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THE WEANING DIET AND PRIMARY HEALTH CARE IN SENEGAL: POSSIBILITIES FOR THE FUTURE

by

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Home and Village Prepared Weaning Foods Project
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This drawing found in a stationery shop in Dakar, represents a Senegalese family at a meal. It illustrates the tradition of sharing a common bowl, usually filled with cooked millet or rice, and enriched with cooked meat or fish, broth and vegetables. The child enduring the weaning process normally would be held and fed by his mother using her fingers or a spoon. In this illustration, however, the family has apparently acted on the admonition "give the child his own bowl", which is a common nutrition message - designed to help the mother account for how much the child eats at at a meal. Here the artist seems to transmit an outcry: The child has been abandoned with his bowl!

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EXECUTIVE SUMMARY

The agreement for the Sine Saloum Rural Health Project was signed in August, 1977, for the purpose of providing a primary health care delivery system to about 800,000 persons in this largely rural area south of Dakar in western Senegal.

The project contains no nutritional component. The services of a consultant were requested for about three weeks in June 1981, to examine the potential for such a component, and particularly a weaning foods component, since studies have shown that more than 20 percent of very young children suffer 2nd and 3rd degree malnutrition in the area.

The consultant also was asked:

-- To consult with the Medical Research Council in Gambia about nutrition research at Kenneba which might have a bearing on weaning foods and nutrition projects in Gambia, and in the neighboring project area in Senegal;

-- To suggest an affordable approach for monitoring children's nutritional status in the project area which could be carried out at village level by the Community Health Worker or Dispensary-level Nurse.

I visited Senegal June 1-6 and 10-17 with the intervening period in Gambia, and I also visited Liberia for one day, June 18th, at the request of the Liberian Ministry of Health and Social Welfare and USAID Monrovia. While my remarks in this report focus on Senegal, certain common themes appear in all three countries.

A. GENERAL REMARKS ABOUT SENEGAL, GAMBIA, LIBERIA

(1) In all three countries there is a special "high risk group" (0-2 year old children), a "high risk season" (the "soudre", or hungry season in Senegal) and "high risk foods" (starchy gruels which may be contaminated and which contain neither enough calories nor enough protein to supplement children during the weaning process).

(2) It is impossible to separate out the need for better management of the diet for vulnerable groups from the overwhelming need to identify and reach earlier those most in need of nutritional help and advice.

(3) Cereal/legume mixtures are usually available to rural mothers in this part of Africa, but are not fed in adequate quantities or often enough to children aged 4 months to two years.

(4) There is a need for improved culinary methods so that foods are prepared in a more sanitary and digestible way for pre-school children.

(5) Infection, especially gastroenteritis, is so frequent in the most vulnerable age group that it must be looked upon as a primary cause of malnutrition for the following reasons:

-- children suffer from anorexia before, during, and after the frequent diarrheal episodes and therefore tend to have periodic drastically decreased nutrient intakes.

-- post-diarrheal "starvation" or "resting the bowel" is common just at the moment of recovery when the child may have a return of appetite and increased caloric needs.

-- episodes of diarrhea are frequent enough (as often as 2-3 times per week) that a child often barely recovers from one episode before another overtakes him.

(6) There is a need to reinforce positive traditional practices such as a prolonged breast-feeding which protect the child during the weaning process, and to find ways of introducing modification or change of certain adverse child feeding practices (for example, children eat or are fed from a common pot, instead of having their own bowls). This results in inadequate supervision of food intake.

(7) In all three countries, the strength of rural mothers in leading and feeding their families while at the same time having to participate in the agricultural labor force is remarkable. Whenever and wherever these mothers form groups which take it upon themselves to participate in solutions of nutritional and health problems, there has been success.

In all three countries baseline studies have been begun or are completed on the weaning diet. But the messages from these studies are not clear, or are not reaching the majority of mothers. There is also a common realization that pregnant and lactating mothers represent an especially vulnerable group. But pregnant mothers are rarely seen before the third trimester of pregnancy, and little is known about how to bring about behavioral change that will guarantee more calories and protein to women during their days of greatest need.

My Senegalese colleagues asked especially that I should make recommendations about integrating a weaning food project into a nutrition monitoring program as part of the national primary health care program; they also stressed what they consider to be their greatest problem: to reach the periphery with nutrition and health.

The single most important impression that I have received is that there is great need to integrate nutrition into primary health care programs, and the countries themselves see this as essential. The "weaning food" question includes the need to target the program to the neediest mothers. And unless this need is diagnosed in a determined manner, pregnant mothers will continue to come into the clinics with anemia too severe to treat adequately before they deliver, or children will come in already suffering from marasmus when they should have been discovered much earlier in community based nutrition monitoring programs. The "weaning food supplement" demonstration that may have gone on in the clinic is often missing the target group.

B. RECOMMENDATIONS WITH REFERENCE TO THE SINE SALOUM PROJECT, SENEGAL

In Senegal, my colleagues who gave information and assistance in the preparation of this report include health professionals and administrators in the Sine Saloum Project, members of the USAID Mission, and personnel in other internationally-supported and PVO projects. Apart from meetings in Dakar, I spent much time in Kaolack and villages in the project area. Special thanks to to Dr. Thianar N'doye, senior nutritionist in Senegal, Dr. Niang in Kaolack, and Dr. Michael White and Ms. Linda Worthington, USAID.

Principle findings and recommendations, summarized, are as follows:

(1) There is an urgent need for a nutrition program targeted to weaning age children and pregnant and lactating mothers.

(2) A number of potential weaning foods have been developed by Senegalese doctors but have been inadequately tested in the field. These should be tested, as it seems likely that one or more can be introduced in weaning diets composed of locally available and locally produced foods. Dr. N'doye in particular has worked with old traditional recipes which with some modification can yield adequate weaning diets. These have been tested for nutritional composition and the methodology has been developed for tests in the field, but the latter have yet to be carried out.

(3) The institutional framework exists for the introduction of the weaning diet in villages, i.e. the village health personnel of the Sine Saloum Project. However, a careful training program for these personnel is required and must be developed.

(4) Monitoring and evaluation can be carried out by these same personnel, preferably in one or more special areas within the project comprising populations of about 10,000 persons each. This activity will likewise require careful training and supervision for a period of time possibly extending up to one year.

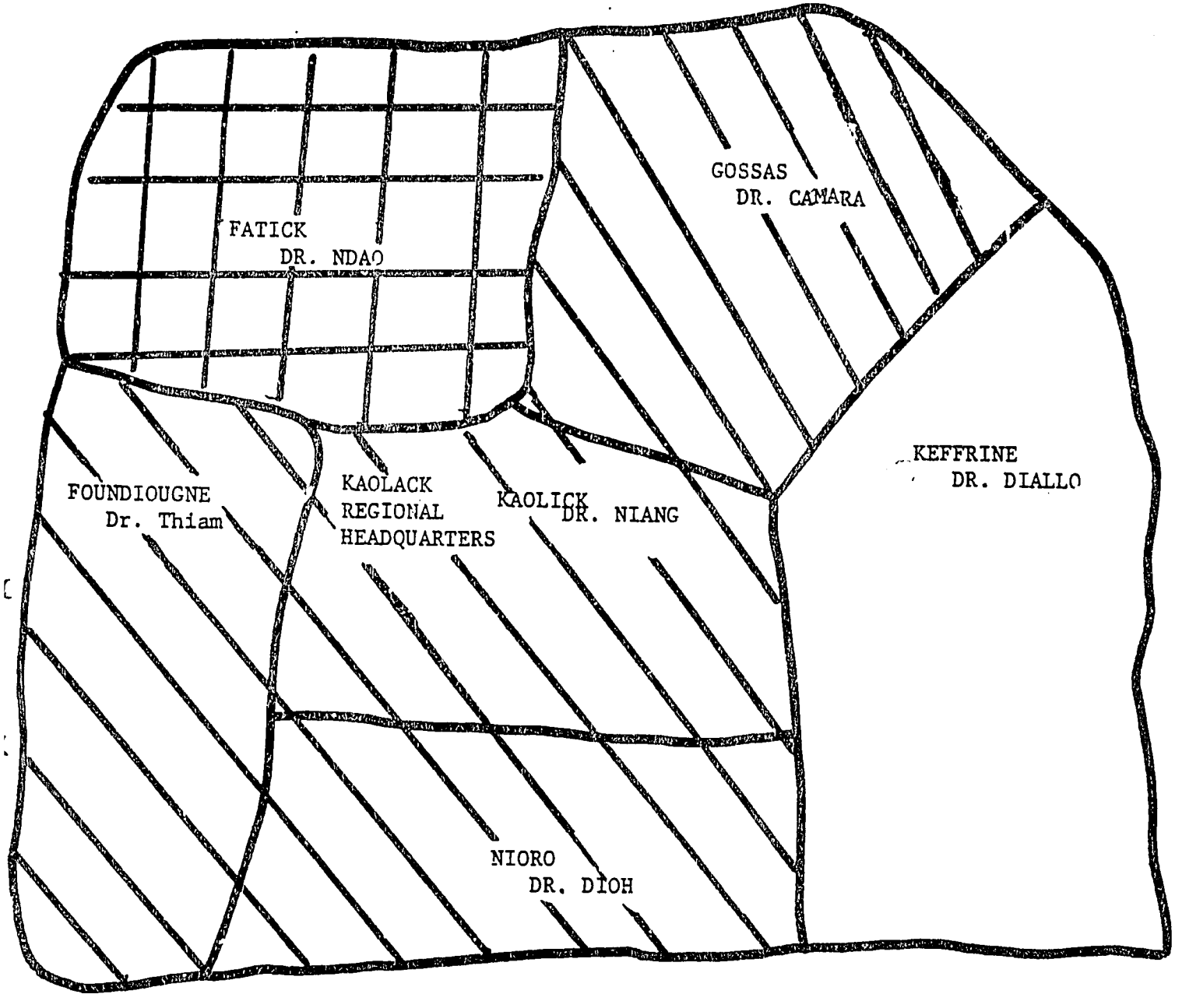
(5) It is recommended that the services of a nutritional professional with experience in village programs in LDCs be requested by USAID, for a period of up to one year, to assist in the implementation of these recommended activities.

THE WEANING DIET AND PRIMARY HEALTH CARE IN SENEGAL: POSSIBILITIES FOR THE FUTURE

Background

A USAID-supported rural health delivery project has been operative in the Sine Saloum area of Senegal since 1978, when the need for a community health outreach program for the area was expressed by Senegalese authorities. The government had already established a health system regional headquarters in Sine Saloum, in the town of Kaolack with a population of 1,200,000. A government hospital also had been established in the town. About 600,000 people inhabit five surrounding rural "departments:" Fatick, Gossas, Foundiougne, Kaolack and Nioro.

Each department has a resident physician who acts as supervisor in charge of a number of outlying health posts (about 10 to 15 in each department), the latter being in charge of a male nurse. Under the USAID-supported project, these nurses have become the supervisors of a series of outlying health units called "health huts", each with a staff of three: a village health worker (VHW), an aide hygienist, and a traditional birth attendant (TBA). It is estimated that the Health Huts serve a scattered rural population of about 225,000 living in 400 small villages in the project area (see Annex I).



PRIMARY HEALTH CARE PROJECT DISTRICTS OF SINE SALOUME

USAID Funded

Dutch Government Funded

An evaluation team from the U.S. visited the project in 1980 and raised a number of criticisms. Those retained and mentioned by Senegalese health professionals during my stay are as follows:

1. The "team" at the health hut level V.H.W., traditional birth attendant (TBA) and "hygienist") had presented problems. The V.H.W. (known as a "secourist") tended to become "chief-of-the-party" since he passed out or sold medications from the "pharmacie communitaire." Neither he nor the villagers understood clearly the role of the "hygienist," or sanitarian; the TBA's played no key role aside from accomplishing deliveries in an improved fashion.
2. The method of recruitment of village VHWs had resulted in some inappropriate and politicized choices.
3. The <u>transport</u> of health post nurse-supervisors to visit rural villages where VHWs work had become a problem.
4. Contact and coordination with central headquarters (Ministry of Health of Senegal and USAID) was not ideal.
5. Functioning of "health huts" was a serious problem partly because "400" health huts were too many, too fast.

- One third of health huts were closed because "secourists" (VHWs) had left. In some cases, poor location of the hut (too near the post) was a factor.

- One third of health huts were in serious financial and administrative difficulty. In the usual case, the "pharmacie villageoises" were non-functioning. (These were meant to be run by a local health committee). A cash "kitty" maintained by the local health committee in each village was to have made it possible to replace medications as they were sold.

6. The "health huts" and VHWs were seen by Senegalese professionals as a "curative medicine" approach, whereas real "primary health care" (according to Senegalese doctors) should have a strong preventive component (immunizations, prenatal care, and the like).
7. No <u>nutrition component</u> existed in the project, although nutrition was and is recognized by Senegalese health officials as a major problem of mothers and pre-school children.
8. <u>Doctors</u> at Department level seemed to have been left out of the plan. However, sixty "health huts" seem to be functioning exceptionally well, and usually the "mothers committee" is a key to the success.

To counter these criticisms and optimize the strengths already an immunization project is presently being planned, as well as a nutrition component. Restructuring/reformation and concentration at first in 60 villages where the workers function well has also been recommended.

The following report leads up to recommendations for a nutrition component. It focuses on three problems:

1. Implementation of an appropriate nutrition component, emphasizing weaning foods.
2. Development of methodology to reach all children.
3. Suggestions about nutrition-monitoring and possibly a targeted supplementary feeding program, since these seem especially important to the Senegalese Regional Medical Officer.

Nutrition Situation in Sine Saloum (See also Annex II - FAO Report)

I. Caloric Intake and the Weaning Diet

Senegalese people suffer calorie deficit which varies seasonally, and between urban and rural areas, and within the Senegalese family.

Pregnant and lactating women, especially during the "hungry" season" (pre-harvest, July-August-September) are at especially high risk along with pre-school children.

The average urban (town) calorie-intake is 2,200 cals/day overall (World Bank) while rural area consumption is probably about 1,660 cals/day according to studies from nearby Keneba, in Gambia.

(Studies of calorie intake of pregnant and lactating women there indicated about 1,660 cals/day or only about 60% of the U.S. norm for such women). Children are also found to have calorie deficits at all ages, with the overall deficit being 80% of normal. Men, on balance, fare better, but even the men lose an average of about 19 lbs. of body weight during the "Soudure," or hungry season.

During the weaning process, the mother begins as early as three months to give a starchy gruel or pap morning and evening. This gruel ("Bouilli"made of water and millet flour tends to be low in both calories and protein).

The practice of sharing a common bowl at mealtimes (at noon and in the evenings) from which the whole family commonly eats may be a factor contributory to malnutrition of children in the weaning process. The small amount of fish or meat at each family meal is usually placed in the center of one common huge bowl of cooked millet or rice on which a sauce is poured. The fish or meat is placed in the center and then cut into smaller pieces and apportioned to the children by the mother or household head; but wherever there is a man, he will receive the larger portion. Everyone (including toddlers) eats with his hands from the bowl.

Sons will be given preference over daughters in food apportionment, and we observed that children under five years of age are at a special disadvantage. If they reached to the center of the bowl for a piece of meat or fish, they would commonly have their fingers slapped. Often this depended on mother to "give them a bite". The overworked mother is often harassed and hungry herself; she tends not to know how much the child consumed at the common meal. She then breast-feeds the child to quiet him/her.

Calories from breast milk intake by infants is essential to survival, as this may be the only "extra food" a child receives apart from the common bowl. A study in Keneba, Gambia, revealed the following:

Mo. Lactation	
0 - 3 months	555 calories
4 - 6 months	510
7 -12 months	470
13 -18 months	425

These findings go along with the fact that children grow normally until about 3 months of age. This is curious: although WHO recommends 120 Kcal.Kg at 3 months, Keneba (Gambian) children who got 111 Kcals/Kg from breast milk grew at normal rates. Thereafter, unless supplemented, Keneba children would fall behind.

II. The Hungry Season

During planting and harvest, peasant families in the Sine Saloum undergo an annual food shortage. This is complicated by the fact that mothers spend up to 10-12 hours a day in the fields, and have less time than usual to spend with their children. In addition, with the rains comes an increased incidence of diarrhea and malaria, when mothers can ill afford the time to care for sick children. Food stores were getting low in June and would be close to exhaustion by late summer.

Factors which contribute to the "hungry season" are as follows:

a) Economic constraints: Rural families may tend to sell more food after the harvest (September) than they should, if they are to provide for their families through September of each year.

b) Post-harvest food loss: Dwindling stocks of food stored in home granaries are hardest hit by insect pests, molds, and the like during the hungry season. (We observed cow-peas in the dry season Kaolack market which had been reduced to hollow shells by insects.)

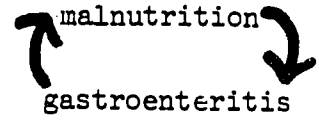
c) Time constraints: Mothers have less time to forage for and utilize the many leaves, fruits, shellfish, and the like which contribute to the diet during the rest of the year. In addition, time available to build fires and cook are greatly diminished. Unless the mother has active teenagers at home to help, the number of meals/day may be cutdown. Also cutdown during planting and harvest is time spent pounding grain, preparing millet flour, and the like, which normally may take up to 5 hrs./day. Millet "flour" is prepared as a moistened product, since the grain is impossible to control otherwise with the usual mortar and pestle. Similarly, cow peas (niebe beans) must be soaked, decorticated, washed repeatedly, and cooked for at least 30 minutes in order to have a product digestible by young children.

d) Timing of cash availability: Since farmers receive their cash for cash crops in October-November, they have difficulty arranging to husband this cash reserve through to the next year if they are to help their families buy food or seed. (In developed countries, workers prefer to be paid on a monthly basis partly because it helps distribute the family cash reserve over time. Agricultural cooperatives are set up in developed countries to help farmers achieve a similar distribution).

e) Absence of the mother from the foyer: In the case of infants age 0-24 months, the long daily absence of the mother during planting and harvest may mean less breast feeding; if the mother does return from the fields to breast-feed, she is often exhausted and her milk supply greatly diminished.

f) Malaria peaks: Malaria also peaks during the wet season. Already in June in Sine Saloum hospitals children were observed suffering from cerebral malaria. This febrile illness cuases anemia and predisposes children to malnutrition.

g) Diarrheal peaks: Diarrhea is known to peak during the rainy season. This perpetuates the vicious cycle:



Children recovering from diarrhea have increased calorie needs. Custom often dictates that they are "starved" instead.

Conclusion:

All of the above contribute to malnutrition. Prevalence of pem varies seasonally, being 61% in the hungry season vs. 41% in the dry season based on weight/age. Weight gain in the six to thirty-six-month-old child (gms/month) is 206 during the dry season but drops to 12 during the hungry season.
In nearby Gambia, birthweight is 3.0 kg in December-June, and 2.7 kg in July-November. Children born during the December-June period probably start off at a disadvantage. (N.B. - studies in Guatemala indicate that survival to age one is adversely affected if the newborn weighs less than 2.8 kg at birth.)

Influence of Farming Patterns and Foods Availability:

Farmers seem to sell more of their food crop and consume less than would be ideal. This is especially true in the case of the major crop: peanuts; and it is also true for palm nuts (Senegal exports peanuts and palm nuts, but imports cooking oil.

Millet, the staple source of calories for all age groups, would also be planted in late June or early July. During my stay in Senegal, I observed farmers raking the sands of parched soil, and noted many small piles of dried grass being burned. No composting was observed, but rather a continued working of what appears to be parched desert soil, relieved every one hundred feet or so by a mango, a "Uhl" or a Baobab tree.

Children were observed drinking a weak tea for breakfast, snacking, and eating only a few bites from a common bowl at noon or night. Mangoes, a "monkey bread" (from Baobab) and Uhl-pod fruit are eaten by children in the village, including those of weaning age as snacks. Bananas, while available in the market, were rarely seen growing or being eaten in the Sine Saloum villages.

Food Storage and preservation is a problem. Granaries, thatched-roofed huts up on poles appeared to be built so as to guarantee aeration as well as storage in the Wolouf villages. These offer little protection from either insects, pests, or rats. When asked about post-harvest food loss, farmers complained about millet-eater birds which regularly attack their main supplies, about rats, and about insects.

Nutritional Status Studies of Pre-School Children in Sine Saloum:

I. Background Studies:

Gambian studies in an area near the Sine Saloum show that the growth "norm" from age 3 months to 3 years is about 75% of the international standard. However, these children start out growing at a rate comparable to American children indicating their excellent genetic potential. Growth begins to fall behind at 3 months of age, indicating that calorie intake or absorption is not keeping up with growth requirement. Weight-gain and growth faltering seems to be most severe for the first year of life, is affected by concurrent infections especially gastroenteritis.

Growth rates in the nearby Gambia study area dropped precipitously during July-August, when the diarrhea season also was at its peak, and there was little evidence for catch-up growth. Except during 2 months of July-August, normal rates of growth for 2nd and 3rd years of life could be expected if it were not for gastroenteritis according to researchers in Gambia. But during July-August, growth rates would be zero even if gastroenteritis were eliminated, according to studies carried out by Jelliffe and others in Gambia.

Protein energy malnutrition (pem) has repeatedly been shown to be present in rural Senegal, with prevalence of 2nd and 3rd degree malnutrition higher in children 3-18 months of age than in children 18-48 months old. Fourteen percent of children had second degree PEM based on weight/height; five percent had second degree and four percent had third-degree based on weight/age (See Annex IV)

II. Data on Children in the Sine Saloum:

Three possibilities existed for looking at data on nutritional status of children in the project area Sine Saloum.

1. Catholic Relief Service DAta (PPMS)
2. "Well-baby clinic" data (Project Materno-Infantile)
3. Data from the Fatick primary health care project (being run by the Senegalese government with the aid from Holland - see map)

The data from #1 and #2 (above) was highly selective and incomplete. Both Dr. Camera (Gossas) and Dr. Niang (Kaolack) helped to interpret the data. They agreed that less than 25% of children are regularly seen in areas where they serve whether for immunization or for nutrition monitoring. The Department of Fatick, on the other hand, is seeing about 80% of all children regularly, and they are being weighed, measured, immunized, and giving nutrition counseling.

A Belgian nurse-midwife living in Fatick has trained the nurse-supervisors and health post nurses. She is presently leaving and turning the project over to them. The program seems practical, and not costly as will be described. It utilized health workers similar to those running the health huts-and works with mothers to get more food, better prepared, into weaning age children. (See Tables 1 and 2)

Mlle. Van Dyck and Mr. Diallo of the Fatick area shared the following data:

TABLE 1

Results of Nutrition Monitoring* for April-May-June 1981:

Village near Fatick where 80% of children were weighed:	Number weighed:	75-85% of std wt/age (1st degree malnutrition):	Less than 75% of std wt/age (2nd & 3rd degree malnutrition)
Village I	70	15 (21%)	11 (15%)
II	70	12 (17%)	22 (31%)
III	48	9 (18%)	12 (25%)
IV	74	10 (13%)	18 (24%)
V	55	8 (15%)	12 (22%)
VI	130	27 (21%)	28 (22%)
VII	65	12 (18%)	15 (23%)
VIII	59	14 (24%)	10 (17%)
	T: 571	107 (19%)	128 (22%)

Overall, 41% of children suffer some degree of malnutrition. All mothers received counseling. The most important message was "give baby his own bowl to eat from the family pot."

By contrast, data from P.M.I., Kaolack-Keursoce area where only 20% of children are reached is as follows:

TABLE 2

	Total	N	Malnutrition (Gomez Classification) 1st degree	2nd degree	3rd degree	% and 2nd 3rd degree
Feb 1981	139	113	13	10	3 (2%)	9%
Sept 1980	180	155	10	13	2 (1%)	8%
Nov 1980	352	329	0	12	11 (3%)	6%

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* Mlle. Van Dyck and Mr. Diallo (the Health post nurse Supervisor) of Fatick visit all village health huts on a quarterly basis, according to a fixed itinerary with a set of scales to carry out nutrition monitoring. Mlle, Van Dyck plans to return to Belgium, and the government personnel (Health Post nurses, Supervisor and Village health workers) will continue to carry out an itinerant immuniztion, prenatal clinic and nutrition monitoring scale which reaches 80-90% of the mothers in Fatick. (See map on page 2)

Clearly there is self-selection in the 20% of children seen by the PMI. The remaining 80% of children, if seen, would present a picture similar to that seen in Fatick.

Overall, the evidence suggests that up to 3% of children are in a severe state of malnutrition, and that 10-22% are in a state of moderate-to-severe malnutrition and are in need of rehabilitation.

The Role of Infection in Malnutrition

1) Measles was ravaging the children in Kaolack and Gossas, according to the doctors serving the area. Accordingly, children became malnourished, and cases or marasmus following measles were being seen in outpatient clinics on a daily basis.

Villagers we talked to seemed to know measles as a killer. (A measles study carried out in another area of Senegal showed that while the overall mortality rate is 12%, it rises to 30% if children have lost 10% or more of body weight, and if the epidemic occurs during the hungry season.)

2) Malaria contributed to the picture, and children recovering from cerebral malaria had a skeletal appearance in the hospital.

A marabou religious leader in Gossas told us he had been grateful for two programs which, in his eyes, had spared the lives of many children:

A. Measles immunization - a campaign held by the Canadians 3 years ago

B. "Chloroquinization" (Malaria prophylaxis)

3) Diarrhea: Repeated episodes of diarrhea are responsible for a great deal of the periodic weight loss observed in children in all countries. Furthermore, increased caloric requirements in the recovery period have often been underestimated, even by professionals. The traditional practice in the Sine Saloum, according to informants, is to deny the child nutritious food during and immediately following a diarrheic episode. The author observed a child who reportedly had diarrhea "all day" during the day before observation. In the home setting, no special effort was made to encourage the child to eat, although food was not denied him. However, the child managed to get only a few bites of the main meal, and was ignored while other children were being encouraged to eat fruit. Later, when a sturdy gruel was prepared for the benefit of the author, she offered it to the child who had diarrhea; he ate it eagerly.) Presumably, in the anorexic period following illness, the child may accept an attractive, easily digested food if some effort is made to hold and/or feed him.

Traditional remedies for diarrhea include Baobab fruit, herb teas, and uñl tree fruit. (No scientific data could be found on these remedies.)

Hospital Observations:

The regional hospital of Kaolack presents the kind of serious pediatric picture which results when there is no way of reaching mothers children with precocious nutrition counseling or follow-up nutrition program. In the hospital are children recovering from infectious diseases of all sorts with many also suffering severe malnutrition, including marasmus. On Saturday morning rounds, we saw several 15-18 month old babies who had lost the ability to walk through loss of body stores and muscle wasting (marasmus). Mothers had weaned these babies early due to pregnancy in some cases. Other children were apparently victims of both malnutrition and pneumonia or measles, or cerebral malaria (3 cases). Children were not being weighed regularly in the hospital nor was there any protocol for nutrition rehabilitation follow-up, or counseling. The pediatrician was interested in oral dehydration but had no "oralyte" packages available to her. Intravenous solution was lacking or expensive. No special diet was possible for children suffering severe malnutrition. No demonstration education to teach mothers how better to prepare weaning foods has been developed.

The Weaning Process in the Sine Saloum:

Breastfeeding and Supplementation

Breastfeeding begins soon after birth, and includes colostrum, which is not discarded here as in so many countries.

Supplementary feeding may not begin until 6 months of age, although no consistent pattern is found. Indeed, some babies have been found to be supplemented as early as 2 months of age, thus introducing the diarrhea problem. Western type infant feeding (bottles and commercial infant products) are virtually unknown in rural villages. However, maternity units give babies glucose-water in western-type bottles and thus may be introducing an undesirable practice to mothers who come to the maternity units for delivery.

Breastfeeding may traditionally be continued or not during diarrhea, and no consistent pattern could be found. However, where breast milk is denied, the dehydration which menaces the child is even greater and contributes to the problem.

The usual first food is "bouilli" or "roug", a starchy gruel which, if enriched could provide an acceptable supplement. Calories, protein, and vitamin content have been analyzed in the enriched form (See Annex VIII, p. 138-141)
It is often made of pounded millet flour, which must be freshly prepared daily and can become a vehicle for contaminants which cause diarrhea (See Annex VI)

If it is made thick enough to contain enough calories, the mothers say it is too thick to be palatable. (The Keneba studies show the usual prepared "bouilli" to be too low in calories to provide an adequate supplement. It usually contains 30 cals/100 gms and is apt to be contaminated.)

By six months of age, the child is held by the mother while eating at the family pot. Rarely is the child given his own bowl. The mother sporadically gives the child a "bite or two" of the family fare, usually rice or millet with meat sauce. Little protein may be eaten unless "basse" or a similar dish is prepared (pounded cowpea and peanut flour) with the evening meal of millet.

What is Being Done to Achieve Coverage of Under-Five Year Olds?

Catholic Relief Service data reveals that only 12%-15% of children in Sine Saloum are being reached by their food supplement program in the "P.P.N.S." system. Furthermore, the children "most at risk" (those suffering 2nd and 3rd degree malnutrition) may not be the ones receiving supplement. (See Annex III) This is due to:

1. Self-selection of mothers who agree to participate
2. Limited resources: PPNS cannot reach more children unless increased capacity is found in terms of ware-housing, logistics, and personnel

3. Distance and cost - both of which may act as barriers to access for the poorer mothers who live furthest away

The Catholic Relief program has introduced a different, and controversial weight/age personal health record (See Annex III

Government Service Capability:

Let us take one typical community of villages in rural Kaolack, that of Doffane (See Annex I), served by a health post and 10 outlying "health huts." According to data, if the huts were well distributed, 273 children per hut could be reached. This implies that a population of about 1,500 would be served by each hut. In reality, however, only about 470 people and less than 10 children are served by the hut; these are those who live nearby, and they represent about 1/3 of the population. Apparently villages that depend on the health huts seem too far away to walk to it, or people have no confidence that help can be found there, or they do not view the health hut as a place for prevention and health maintenance but rather as ap place to receive curative medicine. Yet the mothers in Doffane do believe in prevention as evidenced by the many charms and fetishes tied on babies in an effort to protect them from illnesses.

This is understandable. Except for the Canadian funded demonstration - immunization project against measles - they may have seen little evidence that it pays to bring a well child to a health team for any reason.

Some preventive services were rendered to 458 of the 2.736 children of Doffane, during May 1981, according to the following statistics:

P.P.N.S.	Catholic Relief Services program (food supplement, weighing and counseling).....	400 children
P.M.I.	(well-baby clinics) - children seen for immunization or minor illness.....	58 children
Total	.....	458 children

The statistics allow us to make some tentative projections keeping in mind that among the 400 seen by P.P.N.S., 350 are the regular attenders each month, seen over and over during the year. Furthermore, among the 58 PMI children are 38 new cases and 20 are old cases. Thus, with 38 new cases/month, a maximum of about 500 new cases/year would be seen by the PMI. Adding the 350 of PPNS and the 500 who might be seen at least once in government clinics, there are 850 children in Doffane who will be seen this year in a systematic way. Nearly 2,000 children (84%) will be left out, both for nutrition monitoring and for any kind of nutrition program that might exist.

Let us look at the statistics on a departmental level (We are indebted to Dr. Niang for these estimates). For the Department of Kaolack, as a whole, the P.P.N.S. (Catholic Relief Service) sees about 1,700 children/month, and the government well-baby clinics (PMI) sees another 1,000/month. Thus, a maximum of 2,000/month are seen out of an estimated 18,000 preschool population. (No wonder Dr. Kane, the regional medical director, asked the USAID Consultant to include the problem of reaching the periphery in this report).

A Weaning Food for Senegal

Introduction

Dr. Thianar N'doye of B.A.N.A.S., the Dean of Senegalese nutritionists, has been documenting/analyzing traditional foods in Senegal for years. He has written a book on the weaning diet (See Annex VIII which contains many appropriate recipes that have been analyzed for protein, calories and vitamin content. This book is used as a text in the capitol city. However, the weaning foods recommended do not seem to be utilized often enough or in quantities adequate to prevent malnutrition.

Because there has been a recognition for at least twenty years that preschool children in Senegal suffer protein-energy malnutrition, the search for a special "weaning food" is not new. The history and background of development of the product "Ferelin" is of special interest to the study of home/village prepared weaning foods. Although it is possible to process it centrally (and Senegal had done that in the past), it could actually be produced at a home/village level. In fact, Dr. N'doye, who first described the food, based on a traditional dish that he observed, explains that it is consistent with the concept that a legume-cereal mixture, such as those traditionally produced in some areas of rural Senegal, could be ideal sources of nutrition supplement for rural children. Research in Senegal has long indicated that the major impediment to using bean-cereal mixtures for infants and small children is the undigestibility of the leguminous portion of the food. This was shown to be due to enzymes, such as the antitrypsin factor. Dr. N'doye explains that traditional methods, such as decortication, washing, and prolonged cooking have long been used here as in many societies to increase the digestibility of the finished product.

In Senegal, the cow-pea or Niebe bean is ubiquitous, and with adequate decortication processing to remove the "anti-trypsin" factor, (apparently a steaming-pounding-drying process) it has been incorporated into an appropriate weaning food that can be prepared at home or centrally.

Based on these findings, a weaning food mixture composed of cow peas, millet, dry skim milk, and sugar, called Ferelin has been developed: Extracted here are key facts from the document: A Weaning Food for Senegal (by Dr. N'diaye Makhtar, published by Org. de Recherches sur l'Alimentation et la Nutrition Africaines) as follows:

Rationale: (excerpted and translated by G. Berggren)

Nutrition during the first months/years of life has been proven to be crucial to development, both physical and mental, and to survival in the preschool years.

This period of life is dominated by the fundamental event of weaning, that process by which the infant is progressively separated from his/her mother's milk as his basic source of nutrients. It should be characterized by a passage from a lactation-dependent diet to a more and more diversified type of nutrient intake. The continuation of an inappropriate weaning practice, such as allowing a child to receive breast-milk only through 6 months of age, introduces protein-energy malnutrition into the Senegalese milieu.

Children grow normally to about 3-4 months of age when they seem to fall behind the international standard growth rates. In Africa, in general, about 4.4% of children have severe pem and 26.5% are considered to have moderate forms. The quest for a weaning food in Senegal dates to 1953-54 when peanut milk and peanut-millet mixutres were tried. Peanut-flour was tried in 1963, and an attempt to market a local product called "Lady Lac" made of peanut-flour, milk and sugar was attempted unsuccessfully in 1966. Fear of aphlatoxin halted peanut-flour experimentation. One such mixture was:

Farine 21 (peanut-millet flour)----------60%

Dry Skim Milk----------20%

Sugar----------20%

The peanut-millet mixtures were never markedted successfully and a whole series of mistakes were chalked up: financing errors, lack of coordination, production problems, and promotion problems.

The result of Dr. Thianar N'doye's many years of study of the determinants and consequences of protein-energy malnutrition in Senegal, was a proposed new "weaning food" in the 1960's. This food, called "Ferelin" utilizes the niebe bean or cow-pea which traditionally is steamed and/or soaked, hulled, thoroughly rinsed and may be pounded before being added to main dishes, su h as "LeNatt" (p. 163 of his book, Guide de Regine du Sevrage de Senegal, 11 edition B.A.N.A.S., Dakra, Senegal, 1967).

In 1969 the Sentenae mills produced the first "weaning food", incorporating pre-cooked cow peas with a method recalling the decortization process long in use in rural villages. The product was named "Ferelin", which in theWolof tribal language means "weaning".

Two different formulas were worked out as follows, and O.R.A.N.A. sponsored the trials.

Ferelin-Trial Formulas:

	Formula A	Formula B
Decorticated Niebe bean (cow-pea) flour	50%	50%
Millet semolina	20%	20%
Sugar	10%	5%
Dried Skim Milk	20%	20%
Salt	0	5%
Aroma	1%	0

This is an industrial product and contains imported contents, especially the dried skim milk. Formula A had made diminished shelf life compared to Formula B.

Calories, protein and vitamin content were the next subject of concern. O.R.A.N.A. published the results of laboratory analysis in March 1977.

Nutrient contents of Ferelin compared to Daily Requirements of Pre-school children

Ferelin nutrient values		Daily requirement
Cals.	380/100g	About 1,000 cals/day
Vit. A	0	830 UI/day
Vit. B_1	0.41mg/100g	0.5mg/day
Vit. B_2	0.53mg/100g	0.8mg/day
Vit. B_6	0.12mg/100g	0.6mg/day
Vit. C	3.5mg/100g	20mg/day
Vit. D	-	400 UI/day

The coefficient of "digestibilite" of protein +81
(Niebe beans alone = 155)
Coefficient of crude protein efficacy = 1.91

Comment: Cereal-bean mixtures have provided a basis for weaning food in a number of countries. I.N.C.A.P., of Guatemala produced INCAPARINA.

INCAPARINA;

Corn	29%
Millet	29%
Cotton seed flour	38%
Yeast	3%
$CaCo_3$	1%

Vit. A. 4500 I.U.

Haiti produced a simpler formula, and one that could be duplicated at a village level, based on Haitian corn (70%0 and red beans (30%). Thailand, with a problem similar to Senegal's in that children lack calories more than protein, recently published requirements for an "ideal weaning food" for Thailand. It should contain:

- -Not less than 2.5g/protein per 100Kcal., with an amino-acid score of 70%
- -300 mg. linoleic acid/100 Kcals.
- -Not less than 2g of fat/100 Kcals.
- -It should be calorie dense enough to contian 350-400 cals/100g

Compared with these criteria, "Ferelin" comes out as follows:

	"Ideal" weaning food	Ferelin
Protein amino-acid score	2.5g/100 cals 70%	5.2g/100 cals 81%
Linoleic acid	300mg/100 cals	?
Lipids	2-6 g/100 cals	.3g/100 cals
Calories	400 cals/100g	380 cals/100g
Amino acid balance:	See next page.	

Amino Acid contained in Ferelin

	in mg/g Nitrogen	in g/100g product
Aspartic acid	336	0.06
Threonine	165	0.52
Serine	191	0.60
Glutamic acid	722	2.28
Proline	257	0.81
Glycine	122	0.38
Alanine	172	0.59
Valine	221	0.69
Methionine	65	0.20
Isoleucine	180	0.56
Leucine	327	1.03
Tyrosine	155	0.49
Phenylalanine	198	0.62
Lysine	213	0.67
Histidine	105	0.33
Arginine	257	0.65

Usine PAG Criteria to compare Ferelin with ideal weaning food:

	Ferelin Formula		PAG Recommendations
	A	S	
Protein (g%)	20.5		20
Lipids	1.26	1.30	3 to 10
Cellulose	1.05		5
Ash	3.2	7.4	5
Calcium (mg%)	327	348	300
Iron (mg%)	10	8.8	10
Thiamine (mg%)	0.41		0.3
Riboflavin (mg%)	0.53		0.4
Vit. C	3.5		20
Vit. A (units)	0		1,300
Vit. D	unknown		400

In Senegal, as in Thailand, the primary concern is with a well-balanced product that is calorie-dense; in this regard Ferelin seems adequate. Furthermore, like Haiti's AK-a-mil, the Ferelin formula, slightly modified, has the potential of being taught as a weaning food at the home/village level. However, the packaged centrally processed product, "Ferelin" is precooked and can be reconstituted with tepid water and fed immediately to the child. On the other hand, the mother's task in the village will involve preparing millet flour, preparing the cow peas (soaking, removing the shell, pounding) and mixing the two in a final boiled mixture. By adding oil or butter and milk and sugar, she will have not only duplicated but improved on the centrally processed product.

The major deficit, seen in these tables of comparison, is the lipid level, which can be easily changed if the mother either adds oil to the product, or adds the product (or flour of millet and pounded or pureed beans) to a meat or fish sauce normally prepared for the family.

Conclusions Regarding Weaning Food Counseling:

1. "Ferelin" will be needed as a centrally processed weaning food for cities and towns where mothers tend to buy western-type infant foods. This is rarely the case in rural areas.
2. Counseling mothers to make their own "Ferelin" at village level can be accomplished by:
   - providing village level machines and mills to make millet flour as a dry product which can be stored
   - teaching mothers to puree the Niebe bean sauce to add to millet flour
   - teaching mothers to add boiled milk, oil and/or peanut butter to millet flour mixtures
3. "Ferelin" is only one of a series of weaning foods that could be developed from a traditional diet. Dr. N'doye (BANAS) has developed a series of these, already analyzed for protein, calorie and vitamin content (See Annex VIII)

Highlights of interview with Dr. N'doye concerning weaning:

Dr. N'doye has written a guide for nutrition of weaning age children (Annex VIII). This guide is based on field observations of different regions of Senegal of people of various language/ tribal origin. An essential further step was Dr. N'doye's observation of seasonal variation of availability of foods appropriate to weaning age children. The underlying hypothesis of Dr. N'doye's work seem to me to be the following:

1. That both quality and quantity of foods that could be available to children of the weaning age group are sufficient to meet the nutrient needs of the child in most regions, during most seasons.
2. That education of mothers through "Ateliers de demonstration" could bring about adoption of better child-feeding practices, utilizing locally abailable resources.
3. That certain key culinary techniques such as those used to prepare "Ferelin", or other special lehuminous "weaning foods" could be introduced at village level in order to change child feeding practices.

Lessons from Gambia MRC Keneba unit possibly applicable for the Sine Saloum:

1. One can anticipate a system of nutrition surveillance and counseling which will reach 80% of children utilizine village workers

   -Mothers bring children for weight monitoring (at least each 3 months)

   -Each child has a weight/age card kept by the mother in a plastic bag "chez elle"

   -This weight/age record also serves as an immunization record

2. Based on studies in Keneba, supplementing pregnant mothers during the last trimester can be expected to increase birth weight, especially during the "Saison du Soudure" when birth weights normally fall

   Birth weights were shown to be low:

   2.7 K wet season

   2.953 K dry season

   However, mothers supplemented with 900 cals/day had babies weighing, on the average, 2.90 k or a gain of 200-270 gms.

3. "Weaning foods" have been shown to be a primary source of diarrhea for 1-4 year old children. This was due to:

   a. Contamination due to preparation of food with dirty hands.

   b. Contamination of cooking utensils.

   c. Poor storage conditions during which bacteria and mold could multiply. The longer food was stored (especially "bouilli") the greater was the chance of contamination).

   d. Lack of thorough cooking.

All recommendations listed here are in keeping with the request of the Regional Medical Director, Dr. Kane, who asked that the nutrition component of the primary health care project funded by USAID must:

1. Provide nutrition monitoring/counseling/weaning-food implementation project that reaches the periphery and all the children, as nearly as possible.

2. Be consistent with the nutrition monitoring/counseling program already field-tested by the health personnel.

3. Be integrated into the primary Health Care System of the Government of Senegal

The recommendations for a Home/Village Prepared Weaning Food Program for Senegal, therefore, must include:

- Coordination with those developing centrally processed weaning foods (Ferelin), so that mothers can learn to prepare these foods at home, and can do more readily, and in a way more appropriate to toddlers. Thus, although mothers "buy" a prepared multimix, they can know how to approximate or duplicate its ingredients from their local stocks. (Rural mothers seem more apt to do the latter)

- Development of a clear nutrition message and participatory demonstration education based on locally available foods, and traditional dishes that are rich in calories and protein - local methods of preparation that can be simplified/or modified should be explored

- Development of participatory-demonstration units to allow mothers to practice making weaning food supplements in more appropriate, safer ways - "Ateliers de Demonstration en Nutrition"

- A Nutrition monitoring system, so that children whose mothers are most-in-need of extra supplements or counseling be identified in a precocious manner, before their children become severely malnourished

Preamble to Recommendations:

Linda Worthington (USAID-Senegal) produced a review in French of the nutrition situation in Senegal partially interpreted here for the "Seminaire sur le Planification Multisectorielle de la Nutrition et la Developpement and rural au Senegal", 4 July 1981. Some of these will have direct bearing on the weaning food problem - for example, Mrs. Worthington recommends that nutrition programs should:

- Help establish food availability in such a way that seasonal deficiencies are minimized
- Develop methodology for effective nutrition education
- Develop and distribute special weaning foods from traditional menus, especially during the "hungry seasons"
- Develop nutrition fortifiants or recommendations about diet that will overcome the iron deficiency apparently extant in Senegal
- Be based on consumption surveys

Resources;

Resources in Senegal for weaning food projects include the following:

1) From the Catholic Relief Effort experience for example

- O Mothers do not lose personal health records
- O Demonstration-education in nutrition can be successfully carried out (See Annex III)

2) From the Peace Corps experience

- O "Centres nutrionnels" were carried out by Star Campbell and others in 1977, under the direction of BANAS (See Annex V) to successfully educate mothers in centers at village level
  - -mothers paid 200 CFA for 200 CFA for inscription and 20-50 CFA francs, for monthly weigh-in, wt. card, etc.
  - -one mother acted as volunteer to help see that all children are weighed monthly, their charts kept up, and mothers counseled
  - -work with village "committees du Sante" proved successful

3) From the Ecole Nationale d'deonomic Appliquee

- O young women are being educated to work with mothers in rural area; these women will deal with weaning foods
- O recommendations from the multisectoral planning seminar are available (See Annex VI, Linda Worthington's document)

4) From FAO Regional offices for Africa (See Annex II, and Annex VII)

Anthropometric measurements which could be more practically applied are being tried out in Africa; these could improve nutrition monitoring/counseling. For example, arem curcumference measurements (it is hypothesized by Dr. K.V. Bailey) could possibly replace wt/age measurements, he proposes a series of seven arm bands to be utilized to identify risk categories of malnutrition for different trimestrial age groups, for example:

age	severe pcm arm circ	moderate pcm arm circ
0 mois	< 9.5 cm	<11.0 cm
1-3 mois	<10.0 cm	<11.5 cm
4-6 mois	<10.5 cm	<12.5 cm

The arm circumference would be measured by a simple color-coded arm band as described by Zerfuss, Zeitland and others (See Annex VII)

5) From the following organizations in Senegal

- Le BANAS -Bureau d'Alimentation et de la Nutrition Appliquees
- Dr. Thianar N'doye
- Both demonstration education in nutrition and a manual for preparation of weaning foods have been developed
- ITA - L'INSTITUT de Technologie Alimentaire
- Madame Basse
- Technical expertise for experimentation of cereal-legume blends for either local or regional use exists here
- LeCANAS- Coordinating organism for nutrition programs under the Minister of PLAN of the government of Senegal. For example, the Secretaire d'Etat a La Promotion Humaine, la Directeur de la Formation Rurale, etc. meet here.
- L'ORANA Regional Organization West African for Nutrition Research (Dr. Armandou Makhtar Ndiaye) conducts research relevant to the weaning food issue (see notes on Ferelin) and highest risk groups (for example ORANA research showed that higher risk for malnutrition at weaning age exists in cities rather than rural areas) (See Annex IV)
- L'ORSTOM - Private scientific research unit maintains excellent library on past and present research findings relevant to nutrition in Senegal (See Annex IV)
- Le SONED - Private consultation unit allied with World Bank for recommendations in nutrition
- L'IFAN - University of Dakar center of cultural, anthropologic, and ethnologic studies

Dr. Kamara has accomplished a scheme for the study of food consumption in Senegal. Childrearing practices as far as food consumption is concerned have been realized here. The difficulty in changing rice preferences to millet preferences has been especially well documented.

Overall Recommendations:

It is clear that the overall recommendations for a Home/Village Prepared Weaning Food Program for Senegal must take into consideration the special problems of the country which have been ferreted out by Senegalese nutrition scientists and their neighbors in nearby Gambia. Cardinal among these findings are:

- a "high risk" season (June, July, August, September)

- High risk, or expecially vulnerable groups; these are preschool children and pregnant and lactating women (Children 0-3 years of age have very high death rates related to malnutrition)

- "High risk" foods; starchy gruels that are low in calories, and easily contaminated are often depended upon as "weaning foods" while traditional dishes rich in calories and protein may be withheld or inadequately prepared for the child in the weaning process

- Strong evidence of the negative interaction between nutrition and infection; infections are
  - diarrhea, often deriving from contaminated "weaning food"
  - measles
  - whooping cough and other respiratory illnesses

Steps that must be taken in order to begin to meet the need:

1. The development of the most appropriate nutrition demonstrations concerning the best possible weaning diet should continue to emerge based on the work of Dr. N'doye, Dr. N'daiye and the staff at O.R.A.N.A., in collaboration with other instituations, such as the University Home Economics teaching staff. Demonstration units for participatory learning are essential. (Experience has shown that food habits do not change by merely "talking". There must be a methodology in which mothers can help prepare the weaning foods, such as enriched "bouilli", and feed them to their children under supervision) The "weaning diet" for Senegalese babies should depend heavily on the village equivalent of "Ferelin" and similar traditional dishes according to season and shown to be adequate in nutrient content by B.A.N.A.S. (Dr. N'doye) or O.R.A.N.A. (Dr. N'daiye). The book already developed to serve as a baseline for weaning food intervention is Guide du Regime de Sevrage, by N'doye, T.; N'daiye, A.M.B.; Camara, D.F.; and Coulibaly, M.A. 11th edition, Ministry of Public Health and Social Affairs of Senegal, Dakar, 1978 (See Annex VIII)

2. Preservation of positive traditional practices, such as prolonged breast-feeding, should be reinforced.

3. The method of nutrition counseling and referral and treatment (where necessary) should be clearly delineated. For example, if it is possible to refer children whose graphic weight-curve shows faltering to the Catholic Relief Services P.P.N.S. program for temporary* nutrition supplements, this method must be spelled out in such a way that it is consistently followed for all children in need, not just a self-selected group who decide to follow. Coordination with the Catholic Relief Service 85 centers (PPNS) of food supplementation/distribution in a method approved by the physicians of the Sine Saloum area is desirable.

4. Establishment of a nutrition monitoring and demonstration education system at the periphery, so that mothers most-in-need are not left out

   - Sensitization of parents in villages to the benefits of regular weighing, nutrition counseling and immunization of their children

   - Education of village health workers, traditional birth attendants, and health post nurses in nutrition, including preparation of weaning foods and use of the weight/age monitoring method

* Temporary supplements may turn out to be necessary for many children during the "hungry season" until mothers can better cope with food stores

-All 0-4 year old children served by a "health-hut-team" should be registered and a personal health record established for each child. This record, including a graph of the child's wt/age and immunization, should be on a sturdy card which is to be kept in its plastic sleeve at home by the mother (See Annex II)

-A protocol for consistent, regular nutrition monitoring/counseling sessions should be developed. This has already proven successful in the Fatick where

-each health-hut-team along with health committee members from outlying villages, carries out nutrition monitoring on a quarterly basis

-a system of maps and regular itineraries permits all members of the team to stick to a regular schedule for nutrition monitoring/counseling

The health-hut-team notifies families in advance of the visit of the team for a health fair or rally

Voluntary village collaborators help to set up the "rally day" when all children and their mothers will be seen by the health post nurse, nurse-supervisor and other professionals on their regular rounds.

5. Coordination with the UNICEF Nutrition program being established in Senegal is desirable:

-Nutrition-agriculture lessons are now apparently being developed which could work out well as a part of the quarterly "health fairs" or rallies to be held in health-hut villages.

-One should take advantage of the "Demonstration culinaire; techniques, and the audio-visual aids developed by UNICEF whenever these are available and appropriate

6. Coordination with and expoitation of findings of Peace Corps team members who have developed appropriate culinary technology and recipes (example: stove making it easier for mothers to prepare food more often, and using less fuel)

7. Develop, in coordination with Dr. Kane and the doctors in the Departmental headquarters, the methods of referral and treatment, rehabilitation, and education for mothers whose children continue to be malnourished. (The P.M.I. system)

8. Develop a nutrition protocol for the education of mothers whose children are hospitalized with kwashiorkor and marasmus at Departmental level or at the Kaolack regional hospital.

9. Incorporate the oral rehydration program into the nutrition teaching and weaning food implementation project, because diarrhea is a primary cause of malnutrition in this population.

10. Suggestions for How to Begin:

    a. Develop a training area, such as the Djilor Health Post area where the population outlying the health post is already registered and counted on an annual basis. (The health post nurse assured us that it would be possible to register all the children in his area and to visit the health huts for nutrition monitoring purposes on a regular basis)

b. Develop a plan for rotating all appropriate personnel through this training area

c. Implement the program, beginning with the health posts connected to the 60 health huts which have already demonstrated their capability to carry out a program

11. Add a simplified form of prenatal clinic at the health hut level as soon as the under-fives nutrition monitoring/ counseling is going smoothly. Pregnancy weight-gain personal health card records (See Annex IX) during the "hungry season". The itinerant team can carry out this clinic at the same time as the under-five clinic.

12. Develop an Evaluation and Research component

Any Home Village prepared weaning food program will be expected to have an impact. How to evaluate this impact must be decided from the outset. Indirect indicators, such as <u>infant mortality</u> rates and <u>one-to-four year age specific death rates</u> are often the most sensitive, and earliest indicators of improvement of child health and nutrition and will provide a sound basis for deciding whether the program should be continued. Next. the fact that children are being weighed on a regular basis will permit continuing evaluation of impact at least on a wt/age basis. With all the children registered sample surveys are easily carried out with the more scientific measures of ht/age, ht/wt and the like (See Annex X)

The implied vital events reporting system, at least in some subsample regions (defined populations or "sentinel areas") of about 10,000 each is necessary in order to keep track of changing infant and childhood mortality rates. This is in line with the request of the Government of Senegal which I understand has indicated its desire to see vital rates measured as the indicator of impact of primary health care programs. Registering all births and deaths through village health workers, even those barely literate has been carried out in many parts of the world and can be initiated here. Continued research is necessary as new or modified practices are introduced in weaning food area. For example:

a. Can groups of mothers band together to profit from the use of mills (hand or gasoline operated) to grind millet dry? (The present method of pounding moist millet forces mothers to prepare it daily in order to reduce contaminants)

b. How can mothers help toddlers to share from the family pot? For example: it seems obvious that some foods need to be pureed (sieved? ground with small hand mills?) If such innovations are to be an improvement in traditional methods, they should be tried first in the field training area.

c. "Mother following" and child watching observations by persons living in villages should be encouraged

13. In order to carry out the task not only of adding a nutrition component which can be evaluated, but of developing a model useful for Senegal, a full time French-speaking physician/nutritionist/epidemiologist should be assigned to the project for six months to one year. S/he must be experienced, having implemented such projects for populations of 30,000 or more; s/he must be able to "train the trainers", establish the monitoring system, develop the village level supplement program and establish the criteria for impact evaluation. Ideally s/he should have experience with successful "demonstration education" using appropriate village level technology.

Scope of Work for a Full time Nutritionist:

Rationale: Children suffering serious forms of malnutrition in the Sine Saloum area and in general are being seem too late to correct the nutritional status which is making them vulnerable to repeated infections and at high risk of dying. If they survive, their nutritional condition has often led to chronic malnutrition, wasting, and stunting of growth and impeded development. The present outreach program of the government clinics has resulted in less than 20% of children being immunized or seen on a regular basis; their mothers are receiving little if any nutrition counseling, and they are not counseled in the prevention of repeated infection. These facts contribute to the continued high infant and childhood mortality rates experienced in rural Senegal.

The government of Senegal, the USAID mission, and especially the physicians and health personnel working in rural areas recognize the fact that distributing drugs, by itself, will do little to improve this situation. They are demanding a "real primary health care program" (which includes prevention and nutrition) which can be evaluated in terms of program impact on mortality rates.

At the same time, a number of organizations (see Resources) have developed appropriate nutrition messages, explored the seasonality of the food supply, documented key traditional practices, such as prolonged breastfeeding, and begun to develop methodology which will make it possible for mothers to better nourish their children using locally available resources, and appropriate culinary technology.

The task, then, of a nutritionist is to take those lessons which have already been learned, those methodologies which have already been field-tested in Senegal and those studies which have documented the best child-rearing and feeding practices and combine them in such a way as to have a practical methodology that will reach all the mothers and children.

The nutritionish must: 1) Sift out and search out the best way to introduce new or modified nutrition practices, including the more appropriate preparation of weaning foods, S/he must, for example, take into account the studies in the British Medical Research Unit in nearby Gambia which show that improper preparation of weaning foods has not only led to use of a gruel which is deficient in calories but to a food often contaminated and which introduces diarrhea.

2) Develop methodology which will reach the child most at risk as early as possible, before serious malnutrition occurs, and when the mother can be counseled. If food supplements are to be distributed they should be targeted to the child at risk along with the nutrition message to his or her mother at the earliest signs of serious malnutrition. This does not mean "All under-three-year-olds", for example, unless it can be shown that at certain seasons nearly 100% of them risk becoming seriously malnourished. 3) Develop a training unit where on-the job, skill-by-skill training in nutrition monitoring and counseling can be taught to team members, especially

- Health post nurses
- Traditional birth attendants
- Secourists or other

All this implies that a method of registering each child or family within defined populations must be carried out first as a baseline activity, at least in one training area of about 10,000 population. After children are registered they and their mothers can be invited to the nearest health hut on a regular basis for nutrition monitoring (see description of the Fatick area project).

Here also, the major demonstration in how to prepare enriched weaning foods can begin.

Once a Health Post Nurse is regularly visiting his health huts to carry out immunization and nutrition surveillance, his unit can begin to be used as a training area. (Djourbel, for example has already demonstrated that all children can be registered/counted)

Tasks:

1) Develop the methodology and train the staff in one health post area to carry out nutrition surveillance and counseling of "all the children" in surrounding health huts. This means the registering of each mother and child by the personnel from the nearest "health hut" (using the most appropriate personnel: secoutists, sanitarians). 2a) Develop the system whereby all children, their mothers, and pregnant women are invited to the "health hut" or other appropriate village rallying spot on a regular quarterly basis for weighing, use of the Road-to-Health wt/age card, and the like (see description of Fatick model) 2b) Develop the methodology for establishing the itinerary of the supervisory personnel.

3) Synthesize and further develop the most appropriate weaning-food message so that it can be presented in demonstration-education units. (The Berggren's "Foyer-de-Demonstration en Nutrition" units, a modification the Haitian "Mothercraft Centers: might be used as a model for a rotating demonstration unit that would teach mothers how to better prepared weaning foods on a village-by-village level). Dr. N'doye's manual should serve as a basis for this message. 4) Delineate further studies and field tests which are necessary to find the best methods for mothers to feed under five year olds in the target areas. 5) Develop, based on the "Vulnerable" population registry, in at least one or two sentinel* areas, the possibility of measuring program impact through:

- Prospective gathering of information on all births and deaths in birth and death registries
- Annual census of defined population where vital events have been recorded (this will provide a denominator for age-specific mortality rates, especially the one-to-four mortality rate which has proven to be a very sensitive indicator of nutrition program impact)
- Periodic sampling surveys for nutrition/morbidity studies

* Sentinel area should probably include 10,000 population

6) Proceed to take other appropriate steps, as advised by Dr. White, on pages 45 to 51 of this report such as:

- further development of nutrition demonstrations especially on how to better cook and enrich starchy gruels
- introduction and trial of improved culinary techinques for example to explore
  - whether food mills are better than sieves
  - whether groups of mothers can dry-mill millet, cost effectively, thus eliminating hours of pounding
- development of protocol for referral and treatment of malnourished children who do not respond to the primary interventions

7) Incorporate simple prenatal check-ups into the itinerant health rallies as soon as possible, utilizing the personal health record developed by Dr. Kusam Shah. (This record, which shows a graphic record of pregnancy weight gain, will help pregnant mothers to begin to understand the importance of weight gain especially during the "hungry season") N.B.: Studies [illegible] the MRC Unit of Keneba, Gambia, showed that birth weights of babies born to mothers who received a 900 cal dry biscuit supplement daily remained constant rather than dropping from about 3.0 Kg ave birth weight to about 2.7 Kg ave birth weight during the "hungry season".

Time Frame

The first month will need to be spent in orientation both to the program and to the resources available in Senegal and to a Senegalese counterpart. Some simple studies which can be carried out by Peace Corps personnel living in rural villages may need to be assigned, for example, "mother-watching" studies. The training modules already developed by Dr. N'doye at BANAS, should be studied and utilized if possible. Exploration in the field area should be made as to whom among the various categories of personnel, actually has the possibility of contacting each family in his or her area on a regular basis, helping to weigh children, and the like. The role of the Mother's Committees should be explored. The communal "Day Care Center" approach for the approach for the care of under-fives during the planting and harvest season inthe Cassamance should be explored to see how it could fit into a nutrition program. These and other experiments already evaluated should be utilized. Once the nutritionist and his counterpart get these things underway, he or she may wish a brief consultation from a nutrition-anthropologist from a weaning food implementation project who could further explore, recommend and delineate the best nutrition message while the nutritionish goes on to develop the first steps in the implementation of the nutrition component within the primary health care project.

The second, third and possibly a part of the fourth months should be devoted to working with the Kaolack staff in a specific district and health post unit which will eventually serve as the training area. At least six weeks will be needed, the first time around, working with health-hut personnel to get every mother and child or family registered in the health-hut unit. The technical training of all the staff in how to weigh a baby, use the Road-to-Health wt/age card, counsel the mother, and the like must be laid out. The creation of an itinerary for the health post nurse so that his supervisor and the Health Committees know when he intends to visit each health hut and for how long must be realized. (See page

The methodology for motivating the mothers to attend the quarterly health rally must be developed, including the means of inviting each family. (In Haiti, mothers came more happily when they were assured that either immunizations or worm medicine would be available at the health rally)

At the same time that the first "tournee" of the health post nurses to visit the health huts on a regular basis is being realized, further attention will need to be given to the development of field instruments for

- Simple birth registration and the establishment of a birth registry
- Simple death registration and the establishment of a death registry

Many questions must be carefully explored. For example, who will register the deaths and births? Will the simple report form be made in duplicate? (These questions need to be answered, and kept as simple as possible) For one "health-hut population" of 1,000, however, one anticipates the registration of only about 45 births and not more than 20 deaths per year; this means that a health hut has to report only about four births per month and possibly two to three deaths, not an overwhelming task! (In fact, if one could move to registering every pregnancy as well, the whole system would be much improved in that one thus has a method of checking up on the pregnant mother, and on the pregnancies for which no outcome is reported - all too often a neonate that lived only a few hours and who should be reported both as a birth and as a death).

The last six months of the nutritionist's work should be to develop the skill-by-skill on-the-job training modules for all other staff members from the district, and then from other districts. He should pass on this training responsibility to his Senegalese counterpart. During the last months of his stay he should be laying out the plans for the nutrition component of the revised primary health care program, and working with Dr. White and others to get appropriate nutrition components going in the Cassamance and other USAID funded areas.

From the outset the nutritionist will have to coordinate with other units dealing with nutrition in Senegal, and possibly will be asked to report to them or to utilize their personnel in an integrated way. This will require time and careful planning but could be very beneficial.

The follow-up of other consultant's recommendations, and the task of integrating the most recent research results into nutrition education should be another part of the task of the nutritionist and his counterpart.

Last, the evaluation and research component should document the functioning of the nutrition monitoring/counseling unit if possible, at least insofar as looking at client acceptance, methodology for motivating mothers and the propensity to change food habits has been studied. The age-specific-mortality-studies will be planned in such a way that they can be carried out by the Senegalese counterpart of the nutritionist.