Malaria and anaemia in pregnancy: importance, detection and prevention
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6 Listening to pregnant women in Kenya: impact of anaemia on their lives

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Submitted
SUMMARY
We employed qualitative and quantitative methodologies to develop and test an anaemia-specific health status questionnaire based on a locally recognised set of signs and symptoms. These reached beyond the biomedical definition of anaemia incorporating locally identified indicators of physical, social and psychological well and ill-being. In this way we were able to capture many aspects of the distress caused by anaemia and the impact it has on the wellbeing of pregnant women. The indicators proved to be successful differentiators of non anaemic and anaemic women with a clear relationship seen between haemoglobin and the reporting of a number of physical symptoms of ill health, stopping work, women's concern about their health and failing to attend socially important events. Anaemia had a major impact on pregnant women's lives with far reaching social implications. The symptoms and signs associated with anaemia may be "masked" due to relationships between household members and perceptions about what symptoms are "normal" in pregnancy.

There are few programmes effectively preventing severe anaemia in pregnancy. This may be due to an underestimation by policy makers and programme managers of the impact anaemia has on the health of pregnant women, and the benefits that can be expected from successful intervention. Also, where strategies do exist, they may not be utilised optimally by the community because of the populations perceptions of the nature and magnitude of the problem or because local knowledge has not informed their development.

The information obtained here provides a rationale and a mechanism for effectively developing and implementing anaemia-prevention policies and programmes. The data is also a step towards providing a tool for assessing the impact of such policies.
INTRODUCTION

In Africa it is estimated that two-thirds of pregnant and one half of non-pregnant women are anaemic and that up to 15% are severely anaemic. The main aetiologies in sub-Saharan Africa are iron deficiency (often exacerbated by hookworm infestation), folate deficiency, malaria, haemoglobinopathies and human immunodeficiency virus (HIV) infection. Most of these conditions are preventable.

When very severe, maternal anaemia is associated with maternal mortality. It is also recognised by health professionals that severe anaemia is associated with poor physical health, such as tiredness, lethargy, breathlessness and palpitations. However, little is described about the effect of anaemia in pregnancy on the social functioning and quality of life of women.

In industrialised countries, the application of disease-specific health status questionnaires has improved our understanding of the relationship between clinical diagnosis and the broader picture of patient functioning and quality of life. This information is relevant to a variety of contexts, including patient management, public health needs assessment and resource allocation decisions. Within research, health status questionnaires are being used to supplement and, in a few cases to replace, biomedical readings as outcome measures for clinical trials and evaluation of interventions.

In developing countries, there are similar justifications for developing and applying tools to understand the impact of prevalent diseases on people's lives. In the case of anaemia in pregnancy, although most developing countries have policies for preventing it, effective implementation of anaemia control strategies has been limited. One of the reasons may be that the full impact of the disease may not be fully realised by those responsible for implementation, as, despite the high prevalence of the condition, the myriad effects of severe anaemia on pregnant women's lives have been poorly documented. Where policy-makers are not fully informed about what anaemia in pregnancy does to women and how communities see its effects, it is difficult for them to allocate resources optimally. In addition, where anaemia control strategies do exist, adherence to treatment, such as haematinics, is often poor. This may be because the community's views and the women's experiences have not been taken into account in the design of programmes. By providing missing data about the effects of anaemia, we can enable policy-makers at international, national and local levels to make more informed, data-driven decisions about which programmes to prioritise and how best to promote them.

In this study, we set out to develop and test an anaemia-specific health status questionnaire in order to describe the effects of anaemia and severe anaemia on pregnant women's wellbeing in Kilifi District, Kenya. The items for this questionnaire derived from an exploratory phase (phase 1) of in-depth interviews and focus group discussions with local women. The questionnaire was constructed with the aim of reaching beyond the technical biomedical definition of anaemia to incorporate locally recognised signs of physical, social and psychological well-being and functional ability which would be affected by low haemoglobin level. The questionnaire was tested in a sample of rural pregnant women attending antenatal care at Kilifi District Hospital. In this paper we report on the development of the questionnaire and describe the impact of anaemia on women's quality of life.
MATERIALS AND METHODS

Study Area and Population
The study was based in Kilifi district, north of Mombasa on the coast of Kenya. A previous study in this area reported the prevalence of anaemia in pregnancy (Hb<11 g/dl) to be 76% and severe anaemia (Hb<7 g/dl) to be 10%. In primigravidae, infection with Plasmodium falciparum was strongly associated with moderate and severe anaemia, while iron deficiency and hookworm infection were the dominant risk factors for multigravid women.10

The population of Kilifi district is made up of Mijikenda people of whom 90% are the Girama11. Kilifi district hospital has a busy antenatal clinic with an average of 900 women from a predominately rural population attending each month. It is estimated that at least 90% of women attend for antenatal care at least once during their pregnancy in Kilifi district12.

Recruitment and Data Collection
Ethical clearance was gained from the Kenya Medical Research Institute (KEMRI) and the London School of Hygiene & Tropical Medicine (LSHTM). Informed consent in the women's first language was obtained. This study was conducted in 2 phases. Phase 1, from January 1996 to June 1996, was a period of qualitative work that included the development of a questionnaire. In phase 2, from October 1996 to December 1996, the instrument was pre-tested and applied.

Qualitative Data Collection (phase 1)
The methodologies employed for data collection in phase 1 is summarized in Table 1. The data was collected in people's homes, public meeting points, rural health centres and Kilifi district hospital (KDH). The group discussions were recorded on audio-cassette. All interviews and discussions were conducted in the local language, Kigirama, by female field staff from Kilifi District, under the supervision of ML or CS.

For the initial in-depth interviews, women attending for antenatal care at KDH were screened for anaemia. Women with different levels of anaemia were identified, and those who consented, were interviewed. During this interview, the women were able to talk freely about how they felt physically and psychologically, how they expected to feel at this point in their pregnancy, about their daily activities, their family situation and their social lives. Some very severely anaemic women who had required hospitalisation, were interviewed and subsequently followed up at home. If their families agreed, they too were interviewed about the way in which the illness had affected the life of the pregnant household member.

Following on from this period of in-depth interviews, women attending antenatal clinic were invited to participate in focus group discussions. If they responded positively, they were provided with transport or expenses to return at a pre-arranged time. Over 90% of women who were invited to participate in the in depth and focus group discussions agreed. Community based focus group discussions took place with groups of women and mothers in law recruited to these discussions by community based seeds. In depth interviews were also conducted with traditional healers and traditional birth attendants, who were identified in discussions with community leaders and with local colleagues working as field workers, midwives and clinical officers in the district hospital (table 1). The aim
### Table 1: Summary of Qualitative Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>No.</th>
<th>Participants</th>
<th>Information Gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Discussions</td>
<td>6</td>
<td>pregnant women with mixed Hbs at KDH and in the community</td>
<td>how women feel before pregnancy, as the pregnancy progresses and now</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>pregnant women with similar Hbs (unknown to them at the time of the discussion) at antenatal clinic at KDH</td>
<td>symptoms of normal pregnancy and symptoms of illness</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>mothers, mother-in-laws and natural groups of women in the community</td>
<td>attitudes of household members to pregnant women's symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>illnesses in pregnancy: their aetiology, morphology, likely consequences and treatments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>duties women undertake, measurement units for those duties and difficulties performing those duties in pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>duties expected of pregnant women</td>
</tr>
<tr>
<td>In-Depth Interviews</td>
<td>25</td>
<td>pregnant women at antenatal clinic at KDH (blood tests performed after the interviews)</td>
<td>symptoms they experienced throughout their pregnancies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>symptoms before the pregnancy began</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>symptoms now (today)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>duties they are currently performing, duties which are difficult and how to cut them down</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>attitudes of household members to their symptoms</td>
</tr>
<tr>
<td>In-Depth Interviews</td>
<td>8</td>
<td>traditional healers</td>
<td>symptoms of normal pregnancy and symptoms of illness</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>traditional birth attendants</td>
<td>illnesses which occur in pregnancy: their causes, symptoms, diagnosis, likely consequences and treatment</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>allopathic health workers in health centres</td>
<td>knowledge of anaemia: its causes, morphology, consequences and treatment</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>women in their homes</td>
<td>dietary restrictions for pregnant women</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>social expectations of pregnant women</td>
</tr>
<tr>
<td>Case Studies</td>
<td>3</td>
<td>pregnant women with severe anaemia admitted to KDH: interviewed before discharge and at home</td>
<td>current symptoms and functional incapacities</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>families of those 3 severely anaemic pregnant women</td>
<td>history of symptoms and functional incapacities through the pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>diet, vomiting, if ate soil during this pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>symptoms triggering decision to treat and treatment history before coming to hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>psychological and social morbidity</td>
</tr>
</tbody>
</table>

of this phase was to understand, in as comprehensive a way as possible, what problems important to Girama women were associated with moderate and severe anaemia, and to identify the exact language women use to describe these symptoms.
For analytical purposes, we categorised information we had collected on well-being and distress into four areas:

1. Physical symptoms.
2. Functional ability / disability, such as in the performing of daily tasks and in meeting their own and others' expectations.
3. Psychological well-being / distress, such as worrying or stress related to perceived illness.
4. Social well-being, such as participation in community activities, perception of social support etc.

At the end of phase 1, local names for health problems, tasks, worry and stress and social well being were used to construct items for the questionnaire.

**Health status Questionnaire (phase 2)**

The objective of phase 2 was to identify which items were most strongly associated with low haemoglobin.

The questionnaire contained 25 items and took 5-10 minutes to undertake. Respondents were rural Gyirama women, attending antenatal clinic at Kilifi District Hospital. Most primigravid women were recruited via an ongoing anti-malarial intervention study. A field-worker selected every third eligible multigravid woman from the queue of antenatal clinic attendants, up to, for logistic reasons, a maximum of eight a day. Women with multiple pregnancies were excluded. Gestation was assessed by ultrasound scanning and history of last menstrual period when available. The interviewer was blinded to the women's haemoglobin status. Women were also unaware of their anaemia status. Blood samples were taken after the interview by the study mid-wife and haemoglobin was measured using a Coulter counter. Following the blood test results, all women were assessed by the mid-wife and given haematinics. Severely anaemic women were also given antimalarials and referred to the hospital clinical officer.

**Data Analysis**

Data from the health status questionnaire was analysed using STATA. Women were divided into three groups by their haemoglobin levels: severely anaemic (Hb < 7 g/dl), moderately anaemic (Hb 7-9.9 g/dl) and mild/non anaemic (≥ Hb 10 g/dl). Mildly and non-anaemic women were combined into one group of Hb ≥ 10g/dl because only 36/275 (13%) of the population were non-anaemic (Hb ≥ 11 g/dl). Furthermore, mild anaemia has not previously been shown to be associated with adverse outcomes and little benefit has been associated with interventions. Odds ratios were calculated for the proportions of severely anaemic women (Hb<7 g/dl) experiencing symptoms compared to women with mild/non anaemia (Hb≥10 g/dl). Logistic regression analysis was used to adjust for variables which may confound the association between symptoms and anaemia: gestational age (grouped into as < 24, 24-27, 28-31, 32-35, 36 +), gravidity (1, 2, 3, 4, and 5+) and education status (history of having attended primary school of not).

**RESULTS**

Presentation of the results will focus on the questionnaire, and draw links to the phase 1 research where appropriate.
The mean haemoglobin of the 275 pregnant women was 8.97 g/dl (S.E. = 0.116). Forty one women (15%) were severely anaemic (Hb<7 g/dl), 147 (54%) had moderate anaemia (Hb 7-9.9 g/dl) and 87 (32%) were mild/non anaemic (Hb ≥ 10 g/dl).

Twenty-one percent of women were less than 28 weeks gestation, 22% 28-31 weeks gestation, 48% 32-36 weeks and 11% were 36 weeks gestation or more. Thirty percent of women were primigravidae, 30% gravidity 2-4 and 35% gravidity of five or more. Forty-five percent of women had attended primary school.

**Health during pregnancy**

In the focus group discussions with pregnant women, normal pregnancies were described as being associated with discomfort, weakness, general body pains and lower abdominal pains. Dizziness, palpitations, fever (*koma*), headaches, vomiting, chest complaints, shortness of breath and loss of appetite were also described as being common, but only “normal” in the first 5 months of pregnancy. However, pregnant women and their families reported difficulties in distinguishing between the normal symptoms of pregnancy and those of illness, at any stage in a pregnancy.

“Reduction in blood” or “low blood” is believed by pregnant women, older women and traditional health workers to be a common condition in early pregnancy as “the child takes blood from the mother in order to develop”. More blood is produced by eating “foods of strength”, such as eggs, milk, fish, beans, green vegetables and oranges. However this process can be interrupted by nausea, vomiting, loss of appetite and being too poor to afford these foods. This belief is reported in many sites across Africa.14

**Physical Symptoms Associated with Anaemia**

Common symptoms described by severely anaemic pregnant women during in–depth interviews and focus group discussions were dizziness, fast breathing, sensations of not having enough breath or not being able to breathe out, swollen, heavy and lifeless legs, awareness of the heart beating either faster or with greater force than normal, buzzing of the ears, chest pains and coughing. The women reported that the dizziness could be so severe as to make them fall over. Difficulties in breathing could interfere with eating and talking. The buzzing in the ears was often associated by women with pain and reported to be loud enough to interfere with hearing. Heavy and swollen legs hindered mobility. Sensations of legs “feeling like they want to burst” and “as if things are moving or crawling inside of them” were also reported. Though coughing was a frequent symptom experienced by women with very severe anaemia, having a cough was a very common symptom within the population irrespective of haemoglobin status, so we decided not to include it in the health status questionnaire.

The results of phase 2 demonstrated a clear relationship between the reporting of a number of physical symptoms and women's haemoglobin group throughout the range of severe, moderate, mild and non-anaemia (table 2). Severely anaemic women were significantly more likely to report dizziness, breathlessness, buzzing ears, heavy legs, swollen face, heart feeling “swollen” and palpitations than women with mild / no anaemia (Hb>10 g/dl).

**Capability to perform everyday functions**

In group discussions and interviews, pregnant women reported that the most physically demanding tasks are digging and pounding maize, followed by collecting wood and water
and finally cooking and sweeping. Pregnant women feeling physically ill reported working longer hours at a slower rate and/or with frequent rests. Certain duties were reported to be associated with specific symptoms. For example, the heat from cooking was reported to bring on dizziness, making women concerned, for example, that they might fall into the fire.

Table 3 describes the proportion of women from the questionnaire with different levels of haemoglobin, who stopped different work tasks. For the severely anaemic group, digging was the activity most commonly stopped (34%) followed by pounding (29%) and then water collecting (22%). These results confirm findings from phase 1.
Table 4  Frequencies and odds ratios for questions about psychological and social morbidity

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Hb &lt; 7</th>
<th>Hb 7 - 9.9</th>
<th>Hb 10+</th>
<th>Crude OR (^2) (95% CI)</th>
<th>Adjusted OR (^1,2) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wants to stop household duties(^3)</td>
<td>25/36(69%)</td>
<td>71/124(57%)</td>
<td>31/76(41%)</td>
<td>3.22(1.34, 7.75)</td>
<td>3.15(1.15, 8.62)</td>
</tr>
<tr>
<td>Has wasi-wasi</td>
<td>28/41(68%)</td>
<td>85/147(58%)</td>
<td>48/87(55%)</td>
<td>1.45(0.63, 3.50)</td>
<td>1.25(0.46, 3.42)</td>
</tr>
<tr>
<td>Worried about own health</td>
<td>27/41(66%)</td>
<td>68/141(48%)</td>
<td>32/86(37%)</td>
<td>3.65(1.52, 8.76)</td>
<td>3.98(1.44, 10.96)</td>
</tr>
<tr>
<td>Thinks she is ill(^4)</td>
<td>29/36(81%)</td>
<td>67/134(50%)</td>
<td>30/83(35%)</td>
<td>6.14(2.23, 16.92)</td>
<td>6.04(1.89, 19.32)</td>
</tr>
<tr>
<td>Stopped going to funerals due to how she feels</td>
<td>18/41(44%)</td>
<td>32/146(22%)</td>
<td>18/87(21%)</td>
<td>2.51(1.05, 6.04)</td>
<td>3.56(1.27, 9.96)</td>
</tr>
<tr>
<td>Stopped visiting friends due to how she feels</td>
<td>20/41(49%)</td>
<td>38/146(26%)</td>
<td>26/87(30%)</td>
<td>1.88(0.82, 4.34)</td>
<td>2.64(1.00, 6.97)</td>
</tr>
</tbody>
</table>

1  Odds ratios for severe anaemia compared with mild/non anaemia, adjusted for gestation, gravidity and education
2  The odds ratios were based on between 101 and 108 women, on account of missing values of the adjusting factors.
3  Question added late so only 236 respondents
4  27 "Don't know" replies were excluded

Psychological well-being

In this community when women get married they leave their parents' home and join their husband's family. In focus group discussions, many pregnant women reported difficult relationships with other household members, particularly females (mother-in-laws, sister-in-laws and co-wives). The pregnant women claimed that the other household women did not always want the best outcome for their pregnancies, due to envy. From fear of being cursed, the women hid their pregnancies for as long as possible. Similar accounts are reported in the ethnographic literature\(^15\). Although discussions confirmed that a healthy diet and little physical exertion are considered best for pregnant women's health and her baby, many of the pregnant women perceived that other household members did not support pregnant women eating well or working less. The pregnant women reported that they would have liked to increase their food intake, but were not in control of the portions they received and it was unacceptable for them to ask for more. Similarly, they would have liked to stop or lessen their household duties but felt unable to do so, as this would mean that others from the household would have to take their place. Many reported that they felt alone and that their fellow female household members would be unwilling to assist them. Others were uncomfortable asking for help as they feared they would be regarded as lazy. This was compounded by the common suspicion reported by older women and traditional birth attendants, that pregnant women exaggerate symptoms, pretending to be ill, so that they can work less. If a pregnant woman could eat, she was said to be well enough to work, even if she appeared quite unwell. Diagnoses were often made retrospectively: if the baby was born small, early or had died then it was acknowledged that the mother must have been sick. A few women mentioned that their husbands might be prepared to intervene on their behalf to reduce their work, but they felt such interference might damage household relationships further. If matters became intolerable, women reported considering returning to their parents' home, yet in this community this rarely occurred.
These findings were confirmed by the questionnaire, with 54% of all women reporting that they would like to stop some duties but could not. There was a clear inverse relationship between wanting to stop work and haemoglobin group (table 4).

A common illness label used to describe conditions such as worry, anxiety and stress is wasi-wasi. Pregnant women used it to describe concerns about their health, their delivery and the relationship with their husband. It is also a label for conditions that resemble serious depression. Several traditional healers described that when a pregnant woman has wasi-wasi, her blood is likely to "go down", as she eats less and does not get the strength from the food. As she becomes weaker both physically and mentally, she worries more. Thus wasi-wasi is an important link in a cycle of decreasing health.

In the questionnaire, many women admitted to experiencing wasi-wasi (59% overall) but clarification of the type of wasi-wasi they were experiencing was difficult to elicit in a questionnaire format. The majority (65%) of women who reported wasi-wasi said that they did not know why they were worried. There was no statistically significant difference in the proportion of women with severe anaemia who had wasi-wasi compared to non anaemic women, though women with severe anaemia were more likely to think they were ill than non anaemic women (table 4).

**Social well-being**

Attending funerals, weddings and religious services (often overnight) are an important part of social interaction. These involve walking and climbing hills, which was particularly difficult for the more anaemic women. Pregnant women described that non-participation in these activities left them feeling socially isolated. Table 4 demonstrates that women who were severely anaemic were more likely to have stopped these social activities than non-anaemic women.

**DISCUSSION**

Anaemia in pregnancy is a common condition. Unless local expression of its effect is captured, its impact on the lives of pregnant women is likely to be underestimated. This study describes the steps undertaken to develop and test an anaemia-specific health status questionnaire which aimed to reach beyond the biomedical definition of anaemia and incorporate indicators of physical symptoms, functional ability and social and psychological well-being. The exploratory in-depth interviews and focus group discussions enabled us to acquire local language and explore how the condition affects pregnant women within the context of the household and community. The items employed in the questionnaire were therefore suggested to us by local women. Many of them proved to be successful differentiators, with anaemic women reporting significantly more adverse problems than non-anaemic women.

The strongest relationships we found were between haemoglobin and a number of physical symptoms. This association was greater than that between haemoglobin and stopping daily housework duties, presumably because each woman's personal circumstances affect her ability to reduce her work-load. The signs and symptoms associated with anaemia may therefore be "masked" due to household pressures. This hypothesis is supported by the fact that there was a stronger relationship between anaemia and whether women would like to stop their duties as compared with what they had actually stopped. Previous studies have demonstrated an association between anaemia and reduced work output in women\(^{16,17,18,19}\) and men\(^{20,21,22}\).
The term we were using to capture worry or stress, wasi-wasi, which traditional healers described as being important in terms of both causing and being the result of "low blood", was not significantly associated with severe anaemia. This may be because wasi-wasi is very common during pregnancy for reasons unrelated to anaemia (such as anxiety regarding the delivery etc). In addition, wasi-wasi incorporates a wide range of distress / ill health that probably cannot be reliably asked about in a short structured questionnaire. Similarly, in the questionnaire, very few women admitted that they suffered from other "traditional" illnesses, although in the qualitative work other women had reported that these illnesses were very common during pregnancy.

The introductory in-depth phase not only ensured the development of a useful questionnaire that employed local indicators of well-being and distress, but it also gave insights into local explanatory models and health seeking behaviour of pregnant women in this community. This information is important if effective and sustainable interventions are to be developed.

The impact that anaemia has on women's lives may not be realised by the women or the community, partly because many of the symptoms of anaemia in pregnancy are symptoms also experienced, to a lesser extent, in normal pregnancy (such as palpitations, breathlessness, and tiredness). Pregnant and non-pregnant women expressed a difficulty in knowing whether someone was ill or just experiencing the normal symptoms of pregnancy. This may, in part, explain why women often suffer symptoms without presenting with them to the health facilities. This has been found with other reproductive morbidities that are so common that they are considered normal and so not worth reporting or acting upon, such as prolapse in Turkey and Egypt23,24.

Some insights were also gained into how the internal dynamics of the household may relate to the health seeking behaviour of pregnant women in this community. One important feature is that women are not in their natal household and surrounded by kin, and have pressures on them to carry on working hard during pregnancy even if they are feeling unwell. Despite traditional beliefs around the importance of low blood and its link to poor pregnancy outcome and wasi-wasi (which was reported as very common during pregnancy), pregnant women are often thought of as being well enough to work if they are able to eat. The impact therefore of anaemia on the well-being of pregnant women in this community may be greater that in an environment where women are able to rest and relax during pregnancy.

The indicators which were successful differentiators for anaemia in pregnant women in coastal Kenya are likely to be context-specific so we would recommend piloting to elicit the appropriate language and concepts in other areas.

CONCLUSION
This work demonstrates the importance of anaemia, a largely preventable condition, in terms of its effects on individual women's physical, psychological and social health. It illustrates how important it is to look beyond a strictly biomedical definition of a condition such as "anaemia", in order to fully understand the ways local people perceive the problem. The information gained here can assist both in the identification of the magnitude of the problem and also in the development of appropriate IEC strategies, by providing the community with a better understanding of the impact of anaemia in pregnancy on quality of life and daily activities. Locally defined indicators can also be used alongside other health outcome indicators to evaluate the full impact of an intervention on people's
lives. Understanding how a disease such as anaemia, affects women's lives therefore assists clinicians, public health researchers and health care planners at every level when devising a wide range of strategies, from recommendations for individual patient management to population-based intervention and control measures.

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REFERENCES

16. Dodd NS, Sheela TS and Sharma UK. Effect of different levels of iron supplementation on the iron status and physical work capacity of anaemia Indian women. Indian Journal of Medical Sciences, 1992; 46: 33-42.