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Implementing Components of the PHC for PE/E Model in Pakistan: A Cost Analysis

INTRODUCTION

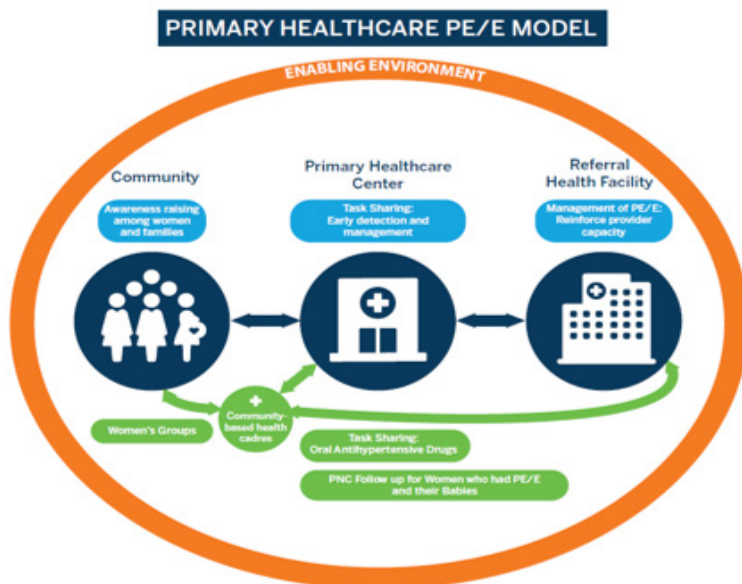
As of 2015, the maternal mortality rate in Pakistan is 178 per 100,000 live births [1]. Pre-eclampsia/Eclampsia (PE/E) is the third leading cause of maternal mortality in Pakistan. The 2006-2007 Pakistan Demographic and Health Survey reported that PE/E accounted for more than 12% of maternal deaths [2].

PE is a condition that can affect pregnant women and is characterized by high blood pressure and protein in urine after 20 weeks' gestation. Women with PE are at increased risk for organ damage or failure, pre-term birth, loss of pregnancy, and stroke. PE can progress to eclampsia, which is characterized by seizures, and may be associated with kidney and liver damage, as well as maternal death. Infant risks include pre-term birth, low birth weight, stillbirth and death, among others [2]. Infants born pre-term due to PE are at higher risk of long term health issues. The risks of PE/E can be mitigated with regular screening during antenatal care (ANC) as well as the postnatal period. Once detected, regular monitoring of PE can lessen progression to severe PE/E, and severe PE/E can be managed through administration of magnesium sulfate (MgSO₄) and antihypertensive drugs [2].

Between 2016 and 2018, the Population Council, in collaboration with the Provincial Health Department, Government of Sindh Pakistan, implemented an intervention to confront PE/E that was part of the Ending Eclampsia project, a five-year USAID investment that implemented aspects of the Primary Health Care (PHC) PE/E Model in Bangladesh, Nigeria, and Pakistan.

The PHC PE/E Model is comprised of five Components: (1) Task sharing to detect and manage PE/E with PHC providers; (2) Introducing antihypertensive drugs at the PHC-level; (3) ANC uptake at the community level; (4) Logistic Officer training; and (5) Health education messages. Each country implemented aspects of the PHC-model based on the country context and needs. The intervention in Pakistan comprised two Components of the PHC PE/E Model: Component 1: Task sharing to detect and manage PE/E (MgSO₄ and referral) with PHC providers (Community Midwives and private providers) and Component 3 Increase ANC uptake at the community level.

This brief describes the economic cost for implementing the two Components in Pakistan and includes a brief description of the activities within each Component. Full descriptions of the intervention can be found on the [Ending Eclampsia website](#).



Highlights

- **Component 1 Core task sharing with PHC providers:** 81 Community Midwives, private providers, and 10 referral site staff were trained and received monthly monitoring support for two years, for a total of USD 144,421 (PKR 20,185,776). The cost per provider was USD 1,783 (PKR 249,207). Actual cost per provider varied.
- **Component 3 Community engagement to increase ANC uptake:** 176 Lady Health Workers were trained to provide ANC services and information on PE/E to pregnant women. LHW and CMW from Component 1 held group ANC sessions in their community and LHW conducted home visits for a total of USD 75,867 (PKR 9,172,082). The average cost per provider was USD 286 (PKR 34,612).
- Estimates include costs of the project and opportunity costs to the Provincial Health Department, Government of Sindh and to participants. Approximately 31% of the total costs were covered by the government and people of Pakistan.



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COST ANALYSIS METHODOLOGY

The Ending Eclampsia Project in Pakistan collected retrospective cost data between May and August of 2019. A cost ingredient approach first identified each element (input) required to implement activities for Components 1 and 3 of the PHC PE/E Model and then grouped them into cost categories: a) personnel, b) supplies, c) infrastructure, d) travel, and e) miscellaneous. For the purposes of the cost analysis, the Technical Advisory Group (TAG) meetings were considered a separate activity because they were conducted jointly for both Components 1 and 3. The economic cost of each activity was calculated regardless of whether the project directly paid for the goods or services. For example, to account for the opportunity cost to Community Midwives (CMW) who participated in a training, their daily wage was calculated although they were not compensated by the project. Opportunity costs such as estimates for training venues and rooms donated in-kind by Provincial Health Department, Government of Sindh, and meeting spaces used for monitoring visits at health centers were also calculated and categorized under infrastructure. Activity costs and project management costs were also captured.

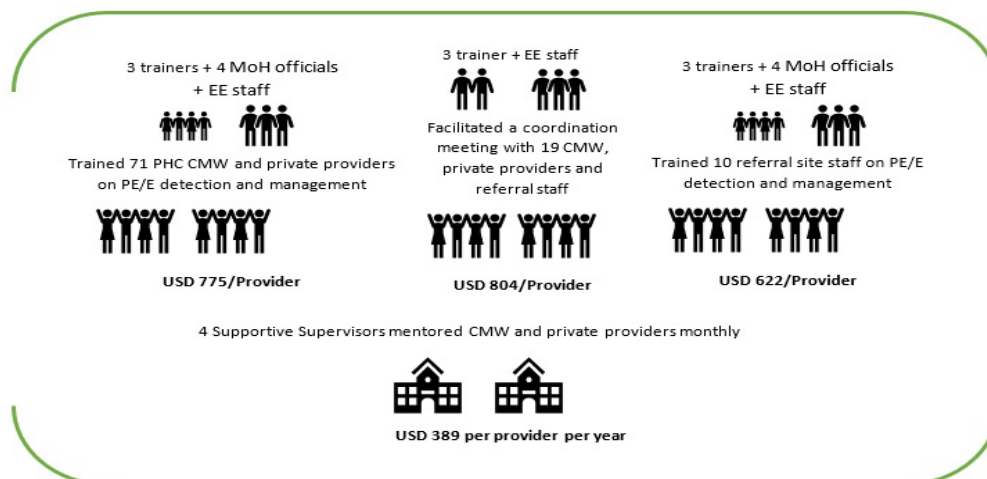
Cost data were collected from the Ending Eclampsia project's expenditure reports. When cost information was unavailable (such as daily rates), average estimates were used. Cost data were generally collected in Pakistan Rupees, in the year purchased, and then converted into 2018

TABLE 1: Cost of the core task sharing to PHC level component

| Ingredients | Total cost (PKR) | Total cost (USD) |
|-----------------|------------------|------------------|
| Personnel* | 14,789,926 | 105,816 |
| Supplies | 133,200 | 953 |
| Infrastructure* | 4,785,274 | 34,237 |
| Travel | 409,808 | 2,932 |
| Misc. | 67,568 | 483 |
| Total | 20,185,776 | 144,421 |

*Total includes overall program management estimates for the project.

FIGURE 1: Cost per participant for each activity under Component 1 Core task sharing to the PHC level



USD using the December 31, 2018 closing exchange rate of 139.8 Pakistan Rupee per 1 USD (XE Currency chart). Costs per participant were calculated for Components 1 and 3. The following section describes the economic costs for Components 1 and 3 and the TAG meetings.

COMPONENT: 1 CORE TASK SHARING WITH PHC PROVIDERS

Component 1 involves task sharing for the prevention, detection and management of PE/E at the PHC level using MgSO4. There were four main activities: 1) training CMW and private providers on the detection and management of PE/E; 2) a coordination meeting between providers in a district; 3) training referral site staff on managing PE/E; and 4) routine monitoring support to PHC providers.

Table 1 lists the costs of replicating Component 1, task sharing with PHC providers. The total cost was USD 144,421 (PKR 20,185,776), with personnel as the largest cost category, followed by infrastructure. Of the USD 105,816 in personnel costs, approximately USD 4,684 (4%) were in-kind from the Provincial Health Department, Government of Sindh. Of the USD 34,237 in infrastructure costs, USD 1,374 (approximately 4%) were also in-kind from the Provincial Health Department, Government of Sindh. Under Component 1, a total of 81 providers (71 CMW and private providers, and 10 referral site staff) were trained. Figure 1 shows the cost per provider. The average cost per provider was USD 1,783 (PKR 249,207) but the cost per provider varied by activity. The program management and trainer preparation costs were shared across activities. Before any activities were implemented, a trainers' orientation was led by Ending Eclampsia staff to orient the trainers on the training content for each cadre. Under Activity 1, training CMWs and private providers on the detection and management of PE/E, 71 providers were trained for an average of 775 USD (108,254 PKR) per provider. This included a one-day refresher training for 17 CMW who were identified by the Ending Eclampsia team as needing additional training and support.

In Activity 2, a coordination meeting was held to bring together 19 CMW and referral site staff to discuss how referral system can be strengthened. This was a one-day meeting led by Ending Eclampsia staff and three Master Trainers. The average cost per participant for the coordination meeting was 804 USD (112, 375 PKR). As a result of the coordination meeting, a one-day training was held for 10 referral site staff from two facilities on managing and detecting cases of PE/E (Activity 3). The average cost per provider was USD 622 (PKR 86,972).

To continually provide support to the providers trained to manage cases of PE/E, four supervisors were trained over three days to provide on-going mentorships to the CMWs and private providers trained to detect and manage PE/E in three sub districts of one district. Over the course of two years, each trained supervisor along with an Ending Eclampsia trainer conducting monitoring visits with 20 CMWs each at the local CMW school. The average cost per provider was 339 USD (PKR 54,330) per year for a total of USD 777 USD (PKR 108,660) over two years.

COMPONENT 3: ENCOURAGING ANC AT THE COMMUNITY LEVEL

The Ending Eclampsia project encouraged uptake of ANC services by working with Lady Health Workers (LHW) and CMWs to provide ANC services at the community level. Component 3 included three activities: 1) training LHW and Lady Health Supervisors (LHS) to provide ANC services to pregnant women in their community and educate women on signs of PE/E; 2) CMW-led group ANC and PNC sessions; and 3) LHW home visits to provide ANC services. Table 2 lists the total costs for implementing Component 3- Community engagement to increase ANC uptake- which was USD 75, 867 (PKR 9,172,082), with an average cost per provider of USD 286 (PKR 34,611). Of the USD 56,070 in personnel costs, USD 25,298 (45%) were donated in-kind, and USD 4,472 of the USD 14, 306 (31%) in infrastructure costs were in-kind from the Provincial Health Department, Government of Sindh. **Figure 2** shows the cost per

provider. In Activity 1, a total of 176 LHW participated in a 1-day training led by CMW from Component 1. The 176 LHW were trained over 5 training batches, with an average of 35 LHW per training, facilitated by 2 CMW per training. The cost per provider was USD 143 (PKR 20,042). CMW also facilitated group ANC sessions for pregnant women in the community (Activity 2). Over the 2 years of the project, CMWs organized 89 group ANC sessions, with approximately four women per group session. The average cost per group ANC sessions was USD 6 (PKR 824) and mostly consisted of CHW's time and program management costs. Finally, LHW trained under Activity 1 (Component 3) visited pregnant women monthly to provide ANC services and information on the signs of PE/E. On average, each LHW visits about 20 women over a span of four days each month. The average cost per LHW to conduct ANC home visits monthly was USD 103 (PKR 14,400) per provider per year.

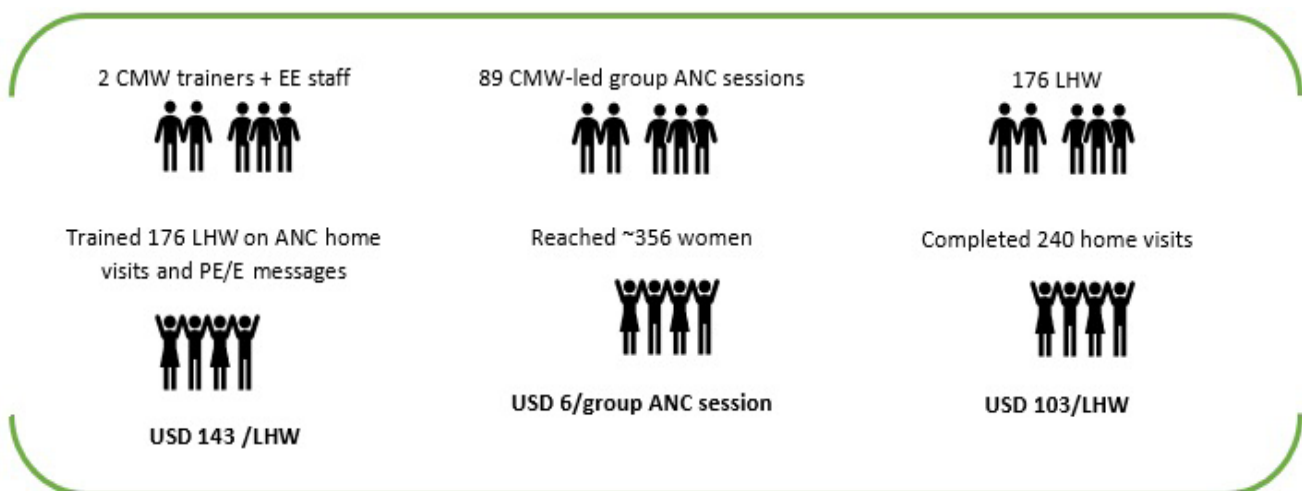
In addition to direct program activities, the Ending Eclampsia Project in Pakistan conducted multiple TAG meetings to raise awareness of PE/E, raise awareness of the project, and orient stakeholders and health workers who would be directly involved in the project's implementation. The total costs to conduct eight TAG (Technical Advisory Group) meetings over two years was USD 14,417 (PKR 2,015,000). Three TAG meetings were held at the provincial level and five were held at the district level. The purpose of the TAG meetings was to inform stakeholders about project activities and

TABLE 2: Cost of introducing antihypertensive drugs at PHC

| Ingredients | Total cost (PKR) | Total cost (USD) |
|-----------------|------------------|------------------|
| Personnel* | 6,405,036 | 56,070 |
| Supplies | 50,000 | 358 |
| Infrastructure* | 1,999,546 | 14,306 |
| Travel | 717,500 | 5,133 |
| Misc. | 0 | 0 |
| Total | 9,172,082 | 75,867 |

*Total includes overall program management estimates from the project.

FIGURE 2: Cost per participant and facility under Component 2 introducing antihypertensive at PHC



seek buy-in regarding key implementation decisions. The TAG meetings were also used to share study achievements, challenges and solutions to those implementation challenges. Suggestions and recommendations were sought by the stakeholders to carry forward project activities.

CONCLUSION

The economic cost to implement the Ending Eclampsia project activities with 257 providers was USD 234,705 (PKR 31,372,858). The total includes the costs for Components 1 and 3 and the TAG meetings. In all components, personnel was the largest cost category, totaling USD 161,885 (PKR 21,194,962), accounting for approximately 70% of the total costs. Personnel was the largest cost component because this was a human resource-based intervention.

Lessons from implementation of the PE/E PHC Model in Pakistan could lead to cost savings in future interventions. For example, the original CMW training was planned for five days but after a review of the first training batches and the curriculum, the project was able to reduce the training by one day while maintaining quality. For future programs, a four-day training is recommended. Other considerations for scale-up include staff retention. Of the 71 CMW trained, about 13 (18%) had moved or changed professions over a two-year period. Staff-turnover could increase the cost to maintain qualified staff able to manage PE/E and ways to retain staff should be explored.

The project directly paid for approximately USD 131,905 (PKR 18,436,362) or 81% of the personnel costs captured in this analysis and the other 19% were opportunity costs for participant and stakeholder participation in the project. The project believed that it was important to capture the participants' contributions to the project and therefore calculated opportunity costs, which accounted for approximately 19% of personnel cost, for their participation in the Ending Eclampsia program activities. For example, CMWs (private providers who do not receive a regular stipend from the Provincial Health Department for their work) were taken away from their posts and Provincial Health Department staff were unable to partake in other health interventions. The real opportunity costs to providers would vary depending upon on each individual's responsibility and years of experience. Average estimates were used for this analysis. We also considered estimates for space contributed by Provincial Health Department, Government of Sindh because those rooms were unavailable for use by others during Ending Eclampsia activities.

This project implemented Components of the PHC PE/E Model in a phased way, starting with Component 1 followed by Component 3. While the CHW trainings around administration of MgSO₄ and referral took place first, the introduction of the group ANC sessions commenced later. Only the TAG meetings were jointly implemented. Additional costs could be saved by implementing these two component models concurrently and combining certain activities.

To replicate this intervention in Pakistan or elsewhere, infrastructure and travel costs will vary, depending if an implementing organization or agency had already purchased large equipment and could share costs (e.g., vehicles and projectors) among other activities or would need to rent goods and services. Average rental costs were used for this analysis for a broader cost synopsis, although the cost to the project may have been lower.

Exploring ways to integrate the two components of the Ending Eclampsia Model within existing training systems should be explored to further reduce costs. This implementation cost analysis serves as a starting point for those considering implementation of different PHC PE/E Model components.

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