assistant.

Ethics approval and consent to participate

Ethical approval was obtained from the ethical board of the University of Dodoma (UDOM/DRP/134/VOL IV/41). Informed written consent was sought from all participants who could sign, while informed verbal consent was obtained from those who could not. Transcripts of the SSIs were anonymised with pseudonyms. Participants were informed that participation was voluntary and would not affect care or other services. Those that were found to have either physical or psychological problems were given a phone number of a physician in Ndala Hospital and advised to make an appointment for assistance.

Results

A total of 25 and 84 potentially eligible women for the case and reference group agreed to participate. A total of 12

references and one case were eventually excluded after filling CRFs (Figure 1). A total of 24 cases and 72 references were finally enrolled, leading to a case-to-reference ratio of 1:3. Due to time and logistical restrictions, 17 (3 severe pre-eclampsia and 14 eclampsia) of the 24 cases (nine severe pre-eclampsia and 15 eclampsia), were interviewed. The 17 cases were randomly selected from the 24. All women invited for an interview were willing to participate.

Quantitative results

Characteristics of the women of both groups are shown in Table 1. Women with a history of severe pre-eclampsia and eclampsia were younger (26 years vs 32 years), had more often suffered foetal or neonatal loss during their index pregnancy (29% vs 1%) and had fewer pregnancies in their lifetime (median 3 vs 4). Presently, they were part of a smaller household (median 5 vs 16).

Table 2 shows clinical outcomes. Hypertension was present in 17% of all women, more often in the group of women after (severe pre-)eclampsia (29% vs 13%). When only comparing cases of severe pre-eclampsia, this difference is more pronounced: 44% vs 13%. There were no substantial differences in the presence of moderate to moderate-severe depression measured by the PHQ-9 or in the EQ-5D domains about mobility and self-care. Some anxiety or depression was common in all women (36%). This occurred, however, more often after severe pre-eclampsia or eclampsia (54% vs 30%). Slightly more women after severe pre-eclampsia or eclampsia reported some pain or discomfort (42% vs 38%) and more often some problems with usual activities (38% vs 15%).

Qualitative results

Demographic and obstetric characteristics of the 17 women, presence of hypertension and outcomes of the EQ5D evaluation of 'pain or discomfort' and 'anxiety or depression' are shown in Table 3. Furthermore, it is shown if these complaints were attributed as sequelae of pre-eclampsia or eclampsia.

Four overarching themes emerged. Findings are discussed in terms of the experiences of the index pregnancy, body functions, limitations in daily functioning and reproductive life course. A table with all quotations that supported each theme is provided in appendix A.

A life-event with a large impact

Many women regarded their SAMM event six to seven years before as an intense and overwhelming life-experience and still had strong negative feelings when talking about it.

"I feel bad because once I got the pregnancy I felt I was sick. Those thoughts lead me far away (...)." *Grace, eclampsia*

"I felt I like I was going to die, the way I was there [in the hospital] with my body (...)." *Hediye, eclampsia*

Women with an eclamptic index pregnancy had vivid memories of the moment shortly before convulsions occurred, which happened unexpectedly and left them in a state of unconsciousness. Some described this as a frightening moment for the woman and her family. Many women did not remember what happened after convulsions started, but were told about it later by their family.

"I felt headache pain at eight o'clock in the morning. I went to take a shower to prepare to go to the hospital. I was laying

down, at home. After that situation, I lost my mind. From that moment I did not know anything and I did not know at what time I would be back, my mind could be back.[...] They [family members] told me I was laying down, then they went with me to the hospital.” *Winnie, eclampsia*

Negative feelings about the SAMM event were intensified for some women due to loss of their babies.

“I felt bad, the health care workers told me that the baby died in the womb (...) really I was very anxious and not happy, because I already knew the baby died.” *Ruqaiya, severe pre-eclampsia*

Lasting symptoms

Many women described that after discharge from the hospital, they were still ill at home for a period that lasted up to two years.

“Months, four months. I was sick, headache and I felt tiredness.” *Winnie, eclampsia*

In the longer run, the majority of women still experienced periodic complaints, describing sensations within their head, mind or body, which were perceived to be long-term sequelae. These sensations were painful for the minority of women and bothersome for many. A wide variation of complaints was mentioned: abdominal pain, chest pain, headaches, dizziness, numbness, palpitations, tiredness, anger attacks, concentration problems and other complaints (see appendix A for a list with quotes).

“For this time, physically, I feel the heart is painful when blood pressure goes high (...)” *Hediye, eclampsia*

Some women went to see a doctor with these complaints, but the cause often remained unknown, although some were diagnosed with hypertension.

Limitations in functioning

In the first period after SAMM, women described that they felt so ill that they could not perform their household tasks.

“(...) my health was not good [after discharge] [...] for two years [she needed help from her husband around the house]”

Irene, pre-eclampsia

The majority of women also expressed limitations in their current daily activities, such as washing, cooking, taking care of children, fetching water and farming that they attributed as long-term sequelae of HDP.

“Any kind of work I feel to perform, sometimes I fail. I planned to finish a work, but then I feel tired and I go back home.”

Rosemary, eclampsia

For some, this has financial implications:

“I may cultivate for business, but I failed to achieve selling crops to get extra money if the harvest is big enough and exceeds personal needs” *Maria, eclampsia*

Worries

Women were afraid a next pregnancy would also be complicated by (severe pre-) eclampsia.

“Until this time, I am afraid to deliver.” *Grace, eclampsia*

For some women, a next pregnancy was uncomplicated; for others, their fears came true. Some did not conceive

again. Notably, when asked why they indicated to have depressive symptoms on the PHQ questionnaire, two were worried about reoccurrence of complications in subsequent pregnancies to the extent that they thought they would be better off being dead or hurting themselves in some way.

“(..) I am unhappy about everything, I feel bad every day, that is why I feel it’s better to die. [...] Because my deliveries are complicated. When I conceive, in the first pregnancy the delivery process was complicated, in the second pregnancy, just normal, and in the third pregnancy the delivery process was complicated.” *Maria, eclampsia*

Worries of recurring complications may be driven or enhanced by lack of knowledge regarding their condition, what had caused it, or how to recognise it early.

“The problem during delivery? To be honest, I do not know what caused it [...] the health care workers said that when I get pregnant that problem will be back again.” *Hediye, eclampsia*

Several women attributed the lack of knowledge to their period of unconsciousness and subsequent lower consciousness, but the women also acknowledged that they were not told at all.

“[After getting back to conscious] I stayed in Ndala for three days without knowing anything. The fourth day, [...] I got permission to go home without knowing anything. Maybe they told my husband” *Grace, eclampsia*

Women resumed with their normal lives after they felt physically and mentally capable of doing so, and there was no follow-up at the hospital or by community health workers. Other women were told that they suffered from (severe pre-)eclampsia, but most of them did not receive further explanation about this condition or risk factors.

“No, I do not know [...] Maybe you [the interviewer] tell me, you know what happened.” *Irene, pre-eclampsia*

Some women decided they wanted family planning, sometimes because of worries for reoccurrence. For others, postponing childbirth was impossible due to expectations that married couples bear children.

“(..) I am married, and inside a marriage we need a child (...). When they [the doctors] told me that I am not allowed to deliver until five years later it was a very big challenge for me, although I accepted their advice because they were doctors and they know what they mean, I decided to go against it, because I am a human being and I have a child wish. So I made the decision to deal with faith, I prayed to God (...).” *Na’imah, eclampsia*

Women who had SAMM at a young age and in their first pregnancy more often mentioned to rely only on ‘natural’ family planning (e.g. an ‘understanding’ with the male partner) or to continue with subsequent pregnancies with their fate and that of their (unborn) children in God’s hands.

Discussion

In this study, 25 of 74 women (34%) were available for follow-up after six to seven years (one was excluded because of recent eclampsia). Five of these 25 women (20%) had suffered from (pre-)eclampsia twice. Hypertension happened to be more common after (severe pre-)eclampsia (29% as compared to 13% in references). After pre-eclampsia this proportion is even higher (44% of women) compared to women with eclampsia, a finding that has been described before in a high-income setting (30). Our findings are not surprising given studies conducted in HICs (2), but ours is the first to find this in an African LIC. Differences between high- and low-income settings, such as socioeconomic and environmental factors (e.g. access to healthcare and nutrition) mean that results from HICs could not be applicable to an African setting, where even genetics and aetiology may be different (31). Larger studies,

including a control group are needed to confirm this possible important finding since women who have experienced HDP could be a relevant risk group to identify hypertension. Untreated hypertension is common in Africa and can cause stroke or heart and renal disease (32). Hypertension has become one of the continent's greatest health challenges after HIV/AIDS, and 25% hypertension control is aimed for by 2025 (33). In the Pan-African Society of Cardiology 10-point action plan to increase hypertension control, no mention is made of former (pre-)eclamptic patients. However, the high incidence we found has policy implications and warrants blood pressure follow-up in these women (33). Anxiety and depression were more common after (severe pre-)eclampsia (54% of cases). A higher prevalence of postpartum depression six weeks after birth and depression after different forms of SAMM has been described in LICs (9, 11, 13), but a lasting effect has not yet been reported. The small sample size of our study and other methodological limitations preclude drawing firm conclusions, but the findings do suggest follow-up studies assessing psychological problems are needed.

Interestingly, anxiety or depression was also common in the reference group (30% of women), which could reflect the harsh living conditions and hardship these women experience or limitations in the validity of the questionnaire. Here too, further research is desirable. A reference group of women without HDP was used to compare outcomes of cases with the local population. No case-control statistics were used due to risk of bias and small sample size, realising that these limitations would make results, even when statistical significant, not reliable. The differences in characteristics of women with or without a pregnancy complicated by HDP can be caused by the nature of HDP, for example, a younger age in the cases. Another reason for differences between both groups can be the selection process of the reference group, with possibly more healthy women being included through recruitment in a local school and church than in the general population, leading to a larger difference in the two groups. A possible bias towards a smaller difference between the two groups can be that other complications than HDP as well as pregnancy loss were no exclusion criteria for the reference group and can be a cause for long-term symptoms. This study indicates that (severe pre-)eclampsia was experienced as a life-event with a lasting impact, reflected in high scores of anxiety and depression, years after the event. Especially convulsions and a lowered consciousness in women with eclampsia were described as contributing to their negative feelings. This seems to be caused by the frightening recounts of family members and by the loss of memory.

Another reason for the huge impact was the death of the baby (which occurred in 29% of the cases), which is unsurprising and has been described before (34). Perinatal death can be regarded as confounding our results. Since perinatal death is closely related to SAMM and often the direct result, long-term effects of these two are inseparable and can be studied together (35). Studies have found a high burden of mental health morbidity, specifically depression and pregnancy-related anxiety, in women visiting antenatal care (ANC) clinics in Tanzania (36, 37). Antenatal depression has been described as a public health concern because of negative effects on women's general health, associated with underutilisation of ANC services, negative experiences during childbirth and adverse pregnancy outcomes (36). Given the higher scores on the severity of anxiety and depression after SAMM, women may well be at increased risk of feelings of depression and anxiety or even suffer from clinical antenatal and postpartum depression in the next pregnancy, and need extra attention for their mental health in subsequent

pregnancies.

Some women reported pain or discomfort after (pre-)eclampsia, and in their narratives attributed symptoms as sequelae of their condition. These symptoms ranged from pain, numbness and palpitations to cognitive symptoms such as forgetfulness and concentrating problems. In some women, these symptoms related to hypertension since they were either on treatment for hypertension or diagnosed with hypertension during the study. However, most women with hypertension had mild hypertension, which is unlikely to cause physical symptoms (32). Another explanation could be potential damage of cerebral white matter as has been noted in studies of (pre)eclampsia (4). It is not clear whether these lesions, which can be demonstrated in MRI imaging of women after (pre-)eclampsia, relates to cognitive impairment in the long run (7). Alternatively, women's perceived sequelae may be related to psychological factors, as most women had who reported this had some form of depression and anxiety. Accounts of periodic complaints like palpitations and dizziness can point to phenomena akin to panic attacks. Language barriers and lack of familiarity with psychological phenomena in LMIC settings may have contributed to the fact that emotional and psychological complaints were described as physical complaints in their narratives (38, 39).

These lasting symptoms are reflected in the limitations in daily functioning. Although problems with mobility and self-care were not frequently reported, problems in the execution of daily activities, such as cooking, washing, farming or fetching water, were reported by 38% of women, more than in the reference group. In the qualitative arm of this study, women largely attributed these problems to their perceived sequelae of (pre-)eclampsia.

Worries for the reoccurrence of (pre-)eclampsia were evident in women's accounts, and this was also found in previous studies (40, 41). These feelings are realistic since there are increased risks for recurrent (pre-)eclampsia in subsequent pregnancies (42, 43). A study in Tanzania showed a recurrence risk of pre-eclampsia of 25% but also increased risks of other adverse outcomes in subsequent pregnancies (44). In our group, five women (20%) had recurrent pre-eclampsia. In their narratives, women related the risk of recurrence to their reproductive future. In our cohort, 29% of women lost their baby after SAMM (23). When women in Tabora region were asked about their fertility preferences during the national demographic health survey in 2015-2016, they reported a mean desired or ideal number of children of 5.7 (26). Uncertainty about being able to produce the desired number of children can increase worries (40). Studies on fertility desires among women living with HIV/AIDS show the importance of sustained reproductive potential (45).

Various studies in African LICs have found that men have a considerable influence on reproduction-related decisions and the ability to reproduce is an important factor of women's status and affects the strength of their relationship (46, 47). This underlines the importance to re-orient men to proactive involvement to ensure the health of their female partners after having experienced SAMM (48, 49). Worries and risks of the couple should be addressed to make a realistic reproductive plan that can be supported by both.

Many women pointed to the need for more information about their condition, the chances of reoccurrence and strategies to mitigate this risk. Postnatal care (PNC) is only given to 23.5% of women in Tabora region, but this is all within the first week (26). Especially for women who have had diminished or lost consciousness, a late postnatal visit (after at least two weeks) is useful to discuss what has happened. Late PNC visits are recommended by the World

Health Organization and the Tanzanian government. Still, they have the lowest coverage within the continuum of care (50), probably because it is difficult for women to attend the hospital. A community health worker (a WAJA in Tanzania) visiting the patient or support in transport to the hospital can be used to reach high-risk women who have experienced SAMM. PNC visits after (pre-)eclampsia are also important to detect persistent hypertension, but the consequences of late PNC in women after (pre-)eclampsia in LICs should be further studied (51). After complicated pregnancies, information should be given about obstetric warning signs, birth preparedness and complication readiness, as well as ANC visits during subsequent pregnancies (52, 53). Our results show that women worry about the chance of re-occurrence of pregnancy complications, which means they will likely welcome information on how to mitigate risks in the next pregnancy. Unfortunately, prevention of SAMM by (pre-)eclampsia relies on early detection and treatment of HDP, since primary prevention is usually not an option in LICs. Strategies to reduce the risk of HDP exist (54, 55). Results about supplementing calcium are conflicting (56, 57), and to our knowledge, low-dose aspirin has never been studied in an LIC and is not commonly used in such settings. Because of the high burden of the disease, this could be further studied in high-risk women in LICs.

Strengths and limitations

To our knowledge, this is one of the first studies that examines the long-term health effects (6-7 years) after (pre-)eclampsia in an LIC. Another strength is that participants were found far from Ndala Hospital; the furthest participant lived 87 km away. A major limitation is that only 24 of 74 women were enrolled in this study; the small sample size and possibility of selection bias limits interpretation of especially the quantitative results. This expected limitation in the size of the group was one of the reasons to choose a mixed-methods approach; qualitative data could help interpret non-significant differences between case and reference groups. This shows that long-term follow-up studies in LICs are feasible. This study relies on self-reported outcomes; women might have given answers which they thought were desirable. The use of questionnaires, especially to assess mental health, has limitations and the mixed-methods design was used to strengthen the findings from the questionnaires. Finally, the number of interviews (17) was determined by practical reasons, not by data saturation.

Conclusion

This study suggests that more than five years after having suffered (pre-)eclampsia or, women have a high chance of long-term sequelae, including hypertension in 29% of women. Women are worried to conceive again, and 20% had recurrent hypertensive disease in subsequent pregnancies. Women expressed the need to receive information about their condition, chances of recurrence and strategies to mitigate this risk; this may reduce their worries. Late postnatal check-ups after complicated pregnancies should be encouraged and facilitated so that physical health problems (such as persistent hypertension after HDP) will be detected. Early detection and treatment of mental health problems are important, especially in women who experienced diminished consciousness or child loss. Our results call for an integrated care strategy along the continuum of care, integrating physical and mental health aspects, not only during the postpartum period but also during family planning and ANC visits in subsequent

pregnancies.

Declarations

Data are available from the corresponding author upon request. Financial support to cover travelling expenses to visit participants was granted by the Working Party International Safe Motherhood and Reproductive Health.

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Table 1: characteristics of cases and references

	Total (n = 96)	References (n = 72)	Cases (n = 24)
Median age (yrs)	30	31,5	26
Education level			
none	12 (13%)	6 (8%)	6 (25%)
primary	67 (70%)	53 (74%)	14 (58%)
secondary/tertiary	17 (18%)	13 (18%)	4 (15%)
Marital status			
never married	8 (8%)	7 (10%)	1 (4%)
monogamous relation	62 (65%)	45 (63%)	17 (71%)
polygamous relation	16 (17%)	13 (18%)	3 (13%)
divorced/widowed	10 (10%)	7 (10%)	3 (13%)
Household family members	6 (1-32)	16 (2-26)	5 (1-32)
Median (min-max)			
HDP in index pregnancy			
severe pre-eclampsia	9 (9%)	0	9 (38%)
eclampsia	15 (16%)	0	15 (63%)
Discharged with live child index pregnancy			
yes	88 (92%)	71 (99%)	17 (71%)
no	8 (8%)	1 (1%)	7 (29%)
Number of lifetime pregnancies	4 (2-14)	4 (2-14)	3 (2-9)
Median (min-max)			
Total number of pregnancy losses			
Median (min-max)	0 (0-6)	0 (0-3)	0 (0-6)

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Table 2: clinical outcomes

	Total (n = 96)	References (n = 72)	Cases total (n=24)
Hypertension			
yes	16 (17%)	9 (13%)	7 (29%)
no	80	63	17
PHQ-9			
no or minimal to mild depression	83	63	20
moderate-severe depression	13 (14%)	9 (13%)	4 (17%)
EQ-5D Mobility			
no problem	88	65	23
some or extreme problems	8 (8%)	7 (10%)	1 (4%)
EQ-5D Self-care			
no problem	95	71	24
some or extreme problems	1 (1%)	1 (1%)	0
EQ-5D Pain or discomfort			
no problem	59	45	14
some or extreme problems	37 (39%)	27 (38%)	10 (42%)
EQ-5D Usual activities			
no problem	76	61	15
some or extreme	20 (21%)	11 (15%)	9 (38%)

problems			
EQ-5D Anxiety or depression			
no problem	61	50	11
some or extreme problems	35 (36%)	22 (30%)	13 (54%)

Table 3: characteristics of interviewees

	Age	Education	Primiparous in 2011-2012	Live children	Live child at index pregnancy	Marital status	Hypertension	Anxiety / depression	Pain/discomfort	Perceived sequelae
Former severe PE										
1 Irene*	42	Primary	No	6	No	Monogamous	Yes	No	No	No
2 Ruqaiya	44	Primary	No	3	No	Polygamous	Yes	Yes, very	Yes	Yes
3 Silvia	25	Primary	Yes	2	No	Monogamous	No	Yes	No	No
Former eclampsia										
4 Aziza	23	Primary	Yes	2	Yes	Monogamous	No	Yes	Yes	Yes
5 Bibba	25	None	Yes	1	No	Monogamous	No	No	No	Yes
6 Grace	35	None	No	3	Yes	Monogamous	No	Yes	No	Yes
7 Hediye	38	Primary	No	7	Yes	Monogamous	Yes	No	Yes	Yes
8 Jiona	22	None	Yes	2	Yes	Divorced	Yes	No	No	No
9 Layla	26	Primary	No	4	Yes	Monogamous	No	Yes, very	No	Yes
10 Maria	26	Primary	Yes	2	Yes	Monogamous	No	Yes	Yes	Yes
11 Moreen	22	Primary	Yes	2	Yes	Monogamous	No	No	No	No
12 Salomé	28	Primary	No	3	Yes	Polygamous	No	No	Yes	No
13 Rosemary	25	Primary	Yes	2	Yes	Monogamous	No	Yes	Yes	Yes
14 Na'imah	26	Secondary	Yes	2	No	Monogamous	Yes	No	No	No
15 Victoria	27	Secondary	Yes	2	Yes	Monogamous	No	Yes	Yes	Yes

16 Winnie	23	None	Yes	2	No	Monogamous	No	Yes	Yes	Yes
17 Zuhura	23	Primary	Yes	2	No	Monogamous	No	No	No	No

*names are pseudonyms

Figure 1. Quantitative participant selection flowchart