Impact of iron & folate supplementation on anaemic status of extreme poor pregnant women

Key findings

- Regular iron and folate supplementation can significantly reduce the prevalence of anaemia in extreme poor pregnant women: a reduction of 27% was observed between baseline (70%) and endline (43%).
- The women received supplementation for about 4 months and compliance was high (i.e. nearly 90% of women took iron and folate tablets regularly).
- At baseline the mean haemoglobin concentration was 104g/L. At endline mean haemoglobin concentration was 110.6g/L, an average improvement of 6.3g/L between baseline and endline.
- Haemoglobin concentration improved more in anaemic than non-anaemic women by on average, 9.6 g/L and 1.2 g/L, respectively.
- Over two-thirds of extreme poor pregnant women are anaemic compared with the national average of <50%.
1. Introduction

The CMS3 annual surveys have shown that the socio-economic indicators being monitored as part of EEP improve year by year with the exception of some of the adult and child nutritional indicators. In addition, when the logframe was revised following introduction of the nutrition intervention, it included a number of improvements in undernutrition which are currently not being measured as part of either CMS3 or the independent impact monitoring by IFPRI. In addition to revising those indicators to address these issues, EEP/Shiree proposed undertaking three additional studies which were approved by DFID.

**Study 1: Reduction in the prevalence of anaemia in pregnant women**
To determine whether regular iron + folate supplementation significantly improves haemoglobin concentration and reduces the prevalence of anaemia in pregnant women.

**Study 2: Reduction in anaemia and CED in adolescents**
To determine to what extent regular iron + folate supplementation and deworming improves adolescent nutritional status.

**Study 3: Reduction in stunting, wasting, underweight and anaemia in children**
To determine to what extent (a) regular iron + folate supplementation and deworming, together with improved weaning practices, has a lasting effect on children under 3 years of age and (b) deworming alone improves the nutritional status of children who were between 2 and 5 years of age in 2013.

This report presents the results of **Study 1**, and examines whether the target in the logframe (a reduction of 5% in anaemia in pregnant women) is achievable. The results of this study are not being used to report against the indicator.

2. Methodology

EEP/Shiree is undertaking a nutrition programme focusing on pregnant women, breastfeeding mothers, adolescents and children under two years of age. The aim is to improve haemoglobin concentration for pregnant women and thus reduce the prevalence of anaemia. Anaemia in pregnancy is defined as a haemoglobin concentration <110 g/L (WHO, 2001): this definition was adopted in this study. The programme provides 60mg of iron (as Ferrous Fumarate) and folate supplementation (Folic Acid BP 400 mg) daily to pregnant women from about their 4th month of pregnancy: this package is known in EEP as “IFA supplementation”.

To assess the impact of iron and folate supplementation, Shiree/EEP recruited a sample of extreme poor pregnant women living in Rangpur, Nilphamari, Saitpur, Lalmonihart and Polashbari Districts who were working with CARE International, which was the only Scale Fund NGO with a sufficient number of pregnant women that met the criteria of receiving at least 4 months of supplementation before birth. A power test showed that a significant improvement in haemoglobin concentration of 4g/L could be detected with a minimum sample size of 89 pregnant women (based on a within-subject change, power of 80% and p=0.05).

For the baseline survey in April 2015, 10 staff in CARE and Partner NGOs working under the Nutrition programme visited the recruited pregnant women after receiving training from Dr Goto (RG). They obtained the date of the last menstruation period (LMP) using an event calendar and then measured haemoglobin concentration (using a portable haemoglobin analyser, HemoCue). At the endline survey in August 2015, the same 10 staff received re-
training from RG and repeated the haemoglobin measurement on the same women. The pregnant women were also asked about compliance in taking the iron and folate tablets in the last 7 days as well as reasons for non-compliance.

3. Results

138 pregnant women had their haemoglobin concentration measurement at baseline. Of these, 110 pregnant women were re-measured at endline; 5 women were absent on the day of the endline survey, 17 women had already given birth, 5 women had miscarried, and 1 woman refused to be re-measured at endline. There were no cases of abortion. Attrition in the sample did not introduce any obvious bias: there were no significant differences in women’s age or haemoglobin concentration between the 110 women who were measured at baseline and endline, and the 28 women who were only measured at baseline.

Of the 110 women who participated at baseline and endline, over a quarter of the women (27%) were teenagers and the mean age was 23.2 years (range 14-36 years). Nearly 90% of the women reported taking the supplementation regularly (98 women took all 7 tablets in the last 7 days, 9 women missed more than one day); 2 women stopped taking the iron tablets for the previous two months due to sickness; one woman refused to take the tablets following advice from a local traditional doctor.

The key findings of the study are below, and shown in Tables 1 and 2 and Figures 1 and 2:

- At endline, the pregnant women were, on average, at 8 months of pregnancy.
- There was a reduction of 27% (p=0.010) in anaemia in pregnant women between baseline and endline.
- Mean haemoglobin concentration was 110.6g/L at endline indicating a highly significant (p<0.001) increase in haemoglobin concentration of 6.3g/L.
- There were no severe cases of anaemia (below 70g/L) at either baseline or endline.
- Nearly three-quarters of the pregnant women (74%) showed an improvement in haemoglobin concentration between baseline and endline.
- The relative change ((change in haemoglobin concentration endline - baseline/baseline haemoglobin concentration) X 100), on average, was a 7% improvement from the baseline level; 20% of the women showed a 10-20% improvement and 15% of the women showed more than a 20% improvement from baseline.

Table 1. The sample characteristics and anaemia in the pregnant women

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Baseline</th>
<th>Endline</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Pregnant months</td>
<td>3.9</td>
<td>0.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Anaemia (N and %)</td>
<td>77 (70.0%)</td>
<td>47 (42.7%)</td>
<td>0.010</td>
</tr>
<tr>
<td>Haemoglobin (g/L)</td>
<td>104.3</td>
<td>10.4</td>
<td>110.6</td>
</tr>
<tr>
<td>Absolute change in Haemoglobin (g/L)</td>
<td>-</td>
<td>+6.3</td>
<td>12.4</td>
</tr>
<tr>
<td>Relative change in Haemoglobin (%)</td>
<td>-</td>
<td>+6.7</td>
<td>12.5</td>
</tr>
</tbody>
</table>
There was a highly significant reduction in the incidence of anaemia between baseline and endline (p<0.001, Table 2): 34.6% changed from anaemic to non-anaemic status, i.e. about half of those with anaemia at baseline, while 7.3% worsened (non-anaemic to anaemic) so the net reduction in anaemia was 34.6% - 7.3% = 27.3%.

Table 2 Change in anaemic status from baseline to endline

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remained non-anaemic</td>
<td>25</td>
<td>22.7</td>
</tr>
<tr>
<td>Change from anaemic to non-anaemic (i.e. improved)</td>
<td>38</td>
<td>34.6</td>
</tr>
<tr>
<td>Change from non-anaemic to anaemic (i.e. worsened)</td>
<td>8</td>
<td>7.3</td>
</tr>
<tr>
<td>Remained anaemic (i.e. no improvement)</td>
<td>39</td>
<td>35.5</td>
</tr>
</tbody>
</table>

The haemoglobin concentration of anaemic women improved much more than non-anaemic women (by, on average 9.6 g/L versus 1.2 g/L in non-anaemic women, respectively (p<0.001, Figure 1).

There was a highly significant negative association (Figure 2) between haemoglobin concentration change (endline-baseline, Y axis) and baseline haemoglobin concentration (X axis). Greater improvement was apparent among women with lower haemoglobin concentration at baseline, in keeping with the finding that there was a greater improvement in mean haemoglobin concentration in anaemic women than in non-anaemic women (Figure 1).

There were no significant associations between pregnant women’s age and haemoglobin concentration at both baseline and endline nor was there any significant association between teenage pregnancy and mean haemoglobin concentration or anaemia.
4. Discussion

4.1 Prevalence of anaemia in extreme poor pregnant women

This survey showed that 70% of extreme poor pregnant women suffered from anaemia at baseline which reduced to 47% following the iron and folate supplementation programme. The prevalence of anaemia in pregnant women in their second trimester was reported as 45% in a sample of rural Bangladesh communities (Choudhury et al., 2012) and the prevalence of anaemia at any stage of pregnancy in Bangladesh was 46% in a national survey (BBS/UNICEF, 2004) and 39% in a rural only survey (Helen Keller International, 2006). A study conducted in BRAC communities in Mymensingh found an anaemia prevalence of 50% in pregnant women (Hyder et al., 2004). The current survey revealed that the prevalence of anaemia in extreme poor pregnant women was between 25% to 30% higher than in previous reports. The intervention reduced the prevalence of anaemia in pregnant women to close to the national average.

4.2 Impact of iron and folate supplementation on anaemia in pregnant women

A cluster randomised trial study in Kaliganj (Dhaka Division) examined the impact of the same regimen of iron-folic acid (IFA) tablets (60mg of iron and 400µg of folic acid) as well as micronutrient powder on pregnant women from the second trimester onwards (Choudhury et al., 2012). Women in the IFA group did not show any clear improvement in anaemia (the reduction in prevalence was from 39.1% to 38.9% and the mean of change in haemoglobin concentration was only from 111.6 to 112.0g/L). However analyses which focused on only anaemic women showed significant improvement of haemoglobin concentration in the IFA intervention group (from 97.9 to 110.2g/L, p=0.011); unfortunately no information was presented on the change in anaemia prevalence in this group.

In the current survey, the mean haemoglobin concentration of anaemic women was 99.3g/L and they improved to 108.8g/L, on average, which is a similar change to the previous study. Anaemic women improved their haemoglobin concentration on average 9.6 g/L between baseline and endline compared with an increase of only 1.2 g/L in normal women. These results suggest that the benefit of iron and folate supplementation is more in anaemic women.

Below 95g/L haemoglobin concentration is associated with increased risk of delivering a low birthweight baby as well as a premature birth (Bruke, 2014). This study showed that the intervention reduced the at-risk sample (i.e. those having haemoglobin concentration below 95g/L) by half from 19.1% at baseline to 8.2% at endline. No pregnant women in both baseline and endline had haemoglobin concentration of above 135g/L which is also associated with the same risk.

The percentage of women who changed from non-anaemic to anaemic status (worsened) following the intervention was only 0.9% suggesting that supplementation benefited both anaemic and non-anaemic women.

4.3 Compliance

Although information on compliance (asking about supplement use during the last 7 days prior to the survey) was limited, compliance appeared to be high. Enrolment of the pregnant women by CPKs was good and well accepted by communities.
4.4 Challenges of delivery at scale

The survey shows that IFA supplementation has a beneficial effect on reducing anaemia in a small group of pregnant women when taken consistently at the correct period of time. However, there are clear challenges to delivery at scale. Analysis of the Demographic Health Surveys showed that the percentage of women who had taken iron during pregnancy was only 44% in South Asia, suggesting that the coverage of iron supplementation through antenatal care is inadequate (Yip, 2002). One of the main criticisms of the Bangladesh Integrated Nutritional Programme was that over a third of women in the target group failed to be enrolled and only 10% of target women received supplementation for the correct duration (Nahar, Mascie-Taylor and Begum, 2009; Victora et al., 2012) albeit a more complex intervention than IFA supplementation. However, the point remains clear that in order to be effective, the approach for successful IFA delivery needs to be carefully considered.

5. Recommendation

Women with low haemoglobin concentration are more likely to benefit from iron and folate supplementation and became non-anaemic thereby reducing the risk of delivering low birthweight babies and having premature births. In mass-intervention, provision of IFA supplementation to all pregnant women is advisable for the following reasons;

a) Supplementation appears to benefit both anaemic and non-anaemic women albeit differentially,

b) There are savings to be made in logistics, equipment, and time through not having to take a blood sample from each women in order to measure haemoglobin concentration,

c) High compliance among pregnant women could be achieved through positive acceptance by women and through the work of CPKs,

d) There appears to be little risk of overdose: no excess haemoglobin concentration cases were found (no women had a haemoglobin concentration above 135g/L).

References


