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## ORIGINAL ARTICLE

# POOR POSTNATAL HOME VISITS COMPROMISED THE IDENTIFICATION OF POSSIBLE SERIOUS BACTERIAL INFECTIONS IN YOUNG INFANTS (0-59 DAYS) FROM SOUTHERN TIGRAY, ETHIOPIA

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## ABSTRACT

***Introductions:*** *Postnatal period is neglected in Ethiopia and receives relatively little attention compared to the other components of the health extension program. Given that a large number of women and their newborns remain at home during and immediately after birth and strengthening postnatal follow up service is a key strategy.*

***Objective:*** *To assess how postnatal home visits influence the identification of young infants with possible serious bacterial infections in woredas in Southern Zone of Tigray, Ethiopia, an implementation research on community management of possible serious bacterial infections, where referral is not feasible.*

***Method:*** *We used data from implementation research on the management of sick young infants with PSBIs where referral was not feasible. Infants 0-59 days of age during the implementation period of the larger project were included. Data were collected by health extension workers and checked in the field by cluster supervisors, field coordinators, and research team members. Descriptive data analysis was used to describe the study participants and the postnatal care visits. Data analysis was carried out using Statistical Package for Social Sciences version 20 software.*

***Results****: The proportion of young infants visited at home compared to the expected postnatal home visits within the first 24 hours., 3 days and 7 days after delivery were 12.1%, 39.4% and 48.9% respectively, suggesting low postnatal care home visits in the study communities. A total of 2,336 out of an expected 4,914 live births (47.5%) were traced or identified in Raya Alamata Woreda and 4,860 out of an expected 8,564 live births (56.7%) were traced or identified in Raya Azebo woreda. Nearly 65% (n = 73) of newborns with clinically severe infections, 73% (n = 19) with critical illness, 8% (n = 13) with pneumonia and 82% (n = 587) with local bacterial infections were identified in the first seven days after birth. About 2.2% (n = 76) and 4.6% (n = 223) of young infants from Raya Alamata and Raya Azebo were identified as having PSBIs, respectively, which was lower than expected.*

***Conclusion:*** *Uptake of early postnatal care service was low. Health extension workers were unable to capture all live births, which resulted in low detection rates of possible serious bacterial infections in young infants. Reinforcing and strengthening the links between the health extension program, the community, and the midwives from the health facilities during the early postnatal days is recommended.*

***Key words****: Implementation Research, possible serious bacterial infections, Raya Azebo, Raya Alamata, Postnatal Care, Health Extension Workers, Ethiopia.*

## INTRODUCTION

The postnatal period, defined as the first six weeks after birth, is critical to the health and survival of newborns (1). The World Health Organization (WHO) recommends that postnatal checkups should start within the first day and continue on days 3 and 7 and six weeks after delivery so that complications can be identified and treated properly. Postnatal home visits are critical for the prevention and early identification of newborn health problems, including possible serious bacterial infections (PSBI).

The first week of life, particularly the first 24 hours, are crucial because most newborn deaths occur during these periods. Lack of care in the early days may result in death or disability as well as missed opportunities to promote healthy behaviors affecting newborns. During this visit, the health care provider or health extension worker should assess the newborn for any danger signs to identify and refer or treat them as early as possible (2). If routine postnatal care (PNC) services reach up to 90% of newborns, an estimated 10% to 27% of newborn deaths could be averted (3).

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The period soon after birth poses substantial health risks for the newborn, but PNC during the first week of life remains low in the developing world (4). PNC for young infants is likely to be better if given at a health facility, however, this is difficult in practice in low resource settings like Ethiopia. In Ethiopia, the postnatal follow up in the first two days after birth was lower in rural areas (12.6%) than in urban settings (5). Even for deliveries at a health institution, most mothers are discharged very quickly, and most do not return for follow-up visits in the next few days, mainly because of transport, costs, and cultural constraints.

Despite the progress in antenatal care (ANC) services and institutional deliveries, the postnatal period is neglected in Ethiopia and receives relatively little attention compared to the other components of the health extension program (HEP). Strategies for the provision of quality PNC services should include both women giving birth in health facilities and at home. Given that a large number of women and their newborns remain at home during and immediately after birth, building and reinforcing the links between the community and health facilities is essential. Ethiopia has adopted community management of PSBI through the community-based newborn care (CBNC) program. Under this scheme, the Health Extension Workers (HEWs) provide care for young infants by identifying, classifying, and treating young infants with PSBI where referral is not feasible. For the successful implementation of PSBI case management at community level, strengthening postnatal follow up service is a key strategy. Thus, the objective of this study was to examine how postnatal home visits influence the identification of young infants (0-59 days of age) with PSBI from the two districts (woredas) in the Southern Zone of Tigray, Northern Ethiopia that were receiving simplified regimen implementation testing.

## PARTICIPNATS AND METHODS

***Study setting***

This research took place in Raya Azebo and Raya Alamata woredas in Tigray. The total population of the two study districts (woredas) was 260,844. Applying estimates of 3.4% of population for pregnancies and 3.1% for live births, a total of 8,869 pregnancies and 8,087 live births were expected during the study period in the two districts (woredas). Raya Alamata has one primary hospital, five health centers (HCs), and 17 health posts (HPs), and Raya Azebo has one primary hospital, seven HCs, and 22 HPs. Each HP has two female health extension workers (HEWs) with at least one year's training in primary health care delivery.

***Study design***

The purpose of the implementation research on PSBI was to inform and accelerate the use of simplified management of sick young infants up to two months of age for eventual scale up at country level. If referral from the community is not feasible then patients are managed at HPs by the HEWs with one of two simplified treatment regimens. This analysis is part of the larger implementation research to increase access to quality patient management of sick young infants with PSBI from the two districts (woredas) in Tigray.

***Sample size and sampling technique***

The sample size was determined to address the objectives of the overarching PSBI project. Seven thousand one hundred ninety-six (7,196) women with young infants were identified by the HEWs during the 20-month period of the project. These women were identified by the HEWs during their routine home and regular postnatal visits. Women were interviewed using Case Recording Forms (CRFs) by the HEWs after they gave informed consent. The HEWs were trained to complete the forms accurately with close follow-up from cluster supervisors and frequent supervisory visits from research team members. Based on estimates provided by the Federal MOH, a total of 8,564 births were expected from Raya Azebo and 4,914 births were expected from Raya Alamata during the reporting period of the project (January 2016 to August 2017).

***Study participants***

The study participants were all live births and young infants from Raya Alamata and Raya Azebo woredas targeted by the PSBI intervention. All babies born at home and in health facilities were included in the study. The mothers with live births and young infants during the implementation period of the PSBI project were the respondents.

***Intervention***

In the PSBI project, sick young infants (0-59 days) are identified from communities in the two intervention woredas. If PSBI is confirmed by the HEWs at health posts, they are referred to a hospital. Sick young infants from Raya Alamata were treated with two days' injectable gentamycin and seven days of oral amoxicillin, and sick young infants from Raya Azebo were treated with seven days of gentamycin and seven days of oral amoxicillin. If the mother/ family refused to accept referral of the sick infant to a higher-level health facility or hospital, the sick infant was treated with simplified regimens at the nearest health post or health center.

The experiences and lessons learned from this innovative public health intervention have been documented by technical experts from Mekelle University and Regional Health Bureau. The partnership between academic and service delivery experts allowed the easy adoption and incorporation of treatment innovations into the health system of the study sites.

Performance was assessed against pre-defined criteria consisting:

- All health facilities will provide simplified outpatient management of PSBI;
- 80% of sick young infants will receive treatment; and
- 80% of the sick young infants treated will receive adequate quality treatment.

***Data collection methods***

The CRFs and focus group discussion guides were used to collect the quantitative and qualitative data, respectively. The case report forms (CRFs) were HEW maintained registers developed by the PSBI study. They were designed to capture information on pregnancy surveillance (CRF 1), postnatal home visits (CRF 2), sick young infant assessment (CRF 3), follow-up and treatment for days 2 – 14 (CRF 4), treatment and outcome record for referred or hospitalized infants by day 14 (CRF 5) and adverse events and deaths (CRF 6). CRF 2 was used to collect data for this study (postnatal care) and was filled-in by the health extension workers from the health posts. FGDs were recorded and then transcribed by trained data collectors within 48 hours of conducting the interview. Each interview was reviewed by coordinators and feedback provided.

***Data management***

Data were checked in the field by cluster supervisors, field coordinators and research team members. HEWs were re-interviewed and CRFs re-filled if data were missing. Ongoing quality checks were performed by the field supervisors and the authors. In order to assure the quality of the data collected, repeated and high-quality trainings sessions were organized for HEWs, health center directors, maternal and child health experts from woreda health offices, HEP supervisors and implementers. Sustained monitoring activities were provided to ensure that the procedures in the chart booklet were well-implemented. Field research assistants from the nearby hospital (Alamata Hospital) conducted random spot checks, scheduled supportive supervision to the health posts, health centers and hospitals and data were validated with monthly quality audits.

***Data analysis***

Descriptive data such as means and proportions of selected characteristics were used to describe the study participants and the PNC visits. The data analysis was carried out using SPSS version 20 software. Percentages were calculated both from expected (estimated) live births and actual births identified by the HEWs through house to house visits.

***Ethical considerations***

Prior to the start of data collection, ethical clearance was obtained from the Institutional Review Board of the College of Health Sciences of Mekelle University and the World Health Organization, Geneva.

## RESULTS

***Demographic and birth characteristics of the young infants***

A total of 7,196 infants were included in the study. Of these young infants, 2336 (32.5%) were from Raya Alamata and 4860 (67.5%) were from Raya Azebo woreda. A relatively small proportion (2.9%) of the newborns had low birth weight, < 2,500 g (Table 1).

***Age for PSBI and LBI identification***

Seventy-three (65%) newborns with clinical severe infections (CSI), 19 (73%) with critical illness, 13 (8%) with pneumonia and 587 (62%) with local bacterial infections (LBI) illness were identified in the first week after birth. Only one of the newborns with critical illness was identified on the first day of life by the HEWs. A large proportion of the newborns with critical illness were identified within the first three days of life (Table 2).

***Prevalence of PSBIs and LBI in young infants***

We identified 76 (3.3%) and 223 (4.6%) PSBI cases from Raya Alamata and Raya Azebo woredas, respectively. These included 719 (10.0%) lower bacterial infection and 160 (2.2%) fast breathing pneumonia cases. The first week of life has the highest incidence density of clinical severe infection and critical illness compared to 7-59 days in young infants from the study communities (Table 3).

**Table 1:** Sex and Birth Weights of the Young Infants Identified by HEWs from the Two PSBI Project Areas of Tigray, Northern Ethiopia (*n* = 7,196).

| Characteristic | Category | Raya Alamata N (%) | Raya Azebo N (%) | Total N (%) |
|---|---|---|---|---|
| Sex | Male | 1235 (17.6) | 2514 (35.7) | 3749 (53.3) |
| | Female | 1063 (15.1) | 2224 (31.6) | 3287 (46.7) |
| | Total | 2298 (32.7) | 4738 (67.3) | 7036 (100) |
| Birth weight | Very low birth weight (< 2,000 g) | 2 (0.0) | 21 (0.3) | 23 (0.3) |
| | Low birth weight (2,000-2,499 g) | 79 (1.1) | 107(1.5) | 186 (2.6) |
| | 2,500 g and above | 2212 (31.2) | 4671 (65.9) | 6883 (97.1) |
| | Total | 2293 (32.3) | 4799 (67.7) | 7092 (100) |

**Table 2:** Age of PSBI and Local Bacterial Infections Identification in Young Infants Traced by the HEWs from Raya Alamata and Raya Azebo, Southern Tigray, Northern Ethiopia (*n* = 1023).

| Age of identification in days (day of life) | Neonatal infections | | | | |
|---|---|---|---|---|---|
| | Clinical severe infection, n (%) | Critical illness, n (%) | Local bacterial infection, n (%) | Pneumonia, n (%) | Total, n (%) |
| < 1 day | 0 (0.0) | 1(3.8) | 2 (0.3) | 0 (0.0) | 3 (0.3) |
| 1-3 days | 50 (44.2) | 16 (61.5) | 298 (41.8) | 0 (0.0) | 365 (35.7) |
| 4-7 days | 23 (20.4) | 2 (7.7) | 287(40.3) | 13 (8.1) | 332 (32.5) |
| 8-30 days | 21 (18.6) | 5 (19.2) | 92 (12.9) | 92 (57.5) | 211 (20.6) |
| > 30 days | 19 (16.8) | 2 (7.7) | 34 (4.8) | 55 (34.4) | 112 (10.9) |
| Total | 113 (100) | 26 (100) | 713 (100) | 160 (100) | 1023 (100) |

**Table 3:** PSBI and Local Bacterial Infection Cases in Young Infants Identified by HEWs from Raya Alamata and Raya Azebo, Tigray, Ethiopia, 2016 (*n* = 7,196).

| Cases identified at PHCFs | | Raya Alamata (n = 2336) N (%) | Raya Azebo (n = 4860) N (%) | Total (n = 7196) N (%) |
|---|---|---|---|---|
| Local bacterial infection | 0 – 6 days | 53 | 294 | 99 |
| | 7 – 59 days | 77 | 295 | 372 |
| | Sub-Total | 130 (5.6) | 589 (12.1) | 719 (10.0) |
| Pneumonia | 7 – 59 days | 35 | 125 | 160 |
| | Sub-Total | 35 (1.5) | 125 (2.6) | 160 (2.2) |
| Clinical Severe Infection | 0 – 6 days | 19 | 46 | 65 |
| | 7 – 59 days | 15 | 33 | 48 |
| | Sub-Total | 34 (1.5) | 79 (1.6) | 113 (1.6) |
| Critical Illness | 0 – 6 days | 6 | 12 | 18 |
| | 7 – 59 days | 1 | 7 | 8 |
| | Sub-Total | 7 (0.3) | 19 (0.4) | 26 (0.4) |
| Total PSBI | | 76 (3.3) | 223 (4.6) | 299 (4.2) |

***Early postpartum period visits***

The proportion of newborns visited by the HEWs within the first 24 hours, three days and seven days after delivery compared to expected live births were 13%, 33%, and 43% in Raya Alamata woreda and 12%, 43%, and 52% in Raya Azebo woreda, respectively. Of those newborns identified, 27%, 69%, and 91% from Raya Alamata and 20 %, 76%, and 92% from Raya Azebo were visited at home by HEWs during the first, second and third scheduled postnatal visits, respectively. No remarkable differences were observed in the proportions of the newborns visited at home between the two woredas (Table 4).

**Table 4:** Proportion of Newborns Visited at Home by HEWs Within the First Week of Birth in Raya Alamata and Raya Azebo Districts, Tigray, Northern Ethiopia, 2016 ($n$ = 7,196).

| Home Visit | Raya Alamata (Actual = 2,336, Expected = 4914) | | Raya Azebo (Actual = 4860, Expected = 8564) | | Total (Actual = 7196, Expected = 13,478) | |
|---|---|---|---|---|---|---|
| | Calculated from expected (%) | Calculated from actual, n (%) | Calculated from expected (%) | Calculated from actual, n (%) | Calculated from expected (%) | Calculated from actual, n (%) |
| Day 1 | 12.9 | 635 (27.2) | 11.6 | 993 (20.4) | 12.1 | 1628 (22.6) |
| Day 3 | 33.0 | 1620 (69.3) | 43.0 | 3686 (75.8) | 39.4 | 5306 (73.7) |
| Day 7 | 43.1 | 2118 (90.7) | 52.2 | 4467 (91.9) | 48.9 | 6585 (91.5) |
| Day 42 | 44.7 | 2195 (94.0) | 53.7 | 4603 (94.7) | 50.4 | 6798 (94.5) |
| Day 60 | 46.7 | 2297 (98.3) | 55.0 | 4713 (97.0) | 52.0 | 7010 (97.4) |

## DISCUSSION

In this study, only 4% of children in the study area had PSBI and were identified by the HEWs. These prevalence rates for PSBI that ranged from 3.3% in Raya Alamata to 4.6% in Raya Azebo may be underestimates because live births are likely to have been missed by the HEWs. The figures are far below the 10% estimate of expected PSBI cases reported by the AFRINEST study (7) or the 7.6% estimates of the Federal Ministry of Health (8). The majority of the PSBI cases occur in the first week of life, thus early postnatal care is very important to identify and help caretakers take action for sick babies. Unless postnatal care in the first week of life is strong, neonates will be missed and opportunities to educate caretakers will be missed.

Our findings revealed that only 33% and 43% of expected young infants from Raya Alamata were visited during the second and third PNC visits after delivery. While slightly higher, only 43% and 52% of the expected young infants from Raya Azebo were visited. This demonstrates the relatively low PNC uptake in the study communities (Table 4).

The postnatal home visit in the first 24 hours occurred for only 13% and 12% of live births in Raya Alamata and Raya Azebo, respectively. Even though these data do not include those who had PNC at the HCs or hospitals, our findings were similar to the EDHS 2016 finding of 12.6% PNC in the first two days after delivery in rural Ethiopia (5). A study from Lemo Woreda, Hadiya Zone, Southern Ethiopia reported that the prevalence of PNC services utilization was 51.4% (9) and that 66.8% of women from Gonder Zuria woreda, Northwestern Ethiopia received PNC (10). Similarly, 34.8% of mothers from Dembecha woreda, Northwest Ethiopia (11) and 22.7% of mothers from Southern Ethiopia received PNC within the critical first two days after delivery (12).

According to the 2013-14 profile of Tigray, the three main causes of early neonatal death were prematurity, birth asphyxia, and neonatal sepsis (6). Strong postnatal follow up is the cornerstone for the prevention and identification of PSBI in the community. However, as was shown in these woredas, early identification of births and PSBI cases was a challenge for the health system.

Early visits create the opportunity for the HEWs to counsel mothers on preventive care, to detect danger signs, and to encourage appropriate care seeking for the newborn. However, newborns with PSBI were not identified on time for prompt and appropriate healthcare services in our study sites.

Despite the benefits of PNC, most newborns do not receive PNC from skilled health care providers in the first few days after delivery. As a result, the PNC service delivery in the first 24 hours has remained disappointingly low in the study communities. Limited contacts between the HEWs with newborns and mothers means less counseling and health education on danger signs, less identification of PSBI cases, and less opportunity to encourage urgent care seeking. Thus, low levels of PNC remain a challenge for the successful implementation of the community-based management of PSBI in the study communities.

The small proportion of estimated live births identified by the HEWs reflects either the failure to visit or trace all live births and/or inaccurate estimation rates (3.1%). This makes it difficult to enroll newborns in the health system to receive services at optimal ages either for PSBI or other preventive interventions. Fortunately, the percentage of newborns who received care rose from 12% in the first 24 hours to 49% by the seventh day after birth indicating that the HEWs can eventually establish contact. This also indicates that PNC is feasible and can be strengthened. Notification of HEWs for labor and birth within 48 hours was closely linked with improved uptake of PNC services in the Amhara and Oromia regions of Ethiopia (13).

According to the focus group discussions with women from study communities, the postnatal period is governed by long established cultural practices. In the study area, women are expected to stay home in the dark for more than one month after delivery which is a major barrier to HEW household visits or for seeking care for illness. Similarly, 20% of women from Lemo Woreda, Hadiya Zone, Southern Ethiopia reported socio-cultural practices as reasons for poor uptake of PNC services (9). However, there can be considerable variation within Ethiopia. In Gonder Zuria woreda, Northwestern Ethiopia cultural barriers are minimal (10). Thus, it is important for health care providers, especially HEWs, to gain an understanding of cultural beliefs and traditional practices relating to postnatal care in their specific areas.

In conclusion, our study revealed that the early postnatal home visits by HEWs were low in study districts. While recognizing the importance of the use of multiple channels for contact, we argue that the low case detection rate of PSBI in the study communities is partly attributable to poor PNC home visits. Failure to recognize the danger signs in newborns by mothers, the absence of counseling on newborn danger signs during the ANC period, poor newborn health care seeking behavior of the mothers, and challenges to HEWs home visits to every birth within the first 48 hours were some of reasons for the low identification of sick young infants with PSBI. It is widely recognized that the health system in the region is strongly committed to and effective in reaching pregnant women with ANC and delivery services. This may provide a platform to strengthen the PNC program through commitment and support of HEWs as well as increased demand generation for improved care seeking.

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**Conflict of interest**:
Authors have no conflicts of interest to declare .

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