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Iron-supplementation programmes: Compliance of target groups and frequency of tablet intake

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Abstract

The prevalence of iron-deficiency anaemia remains especially high in developing countries, despite large-scale iron-supplementation programmes. The reasons for the lack of success of these programmes are discussed based on the results of original research conducted in Indonesia. Studies among pregnant women in rural Sulawesi and urban Jakarta demonstrated that besides insufficient coverage of the target group, women's compliance with tablet intake was a serious problem. Compliance may be improved when it is not necessary to take tablets on a daily basis. Studies among pre-school children and non-pregnant women proved the effectiveness of once-weekly and twice-weekly supplementation. These supplementation schedules should also be investigated in pregnant women.

Introduction

Iron-deficiency anaemia is still a major public health problem in developing countries. Its prevalence among pregnant women and pre-school children is particularly high; for example, in South-East Asia it is estimated to be between 50% and 70% [1, 2]. Iron deficiency occurs if the amount of iron absorbed is too little to meet the body's demands. This may be due to insufficient iron intake, reduced bioavailability of dietary iron, chronic blood loss, or increased iron requirements, as occurs during pregnancy or a period of growth [3]. The most appropriate way to improve iron status on a short-term basis is by taking iron tablets as supplements.

To reach large parts of a population, programmes have been designed to distribute iron supplements through the public health-care system. Such programmes proved to be efficient under field trial conditions [4, 5], and many countries, such as Indonesia, started similar interventions. However, as opposed to other micronutrient deficiencies such as vitamin A, limited progress has been made in solving the problem of iron-deficiency anaemia during the past decade [1]. This paper reviews some possible reasons for the lack of success of iron-supplementation programmes, specifically programmes for pregnant women. The contents are based on research carried out in Indonesia at the Regional SEAMED Centre for Community Nutrition.

Organizational aspects of iron supplementation

The Indonesian government started implementing an iron-supplementation programme for pregnant women about 10 years ago. The programme is based on the expectation that all pregnant women regularly visit a health centre to receive prenatal care. Healthcare staff are instructed to distribute iron folate tablets to each woman free of charge. The women are told to take one tablet containing 60 mg elemental iron and 250 µg folic acid per day. The impact of this programme seems to be limited. The prevalence of anaemia among pregnant women in Indonesia dropped from 70% in 1983 to 55% in 1988 [6]. However, a 1992 nationwide survey indicated that the figure has remained at 55% since 1988 [7].

Figure 1 shows some of the requirements for a succesful iron-supplementation programme for pregnant women organized through the public healthcare system. After the production of a sufficient number of tablets, many conditions still have to be fulfilled before the prevalence of anaemia will actually decrease. Tablet production, stock management, and tablet distribution to health centres depend mainly on factors such as availabilty of funds, government policy, available infrastructure, and healthcare management. The availability of sufficient iron tablets at a health-care centre does not automatically imply that pregnant women will receive them. This depends on factors such as the coverage rate of the health service and the training, motivation, and time availability of the health service staff. After receiving the iron tablets, it still remains uncertain whether the women will actually take them on a daily basis as prescribed [3].

FIG. 1. Iron supplementation through the primary health care system for pregnant women: Determinants for success

Coverage rate of health service and compliance with supplementation

Two studies were carried out in Indonesia to investigate the coverage rate of the health services and the compliance of pregnant women. A small sample of 45 pregnant women in urban Jakarta was followed after they came to a health centre for prenatal care [8]. They all received iron tablets. Of the 45 women who entered the study, only 33 were available to be questioned and measured two months later (fig. 2). Of these 33, 21 (64%) claimed to have taken all the tablets. This claim was confirmed by a positive stool test (high concentration of iron in stool) in only 12 women (36%). It was concluded that overall compliance may have been as low as 36%.

A cross-sectional study was carried out among 107 women in the second or third trimester of pregnancy from 17 rural villages in Sulawesi [9]. The women were randomly selected from the total population of pregnant women in every village. Although women in the second trimester are supposed to have visited a health centre, only 68 (63%) actually had received prenatal care and 49 were given iron tablets. Of these 49 women, 33 (31%) claimed that they had taken all tablets. It was concluded that both coverage and compliance were low (fig. 3).

FIG. 2. Two-month follow-up of pregnant women from urban Jakarta (n = 45 at start) showing the number claiming to have taken iron tablets and the number with iron in their stool

FIG. 3. Coverage rate of prenatal care and number claiming to have taken iron supplementation among pregnant women in south Sulawesi

These two studies may not be representative of the general situation in Indonesia. However, the results clearly show that the efficiency of the iron-supplementation programme may be seriously affected by insufficient coverage of prenatal care and by incomplete tablet distribution. Furthermore, low compliance is very important, reducing the impact of the programme. It is likely that the situation in Indonesia is not much different from that in other countries, considering the reported high prevalences of anaemia [1, 2].

Alternative supplementation methods

Compliance with iron supplementation is influenced by the disagreeable side-effects, which are related to the form of the iron and the dosage schedule [5], that is, tablets that are to be ingested orally evey day. Supplementation programmes for other micronutrients, such as vitamin A, are more successful, perhaps due in part to the fact that daily ingestion is not necessary.

Administration of iron supplements every third day may be as effective as daily administration in improving iron status, as first reported in anaemic rats [10]. If less frequent intake was also effective in humans, it could have important implications for the organization and efficiency of iron-supplementation programmes. It could affect the distribution of tablets, the compliance of subjects, and the total costs of the programme. Two studies were conducted in Jakarta, Indonesia, to compare the effect on iron status of daily versus less frequent supplementation.

The effect of daily versus twice-weekly iron supplementation on iron status was studied in preschool children with low iron levels in a randomized, double-blind field trial [11]. For eight weeks, one group of 32 children received 30 mg iron per day and another group of 33 received 30 mg iron twice a week. Haemoglobin, serum ferritin, and protoporphyrin levels increased significantly in both groups. The difference in treatment effect between groups was not significant after correction for initial haemoglobin level, which was not similar in the two groups (fig. 4). It was concluded that for pre-school children with low iron levels, twice-weekly iron supplementation has an effect on iron status similar to that of daily supplementation.

Treatment of anaemia with weekly iron was investigated in non-pregnant woman factory workers [12]. for nine weeks, 42 women received iron tablets (60 mg Fe, 250 µg folic acid) daily, and 38 women received the same tablet once a week. Haemoglobin concentrations of the two groups increased to 16 and 13 g/L, respectively (p = .145). It was concluded that weekly supplementation with a relatively low dose of medicinal iron was as effective as daily supplementation in improving the iron status of women with moderate anaemia.

FIG. 4. Changes in haemoglobin concentration in two groups of pre-school children according to three classes of initial haemoglobin concentrations

Quality of tablets

Another factor that is important for the effectiveness of a supplementation programme is the quality of the iron tablets. Many available types of tablets contain different chemical forms of iron compounds and have different degrees of iron bioavailability. The relative bioavailability of the iron provided by the tablets used in the official Indonesian supplementation programme is high [13], indicating good therapeutic efficacy.

Conclusions

The degree of coverage of the target population for whom iron tablets are intended is an important determinant that impairs the effect of the Indonesian iron-supplementation programme. Coverage is influenced by the behaviour of pregnant women who seek health care themselves as well as by the behaviour of health centre staff. The motivation and awareness level of both groups must be increased through nutrition education to improve the coverage. A reliable monitoring and evaluation system is necessary to supervise the programme [8]. Furthermore, compliance of the target group with tablet ingestion affects the impact.

These problems are not confined to the lndonesian programme. Compliance, for example, was described as being a problem in a Western population [14]. Compliance may be increased by improving the target population's knowledge and awareness. Despite sufficient awareness, however, daily tablet intake during a prolonged period of time may continue to be unappealing to people, in part due to unpleasant side effects. Tablet intake on a weekly basis may be a promising alternative to improve the efficacy of supplementation programmes. Compliance may be increased, and the costs of the programme will be reduced.

Even if, under experimental conditions, the increase in haemoglobin or serum ferritin concentration with weekly supplementation may be slightly lower than that with daily supplementation, the positive implications for large-scale interventions may compensate for this. Weekly intake was effective in improving the iron status of moderately anaemic children and non-pregnant women. More research is necessary to investigate the effects of weekly supplementation in pregnant women. Furthermore, the optimum amount and type of supplement should be investigated.

A supplement combining iron with vitamin A may be an effective option in areas where subclinical vitamin A deficiency is still prevalent [15, 16]. Finally, the use of intermittent supplementation should be investigated in terms of general efficacy, subject compliance, supplement distribution, and cooperation of health personnel.

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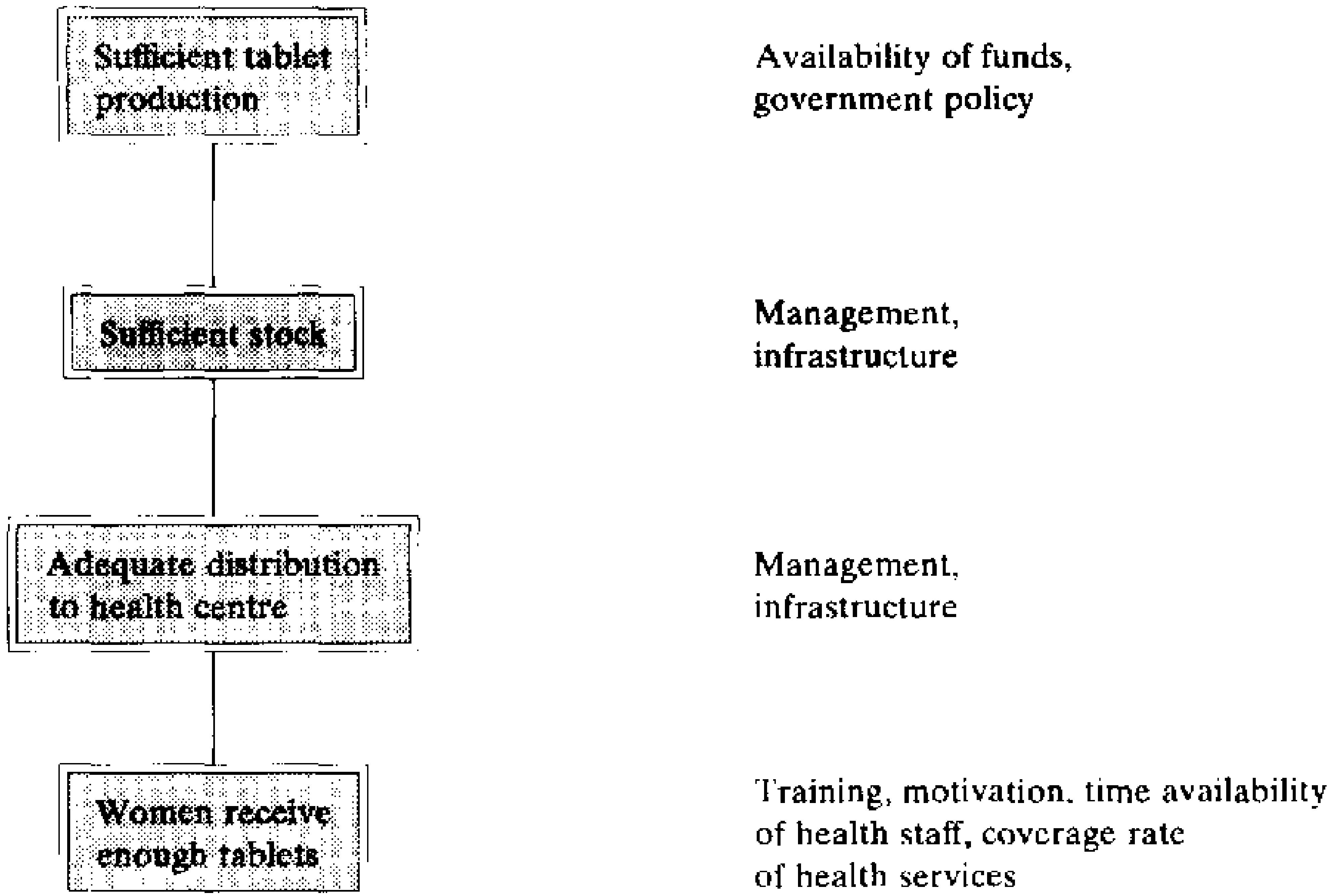
SITUATION
DETERMINANTS
Sufficient tablet production
Availability of funds, government policy
Sufficient stock
Management, infrastructure
Adequate distribution to health centre
Management, infrastructure
Women receive enough tablets
Training, motivation, time availability of health staff, coverage rate of health services

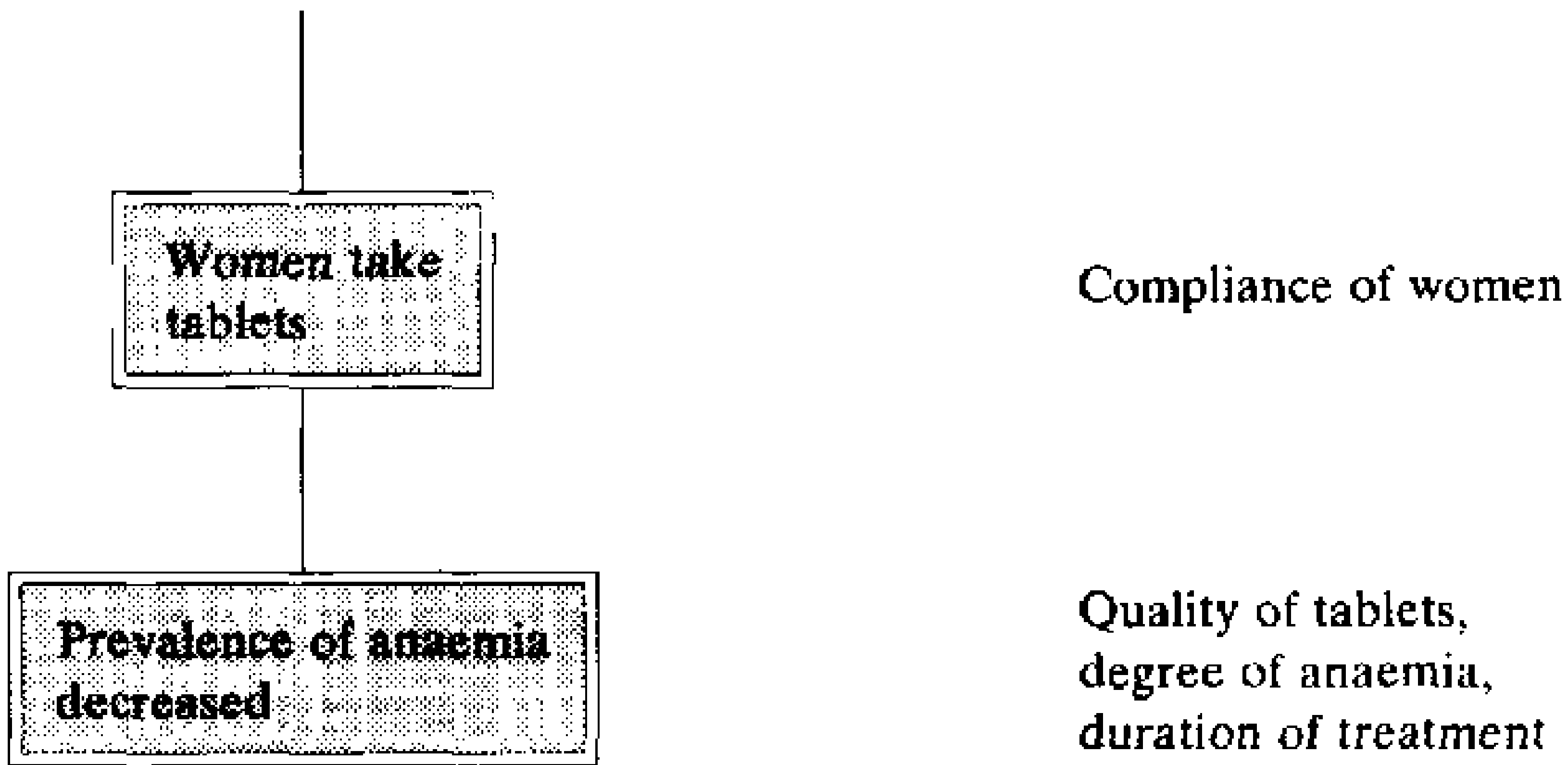

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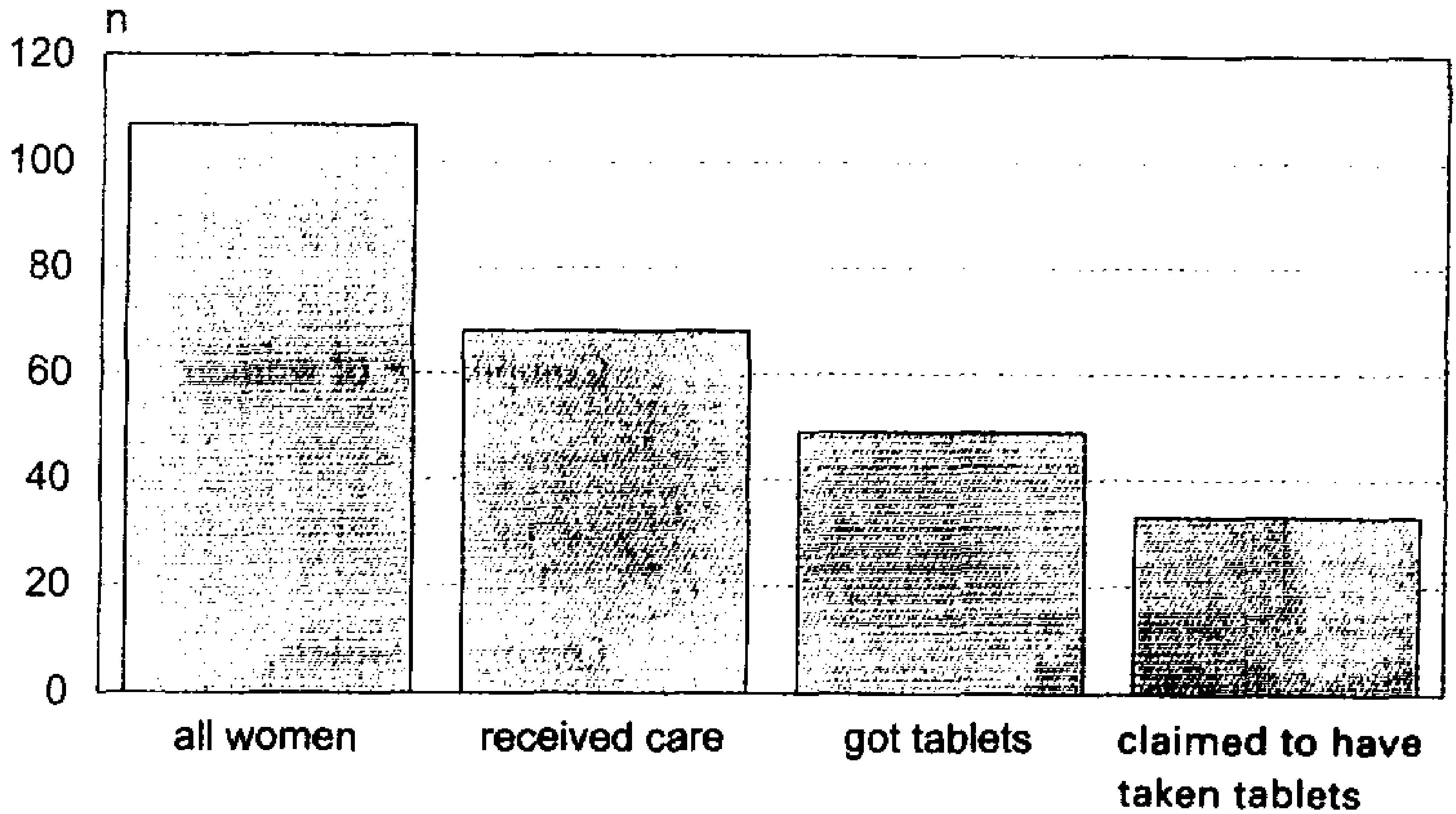
Figure - 2



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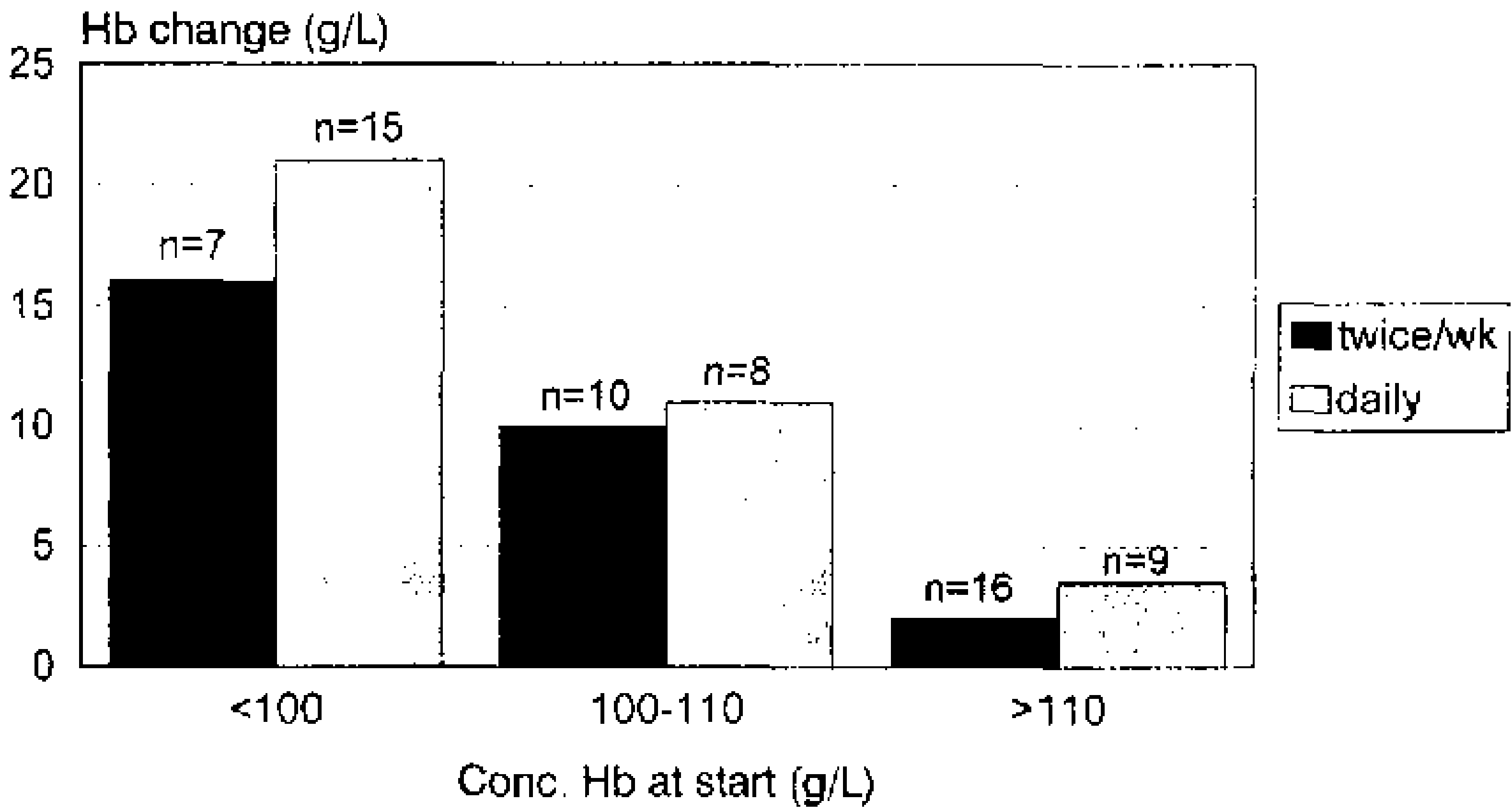

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