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GLOBAL REVIEW OF PCM PROBLEMS

INTER-REGIONAL SEMINAR ON PROTEIN PROBLEMS, WITH PARTICULAR REFERENCE TO WEANING FOODS

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CAUSES AND PREVALENCE OF PCM IN THE AFRICAN REGION

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1. INTRODUCTION

PCM is a nutritional disorder found in both mild and severe forms. It is usually due to a combination of dietary inadequacy and intercurrent infections Both the dietary deficiencies and the contributing infections are usually multiple. PCM is seen most strikingly in children aged 0-4 years but also in older children, pregnant and lactating women, and old people

The purpose of this exposé is to identify the role of various factors leading to malnutrition, with a view to enabling a rational approach to be made towards prevention, and to outline the prevalence in various areas and suggest methods whereby the trends may be evaluated.

2. CHILDREN 0-4 YEARS

2 1 Severe PCM

Main forms	Main distinguishing characteristic	Main immediate cause	Common age
Nutritional marasmus -	wasting (skin & muscle)	caloric deficiency	0-4 yr
kwashiorkor -	oedema	protein "	1-4 yr
marasmic kwashiorkor	wasting + oedema	caloric + protein	1-4 yr

2.1.1 Causes

Marasmus is often due to severe direct lack of energy-containing foods in the diet. In infants, this is commonly due either to insufficient breastfeeding, or to artificial feeding which is too little in amount, too dilute, and highly contaminated. It also occurs in low-birth-weight or premature babies.

Marasmus in breastfed children below 6 months is due to inadequate lactational performance for a variety of reasons·

- The mother may be a multigravida, herself malnourished, and obliged to work in the fields from early after childbirth In Africa it often happens that even quite young babies are left with grandmothers or siblings who pacify the baby with pap or suger-water or other inadequate concoctions until the mother returns.

- Malaria and other puerperal infections are common and they reduce milk supply.

- Dietary restructions, especially in respect of animal proteins, are common during
perium. Usually this is due to the belief that the child will acquire some undesirable
ter which it is supposed (by association) will be transmitted to the suckling child,
the mother's eating fish may cause the child to have skin disorders, etc.

- In the urban setting, the mother may have reduced milk output because of psychosocial
s, or because she is working, or has insufficient food supply.

Bottle-feeding is sometimes introduced even in the first three days of life, after
y in hospitals, this renders difficult or impossible the establishment of proper
ion. This sequence of events may occur

- to suit the convenience of doctors or nurses (who may prefer a regular feeding-time
than on-demand feeding),

because hospital structures or routines make it difficult for the baby to remain
de the mother,

- or because of "invasion" by charitable people or commercial firms, offering cows'
preparations which are free at this stage, but later have to be paid for and are too
burden financially for modest-income families.

Diarrhoea . Bottle-fed infants are particularly proné to diarrhoeal diseases, which are
unavoidable given the hygienic problems of modest-income households. A vicious circle
diarrhoeal disease, reduced intake (due to semi-starvation or starvation diet),
malnutrition, reduced appetite, reduced resistance, further diarrhoea.

Children 6 months - 4 years often have inadequate caloric intakes, especially from
ths It is commonly believed that breastfeeding alone is sufficient up to 12 months,
merely a taste of semi-solid food Since the breastmilk production usually remains
ary or declines from 4-6 months onwards, a non-supplemented breastfed child becomes
ively semi-starved and marasmic. Parents seldom understand that supplementary feeding
tial and should normally start between 4-6 months, provided adequate hygiene can be

is commonly said also that the bulky nature of the diet, in tropical countries, is
ot leading to marasmus or at least to chronically inadequate dietary intakes. Both
nd tuber diets are bulky, and they are usually low in fat content. However the
of children even on this type of diet are relatively "well covered" and seemingly
ie-deficient.

Infections· Children in this age range also suffer frequently from numerous infections on average, about one a month during the first three years of life Those episodes usually entail fever (with increased metobolic losses), diarrhoea (with reduced absorption of nutrients) and reduced intake - due to lack of appetite or (regrettably) instructions of health attendants or parents The common infections are measles, whooping cough, diarrhoeal diseases, skin, respiratory (including TB), urogenital and parasitic diseases.

Studies on children with severe malnutrition, for whom pre-existing health centre records are available, usually show that a period of retarded growth has existed before the vicious circle of diarrhoea/malnutrition sets in

Kwashiorkor The sequence of causation is usually rather different The child may be relatively well-nourished up to 12 months He is usually seen some weeks or months after weaning (cessation of lactation), at which time he switches abruptly to a low-protein, low-fat diet Kwashiorkor is most common in areas where cassava is the staple diet, also common where other tubers (e g. sweet potato) form the staple, but less so where cereals form the staple for at least a substantial part of the year. Kwashiorkor arises when, with cessation of lactation, the staple food dominates unduly the dietary intake, with little or no protein-rich supplement. In Africa, the protein foods which may be available, and sometimes are used, include milk (pastoral tribes), fish (fresh and dried) (from sea, lakes, rivers), and various pulses including groundnuts. These foods are often not given to children below about 2 years of age because they are too expensive for the family cooking pot, or because they are deemed to be

- undesirable, e g. children given eggs may become robbers, given meat, may become greedy for meat, given fish, may get worms,

- unnecessary, e g. parents may think the cooking-water is enough for the child,

- indigestible, e.g pulses

In general therefore, the restricted use of these foods is a combination of food beliefs, food availability and food prices.

Another factor which contributed (classically) to the occurrence of kwashiorkor is the psychosocial disturbance, which arises when a child is forcibly weaned from the breast by sending the child away (e.g. to live with another branch of the family), or even with abrupt weaning when the mother becomes pregnant again.

Intercurrent infections (especially measles) are often contributing causes of kwashiorkor, but since they cause loss of the whole range of nutrients, they more often lead to marasmus.

Kwashiorkor is seen more often, relatively speaking, in rural than in urban areas, but is also sometimes seen in urban areas.

Marasmic kwashiorkor is due to a diet deficient in calories but with a concomitant particular deficiency in protein. This form of PCM seems to be more and more common in urban areas where, according to clinical impressions and a few collected data, it constitutes the bulk of cases. One factor contributing to this, notably in East Africa (e.g. Lusaka) is the marketing of more refined maize meal preparations which are virtually just starch ("breakfast food"), the protein component having been removed in favour of livestock But the decline of breatfeeding is probably the most important factor even there.

It is clear that almost everywhere (except perhaps in cassava areas) maramus is several times more frequent than kwashiorkor It is an important question, on which little direct evidence is available, as to whether this predominance of marasmus is mainly due to an overall lack of foods, or rather to particular infant feeding practices, or to concomitant infections.

On the one hand, it is certain that famine and seasonal food shortages and poverty are important causes of PCM in Africa today Data from the drought-affected countries of West Africa suggest that the children below 6 years are in poorer nutritional state than older children and adults Outside the famine areas, the main causes of marasmus seem to be the decline in breastfeeding ard poverty (in urban areas), and lack of awareness of the need for semi-solid feeding of infants beginning from 4-6 months. We are of opinion that at least outside the famine areas, a considerable amount of malnutrition, of both marasmic and kwashiorkor type, could be avoided if the parents were well educated on the need for adequate supplementary feeding of infants and the inclusion of protein-rich elements. This needs to be coupled with early and adequate treatment of diarrhoeal, parasitic and respiratory diseases. We feel that a protein-rich weaning food has some importance, particularly as a convenience food for urban families, but that its place is secondary to the overall educational effort.

2.1.2 Prevalence

Some data are presented in table 1. It is to be noted that these figures are, in most cases, based on studies in particular localities or populations groups in a country, not necessarily representative of the whole, but representing rather (in most cases) a particular ecological zone. The criteria are not always identical and it is not possible to make statistically valid comparisons between countries Within countries where uniform criteria were applied (e.g. Tanzania), this is feasible. The prevalence of severe PCM ranges from 1-24% with a median of 4% Marasmus exceeds kwashiorkor in all places except Douala.

For several countries (e.g. Ghana, Kenya, Nigeria, Tanzania, Zambia) much more detailed information is also available.

It is important to gather more data on the prevalence of severe PCM in its different forms in different ecological zones (in rural areas) and socio-economic groups (urban areas). Severe PCM is usually said to be more common in urban areas than rural. However in Zambia

(for instance), closer study of hospitalized cases indicated that many of these children came in fact from rural areas, and that in rural areas there were more cases of PCM who were not brought to hospitals.

More detailed data would allow conclusions to be drawn on the following

- which dietary patterns are apparently preferable (in different ecological zones),
- whether urban or rural problems are more severe,
- whether caloric or protein problems are more severe,
- which are the priority areas for nutritional recuperation services

2 2 Moderate PCM and growth retardation

Moderate PCM is manifested principally by a retardation of physical growth. If the dietary deficiency is not too severe nor acute, there is likely to be an equivalent reduction in both weight and height for age, and a more or less normal weight/height ratio for age. In severe or sudden PCM or with dominating caloric deficiency, W/H ratios are reduced.

A simple and for practical purposes reasonable way of identifying children who are moderately undernourished or malnourished is that the body weight lies between 80% and 60% of an accepted weight - for - age standard Studies have shown that for most African children* who are well nourished, growth performance is more or less identical with those of USA, British or French children In the African Region, the standards commonly used are those given by Jelliffe (WHO Monograph No.53, Annex 1), those used in Morley's weight charts, or the Dakar standard

In the assessment of growth, it is in fact the rate of weight gain over a period which is of more importance than the position at one point in time relative to any standard Failure to gain weight between three visits to a health centre is an important indication to check the nutritional history as well as for presence of disease.

The growth of African infants is commonly good until 4, 6 or 8 months of age. It is of importance to determine at what age retardation sets in, since this will indicate the age around which education on infant feeding should be concentrated. Most studies show the retardation beginning between 4-6 months.

The causes of moderate PCM are essentially the same as indicated for severe PCM. Infective illnesses contribute as well as dietary inadequacy

Overall, one may say that apart from conditions of emergency and seasonal food shortages, there are two periods of inadequate supplementation in the existing dietary patterns of young children

*Excepting some ethnic groups e.g pygmies.

- from 6-12 months, deficit mainly in calories, sometimes also of protein,
- from 12-24 months deficit mainly in protein, sometimes also of calories.

The relative importance of these deficiencies varies from place to place and from season to season.

The prevalence of moderate PCM is naturally much greater than that of severe PCM. Table 1 gives available data from most countries Again the criteria are not always the same. The prevalence is generally between 10 and 40%.

Again it would be desirable to tabulate such data for each ecological zone and socio-economic group in a country, in order to determine which are the priority areas for educational and other measures

PCM IN CHILDREN 5-15 YEARS

PCM is commonly manifested as a retardation of growth in school age children. During seasonal food shortages there is sometimes a failure to gain weight between three-monthly weighings, but this is largely compensated for by accelerated growth after the harvest season. It is not certain whether this sort of cyclical growth pattern has serious consequences, but it seems likely that alternating phases of undernutrition and overnutrition are prejudicial to physical fitness and may have harmful effects on other metabolic processes.

It is well known that school children often leave for school with little or no breakfast, and may even pass the whole day without food. This is probably detrimental to both physical and mental performance.

Studies in several countries have shown that children of well-to-do families approximate to European children in their growth performance. Rural children generally grow markedly less rapidly than urban, e g. in Nigeria, rural children at 4 1/2 years were found to be 2 kg lighter and 15 cm shorter than urban children. Children in the southern parts of Nigeria and Ghana are generally heavier but shorter than children in the northern parts, where the staple foods are cereals and generally the protein intakes are better but caloric intakes poorer

Growth studies during supplementary feeding programmes in a number of countries have shown a beneficial effect on growth of school age children. It may be inferred that energy supplementation is probably more important than protein supplementation in this age group.

Although growth records are often kept for schoolchildren, they are relatively seldom analyzed, and even more rarely presented according to an agreed set of criteria. The following would appear to be some useful indicators (referring, for example, to the standard of WHO Monograph No.53).

- % of children below 80% and 60% of standard weight for age,
- % of children below 90% and 80% of standard height for age,
- % of children below 80% and 70% of standard armcircumference for age.

4. PCM IN ADULTS

In times of severe shortages of food - such as are not uncommon in the northern parts of Ghana and Nigeria and many parts of Eastern and southern Africa -almost the whole population may be undernourished to some extent. Adults lose weight, and nutritional oedema appears if the undernutrition is severe and prolonged, especially if cassava forms the staple food. In Gambia, 30% of the adults were found to have oedema during the hungry season In lactating women in Zambia, 50% were found oedematous in a cassava area. In Senegal (drought affected area) oedema was not common in adults of reproductive age, but was relatively common in old people (12-18%).

In Upper Volta, the percentage of women who weighed less than 40 kg was found to be a useful indicator of relative nutritional status

Women in African countries often gain relatively little weight during pregnancy averagely 5-7 kg, and sometimes none at all.

It is likely that caloric deficiency is the main cause of these phenomena, but protein deficiency is a contributing factor to the nutritional oedemas.

Relatively few data are available as to nutritional status among adults PCM is only readily detectable when the protein-calorie deficiency is relatively advanced. It seems important, again, to agree on some criteria (which will be useful mainly in circumstances of severe protein-caloric deficiency) e.g

- % of women (15-45 years) below 44 kg and 40kg,
- % of women (15-45 years) below 80% of standard weight for height,
- % of women (15-45 years) below 80% and 70% of standard arm circumference for age,
- % of lactating women with bilateral oedema,
- % of third-trimester pregnant women with oedema.

Until certain criteria have been agreed upon and widely used, it is difficult to make any attempt to compare the nutritional status of adult populations in different areas within a country, and between countries

CONCLUSION

In the foregoing discussion on the causes of PCM, emphasis has been on the importance ecological and socio-economic factors. The importance of precise identification of the ses is that only thus can rational preventive approaches be developed - which will be the ject of the rest of our discussions during this seminar It is at once evident that dietary causes are multiple, and also the ecological ones, the socio-cultural factors the concurrent medical factors (infections etc.) The causes are complex and inter-plinary, and so are the remedies

The presentation of data for prevalence, although sketchy, show what are some of the lable baselines and indicators by which the present situation and future trends can be sed in each country Such profiles should be compiled for each ecological zone and o-economic group in a country, and the profile should be reassessed periodically, icularly where nutritional programmes are implemented. The present paper gives therefore indications both of what we do know already, and what we do not know but feel are ntial data for planning purposes.

r short, the analysis of causes and the assessment of prevalence is neither an end in f nor an academic exercise, but rather forms the basis for the planning and implemen-n of programmes in the field of food and nutrition. Since the causes of the problems ultifactorial, involving a broad spectrum of socio-economic and ecological factors, action taken should be correspondingly multidisciplinary, and integrated in overall nal socio-economic development plans Within the health sector, nutrition activities d be closely linked with relevant aspects of general health care - curative, preventive motive - so as to assure an efficient multipronged attack on the problems. ssment of the prevalence of malnutrition affords a basis for evaluation of trends and of dial measures. Analysis of the causes and prevalence of malnutrition is therefore the ary background material for food and nutrition planning

Table 1 Prevalence of protein-calorie malnutrition in African children under 5 years (selected areas)

Year	Country	No of children examined	Severe PCM (%)			Moderate PCM (%)		Total PCM (%)	Reference
			Kwash.	Maras.	Total	Anthropometric criteria	Clinical criteria		
1971	Botswana	...	...	..	5	25	-	30	Burgess
1973	Cameroon (Douala)	...	3.0	1.4	4.4	36.4	-	40.8	Martineaud
1971	CAR				3.0	36.3		39.3	Martineaud
	Ghana		. .	.	. .	...	North-37 South-12	45	Simic
1964	Guinea								
	Labé		11.8	11.8	23.6	.	.	..	Valtuena-Borque
	Conakry		?	2.5	..	..	...	..	
1968	Kenya	353			(1.0)*	25.0	..	26.0	Bodhal
1956-1960	Lesotho				2 (4.0)*	27.6	-	29.6	Munoz
1969	Malawi- Namitambo	619	0.5	2.7	3.2 (4.6)*	-	25.8	29.0	Burgess
1970	Nkhotakota	445	0.2	2.7	2.9	11.1	-	14.0	Burgess
1970	Lower Shire	547	0.2	0.7	0.9	13.1	-	14.0	Burgess
1964	Mali Towns				1.5-5.4				Paret
	Sanankaroba								Alexik
	1 year	...	. .	..	..	5	-	..	
	1-3 years		.	...	.	34	-	..	
	4-5 years	...	...	...	...	31	-	...	
1959	Mauritania	.	...	..			...	5	Mazer
1972	Niger 7 centres	551	...	..	..	...	...	13-38	Peace Corps/Nig
	13 centres 1 yr	480		..	...	. .	..	53.5	WHO/Min.Health
	2-3 yrs	293	...		. .	.	..	64.2	
1965	Nigeria	432	1.6	3.2	4.8	. .	...	...	ICNND
1965	Nigeria	1268	...	..	1.7	-	5.6	7.3	ICNND
1968	Oba and Owu villages (Abeokuta)	131	. .	..	3.1	35.0	-	38.1	Univ. of Ibadan
1970	Rwanda	..	...	...	9.8	55.5	-	65.3	Martineaud
1965	Senegal (Niayes)	...	...	...	7.2	25	-	32.2	Cros
1964	Sierra Leone	1448	1.2	2.3	3.5 (5.7)*	(25)	-	30.7	Blankhart
1972	Sudan	82 (12mo.)	..	.	(2)*	12	-	14	Sanhouri & Gabr
	(Khartoum/	116 (1-3yr)	...	...	(4)*	18	-	22	" "
	Omdurman)	102 (3-5yr)	...	..	(1)*	8	-	9	
	Tanzania								
1968	Kisarawe (Coast)	630	0.8	6.8	7.6	-	19.3	26.9	Burgess et al.
1969	Tabora	551	0.2	0.3	0.5 (1.5)*	-	7.3	7.8	Burgess
1969	West	393	0.3	1.2	1.5 (0.5)*	-	10.5	12.0	Burgess
1968	Hombolo, Dodoma	401	0	3.2	3.2	-	17.8	21.0	Burgess
1961-1964	Uganda	...	0.0-0.7	0.4-1.5	0.4-2.2	...	...	...	Bengoa
1968	Uganda	...	...	...	5.0	...	25.0	30.0	Cook
1967	Uganda (Ankole)	345	0.3	1.2	1.5 (4.5)*	27.2		32.1	
	Upper Volta		..	.			30-40	.	Budlovsky
1965	Zambia	1104	...	1.7-4.1	.	..	...	...	Blankhart
1971-72	Zambia	2258	0-1**	0-21**	0-21**	27-62**	..	31-78**	National survey

* These figures indicate the percentage of children whose weight was 60 per cent of standard and could be considered therefore as marasmic.

** Minimum and maximum mean values among 16 ecological zones

REFERENCES

A GENERAL

BENGOA, J M. (1967) Priorities in public health nutrition problems
Proc. Seventh international Congr. nutr. (Hamburg 1966), p. 811

- (1970) Recent trends in public health nutrition. protein-calorie malnutrition.
Proc. Eight international Congr. nutr. (Prague 1969), Excerpta Medica Amst. p 14

- (1973) The state of world nutrition, NUTR/73 1, WHO, Geneva

MAY, J. M. (1965) The Ecology of malnutrition in middle Africa - Hafner, London

- (1970) The ecology of malnutrition in Eastern Africa and four countries of Western Africa, Hafner, New York

WHO (1970) Report of inter-regional seminar on epidemiology, prevention and treatment of protein-calorie malnutrition, (NUTR/70.4), Geneva

B BY COUNTRY

Botswana

BURGESS, H J. L. (1972) Nutrition survey in Botswana (AFR/NUT/52), Brazzaville

Ghana

National Food and Nutrition Board (1963) - Report of the 1962 nutrition survey

PLATT, B. S. and MAYER, J. (1959) Report of a Joint FAO/WHO mission to Ghana (FAO, Rome)

SAI, F T (1967) Health and nutritional status of the Ghanaian people - Min. of Health

SIMIC, B. S. (1971) Nutrition and diseases related to nutritional status of the population in Ghana

Kenya

BOHDAL, M., GIBBS, N E and SIMMONS, W. K. (1968) Nutrition survey and campaign against malnutrition in Kenya, 1964-68 (Ministry of Health)

Lesotho

MUNOZ, J. A. and ANDERSON, M. M. (1962) Report on a nutrition survey in Basutoland (AFR/NUT/12), Brazzaville

Liberia

NAH, N. N. (1971) Report on nutrition in Liberia
Paper presented to Symposium on Nutrition Priority in African development
Dag Hammarskjold Foundation, Uppsala

Malawi

BURGESS, H. J. L. and COLE-KING, S M. (1969) Report on a survey of nutritional status of preschool children in Namitambo, Local Court Area, Chiradzulu subdistrict, Malawi Med. Bull., 3, 99

BURGESS, H. J. L. and DRIESSEN, F. (1970) Report on a nutritional status survey carried out in Chief Malanga Chanzi Area, Nkhotakota district (Ministry of Health)

BURGESS, H J. L. and WHEELER, E. (1970) A report of a nutritional status and dietary survey carried out in Ngabu Area, Blantyre (Ministry of Health)

Mauritius

OMOLULU, A. (1966) Report on a visit to Mauritius (AFR/NUT/30), Brazzaville

Nigeria

COLLIS, W. R. F., DEMA, I. & LESI, F. E. A. (1962) Transverse survey of health and nutrition, Pankshin division, Northern Nigeria; W. Afr. med. J., 11, 131

COLLIS, W. R. F., DEMA, I. & OMOLULU, A. (1962) On the ecology of child health in Nigerian villages, Trop geogr. med., 14, 140 and 201

EDOZIEN, J. C. (1966) Establishment of a biochemical norm for the evaluation of nutritional status in West Africa - J. West Afr. Science Assoc., 10, 3-21

Nutrition Section, Office of International Research (USA) (1967) Nutrition survey Republic of Nigeria, Washington D C.

OMOLULU, A. (1965) Child health in Western Nigeria - W. Afr. Med. J., 14, 255

Sierra Leone

BLANKHART, D. M. (1967) Nutrition survey in Sierra Leone (1964) - (AFR/NUT/17 Rev.1), Brazzaville

Swaziland

BURGESS, H. J. L. (1964) Report on a visit to Swaziland (AFR/NUT/14), Brazzaville
BURGESS, H. J. L. (1966) Report on a visit to Swaziland (AFR/NUT/32), Brazzaville
JONES, S. M. (1963) A study of Swazi nutrition (Institute for Social Research, Univ. of Natal)

Tanzania

BURGESS, H. J. L., MALETNLEMA, T. N. and BURGESS, A. P. (1968) The nutritional status of young children in Hombolo - E. Afr. Med. J., 45, 605

BURGESS, H. J. L., MALETNLEMA, T N. and BURGESS, A. P. (1969) The health of children in Kisarawe district - Trop. geogr. Med., 21, 39

Uganda

COOK, R. (1967) Criteria for the evaluation of child health in a rural area (Ankola) of Uganda

In: Living conditions of the child in rural environment in Africa
Proceedings of a colloquium, Dakar 1967, (International Children's Centre, Paris)

Zambia

BLANKHART, D. M. (1967) Report on a visit to Zambia (1966) (AFR/NUT/33 Rev.1),Brazzaville

KRIKAVA, L. (1974) National food and nutrition programme, Zambia - Nutrition status survey FAO, Rome (ESN· DP/ZAM/69/512)