

ENDING
Eclampsia

LANDSCAPE ANALYSIS ON PRE-ECLAMPSIA AND ECLAMPSIA IN BANGLADESH

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ENDING Eclampsia

Ending Eclampsia seeks to expand access to proven, under-utilized interventions and commodities for the prevention, early detection, and treatment of pre-eclampsia and eclampsia and strengthen global partnerships.



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List of Abbreviations

ANC	Antenatal Care
BCC	Behavioral Change Communication
BDHS	Bangladesh Demographic and Health Survey
BMMS	Bangladesh Maternal Mortality Survey
BP	Blood pressure
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DH	District Hospital
FGD	Focus Group Discussion
FP	Family Planning
FWA	Family Welfare Assistant
FWV	Family Welfare Visitor
IDI	In-Depth Interview
IEC	Information Education and Communication
LARC	Long Acting and Reversible Contraception
MCWC	Mother and Child Welfare Centre
MgSO ₄	Magnesium Sulphate
MMR	Maternal Mortality Ratio
MNH	Maternal and Newborn Health
MoH	Ministry of Health
MOH&FW	Ministry of Health and Family Welfare
NGO	Non-governmental Organization
OGSB	Obstetrical and Gynecological Society of Bangladesh
PE/E	Pre-eclampsia/Eclampsia
PHC	Primary Health Care
PNC	Postnatal Care
RH	Reproductive Health
SACMO	Sub-Assistant Community Medical Officer
SPE	Severe Pre-eclampsia
UH&FWC	Union Health and Family Welfare Centre
UHC	Upazila Health Complex
USAID	United States Agency for International Development

Introduction and Background

Globally more than 800 women die every day from preventable complications related to pregnancy, childbirth, and 99 percent of these deaths occur in developing countries. Every day approximately 7,200 babies are stillborn (Lancet 2016). Pre-eclampsia and eclampsia contribute significantly to these mortalities.

The Bangladesh Maternal Mortality Survey (BMMS) 2010 revealed that eclampsia is the second most common direct cause of maternal death in Bangladesh followed by post-partum hemorrhage (PPH); it is responsible for about 20 percent of all maternal deaths (Niport 2012). Among the 5,000 to 6,000 maternal deaths each year in Bangladesh, 1,000 to 1,200 are due to eclampsia. Through the **Ending Eclampsia** project, with support from USAID, Population Council is seeking to expand access to proven, underutilized interventions and commodities for the prevention, early detection, and treatment of PE/E and strengthen global partnerships.

In resource poor countries, particularly Bangladesh, magnesium sulphate (MgSO₄) for management of severe PE/E, anti-hypertensives to manage high blood pressure during pregnancy, aspirin prophylaxis for pregnant women at high risk of developing PE/E, task shifting to lower level cadres, and community involvement have not been optimally examined. There has been no systematic review of research and programming on PE/E prevention, early detection, and treatment in Bangladesh. Until recently, PE/E policy and the perception of the health system and communities were unknown to program implementers and service providers.

To appreciate the enormity of the problem at the country level, Population Council conducted a landscape analysis on PE/E in Bangladesh in August and September 2015 to:

- Understand the level of program and policy support for PE/E prevention and treatment;
- Analyze the gaps in providers' competence for preventing, detecting, and managing PE/E;
- Determine primary health facilities' capacities for managing PE/E;
- Assess communities' PE/E awareness, beliefs, and experiences;
- Understand the volume of research on PE/E in the last 15 years; and
- Determine priority areas for PE/E research and program interventions.

The Council collected data on information on PE/E policy support, current program elements addressing PE/E in the country, antenatal and maternity care facilities' capacities for detecting and managing PE/E, the availability of essential tools and life-saving commodities at health facilities, communities' beliefs and misperceptions hindering pregnant women's timely care, and research gaps, to improve health care for PE/E prevention and management. This report provides major findings of the landscape analysis for Bangladesh and suggests priority areas for interventions.

BOX 1 Health system structure in Bangladesh

Tertiary hospitals	Medical College and Specialized Hospitals	68
Secondary facilities	District Hospital (DH) Mother and Child Welfare Center (MCWC) Upazila Health Complex (UHC)	632
	Union Health and Family Welfare Centers (UH&FWCs)	3,942
	Community Clinics (CCs)	13,235

- **DHs are designed to provide all medical and surgical services including comprehensive emergency obstetric care (CEmOC).**
- **MCWCs provide mother and child health services including normal delivery and caesarian section, and all family planning (FP) services.**
- **UHCs are designed to provide all general and minor surgical services including all FP services; some UHCs are also upgraded for Comprehensive Emergency Obstetric Care (CEmOC) services.**
- **UH&FWCs are designed to provide antenatal care (ANC), postnatal care (PNC), short acting contraception, and child health services. Some UH&FWCs are also upgraded for normal delivery and long acting and reversible contraception (LARCs) and permanent contraception.**
- **CCs provide general health services, ANC, PNC, and short acting contraception.**

Methodology

This cross-sectional study encompasses a systematic review of available literature and collection of primary data from a range of audiences using both qualitative and quantitative methods. About one-third of these activities were supported by MacArthur Foundation grants and the remaining two-thirds by USAID through the *Ending Eclampsia* project.

In reviewing PE/E related literature, researchers collected and analyzed all published literature on PE/E from 2000 to 2015. Policy and program level data were gathered at the national and district levels through interviewing related policy makers, managers of MNH programs, and representatives of the related local and international NGOs. At the district level, District Hospitals (DH) and Mother and Child Health Centers (MCWC) were selected from all districts. At the upazila/sub-district level, three sub-districts were selected for the study. At the sub-district level, all facilities were selected for the study. The district and sub-districts were selected purposively in consultation with the Ministry of Health and Family Welfare (MOHFW).

At each study facility, researchers interviewed providers working in antenatal, maternity, or labor/delivery wards, conducted facility inventories, and observed client-provider interactions of ANC consultations prior to interviewing the same pregnant women leaving the facility. Women (18–49 years of age) and men (18–55 years) participated in focus group discussions (FGDs). In-depth interviews were conducted with women who had experienced eclampsia and survived with a living newborn. The data collection activities can be classified and presented in three broad thematic areas: policy, health system, and community.

Policy

- Desk review of published and unpublished documents on PE/E from 2000 to 2015;
- In-depth interviews (IDIs) with policymakers, development partners, and Ob/Gyn professionals; and
- E-Survey of reproductive health (RH) program managers in the country.

Health system

- Personal interviews with health care providers;
- Observations of client and provider interactions during ANC consultations;
- Client exit interviews after ANC consultations; and
- Facility inventory.

Community

- Focus group discussions (FGDs) with married men and married women; and
- Case studies of eclampsia survivors.

DATA COLLECTION

The study was conducted in four districts (figure 1) and selected sub-districts. The study protocol was reviewed and approved by the Population Council IRB in New York, with additional reviews and approvals by the Bangladesh Medical Research Council (BMRC) and the Ethical Committee of Dhaka Medical College. Informed consent was taken from all participants before conducting any interviews.

Before beginning the study, approval and administrative orders were collected from both Directorate General of Family Planning (DGFP) and Directorate General of Health Services (DGHS). A 24 member data collection team including four supervisors were recruited and trained for ten days on the study objectives, study tools, procedures, and ethical issues. The researchers were given hands-on training for one day in the field other than the study area. All filled in questionnaires were checked by the supervisors in the field and sent to the Council office for entry and analysis. Data entry was conducted using CSpPro and analysis was conducted using SPSS/SAS software. The results are presented in this report as frequencies and percentages. Qualitative data were collected through using hand-written notes, supported by tape recordings and transcribed for content and thematic analysis using Atlas-ti.

FIGURE 1 Study districts for Ending Eclampsia project in Bangladesh

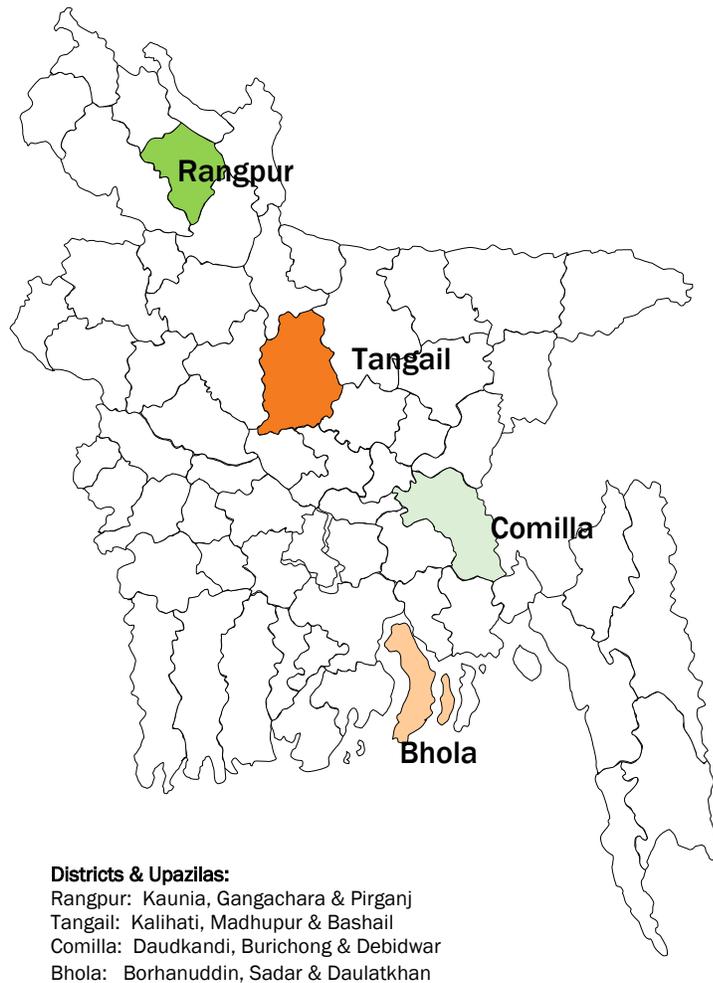


Table 1 shows the distribution of facilities and interviews by district and type of data collection. In addition a total of 17 national level in-depth interviews (IDIs), 33 districts level IDIs, 8 focus group discussion (FGD) and 22 case studies with eclampsia survivors were conducted.

TABLE 1 Distribution sample by district (quantitative)

Name of District	Type of data	Type of Facility (number)				Total
		DH	MCWC	UHC	UH&FWC	
Comilla	Inventory	1	1	3	36	41
	SP interview	4	3	19	66	92
	CPI	5	4	6	67	82
	Exit interview	5	4	6	67	82
	Total	15	12	34	236	297
Rangpur	Inventory	1	1	3	27	32
	SP interview	4	3	17	44	68
	CPI	5	4	6	48	63
	Exit interview	5	4	6	48	63
	Total	15	12	32	167	226
Tangail	Inventory	1	1	3	27	32
	SP interview	4	3	21	52	80
	CPI	5	4	6	48	63
	Exit interview	5	4	6	48	63
	Total	15	12	36	175	238
Bhola	Inventory	1	1	2	25	29
	SP interview	4	3	12	30	49
	CPI	5	4	4	47	60
	Exit interview	5	4	4	47	60
	Total	15	12	22	149	198
	Facility Inventory	4	4	11	115	134
	SP interview	16	12	69	192	289
	CPI	20	16	22	210	268
	ANC exit interview	20	16	22	210	268
Total		60	48	124	727	959
Distribution data collection by district (qualitative)						
National IDIs						17
District IDIs						33
FGDs						8
IDIs with eclampsia survivors (Case studies)						22

PARTICIPANTS' CHARACTERISTICS

Health service providers

For analysis and better representation of the data service provider responses were grouped into two categories (i.e. service providers' comparable levels of knowledge and skills):

- Obstetric/Gynecologists (Ob/Gyns) specialists and Medical Officers (MOs) at the MCH unit; Medical Officers Maternal and Child Health (MOMCHs), Indoor Medical Officers (IMOs), Emergency Medical Officers (EMOs), Resident Medical Officers (RMOs), or
- Nurses/midwives, Family Welfare Visitors (FWVs), and Sub-Assistant Community Medical Officers (SACMOs) or Paramedics.

Moreover, the health facility was also categorized within two levels:

- Secondary facilities: District Hospital (DH), Maternal Child Welfare Centre (MCWC), and Upazila Health Complex (UHC), or
- Primary facilities: Union Health and Family Welfare Centre (UH&FWC).

Table 2 (page 9) presents the background characteristics of service providers (n=289). The majority of the doctors (57%) and other service providers (65%) are female. Over half of the doctors are younger than 40 years old, most other service providers are older than 40. Most doctors work at the secondary level facilities and most of the other cadres work at PHC facilities. More than half of the doctors have worked in the same unit for less than five years while 83 percent of the other service providers have worked in the same unit for more than five years. Around one third of the doctors and over half of the other service providers received any training on FP and maternal, newborn and child health (MNCH) within the previous three years. Of those who received training, about one quarter of the doctors and one fifth of the other cadres received training on emergency obstetric care (EmOC).

TABLE 2 Background characteristic of service providers (n=289)

Characteristics	Types of provider (%)		Total
	Doctor n = 98	Other service providers n = 191	
Sex			
Male	43	35	37
Female	57	65	63
Age in years			
<30 years	25	11	15
30-39	30	9	14
40-49	29	39	36
>49	15	41	34
Type of facility			
Secondary level	86	14	34
Primary level	14	86	66
Duration of work in this ward/unit			
<=1	30	5	12
1-5	28	12	17
5-10	8	3	4
>10	34	80	67
Types of provider			
	Secondary	Primary	Total
OB/GYN specialist/MO	24	0	8
MO/MOMCH/IMO/EMO/RMO	45	6	19
Nurses/midwives	14	0	5
FWV/SACMO/Paramedic	16	94	68
Training on FP, maternal, newborn and child health in last three years*			
Yes	33	56	50
No	67	44	50
Type of training received*			
Emergency obstetric care	27	22	23
Antenatal care	19	27	26
Safe delivery care/ Skill Birth Attendant training	27	33	32
Postnatal care	15	27	25
Helping babies breathe/Essential newborn care	44	39	40
Family planning	35	43	42
Expanded immunization program	50	45	46
Nutrition/breastfeeding	6	12	11
Laboratory investigations	4	0	1
Others (infection prevention and computer skills)	0	4	4
*multiple responses			

ANC client characteristics

Background characteristics of the 268 ANC clients who participated in the exit interviews are detailed in Table 3. One fifth were under 20 years and almost two thirds were 20 to 29 years. All ANC clients were married. Ninety-two percent of the clients had primary or above level education, while only eight percent had no education. More than one third of ANC clients were of low socio-economic status (SES) and middle SES, and 30 percent were of high SES.

TABLE 3 Background characteristics of ANC exit clients (n=268)

Characteristics			
Age	%	Pregnancy duration (week)	%
<20	20	<13	5
20-24	36	13-20	29
25-29	28	21-28	33
>29	16	>28	33
Education		Current ANC visit	
Never attended school	8	1	34
Primary	29	2	28
Secondary	51	3	17
College	10	4 and above	21
University	2		
No. of pregnancy		Socio-economic status	
1	37	Lower tercile	35
2	37	Middle tercile	35
>2	26	Upper tercile	30
Total	268		268

Policy

IDENTIFYING AND REVIEWING PROGRAMS AND RESEARCH ON PRE-ECLAMPSIA AND ECLAMPSIA IN BANGLADESH

Clinical practices for PE/E are more or less established for tertiary and secondary facilities in Bangladesh. With high rates of maternal mortality due to PE/E, more emphasis is required at primary health care (PHC) and community levels to address lower level management and understand health care seeking strategies among pregnant women and communities.

- Researchers conducted a desk review of published and unpublished articles and program materials from various sources on PE/E particularly related to community level interventions in Bangladesh. Only 17 articles conducted in Bangladesh including clinical trials between 2000 and 2015 were found. Only one resource described training of community-level service providers, and three published research materials were identified that described studies implemented at the community level;^{1 2 3}

In addition, researchers reviewed descriptions of two current projects, implemented at the community level (unpublished):

- Lutheran Aid to Medicine in Bangladesh (LAMB) - Integrated Rural Health and Development: A loading dose of MgSO₄ administered to the severe PE and Eclampsia patients detected at ANC implemented in 3 upazilas of Dinajpur and Rangpur districts⁴; and
- CARE-GSK Community Health Worker Initiative: availability of loading dose of MgSO₄ for Private Community Based Skilled Birth Attendants (P-CSBAs). This project is implementing in all sub-districts of Sunamganj district, the most remote district of Bangladesh.⁵

Analysis of the contents of the other 17 studies revealed that six studies have examined profiles of eclampsia patients, seven studies examined maternal and fetal outcomes of PE/E patients, one study examined clinical features of eclampsia patients, three studies examined loading dose of MgSO₄ at the community level, one study examined loading dose versus standard regime of MgSO₄ and one study examined the effect of MgSO₄ vs diazepam in PE/E patients (Population Council 2015).

Only three studies
involved
community
providers.

¹ Shamsudin et al 2005; OGSB, DGFP

² Population Council 2013;

³ Save the children and ICDDRDB 2015

⁴ www.lambproject.org

⁵ http://familyplanning.care2share.wikispaces.net/file/view/GSK+1+page+brief_FINAL.pdf

COMMUNITY-BASED STUDIES ON PRE-ECLAMPSIA AND ECLAMPSIA

Review findings of the community-based studies reveal that a number of factors are responsible for maternal mortality and morbidity due to PE/E at the community level, including lack of knowledge and misconceptions about PE/E's causes and treatment, initial intention to seek care from Imams, traditional healers, spiritual healers, or village doctors, lack of ANC care, delay in decision making, delay in reaching appropriate facility to receive treatment, lack of trained or skilled service providers including community service providers in detecting and managing PE/E patients, lack of knowledge on the correct use of MgSO₄, poor quality of care of ANC, and delays in providing appropriate services.

The three community studies are:

(Prof. Latifa et al. 2005.) Use of Parenteral Magnesium Sulphate in Eclampsia and Severe Pre-eclampsia Cases in a Rural set up of Bangladesh

This quasi-experimental study assessed the provision of a loading dose of MgSO₄ injection to women with severe PE/E patients at community level in a rural context (Tangail, Netrokona and Jamalpur districts), followed by referral to a hospital. This study was conducted over a period of six months with 265 women with severe PE/E. In the intervention group, 133 women received the loading dose of MgSO₄ before referral to hospital. The other 132 patients in the non-intervention group were referred immediately to a hospital and did not receive the loading dose of MgSO₄ at the community facility. Administration of the loading dose of MgSO₄ successfully controlled convulsions in 94 percent of the intervention group and 74 percent in non-intervention group. Significantly fewer ($p < 0.005$) women died in intervention group (2.3%) than in the non-intervention group (10.4%). Moreover significantly fewer ($p < 0.001$) babies (13.7%) were stillborn (13.7%) in the intervention group than in the non-intervention group.

(OGSB, DGFP and Population Council. 2013.) Operationalizing the Proposed National Protocol for the Prevention and Management of Severe Pre-Eclampsia and Eclampsia Patients Using Loading Dose of Magnesium Sulphate at Community Level in Bangladesh

This was conducted to operationalize a proposed national protocol for the prevention and management of severe PE/E patients using loading dose of MgSO₄ at the community level. The study was a quasi-experimental pre-post-test design without any control group and was conducted in public facilities with public providers in real life situations. The objective of the study was to assess the ability of community-based service providers to screen and detect PE/E patients and administer the loading dose of MgSO₄ and refer patients to referral facilities. The intervention included training service providers on detecting and managing PE/E (measuring blood pressure, testing urine for albumin, and administering loading dose of MgSO₄). Findings showed that knowledge of community-based service providers on PE/E has increased significantly due to this intervention. While there were no documented PE/E patients before the intervention in the study facilities, 33 PE/E patients were identified and correctly treated and referred during the intervention period. No deaths occurred among mothers or their newborns who received the loading dose of MgSO₄ at the community level facility; among mothers and newborns at the hospitals, one newborn died. Due to lack of manpower, the study could not follow up patients who were advised to visit a doctor for further evaluation and take anti-hypertensives. There is a need to understand adherence to advice and what a patient actually does at home after PE/SPE/E diagnosis.

(Save the Children (Mamoni Project) and ICDDR,B. 2015.) Community-based Prevention and Treatment of Severe Pre-eclampsia and Eclampsia

The study was a case-control study in Habigonj district, with three sub-districts selected for intervention and four sub-districts for comparison. The study objective was to identify and manage SPE/E cases at the community level through trained community-based health providers, administer MgSO₄ prior to hospital referral, and understand the factors that influence the identification and use of MgSO₄ in severe PE/E. The intervention included training of service providers on detecting and managing PE/E, measuring blood pressure (BP), testing urine for albumin, administering loading dose of MgSO₄, and referring PE/E patients to higher level facilities. In addition to other interventions, the study also included oral calcium 1000 mg/day to all pregnant women

from the second trimester of pregnancy for the primary prevention. The final report of the study is not yet available. However, presentations from the study findings revealed that 33 percent of all severe PE/E cases were identified at the intervention sites and only 13 percent at the control sites. Eighty-eight percent of the identified cases received the loading of MgSO₄ at the community facility. The study also found poor ANC coverage, poor quality of ANC services and lack of supervision structure at the study sites. Study recommended for the loading dose of MgSO₄ through H&FWC at community level and suggested inclusion of loading dose of MgSO₄ for the community implementation into the policy with a further evaluation strategy.

All three studies demonstrated improvements in detecting, preventing and managing PE/E at the community level. The evidence has contributed to the government's intention to approve the expansion of loading dose of MgSO₄ at the community level through UH&FWC level service providers. MoH&FW has suggested revising the community level protocol for future implementation. The national protocol for loading dose of MgSO₄ for the community level is a one page algorithm that portrays key diagnosis features and regimens for the management of PE/E. It dictates how to diagnose and what to do. The community service providers (i.e. FWV, SACMO, CSBA, paramedics) involved in these studies recommended further simplification of the algorithm.

POLICY AND PROGRAM MANAGER PERSPECTIVES

Although trained and skilled providers are available at the secondary and tertiary level, MOH&FW was concerned about technical capacity of the community level providers to administer MgSO₄ and to monitor the safety and toxicity of the drug.

Researchers conducted in-depth interviews (IDIs) with policy level stakeholders, these included policy makers, program managers, development partners and implementers, and other relevant organizations. The purpose was to identify the nature and extent of their involvement (including the commitments of the national, district and sub-district level program managers), current policies and their use, and to determine the bottlenecks within the health system. The analysis also aimed to identify potential areas of synergy with other ongoing efforts.

Fifty IDIs were conducted at the national level as well as district and sub-district level. Interviews were held with:

- Director, Primary Health Care & Line Director MNC&AH, DGHS, MoH;
- Director, MCH-Services and Line Director MCRAH, DGFP, MoH;
- Deputy Director, Maternal and Child Health (MCH), MCH Unit, DGFP, MoH;
- Joint Secretary, Family Planning, MOHFW;
- Joint Chief, ECNEC, MoH;
- Director, Directorate General of Drug Administration, MoH;
- Civil Surgeon (CS);
- Deputy Director of Family Planning (DDFP);
- Deputy Civil Surgeon (DCH), MoH;
- Upazila Health and Family Planning Officer (UH&FPO), MoH;
- Upazila Family Planning Officer (UFPO), MoH;
- Assistant Director, Family Planning, DGFP, MoH;
- President and Secretary General of Obstetric & Gynecological Society of Bangladesh (OGSB);
- Development partners;
- NGOs representatives; and
- Other implementers who are particularly working on maternal health.

Findings from the 50 interviews are summarized in seven sections: impact of PE/E on MCH, government policy for PE/E, task shifting, current projects, essential drugs, and government policy for aspirin and referral system.

Impact of PE/E on maternal and child health

When asked about the causes and relative burden of PE/E in this country, about half (n=21) of the 50 respondents replied lack of awareness of the pregnant women and not receiving ANC during pregnancy contribute to the high levels of PE/E. More than three fourths (n=40) mentioned that PE/E contributes to premature delivery, miscarriage, stillbirth, liver damage and death. One informant said:

“Due to family barrier [in-laws do not allow them to come], pregnant women do not take ANC services properly and do not visit us. Usually [they] come at the last moment, when the disease becomes severe. They [pregnant women and their families] do not have any knowledge about pre-eclampsia and eclampsia. They think of it as a simple matter.”

UH&FPO, Program Manager, sub-district

Government policy

The government policy on PE/E falls under the broader issue of maternal health. The government has a Standard Operating Procedure (SOP) which specifies the prevention and management of PE/E at the secondary and tertiary levels. However, the government has yet to formalize any policy on PE/E prevention and management at community level. A protocol has been developed, tested and approved for implementation in the field but has not yet been widely circulated and many program managers and service providers are unaware of this policy.

**Policies are not
adequately communicated
from the central to local levels**

Almost all of the informants stated that they were actively working together to prevent, manage and refer PE/E patients. It appears that PE/E management services are consistently available in the tertiary level hospitals including all DHs. MCWCs (secondary level) do not admit PE/E cases but refer the cases to DHs. No UHC and H&FWC cater to women with severe PE/E (except for those who have CEOC services) rather, they refer pregnant women to the higher level facilities. Policy makers and program managers are confused about the existence of the PE/E policy. A majority of the informants (n=31), from all levels mentioned they are not aware of any policy addressing the PE/E in Bangladesh and do not have copies of the policy or written instructions. One of the policy makers said:

“I don't know about the government policy. There might be one. I cannot tell you about the policy as I didn't get it yet. I didn't get the policy in my hand so that I don't know about where the policy is being implemented. There is no implementation policy in my district or upazilas.”

Policy Maker and Program Manager, MoHFW

Contradicting this, another policy maker mentioned:

“As far as I know, the policy is being implemented all over Bangladesh otherwise reaching the targets of MDGs 4 and 5 were not possible. Of course we are involved in it, we are providing health care services to all types of patients from national, district and sub-district health facilities.”

Program Manager and Policy Maker, MoHFW

Another stated:

“Definitely there is government policy regarding PE/E particularly for the secondary and tertiary level facilities. That is national SOP [Standard operating procedure for maternal health issue] which was already developed in 2014 and endorsed. However, government does not have any policy for the community level. I have heard that a protocol has been developed and tested in some areas.”

WHO Representative

Task shifting

Interviewees were informed about the evidence about task shifting for the detection and management with loading dose of MgSO₄ and referral to the higher facilities by the PHC providers (which includes FWV and SACMO). Almost all of the policy level respondents (n=49) think that task shifting to lower cadre providers is a good decision but they strongly suggest proper training and mentoring of these lower level providers. While most of the respondents have reservations about the abilities of Community Skilled Birth Attendants (CSBAs), one supported including CSBAs if properly trained. All respondents had reservations about Community Health Care Providers' (CHCPs) abilities to safely and accurately administer the loading dose of MgSO₄. The respondents also highlighted the importance of recognizing MgSO₄ toxicity and its management. Improving the quality of ANC and PNC visits is needed, as detection at PHC level is rare. One informant said:

"We say that we made progress in MDG goals. But, still 50 percent of deliveries are taking place at home and if there is any problem, they first come to the grass root level health workers such as the FWV, CSBA and SACMO. Women usually go to H&FWC or UHCs or DHs. If we can make the service providers more aware and train them at the community level, then they can identify PE/E, administer the loading dose of MgSO₄, and refer. Then it will definitely have a good effect and will reduce maternal mortality."

UNFPA Development Partner Representative

Another stakeholder countered:

"We need to think whether permission should be given to PHC providers for providing MgSO₄ injection. PHC providers can detect PE/E by measuring blood pressure and urine test. That is simple. After that they can refer the patients to higher facility. But allowing that level of service providers to administer the injection; we definitely need to think about it, because, we have seen abuse. We do not have any mechanism to stop the abuse. Likewise doing this, are we causing harm?"

Researcher, ICDDR,B

Essential drugs for PE/E

Magnesium sulphate, calcium gluconate and anti-hypertensive drugs are essential to provide comprehensive treatment of PE/E. The DGFP never supplies these drugs to its facilities, rather they expect pregnant women presenting with PE/E to be referred to a higher level facility. In the DGHS, MgSO₄ and calcium gluconate (which is used as the antidote to MgSO₄ toxicity) are supplied irregularly by the Central Medical Store of Drugs (CMSD) to District Reservation Store (DRS). If these medicines are supplied to the DRS, they are either stored there or sent to the DHs or UHCs depending upon the need. Anti-hypertensive drugs (Losartan potassium, Atenolol, Amlodipine, Methyldopa) are usually purchased quarterly using the 20% allocated money through CMSD or by local purchase through a competitive bidding process. Again, purchase should be done from Essential Drug Company Limited (EDCL) if the specific drug is manufactured by them. When asked, more than half (n=31) of the respondents replied these drugs are not available in their facilities because these are not supplied by central level. One informant said:

"Magnesium Sulphate, calcium gluconate and anti-hypertensive drugs are not supplied to our Family Planning department. It may be supplied to Health department. We usually prescribe medicines for the pregnant women who come for treatment."

DGFP

Medical Officer, MCH,

Most of the informants believe that the quality of the drugs is good because the government has strong mechanisms to control quality. One of the informants said:

"The quality of drugs is certainly very good, because government has a distinct department to ensure the quality and maintain standard. They regularly supervise and pharmaceutical companies need certification from Drug Administration. "

Manager

Policy Maker and Program

All district health program managers stated that they have regular and current supply of these essential drugs. When checked with store keepers in all districts, none had any supply of MgSO₄ or calcium gluconate, however,

and a few only have Atenolol or Amlodipine as anti-hypertensive drugs. Sometimes even tertiary hospitals have irregular supplies of MgSO₄ from the central level. A policy maker and program manager at the central level said:

“The main thing is all these three drugs are cheap, but the problem is these are used less frequently and that’s why they are not OTC drugs [over the counter]. One ampule MgSO₄ costs Tk. 18 to 20 [~\$0.23 USD], aspirin and calcium gluconate are also cheap. However, MgSO₄ is not an easily available drug all over Bangladesh. We have supplies of aspirin in GoB system. EDCL doesn’t manufacture MgSO₄ and we purchase from Gonoshastho but they don’t have enough MgSO₄ supplies at the Medical College Hospitals. Nalepsin, a product of Beximco Pharma, do not have adequate doses for managing Eclampsia, thus it is not recommended.”

Policy Maker, MoHFW

In exploring the reasons for irregular supply of these drugs, it appears that where the incidence of PE/E is lower, facilities are not using the drugs frequently, and any drugs in stock are expiring. Moreover, only a few pharmaceutical companies produce MgSO₄ which can only be stored for three years. The Directorate General of Drug Administration (DGDA) reported that there are eight enlisted pharmaceutical companies (EDCL, Gonoshasthaya, Beximco, Opsonin, Incepta, Libra, Chemist and Reneta) that are producing MgSO₄ as an injectable (2.5 g/5ml) or Intravenous (IV) infusion (4g/100 ml) forms. One informant said:

“MgSO₄ is very much affordable but it is not available. If it was available, then it would be accessible. A few pharmaceuticals are producing the drugs. The pharmaceuticals think it is not commercially viable as the demands is less. That’s why they do not produce it. Therefore, government has to take the initiative since it not a matter of profit to them.”

Researcher, ICDDR,B

It appears that Civil Surgeons from DGHS and MOMCH-FP from DGFP have the local level purchasing authority. No other program managers from the upazila level have the authority to make purchases; they can only inform the district authority of their needs. The district authority then locally purchase and supply to the upazila according to their need. Out of 37 district and sub-district level public program managers, only seven from district and upazila levels have the drug purchasing authority.

“It is purchased by the health department. MCWCs are not allowed to purchase it, they can advise and refer the cases. DDFP cannot purchase it, but MO-MCH has the power. There is a committee to purchase medicine, ADCC is the chairman and MO (Clinic) is the member secretary and FPO is the member.”

Policy Maker and Program Manager, MoHFW

Government policy on prophylaxis (aspirin and calcium supplements) for pregnant women at high risk of PE/ E

The World Health Organization (WHO) and other global and national professional associations have approved use of aspirin during ANC for pregnant women who are at risk of developing PE/E (WHO guidelines, FIGO, American Ob/Gyn, and RCOG). A few obstetricians are prescribing aspirin as prophylaxis in their own practice; however, they suggested that while PHC providers can provide calcium supplements as a prophylaxis, they felt that the PHC providers should refer critical cases to an Ob/Gyn to determine whether aspirin should be prescribed. A majority of the respondents (n=40) had no idea about this international guideline or whether there is a government policy on use of aspirin as prophylaxis for managing PE/E during ANC. Four respondents who have some knowledge on using aspirin as prophylaxis mentioned that this needs to be incorporated into the government policy. Two policy makers from Directorate General of Family Planning clearly mentioned that there is no policy on use of aspirin prophylaxis for high risk pregnant women.

“Nothing has been discussed in the National Technical Committee meeting at Directorate General of Family Planning. As a program manager, I need to know and analyze well and finally discuss in the NTC meeting. Approval from NTC is needed and Eclampsia Technical Committee approval is also needed.”

Deputy Program Manager, DGFP

Improving the referral system

The interviewees were divided on the question of a functioning referral system. About half (n=28) of them thought that the existing referral system is weak and needs to be strengthened while the remaining respondents (n=22) believe that the referral system is functioning. Though even those who think that the current system functions, they perceived a need for further strengthening of the referral system.

It should be noted, however, that very few of the respondents have a proper understanding of the referral process for obstetric emergencies from the community to a specific facility where emergency obstetric care is available, and then back home with provision of follow up care. Some of the important measures suggested for improving referral pathways include training, supervision and monitoring of service providers, vehicle arrangement, use of referral slips, raising community awareness, financial incentives to the service providers through demand-side financing, financial support to the pregnant women, and using mobile technology. One informant opined that:

“It is the era of mobile. You just have to pick it up. Certainly you need to have the number. You will just call and tell them that I am referring a patient, please attend her and these are the problems. It is not a big thing. In other countries we observe that this type of referral system is working and lives of many people are being saved.”

Medical Officer, DGHS

Another informant suggested:

“The referral system needs to be established in a way that they refer to a functional and effective place. Not to a UHC, where there is nothing...they could refer to the DH instead of UHC. In that case they need to have a linkage. FWVs need to have a linkage with district, upazila, or general hospital. They need a written list of mobile numbers of the referral facilities. Patients will return after treatment from the facility where they were referred. Since you referred them, therefore they need to come back to you for follow up. Otherwise, there is no document whether they have gone. Or more follow up might be needed. Those follow up services can be provided by the one who referred. Again, she needs to return back there. Or definitely, there should be a tracking system.”

Donor Representative

One policy maker stated:

“Yes, there are many barriers in the referral system. In the health system, the entry point and exit point for a patient are not fixed. For the common cold, patients are going to Dhaka Medical College Hospital as well as to Community Clinics. Then, how will the referral system work? Sending the patient with only a referral slip is not a true referral. It is not followed appropriately. We need to discuss the issue of the referral system at national level. Health system researchers will manage it.”

Deputy Director, DGFP

STAKEHOLDER SURVEY FINDINGS IN BANGLADESH

As part of the landscape analysis, researchers designed and distributed an online survey to key international and national organizations to assess the breadth and depth of MNH programs, key funders of MNH projects, and the primary topic areas each program is targeting. Eighteen responses were captured.

Current maternal and newborn health projects

The most frequently reported focuses of current MNH programs are ANC (n=16), FP (14), PNC (14), newborn care (13), PE/E (13), quality of care (13), EmOC (11), maternal mortality death reviews (10), and postpartum hemorrhage (PPH) (9). These MNH programs are throughout the country, with more efforts concentrated in the districts of Sylhet (n=10), Chittagong (6), Dhaka (6), Habigonj (6), Khulna (6), Barisal (5), and Cox's Bazar (5).

The online survey revealed MNH projects implemented at all health system levels, with most organizations reporting working at multiple levels: with 11 at the community level, 10 at district level, 10 at UH&FWCs or rural dispensaries, nine at UHCs providing *Comprehensive* Emergency Obstetric and Neonatal Care (CEmONC), and six at UHCs providing *Basic* EmONC at community clinics. These projects reported that their work has the most influence for advocacy (n=14), policy (11), and service delivery (7).

Current funders

The most often reported funding organizations were the Government of Bangladesh, Dhaka South City Corporation, and Urban Primary Health Care Services Delivery Project. International donors include USAID, the Bill and Melinda Gates Foundation (BMGF) and Department for International Development (DFID), Canadian International Development Agency (CIDA), UNICEF, UNFPA, Japan International Cooperation Agency (JICA), AusAID, Swedish International Development Cooperation Agency (SIDA), WHO, and GlaxoSmithKline.

NATIONAL STAKEHOLDERS VIEWS

In collaboration with Directorate General of Family Planning (DGFP), MoHFW and OGSB, Population Council organized a National Stakeholders' Meeting on November 4, 2015 to disseminate findings of the Landscape Analysis and gather recommendations for scaling up PE/E intervention. The meeting was attended by a large number of stakeholders and partners, representatives of MoH&FW, USAID, other donors, including national and district MoH&FW managers in Dhaka. The specific objectives of the meeting were to:

- Share the findings of the Landscaping Analysis,
- Share community experiences of other stakeholders on PE/E programs;
- Inform and sensitize the four district managers; and
- Hear other organizations' PE/E experiences in their communities and PHC facilities (Save the Children, LAMB-Community Health & Development Program, and CARE Bangladesh).

During the discussion session challenges and gaps were identified by the participants and recommendations suggested for implementation.

Gaps and challenges identified

- Poor ANC coverage due to lack of community awareness;
- Poor and low identification of PE/E by PHC service providers (nurses, FWVs, SACMO, midwives, paramedics) during ANC consultations due to lack of knowledge, skills, confidence, logistical support, training, and reluctance by service providers;
- Poor availability of necessary supplies (BP machine, test tubes, dipsticks, MgSO₄, calcium gluconate, etc.) at PHC centers and unreliable supply of MgSO₄ within government system;
- Non-availability of single loading dose MgSO₄ (IM injection);
- Low use of MgSO₄ due to lack of detection of PE/E;
- Service providers and program managers are unaware of government policy on loading dose of MgSO₄ by PHC service providers;
- Gaps for PE/E prevention and management at the secondary level; and
- Poor and non-functional referral system.

Recommendations

Policy

- Ensure strong technical and supportive supervision of PHC service providers;
- Work with pharmaceutical companies for production of an ampoule of MgSO₄ for an intramuscular loading dose;
- Circulate government policy documents and standard operation procedure (SOP) for PE/E management to all related stakeholders and service providers;

Health system

- Provide hands-on quality training to PHC providers with a standard duration for building confidence and skills to detect, manage, and refer women with PE/E;
- Ensure quality ANC consultation and provide mentorship from an experienced providers in districts and sub-districts;
- Ensure availability of calcium gluconate at public facilities;
- Review and revise the training curricula for nurses, FWVs, midwives, and other paramedics;
- Identify specific referral facilities in each area and support readiness of those facilities and let people know where it is located.

Community

- Improve community awareness by enlisting public representatives, religious leaders, Imams, and priests;
- Use of information communication technologies (ICT) and behavior change communication (BCC) materials to raise awareness.

Health system

Secondary and PHC facilities are included in this study. To assess the capacity of the facilities and service providers to provide PE/E services, researchers used various methods: observation of client and provider interactions, ANC exit client interviews, facility inventories, and service provider interviews, with different categories of providers working in ANC, maternal and labor wards, or PHC center. This section reports on findings from the facilities and service providers, particularly those that are required for PE/E service provision including: required infrastructure for providing MNH services, facility capacity to perform certain activities for PE/E services, MNH logistics, ANC, PNC and delivery service provision, PE/E service provision, and service providers' knowledge, attitudes, and practices. The operational definitions which are used for the study purposes are presented in Box 2.

BOX 2: Definitions

Chronic hypertension in pregnancy is defined as BP recording of $\geq 160/100$ mmHg during pregnancy with no proteinuria and not resolving postpartum.

Pre-eclampsia is the development of hypertension ($\geq 140/90$) and significant proteinuria for the first time after 20 weeks of gestation of a woman who previously had normal blood pressure.

- **Hypertension is defined as blood pressure (BP) measurement of ≥ 140 mmHg systolic and/or BP of ≥ 90 mmHg diastolic (either one) measured on two consecutive occasions four hours apart.**
- **Significant proteinuria is defined as protein of 0.3g in 24 hours collection of urine, or a urine protein estimation that is $\geq 2++$ using dipsticks.**

Severe pre-eclampsia is:

- a) **Diastolic blood pressure is ≥ 110 mmHg and/or systolic ≥ 160 mmHg after two measurements, four hours apart + albumin in urine;**

OR

- b) **Diastolic blood pressure is 90-109 mmHg or systolic ≥ 160 mmHg after two measurements four hours apart + albumin in urine + severe headache, and/or blurred vision, and/or pain in upper abdomen.**

SPE is associated with symptoms and clinical manifestations such as severe headache, changes in vision (including temporary loss of vision/blurred vision, light sensitivity, seeing spots), upper abdominal pain (usually under ribs on the right side, nausea/vomiting, dizziness, and decreased urine output.

Eclampsia is defined as pregnancy induced high blood pressure ($140/90$ mmHg or greater), excess protein in urine (Albuminuria) and convulsions after 20 weeks of pregnancy with the absence of any neurological cause of a woman who previously had normal blood pressure.

GUIDELINES AND PROTOCOL FOR PE/E DIAGNOSIS AND MANAGEMENT

Available written guidelines or protocol for diagnosing and managing PE/E are pre-requisites for successful treatment women with PE/E. Respondents were asked about the existence of any written guidelines or protocols for diagnosing and managing PE/E and administering MgSO₄. Table 4 shows that all DHs reported availability of guidelines or protocols but only 50 percent of MCWCs and 36 percent of UHCs have the same. As expected, no H&FWC have any guidelines or protocols for diagnosing and managing PE/E available. We found a similar situation concerning guidelines or protocol on the administration of MgSO₄; no written guidelines or protocol was found in any of the centers.

TABLE 4 Availability of guidelines and protocols for diagnosis and management

Availability of guidelines or protocol	Type of Facility (number)				Total
	DH	MCWC	UHC	H&FWC	
Protocols or guidelines for diagnosing PE	4	2	4	0	10
Protocols or guidelines for managing PE	4	2	4	0	10
Protocols or guidelines for diagnosing eclampsia	4	2	4	0	10
Protocols or guidelines for managing eclampsia	4	2	4	0	10
Protocol or guidelines for administering MgSO ₄	4	1	2	0	7
N	4	4	11	115	134

INFRASTRUCTURE AND LOGISTICS

Availability and function of infrastructure and logistics

Facility inventories in each of the 134 centers in four districts assessed the center for provision of MNH services. Inventory exploration included availability of various registers for MNH service information; availability and functionality of the facility structure for MNH services; facilities for ANC, delivery and PNC services; availability and use of PE/E commodities and logistics and existence of referral mechanisms.

All secondary facilities (DH, MCWC and UHC) have registers for documenting ANC, PNC, delivery referral, admission, and operating theater information; they do not, however, have death registers. PHC centers (UH&FWC) do not have MNH registers, they only have ANC and/or referral registers. Only 22 percent of UH&FWCs have maternity admission registers and 20 percent have maternal death registers (Table 5).

Facility availability and function for providing MNH services is mixed. While most secondary facilities have functional facilities for clean water supply, 24 hour power, adequate lighting, functional autoclave or sterilization instruments, infection prevention buckets, chlorine solution, functional delivery beds, and postnatal wards with beds and operating theater, PHC facilities lack essential infrastructure and supplies for quality MNH services: Only 59 percent of UH&FWCs have facilities for clean water supply and 39 percent have 24 hour power (Table 5).

Primary Health Care facilities (H&FWCs) lack essential infrastructure and supplies to provide MNH services.

TABLE 5 Distribution of facilities by availability and functionality of MNH indicators

Availability of MNH registers	Type of Facility (%)				Total
	DH	MCWC	UHC	H&FWC	
ANC and referrals register	100	100	100	100	100
Delivery register	100	100	100	93	94
PNC register	100	100	91	95	95
Maternity admission register	100	100	100	22	33
Operating theatre register	100	100	100	32	42
Maternal deaths register	100	50	82	20	28
Availability and functionality of facility structure for MNH services					
Clean water supply for 24 hours	100	100	100	59	65
24 hour power supply	75	100	91	39	46
Adequate lighting	100	100	100	51	58
Functional autoclave/sterilization instruments	100	100	91	65	69
Infection prevention buckets	100	100	100	90	92
Chlorine solution for processing equipment	100	100	91	80	82
Functioning delivery bed	100	100	100	78	81
Postnatal ward with beds	100	100	100	0	14
Operation theater	100	100	100	32	42
N	4	4	11	115	134

ANC, delivery, and PNC service provision

A number of questions were asked and checked to assess the service provision for ANC, delivery, and PNC. Findings suggest that all facilities, including PHC facilities, provide ANC, delivery and PNC services. However, the number of staff working at the ANC or delivery unit varies significantly between PHC and secondary facilities. The H&FWCs run with one or two staff while secondary facilities have two or more staff. While all of the secondary facilities admit patients for delivery only 18 out of 115 (16%) H&FWCs do the same. Almost all of the secondary facilities serve four or more ANC clients per day, while about 50 percent of the H&FWCs serve fewer clients daily.

Pre-eclampsia and eclampsia service provision

Informants from all facilities were asked if any women presented with PE/E during ANC, delivery, or post-natally, and how many they had seen within the previous six months (Table 6, page 23). Providers from all of the secondary facilities reported detecting pre-eclampsia clients during ANC service provision, 64 percent of UHCs reported doing so, and 30 percent of UH&FWCs (30%) detect PE patients during ANC service provision. Detection and admission during labor or postnatal period is low.

TABLE 6 Pre-eclampsia and eclampsia service provision

Pre-eclampsia and eclampsia	Response	Type of Facility (number)				Total
		DH	MCWC	UHC	H&FWC	
Saw client with PE during ANC visit	Yes	4	4	7	34	49
N		4	4	11	115	134
No. of PE patients seen in the last six months	None	0	1	1	10	12
	1 - 2	0	0	2	19	21
	>2	4	3	4	5	16
N		4	4	7	34	49
Saw clients with eclampsia during ANC visit	Yes	3	1	4	5	13
N		4	4	11	115	134
No. of clients seen in the last six months	1	1	1	1	4	7
	>1	2	0	3	1	6
N		3	1	4	5	13
Admitted PE patients in the labor ward	Yes	4	1	5	0	10
N		4	4	11	115	134
No. of PE patients admitted in the last six months	Up to 5	2	0	4	-	6
	>5	2	1	1	-	4
N		4	1	5		10
Admitted eclampsia patients in the labor ward	Yes	2	1	1	0	4
N		4	4	11	115	134
No. of eclampsia patients admitted in the last six months	13	1	1	1	-	3
	>3	1	0	0	-	1
N		2	1	1	-	4
Saw PE patients in the facility during PNC visit	Yes	3	1	1	9	14
N		4	4	11	115	134
PE patients seen in the last six months	1	0	1	0	8	9
	>1	3	0	1	1	5
N		3	1	1	9	14
Saw eclampsia patients in facility during PNC visit	Yes	4	0	0	1	5
N		4	4	11	115	134
Eclampsia patients seen in the last six months	1	3	0	0	1	4
	>1	1	-	-	0	1
N		4	-	-	1	5

Availability of PE/E equipment and commodities, and their uses

It is essential that certain equipment and commodities needed to provide PE/E services are available at the facilities. Table 7 shows that there is a lack of essential equipment and commodities in all H&FWCs as well as some of the secondary facilities. MgSO₄ is found in only in four secondary facilities and none of the H&FWCs. Calcium gluconate for managing MgSO₄ toxicity is found in only one secondary facility and no PHCs (Table 7, page 25).

Only four of 20 secondary facilities reported use of MgSO₄ regularly while another seven reported use of MgSO₄ occasionally. It is important to note that three out of four MCWCs (75%) and five out of 11 UHCs (45%) (secondary facilities) never used MgSO₄ at the facility. Those who use MgSO₄ mentioned using various concentrations of MgSO₄.

Some said 20% solution, some said four percent water/volume (w/v), some said 50% solution, and some informants could not name the concentration they used. Those who use MgSO₄ use both intramuscular (IM) and intravenous (IV) routes.

MgSO₄ is found in only in four secondary facilities and no PHCs. Calcium gluconate for managing MgSO₄ toxicity is found in only one secondary facility and no PHCs.

How facilities obtain MgSO₄

Out of 11 facilities that use MgSO₄, six facilities (55%) either get it from central level as a regular supply or purchase it from local market and the remaining five facilities (45%) reported that clients purchase it from the market when there is a need (Table 7).

Prescribing anti-hypertensive drugs

Out of 286 service providers interviewed, almost 50 percent prescribe antihypertensive drugs (Table 7). Further analysis suggest that about 82 percent of physicians prescribe antihypertensive drug, as they are allowed to, and 41 percent of other service providers prescribe antihypertensive dugs, although they are not allowed to prescribe them.

TABLE 7 Availability of functional PE/E equipment and commodities, and use

Equipment and commodities	Type of Facility (number)				Total
	DH	MCWC	UHC	H&FWC	
Stethoscope	4	4	11	101	120
Sphygmomanometer	4	4	11	95	114
Clean container/test tube for urine test	4	2	10	28	44
Patella hammer	3	3	8	20	34
MgSO ₄	1	1	2	0	4
Calcium gluconate	0	1	0	0	1
Use of MgSO ₄ to treat PE/E					
Magnesium sulphate is always used	1	1	2	0	4
Magnesium sulphate is sometimes used	3	0	4	0	7
Magnesium sulphate is never used	0	3	5	115	123
N	4	4	11	115	134
Concentration of MgSO ₄ used					
20% solution	0	0	2	0	2
4% w/v (Nalepsin)	1	1	2	0	4
50% solution	2	0	0	0	2
Do not know	1	0	2	0	3
Route use for administration					
IV	0	1	3	-	4
IM	4	0	0	-	4
Both	0	0	3	-	3
Supply of MgSO ₄					
Regular supply from central level	1	0	3	0	4
Local purchase	1	1	0	0	2
Client purchases it from the market	2	0	3	0	5
N	4	1	6	-	11
Prescribe antihypertensive drug					
Yes	12	12	46	84	135
No	4	0	22	106	151
N	16	12	68	190	286

Facility capacity for parental routes, caesarian section, blood transfusion, and neonatal resuscitation (EmONC)

Certain skills are essential for PE/E patient management. Informants from facilities were asked if their service providers had the necessary skills for providing Emergency Obstetric and Neonatal Care (EmONC), which include the capacity to administer parental antibiotics, oxytocin, and anticonvulsants, make blood transfusions, perform caesarian sections and neonatal resuscitation, and whether or not they had occurred in the last three months. Findings suggest that not all these elements are available in all secondary facilities and many did not occur in the last three months. PHC service providers have the lowest capacity for treating PE/E patients. Service providers from two out of four DHs, two out of four MCWCs, three out of 11 UHCs, and one out of 115 UH&FWCs have the capacity to administer intravenous MgSO₄, and all of them have done so in the last three months.

Availability of regular and emergency response materials for PE/E services

All facility informants were asked to report if they have certain regular and emergency response materials in the facility particularly related to the provision of PE/E services. Almost all secondary facilities reported having all regular and emergency response materials. PHCs, however, are not designed to provide emergency care, though some of these facilities have the materials in variable quantities and the availability is very low. Only 13 centers have 20 milliliter syringes, no facilities had 6mg betamethasone/dexamethasone for premature respiratory distress syndrome (PRDS) and 15 PHCs had none of the regular and emergency response materials. Interestingly, 61 percent and 86 percent of PHCs had Misoprostol for PPH prevention and neonatal resuscitation kits for neonatal resuscitation, respectively (Table 8).

TABLE 8 Facility materials for regular and emergency responses

Regular and emergency response materials	Type of Facility (number)				Total
	DH	MCWC	UHC	FWC	
Regular materials					
Self-retaining catheter	4	4	9	8	25
Urine bag	4	4	11	4	23
20 milliliter syringe	1	4	5	3	13
Xylocaine/LA	3	4	11	16	34
Normal saline(IV)	3	4	10	41	58
IV equipment	4	4	11	20	39
Syringes and needles	4	4	11	92	111
Saline Stand	4	4	11	53	72
Don't have anything	0	0	0	15	15
Emergency response materials					
Oxygen and adult masks	4	4	11	0	19
6 mg Betamethasone/dexamethasone	0	0	0	0	0
Misoprostol	3	4	10	70	87
Neonatal resuscitation kit	4	4	11	99	118
Ambulance	4	4	11	0	19
N	4	4	11	115	134

SERVICE PROVIDERS' KNOWLEDGE, ATTITUDES, PRACTICES

Two-hundred eighty-nine (289) service providers from 134 facilities were interviewed face-to-face to assess their knowledge, attitudes and practices regarding maternal health; particularly PE/E. Among the service providers, 79 were doctors (including those who were working in the MCH Unit) and 210 were other service providers (nurse, FWV, SACMO, MA).

Service provider awareness of PE/E policy and protocol for community level MgSO₄ loading dose

Service providers are mostly unaware of the policy on PE/E. As expected, they are also not aware about the protocol or guidelines for administering the loading dose of MgSO₄ to prevent and manage PE/E within the community. Only about 27 percent of doctors and three percent of other service providers were aware of any guidelines on the use of prophylactic drugs for PE/E prevention.

Service provider knowledge and practice for PE prevention

Researchers assessed health care providers' knowledge of proven P/E risk factors, including history of hypertension, diabetes, bad obstetrics, extreme maternal age (<18 or ≥ 30 years), and others. Only 1.87 percent of providers observed (n=268) in secondary and PHC facilities looked for PE risk factors during ANC consultations, while four percent advised women of symptoms for impending eclampsia, and eight percent of secondary facility providers and one percent from PHC facilities described pre-eclampsia detection. The following definitions were used to measure provider awareness for the prevention of eclampsia:

Assessing the risk of PE: Asked about client's age, number of current pregnancy (gravida), measured weight, checked edema, history of hypertension and history of diabetes.

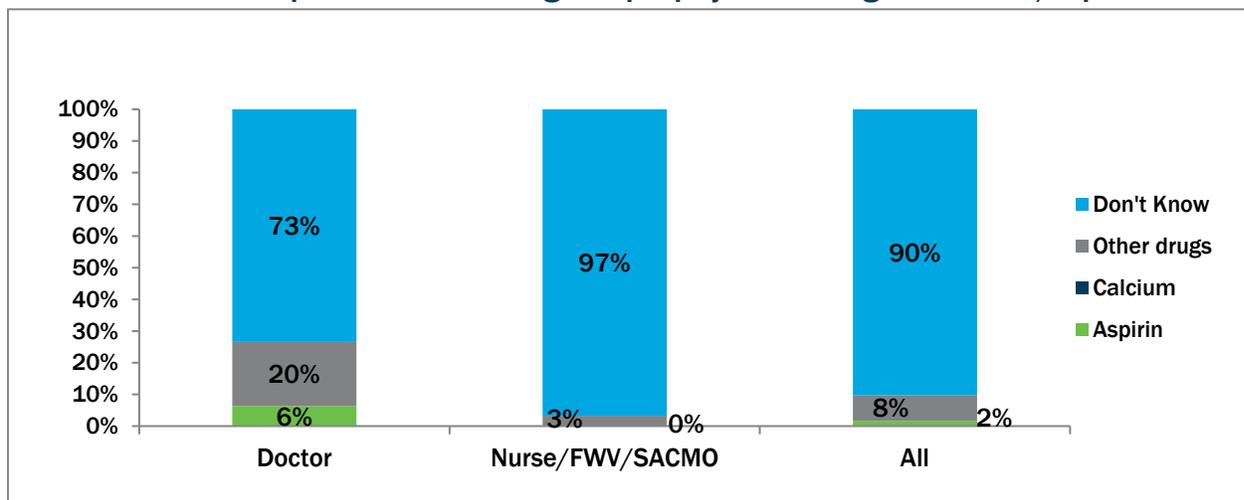
Detecting PE: Measured client's blood pressure and tested urine for protein/albumin.

Advising on the symptoms of impending eclampsia: High blood pressure, generalized edema, proteinuria, severe headache, blurring of vision and upper abdominal pain.

Service provider knowledge of drug use for PE prevention

Precursors to PE/E can be identified and managed to prevent escalation. Researchers investigated service provider knowledge on prophylactic drugs such as calcium supplements or low dose aspirin and found only six percent of doctors and no other service providers aware of the use of aspirin or calcium supplements for prevention of pre-eclampsia (Figure 2).

FIGURE 2 Service provider knowledge of prophylactic drug use for PE/E prevention



No providers interviewed mentioned calcium supplements as a prophylaxis. About 20% doctors and 3% other service providers mentioned other drugs as prophylaxis or said that they did not know, which indicates confusion around preventive drugs. These providers mentioned Amlodipine, Methyldopa, Nifedipine (BP lowering drugs) and Phenobarbitone as prophylactic drugs to prevent PE/E in pregnancy.

Table 9 presents the use and relationship of aspirin prophylaxis and anti-hypertensive drugs with other variables. Doctors and providers in secondary facilities were significantly more likely to associate the use of aspirin prophylaxis among pregnant women at risk of developing PE. Duration of experience in the same unit and previous training on maternal health, family planning (FP), or child health have no effect on whether a provider would give aspirin prophylaxis for high risk women.

TABLE 9: Use and relationship of aspirin prophylaxis and anti-hypertensive drugs with other variables

Independent variable	Use aspirin among women who are at risk of developing PE		Use anti-hypertensive drugs with pregnant women who have high BP		N=289
	% Correct response	p-value	% Correct response	p-value	N
Type of provider					
Doctors	25.32	0.000	82.28	0.000	79
Other service providers	0.00		40.95		210
Type of facility					
Secondary	19.39	0.000	69.39	0.000	98
Primary	0.52		43.46		191
Duration work in current unit/ward (years)					
<=1 Years	11.43	0.490*	62.86	0.392	35
>1-5 years	6.38		48.94		47
>5 years	6.28		51.21		207
Any training on maternal health, FP or child health care					
Yes	4.86	0.169	48.61	0.217	144
No	8.97		55.86		145

*Fisher's exact test

Similar findings were also observed regarding use of anti-hypertensive drugs among pregnant women who have high blood pressure. Doctors and providers in secondary facilities ($p < 0.000$) and more years of experience ($p < 0.057$) are more likely to be associated with the use of anti-hypertensive drugs with pregnant women who have high blood pressure.

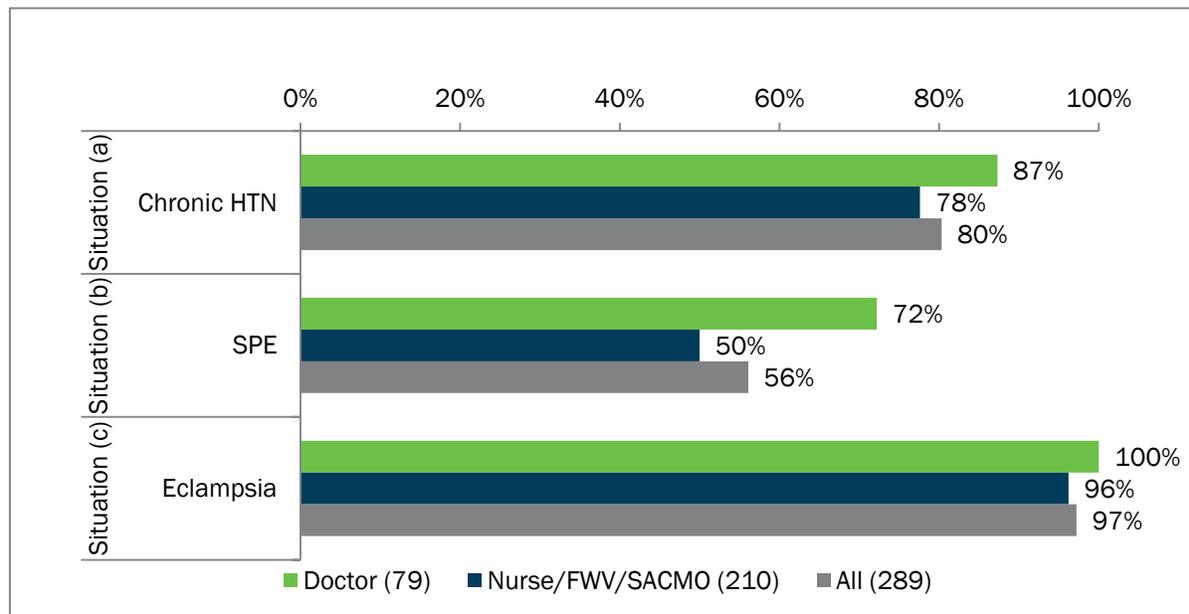
Service provider knowledge and capacity to detect hypertensive disorders in pregnancy

Eighty-four percent of doctors and 79 percent of other service providers were able to correctly define hypertension as systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg (either one), although 17 percent of doctors and 22 percent of the service providers are confused about the definition of hypertension.

In addition to the definition of hypertension, service providers' knowledge on hypertensive disorders in pregnancy was assessed by three hypothetical situations on hypertensive disorders in pregnancy. These three situations were presented to determine the best diagnosis that fits the situations. **Situation A** involved "A pregnant woman was seen in the antenatal clinic at 30 weeks gestation with blood pressure of 180/115mmHg and proteinuria 28

of 2++, what would be the diagnosis? **Situation B** involved “A pregnant woman was seen in the antenatal clinic at 12 weeks of gestation with blood pressure 160/100mmHg with no proteinuria, what would be the diagnosis?” **Situation C** involved “A pregnant woman was found to have developed hypertension and significant proteinuria at 30 weeks of gestation. 1 week later, her partner brought her to the clinic with complaints of convulsion, what would be the diagnosis?” The service provider’s correct knowledge on diagnosis is presented in Figure 3.

FIGURE 3 Correct responses from service providers on hypothetical questions about hypertensive disorders



All service providers were requested to identify signs and symptoms of pre-eclampsia, severe pre-eclampsia and eclampsia. Researchers found that doctors had good knowledge and other service providers had reasonably good knowledge on the signs/symptoms of PE, severe PE and eclampsia. Findings suggest that while both doctors and other cadres mentioned a number of important signs/symptoms of PE, severe PE and eclampsia, they also mentioned some less important and un-important signs/symptoms. For example, for pre-eclampsia they mentioned weight gain and bleeding.

Table 10 describes service provider knowledge and ability to detect and classify hypertensive disorders in pregnancy (provided three hypothetical situations **Situation A**, **Situation B**, **Situation C**) were analyzed against the same independent variables above. Table 10 (page 30) shows that there is no direct correlation between correct clinical diagnosis of chronic hypertension in pregnancy and eclampsia with type of provider, type of facility, duration of work in the same unit or ward and received any training on maternal health, FP, or child health care. However, correct diagnosis of severe PE was significantly associated with type of provider ($p < 0.004$) and type of facility ($p < 0.000$) but no association with duration of work or any training received.

TABLE 10 Provider knowledge and ability to detect hypertensive disorders in pregnancy

Independent variable	Chronic hypertension in pregnancy		Severe Pre-eclampsia		Eclampsia		N=289
	% Correct response	p-value	% Correct response	p-value	% Correct response	p-value	n
Type of provider							
Doctors	87.34	0.240	72.15	0.004	100.0	0.377	79
Other service providers	77.62		50.00		96.19		210
Type of facility							
Secondary	81.63	0.615	74.49	0.000	100.0	0.239	98
Primary	79.52		46.60		95.81		191
Duration of work in the current unit/ward (years)							
<=1 Years	82.86	0.144	62.86	0.398	97.14	0.270	35
>1-5 years	82.98		57.45		97.87		47
>5 years	79.23		54.59		97.10		207
Any training on maternal health, FP or child health care							
Yes	79.17	0.120	53.47	0.532	97.92	0.423	144
No	81.38		58.62		96.55		145

Knowledge and practices of service providers to manage PE/SPE/E

Service providers must have the knowledge and skills for appropriate PE/E management. They must know what anti-hypertensive drugs should be used and when to initiate (at what blood pressure). They should also know what anticonvulsants to administer, such as MgSO₄, and how (and how to monitor, identify and administer calcium gluconate for any MgSO₄ toxicity) if required. In this study, researchers asked service providers about commonly used anti-hypertensive drug for managing mild to moderate hypertension, and severe hypertension in pregnancy. It was also explored at what levels of blood pressure these drugs should be administered.

The recommended first choice of drug is Labetalol. Methyldopa or Nifedipine is the second choice of drug for mild to moderate hypertension in pregnancy⁶. Hydralazine (a peripheral arterial vasodilator) is the drug of choice for severe hypertension in pregnancy⁸. As Labetalol is not widely available in Bangladesh and expensive, Nifedipine and Methyldopa are often the drugs of choice. Only about 77% doctors and 19% other service providers mentioned Methyldopa or Nifedipine as the drugs of choice for managing mild to moderate hypertension in pregnancy. For severe hypertension, only 9% doctors and none of the other service providers can mentioned Hydralazine as the drug of choice.

Anti-hypertensives should be initiated for controlling mild to moderate blood pressure at a level of $\geq 150/100$ mmHg in pregnancy⁸. The use of a vasodilator to lower blood pressure rapidly to a safer level (<110mmHg) is also recommended⁸. Table 11 (page 31) shows poor provider knowledge for introducing anti-hypertensives in pregnant women with hypertensive disorders. Only 53 percent of doctors and 39 percent of other service providers correctly knew when anti-hypertensive drugs should be initiated ($\geq 140/90$ to $159/109$).

⁶ UK National Institute for Health and Care Excellence, 2011.

For severe hypertension, only 19 percent of doctors and nine percent of other service providers correctly knew when Hydralazine should be initiated ($\geq 160/110$).

There is no correlation between the type of facility and which providers know when to start anti-hypertensives. Knowledge gaps persisted across providers at primary and secondary facilities.

TABLE 11 Service provider knowledge on when to initiate anti-hypertensive drugs for mild to moderate and severe hypertension in pregnancy

Independent variable	Mild to moderate hypertension		Severe hypertension		N=289 n
	% Correct response	p-value	% Correct response	p-value	
Type of provider					
Doctors	53.16	0.025	13.92	0.177	79
Other service providers	38.57		8.57		210
Type of facility					
Secondary	53.06	0.010	12.24	0.370	98
Primary	37.17		8.90		191
Years working in present unit/ward					
≤ 1 Years	57.14	0.145	8.57	0.816*	35
>1-5 years	44.68		12.77		47
>5 years	39.61		9.66		207
Any training on maternal health, FP or child health care					
Yes	38.89	0.208	7.64	0.177	144
No	46.21		12.41		145

*Fisher's exact test

Service provider knowledge, attitudes and practice on MgSO₄

Controlling impending convulsions in cases of severe PE, and convulsions from eclampsia, with anticonvulsants is a life-saving intervention for both mothers and babies. Evidence recommends MgSO₄ as the 'gold standard' for preventing and treating severe PE/E convulsions. Administering MgSO₄ intramuscularly (Pritchard regimen⁷) is preferred and is the most utilized regimen, whereby 14 grams of MgSO₄ is administered as a loading dose, followed by five grams intramuscularly into alternate buttocks, every four hours, for maintenance.

Service providers were asked to explicate the loading dose of MgSO₄ (Pritchard regimen) and maintenance dose of MgSO₄. Findings suggest that only 35 percent of doctors and one percent of other service providers correctly knew the loading of MgSO₄ to be administered, and only 36 percent of doctors and one percent of other service providers correctly knew the maintenance dose of MgSO₄ (Table 12, page 32).

Table 12 shows that doctors providers working in secondary facilities and providers with longer experience are significantly more likely to know the total Pritchard regimen (loading dose and maintenance doses of MgSO₄). Previous exposure to any MCH training has no association with either of these two indicators.

⁷ The alternative regimen is the Zuspan regimen whereby MgSO₄ is administered intravenously at a given rate using infusion pump. Because infusion pumps are generally not available in most developing countries, Bangladesh adopted the Pritchard regimen for all of levels of health care except primary health care center.

TABLE 12 Service provider knowledge of total loading and maintenance doses of MgSO₄ and their associations

Independent variable	What is the total loading dose of MgSO ₄ ?		What is the maintenance dose of MgSO ₄ in PE/E for intramuscular injection?		n
	% Correct response	p-value	% Correct response	p-value	
Type of provider					
Doctors	35.44	0.000*	36.17	0.000*	79
Others service providers	1.43		0.48		210
Type of facility					
Secondary	27.55	0.000*	28.57	0.000*	98
Primary	2.09		1.05		191
Duration of work at the same unit/ward					
<=1 Years	31.43	0.000*	28.57	0.000*	35
>1-5 years	17.02		19.15		47
>5 years	5.80		5.31		207
Received any training on maternal health, FP or child health care					
Yes	6.25	0.037	6.94	0.162	144
No	15.17		13.79		145

*Fisher's exact test

Although rare, toxicity of MgSO₄ may occur. Calcium gluconate is the antidote for MgSO₄ toxicity. All service providers were asked if they knew of any drug used to treat MgSO₄ toxicity. Only 30 percent of doctors and less than one percent of other providers knew that calcium gluconate is the antidote for MgSO₄ toxicity.

The toxicity of MgSO₄ may manifest as depressed respiratory rate, loss of tendon reflex, or decreased urine output, either in isolation or in any combination of all three. Only 48 percent of doctors and one percent of other service providers knew at least one sign or symptom of toxicity, while only 18 percent of doctors and one percent of other service providers knew all three signs or symptoms to monitor MgSO₄ toxicity (Figure 4).

FIGURE 4 Service provider knowledge of monitoring MgSO₄ toxicity

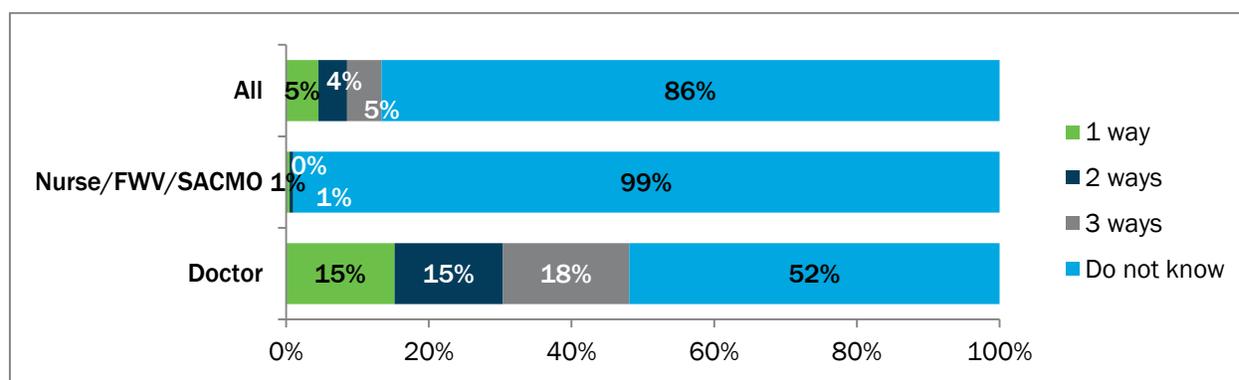


Table 13 shows that doctors, providers working in secondary facilities, providers with more experience in the same unit, and previous exposure to any training on MCH training are significantly more likely to know how to monitor and treat MgSO₄ toxicity. About four fifths of doctors, however, did not know how to monitor for toxicity, and about two thirds of the doctors did not know what drug is used to treat MgSO₄ toxicity.

TABLE 13 Service provider knowledge on monitoring for MgSO₄ toxicity

Independent variable	Ways to monitor for MgSO ₄ toxicity		What drug treats MgSO ₄ toxicity?		N=289 n
	% Correct response	p-value	% Correct response	p-value	
Type of provider					
Doctor	17.72	0.000*	30.38	0.000*	79
Other service provider	0.00		0.48		210
Type of facility					
Secondary	14.29	0.000*	24.49	0.000*	98
Primary	0.00		0.52		191
Years working in present unit/ward					
<=1 Years	8.57	0.000*	14.29	0.340	35
>1-5 years	4.26		10.64		47
>5 years	1.46		7.25		207
Any training on maternal health/FP/child health care					
Yes	2.08	0.013*	6.94	0.304	144
No	7.59		10.34		145

*Fisher's exact test

Service provider practice for MgSO₄

We asked service providers about their current practices regarding use of MgSO₄, supply of MgSO₄, availability of MgSO₄ at the facility, alternative drug use to control seizures, and barriers to MgSO₄ use. Only 37 percent of doctors and four percent of other service providers reported currently using MgSO₄. Those who are using MgSO₄ mentioned supply conditions of MgSO₄. Thirty-three percent of providers (31% of doctors and 38% of other service providers) reported sufficient supply, five percent overall reported inadequate supply (7% of doctors and none of the other service providers), and the remaining 62 percent of providers reported none.

All service providers were asked to report whether MgSO₄ is currently available at the facility. Only 11 percent of all service providers (33% of doctors and 3% of other service providers) reported availability of MgSO₄ at the facility. The reasons for non-availability include no supply (59%), no training (15%), not allowed to administer the drug (10%), and 23 percent of providers reported that they do not know why it is not available.

About 39 percent of doctors and four percent of other service providers reported use of alternative drugs for controlling convulsions with PE/E patients. Service providers use a number of alternative drugs instead of MgSO₄ to control seizures in PE/E patients. Among those who reported using alternative drugs, 58 percent of doctors and 63 percent of other service providers reported using an appropriate (though less safe and effective) alternative like diazepam to control convulsions in PE/E patients. Sixty-seven percent reported using anti-hypertensive drugs to control convulsions.

About 71 percent of doctors and 35 percent of other service providers mentioned some barriers to administering the loading dose of MgSO₄ to SPE/E patients at the PHC level. Those barriers were lack of training (65%), lack of knowledge of side effects (25%), lack of equipment or supply (18%), need for doctor supervision (13%), fear of community reaction if patient were to die after use of MgSO₄ (9%), and lack of proper monitoring (6%).

Service provider views on facility readiness for providing PE/E services

Service providers' responses helped assess facility readiness for providing PE/E services. Findings suggest that 94 percent of respondents from DHs, 50 percent from MCWCs, 77 percent from UHCs, and 10 percent from H&FWCs reported PE/E patients visit the facility. Researchers also asked service providers a number of related questions on facility readiness. Findings show that 81 percent of service providers from DHs reported that their facilities are ready with PE/E training and 50 percent of providers from MCWCs, 77 percent from UHCs and 10 percent from H&FWCs reported the same. Fifty-six percent of service providers from DHs, 33 percent from MCWCs, 63 percent from UHCs, and nine percent from H&FWCs stated that MgSO₄ is available at their facility.

Service provider practices with ANC clients

A total of 268 client and provider interactions (CPIs) were observed to assess the quality of service for clients. CPIs showed that service providers are capable of reasonably good service, except for providing BCC materials. These findings were not uniform for all facilities.

Researchers observed service providers' inquiries and history taking, performance, and discussion with clients. History taking seems weak among most providers in all facilities. Most providers inquire about the total number of pregnancies, date of last delivery, duration of gestation, and any current medication. When taking a client's medical history, providers rarely ask about any history of hypertension or previous history of signs or symptoms of PE/E, and history of other diseases.

Physical examination is not consistent among all service providers at all facilities. Although there were inconsistencies, most service providers checked weight, blood pressure, and edema, palpated the abdomen, checked for fetal movement, and listened to the fetal heart rate.

Discussion with clients was poor: Only a few providers from secondary facilities and approximately one third from H&FWCs discussed birth planning with clients. In addition, 10 out of 20 service providers from DHs, six out of 16 providers from MCWCs, 13 out of 22 providers from UHCs and 141 out of 210 providers from H&FWCs advised clients to return for a follow up visit in the event of any complications.

CLIENT EXPERIENCES

ANC exit client interviews after observations of CPIs assessed pregnant women's perceptions of their care quality, and understanding of their services. Analysis of 268 ANC responses shows that clients attending MCWCs and H&FWCs received more ANC service components than other types of health facilities.

TABLE 14 ANC services received on the day of visit

ANC service component	Types of Facility (n)				Total (268)
	DH (20)	MCWC (16)	UHC (22)	H&FWC (210)	
Measured weight	75%	75%	73%	86%	83%
Checked blood pressure	60%	94%	77%	82%	81%
Abdominal examination	25%	69%	77%	93%	85%
Checked for anemia	15%	50%	77%	79%	73%
Listened to baby's heartbeat	20%	56%	64%	52%	51%
Checked urine for protein and sugar	5%	0%	27%	6%	7%
Told about the progress of pregnancy	80%	94%	77%	83%	83%
Given chance to ask questions	80%	75%	86%	82%	82%
Told to return for another visit	90%	81%	100%	94%	94%

Table 15 shows composite responses to the questions about the eight ANC components that should be provided during ANC consultation. Only two percent of clients received all nine ANC components at their current visit (weight, blood pressure, abdominal examination, check for anemia, infant heartbeat, urine check for protein and sugar, discussion about progress of your pregnancy, and chance to ask questions).

Demographic characteristics (age, education, socio-economic status, religion) had no association with a client's likelihood for receiving all nine ANC components during the visit or receiving all six services listed earlier during any ANC visit.

TABLE 15 Required services and information during ANC consultation

Independent variable	Proportion of clients receiving all 8 ANC components during this visit			Proportion of clients receiving all 6 services listed above during any ANC visit	
	n	Yes (%)	p-value	Yes (%)	p-value
Age					
≤24	151	0.66	0.294*	5.96	0.394*
≥25	117	2.56		1.71	
Education					
None	21	0.00	0.339*	4.76	0.081*
Primary	78	3.85		0.00	
Secondary	136	0.74		5.88	
Higher	33	0.00		6.06	
Socio-economic Status					
Low	93	1.08	0.331*	3.23	0.265*
Middle	93	3.23		2.15	
High	82	0.00		7.32	
Religion					
Muslim	246	1.22	0.292*	3.66	0.225
Hindu	22	4.55		9.09	
Total	268	1.49		4.10	

*Fisher's exact test

ANC client knowledge on danger signs during pregnancy

The exit interviews showed that ANC clients have very poor knowledge of the danger signs during pregnancy. Only about one sixth to one fourth of clients had some knowledge on aspects of danger signs. Client knowledge on PE/E is particularly poor—only four percent mentioned high blood pressure and 13 percent reported convulsions as danger signs during pregnancy—indicating the need for strengthening educational efforts.

Perception of quality of care at this ANC visit

Clients interviewed received care during this visit from FWVs (84%), doctors (12%), nurses (10%), while less than 10 percent received services from a SACMO, CSBA, or MA. At a DH, MCWC, or UHC primarily doctors, nurses, or FWVs provided services, while at H&FWCs services were provided mainly by FWVs, SACMOs, CSBAs, or MAs.

To assess ANC clients' perceptions and satisfaction with their current visit, researchers asked about their waits for services, time spent with providers, and satisfaction with their services. Satisfaction was indirectly measured by asking if they would recommend that center to a friend for ANC care. Table 16 (page 36) shows that most ANC clients thought the waiting time and time spent with service provider reasonable. Most ANC clients were satisfied with their services, and 92 percent would recommend that service center to friends for ANC.

TABLE 16 Waits, time with providers, satisfaction

		Type of Facility (n)				Total (268)
		DH (20)	MCWC (16)	UHC (22)	H&FWC (210)	
Waiting before being seen by the service provider (minutes)	<15	50%	44%	54%	63%	60%
	15-29	30%	6%	27%	24%	23%
	>29	20%	50%	18%	13%	16%
Perception of waiting time	Too long	25%	44%	18%	14%	17%
	Reasonable	65%	31%	68%	58%	58%
	Too short	10%	25%	14%	28%	25%
Time spent with the health care provider (minutes)	<6	15%	6%	9%	12%	12%
	6-10	20%	12%	36%	43%	39%
	11-15	25%	31%	39%	20%	22%
	16-30	40%	25%	23%	23%	24%
	>30	0%	25%	0%	2%	3%
Perception about time spent with the service provider	Too long	10%	19%	0%	4%	5%
	Reasonable	45%	50%	82%	67%	65%
	Too short	45%	31%	18%	29%	29%
Quality of services you received today	Satisfied	70%	56%	77%	57%	60%
	Somewhat satisfied	10%	37%	18%	39%	35%
	Not satisfied at all	20%	6%	4%	3%	5%
Would recommend a friend to come to this facility for ANC	Yes	85%	75%	95%	94%	92%
	No	15%	25%	4%	6%	8%

Community perceptions, beliefs and experiences

Community perspectives of pre-eclampsia and eclampsia were sought in male and female focus group discussions (FGDs) and in-depth interviews (IDIs) with PE/E survivors for assessing community PE/E awareness, beliefs, and experiences, and the strategies for seeking care.

Despite some similarities, major disparities of perceptions and beliefs exist among female and male informants about the serious problems women suffer during and after delivery. Most female participants reported excessive bleeding, convulsion, anemia, abdominal pain, physical weakness, malnutrition, retained placenta, ruptured uterus, and fetal presentation other than head as the most serious problems during pregnancy and immediately after childbirth. Most male informants reported anemia, physical weakness, leucorrhea (discharge), loss of appetite, headache, edema, retained placenta, and bleeding from the vagina as the most serious problems during pregnancy and immediately after childbirth. Almost all informants, regardless of district, mentioned anemia, edema, physical weakness, retained placenta, and vaginal bleeding as the most serious problems or complications women suffer during pregnancy and immediately after childbirth.

When asked to list three major problems or complications during or after delivery, the most common responses from female informants were physical weakness, breech presentation, and bleeding before and after delivery. The most common responses from male participants were physical weakness, retained placenta, and vaginal bleeding. Informants consider pregnancy and its related problems to be natural and believe they heal over time. In addition, men consider these complications a woman's problem:

"The mothers of our community think these are general problems during pregnancy and delivery and they also passed through these. So, they don't give much importance on the problems, rather suggest some spiritual and common sense remedies."

Female, FGD

On the other hand, one male informant said:

"These are women's problems during pregnancy and after delivery. My mother also passed through these. So, I don't want to interfere with women's problems and step in. My mother and grandmother might be the right persons to decide."

Male, FGD

Health seeking behaviors for pregnancy problems or complications follow a pattern. Most men and women stated that at first the mother-in-law or husband takes the pregnant women to the Imam or *kobiraj*, a traditional or spiritual healer, and then to a village doctor. If the condition does not improve, they take her to a hospital. They believe "holy water," herbs, exorcism, and charmed amulets can improve conditions. If a pregnant woman has a convulsion, community people believe she was caught by "the evil eye."

"My husband intends to take [me] to the hospital but mothers-in-law said that the nowadays daughters and daughters-in-law don't have faith in Allah. They think that when they gave birth they did not go to the doctor or hospital, so they don't want to take them to the hospital. But, they take the women to the doctor when it is too late and mother and child condition become serious."

Female, FGD

The influence of mothers-in-law and husbands, financial solvency, perceptions about poor quality of care at hospitals, and lack of transportation negatively affect the health seeking behaviors of women suffering from PE/E. Mothers-in-law or husbands make the decision to go a hospital. Most men and women mentioned that women do not seek care at facilities because of lack of money, lack of transportation, distance to hospital, lack of proper care at a hospital, lack of qualified doctors, and their mothers-in-laws' strictures. Both pregnant women and their husbands prefer to go to a health facility if a woman suffers from high blood pressure or convulsions. Economically solvent couples attend private clinics, and those who cannot afford them go to "kabiraj" (traditional or spiritual healers) or the village doctor.

"We go to the village doctors or Kabiraj [traditional or spiritual healers] seeking health services because of finances and lack of good treatment in the government hospital. There is no good doctor in our hospital."

Female, FGD

Suggestions from both male and female FGD informants on improving the care of pregnant women with PE/E include regular health worker visits in communities, meeting with husbands and wives together, and meeting with mothers-in-law or older people, sessions with qualified doctors in the community for pregnant women, and regular ANC check ups, among others.

EXPERIENCES OF ECLAMPSIA SURVIVORS

To assess the knowledge, attitudes, views, and experiences of eclampsia and pre-eclampsia among survivors of the condition, 22 survivors were interviewed about their antenatal care including their PE/E education and screening, the accessibility of essential services and commodities, and their strategies for care during their PE/E episodes. Informants, who had successfully delivered a child and were in stable condition, were purposively selected at a tertiary care hospital, following the hospital's ethical procedures. Sixteen questions were posed.

Socio-demographic characteristics

Survivors were mostly 18 to 20 years old (n=13), between 21 to 25 (n=7), with only one 35 years old. Half (11) reported becoming pregnant between 18 and 20 years of age, while five became pregnant when they were younger than 18. About one third were illiterate, while the remaining two thirds had some education, either primary (n=4) or secondary or higher (19). About two thirds of informants (14) had one child, and the remaining eight had more than one.

Availability of health facilities in communities

Half (11) of the informants reported only needing 10 to 20 minutes to reach the nearest facility, while half required 30 minutes to an hour. Due to perceived unavailability of doctors and other commodities at public hospitals, most informants preferred services from private facilities, which are both nearby and perceived to have available staffs.

Antenatal care quality

The quality of ANC care reported by eclampsia survivors was inconsistent at best. Although 15 survivors received ANC, only 11 had their blood pressures measured. Four survivors reported normal blood pressure, while four had elevated readings. Urine tests were done in only four cases. Most respondents reported that their service providers advised them to eat nutritious food, prescribed medicines (calcium and iron), and advised them to rest and work less.

Health seeking behaviors

Many health problems in pregnant women can be prevented, detected, and treated during ANC visits with trained health workers. WHO recommends a minimum of four ANC visits, with tetanus toxoid vaccination, infection screening and treatment, and identification of warning signs. Among the 22 survivors, four informants received only one ANC check up at 32 weeks of gestation, four survivors received two to three ANC check ups, and seven survivors had five or more ANC check ups during their most recent pregnancy. Six survivors did not receive any ANC during their pregnancy, did not hear about it, or believed that pregnancy is normal and natural and ignored ANC check ups. Most remaining survivors went to clinics between eight and 12 weeks of gestation to confirm their pregnancy. Among six of the survivors, four had a sonogram to determine the infant's sex. Three reported visiting the doctor because of complications such as convulsions, bleeding, and chest pain followed by convulsions. Almost all those who attended ANC reported that service providers did not give them any information on possible pregnancy problems or danger signs, and did not explain the significance of high blood pressure during pregnancy.

Problems prior to convulsions

Most eclampsia survivors said they did not notice any serious health problems, or they ignored them prior to their convulsions. Some survivors reported tolerable headaches, blurred vision, edema, and high blood pressure before their convulsions. Some survivors had convulsions at home before delivery.

Knowledge of high blood pressure and convulsions during pregnancy

Most survivors reported that they did not know about the significance of high blood pressure and convulsions. They had never heard about these danger signs, nor others related to pregnancy.

Strategies for seeking care

Despite problems of high blood pressure, women stay at home in the hope the problem is not serious, or they visit their village doctors, Imams, and traditional or spiritual healers. After they start convulsing, relatives rush women to a hospital for treatment. All survivors reported that, after seeing them, their initial service providers referred them to another hospital. No providers retain PE/E patients at their hospital, and skip emergency management. This situation is true for all PHC, and most secondary and private clinics, because of providers' fear of expected poor outcomes and relatives' reactions. This moving of eclamptic women from one hospital to another results in long delays (10 to 20 hours) before finally reaching a tertiary hospital, where, sometimes, it is too late to initiate the required intervention.

CASE STUDY

We interviewed a 19 year old housewife, who had gone to school through the ninth grade, married when she was 18 years old, and had her first baby by caesarian section. She lives in a district town of Tangail, with her in-laws. There are several hospitals near her house. It takes 20 minutes to reach the nearest government or district hospital, but it takes only 10 minutes to reach the nearest clinic. She conceived within three months of her marriage and attended the Janata clinic for her first check up and sonogram at eight months of gestation. A female doctor checked her blood pressure and gave her a blood test. Her blood pressure was low, and the doctor suggested a nutritious diet and monthly check up; she also told her not to worry and suggested normal delivery. She had had swollen legs in her seventh month of pregnancy and headaches, but the doctor didn't say anything about it.

Her convulsions started at midnight before delivery, and she was immediately taken to the district hospital. She received an injection to reduce the convulsions, but her condition did not improve. As it was a Friday, the doctor was not available. She was then referred to Mirzapur Kumudini Hospital (a private hospital) for better treatment, but there was no doctor available, as it was a Friday. One female nurse suggested her family to take her to Dhaka Medical College Hospital (DMCH), but she was taken to another clinic in Tangail, as DMCH was too far from their home. The Tangail clinic sent her home. Her condition did not improve, and she was taken to DMCH by ambulance and had a caesarian section. At the time of the interview, she was slowly recovering and the baby was in an incubator. She wishes that doctors would be available 24 hours at the hospital near her home.

Discussion

This cross sectional study identifies the policy and program activities, gaps, and challenges for PE/E prevention and treatment as well as the MgSO₄ loading dose regimen in Bangladesh. It also analyzes the gaps and challenges faced by providers and facilities, and their capacities for preventing, detecting, and managing PE/E, to assess community PE/E awareness, beliefs, and experiences, including eclampsia survivors, to determine the barriers to care and priority areas for research and programs for improving access to PE/E prevention and management.

POLICY

National policies for maternal health and a Standard Operating Procedure (SOP) encompass prevention and management of PE/E, but no discrete policies exist for PE/E. Bangladesh's SOPs enable only doctors and nurses to administer MgSO₄ to women with PE/E, and at secondary and tertiary levels. Nurses, however, can only administer it following doctors' advice or prescription. Task sharing with PHC providers (FWVs and SACMOs) to administer an intramuscular loading dose of MgSO₄ before referral has recently been approved, based on the evidence of studies by OGSB and Population Council as well as Save the Children, both in 2015. This approval has not been widely disseminated, however, evinced by the lack of awareness and confusion about it observed among most study participants. One major gap results from the fact that national policies are not adequately communicated to the district level and their facilities.

Doctors, policy makers, and program managers expressed similar opinions on the policy for anti-hypertensive drugs. Lower level cadres are not allowed to prescribe anti-hypertensives in Bangladesh, but many do prescribe them. Without a policy for PHC providers' legal administration of anti-hypertensives to pregnant women, they are not properly trained about which drugs can and cannot be given during pregnancy. Primary providers inappropriately prescribe anti-hypertensive drugs that indicate their inability to classify and determine the severities of hypertensive disorders in pregnancy. Similar findings were also observed for some doctors. In Bangladesh anti-hypertensive drugs for mild to moderate hypertension (Methyldopa and Nifedipine) as well as severe hypertension (hydralazine) are cheap and easily available, but Labetalol is expensive and not easily accessible; Hydralazine is an intravenous drug PHC providers are not allowed to administer. Knowledge gaps have also been observed among providers about when to initiate which drugs. Future interventions targeting health providers should include training on the selection of anti-hypertensives for pregnant women with varying degrees of PE/E.

Few policy makers or providers were aware of aspirin prophylaxis for pregnant at high risk of PE/E. In fact, there is no policy on use of aspirin as prophylaxis in such cases. PHC providers in Bangladesh are not allowed to prescribe aspirin; in reality they do recommend it for other ailments. Most policy makers, program managers, and providers are apparently unaware of aspirin's prophylactic use PE/E, which is a clear gap in provider knowledge. No service providers mentioned calcium as a PE/E prophylaxis, possibly because calcium is regularly supplied to facilities for pregnant women as a standard "supplement," not as prophylaxis for PE/E. Obstetricians have reservations about sharing responsibilities for aspirin prophylaxis with PHC providers; they suggested that PHC providers should instead refer those cases to doctors. Obstetricians apparently want to keep those cases under their expert supervision, suggesting PHC providers prescribe calcium for PE/E prevention.

Policy makers and program managers should ensure that facilities are supported with the necessary guidelines, job aids, and BCC materials, which are lacking in most facilities, to help their PE/E management and improve their overall quality of care. Providers at all levels are not reliably taking antenatal clients' medical histories, especially in relation to PE/E. Managers should focus their efforts on improving provider antenatal care performance, with particular attention to medical history aspects related to PE/E.

HEALTH SYSTEM

All facilities surveyed provide antenatal, delivery, and postnatal services. While services for preventing and managing PE/E exist in secondary and tertiary facilities, PHC centers lack essential commodities and equipment for PE/E services. Many facilities, particularly PHCs, lack materials necessary for emergency response. Many secondary facilities do not provide their expected levels of PE/E services due to lack of trained and skilled providers, no MgSO₄ in stock (DGFP never supplied MgSO₄ to its facilities), or other essential equipment. In some facilities, MgSO₄ remains underutilized due to lack of PE/E patients. Although MCWCs (secondary facilities), conduct normal and caesarian deliveries, they do not appear to always stock MgSO₄ and are obliged to refer PE/E women to district hospitals. DGHS supplies MgSO₄, calcium gluconate, and anti-hypertensives (Losartan potassium, Atenolol, Amlodipine, Methyldopa) to its facilities, but calcium gluconate is rarely found in secondary facilities, and in reality, few have any of those drugs in stock. When required, upazila or DGFP district managers can purchase a drug from the local market, or patients are advised to purchase it from the pharmacy or market. PHC centers see few women with PE/E, with PE/E patients at secondary facilities even lower. Communities' lack of confidence in PHC and secondary facilities leads to delays in seeking care until the condition becomes serious and they are forced to rush to tertiary facilities.

Doctors' knowledge of the signs and symptoms of eclampsia's various manifestations is satisfactory, and reasonably good among other cadres. Despite demonstrating high levels of knowledge, however, service providers are not routinely screening for PE/E and miss opportunities to identify and effectively manage cases. A number of doctors and other cadres, particularly at the PHC level, are confused about the signs and symptoms and reported insignificant signs and symptoms, indicating that their future training should include PE/SPE/E in detail.

Evidence supports the recommendation of MgSO₄ as the best strategy for preventing and treating convulsions in severe PE/E. While it is imperative that service providers know which drugs should be used for effective management, only one third of doctors know MgSO₄'s loading and maintenance doses. Oladapo et al. reports, that due to poor provider knowledge, *"It is not surprising that these pregnancy complications account for more maternal deaths than any other causes, including postpartum hemorrhage"* (2015). While service providers should be adequately trained to administer MgSO₄ at the right time and with the proper doses, they also need to know the warning signs for MgSO₄ toxicity and the proven antidote, calcium gluconate. Currently, this knowledge is lacking.

As expected, only about one third of doctors currently use MgSO₄ and report its availability at their facilities. The reasons for its lack of availability are numerous: insufficient supplies, lack training, not allowed to prescribe it, and uncertainty about its indications. When there is no supply, purchasing MgSO₄ from a market is the only reliable option for service providers, however, they—incorrectly—see Diazepam or Phenobarbitone as alternative options. Many providers use inappropriate drugs as alternatives when MgSO₄ is unavailable, which strongly indicates that providers need more training. Many service providers reported their lack of training, lack of knowledge of side effects, lack of equipment and supplies, need for doctor supervision, fear of community reaction if a patient dies after being given MgSO₄, and lack of monitoring as barriers to administering a loading dose of MgSO₄.

Facility documentation is poor in almost all facilities. Many essential elements are missing from registration, patient histories, diagnosis, and treatment. To draw conclusions from service statistics, disease profiles, client presentations and demographics, service providers must take detailed histories that are properly documented in the prescribed forms. These gaps only can be improved by regular supervision and monitoring.

COMMUNITY

Most clients were satisfied with their services, although many essential elements were missing from their care. Clients' reported satisfaction could be due to low expectations or societal norms to say "good" to everything.

Another possible reason could be their low levels of education and lack of awareness of their rights and the availability of services.

Over the last three decades the status of women has improved for various aspects: social, economic and empowerment. A vast majority of women, however, are still dependent upon the decisions of their mothers-in-law and husbands about seeking health care outside of the home and visiting health care providers (BMMS 2010, BDHS 2014). Study findings suggest that mothers-in-law and husbands consult with Imams, kobiraj or traditional or spiritual healers, or village doctors for problems during pregnancy. Pregnant women are taken to health facilities only when a problem becomes truly serious. Other factors negatively affecting health seeking behaviors for PE/E patients include lack of money, lack of transportation, distance to hospitals, lack of proper attention and care at hospitals, lack of qualified doctors, and restrictions from mothers-in-law (Population Council 2015).

Many beliefs and misconceptions about pregnancy exist in communities; often, pregnant women cannot go outside, eat certain foods, or are required to eat other foods, and many women are not allowed to take modern medicine during pregnancy. Community members and pregnant women lack awareness and knowledge of pre-eclampsia and eclampsia danger signs, particularly high blood pressure. Many pregnant women are not even informed about danger signs during their antenatal care visits. Convulsions during pregnancy are a life-threatening problem, but many community members consider it a “problem of evil eyes.” Policy makers and program managers must understand the significance of these factors so they can make greater efforts to educate community members through various mechanisms including regular health worker visits to communities, meetings with husbands and wives together, and meetings with mothers-in-law or older people, as part of a whole community mobilization effort.

An unclear picture about referrals and their relevant facilities prevails both among service providers and within communities. According to many pre-eclampsia survivors, they did not receive proper, timely, and adequate treatment at lower and secondary level facilities and were referred from one facility to another, in both the public and private systems.

Policy makers need to give urgent attention to determining why seriously ill eclamptic patients are being refused treatment by public secondary facilities and private clinics, and develop a strategy to improve the situation. Further exploration is needed to understand the depth of the problem.

Conclusions and recommendations

This section presents the gaps and challenges identified throughout this landscape analysis and draws conclusions from the various national and district studies examined. It also provides recommendations for the prevention and management of pre-eclampsia and eclampsia, and reduction of those gaps and challenges.

TABLE 17 Conclusions and recommendations

Identified Gaps and Conclusions	Recommendations
Policy	
<ul style="list-style-type: none"> • Policies for PE/E prevention and management exist within the broader maternal health strategy but many providers are unaware of the policies or don't place any importance on them. 	<ul style="list-style-type: none"> • Government PE/E policy and guidelines should be adequately communicated to all related stakeholders, program managers, and service providers.
<ul style="list-style-type: none"> • The policy environment is conducive for task sharing for PE/E prevention and management—to PHC providers with proper training and mentoring. 	<ul style="list-style-type: none"> • A policy document is required, for distribution throughout the health system, including PHC facilities.
<ul style="list-style-type: none"> • Clinical practices for PE/E prevention and management are established at the tertiary level, but variably at the secondary level. PHC level facilities do not have any PE/E protocols. 	<ul style="list-style-type: none"> • Policy should be set for secondary facilities' uniform clinical practice of PE/E prevention and management, and secondary providers should be trained according to it, as well as PHC providers.
<ul style="list-style-type: none"> • PHC providers are not allowed to provide aspirin or anti-hypertensive drugs for PE/E prevention and treatment. 	<ul style="list-style-type: none"> • Policy decision should commence on the introduction of aspirin and antihypertensive drug use by PHC providers.
<ul style="list-style-type: none"> • A user-friendly loading dose of MgSO₄ is not available, and the non-existence of a single loading dose of MgSO₄ (IM) is a barrier to proper and timely use. 	<ul style="list-style-type: none"> • Government policy and persuasion with pharmaceutical companies is necessary for production of single IM loading dose of MgSO₄.
Health system	
<i>Knowledge</i>	
<ul style="list-style-type: none"> • Service providers, including physicians, lack knowledge of MgSO₄, PE/E preventive drugs (aspirin and calcium), appropriate anti-hypertensive drugs, signs of MgSO₄ toxicity, calcium gluconate, and PE/E signs and symptoms. 	<ul style="list-style-type: none"> • All levels of service providers should be properly trained on broader MNH issues, particularly PE/E, to build their confidence and skills for its prevention, detection, management. Training should also include emergency management of premature births and referrals as well. • ANC consultation should be an opportunity to improve PE/E prevention, detection, management and referral through regular blood pressure measurement and urine testing.
<ul style="list-style-type: none"> • All PHC providers as well as other axillary staff lack knowledge and skills for PE/E detection, prevention, management. 	<ul style="list-style-type: none"> • Review and revise curricula for Nurses, midwives, FWVs, SACMOs and other paramedics.
<ul style="list-style-type: none"> • Secondary facility providers lack essential PE/E knowledge and skills. 	<ul style="list-style-type: none"> • Relevant service providers at secondary or referral facilities should be thoroughly training trained on PE/E prevention, detection, management. • PE/E management protocol should be available at all facilities.

Identified Gaps and Conclusions	Recommendations
<i>Practice</i>	
<ul style="list-style-type: none"> • Low use of MgSO₄ due to poor screening and detection leading to a low number of properly identified patients. 	<ul style="list-style-type: none"> • ANC, delivery, and PNC service providers should screen every patient for increased blood pressure and assess PE/E risk.
<ul style="list-style-type: none"> • Low detection of PE/E patients by PHC and secondary facility providers during ANC and PNC consultations due to service providers' lack of knowledge, skills, low confidences, poor logistical support, lack of accountability, and reluctance 	<ul style="list-style-type: none"> • Service provider capacity needs strengthening in regular refresher training, with competency-based training recommended. • A checklist can assess PE/E risk and initiate prophylactic treatment using calcium and aspirin. • PHC providers (FWVs and SACMOs) must be mentored by a referral provider.
<ul style="list-style-type: none"> • Low levels of detection of PE/E and high risk patients in communities and resultant low levels of referral 	<ul style="list-style-type: none"> • Field workers, supervisors, and program managers should be oriented on PE/E patient identification in the community and the importance of timely referral.
<ul style="list-style-type: none"> • Poor history taking 	<ul style="list-style-type: none"> • Supervisors should ensure service providers correctly and adequately take the client history.
<ul style="list-style-type: none"> • Inappropriate anti-hypertensive and anticonvulsant drugs 	<ul style="list-style-type: none"> • To reduce the unhealthy practice providers should be thoroughly trained on choice of anti-hypertensive drugs and anticonvulsant drugs.
<i>Training</i>	
<ul style="list-style-type: none"> • Service providers particularly, PHC providers, lack essential skills in administering MgSO₄, measuring blood pressure, testing urine albumin, assessing PE/E risk, and emergency management. 	<ul style="list-style-type: none"> • Competency-based training should be organized for all PHC service providers, with a refresher training after three months. • Provider training should include selection of anti-hypertensive drugs with varying degrees of PE/E.
<ul style="list-style-type: none"> • Lack of organized PE/E training 	<ul style="list-style-type: none"> • Cascade training on PE/E for all service providers is recommended. • A PE/E component should be incorporated in ongoing trainings. • Orientation of program managers and field workers is also recommended to ensure their understanding of the importance of PE/E prevention, detection, management.
<i>Service provision</i>	
<ul style="list-style-type: none"> • Many secondary facilities are not providing PE/E services instead refer to District Hospital. 	<ul style="list-style-type: none"> • All secondary facilities should provide PE/E services, as time and distance to another referral facility affects outcomes.
<ul style="list-style-type: none"> • NGOs are working on improving maternal health and their reach is wide, but most are not focusing their efforts on PE/E prevention and management. 	<ul style="list-style-type: none"> • All stakeholders should be involved in preventing and managing PE/E through a national network.
<ul style="list-style-type: none"> • PE/E patients seen during ANC, as well as PNC, at most facilities are referred to District Hospitals and medical colleges. 	<ul style="list-style-type: none"> • Decentralized service provision should be established, with appropriate training, with essential equipment and commodities at PHC facilities to improve PE/E outcomes resulting due to time and distance.

Identified Gaps and Conclusions	Recommendations
<ul style="list-style-type: none"> Lack of proper documentation of clients' details and differential diagnoses 	<ul style="list-style-type: none"> Strong technical and supportive supervision and monitoring of service providers to ensure proper documentation through immediate supervisors.
<ul style="list-style-type: none"> Many essential elements of documentation are missing from the registration, history taking, diagnosis and treatment. 	<ul style="list-style-type: none"> Ensure strong technical and supportive supervision and monitoring the of PHC service providers.
<ul style="list-style-type: none"> Lack of supervision, monitoring and review of performance. 	<ul style="list-style-type: none"> District managers should lead a monthly review of PE/E cases detected and referrals to ensure client follow up and recommendations for the initial service providers. Other supervisors should visit a facility each month for supervision and monitoring.
<i>Supplies and commodities</i>	
<ul style="list-style-type: none"> There is an irregular supply/lack of supply or no supply of MgSO₄, calcium, calcium gluconate, anti-hypertensive drugs, BP machines, test tubes, dipsticks, patella hammers at the PHC facilities as well as the referral facilities to prevent, detect and manage PE/E patients. 	<ul style="list-style-type: none"> MoHFW should ensure regular supply of all equipment and commodities at facilities to prevent, detect and manage PE/E patients, and monitor their availability periodically.
<ul style="list-style-type: none"> Anti-hypertensive drugs (Losartan potassium, Atenolol, Amlodipine, Methyldopa) are irregularly available through the public supply system only to the secondary level and above. 	<ul style="list-style-type: none"> Regular supply of these anti-hypertensive drugs should be made available in facilities.
<ul style="list-style-type: none"> Lack of emergency materials in the PHC centers and many secondary facilities. Program managers are unaware of shortages of essential equipment and commodities. 	<ul style="list-style-type: none"> Essential emergency materials need to be made available in all facilities. District program managers need to, and should, monitor them regularly.
<ul style="list-style-type: none"> Protocol/algorithm on PE/E detection and management for PHC providers is complex. 	<ul style="list-style-type: none"> Review and revise the PE/E protocol and algorithm.
<i>Referrals</i>	
<ul style="list-style-type: none"> The referral system is poor, and even non-functional, with no system for tracking or following up with PE/E clients. 	<ul style="list-style-type: none"> Strengthen referral system by identifying local facilities and assessing their readiness and ensuring lower level provider readiness to identify referral facilities in relation to their facilities.
<ul style="list-style-type: none"> SPE/E patients do not receive adequate treatment or any treatment at all in lower level facilities; they are referred from one facility to another until they finally end up at a tertiary facility or medical college, often when too late. 	<ul style="list-style-type: none"> MoHFW intervention is needed to ensure patients do not experience undue stress and logistical challenges and get appropriate treatment. The root causes of such problems need to be identified.
<i>Community</i>	
<ul style="list-style-type: none"> Lack of community awareness of the importance of regular ANC visits. 	<ul style="list-style-type: none"> Community awareness of ANC services as well as PE/E should be improved by using public representatives, religious leaders, imams, priests, local government, health workers, and ICT and BCC materials.
<ul style="list-style-type: none"> Misperceptions and misbeliefs about PE/E are prevalent in the community. 	<ul style="list-style-type: none"> Misperceptions and misbeliefs should be reduced through mass media as well as interpersonal communications.

Identified Gaps and Conclusions	Recommendations
<ul style="list-style-type: none"> Health seeking behaviors for pregnancy complications follow a pattern: First mothers-in-law or husbands take a pregnant woman for suggestions from the imam, traditional or spiritual healers; then they visit a village doctor; and finally they attend a secondary or tertiary facility when the complication becomes more serious. 	<ul style="list-style-type: none"> Community people should be aware about the signs, symptoms and dangers of PE/E and need of ANC and timely treatment of PE/E through mass media and interpersonal communication.
Further research	
<ul style="list-style-type: none"> Further implementation research is necessary for identifying programmatic problems and solutions for PE/E prevention, detection, and management. This landscape analysis raised some research questions that are important for examining to enrich our understanding of PE/E. 	<ul style="list-style-type: none"> Are PHC providers capable of identifying pregnant women at risk of developing PE/E and providing prophylactic aspirin? Will a simple tool assist PHC provider identification of pregnant women at risk of developing PE/E, for proper detection, management, referral? What happens to women sent to a referral facility with or without a loading dose of MgSO₄? What is the best approach for improving referral linkages? Will an ICT-based mentoring system for PHC service providers be feasible and effective? Does water salinity in coastal areas increase PE/E risk? Are PHC service providers capable of identifying hypertensive disorders in pregnancy and appropriately prescribing anti-hypertensive drugs? Do women think treatment is complete after a loading dose of MgSO₄? What happens to them at home? Why are seriously ill eclamptic or SPE patients being refused services by secondary facilities and private clinics, and how can we improve this situation?

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