mHealth Application for health promotion of pregnant women with preeclampsia

I. Problem statements: Hypertensive disorders in pregnancy are a leading cause of morbidity and mortality(1). The community-based health care providers in Bangladesh visits door-to-door for antenatal care and collect symptoms and perform clinical measurements. Sometimes the collected data are being recorded in manual registers hence the pregnant mothers can't get sufficient and necessary information when they suffer with several danger sings. A mHealth application as for the digital intervention can help to overcome these challenges.

II. Research question: How can a mHealth application help early detection of raised BP, improve quality of care, awareness among the clients and health workers, and reduce maternal mortality ratio?

III. Objectives

3.1 General Objectives
- To assess the quality of care, service improvement, awareness development, health education, and introducing digital platform for the pre-eclampsia during pregnancy among the two Upazila's in Bangladesh where one Upazila will be under the intervention group, and another will be the control group.

3.2 Specific Objectives
- To design and develop a mobile app and electronic platform to conduct pregnancy surveillance.
- To Capture door-to-door antenatal visits information.
- To provide essential services such as targeted client communication, voice call, live text chat, and telemedicine's.
- To develop referral system and providing support by overseeing an ambulance.
- To provide necessary training to the clients and health workers as well as awareness development among them.
- To focus on improving service quality and declining the maternal mortality ratio.

IV. Methods

4.1 Study design and Settings: We will conduct the study in two Upazila's where the mobile and web apps will be deployed as an intervention group and another Upazila's where there is no such digital platform. The community-based health care providers will use the mobile apps and sync data with the web applications for the tertiary level health managers during their regular antenatal visits to pregnant women. We are planning those 100 health workers will use this application to assess over 5,000 pregnant women throughout their pregnancies. The necessary training will be provided to both the health workers and clients so that service providers and receivers can use this application smoothly.

The synched data from the health workers mobile apps will be stored in a web platform and a clinical prediction model predicts adverse maternal outcomes occurring because of pre-eclampsia, based on

surveillance data including demographics, symptoms, clinical signs, and laboratory tests. This simplified prediction model will include parity, gestational age at presentation, systolic blood pressure, and the presence of the following symptoms: chest pain, shortness of breath, headache, visual disturbances, and vaginal bleeding with abdominal pain(2). A targeted client communication channel will send notifications automatically. A Phone Oximeter which is a smart phone application will be used to collect the real time data, live text messaging and voice call will be allowed when they encounter with the danger sign/sings. A decision support panel by the combination of Ambulance care, Blood bank will be helpful for managing ambulance instantly and refer to the nearest tertiary hospitals.

4.2 Sample size and target population: A total of 5000 individual patient information will be collected for this study from the intervention and control groups. The targeted population will be engaged from village and union levels.

4.3 Inclusion & Exclusion criteria: The willingly participated pregnant women who will have their smart phones will be included and no interested without smartphones will be excluded.

4.4 Data collection tools: Primarily the data will be collected from the proposed mobile application and then synched the collected data periodically in a web server. The data will be extracted from the web server as the Excel or CSV format.

4.5 Data management and statistical analysis: Data will be entered, cleaned, and analyzed using the statistical data analysis software Stata Version-16.0. We will prepare our dataset by dropping missing observations from outcome and exposures. We will change the variables to a meaningful name, categorize age to age-groups, and generate new variables for the outcomes. The sensitivity and specificity will be calculated from each group. … Julhas will extend

4.6 Quality control: We will emphasize the structure of database during it's design phase and it will be stored a secured server. Necessary validations will be set in the data forms. The data will be checked and verified by the senior health managers.

V. Intervention: Mobile and web application, Targeted Client Communication (TCC), Voice calls, Live text chatting facilities and Telemedicine's.

VI. Expected Outcome
- It will help to improve service quality, optimize time and cost.
- Targeted Client Communication will help to know the necessary information.
- Life saving treatment can be provided rapidly.
- It will help of pre-eclampsia adverse outcome prediction, monitoring and treatment.
- Data manager can analyze the data and take quick decisions.
- It will reduce the maternal mortality ratio and morbidity rate.

VII. Time frame

This research activities will be started from 15 August 2021 and ended until end of November 2021. The following action plan will be followed during the research activities:

Activities detail	15 Aug 2021	31 Aug 2021	15 Sep 2021	30 Sep 2021	15 Oct 2021	31 Oct 2021	15 Nov 2021	30 Nov 2021
Designing of the study	██							
Literature review		██						
Application development		██	██	██				
Implementation and data collection					██			
Data extraction, cleaning and importing in Stata software						██		
Data management and analysis							██	
Manuscript and report writing and review								██

References:

1.   N.Bekkera JFM va. den HTJHCAT. Early Detection and Intervention of Postpartum Preeclampsia With the Use of Mobile and Digital Tools [29E]. 2019; Available from: https://journals.lww.com/greenjournal/Abstract/2019/05001/Early_Detection_and_Intervention_of_Postpartum.202.aspx

2.   Dunsmuir DT, Payne BA, Cloete G, Petersen CL, Görges M, Lim J, et al. Development of mHealth applications for pre-eclampsia triage. IEEE J Biomed Heal Informatics. 2014;18(6):1857–64.