Situation analysis of supply and demand of iron related supplements in the iron deficiency anaemia control programme

Myrtle Perera[1]

The Ceylon Journal of Medical Science 1999; 42: 55-74

Introduction

An island wide programme for control of iron deficiency anaemia (IDA), implemented predominantly through the Medical Officers of Health (MOHs) and Public Health Midwives (PHMs) has been in operation for several decades. The IDA control programme is part of a wider programme of Maternal and Child Health (MCH) and is carried out primarily through the antenatal and postnatal clinics for pregnant women and lactating mothers. These clinics are generally held weekly or monthly. The wide out-reach of these antenatal clinics provide opportunities for pregnant women even in remote areas to establish contact with the PHMs. The PHMs conduct a wide range of activities related to maternal nutrition, immunisation, family planning and other areas. They have to conduct the IDA control programme along with the above activities.

The reasons for starting the IDA control programme several decades ago included the high prevalence of iron deficiency anaemia (IDA) in pregnant women and its adverse impact on maternal and foetal wellbeing. Although this programme has been in operation for a long period the prevalence of IDA amongst pregnant mothers is still high (1). Also, the rates of maternal mortality and other indices calls for an examination of the effectiveness of the IDA control programme (2).

The Anaemia Control Project of the Ministry of Plan Implementation and Parliamentary Affairs decided to look into some areas of the existing IDA control programme. This manuscript deals with the supply and demand of haematinics and other supplements. It is arranged in three parts. Part A deals with issues pertaining to the supply side and Part B deals with issues dealing with the demand side. Part C deals with recommendations that are made from Parts A and B. In some areas the divide between supply and demand is not clear. A question and answer format is followed in the manuscript.

Objectives

The broad objective of the present study was to look into the supply and demand of haematinics and other supplements in the IDA control programme carried out through the MOH and PHM clinics for pregnant and lactating mothers.

Part A - Supply Issues

Specific Objectives

The following questions about the supplements were asked:

1. What are the drugs supplied?
2. What is the estimation procedure?
3. What is the supply route?
4. What is the position on supplies, issues and stocks in the stores?
5. What are the facilities for storage, problems in storage and distribution?
6. What is the condition of the drugs?
7. What is the extent of the problem of unsatisfactory drugs?
8. Is there non-availability?
9. Are their any mechanisms for monitoring and reporting?
10. What is the level of staffing and their training?

1. Executive Director, Marga Institute (Sri Lanka Centre for Development Studies) P.O.Box 601, 93/10, Dutugemunu Street, Kirilapone, Colombo 6, Sri Lanka.

Methods

The study carried out in April 1998 covered seven provinces *viz.* Western, Central, Southern, North Western, North Central, Uva and Sabaragamuwa. The North and Eastern provinces had to be excluded because of the war. Information was gathered by interviewing the experts based in Colombo, by visiting the MOH and PHM clinics in the provinces, interviewing MOHs and PHMs, sample survey of drug stores, interviewing pharmacists, and by talking to patients and people in the community.

A survey of a sample of stores was carried out in seven provinces as shown in the chart below.

Central level	2 (*ie.* MSD & FHB)
(MSD =Medical Supplies Division,	
FHB = Family Health Bureau)	
District level (District Drug	
Stores, DDS)	14
MOH level (MOH stores)	28
PHM level (PHM stores)	112
Total	156

Two DDS were selected in each province, one in proximity to the provincial capital and the other some distance away. This criterion was applied in the selection of MOH areas as well. Four MOH areas were selected from each province and 16 PHMs per province. This was done to include stores from both urban and rural areas.

The supply, storage and distribution was examined from the level of the MSD, *ie.* the central supplier, to the level of the antenatal mother who forms the peripheral point of utilization.

Apart from the methods described above, further notes on methods are given (where relevant) under the individual questions.

The study excluded the hospitals as utilizers of supplements.

Results and Discussion

The results are presented in the same order of the objectives.

1. What are the drugs supplied?

The information was obtained from officials of the MSD and the FHB. The iron supplements distributed at the MOH/PHM clinics comprise tablets of ferrous sulphate (200mg each), folic acid (5 mg each) and Vitamin C (500 mg each). These together with mebendazole (100 mg each) and chloroquine (150mg base) given in malarious areas, form the package of iron supplements and related drugs which are distributed from the MSD. The FHB distributes a combined tablet of ferrous sulphate (200mg) + folic acid (5mg), Vitamin C (500mg) and mebendazole (100mg), all donated by the UNICEF. The combined tablet will be referred to as the iron-folate tablet. When the word supplement is used it refers to the above mentioned tablets supplied from both the MSD and the FHB.

2. What is the estimation procedure?

The information was obtained by interviewing officials of the MSD, FHB and Deputy Provincial Directors of Health Services (DPDHSs) and the MOHs. The procedure in estimation of drugs followed by the MSD is documented in detail in the Manual of Management of Drugs (3). Although the estimation procedure is well documented, problems have arisen because of various deficiencies with regard to estimation and the supply of drugs. The MSD gets its drugs through the State Pharmaceuticals Corporation (SPC) which is the sole importer of drugs for the State sector. The order for the purchase of haematinics has to be placed with the SPC about 10 months in advance. The MSD estimates its requirements in advance by use of the annual estimate books.

The MOHs have to draw up a consolidated schedule from reports of requirements from the PHMs who are expected to report the number of mothers at the clinics during the year and the iron

supplements distributed. The district estimate is a consolidated statement of estimates by MOHs and the hospitals. In practice the reporting is delayed along the distribution chain, and as a consequence the MOHs estimates are made without the complete data from the PHMs. The DPDHS at the district level estimates without the full compliment of reports that are due. In fact some of them averred that they get less than 75% of the reports when they make the estimates. The errors pile up until it reaches the MSD. In addition to the estimates coming from the provinces the MSD considers the issues to the DDS over the past 3 to 4 years and the stocks in hand and adjusts the requirements to arrive at a total requirement for the whole island. The MSD places an order with the SPC for the supply of the drugs. The SPC follows a tender procedure, to purchase the drugs.

When it comes to issues the MSD is compelled to keep to its estimates and not to base it on the estimate of requirements submitted several months after placing the order. The MSD maintains a buffer stock adequate for 2 to 3 months to accommodate delays in the receipt of supplies from the SPC but this cannot accommodate the shortages which can occur.

Due to the deficiencies in the estimation procedure, problems in the supply and to various other reasons, shortages of drugs occur. This is illustrated in the following example from the MSD in respect of the supply of folic acid tablets for a three year period (Table 1).

The FHB distributes the UNICEF donations of the iron-folate, Vitamin C and mebendazole tablets to mothers attending the MCH clinics. The allocation for each year is known only at the end of the first quarter, *ie.*, in March of each year. In the past the FHB supplies have bridged the gap in the MOH/PHM requirements and the MSD supplies. In recent years the supply from this route has been curtailed.

3. What is the supply route?

The drugs are supplied to the MSD by the SPC. The supplies from the SPC should come as two instalments. From the MSD the drugs are distributed to the DDS in quarterly instalments. From the DDS the drugs are further distributed to the MOHs. The FHB routes its drugs also through the DDS to the MOH/PHMs. In practice the delivery schedule is often not maintained. Transport, fuel allocations, overtime payments, shortage of staff are some of the restrictions which affect the delivery system.

Table 1

Requirements and issues of folic acid tablets from the MSD

	1995	1996	1997
1. According to forecast by MSD	55.0*	55.0	50.0
2. Estimates of requirements from DDS and Teaching Hospitals	60.0	53.0	60.0
3. Issues by MSD to DDS and Teaching Hospitals	55.0	52.0	51.0
4. Gap between requirements and issues	5.0	1.0	9.0

DDS = District Drug Stores
* These numbers are in millions of tablets
ie. 55 = 55 million tablets

4. What is the position on supplies, issues and stocks in the stores?

Altogether 14 DDS, 28 MOH stores and stores of 112 PHMs were examined in this study. The focus is on the aspects which affect the IDA control of the MCH programme. The information was mainly obtained from the officers of the DDS, MOHs and PHMs.

The study examined the figures of receipts, issues and year end balances for one year (*ie.* 1997) with respect to the iron-folate tablet supplied by the FHB and the ferrous sulphate, folic acid and

Vitamin C tablets supplied by the MSD. The details about receipts of the tablets from the FHB and MSD (Table 2), issues from DDS and MOH stores (Table 3) and the balance stocks in DDS and MOH stores (Table 4) are given. The carry over from the previous year (1996) is given in Table 5.

When the year's performance is considered the movement of supplies appears to meet the requirements in some areas, but even then there are severe shortages in other areas. Approximate figures derived from data from the records of the DDS and MOH stores provide a broad indication of how such shortages can occur. What is also revealing is the high carry over balances in some stores in respect of some of the drugs where receipts had bunched up towards the end of the year in both the DDS and the MOH stores.

The FHB issues in 1997 totalled 26 million tablets of iron-folate, Vitamin C and mebendazole. These were stocks received in 1996 and no drugs had been received in 1997. However, calcium lactate was out of stock throughout 1997 and the iron-folate tablet was not available at the time of the study.

Table 2

Receipts of supplements by 2 DDS and 4 MOH Stores for the year 1997

		WP	CP	SP	NWP	NCP	Uva	Sab
DDS (2 per Province)								
1.	Iron-folate	900*	1820	985	1000	58	2220	833
2.	Vitamin C	8366	5743	4906	4600	4209	6279	5084
3.	Ferrous sulphate	27	6114	3821	3700	6388	2093	1571
4.	Folic Acid	7073	5009	2446	2	4146	2100	12672
MOH Stores (4 per Province)								
1.	Iron-folate	150	202	354	149	135	390	330
2.	Vitamin C	539	463	403	649	240	559	840
3.	Ferrous sulphate	491	360	175	260	50	60	539
4.	Folic Acid	427	113	50	290	100	60	740

Iron-folate refers to the combined ferrous sulphate and folic acid tablet.

WP = Western Province; CP = Central Province; SP Southern Province

NWP = North Western Province; NCP = North Central Province

Uva = Uva Province; Sab = Sabaragamuwa Province

* These numbers refer to tablets in their thousands.
ie 900 means 900,000 tablets.

Table 3

Issues of supplements by 2 DDS and 4 MOH stores for the year 1997

		WP	CP	SP	NWP	NCP	Uva	Sab
DDS (2 per Province)								
1.	Iron-folate	900*	1880	388	1000	105	2030	679
2.	Vitamin C	8056	4557	4026	3229	6297	4930	3461
3.	Ferrous sulphate	26	4406	2590	2471	10238	1590	1266
4.	Folic Acid	6630	3810	1197	2	3404	1610	10163
MOH Stores (4 per Province)								
1.	Iron-folate	170	206	288	184	195	335	228
2.	Vitamin C	537	404	1210	470	248	560	642
3.	Ferrous sulphate	631	197	118	255	72	60	478
4.	Folic Acid	484	100	25	235	90	30	637

The abbreviations used here are described in Table 2.
* These numbers refer to tablets in their thousands.
ie 900 means 900,000 tablets.

Table 4
Year end balance of supplements for 1997

Balance stocks (in thousands of tablets)

		WP	CP	SP	NWP	NCP	Uva	Sab
DDS (2 per Province)								
1.	Iron-folate	0	240*	647	0	0	190	50
2.	Vitamin C	1058	1195	880	1371	1579	1343	1623
3.	Ferrous sulphate	2	1791	1131	1229	11948	2105	348
4.	Folic acid	2967	1536	1279	0	891	934	2798
MOH Stores (4 per Province)								
1.	Iron-folate	0	53	66	9	152	243	126
2.	Vitamin C	9	59	57	45	39	151	200
3.	Ferrous sulphate	109	163	57	5	56	0	87
4.	Folic Acid	146	54	25	84	52	30	93

The abbreviations used here are described in Table 2.
* These numbers refer to tablets in their thousands.
ie 240 is 240,000 tablets.

Table 5

Carry over of supplements from the year 1996

		WP	CP	SP	NWP	NCP	Uva	Sab
DDS (2 per Province)								
1.	Iron-folate	0	300*	0	0	47	0	204
2.	Vitamin C	748	9	0	0	3667	6	0
3.	Ferrous sulphate	1	83	0	0	11970	1602	43
4.	Folic Acid	2524	337	30	0	149	444	289
MOH Stores (4 per Province)								
1.	Iron-folate	20	57	0	34	212	188	24
2.	Vitamin C	7	0	864	47	47	152	0
3.	Ferrous sulphate	249	0	0	0	78	0	26
4.	Folic Acid	203	41	0	29	42	0	0

The abbreviations used here are described in Table 2.

* These numbers refer to tablets in their thousands.
ie 300 is 300,000 tablets.

From the data given in these Tables an average month's issue based on the years issues for 1997 was calculated. This was used to arrive at the number of months for which the DDS and the MOH stores in the sample could supply iron supplements from the total balance stock as at end of 1997. This data is given in Table 6.

The situation was very uneven and excessive stocks were being carried by some DDS and MOH stores, while others had virtually run out of stocks, and these latter would undoubtedly have experienced shortages in the first months of the year. They did in fact experience some shortages but some supplies from the MSD buffer stocks and from neighbouring stores had helped them to tide over the first quarter.

The stocks at the year end did not necessarily prevent shortages within the year. The uneven supplies throughout the year did result in periods of shortages as was evident in the discussion with the PHMs. It often happened that supplies peaked towards the end of the year.

Some unusual features in the supply system in 1997 was seen in relation to estimates of requirements, which explained a part of the high stock balances in some provinces. This arose from the differences in the dosages of the iron supplements distributed to mothers. A circular from the Ministry of Health in November 1996, stipulated a set of two tablets of the iron-folate or, if separate ferrous sulphate and folic acid were given, two tablets of ferrous sulphate totalling 400mg, two tablets of folic acid together with two tablets of Vitamin C to be distributed to mothers at the clinics. Some of the DPDHS offices followed this circular and submitted new enhanced requirements for 6 months to the MSD and received supplies from MSD buffer stocks. Interviews with the DDS store officers which received these excessive stocks maintained that since these higher dosages were not well received

Table 6

The calculated number of extra months for which stocks at hand would be adequate (this is an estimate only)

		WP	CP	SP	NWP	NCP	Uva	Sab
DDS (2 per Province)								
1.	Iron-folate	0	1*	23	0	0	1	0
2.	Vitamin C	0.5	3	3	5	3	3	5
3.	Ferrous sulphate	1	5	5	4	14	16	3
4.	Folic Acid	5	5	13	0	3	7	3
MOH Stores (4 per Province)								
1.	Iron-folate	0	3	3	0	10	9	6
2.	Vitamin C	0	2	0	1	2	3	4
3.	Ferrous sulphate	2	10	6	0	9	0	2
4.	Folic Acid	3	7	12	4	6	10	1.5

The abbreviations used here are described Table 2.
* These numbers refer to tablets in their thousands.
ie 1 is 1000 tablets.

by the mothers, the PHMs continued to issue the earlier doses and the stocks piled up. These will now be utilised for 1998. The other explanation for having high end of year stock balances was that the FHB moved out its supplies of the iron-folate tablet to the provinces since they were close to the date of expiry. The stores issued the FHB supplies and retained the MSD supplies to avoid rejection and wastage of drugs left after the date of expiry.

5. What are the facilities for storage, problems in storage and distribution?

Condition of stores and stores management practices

Fifteen items were checked to assess the condition of a store. This will be referred to as the scale of store conditions. It included construction aspects, space, lighting and ventilation, cleanliness, storage practices (such as stacking system, labelling arrangements to facilitate issues), checks to protect from pests and termites and prevent damage from heat and sunlight.

The MSD probably has the best facilities and standards. Limitation of space was a problem there also. The stacking arrangements and separation of the drugs past their date of expiry from others was not satisfactory.

On the scale of store conditions with a maximum score of 16, among the DDS, 8 out of 14 stores scored 12 points and over; 5 stores scored 11 points each and 2 stores scored 9 points each, from a maximum of 15 points. The DDS located close to the capital of each province was in a somewhat better condition than those in the re-

moter areas. In general, a mean score of 12 and over was obtained by 10 out of 28 MOH stores, 10 stores had a score of 11 each, and 8 had a score under 11. The MOH stores in the rural areas were less crowded (compared to those in urban areas) and there was less pressure on space and management. They depended to a large extent on obtaining *ad hoc* supplies from the DDS.

All stores were required to maintain a stock recording system and all stores examined met this requirement. However, the stock verifications were not conducted according to the requirements. Some stores had not completed stock taking due at the end of 1997, at the time of the survey which was in April 1998. There were lapses in stores inspection also. Twelve out of 14 DDS and 21 out of 28 MOH stores stated that they had regular inspections of stores. There is a stipulation that a stores inspection be done every month. Many of the stores had inspections about twice a year only. Two of the DDS and seven MOH stores had no regular inspections.

PHM stores

PHM stores comprised a wooden or steel cabinet or cupboard in which small quantities of iron supplements and other drugs used in the clinic were kept. Some of the PHMs, particularly those in the rural areas, drew their supplies from the MOH stores just prior to conducting the clinic.

Problems in supply, storage and distribution

While the FHB was receiving reduced supplies of iron supplements, the MSD had to deal with increasing quantities of drugs being channelled through it. While the central supply system has its own problems the DDS, MOH stores and the minimal storage facilities at the PHM level reflected the effect of these problems. These added to the problems that existed in the periphery. Shortage of staff and space causes difficulties in handling the supplies properly. A systematic schedule of supply could not be implemented because of the severe shortage of transport facilities. The stores which were more remote from the main urban centres in the provinces faced greater restrictions in receiving drugs, as did the MOH stores.

One of the drawbacks in the FHB supply had been the supply of set packs which contain a mix of drugs with different expiry dates. Some drugs were outdated when the packs were opened or were very close to the date of expiry. Those outdated had to be destroyed while those having close dates of expiry had to be dispatched quickly to the regions. This practice, at times, flooded the DDS leading to problems in storage and ended in wastage. In 1997 the FHB had to destroy 2 million tablets of the iron-folate tablet which were outdated and found to be unsatisfactory on receipt.

The MOH it was said, quite often had to collect drugs from the DDS in their vehicles. MOH stores in 4 provinces maintained that often there were shortages of at least one of the iron supplements with the DDS. The DDS however stated that at times (last year) there was an over supply, when the combined iron-folate supplies from the UNICEF had to be accommodated. At such times, supplements go waste because of inadequate facilities in the stores.

6. What is the condition of the drugs?

This information was obtained by interviewing the officers in the DDS, MOHs, PHMs and antenatal mothers. The inquiry related to the type of packaging, whether plastic containers, aluminium packs, tins or glass bottles or loose, the condition of the packging, whether intact or damaged, whether labelling was in place and lastly the condition of the tablets. Tablets could not be examined since it was not planned to open the packages. Except for two district stores, in all the other DDS and MOH stores the drugs were in some form of packs. In one DDS mebendazole was not in packs and in another chloroquine was not in packs. There was evidence of damage or spoilage in certain packs and the label was also not intact in some instances. The details about the drugs which were in an unsatisfactory condition are given in Table 7.

Table 7

Details of unsatisfactory tablets

DDS Stores (n = 14)

	Drug	Bad packing	Labelling	Unsatisfactory condition of tablets
1.	Iron-folate	2	2	8
2.	Vitamin C	1	1	5
3.	Mebendazole	0	0	6
4.	Chloroquine	2	3	6
5.	Ferrous sulphate	5	5	10
6.	Folic Acid	6	6	9

MOH Stores (n = 28)

	Drug	Bad packing	Labelling	Unsatisfactory condition of tablets
1.	Iron-folate	10	11	12
2.	Vitamin C	2	2	3
3.	Mebendazole	3	3	4
4.	Chloroquine	21	22	22
5.	Ferrous sulphate	15	13	15
6.	Folic Acid	15	15	15

n = number of stores.

A majority of the PHMs had iron supplements, loose, in polythene bags, tins or plastic containers which were placed in a cardboard box or placed in a cupboard. The container was not air tight. In one office the iron tablets were found to be discoloured and in another the iron-folate tablet had the sugar coating cracked and spotted. One office had iron tablets which were past the date of expiry but which were not rejected.

The PHMs received the tablets in bulk. Except for a few PHMs in one MOH area in the central province who stated that they pack tablets in polythene bags, others either instructed the mothers to bring bottles to take the tablets (the majority) or the drugs were given wrapped in paper (the minority).

7. What is the extent of the problem of unsatisfactory drugs?

Quality tests are not done regularly. At MSD tests are requested if there is suspicion about quality. Also quality tests are done as part of a standard procedure prior to condemning and destroying. The following information about drugs found to be unsatisfactory in 1997 were obtained.

In the DDS

651,000 tablets of iron-folate and 22,000 chloroquine tablets rejected in the Western province; 200,000 tablets of iron-folate in the Central province; 116,000 tablets of chloroquine in the Sabaragamuwa province.

In the MOH stores

134,000 tablets of iron-folate in the Uva province; 22,000 tablets of iron-folate in the Southern province; 1000 tablets of Vitamin C in the North Central province. Further information about the rejections and the reasons for rejection during 1997 are given in Table 8. Six out of 14 DDS had some wastage of iron supplements last year. Quantities were not available to the investigators at the time of the survey.

Table 8

Rejections within the past year and reasons for rejection

Province	PHMs	Rejected drugs	Reasons
Western	5	Fe sulphate 1000 Folic acid 4000 Vit. C 500 Calcium 1000 Mebendazole 1000	Past expiry date, spoilt or disintegrated
Central	3	Iron-folate 6000	Damaged
Southern	6	Fe sulphate 2000	Crushed, spotted or outdated
North Western	1	Fe sulphate	Dissolved
North Central	4	Iron-folate, Calcium &	Damaged
	6	Vitamin C 1000 Fe sulphate 1100 Fe sulphate 1100	Damaged
Uva	6	Fe sulphate	Crushed and powdered
Sabaragamuwa	3	Fe sulphate 4000 Iron-folate 3000	Crushed and powdered

When drugs are received with short expiry dates there is wastage. This has happened with the iron-folate tablet. It was stated by some MOHs that when quality tests are requested sometimes they take up to 3 months by which time the drugs have been issued to the mothers.

Some of the reasons for wastage included damage as a result of pest infection, broken glass containers and pieces of glass mixing with tablets, lack of refrigeration facilities and damage due to adverse climate. The coated iron tablets tend to crack, dissolve and stick together due to the high temperatures, especially in the North Western, North Central, Uva and the Sabaragamuwa provinces. In one instance a batch of chloroquine tablets was received after the date of expiry. The MOHs were asked if they checked the iron supplements in the PHM stores for quality and 19 out of 28 stated that they do not. Out of those who checked, only one of them had found any supplements in unsatisfactory condition within the past year.

8. Is there non-availability?

Definite data on shortages could not be obtained from all stores. One province reported a shortage of Vitamin C tablets for the last three months because of a shortage at the MSD. The reason why acute shortages are not felt is that the medical officers check from hospitals and other stores, even in other districts, and collect whatever is available to tide over the period of shortage, Some mothers, during discussion with the investigators spoke about shortages of iron supplements for varying periods. Sometimes they had been instructed to buy the tablets from the retail market. The Western Province, North Central Province and the Sabaragamuwa Province PHMs in the sample stated that they were distributing the iron-folate tablet and Vitamin C tablet to all the mothers. In the other provinces there was a temporary shortage of Vitamin C and in some they were short of mebendazole.

Recalling the situation in the past year, non-availability of certain drugs were reported by the sampled PHMs. This information is given in Table 9.

9. Are there any mechanisms for monitoring and reporting?

While accounting procedures are laid down in the public sector, and accounts are submitted for regular auditing, a statistical reporting system can facilitate monitoring by providing early signals of impending shortages, movement of stocks according to expiry dates and quality checks. Out of the DDS, only the Western and Southern DDS had a statistical reporting system. The Ratnapura DDS and the Kandy DDS are stated to have such reporting systems also. The reason given for not having a statistical reporting system was that the storekeeper was overloaded with accounting, receiving, issuing and stores management. If regular record keeping is to be done, assistants would be needed.

Out of the 6 DDS that had such a system one assessed the system as not functioning satisfactorily. Out of the 6 DDS only 4 used a standard form for reporting and only four submitted statistical reports along with the resupply orders.

In the case of MOH stores, only 16 out of 28 stores maintained a statistical reporting system. Of these 15 were functioning satisfactorily according to the assessment of the officers in charge. However, only 5 out of the 16 were using a standard reporting form, and 8 out of 16 were submitting the statistical reports along with the resupply orders. Shortage of staff was given as the reason in all cases for not having a scheme of statistical reporting. Lack of a computerised system could have deterred these stores from launching out on a system of maintaining voluminous and cumbersome written records. Sometimes the stores which had a satisfactory statistical and reporting system did not utilize it for purposes of resupply.

10. What is the level of staffing and their training?

In the MOH stores, 23 out of 28 had a stores clerk in charge of the store. In three stores the MOH managed the store and in 2 the store was managed by a public health nursing sister. In 20% of

the MOH stores the clerk, the PHM and the MOHs did not have sufficient knowledge about stores management. Out of 14 DDS storekeepers only 10 had been trained after recruitment and of those in MOH stores only 2 out of 22 have had training. These were mainly short training courses of a week or so at most, with only 2 DDS storekeepers and 1 MOH storekeeper with a one month course in training. Six of the DDS storekeepers were trained outside, that too mainly in administration aspects, while the rest had in service training at the MSD or the FHB. They could not be expected to be sensitive to the storage requirements for drugs and equipment. There was no evidence from the discussion with officials that the expertise required and the quality of training demanded was being adequately recognised. An expert on stores stated that simple principles such as storing Vitamin C away from contact with metal, care in stacking heavy loads on drugs packed in glass containers, keeping sugar coated ferrous sulphate tablets away from the heat were not adhered to because of the lack of knowledge. There is a need to increase the cadre of pharmacists and to provide better training to storekeepers.

Table 9

Non-availability of drugs as reported by the PHMs

1.	Western Province	8 PHMs	Iron-Folate & Vitamin C tablets
2.	Central Province	1 PHM	Iron-Folate
		8 PHMs	Fe sulphate, calcium & Vit. C
3.	Southern Province	7 PHMs	Fe sulphate & Folic acid
		4 PHMs	Vitamin C & mebendazole
4.	North Western Province	4 PHMs	Fe sulphate & Vit. C
		7 PHMs	Vitamin C & Folic acid
5.	North Central Province	4 PHMs	Fe Sulphate & Folic acid Vit. C mebendazole & chloroquine
		2 PHMs	Mebendazole, calcium, Vitamin C & chloroquine
6.	Uva Province	1 PHM	Iron-Folate
7.	Sabaragamuwa	7 PHMs	Fe Sulphate, & Vit. C

Conclusions

The weaknesses in the supply system flowed down in a chain effect from the central supplier to the PHM in the periphery. The weaknesses also reached up, starting at the periphery in a vicious cycle. The central problem cited was the inevitable financial constraints which affect the quantum of supplements procured in the first place and went further to affect storage and distribution, number and quality of staff and transport. The year's supplies, did ultimately reach the region, but haphazardly and unevenly. This system generated shortages and left wide gaps in reaching the ultimate consumer, the antenatal mother. While supplies could catch up, mothers could not catch up on the lapses by consuming extra supplements when supplies come in. If a continuous regime of administering iron supplements is a necessary precondition for reduction of anaemia, the current regime is mostly ineffective.

It is also important that the supplements be administered in a stipulated form. The uneven supply affected the different drugs in the package of supplements. The correct mix for effective treatment was not being administered because of the deficiencies in supply.

Given these limitations, in a third world country which is providing universal free health, there are several key areas which, if addressed systematically, could minimise the effects of resource limitations. The entire system needs close examination to identify the links in the chain which need strengthening, which can improve with coordination, where a closer supervision could eliminate unnecessary wastage and where staff motivation could effect better management.

Even on the limited data which this survey obtained, in 1997, a minimum of 3 million of iron-folate tablets, 2 million of ferrous sulphate tablets, 14000 of Vitamin C tablets, 138000 of chloroquine tablets and about 5000 of folic acid tablets had to be rejected. For a majority of these handling, transport, storage and in the case of the FHB additional funds for freight have been incurred in addition to the cost of drugs. In the light of financial constraints on the one hand and inadequate supplies to meet the needs of anaemic mothers on the other, there is an urgent need to study the process intensively to avoid such wastage. The recommendations made, take account of the financial constraints, which would deter heavy cost escalations.

Part B

Demand Issues

Demand is related to awareness and knowledge. The efficiency of implementation of the IDA control programme was considered as a reflection of the demand.

Specific objectives

The following issues about the demand for haematinics were investigated.

1. What is the state of implementation of the IDA control programme for pregnant and lactating mothers?
2. What is the level of knowledge, and the compliance to the supplements amongst mothers attending antenatal clinics?
3. Is the training adequate and what are the training needs of personnel who implement the IDA control programme.
4. What is the state of knowledge and is there access to information, education and communication (IEC) material for health personnel?
5. What is the level of knowledge and awareness about IDA in the community.
6. How does the PHMs see the IDA control programme.

Methods

Details of the nature and impact of the IDA programme were canvassed from the MOHs and PHMs through questionnaires and dialogue, and

awareness and knowledge from focus group discussions with mothers who attended the clinics. There were about 112 focus groups approximating 1000 mothers and 56 community groups comprising approximately 1000 members of the community. The community groups were organized with an attempt to reflect two social groups in each MOH area, one comprising the younger and the more educated and the other, an older less educated group.

Results and Discussion

1. What is the state of implementation of the IDA control programme for pregnant and lactating mothers?

Information gathered from the service providers (*ie.* MOHs and PHMs) and the consumers (*ie.* the antenatal mothers) on several aspects of the IDA control program is presented here.

Among the MOHs 86% were conducting regular clinics and 14% were not regular. The MOHs and the PHMs in their responses about the services provided by the clinics for IDA control, mentioned clinical assessment, IEC, and administering supplements. Laboratory tests were carried out only in three MOH areas. Iron supplements and deworming tablets were given to all pregnant women in the clinics. Generally, supplements are given for a month; the regular pack being 60 tablets of ferrous sulphate, 30 tablets of folic acid and 30 tablets of Vitamin C per month. As stated previously the drugs are not uniformly given in all MOH areas. The PHM is expected to carry out sensitization and awareness raising programmes related to many aspects of health, including anaemia, among the mothers who attend the clinics. Only about half the MOHs and half the PHMs stated that anaemia is diagnosed and severe cases identified although they were not singled out for treatment.

Some special programmes for IDA control were conducted by 78% of MOHs with the assistance of other health workers and health volunteers for schools, estates and the community. These were mainly in the North Western, Sabaragamuwa, Central, and Uva provinces. While iron supplements were distributed in some of these programmes others were restricted to deworming, and talks given by health workers.

Although iron supplements are given to mothers throughout their pregnancy no monitoring of the impact is done even through physical assessment. Out of the MOHs 89% stated that diagnostic facilities as well as skilled staff are often not available for monitoring, or even diagnosing at the beginning of the pregnancy. Facilities are inadequate for testing for malaria and worm infections also.

The drug supply system did not always meet the needs of the clinics. According to 36% of MOHs, the supply is not regular and inadequate. Another 14% MOHs averred that drugs supplied were sometimes outdated and thought that they were of poor quality. The PHMs had not commented on the quality of drugs but stated that there were shortages (29% stating that shortages were seen quite often, and 30% stating that shortages were seen sometimes).

Mothers' groups confirmed the occurrence of shortages of supplements. Approximately 22% of 112 groups (each with about 10 mothers and at least one in a group responding) agreed that they experienced shortages during the last year and were instructed to purchase iron tablets from private pharmacies. These cost about Rs. 150/= per month. One mother who had to purchase iron tablets for 6 months of her pregnancy was buying only half of the stated amounts as she could not afford it. Mothers who could not tolerate the ferrous sulphate tablets given in the clinics were at times instructed to buy preparations from the private pharmacies. There was a perception that the preparations which were bought from the pharmacies were better tolerated at least in the early months of pregnancy.

2. What is the level of knowledge, and the compliance to the supplements amongst mothers attending antenatal clinics?

While in casual conversation most MOHs and PHMs stated that non-compliance of mothers as

an unsurmountable hurdle in IDA control, when a direct question was asked 72% of PHMs stated that mothers follow their instructions. Non-compliance because of inadequate knowledge of benefits was averred by 25% of MOHs and 14% PHMS, and fear of side effects by 36% MOHs and 9% PHMs. The influence of the family elders in dissuading the mothers was considered minimal. However, 10% of PHMs found that mothers simply forget to take the supplements daily in the rush of the other responsibilities and work in and outside the house.

On inquiry from mothers, 72% of the mothers' groups stated that they had taken it daily while 27% had taken it irregularly once or twice a week. The mothers' awareness of benefit of iron supplements was reflected in the responses by mother' groups. About 54% thought it improved the blood, 52% that it nourishes the baby and 22% of groups thought that it was good for the health of the mother and the baby. The mothers themselves did not perceive a lack of knowledge, only 2 groups stated this as a reason for non-compliance, but 27% thought it was not important, 20% forgot, 6% feared side effects and 3% had side effects.

A disturbing finding is the statement by 28% of the mothers' groups that they could not take the supplements because they were crushed, spoilt or misplaced. About 28% of mothers had received iron supplements in loose polythene bags, about 6% in bottles and the balance received it wrapped in pieces of paper. Majority of the mothers kept the tablets in plastic bottles at home. Some mothers stated that even when kept in plastic bottles the tablets tend to dissolve in the heat half way through the month. One mother stated that the condition of the tablets is so poor that these were thrown under the bush as she alighted from the bus.

Mothers who obtained tablets other than iron supplements were at times confused about the schedule. Most of them stated that calcium had to be taken in the morning. But 14% of the mothers' groups were not aware what the other tablets were and how they had to be taken. With regard to iron tablets, 36% were not told why they had to take iron supplements, nor were they cautioned about side effects. Sometimes the lack of uniformity in the messages caused confusion amongst the PHMs and mothers. For example there was a period during which some of the MOH areas were distributing 60 tablets of ferrous sulphate, 30 tablets of folate, 30 tablets of Vitamin C while others were giving 30 tablets of each kind per month.

Most of the mothers had received supplements from the PHM but about 30% had received them from the hospital doctor, while about 10% had received from both the PHM and the hospital. It is known that mothers attend hospital clinics as well and obtain supplements. They tend to take the tablets given by the hospital and discard those given in the MOH/PHM clinics.

Discussion with mothers' groups revealed the occurrence of shortages in supply of drugs from time to time. Although these shortages were made good sometime during the year, this practice would not help mothers who had to take the tablets continuously, during the pregnancy. About 45% of mothers' groups experienced several instances of shortages of iron and Vitamin C. When the drugs were not supplied by the clinic they were instructed to purchase them from the pharmacies.

3. Is the training adequate and what are the training needs of personnel who implement the IDA control programme?

The MOHs cited deficiencies in the training of health personnel for IDA control. The training acquired on IDA control by health officials was rated as weak by 32% of MOHs and as moderate by 36%. The MOHs were specific about the weak areas of knowledge of the PHMs. The weakest was the skill for clinical assessment stated by 48% MOHs. While this may not be that critical for administering iron supplements since all mothers are given it anyway, it would deter attempts to have a system of monitoring and evaluation of the IDA control programme and its effects in reducing IDA. Knowledge of iron supplements

was found to be weak by 18% of MOHS, knowledge of causes of anaemia by 21%, knowledge of treatment by 20%, knowledge on prevention by 25% and of ancillary causes by 29%.

The PHMs admitted to weaknesses in training and knowledge. Their knowledge in aspects of anaemia control showed that 55% felt they had an adequate knowledge of iron supplements but 45% felt they had not. Again 26% had inadequate knowledge of correct dosages of iron supplements and 90% stated that their knowledge of side effects of iron supplements as inadequate. It was stated that an anaemia control programme is being carried out and it has been completed in some of the MOH areas in the sample but this was not referred to in any of the interviews with the PHMs. This implied a lack of knowledge about the IDA control programme.

Training opportunities in this respect of health care was stated to be inadequate by 39% of PHMs, while 44% of them highlighted the need for refresher courses.

4. What is the state of knowledge and is there access to information, education and communication (IEC) material for health personnel?

Nearly all PHMs (94%) stated they had not seen a handbook on anaemia control since they assumed work and 71% had no access to education material. The MOHs (79%) commented on this aspect of the lack of adequate material with 50% stating that what was available was not attractive and 53% stated they were not adequately displayed for PHMs and mothers to benefit.

5. What is the level of knowledge and awareness about IDA amongst MOHs, PHMs and in the community?

The majority of the MOHs (93%) perceived anaemia as not so serious. About 74% of PHMs had listed anaemia as a major health problem in their area. Again more than a quarter of the PHMs did not think anaemia as a serious problem amongst pregnant and lactating women. There was lack of awareness of the gravity of the problem and also that it was reversible with the administration of supplements and by educating the mothers on diet.

Some inquiry was made to get an idea of the knowledge of the community about iron deficiency anaemia. Most of the people, when asked, were not aware of a problem of anaemia, but had heard of blood being affected by hookworm infection. The signs and symptoms were described as dry skin, biting of nails, eating raw rice and eating sand. Some of them knew the signs as pale skin, pale eyes and tongue. The younger and the more educated groups gave the latter answers.

Most of them knew about anaemia in pregnancy but only a few of them had connected the problem with infants, preschoolers and adolescents.

They were not aware of the causes of anaemia, the males being less knowledgeable than the females. Poverty, poor housing, unclean surroundings were given by males in the group as causes, and the remedies were improvements in the economic status of the low income groups. Most of the groups gave as remedies for anaemia the same general messages they had gathered in respect of malnutrition. *Triposha* was mentioned by several groups, while red rice, leaf porridge, rice conjee, cod liver oil, soya, goat milk and calcium were mentioned as remedies for anaemia by others.

The source of information differed according to age and education. The younger groups obtained information from the school, posters, newspapers, while the others got this information from the neighbours.

6. How does the PHMs see the IDA control programme?

The PHMs were provided an opportunity to articulate their views on the programme at the end of the discussion. Their responses provided a yardstick by which assessment could be made of the varied interests and capacities of the PHMs in the sample, given the heavy work load and

minimum facilities for travel and home visiting and other constraints within which they are seen to be playing a pivotal role in linking the health system to the community, some with greater enthusiasm and commitment than others. From the interactions with the PHMs it was possible to identify three types of PHMs.

The first type had vague ideas of the potential objectives of the programme, but were ready to continue to attend to the daily tasks at the clinic. The second type showed interest and initiative but their perception of IDA was as one of the services to benefit mothers in some manner which they were not quite sure of. The third type was interested, had realised the need for better training and a more focussed programme for anaemia control. They admitted the limitations in their knowledge of the subject. They were able to provide some constructive suggestions as well. The distribution of the three types of PHMs according to the Provinces is given in Table 10.

Conclusion

The IDA control programme appears to have low priority within the larger and vastly overloaded MCH programme. The PHMs are required to assimilate and dispense a varied mix of health messages, all within a few hours of crowded schedule. Some confusion about the messages disseminated and the treatments given is inevitable in the best of conditions in this kind of environment. The IDA control programme has suffered as a result of this overload. Within these conditions, however, there are ways in which the work can be systematised.

Table 10

Distribution of the different types of midwives (the numbers are percentages)

Province	1st Type	2nd Type	3rd Type
WP	69	25	6
CP	31	19	50
SP	50	38	12
NWP	12	56	32
NCP	56	40	3
Uva	50	38	12
Sab	19	25	56

The abbreviations used here are described in Table 2.

These percentages were derived from total of 16 midwives per province

The weak links between the MOH and the PHM other than in a few instances, left the PHM without supervision and guidance, a need which some of them articulated. The paucity of knowledge regarding the adverse effects of anaemia on mothers and children and of the efficacy of iron supplements in minimising those effects could itself be a factor in the casual manner the IDA control programme was being handled by some of the PHMs. It influenced the way in which the stocks were managed, the tablets given to the mother and the attitude towards mothers compliance.

There appears to be some confusion in their minds about the problem of anaemia itself. Some PHMs in urban areas, who would be expected to be better exposed to knowledge began by stating that there were no anaemia cases in their area, but followed it with a statement that supplements are given to all mothers. With a focus on practical and location-relevant material, the training of PHMs can be made more relevant to the problems they encounter.

The absence of a monitoring system to assess impact affects not only the efficacy of the programme but the interest and the motivation of the care providers, who are denied the satisfaction of savouring the fruits of their labour.

The IEC material should be innovatively designed to convey short terse messages. The awareness programme and the methods used to give information to mothers appears to be ineffective. A more practical approach with suitable recipes for daily meals depending on what is generally available in a location may have more impact than general "talks" on diets and iron rich foods.

IEC material and techniques to raise the level of knowledge, to render it more focussed and specific to IDA are an urgent requirement. Suggestions to maximise the efforts of IDA included involving schools as a catalyst to raise the awareness of the communities. The current IDA programme directed towards pregnant women should be expanded to include a wider population was a suggestion that was made by younger persons. The use of the media with attractive story type messages was preferred rather than talks or lectures. Above all, it was stated that the public should be informed of the adverse effects of anaemia.

The PHMs effort on the IDA control programme requires much more supportive assistance from the community. The health volunteer system which enhances the effectiveness of the PHMs tasks in the community had existed in some areas. However, right now this scheme does not appear to have as much of a presence and a purpose as it had in the past.

Part - C

Recommendations

The study found that several aspects of the iron supplementation component of the IDA control programme need to be reviewed.

Supply Side

1. The MSD and the FHB should devise mechanisms to coordinate their activities in assessing needs and in a schedule of distribution of stocks to the regions.

2. A simple and realistic system of estimating requirements with record keeping commencing at PHM level to facilitate advance information of the requirements should be devised. Since the requirements hinge on the number of mothers that attend each clinic, a simple form to provide this information each month to the MOH should suffice.

3. If the MSD has a realistic forecast made one year ahead by the MOHs the shortfalls between requirements and the supplies could be avoided.

4. A good statistical base is perceived as an urgent need to strengthen the procurement system, minimise delays, shortages and wastage. A computerised network at least at the

Offices of the DPDHS should be considered, to facilitate a service-based assessment of the needs of the MOHs.

5. Within the context of transport shortages which are stated to hinder the implementation of a delivery schedule, alternative systems could still be pursued at least at the MOH/PHM level. The present *ad hoc* system of transport, where during shortages the MOHs have to transport drugs from the DDS in their own vehicles could be systematised and streamlined. This is being done by some MOHs presently. As the MOHs meet the DPDHS and the PHMs meet the MOH a system could be worked out to iron out the distribution problems.

6. Staff training and motivation to improve stores management, particularly at MOH stores could improve the conditions. MOH stores are managed by stores clerks who had served in that capacity for 15 to 20 years. The impression was that they had lost interest in improving their activities.

7. There should be more pharmacists whose services could be utilized in stores management.

8. The basic requirements for pest control should be met. It was lax in some of the DDS and MOH stores where termite damage was seen. Damage possibly from moisture and heat was also evident.

9. PHMs who are required to keep a month's supply of drugs in storage should be provided with an air tight box to keep the packs which have been opened, for use during the month.

10. The different types, strengths and colours of iron supplements cause confusion among PHMs and mothers. The package of tablets that are stipulated is not always available to be given together. To obviate the necessity to change instructions constantly and to enhance compliance by mothers, it is strongly recommended that iron supplements be made in blister packs with daily doses suitably arranged. This ensures protection and reduces spoilage. It should also be sufficiently attractive to motivate compliance.

Demand Side

1. Focussed training programmes should be conducted for health workers in the IDA control programme with specific orientation for conveying knowledge and information effectively to mothers.

2. Establish sentinal sites for monitoring the effectiveness of programme implementation. These could be equipped for haemoglobin estimation, to provide staff training and to establish a regular reporting system.

3. Carry out demonstration projects in one or two locations to demonstrate the running of an effective programme. This could facilitate the development of simple and efficient techniques for all of the activities within an IDA control programme. It could then be adopted and replicated in other locations.

4. Conduct research to determine a practical and effective technique for screening for anaemia in pregnancy.

Acknowledgements

The assistance of the experts attached to the Medical Research Institute, Colombo (Doctors Chandrani Piyasena and Renuka Jayatissa), FHB (Dr. Manikarajah), MSD (Mr. K. Kanagarathnam), Dr. H.M.S.S.D. Herath (former DDG-PHS) and Dr. N. Vidyasagara (former Regional Advisor, MCH, WHO/SEARO) is acknowledged with thanks. The assistance of all the officials who cooperated in this study (the DPDHSs, MOHs, PHMs, the store keepers, pharmacists, antenatal mothers, people in the community focus groups) is gratefully acknowledged. The financial assistance of OMNI (USA) is acknowledged. The assistance of the Ministry of Plan Implementation and Professor T. Wikramanayake is acknowledged with thanks. The assistance of

Dr. R. L. Jayakody in editing the manuscript is acknowledged with thanks. The editing of the original report by Dr. Penny Nestel is gratefully acknowledged.

The input of the research consultants, research assistants and the field investigators is acknowledged with thanks.

The consultants were:

Mr. P. P. M. Gunatilleke
Mr. W. H. Gunatilleke
Mr. K. Jayasinghe

The management team:

Mr. Upali Peiris
Mr. Priyantha Gamini
Ms. C. Kulatunga.

Declaration

This survey report should not be taken as an attempt to make any personal or adverse criticism on a particular individual or any group of health workers. Rather, the author was impressed with unstinting cooperation extended by all the health workers and non health officials, stores officers and for their readiness to provide all the information required to make this study a useful one in rectifying the deficiencies that they identified. It is an investigation undertaken to get some idea on the state of operation, deficiencies and to make recommendations towards improvement. The author, during this study, has come to know the work load and the working conditions of the health workers and appreciates their work which is often conducted under overcrowded conditions with few resources.

Bibiliography

1. Mudalige R, Nestel P. Prevalence of anaemia in Sri Lanka. Ceylon Journal of Medical Science 1996; 39: 9-16
2. Annual Health Bulletin 1997. Government of the Democratic Socialist Republic of Sri Lanka.
3. Manual of Management of Drugs. Ministry of Health and Women's Affairs, Goverment of the Democratic Socialist Republic of Sri Lanka. First Revision, 1993.