No.

STUDY REPORT

ON

THE PROJECT FOR IMPROVEMENT OF THE EQUIPMENT FOR IMMUNIZATION AND MICRONUTRIENT PROGRAM

IN

THE UNITED REPUBLIC OF TANZANIA

February 2000

Japan International Cooperation Agency

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Preface

In response to a request from the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a study on the Project for Improvement of the equipment for Immunization and Micronutrient Program (Grant Aid for Child Health), and entrusted the Japan International Cooperation Agency (JICA) to conduct the study with the assistance of the Japan International Cooperation System (JICS).

JICA sent to Tanzania a study team over the period from October 11 to October 31, 1999.

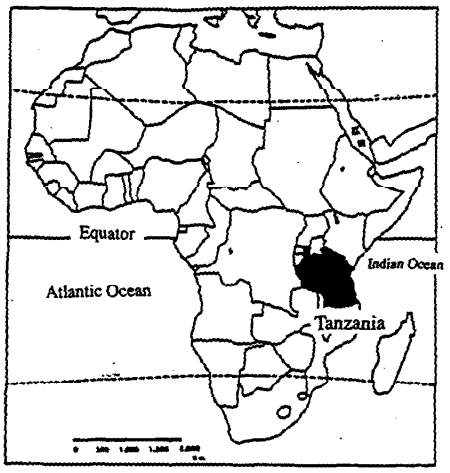
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

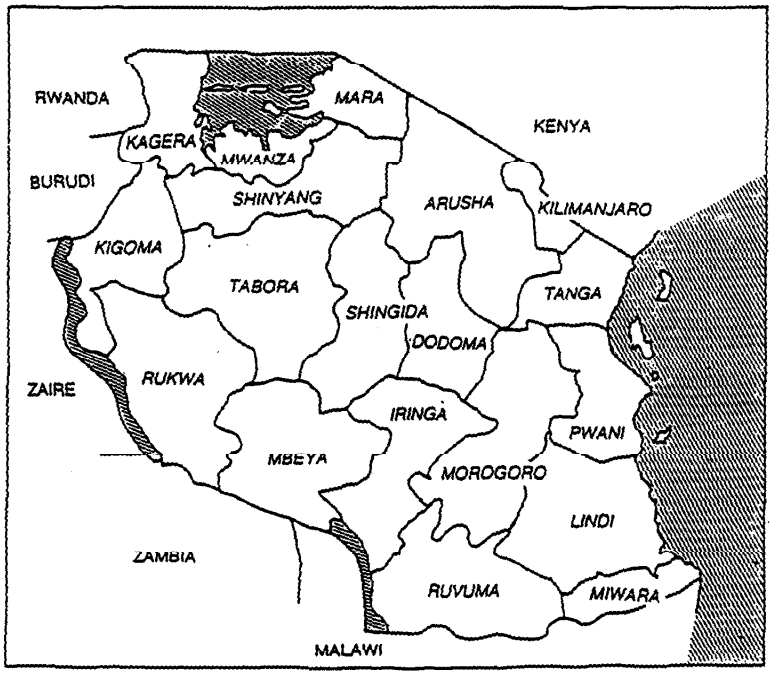
I wish to express my sincere appreciation to the officials concerned of the Government of the United Republic of Tanzania for their close cooperation extended to the team.

February 2000

Kimio Fujita
President
Japan International Cooperation Agency

Location Map





Abbreviations

BCG	Bacillus Calmette-Guérin
CFC	chlorofluorocarbons
DANIDA	Danish International Development Agency
DTP	Diphtheria, Tetanus toxoid, Pertusis Vaccine
EPI	Expanded Program on Immunization
FCC	Food Chemical Codex
GMP	Good Manufacturing Practice
IDD	Iodine Deficiency Disorder
IEC	Information Education Communication
IOC	Iodized Oil Capsule
MCH	Maternal and Child Health
MSD	Medical Supply Department
NCCIDD	National Committee for Control of Iodine Deficiency Disorder
OPV	Oral Polio Vaccine
SIDA	Swedish International Development Authority
TFNC	Tanzania Food and Nutrition Center
TGR	Total Goiter Rate
UNICEF	United Nations Children's Fund
WHO	World Health Organization

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Chapter 1. Background of the Project

In the United Republic of Tanzania (hereinafter referred to as "Tanzania"), the mortality rate for under-fives is 130/1,000, infant mortality rate is 83/1,000 (WHO, 1998), and maternal mortality rate is 530/100,000 (UNICEF, 1997). Of the 193 member nations of World Health Organisation (WHO), Tanzania ranks 33rd in under-5 mortality and 37th in infant mortality. Thus improvement of Maternal and Child Health (MCH) is an important subject.

1-1 Expanded Program on Immunisation (EPI)

The Expanded Program on Immunisation (EPI) formulated by the WHO in 1974 is one of the most effective strategies for the reduction of child mortality. In Tanzania, this program was started in 1975, one year after the EPI was formulated, and vaccinations for poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis, and measles have been implemented throughout the country under the strong initiative of the government of Tanzania with the strong support of the United Nations Children's Fund (UNICEF) and the Danish International Development Agency (DANIDA). Before April 1984 immunisation coverage had been less than 60% except for BCG, but since then there has been a steady improvement, reaching over 80% in 1988 for all vaccines.

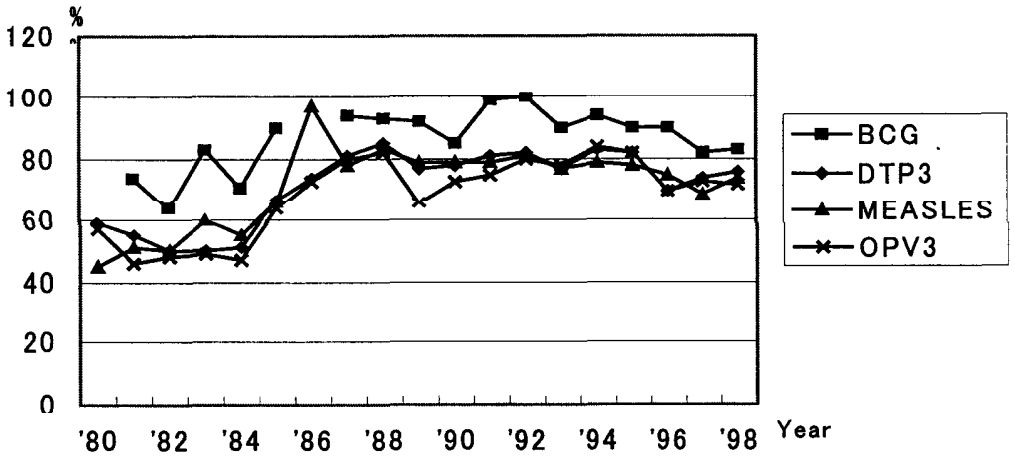


Figure 1-1. Percent of Children Under 1 Receiving Immunization 1980-1998

The vaccine cold chain in Tanzania has improved mainly through the support of DANIDA. However some facilities have discontinued the vaccination service because of old or malfunctioning equipment, and vaccination rates differ from region to region. At the permanent vaccination facilities at present established at 3,544 locations, a total of 3,409 refrigerators are in operation, of which 20% are old, having been in use for fifteen years or more. It is pointed out that the loss of vaccine and increased expenses for spare parts because of malfunction imposes a financial burden.

The MCH clinics providing Mother-and-Child Health (MCH) services started in 1971 are attached to regional or district hospitals, health centres, or dispensaries. In a study conducted in 1992, 96% of

mothers had been examined at the MCH clinics before delivery. At the MCH clinics, nurses, midwives, or MCH aids examine pregnant women and postpartum mothers, assist with deliveries, monitor the weight of infants, and provide family planning services, health education, and vaccination, depending on the level of the health facility. Vaccination is provided on the basis of the WHO guidelines, according to the following timetable. The vaccination timetable is written in the growth-monitoring card of each baby at the time of delivery,.

Table 1-1. Immunisation Timetable

Vaccine	Timetable
BCG	At birth
DPT	6 weeks, 10weeks, 14 weeks
Measles	9 months
OPV	6 weeks, 10 weeks, 14 weeks

1-2 Micronutrient deficiency control

It is an important task facing Tanzania to control micronutrient deficiency disorders which affect the health of children, pregnant women and nursing mothers, in particular iodine deficiency disorders and iron deficiency anaemia which have high morbidity rates.

Iodine deficiency during pregnancy and infancy has undesirable effects such as stillbirth, congenital neuropathy, mental retardation, or growth retardation. A study conducted in the 1980's reported that 40% of the population of Tanzania lived in areas with a high risk of iodine deficiency, and that 25% were suffering from goitre. In order to combat these diseases, the National Committee for the Control of Iodine Deficiency Disorder (NCCIDD) was established in 1986, comprising related ministries and donors under the leadership of the Ministry of Health and the Tanzania Food and Nutrition Center (TFNC): and an Iodine Deficiency Measures Program covering five million residents in the high risk areas was instigated. This program consists of health education to the residents, the administration of iodine supplements, and the addition of iodine to table salt. As the executive organisation for this program, the TFNC has played an important role in distributing iodine supplement in the form of iodised oil capsules (IOC) and providing health education and surveillance. As an emergency measure starting in 1986, IOC were administered to residents of the endemic areas; during the period to 1998, 12 million capsules were administered orally to 5 million residents. These IOC were either distributed through the joint co-operation of the TFNC staff and the district public health staff to communities and schools, or distributed by the MCH clinics or dispensaries through the Primary Health Care system. From the post-distribution study of school children in the three districts in which the IOC were distributed, the total goitre rate (TGR) was found to have fallen by an average of 28%.

As a permanent measure against iodine deficiency, the usual method is to add iodine to the table salt consumed by residents. In Western countries iodine deficiency has been conquered through the formulation of laws concerning the production and sales of iodine-enriched salt. This program started in Tanzania in 1990. By 1998 the iodine addition rate was in excess of 80%, the addition of

iodine having been made legally obligatory in 1994.

In a subsequent study conducted in 1998 in twelve of the twenty-seven districts found to be endemic areas from studies carried out in the 1980's, TGR was found to have fallen below 30% in nine districts, confirming the success of the programme so far. However, the remaining three districts are still endemic areas (a TGR of 30% or more is considered a high risk area). Thus the administration of IOC must be continued in these areas. There is also an urgent need to study once more the remaining areas in order to determine the areas at risk. At the same time, however, the rate of addition of iodine to salt has not yet reached 90%, the target for 2000 specified by WHO. Thus work still remains to be done in securing iodine to be added to table salt, instructing manufacturers, and taking measures in areas where iodine-enriched salt is not yet distributed.

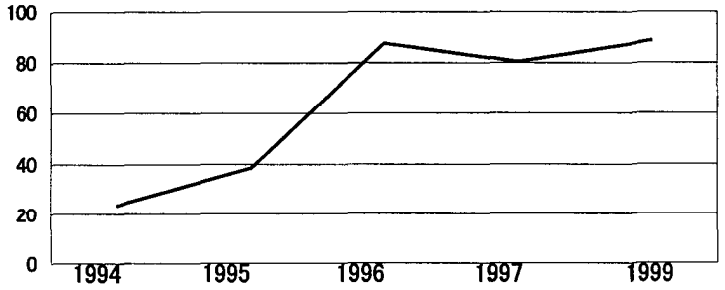


Figure 1-2. Percentage of households using iodated salt in IDD endemic 19 districts by year (Median)

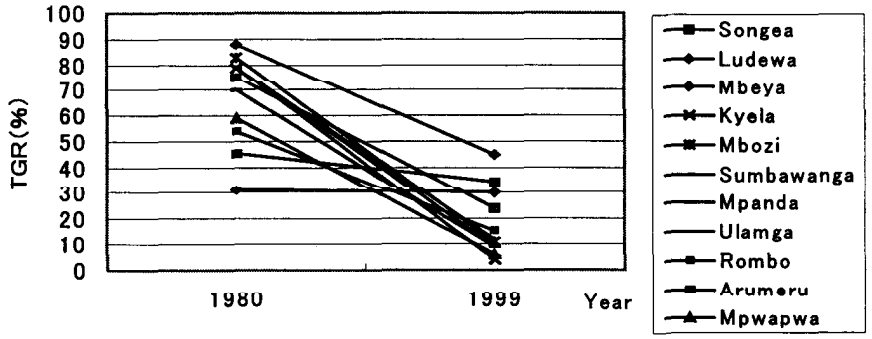


Figure 1-3. TGR in 1980 and 1999 by district

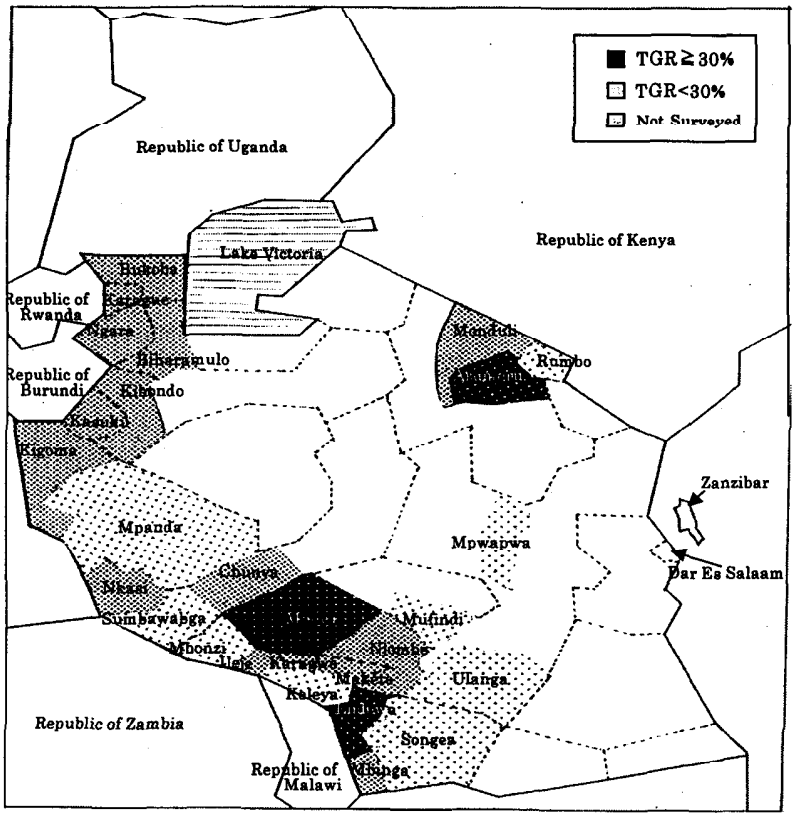


Figure 1.4. TGR distribution map (TFNC 1998)

Morbidity from iron deficiency is high throughout Tanzania especially in the low lands, and poses as great a public health problem as iodine deficiency, but no organ has as yet implemented any systematic, centralised measures. Anaemia in pregnant women can cause not only low birth-weight in babies but also prolonged haemorrhage during delivery, which is closely related to the high mortality rate of women during and after childbirth in Tanzania. The MCH clinics have been providing instruction on nutrition and administering iron and folic acid compounds, but at the present time it is estimated that more than 60% of pregnant women and children under five are suffering from anaemia.

The Iron Deficiency Anaemia Control Program started in 1990 by the TFNC has tried to gain an understanding of the actual state of affairs through morbidity surveillance, but accurate measurement of blood haemoglobin can be carried out at only a limited number of facilities, and sufficient data cannot not be obtained on a continual basis. For this reason, the TFNC formulated a plan to distribute equipment to measure blood haemoglobin to district hospitals throughout the country. With the support of the World Bank, measurement became possible in twenty-four district hospitals in 1998, and it is planned to distribute the equipment to the remaining district hospitals quickly and to set up a surveillance system.

Under the above-mentioned circumstances, the government of Tanzania drew up the present Project to improve cold chain facilities and procure micronutrient-related materials and equipment, and

requested the Japanese government to provide the funds necessary for the implementation of the said Project.

Table 1-2. Anaemia Prevalence in Pregnant Women and Children under 5 (%) 1997

	n	Haemoglobin (g/dl)			
		severe (<7)	moderate (7-10)	mild (>10-<11)	Total
Pregnant women	1,890	9.2	39.7	17.1	65.9
Children under 1Y	2,435	16.3	32.9	10.9	60.2
Children 1Y-under 5	3,783	9.3	33.7	18.9	61.9

TFNC 1998

Chapter 2. Contents of the Project

2-1 Objectives of the Project

"The Project for Improvement of the Equipment for Immunisation and Micronutrient Program" (hereinafter referred to as "the Project") consists of two parts, i.e., EPI and micronutrient deficiency control. The objectives of each part are as follows. In the EPI, the objectives are to achieve immunisation coverage of 90% and reduce the onset rate of preventable infectious diseases. In particular, the Project aims to play a part in the eradication of poliomyclitis, which is a global objective. In micronutrient deficiency control, the objectives of the Project are to essentially eradicate iodine deficiency by 2003 and to reduce morbidity caused by anaemia. The Project shall procure the equipment necessary for the attainment of these objectives, the details for which are as follows.

(1) Improvement of cold chain equipment

Immunisation coverage throughout the country will be improved through the replacement of old refrigerators at health facilities all over the country and the provision of deficient cold chain equipment and supplies.

(2) Procurement of materials and equipment for micronutrient deficiency control programs

In addition to giving basic support to the iodine deficiency control program through the provision of IOC and potassium iodate to be added to table salt, the foundations of a countrywide surveillance system for anaemia diagnosis will be built through the provision of laboratory equipment.

2-2 Basic Concept of the Project

The initial request from Tanzania was for cold chain equipment, IOC, colorimeters, atomic absorption spectrophotometers, 4WD vehicles, and personal computers. On the basis of the study results, the following items were selected and the costs calculated.

(1) Cold chain equipment

1) Kerosene refrigerator

The concept of the initial request was on a large scale: to replace approximately two thousand existing small refrigerators in order to comply with the pressing need to totally eradicate chlorofluorocarbons (CFC) by 2010. However as it was found that the small refrigerators installed at the vaccination facilities were of a type which does not use CFC as the refrigerant, the study team decided that it would be best to limit the Project to the replacement of old equipment; and a review of the number of refrigerators requested was carried out.

Although the EPI Department has an understanding of where refrigerators are installed in each district, neither the state of deterioration of each piece of equipment nor the year of procurement is clear.

However, since there is a listing of numbers according to manufacturer or model, it was possible to determine the approximate time of procurement for each piece of equipment on the basis of when each model was manufactured and the memories of the staff in charge. From this it is thought that the 697 kerosene refrigerators of the oldest type which were procured more than fifteen years ago, between 1975 and 1984, have exceeded their useful life. It was determined that these be replaced under the Project. This type of refrigerator normally runs on kerosene, but a plan is under way to convert them to LP gas, which is more efficient from the maintenance point of view. In order to fit in with this plan, so that the refrigerators can be run on either gas or kerosene, accessories such as conversion kits, regulators and gas cylinders shall also be procured under the Project.

2) Icelined refrigerator

The regional and district vaccine stores use large capacity kerosene refrigerators (207 refrigerators) or icelined refrigerators (89 refrigerators). In the initial request, procurement of two hundred icelined refrigerators was planned. The basis for the initial request was the CFC restrictions. However, since the kerosene refrigerators do not use CFC as the refrigerant, as well as the above-mentioned small kerosene refrigerators, they do not need to be replaced. Some of the existing icelined refrigerators may be using CFC, but numbers are not known. The CFC restrictions refer to the manufacture of CFC, so since the existing refrigerators can continue to be used until they break down and replacement CFC gas can no longer be obtained, it is not considered necessary that they be covered immediately by the Project. Thus the content of the grant aid was drawn up as follows.

Table 2-1. Distribution plan for refrigerators

Region	Dispensary					Regional/district vaccine store				
	No. of small kerosene refrigerators					No. of Electrified Stores / Total	Large kerosene Refrigerators		Icelined Refrigerators	
	Year of installation			Total	**Quantity to be procured =①**		Total	② No. used in electrified stores	Total	**Quantity to be procured =②**
	① 1975-84	1985-89	Not identified							
Dodoma	24	60	104	188	**24**	4/4	7	7	2	**7**
Arusha	71	46	75	192	**71**	5/10	18	8	2	**8**
Kilimanjaro	52	50	88	190	**52**	6/6	13	13	19	**13**
Tanga	19	46	116	181	**19**	6/6	11	11	4	**11**
Morogoro	35	42	76	153	**35**	5/5	7	7	0	**7**
Coast	3	25	98	126	**3**	6/6	12	7	1	**7**
Dar es Salaam	0	19	117	136	**0**	3/3	4	4	3	**4**
Lindi	9	25	91	125	**9**	2/6	8	2	2	**2**
Mtwara	6	69	47	122	**6**	4/5	2	2	0	**2**
Ruvuma	28	28	93	149	**28**	4/4	7	7	3	**7**
Iringa	85	46	82	213	**85**	6/6	13	13	7	**13**
Mbeya	62	50	64	176	**62**	6/8	14	11	7	**11**
Singida	14	35	67	116	**14**	3/5	9	7	5	**7**
Tabora	29	52	54	135	**29**	3/6	10	5	9	**5**
Rukwa	34	31	48	113	**34**	2/4	6	2	2	**2**
Kigoma	21	56	58	135	**21**	2/4	11	3	5	**3**
Shinyanga	65	35	90	190	**65**	5/7	16	12	2	**12**
Kagera	49	38	37	124	**49**	4/6	8	4	4	**4**
Mwanza	75	44	96	215	**75**	5/8	18	13	8	**13**
Mara	16	35	86	137	**16**	5/6	13	11	4	**11**
Total	697	832	1,587	3,116	**697**	86/115	207	149	89	**149**

Although vaccine stores are located centrally in each region or district and in many cases are already served with electricity, many kerosene refrigerators are still used. These refrigerators can run not only on kerosene but also on electricity, and in areas and periods where a power supply is available they are used connected to the power source. However, these absorption type refrigerators have only approximately one quarter of the refrigerating capacity of a compression type icelined refrigerator. In addition, as the temperature inside the refrigerator rises quickly during a power failure, they must be immediately switched over to kerosene operation when the power fails, regardless of the time of day or night the failure occurs. Therefore, only in those stores which have a guaranteed power supply, it is planned to replace the 149 kerosene refrigerators in place with icelined refrigerators, in order to improve efficiency and increase the storage capacity. The existing kerosene refrigerators that are in good condition shall be put to effective use, either as a backup against long-term power failure or to replace those in areas with no power supply.

The assignment of these kerosene and icelined refrigerators has been planned in accordance with the inventory study conducted throughout the country in March 1999. The number of refrigerators to be assigned to each region is shown in Table 2-1.

3) Other cold chain equipment and supplies

① Voltage regulator

The number of voltage regulators to be procured shall be the same as the number of electrically-powered icelined refrigerators to be procured.

② LP gas cylinder, regulator, rubber tube

In view of the fact that the supply of LP gas is unstable, the number of gas cylinders needed for conversion of a kerosene refrigerator to operation by LP gas was estimated to be five cylinders per refrigerator. The number of regulators and rubber hose sets shall be the same as the number of kerosene refrigerators to be procured.

③ Thermometer

One thermometer shall be procured for each refrigerator to be procured by the Project

④ Cold chain monitor card and freeze watch

Because the temperature inside the kerosene refrigerator installed at a vaccination facility fluctuates greatly, a rise in temperature may cause the vaccines to deteriorate. In order to keep a check on this, the Ministry of Health distributes cold chain monitor cards which indicate the cumulative length of time for which the temperature limit has been exceeded. Conversely, for the management of vaccines that deteriorate when frozen (diphtheria, tetanus toxoid, and pertussis (DTP) or tetanus), freeze watches are used. Under the Project, three cold chain monitor cards and two freeze watches shall be procured for each vaccination facility, in line with past consumption.

⑤ Steam sterilisation control spots

One year's supply of the steam sterilisation control spots used to sterilise the injection devices shall be procured. Annual consumption at each vaccination facility was calculated to be two hundred spots.

⑥ Hard water pad

This is equipment to prevent the adhesion of calcium that is a problem when sterilising using hard water. Enough for the four hundred vaccination facilities in hard water areas shall be procured.

⑦ Bell timer, chalk board (two-boards in a set) and vaccine tray set

These items shall be procured for the approximately three hundred vaccination facilities established recently. Timers are used to measure sterilisation time; chalk boards are used for refrigerator management; and vaccine tray sets are used to store vaccines separately from each other.

⑧ Tool kit for CFC-free refrigerator and weighing scale

This is a set of tools for the repair of refrigerators using R134a Freon, which conforms to CFC regulations. Because there are no existing tool kits at present, one set shall be assigned to each region. These items shall be used by the cold chain repair engineers of the region.

⑨ Fuel storage oil can and oil stove for sterilisation purposes

Because these items are widely available in Tanzania and are also supplied by other donors on a continuous basis, it was decided that they be procured by the self-efforts of Tanzania and not be covered by the Project.

(2) Micronutrient deficiency control program

1) Materials for the iodine deficiency control program

As a short-term strategy for the eradication of iodine deficiency, enough iodine supplement (Iodised poppy seed oil fatty acid, ethyl ester 500 mg, hereinafter referred to as "iodine capsule") for the approximately 1.5 million people resident in the high-risk areas shall be procured. As a long-term measure, potassium iodate for addition to table salt shall be procured.

Under the initial request IOC were to be distributed to the 5.7 million residents aged between one and forty-five years in the high-risk areas (twenty-seven districts) where the incidence of goitre is in excess of 30%. However the data on which this amount was estimated came from a study conducted in the 1980s and at present this amount is considered excessive, for which reason the amount was reviewed. As mentioned above, in the second study conducted in twelve districts, the number of high risk areas had fallen to three, the proportion being 26% of the population covered by the study; and the proportion in the fifteen districts not covered by the study can be assumed to have undergone a similar improvement. This proportion was applied to a recalculation of the numbers who should receive IOC. In the four districts which have low morbidity overall but contain pockets of high morbidity, a request was made anew for the administration of IOC to 10% of the population. The above-mentioned considerations are summarised in the Figure below, from which the numbers to whom IOC should be administered was estimated to be approximately 1.574 million. Since two IOC are to be administered to each person, a total of 315 million capsules will be needed.

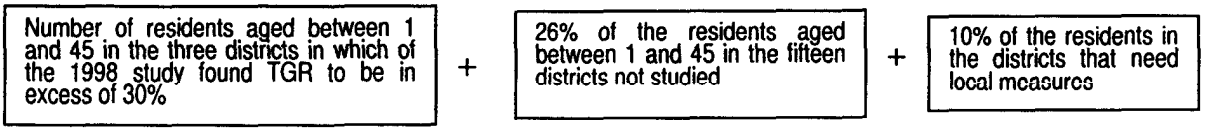


Figure 2-1. Quantity of IOC required for the Project

Table 2-2. TGR in IDD high-risk area and IOC distribution plan

TGR<30%		Districts not surveyed	
District	Population	District	Population
Mfindi*	299,930	Njombe*	413,296
Songea*	332,712	Makete	151,048
Kyela	177,424	Mbinga	355,573
Mbozi	432,009	Rungwe	355,786
Sumbawanga	309,133	Ileje*	115,674
Mpanda	335,485	Chunya	215,237
Rombo	262,724	Nkasi	144,109
Mpwapwa	444,660	Kigoma	357,594
Ulanga	181,664	Kasulu	419,238
①TGR<30 Total	2,775,741	Kibondo	230,551
TGR≧30%(Endemic)		Ngara	207,525
Ludewa	130,393	Biharamulo	274,057
Mbeya	434,818	Bukoba	449,894
Arumeru	420,960	Monduli	142,954
②Total population in endemic area	986,171	Karagwe	382,706
③Total population surveyed (①+②)	3,761,912	④Total population not surveyed	4,215,242

⑤Ratio of affected population against the entire population studied	=②/③×100%	26%
⑥Estimated affected population in the areas not surveyed	=④×⑤%	1,095,963
⑦Estimated total population in IDD high-risk area	=②+⑥	2,082,134
⑧Target population for IOC distribution (1-45Y)	=⑦×70%	1,457,494
⑨Target population for spot IOC distribution in local endemic area	-10%pop. in *district	116,161
⑩Total population to receive IOC under the Project	=⑧+⑨	1,573,655
⑪No. of IOC needed (2 capsules/person)	=⑩×2	3,147,310 ≒3.15million

At the same time, in order to tackle the iodine deficiency at the source, a stable supply of potassium iodate for addition to table salt is essential. The TFNC, in co-operation with the UNICEF, has been promoting the addition of iodine to table salt. Since this activity together with the distribution of IOC is an integral part of iodine deficiency control, potassium iodate for addition to table salt shall be procured in addition to the IOC.

Most of the potassium iodate for addition to table salt is supplied by aid from other donors. However because a donor for 7.5 tons of the potassium iodate needed for 2001 has not been determined yet, a request was made that it be procured under the present Project. The fixed amount of simple iodine to be added to table salt is 100 ppm, or 170 g per ton in the form of the compound potassium iodate. Thus the amount of 7.5 tons to be procured under the Project is the amount to be added to 44,118 tons of salt. Since the annual per capita consumption of table salt in Tanzania is 2,957 g, the above-mentioned amount is estimated to be equal to the annual amount needed for approximately 14.9 million people (approximately 50% of the entire population). It is expected that the shortfall will be procured by UNICEF.

The potassium iodate procured shall be distributed to salt manufacturers through the joint operations of the TFNC and UNICEF. The salt manufacturers will mix the compound with salt using an

automatic adding device (spray or mixer type). Some small-size salt manufacturers spray potassium iodate onto the salt using a manual sprayer.

2) Materials for the iron deficiency anaemia control program

There are several factors that can be measured to test for anaemia. The most important factor is the concentration of blood haemoglobin, which is covered by surveillance. Various measuring methods and materials are available, but in consideration of compatibility with previously distributed equipment, required measurement concentration, technical level of the laboratory technicians, availability of supplies, and the possibility of the diagnosis of other factors, it was decided that colorimeters shall be procured, as requested. The original request was for colorimeters to be distributed to eighty-one facilities. However because the number of facilities listed as hospitals is seventy-six, the amount to be procured was set at seventy-six. Since one hospital carries out approximately four hundred measurements each month, the Project shall procure reagent sets for 2400 measurements, a six-month supply, needed for initial activities. After the initial six months, it is planned that the TFNC will mix and distribute reagents until each hospital is able to provide for itself.

Although not included in the initial request, basic laboratory equipment sets such as pipettes and measuring cylinders needed for mixing reagents or measuring samples shall also be procured, as it was found that most of the laboratory sets at the district hospitals were old or broken.

Table 2-3. Distribution plan for colorimeters

Region	District	Hospitals equipped with colorimeters	Hospitals planned to be supplied
Coast	Bagamoyo Kisarawe Mafia Rufiji Kibaha	Bagamoyo District Hospital	Kisarawe Hospital Mafia Hospital Utete Hospital Tumbi Hospital DDH
	Total	1	4
Morogoro	Morogoro Urban Kilombero Ulanga Kilosa Morogoro Rural	Kilosa District Hospital	Morogoro Hospital St. Francis Ifakara Hospital Mahenge District Hospital Bwagala Hospital
	Total	1	4
Tanga	Handeni Muheza Pangani Korogwe Lushoto Tanga Urban	Handeni District Hospital	Toulo DDH Pangani District Hospital Korogwe District Hospital Lushoto District Hospital Bombo Hospital
	Total	1	5

Region	District	Hospitals equipped with colorimeters	Hospitals planned to be supplied
Arusha	Monduli Arurmeru Babati Hanang Mbulu Kiteto Simanjiro Ngorongoro Arusha Urban	Monduli District Hospital	Nkoaranga Hospital Babati District Hospital Katesh District Hospital Mbulu District Hospital Kibaya District Hospital Simanjiro District Hospital Ngorongoro District Hospital Mount Meru Hospital
	Total	1	8
Dodoma	Kondoa Mpwapwa Dodoma Rural Dodoma Urban	Kondoa District Hospital	Mpwapwa District Hospital Mvumi Hospital Dodoma Hospital
	Total	1	3
Mbeya	Kyela Rungwe Ileje Mbozi Mbeya Rural Mubeya Urban Chunya	Kyela District Hospital	Tukuyu District Hospital Isoko DDH Mbozi DDH Chimala DDH Mbeya DDH Mkwajuni DDH
	Total	1	6
Rukwa	Mpanda Nkasi Sumbawanga urban	Mpanda District Hospital	Namanyere DDH Sumbawanga Hospital
	Total	1	2
Lindi	Liwale Nachingwea Kilwa Lindi Rural Lindi Urban	Liwale District Hospital Nachingwea Hospital Kilwa District Hospital Nyangao Hospital	Mnazi Mmoja Hospital
	Total	4	1
Singida	Singida Rural Iramba Manyoni Singida Urban	Makiungu District Hospital Kiomboi District Hospital	Manyoni District Hospital Singida Hospital
	Total	2	2
Tabora	Igunga Nzega Urambo Sikonge Tabora Urban and Rural	Igunga District Hospital Nzega District Hospital	Urambo District Hospital Sikonge DDH Kitete Hospital
	Total	2	3
Kigoma	Kasulu Kibondo Kigoma Urban and Rural	Kasulu District Hospital Kibondo District Hospital	Maweni Hospital
	Total	2	1
Mara	Tarime Bunda Serengeti Musoma Urban and Rural	Tarime District Hospital	Bunda DDH Mugumu District Hospital Musoma Hospital
	Total	1	3

Region	District	Hospitals equipped with colorimeters	Hospitals planned to be supplied
Mwanza	Magu Sengerema Ukerewe Geita Kwimba Mwanza Urban and Rural	Magu District Hospital	Sengerema DDH Nansio District Hospital Geita District Hospital Sumve DDH Sekoyture Hospital
	Total	1	5
Shinyanga	Kahama Bariadi Meatu Maswa Shinyanga Rural Shinyanga Urban	Kahama District Hospital	Bariadi District Hospital Meatu District Hospital Maswa District Hospital Kolandoto Hospital Shinyanga Hospital
	Total	1	5
Ruvuma	Mbinga Tunduru Songea Rural Songea Urban	Mbinga District Hospital	Tunduru District Hospital Peramiho Hospital Songea Hospital
	Total	1	3
Iringa	Mufindi Njombe Makete Ludewa Iringa Rural Iringa Urban	Mufindi District Hospital	Kibena District Hospital Tandala District Hospital Ludewa District Hospital Tosamaganga Hospital Iringa Hospital
	Total	1	5
Mtwara	Masasi Mtwara Rural and Urban Newala		Ndanda DDH Ligula Hospital Newala District Hospital
	Total	0	3
Kagera	Muleba Bukoba rural Bukoba urban Biharamulo Karagwe Ngara	Rubya Hospital	Mugana Hospital Bukoba Hospital Biharamulo District Hospital Nyakahanga Hospital Murugwanza Hospital
	Total	1	5
Kilimanjaro	Same Rombo Mwanga Hai Moshi Rural Moshi Urban	Same District Hospital	Huruma DDH Usangi District Hospital Kibongoto District Hospital Marangu Hospital Mawenzi District Hospital
	Total	1	5
Dar es Salaam	Ilala Temeke Kinondoni		Amana District Hospital Temeke District Hospital Mwananyamala District Hospital
	Total	0	3
Grand total		24	76

3) Vehicles

Distribution of IOC involves visiting remote villages, for which one 4WD vehicle is necessary. Estimating from the number of days needed for distribution in the past, distribution of the entire amount of iodine preparations under the Project will take at least two years. In addition, a study of TGR in fifteen districts is planned, as well as a study of the rate of addition of iodine to salt and instructions to salt manufacturing plants. In combination with the anaemia control program, it was decided to procure one more vehicle. Under the anaemia program, it is planned to distribute surveillance materials to seventy-six districts and to give operating instructions to laboratory technicians; group examinations at schools in each area are also planned. Plans for use of the vehicles are shown below.

Table 2-4. Plan for use of vehicles

Vehicle A

(1) Activity	IOC distribution (2years)
①Average distance between target area and TFNC	1,000Km×2=2,000Km
②Average travel within target area (A village→B village)	70Km
③Required days per distribution/Campaign	21days
④Average travel per distribution/Campaign	70Km×17+2,000Km=3,190Km
⑤Number of Campaigns per year	10times
⑥Required days per year	21×10=210days
⑦Annual travel distance	3,190×10=31,900Km

Vehicle B

(1) Activity	Colorimeter distribution and instruction
①Average distance between target region and TFNC	800Km×2=1,600Km
②Average travel within target region (A Hospital→B Hospital)	70Km
③ Required days per hospital for distribution /Instruction	1.5days
④Number of hospitals per region	4
⑤Average travel per region	70Km×4+1,600Km=1,880Km
⑥Required days per region	1.5days×4+2days (region→region) =8days
⑦Number of target regions	20
⑧Total required days	8days×20regions=160days
⑨Total travel distance	1,880×20=37,600Km
(2) Activity	Anaemia surveillance
①Average distance between target area and TFNC	800Km×2=1,600Km
②Average travel within target area (A school→B school)	70Km
③Required days per school	1day
④Number of schools per region	5
⑤Average travel per region	70Km×5+1,600Km=1,950Km
⑥Required days per region	1day×5schools+2days (region→region) =7days

⑦Number of target regions	20
⑧Total required days	7days×20regions=140days
⑨Total travel distance	1,950×20=39,000Km
(3) Activity	IDD surveillance
①Average distance between target districts and TFNC	1,000× 2 =2,000Km
②Average travel within target district (A zone→B zone)	70Km
③Required days per zone	1day
④Number of zones per district	5
⑤Average travel per district	70Km×5+2,000Km=2,350Km
⑥Required days per district	1day×5schools+2days (district→district) =7days
⑦Number of target districts	15
⑧Total required days	7days×15districts=105days
⑨Total travel distance	2,350×15=35,250Km
(4) Activity	Inspection/Instruction re salt manufacture
① Average distance between target factories and TFNC	300Km×2=600Km
②Average travel per operation (A factory→B factory)	20Km
③Required days per factory	0.5day
④Number of target factories per operation	10
⑤Average travel per operation	20Km×10+600Km=800Km
⑥Required days per operation	0.5day×10+1day (factory→factory) =6days
⑦Required number of operations	Number of salt manufacturers 200÷10=20times
⑧Total required days	6days×20times=120days
⑨Total travel distance	800×20=16,000Km
Vehicle B Total travel days	525days
Vehicle B Total travel distance	127,850Km

4) Atomic absorption spectrophotometer

This equipment will not be included in the Project because at present there is no technician in the TFNC able to handle the equipment, sufficient maintenance costs have not been secured, and no biochemical research project into zinc, sodium, potassium, etc., for which the equipment would be needed, is being conducted.

5) Personal computer

This equipment was requested for use in epidemiological studies and data analysis, but will not be procured under the Project because it was found that these objectives could be amply attained using the existing equipment.

2-3 Basic Design

2-3-1 Design Concept

1) Policy regarding natural conditions

The refrigerators selected shall be of a type that can maintain a constant interior temperature of between 0°C to 8°C when the outside temperature is 43°C. (See the WHO quality standards described in Table 2-5.)

Iodine compounds for adding to table salt may be either potassium iodide (KI) or potassium iodate (KIO_3). In Japan, production is overwhelmingly of potassium iodide, but because it is strongly deliquescent, in tropical areas potassium iodate is usually used and so this compound shall be selected by the Project.

2) Policy regarding social conditions

Machinery needing power shall be selected to match the power source available at each facility.

- Small refrigerators used at vaccination facility
  ⇒ Types that use kerosene and LP gas as a power source shall be selected.

- Bell timers used at vaccination facility
  ⇒ Spring-type bell timers not requiring batteries shall be selected.

- Refrigerators used at the regional and district vaccine stores
  ⇒ Refrigerators that run on electricity but can cope with power failure (icelined refrigerators) shall be selected.

- Weighing scales used by the staff in charge of the cold chain at the regional level
  ⇒ Digital weighing scales shall be selected because precision is required, but they shall be battery-operated (or rechargeable) to cope with power failure.

- Colorimeters to be distributed to district hospitals
  ⇒ Colorimeters shall be battery-operated (or rechargeable) to cope with power failure.

3) Policy regarding maintenance

Refrigerators that run on LP gas will reduce vaccine wastage through reduced maintenance costs and easier maintenance. However, in remote areas gas supply can be a problem. Therefore, the installation of LP gas refrigerators in all facilities is not practical. For this reason, refrigerators shall not be gas-operated only; kerosene refrigerators together with gas conversion kits shall be procured so that the power source can be promptly switched to kerosene when the gas supply is delayed.
Colorimeters and vehicles selected shall be branded items with established local agents.

4) Policy regarding determination of type and grade

① Cold chain equipment

WHO quality standards are set for six cold chain items, including refrigerators. These standards were set for the procurement of equipment that will operate in a stable manner for long periods of time under the conditions of severe tropical weather, voltage fluctuation and lack of maintenance budget and engineers. For the Project, models conforming to these standards shall be selected.

Table 2-5. WHO Equipment Performance Specifications Code

Item	Code
Kerosene refrigerator	E3/RF.6
Icelined refrigerator & freezer	E3/RF.3
Voltage regulator	E7/VR.1
Thermometer	E6/TH.3
Refrigerator monitor	E6/IN.2
Freeze watch	E6/IN.3

The Ministry of Health at present has 2000 gas cylinders, all of which are manufactured by British Petroleum (BP), deliveries to each district and collection of empty cylinders being entrusted to the local agents of BP. This is because BP has the largest share of gas in Tanzania and BP products are easy to obtain. There is no compatibility between gas cylinders of different brands, which means that if cylinders of another brand are procured by the Project, two types of cylinders will be in use at the same time, leading to possible inefficiency and confusion. The Ministry of Health must bear the delivery costs to remote areas, but if gas cylinders of same brand are used, the unit price of transportation will be reduced, which is a great merit. Thus, under the Project it is planned to procure products of the same brand.

② Iodine capsules

Soft capsules of the specification listed in the WHO essential pharmaceutical products list shall be selected and products manufactured at a plant conforming to Good Manufacturing Practices (GMP) specified by WHO shall be procured. Because distribution will take two years, capsules shall have a validity of three years or more from the manufacturing date.

③ Potassium iodate

Potassium iodate conforming to the Food Chemical Codex (FCC) shall be procured. Most of the potassium iodate supplied by other donors follows this standard.

④ Vehicle

Apart from the main highways, most roads are unpaved and road conditions in the district are extremely poor. Thus the vehicles to be procured under the Project shall be 4WD vehicles.

2-3-2 Basic Design

(1) Overall Program

1) Cold chain equipment

Kerosene refrigerators shall be placed in vaccination facilities throughout the country, and icelined refrigerators shall be installed at the regional and district vaccine storage facilities. Cold chain related supplies and equipment shall be distributed to existing and new vaccination facilities. Equipment shall be transported by the Medical Supply Department (MSD) for a fee.

2) Materials for iodine deficiency control program

IOC will be distributed to approximately 1.57 million residents aged between one and forty-five years in the areas where the TGR is higher than 30%. Potassium iodate will be supplied to the salt manufacturing plants and added to table salt. This amount is equal to the amount consumed by approximately 14.9 million people in a year. The TFNC will be responsible for the management and distribution of both items.

3) 4WD vehicles

4WD vehicles shall be placed with the TFNC and used for the distribution of IOC, micronutrient deficiency control campaigns, surveys and the visiting of facilities to supervise and instruct district hospitals.

4) Colorimeters, haemoglobin reagent sets and laboratory equipment sets

These items shall be placed in the laboratories of seventy-six district hospitals and used for the diagnosis and surveillance of anaemia.

(2) Materials Program

Procurement shall be from third countries for all items except chalk boards, vaccine tray sets and laboratory equipment sets, as shown in Table 2-6 below. LP gas cylinders are manufactured in Britain, but for convenience of commissioning delivery and collection of cylinders purchase from a local agent is desirable.

The budget appropriated for Fiscal Year 1999/2000 to the EPI, the department which carries out vaccinations, is Tsh1,025,499,745, which is approximately 18.55% of the entire budget.

Table 2-6. List of Items to be Procured under the Project

No.	Item	Use	Quantity
1	Kerosene refrigerator	Storage of vaccine in dispensaries	697
2	Icelined refrigerator	Storage of vaccine in regional/district store	149
3	Voltage regulator	Stabilisation of voltage for refrigerator	149
4	Thermometer	Monitoring temperature in refrigerator	1,000
5	Cold-chain monitor card	Quality control of vaccine	10,750
6	Freeze watch	Quality control of vaccine	7,200
7	Steam sterilisation control spots	To ensure sterilisation	750,000
8	Hard water pad	To avoid instrument damage caused by hard water	400
9	LP gas cylinders	Fuel for gas-converted refrigerator	3,500
10	LP gas regulator	Accessories of gas-converted refrigerator	700
11	Hose pipe & clips	Accessories for gas-converted refrigerator	700
12	Tool kit for CFC-free refrigerator	Repair and maintenance of refrigerator	20
13	Weighing scale	For refrigerant recharging	20
14	Bell timer	To measure sterilisation time	300
15	Chalk board	To record temperature in refrigerator	600
16	Vaccine tray set	For sorting of vaccines	300
17	Iodized oil capsule	Prevention/Treatment of IDD	3,150,000
18	Potassium Iodate	Prevention of IDD	7,500Kg
19	Colorimeter	Examination of haemoglobin level in blood	76
20	Laboratory equipment set	Examination of haemoglobin level in blood	76
21	Haemoglobin reagent set	Examination of haemoglobin level in blood	76
22	4WD vehicle	IOC distribution, monitoring, colorimeter distribution, surveillance	2

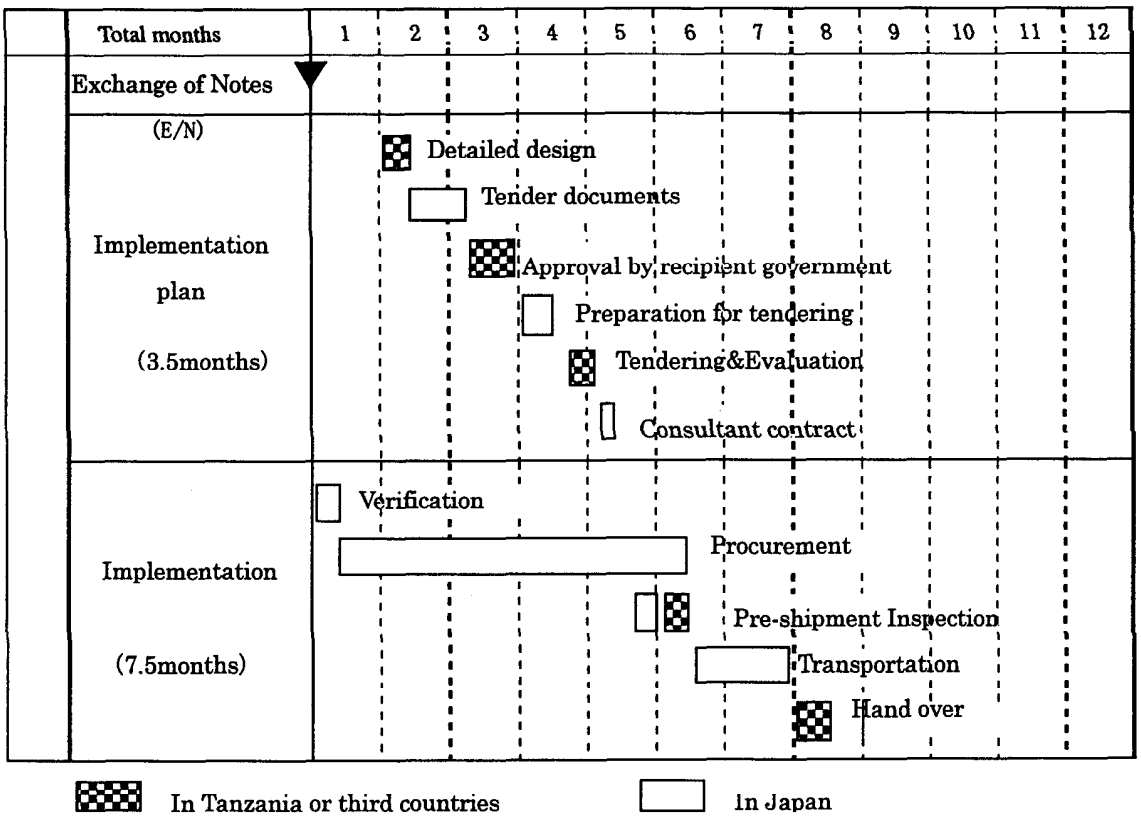
Table 2-7. Country of origin/procurement of Items

No.	Item	Procurement			Expected Country of Origin	Reason
		Tanzania	Japan	3rd country		
1	Kerosene refrigerator			O	Luxembourg	No local / Japanese product
2	Icelined refrigerator			O	Hungary	No local / Japanese product
3	Voltage regulator			O	UK	No local / Japanese product
4	Thermometer			O	UK	No local / Japanese product
5	Cold-chain monitor card			O	Switzerland	No local / Japanese product
6	Freeze watch			O	Switzerland	No local / Japanese product
7	Steam sterilisation control spots			O	UK	No local / Japanese product
8	Hard water pad			O	UK	No local / Japanese product
9	LP gas cylinders	(O)		O	UK	No local / Japanese product Available in Local market
10	LP gas regulator			O	Denmark	No local / Japanese product
11	Hose pipe & clips			O	Not identified	No local / Japanese product
12	Tool kit for CFC-free refrigerator			O	Denmark	No local / Japanese product
13	Weighing scale		O	O	Japan, USA	No local product only one Japanese product
14	Bell timer		O	O	Japan	No local product only one Japanese product
15	Chalk board		O		Japan	
16	Vaccine tray set		O		Japan	
17	IOC			O	France	No local / Japanese product
18	Potassium Iodate		O	O	Japan, UK, Chile	No local product only one Japanese product
19	Colorimeter		O	O	Japan, UK	No local product only one Japanese product
20	Laboratory equipment set		O	O	Japan	
21	Haemoglobin reagent set			O	USA	No local / Japanese product
22	4WD vehicle		O		Japan	

Chapter 3. Implementation Program

3-1 Implementation Plan

3-1-1 Implementation schedule



3-1-2 Obligations of recipient country

① To bear the expenses for transportation of the cold chain equipment and materials to be procured by the Project from the Medical Stores Department (MSD) to the health facilities of each district

② To complete the iodine deficiency morbidity study and identify the high-risk areas

③ To bear the expenses necessary for distribution of IOC

④ To distribute the anaemia examination equipment sets to specified hospitals and to give instruction in examination techniques. Also to establish a system for the supply of reagents

3-2 Operation and Maintenance Plan

(1) Cold chain equipment

Storage and transportation of cold chain equipment to the facilities for installation shall be entrusted to the MSD. The forerunner of the MSD was the Central Medical Stores of the Ministry of Health, but at present the MSD is privatised and operated as an independent company. Thus transportation costs for the Project shall be borne by the Ministry of Health.

The maintenance system for refrigerators is more or less ready and staff in charge of the cold chain have been assigned to each region and district. The fuel for kerosene refrigerators and syringe sterilisation stoves is supplied by the Ministry of Health, and for this Tsh540,955,200 has been appropriated (1999 estimate). Supplies are apparently delayed occasionally, but the equipment is operated with the self-help support of local residents.

Two types of refrigerators will need to be maintained, but since the Project will replace existing old equipment, no increase of expenses is expected. Neither is there expected to be any increase in personnel expenses for the engineers in charge of repairs in each region. Compared with electric refrigerators the costs for maintenance of kerosene refrigerators are markedly higher. Especially in the case of older kerosene refrigerators, more spare parts are needed, supplies wear out quickly, and the loss of vaccine occurs frequently because of the unstable temperature inside the refrigerator. Therefore, with the replacement of equipment by the Project, it is expected that costs for maintenance of the equipment and purchase of vaccines will decrease. The WHO recommends the purchase of spare parts expected to be necessary for seven years' operation at the time the refrigerators are procured, and the Project shall procure the items and quantities of spare parts to conform to the WHO recommendations.

(2) Items related to micronutrient deficiency control program

1) Iodine capsules

IOC shall be distributed by three staff members TFNC and five members of the health management team of each district. In order to raise the distribution rate, the method of visiting schools and targeted areas in conjunction with a campaign is effective, and for this expenses such as personnel costs, fuel costs and brochure costs are expected. The TFNC judges that there will be no technical problems because it has been implementing the program over a long period of time. Costs related to iodine capsule distribution shall be supported by UNICEF and the budget is as follows.

Table 3-1. Budget for IOC Distribution/Campaign

	Budget Tsh (million)
Labour costs	43.68
Fuel for transportation	3.6
Materials for campaigns	0.6
Total	47.88

2) Potassium iodate for salt iodination

Until now potassium iodate has been managed by the Ministry of Energy and Minerals with the support of UNICEF, and distributed to sixty-eight salt manufacturers through the NCCIDD. Under the Project, the TFNC and UNICEF shall co-operate in the distribution, the expenses to be borne by UNICEF.

3) Colorimeters, haemoglobin reagent sets and laboratory equipment sets

The TFNC shall be responsible for the distribution of these items. It is planned that the training of laboratory technicians at each hospital receiving these items will be included in the technical instruction to laboratory technicians for malaria testing implemented under the JICA Mother and Child Health Project. For the improvement of technical levels and the maintenance of equipment after initial training TFNC staff shall tour the hospitals giving supervision and instruction. Since in the past district hospitals to which the same type of equipment was provided experienced interruption of measurement because of a poor supply system for reagents, the TFNC shall distribute these items until the hospitals can prepare and purchase the reagents for themselves. Because prepared reagents and standard solutions cannot be kept long, only a six-month supply shall be procured under the Project. Afterwards, it is planned that the TFNC shall prepare and distribute the items in addition to gradually instructing the laboratories so that they can prepare the reagents for themselves. Material costs when the reagents are prepared by the laboratories are very small and well within the budget of each hospital.

4) Vehicles

Both of the vehicles shall be managed by the TFNC. Drivers have already been secured and it is judged that there will be no problems with maintenance. The main maintenance costs, such as part of the fuel costs, automobile insurance and repair costs, will be borne by the Ministry of Health. The existing vehicles are dilapidated, and considering their poor fuel efficiency and the cost of repairs, the procurement of new vehicles will help to reduce expenses.

Chapter 4. Project Evaluation and Recommendation

4-1. Project Effect

(1) Direct benefits

1) Expanded Program on Immunisation

① The replacement of old and broken refrigerators will reduce vaccine wastage so that vaccines can be used effectively. In addition, the reduction in the number of cases of vaccination being halted because of malfunctioning refrigerators will lead to an increase of the vaccination rate in each area and will contribute to the achievement of a 90% vaccination rate.

② The expense and work involved in temperature control and maintenance of refrigerators will be lessened.

2) Micronutrient deficiency control program

① The distribution of IOC to residents in the targeted areas is expected to bring the TGR under 30%.

② The provision of potassium iodide will allow the distribution of iodine-enriched salt to households (approximately 14.9 million persons) which until now have had difficulty in obtaining it.

③ With the installation of colorimeters the accurate diagnosis of anaemia and the provision of proper treatment will become possible at district level hospitals throughout Tanzania. The establishment of the anaemia surveillance system and a better understanding of the regional and time-related factors involved in the onset of anaemia will make possible the formulation of a more effective control program.

(2) Indirect benefits

1) Expanded Program on Immunisation

The Project will:

① contribute to the achievement of 90% immunisation coverage

② help lower the mortality and morbidity rates of tuberculosis, measles, tetanus, pertussis and diphtheria in children

③ contribute to the eradication of poliomyelitis

2) Micronutrient deficiency control program

The Project will:

① help prevent the mental retardation and growth retardation in children, caused by iodine deficiency

② help prevent stillbirths, miscarriages and birth of children with mental and/or growth retardation, through the control of iodine deficiency in females of childbearing age.

③ help prevent the deaths of pregnant women and the birth of low-weight babies, through the appropriate treatment anaemia in pregnant women.

④ help reduce the child mortality rates, through the provision of appropriate treatment of anaemia in children.

4-2 Recommendation

As outlined above, the Project will contribute greatly to the improvement of mother and child health, and implementation would be more effective if the following problems could be successfully tackled.

(1) Expanded Program on Immunisation

1) Gaining an accurate grasp of the present state of equipment

As vaccine refrigerators are both old and insufficient in number, it is considered that the Project will greatly contribute to the improvement of the cold chain. However the installation plans for the Project have been formulated on the basis of the results of the survey questionnaire on the state of refrigerators which was conducted by the EPI department in March 1999. Because it was not possible in the study to obtain accurate information on the delivery time and the condition of each piece of equipment, to some extent the memory of the staff members in charge had to be depended upon. A great deal of significance attaches to the continued involvement of the Japanese government in this field, but in order to ensure that the content of the grant aid is appropriate, an inventory covering the condition of each piece of equipment ought to be carried out on a regular basis.

The vaccine and cold chain management system spearheaded by the EPI department of the Ministry of Health has been successful so far, but the reform of the health sector will give greater importance to managerial ability at the district level, so that the managerial abilities of the district health management teams should be improved.

2) Storage and transportation of the equipment to be procured

The amount of equipment to be procured by the Project is fairly large. The storage and transportation of refrigerators in particular may be assumed to involve considerable expense, for which the Ministry of Health needs to secure a budget. In order to avoid a situation in which the equipment supplied through the grant aid remains piled up in the warehouse until the old equipment is beyond repair, thoroughness in the collection or disposal of the old equipment will be necessary.

3) Conversion to LP gas

The conversion of kerosene refrigerators to LP gas operation brings greater efficiency from the point of view of maintenance and costs, but the gas distribution routes at private level are not well developed, and it is only in the capital and some large cities, such as Mosi and Mwanza, that there are no problems with the supply system. It cannot be denied that the possibility of a nation-wide conversion from kerosene to LP gas is affected by the supply system for LP gas (improvement of infrastructure and marketing). This will take a fairly long time.

With this type of convertible refrigerator, fuel efficiency is almost 30% lower than for a model running only on LP gas. If the gas supply system develops in the future, it would be desirable to procure gas-only models. Another point is that, under present conditions, the cost of LP gas is higher because the gas transportation cost is paid to the agent. If this conversion programme makes further progress, gas cylinders could be delivered in bulk, which it is expected would reduce the unit price for distribution and make continuation of the programme more promising.

(2) Micronutrient deficiency control programs

1) Iodine deficiency control program

Only three districts were confirmed as target areas for the distribution of IOC, and a prompt survey of the remaining fifteen districts and selection of target areas is needed. However, the implementation of survey and selection would appear to be difficult under the present state of affairs, in which the budget set aside for activities in Fiscal Year 1999/2000 is insufficient. A request for grant aid from the JICA development partnership budget has been requested with regard to the costs of monitoring and evaluating the distribution of IOC and potassium iodate, and some kind of co-operation is also desirable for the survey of the remaining fifteen districts.

In Tanzania, there are sixty-eight plants which add iodine to table salt. Extremely small-scale salt manufacturers produce and sell salt to which no iodine has been added. In order to achieve an iodine addition rate of 90%, it is desirable for iodine-enriched salt to be distributed to these small-scale salt manufacturers. It is also necessary for the quality, i.e., the iodine concentration, of the iodine-enriched salt to be studied and evaluated. In many cases smaller amounts of iodine than are specified are used, in order to save on iodine.

Information, Education and Communication (IEC) programmes have in the past been implemented by the TFNC, targeting residents at high risk of iodine deficiency. However, in order to raise the distribution rate of IOC and make residents aware of the benefits of purchasing iodine-enriched salt, activities should be stepped up in the future, mainly at schools and MCH clinics. Especially at the peripheral MCH clinics attached to dispensaries, MCH activities are weak in areas other than vaccination programmes, and there is little awareness among nurse aids and MCH aids with regard to iodine deficiency. It is considered that use of these local health facilities and personnel can make a big contribution to the improvement of resident awareness and to the control of micronutrient deficiency.

2) Iron deficiency anaemia control program

In the past, some district hospitals have experienced the interruption of examinations because of an insufficient supply of reagents, and it can be said that the supply system for reagents greatly affects the effective use of equipment. In the future, reagents will be mixed at the laboratory of each district hospital, but until then, the hospitals will depend largely on the activities of the TFNC, which is the body that distributes reagents. However, since there is at present no donor that supports the iron deficiency anaemia measures program of the TFNC, there is an urgent need for a budget allocation from the Ministry of Health and overseas donors.

3) Stabilisation of TFNC operating system

As mentioned above, the future operations of TFNC are uncertain because the support of the Swedish International Development Authority (SIDA) is no longer available. It cannot be denied that having been supported by a single donor for more than twenty years has weakened the foundations of the TFNC. However, the TFNC is almost the only study and research institute covering nutrition in Tanzania, and its past achievements are greatly admired. Therefore, there is no doubt as to the need for the TFNC to continue in the future. Its laboratory is well equipped, and it is unfortunate that operations have been stopped because of a lack of operating expenses. The atomic absorption spectrophotometer requested this time was excluded from the Project on consideration of this situation, but normally it is a piece of equipment that would be expected to be put to full use. The government of Tanzania should recognise the importance of the TFNC and act to stabilise its activity base.