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RESEARCH ARTICLE

Burden of Anemia, Perinatal Outcome Community Based Study among Rural Tribal Pregnant Women in an Extremely Low Resource Region

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ABSTRACT

Background: Persisting burden of anaemia during pregnancy, global public health concern, is commonest disorder globally. Severe anaemia is potentially fatal for mother and baby.

Objective: Present study was carried out to know about burden of anaemia and perinatal outcome in rural tribal pregnant women.

Material methods: Prospective community based study was conducted in 100 villages, where mother, child care services were initiated after having created a health facility in one, using pretested tool to get information required as per objectives.

Results: Of 3713 women who delivered, 2617 (70.5%) were anaemic, 1351 (36.4%) mildly, 964 (26.0%) moderately, 211 (5.7%) severely and 91 (2.5%) very severely anaemic during pregnancy. Amongst 2617 anaemic women, 8.6% had Preterm (PT), 91.4% term births, 4% of 225 PT were Intra Uterine Foetal Deaths (IUFDs), 0.9% of 2392 term IUFDs, seventeen (7.5%) of 225 PT babies were Stillborn (SB), 5.2% of 2392 term SB, 78.6% of 225 PT were Low Birth Weight (LBW), 73.4% of 2392 term LBW, 70.2% of 225 PT were Small for Gestational Age (SGA) babies and 36.5% of 2392 term SGA. Total 1.8% babies had early Neonatal Deaths (NNDs) and 0.7% late NNDs. Amongst 1096 non-anaemic women, 1.3% had PT, 98.7% term births, no IUFD, All 14 PT births were SB, 3.9% term born were SB, 1.2% PT were LBW, 30.5% term LBW, 0.6% PT SGA, 3.8% term SGA. Total 0.09% early NNDs occurred in non-anaemic women. Of 10 women who died, five had severe anaemia, three of them died of post-partum haemorrhage, one congestive cardiac failure, one puerperal sepsis with multi-organ failure.

Conclusion: Anaemia was very common in rural tribal pregnant women, quite a few were very severely anaemic with many LBW, SGA babies, perinatal and maternal deaths.

BACKGROUND

Anaemia continues to be a public health problem globally and is the commonest medical disorder in pregnancy. Prevalence, etiology and severity continue to be varied in different populations, but it is more common in developing countries. In India occurrence of anaemia in pregnancy was found to be one of the highest in the world, with estimates consistently above 70%, even up-to 96% incidence has been reported [1]. However World Health Organization estimated around 58% incidence [2]. Severe Anaemia (SA) with all its effects on mothers and babies is potentially fatal [3,4]. SA has been reported to be one of the leading causes of maternal deaths and severe sicknesses worldwide contributing to 20-40% of maternal deaths directly or indirectly [5] and also leads to many perinatal deaths due to prematurity, fetal growth restriction, low birth weight, birth asphyxia and intrauterine deaths [6]. Moderate-to-severe anaemia (Hb <90 g/L) at enrolment has been strongly associated with excessive blood loss at delivery and the immediate postpartum

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period with evidence of link between maternal anaemia and greater blood loss at childbirth and postpartum [7-9]. Iron deficiency, the most common cause of anaemia may be due to excessive menstruation, repeated pregnancies and other conditions leading to chronic blood loss with increased demand of iron. One of the most common causes could also be less intake of iron especially in regions with poverty. 4 Even American Congress of Obstetricians and Gynaecologists recommended screening all the pregnant women for anaemia and treating with iron supplementation, primarily for improving neonatal outcome [10].

OBJECTIVE

Present community based prospective study was carried out to know the burden of anaemia in rural, tribal, pregnant women and their perinatal outcome.

MATERIAL AND METHODS

After approval of ethics committee which works as per Helinski declaration, the study was conducted in 100 villages of Dharni Block of Melghat to get information about anaemia during pregnancy. In these villages community based mother and child care services were initiated after having created a health facility with 24 hours services in one of the 100 villages. It was decided to find out the burden of anaemia in pregnant women. Villages were visited by research assistant 5 days in a week with regular entry of information. After taking consent for collecting information, predesigned, pretested tool was used. Records of pregnancy and outcome were used for the study. But haemoglobin estimation was done by research assistant also by Mission's Electronic haemoglobin meter and mean haemoglobin during pregnancy was recorded. Grading of anaemia was done in pregnant women as Hb ≥ 11g/dl, non-anaemic ≥9g/dl Hb < 11g/dl mildly anaemic, ≥7g/dl Hb < 9g/dl moderately anaemic, ≥5g/dl Hb < 7g/dl severely anaemic, and <5g/dl Hb very severely anaemic.

RESULTS

Of 3713 women delivered, 2617 (70.5%) were anaemic and 1096 (29.5%) non-anaemic, Hb ≥11 g/dl. There were 1351 (36.4%) mildly anaemic, 964 (25.9%) moderately anaemic, 211 (5.7%) severely anaemic and 91 (2.5%) had very severe anaemia, total 8.2% women with less than 7gm/dl Hb during pregnancy. Of 3713 women, 1133 (30.5%) were of 15-19yrs and of them 324 (28.6%) were non-anaemic and 71.4% anaemic, 401 (35.4%) mildly anaemic, 286 (25.2%) moderately anaemic, 86 (7.6%) severely anaemic and 36 (3.2%) were very severely anaemic. Total 207 (5.5%) women were of 30-34yrs and of them 56 (27.1%) were non-anaemic and 72.8% anaemic, 61 (29.7%) mildly anaemic, 63 (30.4%) moderately anaemic, 23 (11.1%) severely anaemic and 4 (1.9%) women had very severe anaemia (p-value 0.0147). Of 3713 women, 1241 (33.4%) were illiterate and of them 282 (22.7%) were non-anaemic and 77.3% anaemic, 492 (39.6%) mildly anaemic, 344 (27.7%) moderately anaemic, 84 (6.8%) severely anaemic and 39 (3.1%) had very severe anaemia. Overall 302 (8.1%) women were graduate and post-graduate studied and of them 155 (51.3%) were non- anaemic, numbers much smaller than overall (p-value 0.0076), 129 (42.7%) mildly anaemic and 18 (6.0%) moderately anaemic. Amongst 2301 (61.9%) of 3713 were housewives, 523 (22.7%) were non-anaemic and 77.3% were anaemic, 912 (39.6%) mildly anaemic, 639 (27.8%) moderately anaemic, 151 (6.6%) severely anaemic and 76 (3.3%) had very severe anaemia. Overall of 853 (23%) unskilled workers (Labourer), 304 (35.6%) were non-anaemic and 64.4% were anaemic, 283 (33.2%) mildly anaemic, 210 (24.6%) moderately anaemic, 44 (5.2%) severely anaemic and 12 (1.4%) had severe anaemia. Of 3319 (89.4%) of 3713 women, of lower economic class and lower middle class, 911 (27.4%) were non- anaemic and 72.6% were anaemic, 1217 (36.7%) mildly anaemic, 902 (27.2%) moderately anaemic, 202 (6.1%) severely anaemic and 87 (2.6%) had very severe anaemia. And in 315 (8.4%) women of middle upper and middle class there were 136 (43.2%) non-anaemic, 110 (34.9%) mildly anaemic, 56 (17.8%) moderately anaemic, 9 (2.8%) severely anaemic and 4 (1.3%) had very severe anaemia significant difference compared to lower middle class (p-value <0.0001). Overall of 1384 (37.3%) primi para, 406 (29.3%) were non-anaemic and 70.7% anaemic, 539 (37.4%) mildly anaemic, 354 (26.6%) moderately anaemic, 58 (4.2%) severely anaemic and 27 (2.0%) had very severe anaemia. Of 868 (23.3%) with 3 or more births, 238 (27.4%) were non-anaemic and 72.6% were anaemic, 321 (36.9%) mildly anaemic, 221 (25.4%) moderately anaemic, 63 (7.2%) severely anaemic and 25 (2.8%) had very severe anaemia, insignificant difference. Of 2971 (80.1%) women who were using biomass fuel, 740 (24.9%) were non-anaemic and 75.1% anaemic, 1148 (38.6%) mildly anaemic, 800 (26.9%) moderately anaemic, 196 (6.6%) severely anaemic and 87 (2.9%) had very severe anaemia significantly high compared to non-users (p-value <0.0001). Of 742 (19.9%) women who were not using biomass fuel, 356 (48%) were non-anaemic and 52% were anaemic compared to biomass fuel users significant difference (p-value 0.0178), 203 (27.4%) were mildly anaemic, 164 (22.1%) moderately anaemic, 15 (2.0%) severely anaemic and 4 (0.5%) had very severe anaemia (Table 1).

Amongst 1096 non-anaemic women, 14 (1.3%) had PT births, 1082 (98.7%) term births, 5 (35.7%) of 14 women had PT VB, 1061 (98.1% of 1082) had term VB, 9 (64.3%) of 14 women had PT CB, 21 (1.9% of 1082) women had term CB and all 14 PT born babies were SB and 42 (3.9%) of 1082 women had term SB babies. Amongst 1351 mildly anaemic women, 69 (5.1%) had PT births, 1282 (94.9%) term births, 56 (81.2% of 69) had PT VB, 1246 (97.2% of 1282) had term VB, 13 (18.8% of 69) PT babies were CB, 36 (2.8%) of 1282 term babies were CB, one (1.4%) of 69 PT baby had IUFD, 5 (0.4%) of 1282 term babies had IUFDs, 6 (8.6%) of 69 PT

Table 1: Anemia in rural tribal pregnant women.

Variables Age	Pregnant Women	Anaemic								Non- Anaemic	
		Hb < 5 gm%	%	Hb ≥ 5 to < 7gm%	%	Hb ≥ 7 to < 9gm%	%	Hb ≥ 9 to ≤ 10.9 gm%	%	Hb ≥ 11 gm%	%
15 to 19	1133	36	3.2	86	7.6	286	25.2	401	35.4	324	28.6
20 to 24	1549	35	2.3	52	3.4	398	25.7	601	38.8	463	29.9
25 to 29	718	14	1.9	39	5.4	195	27.2	247	34.4	223	31.1
30 to 34	207	4	1.9	23	11.1	63	30.4	61	29.5	56	27.1
35 to 39	106	2	1.9	11	10.4	22	20.8	41	38.7	30	28.3
TOTAL	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5
Education											
Illiterate	1241	39	3.1	84	6.8	344	27.7	492	39.6	282	22.7
Primary	1360	36	2.6	66	4.9	449	33.0	422	31.0	387	28.5
Middle	564	10	1.8	37	6.6	104	18.4	224	39.7	189	33.5
High	246	6	2.4	24	9.8	49	19.9	84	34.1	83	33.7
Graducate	189	0	0.0	0	0.0	16	8.5	77	40.7	96	50.8
Post Graducate	113	0	0.0	0	0.0	2	13.0	52	46.0	59	52.2
Total	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5
Occupation											
Housewife	2301	76	3.3	151	6.6	639	27.8	912	39.6	523	22.7
Unskilled Worker	853	12	1.4	44	5.2	210	24.6	283	33.2	304	35.6
Semi-Skilled	349	3	0.9	16	4.6	77	22.1	106	30.4	147	42.1
Skilled Worker	114	0	0.0	0	0.0	21	18.4	29	25.4	64	56.1
Business	96	0	0.0	0	0.0	17	17.7	21	21.9	56	58.3
Total	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5
Economic Status											
Upper	79	0	0.0	0	0.0	6	7.6	24	30.4	49	62.0
Upper Middle	101	0	0.0	0	0.0	17	16.8	31	30.7	53	52.5
Middle	214	4	1.9	9	4.2	39	18.2	79	36.9	83	38.8
Lower Middle	989	21	2.1	61	6.2	219	22.1	346	35.0	342	34.6
Lower	2330	66	2.8	141	6.1	683	29.3	871	37.4	569	24.4
Total	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5
Parity											
P1	1384	27	2.0	58	4.2	354	25.6	539	38.9	406	29.3
P2	1461	39	2.7	90	6.2	389	26.6	491	33.6	452	30.9
P3	702	15	2.1	41	5.8	181	25.8	262	37.3	203	28.9
P4	102	7	6.9	14	13.7	27	26.5	37	36.3	17	16.7
P5 ABOVE	64	3	4.7	8	12.5	13	20.3	22	34.4	18	28.1
TOTAL	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5
Biomass Fuel User											
YES	2971	87	2.9	196	6.6	800	26.9	1148	38.6	740	24.9
NO	742	4	0.5	15	2.0	164	22.1	203	27.4	356	48.0
TOTAL	3713	91	2.5	211	5.7	964	25.9	1351	36.4	1096	29.5

babies were SB and 59 (4.6%) of 1282 term babies were SB. Amongst 211 severely anaemic women, 49 (23.2%) women had PT births, 162 (76.8%) term births, 32 (65.3% of 49) had PT VB, 133 (82.1% of 162) women had term VB, 17 (34.7%) of 49 PT had CB, 29 (17.9% of 162) term had CB, 4 (8.1% of 49) had PT IUFDs, 6 (3.7% of 162) term were IUFDs, 4 (8.1% of 49) had PT SB and 14 (8.6%) of 162 term were SB. Amongst 91 very severely anaemic women, 29 (31.9%) had PT births, 62 (68.1%) term births, 13 (44.8%) of 29 PT were VB, 41 (66.1%) of 62 women had term VB, 16 (55.2%) of 29 PT were CB, 21 (33.9%) of 62 term were CB, 2 (6.9%) of 29 PT were IUFDs, 3 (4.8%) of 62 term were IUFDs, 3 (10.3%) of 29 PT babies were SB and 4 (6.5%) of 62 term were SB babies.

Of 1096 non-anaemic women, 13 (1.2%) had PT LBW babies and 334 (30.5%) term LBW babies. Total 7 (0.6%) PT born babies were SGA and 42 (3.8%) term born babies were SGA. One (0.09%) term born baby had early NND. Of 1351 mildly anaemic women, 63 (4.7%) had PT LBW babies, 904 (66.9%) term LBW babies, 70 (5.1%) PT born babies were

SGA and 405 (29.9%) term born babies were SGA babies. Six (0.4%) PT babies had early NNDs, 12 (0.9%) term born babies had early NNDs, 3 (0.2%) PT born babies had late NNDs and 3 (0.2%) term born babies had late NNDs. Out of 964 moderately anaemic women, 59 (6.1%) had PT LBW babies, 674 (69.9%) term LBW babies, 64 (6.6%) PT SGA babies, 341 (35.3%) term SGA babies, 4 (0.4%) PT born babies had early NNDs, 9 (0.9%) term born babies had early NNDs, 3 (0.3%) PT born babies had late NNDs and 4 (0.4%) term born babies had late NNDs. Of 211 severely anaemic women, 36 (17.1%) had PT LBW babies, 134 (63.5%) term LBW babies, 17 (8.1%) PT SGA babies and 94 (44.5%) term SGA babies, Three (1.4%) PT born babies had early NNDs, 8 (3.7%) term born babies had early NNDs, one (0.4%) PT born baby had late NND and 3 (1.4%) term born babies had late NNDs. Overall of 91 very severely anaemic women, 19 (20.8%) had PT LBW babies, 51 (56.1%) term LBW babies. Total 7 (7.6%) PT born babies were SGA, 34 (37.3%) term born babies were SGA and one (1.1%) PT born baby had early NND, Four (4.4%) term born babies had early NNDs and another (1.1%) term born baby had late NND (Table 2). Overall of 3713 cases ten maternal deaths occurred of which five women were severely anaemic. Three of them died of Post-Partum Haemorrhage (PPH), one had congestive cardiac failure and one had puerperal sepsis with multi organ failure.

DISCUSSION

Anaemia, a preventable but persisting major risk factor for complications during pregnancy continues to be a challenge in low resource of populations. It has greater need of targeted clinical attention especially because significant association has been found between anaemia, literacy, economic status and location of mother and pregnancy outcome and women's health. It is essential to promote awareness about implications of iron deficiency and eliminating it for reduction of anaemia [11]. Deshmukh, et al. [12] suggested that considering the biological and operational feasibility and the effectiveness

Table 2: Maternal and perinatal outcome.

OUTCOME			NO	%	Anaemic								Non- Anaemic	
					Hb<5 gm%	%	Hb≥5 to < 7gm %	%	Hb≥7 to < 9gm%	%	Hb≥9 to ≤ 10.9gm%	%	Hb≥ 11 gm%	%
Total Births			3713	100	91	2.5	211	5.7	964	26.0	1351	36.4	1096	29.5
Term Births			3474	93.6	62	1.8	162	4.7	886	25.5	1282	36.9	1082	31.1
Preterm Births			239	6.4	29	12.1	49	20.5	78	32.6	69	28.9	14	5.9
Vaginal Births	Term		3340	90.0	41	1.2	133	4.0	859	25.7	1246	37.3	1061	31.8
	Preterm		170	4.6	13	7.6	32	18.8	64	37.6	56	32.9	5	2.9
	Total		3510	94.5	54	1.5	165	4.7	923	26.3	1302	37.1	1066	30.4
Caesarean Section	Term		134	3.6	21	15.7	29	21.6	27	20.1	36	26.9	21	15.7
	Preterm		69	1.9	16	23.2	17	24.6	14	20.3	13	18.8	9	13.0
	Total		203	5.5	37	18.2	46	22.7	41	20.2	49	24.1	30	14.8
INTRA UTERINE FOETAL Deaths (IUFD)	Term IUFD		21	0.6	3	14.3	6	28.6	7	33.3	5	23.8	0	0.0
	Preterm IUFD		9	0.2	2	22.2	4	44.4	2	22.2	1	11.1	0	0.0
	Total		30	0.8	5	16.7	10	33.3	9	30.0	6	20.0	0	0.0
STILLBIRTHS (SB)	Term SB		161	4.3	4	2.5	14	8.7	47	29.2	59	36.6	42	26.1
	Preterm SB		31	0.8	3	9.7	4	12.9	4	12.9	6	19.4	14	45.2
	Total		192	5.2	7	3.6	18	9.4	51	26.6	65	33.9	56	29.2
Total Live Births			3635	97.9	78	2.1	189	5.2	943	25.9	1331	36.6	1094	30.1
Low Birth Weight	Term		2097	56.5	51	2.4	134	6.4	674	32.1	904	43.1	334	15.9
	Preterm		190	5.1	19	10.0	36	18.9	59	31.1	63	33.2	13	6.8
Small For Gestational Age	Term		916	24.7	34	3.7	94	10.3	341	37.2	405	44.2	42	4.6
	Preterm		165	4.4	7	4.2	17	10.3	64	38.8	70	42.4	7	4.2
Neonatal Deaths	Early (<7 Day)	Term	34	0.9	4	11.8	8	23.5	9	26.5	12	35.3	1	2.9
		Pre Term	14	0.4	1	7.1	3	21.4	4	28.6	6	42.9	0	0.0
	Late (>7 To 28 Days)	Term	11	0.3	1	9.1	3	27.3	4	36.4	3	27.3	0	0.0
		Pre Term	7	0.2	0	0.0	1	14.3	3	42.9	3	42.9	0	0.0
	Total		66	1.8	6	9.1	15	22.7	20	30.3	24	36.4	1	1.5

of the interventions, weekly supplementation of iron to adolescent girls should be universally started to correct the iron stores pre-pregnancy. Sabina, et al. [13] reported that risks were increased if anaemia and underweight were present simultaneously, about 20% of pregnant women had anaemia, and most of the cases were either of iron deficiency or folic acid deficiency or both. Pregnancy induced hypertension was five times more common and significant proportion of postpartum haemorrhage in women with severe anaemia have been reported [14]. In the present study number of anaemic women was very high and 8% had severe and some very severe anaemia. Also 12.3% anaemic women had hypertensive disorders in pregnancy. A study revealed 35% pregnant women had moderate severe anaemia with increased risk of PPH, LBW, SGA babies and perinatal deaths [15]. In the present study amongst 2617 anaemic women, 177 (78.6%) of 225 PT babies were LBW, 1763 (73.4%) of 2392 term born babies were LBW, 158 (70.2%) of 225 PT babies were SGA, 874 (36.5%) of 2392 term born babies were SGA. Amongst 1096 non-anaemic women, 13 (1.2%) PT born babies were LBW, 334 (30.5%) term LBW, 7 (0.6%) PT SGA and 42 (3.8%) term SGA. Three anaemic women died of PPH. Studies conducted on pregnant women in Zimbabwe, China, India, and Mexico from 1996 to 2008 revealed that between 43% and 73% of the women were iron deficient (Usually diagnosed with low-ferritin concentration). Out of these, 7% to 33% had IDA [16]. Among pregnant women, IDA has been associated with increased risk of LBW, prematurity and increased maternal sickness [17]. Nair, et al. [18] reported that of the total 92 247 births and 93 107 infants included in their study, 87.8% were born to mothers who were anaemic (Mild anaemia 37.9%, moderate anaemia 49.1%, and severe anaemia 0.7%), fetal and neonatal mortality were more with severe anaemia, with 27.7 stillbirth rate in non-anaemic, 25.8 in mildly anaemic, 30.1 in moderately anaemic and 90.9 severely anaemic. And 28 day neonatal mortality was 24.7 in normal, 22.9 in mildly, 28.1 moderately, and 72.6 in severely anaemic women. Severe maternal anaemia was also associated with LBW (<2500 and <1500 g), preterm births, and postpartum haemorrhage. In the present study more than 11% women were severely anaemic. Overall amongst 2617 anaemic women, 225 (8.6%) women had PT births, 2392 (91.4%) had term births, 9 (4%) of 225 PT were IUFDs, 21 (0.9%) of 2392 term were IUFDs, 17 (7.5%) of 225 PT babies were SBs and 29 (1.2%) of 2392 term born babies were SBs. Of 2617 anaemic, 2176 (83.1%) had LBW and 1032 (38%) were SGA babies. Total 47 (1.8%) babies had early NNDs and 18 (0.7%) had late NNDs. Amongst 1096 non-anaemic women, 14 (1.3%) had PT births, 1082 (98.7%) term births and 2 (0.2%) SBs were amongst 1082 term born. Out of 1096 non-anaemic women, 111 (10.1%) had LBW, 49 (4.5%) had SGA babies and there was one (0.09%) early NND. Most prevalent causes of IDA may be chronic blood loss caused by excessive menstruation with increased demand for iron or many births. Jessani, et al. [19] reported that at 6+0-13+6 weeks gestation age, stillbirth, SGA and births weight <2500 g, were significantly associated with Hb of 70-89 g/L compared to Hb of 110-129 g/L. The relationships of adverse pregnancy outcome with various Hb levels were more marked at 26-30 weeks of gestation. However it could also be less intake of iron, the most common reason in resource poor communities, as seemed in the present study too [4]. Sharma, et al. [20] opined that dietary changes alone may not be sufficient to correct an existing iron deficiency in pregnancy and iron supplementation was necessary. Published studies revealed that almost one-third of pregnant women in Ethiopia were anaemic and significant association was observed between anaemia during pregnancy and residence, gravidity, pregnancy interval, and infection during pregnancy. Twenty studies were included in a meta-analysis with a total of 10, 281 pregnant women. The pooled prevalence of anaemia among pregnant women was 31.66%. Well known factors which contributed to IDA in pregnancy were low iron stores at the time of conception and amount of iron absorbed during pregnancy [21]. So it was understandable why anaemia in pregnancy continued to occur frequently in developing countries and was an indication that pre-existing iron stores were inadequate and physiological adaptations to pregnancy were insufficient to meet the increased requirements [22] So iron deficiency has been reported to be not only the most prevalent but also the most neglected nutrient deficiency in the world, particularly among pregnant women [16].

CONCLUSION

Overall 1133 (30.5%) women were of 15-19yrs, 86 (7.6%) of them were severely anaemic and 1241 (33.4%) women were illiterate, of which 84 (6.8%) were severely anaemic and 2301 (61.9%) were housewives, of them 151 (6.6%) severely anaemic and 3319 women (89.4%) were of economically lower, and lower middle class, of them 202 (6.1%) severely anaemic and 868 (23.3%) women had 3 or more births, of which 63 (7.2%) were severely anaemic and 2971 (80.1%) of 3713 pregnant women who were using biomass fuel of 196 (6.6%) were severely anaemic. Five of 10 maternal deaths cases were with severe anaemia. Almost three fourth of pregnant women were anaemic, many severely anaemic too, leading to a lot of LBW, SGA babies, perinatal deaths and maternal deaths.

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