ANNEX NUT.(3)

GUIDE TO CONDUCTING NUTRITION SURVEYS

Standard Procedures for Nutrition Surveillance in Reception Centres and Established Settlements: Eastern Sudan

The Nutrition Office
COR/UNHCR HEALTH UNIT
Eastern Sudan

(revised: December 1985)

GUIDE TO CONDUCTING NUTRITION SURVEYS

Introduction

Nutrition surveys are a fast and relatively easy way to assess the prevalence of malnutrition in a population. Under five year old children are more susceptible to becoming malnourished, and knowing their nutritional status can help in evaluating the status of the general population as a whole. Subsequent surveys permit the detection of the trends of malnutrition in a population. With this information, the evaluation of nutrition interventions (Supplementary Feeding Programmes and General Rations Distributions, for example) can be made, and programmes and plans modified accordingly.

The procedure for conducting a nutrition survey which follows has been employed in Eastern Sudan since early 1985. By following a common survey procedure, it can be assured that results are comparable. Each agency in charge of nutrition programmes is responsible for conducting surveys periodically in their Settlement or Reception Centre (or village). In most areas, a team of in-camp Nutrition Survey Supervisors has already been trained to prepare and conduct a nutrition survey. However, the Nutrition Team of the COR/UNHCR Health Unit is available for assisting teams in camps, or in training a team in your location, on request.

Any agency conducting a nutrition survey without the supervision of the Nutrition Team is kindly requested to forward the Data Collection Sheets, the Data Summary Sheet, and a copy of the Survey Results Sheet to the Nutrition Office immediately following the survey.

Remember: "Bad surveys are worse than no survey at all." If surveys are conducted inaccurately, or sloppily, and if mistakes are made in calculations, the results will be incorrect and unreliable, and the effort a waste of time. Good training, preparation and supervision are essential.

I. PREPARING FOR A NUTRITION SURVEY

a) When should surveys be conducted?

If surveys are conducted at approximately the same time each year, the results will be comparable between camps. If surveys are conducted at different times in different camps, seasonal factors may vary and comparisons may be difficult to make. Substantial changes in nutritional status within communities usually take 3-4 months to manifest. Following a nutritional emergency, it is advisable to monitor nutritional status closely, at least until conditions are improved and stable. Therefore, in Eastern Sudan, it is recommended that nutrition surveys be conducted at least every six months, and in areas of concern, evey four months. At present, nutrition surveys are conducted in May, September, and January.

b) How should the community be informed?

It is essential that the community is prepared for the survey. A meeting should be held with all elders and home visitors well in advance of the survey day, to explain what will be done and why. COR, UNHCR and other agencies in the camp should also be informed. In villages, all appropriate local authroties (Town Council Office; sheik; sheir, etc.) should be consulted before the survey takes place. It is essential that the official bodies concerned understand fully what is going to take place, and that all their questions have been answered. Their assistance may also be enlisted to inform the community itself of the upcoming survey. Once the survey is done, the results should be provided promptly to all officials.

c) What prepareations should be made for Feeding Programmes?

If feeding centres remain open at the time of the survey,

many malnourished children will be out of the home. The best time to conduct a survey is when families are at home, i.e. 6:00a.m. or 5:00p.m. Since a survey takes about 3-4 hours to complete, if the survey is conducted in the morning, ALL SUPPLEMENTARY FEEDING CENTRES should be closed, either for the entire day, or until 11a.m..

The community must be informed beforehand that the feeding centres will be closed. If they are to be closed for the entire day, a dry ration may be provided the day before to all beneficiaries to take home, as a replacement for the meal they miss. Residents must be informed that small children are to be kep home during the survey hours.

The nutrition survey must be conducted on a day when no other large event is occurring, ie. a public holiday, an important community meeting, or even a general rations distribution. Regardless of the event, it may mean that families are out of the house during the survey, and the results will not be respresentative of the community.

d) Who will be included in the Nutrition Survev?

All children from one year (walking) to 110cm in height (59 months) should be included in the survey sample. Children under one year of age are difficult to measure, and acute signs of malnutrition are not normally present. Children measuring 110cms in height are considered to be approximately 59 months old, or 5 years. In some populations, particularly where stunting has occurred, this measurement may include children of 6 or 7 years. If children taller than 110cms are measured, it is possible that some short pubescent children will be included in the survey. Growth chart reference values of weight-for-height are not reliable for children in puberty, and may give inaccurate results.

e) What measurements are to be taken?

There are various methods of measuring malnutrition using anthropometry; weight-for-age, height-for-age, mid-upper arm circumference, weight-for-height, etc. The weight-for-height assessment is considered to be the most reliable means of assessing acute malnutrition, and is used in this nutrition survey procedure. The NCHS Recommended Standard Reference for Weight-for-Height should be used to determine a child's nutritional status once the measurements have been made.

WEIGHT must be recorded to the nearest 0.1kg. A hanging Salter scale should be carried to each household and hung on a bean or a pole carried by two workers. The scale should be checked to read "0" before each weighing. All scales should be tested for accuracy before the day of the nutrition survey, by hanging a standard weight or a plastic bag filled with one litre of water (one litre of water weights one kilogram) one the scale. Hanging Salter scales may only stay accurate for six months if they are used regularly. If the scales have been in use for some time, or are no longer accurate, they can be ordered from the following address:

BY POST: Mr. Morgan
CMS Ltd.
18 Camden High Street
LONDON NW1 OJH
UK

BY CABLE: Morweigh
LONDON NW1

(order 25kg Salter Hanging Scales, weighing to 0.1kgs.)

WEIGHT or length must be recorded to the nearest 0.5cm. Children under 2 years (85cm) must be measured lying down. Children over 2 years should be measured in a standing position. The child is placed on the height board stand (shoes removed) with feet nearly together and heels touching the vertical surface of the board. A solid movable headpiece is carefully lowered so that is firmly and evenly touches the child's scalp. Two persons are always

required to take the height or length measurement of a child accurately. Most mistakes are made when height and length measurements are made carelessly.

Careful measuring is essential to accurate survey results. Mistakes by even one tenth kilogram or one centimetre can totally change the results of the survey. Survey assistants must be thoroughly trained and periodically reviewed to ensure that accurate methods are being used in measuring.

f) How is oedema recorded?

Since oedema of nutritional origin is one sign of kwashiorkor, a simple examination for pretibial pedal oedema is an important means to estimate community rates of kwashiorkor. It must be noted, however, that while not all observed oedema is of nutritional origin, it may be so if it is associated with low weight-for-height.

In order to test for oedema, firm thumb pressure is applied to the lower anterior surface of both legs for 5 - 10 seconds, while the child is in a sitting position or being held by a parent. Any identation remaining after the presure is removed indicates oedame. If oedema is present, it should be recorded in the appropriate column of the Data Collection Sheet.

II. CONDUCTING A RANDOM CLUSTER SAMPLE SURVEY

a) How should the clusters be chosen?

To estimate the nutritional status of a small population such as a refugee camp or a village, only a small number of children need to be measured and weight. If the children are selected in a standardized manner of random selection, the results may be more easily compared. Cluster sampling is a convenient field method for rapidly producing nutritional and epidemiologic information.

A cluster is a sub-group of a population. In this survey procedure, thirty clusters of seven children each are used to estimate nutritional status. The same procedure is also useful for estimating other health issues, such as immunization status.

Clusters should be chosen randomly, that is in such a way as to give each household in the population an equal chance of being selected. Therefore, the thirty clusters should be identified in proportion to the distribution of the population in the camp or village. Most camps, and some villages have "sections" or zones or other such sub-divisions. The estimated populations for each sub-division should be listed and the total population of the site estimated. The thirty clusters should be distributed according to the proportion of the total population located in each sub-division. The example below shows the method for calculating the number of clusters in each sub-division.

Sub-Division	Population	Calculation	No. of Clusters (per sub-division)
A	950	$\frac{950}{10{,}000} \times 30 = 2.9$	3
B	1,300	$\frac{1300}{10{,}000} \times 30 = 3.9$	4
C	4,000	$\frac{4000}{} \times 30 = 12.0$	12
D	2,400	$\frac{2400}{10{,}000} \times 30 = 7.2$	7
E	1,300	$\frac{1350}{10{,}000} \times 30 = 4$	4
	TOTAL...		30

Once the number of clusters to be identified in each sub-division has been determined, each sub-division should be roughly divided into the required number of clusters. Home visitors and other

community members who are familiar with the goegraphical outlay of the sub-division can be of great help in determining the geographical centre of each identified cluster.

The survey team then procedes to the centre of the first cluster in a sub-division, and one member spins a bottle or pen on the ground. The direction in which the bottle or pen is pointing is the direction in which the team will move to find their first household in the cluster.

Next, a money bill is used to determine, in random fashion, the first house in the cluster. Someone is required to suggest the number in the series on the money bill to be used, by random selection. For example, if it is decided that the fourth number in the series will be used, and the number on the bill is "6", then the team should count six houses in the direction that the pen or bottle points. At the sixth house, all children from one year to 110cm should be measured and weighed. The team should then proceed to the nearest household, until at least seven children have been weighed and measured.

If the number 7 child weighed and measured has other siblings between one year and 110cms who have not already been included, they must also be weighed and measured. In other words, <u>all</u> eligible children in the last household should be included in the sample. In this way, up to 8 or 9, and possibly 10 children may be included per cluster. The team should then proceed to the centre of the next cluster and repeat the procedure until all 30 clusters have been completed in the camp village.

The Survey Team should always ascertain if ALL of the young children are in the home. <u>If a child is missing</u> (ie. taken to the clinic, to fetch water, etc.) <u>the household should be marked and returned to later to include the child</u>. If the child is in the hospital or TFP centre, the child's name should be recorded, and

the child traced later by the team for measuring and weighing. If the team arrives at a houshold with no young children (or empty), the house should be skipped, and the next closest household in the chosen direction included instead. If the team reaches a house that is included in a compound with other houses, only one house per compound should be included. The team should then proceed to the next closest compound in the chosen direction, and repeat.

b) How should survey information be recorded?

Information should be recorded carefully and accurately. One team member should be responsible for recording, while two or three others are measuring and weighing. These persons should call out the weight in kilogrammes, and the height in centimetres to the recorder, who should then repeat the number to those taking measurements in order to check that it is correct. The recorder must write down the numbers in a clear and legible manner on the apropriate data form.

The Data Collection Sheet is the form used for collecting survey data. Each sheet provides space for recording information from two clusters. Thus a total of 15 Data Collection Sheets should be available for each survey. For each child included in the survey, space is provided to record information on gender, age, height, weight, % of the reference standard weight-for-height, presence or absence of oedema, and attendance/registration at a feeding programme.

Following the survey, one team member should calculate the % weight-for-height of each child using the attached chart. All figures should be rounded (ie. height figures to the nearest 0.5cm.) for example:

63.2 = 63.0
63.3 = 63.5
63.7 = 64.5
63.8 = 64.0

After the calculation of weight-for-height % for each child has been completed, the results should be checked by another team member. Once the summary results on the bottom of each Data Collection Sheet have been tabulated, they can be transcribed on the Data Summary Sheet, for results from all 30 clusters. Results can then be recorded on the Survey Results Sheet, for distribution to interested persons.

c) How should the survey data be analyzed?

No nutrition survey is complete without a careful examination of the collected data and a determination of the following:

WHO? What population groups are primarily affected? What age, ethnic groups, sexes, etc. are most at risk of increased malnutrition?

WHAT? What are the major types of malnutrition found in these groups? What is the overall prevalence of malnutrition?

WHERE? Where are the highest prevalence of malnutrition?

When analyzing the results of nutrition surveys, only two groups should be compared at any one time, for example:

- Those greater or equal to 80% of the reference weight-for-height standard versus those less than 80% weight-for-height.

- Those with oedema versus those without.

It is not wise to over-generalize results. The NCHS weight-for-height standards can be used for the interpretation of survey results only, not for entire camp or country populations. To put this in perspective, however, in a well-nourished population, between 2 and 2.5% of the under 5 year old children will be malnourished (less than 80% weight-for-height). In less developed countries with no nutritional emergency, between 5 and 7% of the under 5 children will be found below 80% weight-for-height. Proportions above 8% indicate nutritional problems of some concern, above 10%, a nutritional emergency. Findings of oedema above 2% are considered to represent alarmingly high incidence of Kwashiorkor.

d) How should nutrition survey results be used?

Initial surveys provide "baseline" data, after which consequent surveys enable the assessment of whether or not malnutrition is increasing or decreasing. The survey results can be used to estimate the number of under-five year old children requiring special attention (i.e. therapeutic, supplementary feeding). If the total number of under-five children is not known, it can be assumed that in a normal population, approximately 18-20% of the total population is under five. In late 1985, however, in Reception Centres in Eastern Sudan, the actual number of under-five year old children had been reduced to between 13 and 16% of the total population.

Using survey results, trends of malnutrition within a camp or village can be compared over time. In addition, comparisions can be made between camps or villages at a given time or between time periods. Such information can be used to evaluate the effectiveness of nutrition interventions and other health services, and, in particular, to determine how effective outreach efforts are in identifying those in need of assistance.

DATA COLLECTION SHEET

DATE: CAMP:

CLUSTERS:

Cluster	Number	Male	Female	Age	Height	Weight	>100%	>85%	84-80%	79-75%	74-70%	<70%	<60%	Oedema	Sup. Feed
	1														
	2														
	3														
	4														
	5														
	6														
	7														
	8														
	9														
	10														
	1														
	2														
	3														
	4														
	5														
	6														
	7														
	8														
	9														
	10														
	Number	Male	Female	Age	Height	Weight	>100%	>85%	84-80%	79-75%	74-70%	<70%	<60%	Oedema	Supp. Feed + / -
TOTAL				X	X	X									<80%
															<70%

DATA SUMMARY SHEET

CAMP: _____ DATE: _____

TOTAL POPULATION: _____

UNDER 5: _____

Clusters	Number	Male	Female	>100%	>85%	84-80%	79-75%	74-70%	<70%	<60%	OEDEMA	Sup.Feed. <80% +	Sup.Feed. <80% -	Sup.Feed. <70% +	Sup.Feed. <70% -
1 + 2															
3 + 4															
5 + 6															
7 + 8															
9 + 10															
11 + 12															
13 + 14															
15 + 16															
17 + 18															
19 + 20															
21 + 22															
23 + 24															
25 + 26															
27 + 28															
29 + 30															
TOTAL:															

SURVEY RESULTS SHEET

CAMP: _____ DATE: _____

TOTAL CAMP POPULATION: _____

CHILDREN SURVEYED (age 1-5): _____

	No.	%
Male		
Female		
TOTAL		

MALNUTRITION/WEIGHT FOR HEIGHT:

TOTAL: _____	No.	%
>100%		
> 85%		
84 - 80%		
79 - 75%		
74 - 70%		
< 70%		
< 60%		

TOTAL MODERATELY MALNOURISHED CHILDREN:

	No.	%
70 - <80%		

TOTAL SEVERELY MALNOURISHED CHILDREN:

	No.	%
> 70%		
> 60%		
TOTAL		

TOTAL CHILDREDN WITH OEDEMA:

	No.	%
OEDEMA		

MALNOURISHED CHILDREN ATTENDING SUPPLEMENTARY FEEDING

		No.	%
> 80%	+		
	-		
> 70%	+		
	-		
TOTAL	+		
	-		

ANNEX NUT.(4)

WEIGHT FOR HEIGHT (Stature) FOR BOTH BOYS AND GIRLS

Height	Median	Percents of Median 85%	80%	75%	70%
85.0cm	12.0kg	10.2kg	9.6kg	9.0kg	8.4kg
85.5	12.1	10.3	9.7	9.1	8.5
86.0	12.2	10.4	9.8	9.1	8.5
86.5	12.3	10.5	9.8	9.2	8.6
87.0	12.4	10.6	9.9	9.3	8.7
87.5	12.5	10.6	10.0	9.4	8.8
88.0	12.6	10.7	10.1	9.5	8.8
88.5	12.8	10.8	10.2	9.6	8.9
89.0	12.9	10.9	10.3	9.7	9.0
89.5	13.0	11.0	10.4	9.7	9.1
90.0	13.1	11.1	10.5	9.8	9.2
90.5	13.2	11.2	10.6	9.9	9.2
91.0	13.3	11.3	10.7	10.0	9.3
91.5	13.4	11.4	10.8	10.1	9.4
92.0	13.6	11.5	10.8	10.2	9.5
92.5	13.7	11.6	10.9	10.3	9.6
93.0	13.8	11.7	11.0	10.3	9.7
93.5	13.9	11.8	11.1	10.4	9.7
94.0	14.0	11.9	11.2	10.5	9.8
94.5	14.2	12.0	11.3	10.6	9.9
95.0	14.3	12.1	11.4	10.7	10.0
95.5	14.4	12.2	11.5	10.8	10.1
96.0	14.5	12.4	11.6	10.9	10.2
96.5	14.7	12.5	11.7	11.0	10.3
97.0	14.8	12.6	11.8	11.1	10.3
97.5	14.9	12.7	11.9	11.2	10.4
98.0	15.0	12.8	12.0	11.3	10.5
98.5	15.2	12.9	12.1	11.4	10.6
99.0	15.3	13.0	12.2	11.5	10.7
99.5	15.4	13.1	12.3	11.6	10.8
100.0	15.6	13.2	12.4	11.7	10.9
100.5	15.7	13.3	12.6	11.8	11.0
101.0	15.8	13.5	12.7	11.9	11.1
101.5	16.0	13.6	12.8	12.0	11.2
102.0	16.1	13.7	12.9	12.1	11.3
102.5	16.2	13.8	13.0	12.2	11.4
103.0	16.4	13.9	13.1	12.3	11.5
103.5	16.5	14.0	13.2	12.4	11.6
104.0	16.7	14.2	13.3	12.5	11.7
104.5	16.8	14.3	13.4	12.6	11.8
105.0	16.9	14.4	13.6	12.7	11.9
105.5	17.1	14.5	13.7	12.8	12.0
106.0	17.2	14.6	13.8	12.9	12.1
106.5	17.4	14.8	13.9	13.0	12.2
107.0	17.5	14.9	14.0	13.1	12.3

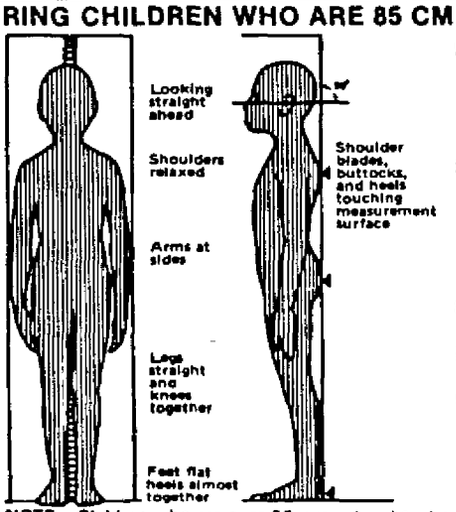
Height	Median	Percents of Median 85%	80%	75%	70%
107.5cm	17.7kg	15.0kg	14.1kg	13.3kg	12.4kg
108.0	17.8	15.2	14.3	13.4	12.5
108.5	18.0	15.3	14.4	13.5	12.6
109.0	18.1	15.4	14.5	13.6	12.7
109.5	18.3	15.5	14.6	13.7	12.8
110.0	18.4	15.7	14.8	13.8	12.9
110.5	18.6	15.8	14.9	14.0	13.0
111.0	18.8	16.0	15.0	14.1	13.1
111.5	18.9	16.1	15.1	14.2	13.3
112.0	19.1	16.2	15.3	14.3	13.4
112.5	19.3	16.4	15.4	14.4	13.5
113.0	19.4	16.5	15.5	14.6	13.6
113.5	19.6	16.7	15.7	14.7	13.7
114.0	19.8	16.8	15.8	14.8	13.8
114.5	19.9	16.9	16.0	15.0	14.0
115.0	20.1	17.1	16.1	15.1	14.1
115.5	20.3	17.3	16.2	15.2	14.2
116.0	20.5	17.4	16.4	15.4	14.3
116.5	20.7	17.6	16.5	15.5	14.5
117.0	20.8	17.7	16.7	15.6	14.6
117.5	21.0	17.9	16.8	15.8	14.7
118.0	21.2	18.0	17.0	15.9	14.9
118.5	21.4	18.2	17.1	16.1	15.0
119.0	21.6	18.4	17.3	16.2	15.1
119.5	21.8	18.5	17.4	16.4	15.3
120.0	22.0	18.7	17.6	16.5	15.4
120.5	22.2	18.9	17.8	16.7	15.5
121.0	22.4	19.1	17.9	16.8	15.7
121.5	22.6	19.2	18.1	17.0	15.8
122.0	22.8	19.4	18.3	17.1	16.0
122.5	23.1	19.6	18.4	17.3	16.1
123.0	23.3	19.8	18.6	17.5	16.3
123.5	23.5	20.0	18.8	17.6	16.5
124.0	23.7	20.2	19.0	17.8	16.6
124.5	24.0	20.4	19.2	18.0	16.8
125.0	24.2	20.6	19.4	18.2	16.9
125.5	24.4	20.8	19.6	18.3	17.1
126.0	24.7	21.0	19.7	18.5	17.3
126.5	24.9	21.2	19.9	18.7	17.5
127.0	25.2	21.4	20.1	18.9	17.6
127.5	25.4	21.6	20.4	19.1	17.8
128.0	25.7	21.8	20.6	19.3	18.0
128.5	26.0	22.1	20.8	19.5	18.2
129.0	26.2	22.3	21.0	19.7	18.4
129.5	26.5	22.5	21.2	19.9	18.6
130.0	26.8	22.8	21.4	20.1	18.7

DIRECTIONS FOR MEASURING CHILDREN WHO ARE 85 CM OR MORE IN HEIGHT

Step 1. Place the measuring board in a verticle position on a flat surface.

Step 2. Have the mother (or assistant) remove any footwear or headgear on the child and lead the child to the measuring board.

Step 3. Place the child so that the shoulder blades, buttocks, and heels are touching the vertical surface of the measuring board. The feet must be flat on the floor, slightly apart, legs and back straight, and arms at sides. The shoulders must be relaxed and in contact with the measuring board. The head usually is not in contact with the measuring board. Tell the child to stand "straight and tall" and look straight ahead.



Step 4. One assistant (the recorder) checks that the child stands flat footed with the knees fully extended. The shoulders and buttocks should be in line with the heels.

Step 5. The movable headboard is then brought to rest firmly on the crown of the child's head by the measurer while the head is held so that the child's eyes point straight ahead.

Step 6. The measurer reads the measurement to the nearest 0.5cm.

Step 7. The recorder then writes the measurement clearly on the form.

Step 8. The measurer then looks at the recorded value on the form to be sure that it is correct.

NCHS/CDC/WHO NORMALIZED REFERENCE
2/82

NOTE Children who are over 85 cm in height who are too sick to stand may be measured lying down, but 1 cm should be subtracted from the measured length before using this table

WEIGHT FOR LENGTH (Supine) FOR BOTH BOYS AND GIRLS

Length	Median	Percents of Median 85%	80%	75%	70%
49.0cm	3.2kg	2.7kg	2.6kg	2.4kg	2.3kg
49.5	3.3	2.8	2.6	2.5	2.3
50.0	3.4	2.9	2.7	2.5	2.4
50.5	3.4	2.9	2.7	2.6	2.4
51.0	3.5	3.0	2.8	2.6	2.5
51.5	3.6	3.1	2.9	2.7	2.5
52.0	3.7	3.1	3.0	2.8	2.6
52.5	3.8	3.2	3.0	2.8	2.6
53.0	3.9	3.3	3.1	2.9	2.7
53.5	4.0	3.4	3.2	3.0	2.8
54.0	4.1	3.5	3.3	3.1	2.9
54.5	4.2	3.6	3.4	3.2	2.9
55.0	4.3	3.7	3.5	3.2	3.0
55.5	4.4	3.8	3.5	3.3	3.1
56.0	4.6	3.9	3.6	3.4	3.2
56.5	4.7	4.0	3.7	3.5	3.3
57.0	4.8	4.1	3.8	3.6	3.4
57.5	4.9	4.2	3.9	3.7	3.4
58.0	5.1	4.3	4.0	3.8	3.5
58.5	5.2	4.4	4.2	3.9	3.6
59.0	5.3	4.5	4.3	4.0	3.7
59.5	5.5	4.6	4.4	4.1	3.8
60.0	5.6	4.8	4.5	4.2	3.9
60.5	5.7	4.9	4.6	4.3	4.0
61.0	5.9	5.0	4.7	4.4	4.1
61.5	6.0	5.1	4.8	4.5	4.2
62.0	6.2	5.2	4.9	4.6	4.3
62.5	6.3	5.4	5.0	4.7	4.4
63.0	6.5	5.5	5.2	4.8	4.5
63.5	6.6	5.6	5.3	5.0	4.6
64.0	6.7	5.7	5.4	5.1	4.7
64.5	6.9	5.9	5.5	5.2	4.8
65.0	7.0	6.0	5.6	5.3	4.9
65.5	7.2	6.1	5.7	5.4	5.0
66.0	7.3	6.2	5.9	5.5	5.1
66.5	7.5	6.4	6.0	5.6	5.2

Length	Median	Percents of Median 85%	80%	75%	70%
67.0cm	7.6kg	6.5kg	6.1kg	5.7kg	5.3kg
67.5	7.8	6.6	6.2	5.8	5.4
68.0	7.9	6.7	6.3	5.9	5.5
68.5	8.0	6.8	6.4	6.0	5.6
69.0	8.2	7.0	6.6	6.1	5.7
69.5	8.3	7.1	6.7	6.2	5.8
70.0	8.5	7.2	6.8	6.3	5.9
70.5	8.6	7.3	6.9	6.4	6.0
71.0	8.7	7.4	7.0	6.5	6.1
71.5	8.9	7.5	7.1	6.6	6.2
72.0	9.0	7.6	7.2	6.7	6.3
72.5	9.1	7.7	7.3	6.8	6.4
73.0	9.2	7.9	7.4	6.9	6.5
73.5	9.4	8.0	7.5	7.0	6.5
74.0	9.5	8.1	7.6	7.1	6.6
74.5	9.6	8.2	7.7	7.2	6.7
75.0	9.7	8.2	7.8	7.3	6.8
75.5	9.8	8.3	7.9	7.4	6.9
76.0	9.9	8.4	7.9	7.4	6.9
76.5	10.0	8.5	8.0	7.5	7.0
77.0	10.1	8.6	8.1	7.6	7.1
77.5	10.2	8.7	8.2	7.7	7.2
78.0	10.4	8.8	8.3	7.8	7.2
78.5	10.5	8.9	8.4	7.8	7.3
79.0	10.6	9.0	8.4	7.9	7.4
79.5	10.7	9.1	8.5	8.0	7.5
80.0	10.8	9.1	8.6	8.1	7.5
80.5	10.9	9.2	8.7	8.1	7.6
81.0	11.0	9.3	8.8	8.2	7.7
81.5	11.1	9.4	8.8	8.3	7.7
82.0	11.2	9.5	8.9	8.4	7.8
82.5	11.3	9.6	9.0	8.4	7.9
83.0	11.4	9.6	9.1	8.5	7.9
83.5	11.5	9.7	9.2	8.6	8.0
84.0	11.5	9.8	9.2	8.7	8.1
84.5	11.6	9.9	9.3	8.7	8.2

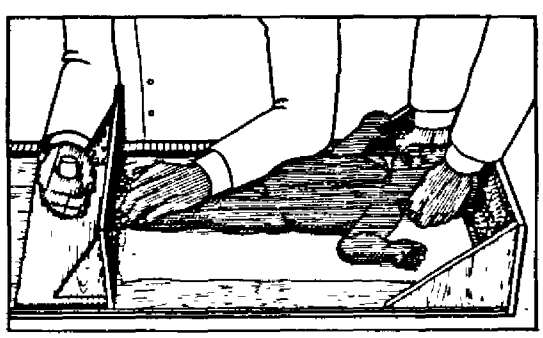
DIRECTIONS FOR MEASURING CHILDREN WHO ARE LESS THAN 85 CM IN LENGTH

Step 1. The measuring board is placed horizontally on the ground or on a table.

Step 2. With the help of one or two assistants, place the baby, barefoot and without head covering on the measuring board with the head against the fixed (non-movable) end.

Step 3. An assistant holds the baby's head so that the eyes are pointed straight up and applies gentle traction to bring the top of the child's head into contact with the fixed end of the measuring board.

Step 4. The measurer holds the child's knees together and pushes them down against the tabletop with one hand or forearm, *fully extending the child* With the other hand, the measurer slides the movable footboard to the child's feet until the *heels* of both feet touch the footboard



Step 5. The measurer then immediately removes the child's feet from contact with the footboard with one hand (to prevent the child from kicking and moving the footboard) while holding the footboard securely in place with the other hand.

Step 6. The measurer reads the measurement to the nearest 0 5 cm.

Step 7. The recorder then writes the measurement clearly on the form.

Step 8. The measurer then looks at the recorded value on the form to be sure that it is correct.

NCHS/CDC/WHO NORMALIZED REFERENCE
2/82

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ANNEX NUT.(5)

AVERAGE PERCENTAGE OF TOTAL POPULATION
WHO MAY NEED SUPPLEMENTARY FEEDING PROGRAMME

Vulnerable Group	Percentage of Total Population in a Given Nutritional Setting		
	Extreme (>20% of children malnourished)	Moderate (10-20% of childen malnourished)	Mild/None* (<10% of children malnourished)
Severely malnourished children for Intensive feeding (wet ration)	2%	0.5%	0.1%
Moderately malnourished children under 5 for Supp.Feeding (Wet or Dry)	6%	2%	0.5%
Moderately malnourished children over 5 for Supp.Feeding (Wet or Dry)	3%	0.5%	(negligible)
Pregnant/Lactating Women (Dry ration)	10%	10%	10%
Medical Referrals and others (Wet or Dry)	4%	2%	None
TOTAL (RANGE)	25% (20-30%)	15% (10-20%)	< 10% (0-10%)

* Where mild or no nutritional problems exist and the general ration is adequate (e.g. refugees have access to income and markets in addition to sufficient ration quantity and quality), no supplementary feeding is necessary, except minimal case-by-case intervention.

Note: The percentages in the table represent proportions of the total camp population and are useful to estimate supplies for S.F.P. in individual camps.

ANNEX O (1)

Organisation of Priority Actions in Early Stages of Assistance

The first priority will be always to assess the situation and to prevent or control those diseases which can be anticipated or assumed to be of high risk. In every case, the following actions should be taken:

Priority Actions in Developing Health and Nutrition Services

Conduct a rapid assessment

Information	Organisation & Coordination	Action
1. Obtain crude estimates of population age and sex distribution	1. Establish system of co-ordination among implementing agencies UNHCR and the host government	1. Immunise all children under 5 years of age against measles
2. Conduct nutritional assessment and organise special feeding programmes when indicated	2. Coordinate with services for water supply, sanitation and food distribution	2. Administer Vitamin A prophylaxis to children under 12 years of age
3. Consider the need for vector control and other activities appropriate to area-specific and/or population-specific problems	3. Divide camp into sectors and assign refugee staff responsibility for a given area	3. Organise oral rehydration therapy (ORT) for dehydrated individuals
	4. Establish basic mortality and morbidity surveillance	4. Establish ongoing screening of new arrivals

Possible Organisation of Health and Nutrition Services in a Major Emergency

Administrative Level	Health Facilities Available	Coordinating Body/Personnel	Health Personnel	Areas of Responsibility/Action
National		National Health Co-ordinating Committee	National refugee health co-ordinator(s) and support	1) Planning and evaluating refugee health and nutrition programmes 2) Establishing refugee health care policies including guidelines on standard procedures 3) Monitoring the health and nutrition status of the refugees and health services provided 4) Overall co-ordination and supervision of refugee health activities 5) Procurement and supply of drugs and equipment 6) Central epidemiological data processing
Regional	Curative care referral services such as hospitals, specialised rehabilitation services	Regional Refugee Health Co-ordinating Committee	Regional refugee health co-ordinator and support staff	1) Regional planning and evaluation of refugee health programmes 2) Establishing regional health policies based on national refugee health policies 3) Monitoring the health and nutrition status of the refugees and the services provided 4) Co-ordinating and supervising refugee health activities regionally 5) Central storage and distribution of drugs and supplies 6) Regional collection, tabulation, analysis and reporting of epidemiological data 7) Co-ordination and supervision of specific health and nutrition surveys 8) Assessing food-supply needs: procurement, storage and distribution of food supplies

Administrative Level	Health Facilities Available	Coordinating Body/Personnel	Health Personnel	Areas of Responsibility/Action
Individual Refugee Settlements - Camp -	One Health Centre (with limited beds for overnight stay, say 1 bed/5,000 refugees) Central pharmacy, laboratory Speciality services: dental services, rehabilitation Special feeding programmes	One lead health agency with a designated camp health co-ordinator	National, expatriate or refugee health professionals - doctors or senior nurses (1/10,000 refugees) - nurses (4-5/10,000 refugees) - pharmacist (1) - laboratory technician (1-2) - midwives (2-4/10,000 refugees) - community health co-ordinator (1-2) Refugee health staff: health assistants, nursing aids, lab personnel, pharmacy personnel, community health staff	1) Co-ordination and supervision of camp health services 2) Planning, monitoring and evaluating camp health and nutrition activities 3) Monitoring health/nutrition status 4) Collection, tabulation, analysis and reporting of epidemiological surveillance camp wide 5) Storage and distribution of drugs and supplies within the camp 6) Referral laboratory for the camp 7) Dental and rehabilitation services 8) Assessing camp food supply needs, storage and distribution of food 9) Special feeding programmes as indicated 10) Assessing, implementing and evaluating vector control 11) Training health/nutrition staff 12) Promoting refugee community
Sector	Decentralised clinics Outpatient primary care Mother and child care Community health Special feeding programmes Say 1 clinic/ 10,000 refugees	National, expatriate or refugee professionals section - nurses (1-2) - midwives (1-2) - community health supervisor (1)	Refugee health staff: health assistants, pharmacy and lab technicians, traditional birth attendants	1) Outpatient services: basic treatments and wound care 2) MCH clinic-based activities 3) Supervision and co-ordination of community health activities 4) Special feeding programmes as indicated 5) Promoting refugee community participation
Community			Refugee community health workers (1-2/1000 pop.) Refugee traditional birth attendants	1) Identification of public and individual health/nutrition needs 2) Providing simple treatments 3) Health education 4) Referral to other services 5) Case-finding and follow-up 6) Basic surveillance 7) Mother and child care 8) Refugee community participation

ANNEX V(1)

SAFE USE OF PESTICIDES

Toxicity and Hazard

All pesticides are toxic to some degree. They should be handled with care. A measure of the potential toxicity of pesticides to man and other animals is obtained from the acute oral and/or dermal LD_{50} value which provide a statistical estimate of the number of mg of active ingredient per kg of body weight required to kill 50% of a large population of test animals. While these figures represent the relative acute toxicities of various compounds to the test animals, they do not measure the actual hazard involved when a pesticide is used in the field. Factors that influence hazards are: the type of formulation, the type of packaging, the concentration of the pesticide in the finished formulation, the method of application, the amount of surface or area to be treated, the dosage required, the association of human or animal population with treated surfaces or areas and the species of animals exposed, their age, sex and condition.

Supplies and Equipment

Planning for vector and pest control must include provision for safe transport and secure storage of pesticide concentrates. Pesticides should not be stored in rooms in which people live or in which food is kept. They should be stored out of direct sunlight and protected from rain and flooding. Protection against theft, misuse and accessibility to children must be provided. All pesticide containers should be adequately labeled to identify the contents and show, in a form comprehensible to the operator, the nature of the material and the precautions to be employed.

Customs authorities should be consulted to ensure that any pesticide, intended to be imported into the country, is registered for use in that country otherwise its importation will not be allowed.

Responsibility for Safety and Disposal of Empty Containers

Preparation and application of pesticide formulations should be carried out under trained supervision. If necessary, a consultant or technical expert should be brought in to provide specialized training and give advice.

It is important to ensure the safe disposal of empty or nearly empty containers. They must not be allowed to go astray or be removed by unauthorized people who might use them as containers for food or drinking water, especially in areas where such containers are scarce. Used containers can be effectively decontaminated by rinsing two or three times with water, scrubbing the sides thoroughly. If a drum has contained an organophosphorous (OP) compound, an additional rinse should be carried out with washing soda (5%) and the solution allowed to remain in the container overnight. Rubber gauntlets should be worn during this step and a soakage pit away from houses, streams and other sources of water, should be provided for the rinsings.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
BITING MIDGES (Culicoides spp.)	Filariasis (Dipetalonema, Mansonella) Nuisance	Swamps and inter-tidal zones, tree holes and rotting vegetation	Space spraying with insecticides included in Annex ____: Tables on Insecticides for Pest Control, can provide temporary relief.
SCORPIONS	Nuisance	Loose stones, fallen trees, stacks of fire-wood and debris. Young and adult scorpions enter dwellings and hide in a variety of places.	If removal of most scorpion hiding places is not possible, residual insecticides may be sprayed on infested areas. Suitable insecticides include azamethiphos (1%), bendiocarb (0.24-0.48%), malathion (5%), dioxacar (0.5-1.0%), lindane (0.5%) or propoxur (2%). Control is effective for about 3 months.
RATS	Plague, haemorrhagic fever with renal syndrome Nuisance	Rats breed in warm, sheltered situations where they have access to food and water	Food should be stored in inaccesible or rat-proof containers. Chemical barriers i.e. repellents are incorporated in some packaging materials to inhibit rodent attack. Traps are the preferred method of killing rats when the use of rodenticides is undesirable. Traps should be placed near runs and at other locations where there are signs of rat activity, but rodenticides should be applied only when there is qualified and experienced supervision. Where rats are abundant in inaccessible areas, use of fumigants should be considered.
BILHARZIA SNAILS (Bulinus spp. Biomphalaria spp.)	Bilharzia (Schistosomiasis)	Submerged vegetation in freshwater bodies with a temper-ature above 17°	Drinking water should be collected upriver from chemically treated bathing and washing sites. Vegetation, on the water edge, should be removed where waterbodies are frequented by people. Molluscicide applications Care usually restricted to only those places much used by people for bathing, washing, etc. The most widely used molluscicide is niclosamid.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
BEDBUGS (Cimex spp.)	Nuisance Hepatitis B?	Crevices in beds, furniture, walls and floors	Simple methods that can be used by the community should be applied first. Heavy infestations can be reduced by removing beds and furniture well away from the dwelling and beating them to dislodge the bedbugs, or pouring boiling water over the bedframe. Where the infestation is widespread within the household, treatment of beds, furniture and surrounding walls with an effective insecticide may be necessary. DDT 50 g/l (5%) emulsion or solution is the insecticide of choice where bedbugs are susceptible. For DDT-resistant bugs, suitable insecticides are: diazinon 5g/l (0.5%), fenchlorphos 10g/l (1%), iodofenphos 10g/l (1%), lindane 5g/l (0.5%), malathion 20g/l (2%), pirimiphos-methyl 10g/l (1%), propetamphos 5-10g/l (0.5-1.0%). For bedbugs resistant to DDT and organophosphorous compounds, carbaryl 10g/l (1%), dioxcarb or propoxur may be used. Deltamethrias at 0.05g/l spray or 0.05g/kg (0.005%) dust or bendiocarb 2.4g/l (0.24%) spray or 10g/kg (1%) dust may be used. The addition of natural pyrethrins 12g/l (0.1-0.2%) to residual insecticide formulation will increase the effectiveness of the treatment by irritating the bedbugs and causing them to leave their hiding places, thereby increasing their contact with the fresh insecticide deposits. Infant bedding, including the crib, should not be treated with residual insecticide. Treated mattresses should be dried completely before being covered with sheets for re-use. Infested bedclothes should only be washed.
SANDFLIES (Phlebotomus spp.)	Leishmaniasis, sandfly fever, Bartonellosis	The larvae occur in soil and are difficult to find so that the resting places of the adult sand-flies are attacked, i.e. crevices in walls and animal burrows	The most widely used and effective control measure is residual spraying supplemented in some situations by space spraying. For indoor spraying DDT is the insecticide of choice applied as a residual spray at 1 or 2g a.i./m^2. Malathion at 1 or 2g a.i./m^2 or HCH applied at 0.5g a.i./m^2 may also be used. Diazinon 40g/l (4%) can be used for treatment of garbage. For space sprays iodofenphos 20g/l (2%) may be applied once or twice a week as a thermal fog or as a cold aerosol at the rate of 0.5/l of ULV concentrate per ha. Resmethrin can also be applied as a ULV formulate at 0.5/l ha. Environmental managament, e.g. rodent reservoir control in desert areas.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
FLIES (cont'd)			effective as a 0.5-1.0g/l (0.05-0.1%) spray against multi-resistant fly populations. Other useful insecticides are bendiocarb (0.24-0.48%), bromophos (1.0-5.0%), dimethoate (1.0-2.5%), fenchlorphos (1.0-5.0%), fenithrothion (1.0-5.0%), malathion (5.0%), pirimiphos-methyl (1.25-2.5%), and fenvalerate (0.0625-0.125%). Weekly treatments may be necessary. Outdoor space sprays are carried out by power units to provide ULV mists or thermal aerosol sprays. Handcarried or back-mounted sprayers are used where access is limited and vehicle-mounted sprayers where access to dwellings is available by road. ULV spray treatments may also be done indoors, but food and water indoors should then be protected. Suitable insecticides and dosages for outdoor treatments are given in Annex ____: Tables on Insecticides for Pest Control. Rooms from which meat or fish are distributed should be screened against flies and dispensers containing the insecticide dichlorvos, or insecticide-treated cords or strips placed in the rooms can be useful for fly control. Cotton gloves should be worn when installing cords or strips, which should not be suspended over food containers or watering troughs.
COCKROACHES	Possibly involved in transmission of diarrhoeal diseases, typhoid and cholera	Domestic cockroaches breed where there is food, warmth and shelter	Cleanliness is important, particularly in kitchen areas. No food particles, debris or rubbish should be left around to encourage infestations. Residual treatments with insecticides (see Annex ____: Tables on Insecticides for Pest Control) should be applied in kitchen areas and other harbourages, but care should be taken not to contaminate surfaces on which food is prepared.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
REDUVIID BUGS (Triatominae)	Chagas disease	Crevices in walls and ceilings of dwellings and outbuildings	Residual spraying of dwellings and outbuildings with lindane at 0.5-1.8g a.i./m^2, malathion and fenitrothion at 1g a.i./m^2 permethrin at 0.25-0.5g/m^2 and propoxur at 1g a.i./m^2. Application of malathion ultra-low volume (ULV) concentrate to the interior of houses, using a motorized knapsack sprayer, at a dosage of 2.5ml/m^2. Residual spray applications are generally effective for at least two months. Care should be taken to avoid contamination of water source, food, cooking utensils and infant bedding by the insecticide. Building walls without crevices.
FLIES (Musca spp.)	Possibly involved in transmission of diarrhoeal diseases typhoid and cholera	Animal and human wastes	Burying of rubbish and any other accumulated organic matter, removal of animal excreta and proper management of basic sanitation measures are the fundamental means for reducing or eliminating fly breeding sources. Controlled tipping should be practised wherever possible when there is a supply of suitable covering material. The top and sides of the dump should be covered each day after tipping has ceased, with 30cm layer of soil or sand, and then compacted. Burning refuse is an effective method of preventing fly breeding, provided that there is no remaining unburnt moist residue in which flies can develop. When flies become a serious problem, insecticides may be applied to dumping sites, but insecticides should be reserved, if possible, for outdoor space treatments during epidemics of cholera, dysentery or typhoid in order to reduce the possibility of resistance developing to them. For residual treatments of dumping sites, diazinon at 10-20g/l (1-2%) is most consistently effective. The insect development inhibitor diflubenzuron is

Pest	Disease Importance	Main Breeding Sites	Methods of Control
FLEAS (cont'd)			
(c) Tinga penetrans (jigger)	Nuisance	Larvae free-lying in dusty soil; adult female intracutaneously	Burning off soil, sweeping or treating with insecticide. Regular inspection of feet, shoes. Chemical repellants.
TICKS AND MITES			
(a) Hard ticks (Ixodidae)	Rickettsial (tick typhus) and viral (tick-borne encephalitis) diseases, tick paralysis	Vegetation	Insecticides (liquids) applied by hand operated equipment, vehicle or aircraft mounted equipment. Suitable insecticides include carbaryl, fenthion, naled and propoxur applied at 2.24 kg of active ingredient (a.i.) per hectare (ha), pirimiphos-methyl at 0.1-1.0 kg a.i./ha depending on time of year or permethrin at 0.03-0.3 kg a.i./ha. Care must be taken to avoid contamination of water sources and adjacent areas and prevent hazard to non-target organisms. Application as above generally prevents re-infestation for a month or longer. Environmental management.
(b) Soft ticks (Ornithodoros)	Endemic relapsing fever	Floors of dwellings	Residual spraying with lindane at 3 g of a.i./m^2 gives control for a year. Monthly applications are necessary with dusts.
(c) Chigger mites (Leptotrombidium spp.)	Scrub typhus	Woodland or bush areas	Hand-operated or power-operated sprayers or dusters are used for the application of dieldrin at 2.8 kg a.i./ha, lindane at 5.6 kg a.i./ha and propoxur at 1.1 kg a.i./ha. Dieldrin gives good control for 2 years or longer.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
Head lice (cont'd)			When conventional insecticides are not available it may be necessary to use other treatments such as 2% of a 50% Cresol and soap solution, or a mixture of 50% Kerosene and 50% of any mild vegetable oil. These substances should be applied thoroughly to wet hair, and the head then bound up in a towel for at least an hour. The hair may then be washed, thoroughly dried and combed to remove any dead lice or eggs which have loosened.
(b) Body lice	Epidemic typhus, Epidemic relapsing fever	Human body and clothing	Insecticides (powder formulations) applied to body and clothing. See Annex ____: Tables on Insecticides for Pest Control. Heat treatment of clothing (70°C for 1 hour). Good personal hygiene including regular changes of clean clothing prevents body lice infestations. Soap and cold water are not sufficient to get rid of an infestation. Clothing should be boiled preferably with soap added or at least immersed in water that is too hot to touch. Dry heat treatment of clothing (70°C for 1 hour) is also effective. Placing clothes on hot rocks or cement surface in the sun for several hours may reduce infestations.
FLEAS			
(a) Xenopsylla spp.	Bubonic plague, murine typhus	Rodent nests and burrows	Insecticide (powders) applied to rodent burrows and runways by hand operated dusting equipment (Annex _____: Tables on Insecticides for Pest Control).
(b) Pulex irritans (Human flea)	Nuisance	Bedding, floor of dwelling	Insecticides (powders) applied to bedding and liquid formulations to floors (Annex _____: Tables on Insecticides for Pest Control). Infants' bedding should not be treated, but should be washed.

VECTOR AND PEST CONTROL
Notes on Groups of Vectors and Pests

* For specific methods of control, please refer to Annex : Tables on Insecticides for Pest control.

Pest	Disease Importance	Main Breeding Sites	Methods of Control
MOSQUITOES			
(a) Anopheles spp.	Malaria Filariasis Viral diseases (occasionally)	Ground-pools, swamps, irrigated areas	Residual spraying with insecticides (for indoor resting species). See Annex ____: Tables on Insecticides for Pest Control Space spraying with insecticide See Annex ____: Tables on Insecticides for Pest Control Larviciding See Annex ____: Tables on Insecticides for Pest Control Environmental management
(b) Culex spp.	Viral diseases, Filariasis	Polluted water, Latrines, swamps irrigated area	Larviciding Environmental management
(c) Aedes spp.	Viral diseases Filariasis	Small Containers of water	Larviciding Residual spraying (in some areas) Space spraying Environmental management
LICE (Pediculus)			
(a) Head lice	Nuisance	Human head	Insecticides (liquid formulation) applied to head. See Annex ____: Tables on Insecticides for Pest Control. The eggs, 'nits', are the easiest to discover when inspecting for head lice and a fine comb will remove the 'nits'. A comb may not remove lice which are mobile but may cripple them causing eventual death. A cheap, simple method, which may have limited acceptability is to closely cut the hair.

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ANNEX V(2)

TABLES ON INSECTICIDES FOR PEST CONTROL

TABLE 1 - Insecticides suitable as residual spray applications against mosquito vectors

Insecticide	Chemical Type[a]	Dosage of a.i.[b] (g/m^2)	Duration of effective action (months)	Insecticidal action	Toxity[c] oral LD_{50} of a.i. for rats (mg/kg of body weight
Bendiocarb	C	0.4	2-3	contact & airborne	55
Chlorphoxim	OP	2	1.3	contact	500[d]
Cypermethrin	PY	0.5	4 or more	contact	>4000[d.e]
DDT	OC	1-2	6 or more	contact	113
Deltamethrin	PY	0.05	2-3	contact	>2940[d.e]
Fenitrothion	OP	1-2	3 or more	contact & airborne	503
Lindane (gamma.HCH)	OC	0.2-0.5	3 or more	contact & airborne	100
Malathion	OP	1-2	2-3	contact	2100
Permethrin	PY	0.5	2-3	contact	>4000[d.e.]
Pirimiphos-methyl	OP	1-2	2-3 or more	contact & airborne	2018
Propuxur	C	1-2	2-3	contact & airborne	95

[a] C = carbanate; OP = organophosphorus compound; PY = synthetic pyrethroid; and OC = organochlorine compound

[b] a.i. = active ingredient

[c] Toxicity and hazard are not necessarily equivalent; the factors influencing the latter are discussed in section 12.

[d] Dermal toxity

[e] Because of their low dermal toxity, and on the basis of experience with their use, these products have been classified in the WHO Hazard Classification in Class III, Table 5 (products unlikely to present acute hazards in normal use).

Table 2. Insecticides suitable as cold aerosol sprays and for thermal fogs for mosquito control

Insecticide	Chemical Type [a]	Dosage of a.i.[b] (g/ha) Cold Sprays	Thermal Fogs[d]	Toxity[c] oral LD_{50} of a.i. for rats (mg/kg of body weight
Bioresmethrin	PY	5-10	20-30	7000
Chlorpyrifos	OP	10-40	150-200	135
Deltamethrin	PY	0.5-1.0	-	>2940[e.f.]
Dichlorvos	OP	56-280	200-300	56
Fenitrothion	OP	250-300	270-300	503
Fenthion	OP	112	-	330[f]
Iodofenphos	OP	100-200	-	2100
Malathion	OP	112-693	500-600	2100
Naled	OP	56-280	-	430
Permethrin[g]	PY	5-10	-	>4000[e.f.]
Pirimiphos-methyl	OP	230-330	180-200	2018
Propoxur	C	53-75	-	95
Resmethrin	PY	7-16	-	2000

[a] PY = Synthetic pyrethroid; OP = organophosphorus compound; and C = Carbamate

[b] a.i. = active ingredient

[c] Toxicity and hazard are not necessarily equivalent; the factors influencing the latter are discussed in section 12.

[d] The strength of the finished formulation applied depends on the performance of the spraying equipment used.

[e] Because of their low dermal toxicity and on the basis of experience with their use, these products have been classified in the WHO Hazard Classification in Class III, Table 5 (products unlikely to present acute hazards in normal use).

[f] Dermal toxicity.

[g] Also used in mixtures with knock-down agents or synergists.

Table 3. Insecticides suitable as larvicides in mosquito control

Insecticide	Chemical Type [a]	Dosage of a.i.[b] (g/ha)	Formulation	Duration effictive action (weeks)	Toxity[d] oral LD_{50} of a.i. for rats (mg/kg of body weight
Chlorphoxim	OP	100	EC	2-7	500[e]
Chlorpyrifos	OP	11-25	EC,GR,WP	3-17	135
Deltamethrin	PY	2.5-10	EC	1-3	>2940[e.g.]
Diflubenzuron	IGR	25-100	GR,WP	1-4	4640
Fenitrothion	OP	100-1000	EC,GR	1-3	503
Fenthion	OP	22-112	EC,GR	2-11	330[e]
Fuel oil	-	h	soln	1-2	negligible
Iodofenphos	OP	50-100	EC,GR	7-16	2100
Malathion	OP	224-1000	EC,GR	1-2	2100
Methoprene	IGR	100-1000	SRS	4-8	34600
Paris Green	CA	840-1000	dust,soln in oil	2	22
Permethrin	PY	5-10	EC	5-10	>4000[e.g.]
Phoxim	OP	100	EC	1-6	1000
Pirimiphosmethyl	OP	50-500	EC	1-11	2018
Temephos	OP	56-112	EC,GR	2-4	8600

[a] OP = organophosphorus compound; PY = synthetic pyrethroid; IGR = insect growth regulator; and CA = copper

[b] a.i. = active ingredient

[c] EC = emulsifiable concentrate. GR = granules; WP = Water dispersible powder; soln = solution; and SRS = slow release suspension

[d] Toxicity and hazard are not necessarily equivalent; the factors influencing the latter are discussed in section 12.

[e] Dermal toxicity

[f] The lowest levels are recommended for fish-bearing waters

[g] Because of their low dermal toxicity and on the basis of experience with their use, these products have been classified in the WHO Hazard Classification in Class III. Table 5 (products unlikely to present acute hazards in normal use).

[h] Apply at 142-190 l.ha. or 19-47 l.ha if a spreading agent is added.

Table 4. Compounds used for residual treatment in fly control

Insecticide	Chemical Type [a]	Concentration formulation as applied g/l	Concentration formulation as applied %	Dosage of a.i.[b] (g/m^2)	Toxity[c] oral LD_{50} of a.i.[b] for rats (mg/kg of body weight
Azamathiphos	OP	10-50	1.0-5.0	1.0-2.0	750
Bromophos	OP	10-50	1.0-50	1.0-2.0	1600
Cypermethrin	PY	2.5-10.0	0.25-1.0	0.025-0.1	>4000[d]
Deltamethrin	PY	0.15-0.30	0.015-0.030	0.0075-0.15	>2940[d]
Diazinon	OP	10-20	1.0-2.0	0.4-0.8	300
Fenchlorphos	OP	10-50	1.0-5.0	1.0-2.0	1740
Fenitrothion	OP	10-50	1.0-5.0	1.0-2.0	503
Iodofenphos	OP	10-50	1.0-5.0	1.0-2.0	2100
Permethrin	PY	0.0625-1.25	0.0625-0.125	0.025-0.05	>4000[d]
Pirimiphos-methyl	OP	12.5-25.0	1.25-2.5	1.0-2.0	2018

[a] Op = organophosphorus compound; PY = synthetic pyrethroid;

[b] a.i. = active agent

[c] Toxicity and hazard are not necessarily equivalent; the factors influencing the latter are discussed in section 12.

[d] Dermal toxicity. Because of their low dermal toxicity and on the basis of experience with their use, these products have been classified in the WHO Hazard Classification in Class III. (products unlikely to present acute hazards in normal use.)

Table 5. Organophosphorus and pyrethroid compounds used for outdoor space treatments for fly control[a]

Insecticide	Chemical Type [a]	Dosage of a.i.[b] (g/m^2)
Bioresmethrin	PY	5-10
Deltamethrin	PY	0.5-1.0
Diazinon	OP	336
Dichlorvos	OP	336
Dimethoate	OP	224
Fenchlorphos	OP	448
Fenthion	OP	448
Iodofenphos	OP	336
Malathion	OP	672
Naled	OP	224
Permethrin	PY	5-10
Pirimiphos-methyl	OP	250
Resmethrin	PY	20

[a] For toxicity data see Tables 2 and 4

[b] PY = synthetic pyrethroid; OP = organophosphorus compound

[c] a.i. = active ingredient.

Table 7. Insecticide dusts commonly employed for the control of fleas

Insecticide	Chemical Type [a]	Concentration g/kg	Concentration %	Toxity[b] oral LD_{50} of a.i.[c] for rats (mg/kg of body weight
Bendiocarb	C	10	1.0	55
Carbaryl	C	50	5.0	3000
DDT	OC	100	10.0	113
Deltamethrin	PY	0.05	0.005	>2940[d]
Diazinon	OP	20	2.0	300
Fenitrothion	OP	20	2.0	503
Iodofenphos	OP	50	5.0	2100
Lindane	OC	30	3.0	100
Malathion	OP	50	5.0	2100
Permethrin	PY	5	0.5	>4000[d]
Pirimiphos-methyl	OP	20	2.0	2018
Propetamphos[e]	OP	20	2.0	75
Propoxur	C	10	1.0	95

[a] C = carbamate; OC = organochlorine compound; PY = synthetic pyrethroid; and OP = organophosphorus compounds

[b] Toxicity and hazard are not necessarily equivalent; the factors influencing the latter are discussed in section 12.

[c] a.i. = active ingredient

[d] Dermaltoxicity. Because of their low dermal toxicity, and on the basis of experience with their use these products have been classified in the WHO Hazard Classification in Class III, Table 5 (products unlikely to present acute hazards in normal use)

[e] If applied by non-commercial operators it should be supplied for safety reasons in a diluted form not exceeding 50g. kg. of active ingredient.

Table 9. Insecticides commonly employed in the the control of human lice

Insecticide	Chemical Type [a]	Formulation	Concentration g/l or g/kg	Concentration %	Toxity[b] oral LD_{50} of a.i.[c] for rats (mg/kg of body weight
Bioallethrin	PY	Lotion	3-4	0.3-0.4	500
		Shampoo	3-4	0.3-0.4	
		Aerosol	6	0.6	
Carbaryl	C	Dust	50	5.0	300
DDT	OC	Dust	100	10.0	113
		Lotion	20	2.0	
Deltamethrin	PY	Lotion	0.3	0.03	>2940[d]
		Shampoo	0.3	0.03	
Iodofenphos	OP	Dust	50	5.0	2100
Lindane	OC	Dust	10	1.0	100
		Lotion	10	1.0	
Malathion	OP	Dust	10	1.0	2100
		Lotion	5	0.5	
Permethrin	PY	Dust	5	0.5	>4000[d]
		Lotion	10	1.0	
		Shampoo	10	1.0	
Propoxur	C	Dust	10	1.0	95
Temephos	OP	Dust	20	2.0	8600

[a] PY = synthetic pyrethroid; C = carbamate; OC = organochlorine; OP = organophosphorus compound

[b] Toxicity and hazard are not necessarily equivalent, the factors influencing the latter are discussed in section 12.

[c] a.i. = active ingredient

[d] Dermaltoxcity. Because of their low dermal toxicity and on the basis of experience with their use, these products have been classified in the WHO Hazard Classification in Class III. Table 5 (products unlikely to present acute hazards in normal use)

Table 10. Insecticides commonly employed in the the control of cockroaches

Insecticide	Chemical Type [a]	Formulation	Concentration g/l or g/kg	Concentration %	Toxity[b] oral LD_{50} of a.i.[c] for rats (mg/kg of body weight
Bendiocarb	C	Spray	2.4-4.8	0.24-0.48	55
		Dust	10	1.0	
		Aerosol	7.5		
Chlorpyrifos	OP	Spray	5	0.5	135
Deltamethrin	PY	Spray	0.075	0.0075	>2940[d]
		Dust	0.005	0.0005	
		Aerosol	0.2	0.002	
Diazinon	OP	Spray	5	0.5	300-850
		Dust	20	2.0	
Dichlorvos	OP	Spray	5	0.5	83
		Bait	19	1.9	
Dioxacarb	C	Spray	5-10	0.5-1.0	90
Iodofenphos	OP	Spray	10	1.0	2100
Malathion	OP	Spray	30	3.0	2100
		Dust	50	5.0	
Permethrin	PY	Spray	1.25-2.5	0.125-0.25	>4000[d]
		Dust	5	0.5	
Pirimithos-methyl	Op	Spray	25	2.5	2018
		Dust	20	2.0	
Propetamphos[e]	OP	Spray	5.10	0.5-1.0	75
		Dust	20	2.0	
		Aerosol	20	2.0	
Propoxur	C	Spray	10	1.0	95
		Bait	20	2.0	

[a] C = Carbamate; OP = organophosphorus compound; and PY = synthetic pyrethroid

[b] Toxicity and hazard are not necessarily equivalent, the factors influencing the latter are discussed in section 12.

[c] a.i. = active ingredient

[d] Dermal toxicity. Because of their low dermal toxicity, and on the basis of experience with their use, cypermethrin, deltamethrin and permethrin have been classified in the WHO Hazard Classification Class III. Table 5 (products unlikely to present acute hazards in normal use).

[e] If applied by non-commercial operators it should be supplied for safety reasons in a diluted form not exceeding 50gms of active ingredient per litre.