18. MOTHER AND CHILD HEALTH

The welfare activities for women and children were not born of medical or social considerations, nor of a demographic concern to sustain human resources. They grew spontaneously from a natural love for African babies, whether awake and lively or sound asleep on their mothers' backs or hips. This constant symbiosis, the maternal tenderness expressed by the mother's songs and comforting voice, with cutting short the tears by suckling, all added up to an attractive family picture. It was even more attractive when compared with the peevish, apathetic, slow-growing, disease-ridden children at the time of weaning.

Many wives of senior officials, judges, company directors, engineers, and doctors spontaneously made the first moves to provide childcare, nutrition, and clothing for the infants. As a result, many local initiatives most effectively helped to lay the foundations of the medical and social services. This was in addition to, and sometimes in collaboration with the work done by the religious missions. The modest scale of these efforts did not lessen their merits when the decision was taken to organize better-structured maternal and child health services.

The first attempt to organize such preventive clinics was made by Rodhain in Kinshasa in 1912. Free clinics run by volunteers mushroomed during the twenties. The best of these include the Charity for the Protection of African Children or Oeuvre de la Protection de l'Enfance Noire, organized by Motoule for the UMHK (Miners' Union of Upper Katanga). The UMHK's uncontested leadership in the field of social work contributed to the multiplication of infant clinics, known familiarly as "gouttes de lait" (drops of milk) in the country's major companies and towns.

Starting in the thirties the MCH system was spread by FOREAMI to the rural areas of first the Lower Zaire Province and then Kwango. These networks of MCH clinics helped to establish a basis for subsequent well-structured MCH programmes, the collection of health statistics, the charting of growth curves, the creation of health records and files, and the identification of such priorities as dietary deficiencies and weaning, to name only a few.

The collaboration between ORAMEI and the FBEI that took place after the war and throughout the fifties made it possible to coordinate MCH activities across the country. As a result, they became an integral part of preventive medicine.

Women accepted the kilo (their word for weighing the infants) readily. Integrated medical and preventive programmes led to an immediate improvement in the children's well-being and thus encouraged the mother's participation. Worming the children, a process in which the expelled roundworms were visible to the naked eye, and the absence of fever in children given preventive anti-malarials, were so many sound demonstrations of the benefits of infant clinics. These fostered confidence and encouraged the acceptance of other medical actions such as vaccination, the value of which was not immediately understood.

Preventive infant care led to the provision of preventive services for the mothers. Antenatal clinics helped to prevent obstetrical problems such as difficult presentations, extra-uterine pregnancies, toxaeemia of pregnancy, anaemia, etc.). It also made mothers aware of the importance of giving birth in a maternity clinic. The women's attitudes towards the traditional practice of extended breast-feeding — one of the factors of natural birth control, because the associated production of prolactin inhibits ovulation — began to change in the sixties. Massive urbanization in the same decade led to shorter periods of breast-feeding in towns, and this trend also spread to the rural areas. There were many negative consequences for both mother and child, but the result for the community has been a demographic boom that is likely to dash the slightest hope of economic progress. In this connection, MCH clinics play an extremely useful role by advising women who wish to space their births.

The trust that the MCH activities have generated among the mothers has proved of great service to women, children, families, and the community as a whole.
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HISTORICAL BACKGROUND

Throughout the world, health has been improving slowly as a result of socio-economic progress, water purification and better housing; but also thanks to the discovery of pathogenic agents, new therapies and preventive measures. Maternal and infant mortality have steadily reflected these beneficial changes.

In tropical areas, medical efforts have for a long while been focused on the control of endemic diseases. In order to check the high infant mortality and the dangers of childbirth, clinics and maternity hospitals were organized by nurses and midwives. Full health control of mothers and children, the most vulnerable group in a community, should begin at the girl's puberty, but it usually covers the pregnancy of the mother and the medical supervision of the child.

The first clinics aimed to protect the health of only newborn infants and young children. These check-ups were instituted before World War I; but the medical staff could only start to perform deliveries many years later, since obstetrics was at first the domain of the native women and no man, not even a doctor, was allowed to intervene.

1. Child welfare clinics

The French description of these as infant clinics (consultations de nourrissons) is incorrect, as the health disorders of young children appear not only between six and twelve months but also from the beginning of the second year until the age of three or five. The actual term is Under-fives clinics.

The development of these check-ups passed through four successive stages:


The first initiatives were taken by female volunteers generally unqualified; and disease control was not specifically targeted.

The League for the Protection of Native Children (La Ligue de Protection de l’Enfance Noire) was set up before World War I. An association named Le Bon Lait (the Good Milk) provided the lactic foods that European experience had indicated were essential.

The first preventive clinics date back to 1912-1913. They were organized at the request of Dr. Rodhain, who asked the Missionary Sisters of Western Leopoldville to set up regular check-ups for infants (Henry, 1929). At the same time, the Sisters of Notre Dame of Namur developed infant clinics in the Kisantu mission in Lower Zaire, while other sisters opened welfare clinics in various missions throughout the country. In them, systematic examinations were carried out, aimed at two main problems: nutritional dangers and infectious diseases.

Effective health education for the mothers was possible only once their trust had been gained. However African mothers were usually breast-feeding very easily; and the magical act of weighing the baby could not by itself stimulate them to attend check-ups regularly. Some additional persuasion was needed, in the form of a small gift such as clothing or soap.

The check-ups took place every week, but each child was examined after an interval of either two weeks or one month, according to the location.

From 100 to 200 children were registered. In the Catholic missions, the check-ups usually took place on Sunday after mass. Children were bathed and weighed; their mothers received a small cloth, a bar of soap, drugs or powdered milk; and there was some kind of educational presentation.

In 1925, with the help from Union Minière (The Mining Union), Dr. L. Mottoule created a charity in Katanga known as Oeuvre de la Protection de l’Enfance Noire (OPEN), which multiplied and supported the Mining Union’s child welfare clinics. These served the workers' children but also the other inhabitants of the region.

The initiatives undertaken by companies, individuals or missionaries were encouraged by the administration, which granted them subsidies; also by doctors, whose workload of treatment and disease prevention was excessive, especially in some regions.

The State medical services could not cope with all the needs on their own, so they depended on the help from private organizations.

In 1925, the Société Saint Luc (Saint Luke society), grouping a number of Belgian Catholic doctors, set up l'Aide Médicale aux Missions (AMM) in Belgium, as a follow-up to steps taken earlier by missionaries. In 1927, also in Belgium, some women established an AMM working group, to provide hospitals and dispensaries with equipment and financial support. One third of the funds was paid into a Reserve Fund aimed at financing the opening of new infant and maternity clinics. By 1929 there were more than 40 such groups in the main Belgian cities, and 220 by 1934. They supported more than 120 mission posts, under the patronage of Queen Astrid.
In 1935, the Child Welfare Clinics handled about 20,000 children.

The infant death rate was not known, and the clinics could not produce any health statistics that gave a clear picture of the health problems affecting young children. However some data do make a rough estimate possible: - in Eastern Province, out of 3,040 women interviewed and followed up in Ponthierville (Umbunda), Mouchet noticed that in 1926:

884 women had no children;
2,256 women had had 5,383 children, 2,564 of whom had died and 2,819 were alive.

The survey revealed a stillbirth rate of 38.9%, a figure probably including abortions.

In Baudouinville (Mobé), the interview of 150 mothers (Aide Médicale aux Missions, 1930) gave the following figures:

<table>
<thead>
<tr>
<th>Number of children per mother</th>
<th>Number of women</th>
<th>Total children born</th>
<th>Death of children</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44</td>
<td>44</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>44</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>45</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
<td>84</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>45</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>48</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>42</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>24</td>
<td>10</td>
</tr>
</tbody>
</table>

The proportion of child deaths rises with the number of children per mother. It suggests that a high number of deaths probably occurred after the first year of life.

In addition to the infant clinics, there were agricultural schools of home economics which trained young girls in mothercraft.

1.2. From 1935 to 1955

From 1935 on the medical services of the Congo did their best to organize preventive check-ups for young children according to the scheme recommended by the Oeuvre Nationale de l'Enfance (National Charity for Children) in Belgium, and every 15 days quinine was distributed.

1.2.1. The MCH service in the FOREAMI health zones

Mother and Child Health service (or Protection Maternelle et Infantile) was organized especially in the areas where FOREAMI (Fonds Reine Elisabeth pour l'Assistance Medicale) developed its activities from 1931 onwards: Lower Zaire and then Kwango (see the chapter Evolution of Health Services p. 121).

In Mayumbe a curve of the average weight according to age was calculated and published (Platel and Vandergoten, 1938):

<table>
<thead>
<tr>
<th>Sex</th>
<th>Birth</th>
<th>12 months</th>
<th>24 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>3 kg</td>
<td>7.5 kg</td>
<td>9.2 kg</td>
</tr>
<tr>
<td>female</td>
<td>2.9 kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The authors noticed that, once past the perinatal period, the child presented almost no problems up to the age of seven months, since it was kept warm, breast-fed easily and was carried close against its mother, also remaining with her at night. But at nine months, the weight no longer increased and started to fluctuate: the mother put her child on the ground where he crawled and swallowed dust: so infections and parasitic infestation began. The child was also contaminated by the food it received in addition to his mother’s milk.

The medical staff and the volunteers gave talks on infant care; however the authors considered the health education impossible to implement, since there was neither water nor soap enough to wash the child and his clothes regularly, and the mother had too little time to prepare special cereal feeds. According to the authors, the clinics in the rural areas, more remote and less frequented, seemed to be inefficient.

Once the child reached 10.5 or 11 kg, he could stop attending the clinics as he was considered out of danger in nutritional terms.

In 1937, in Kwango, more than 18,500 children were registered at the child clinics, 12,500 of them attending regularly.

In the Congo (Zaire) and Ruanda-Urundi in that same year, 1,096 child clinics examined 437,434 children, that is about one child out of two. In many places, close to the mission posts, the dispensary or the maternity clinic, missionary sisters and nurses set up an orphanage for children who had lost their mothers and had to be fed with cow's milk, unless they had a grandmother or an aunt who could breast-feed them. Tradition was prescribing any woman who was not a family member to do so, as she might put an evil on the child.

1.2.2. Aid to Central African maternity clinics and dispensaries

In 1938, the AMM women’s groups became an independent association called L’Aide aux Maternités and Dispensaires du Congo (later Zaire) or AMDC; and the AMDC provided maternity clinics and missionary dispensaries with drugs, milk and funds.
1.2.3. The Native Welfare Fund (FBEI)

As early as February 1945, the Governor-General Ryckmans expressed concern about the increasing disparity between the urban and rural areas caused by industrialization. Belgium decided to set up a substantial fund with the autonomy necessary to be free from administrative rules. This fund, set up on July 1, 1947, was known as the Fonds du Bien-Etre Indigène or FBEI. It was inspired by the English Welfare Fund and by the Fonds d'Investissement de Développement Economique et Social (FIDES) of the overseas French territories (see the chapter Drinking Water Supply, p. 329).

This fund received an endowment of more than 3,500,000 Belgian francs, in acknowledgement of Belgium's indebtedness to the Congo for its war effort. The fund was also fed by receipts from the Loterie Africaine (African Lottery).

Thanks to the FBEI, 424 rural primary schools, 72 pedagogical workshops, and 84 primary and secondary schools of home economics were built, as well as new premises for the medical services in the form of: 125 maternity clinics, 16 orphanages, 139 infant clinics, six schools for medical assistants and nurses, 11 schools for birth attendants.

The fund also provided 258 ambulances. It financed the rural social service in Gandajika, in Befale, the Tshuapa, and in Kasongo; a campaign of milk and food distribution through AMDC; a campaign against the falling birth rate in the Mongo tribe; and the distribution of antimalarial medication.

Social centres were set up in the worker's settlements and military camps in the main cities, as well as in areas where there was some specific problem (leprosy clinics, and regions affected by the falling birthrate). In 1955, there were 15 social centres in Leopoldville and five to eight in each province, that is to say a total of 51 throughout the Congo.

The FBEI also financed the publication (in 1952) of a leaflet “Advice for Congolese Mothers” (Conseils aux mamans congolaises) by Dr. Dony, of which more than 300,000 copies were published in the various vernacular languages. Educational brochures on child health care were also published by the Bibliothèque de l’Étoile in Leverville and were distributed throughout the country. The FBEI also financed a study on the African behaviour and psychology (Ombredane, 1954, 1956).

1.2.4. Studies on child health

In addition to the infrastructural undertakings, extension work and research, studies on child health were carried out in various parts of the Congo and Rwanda by doctors of either the administration, the private sector or the semi-public institutions (Van Nitsen, 1941; Parent, 1945, 1950, 1959, 1960; Brou, 1950; De Smet, 1951; Kivits, 1951; Janssens, 1952; Hiernaux, 1952, 1954, 1956; Vincent, 1954; Hugon, 1959).

In 1936, estimates of infant mortality revealed rates of 160% in the Lower Congo, 300% in the area of the Great Lakes Mining Society, and even 400% in the western part of Kilo-Moto mines. In 1948, an evaluation showed that after medical interventions these rates decreased to 100% in Lower Congo and to 160% in the area of Kilo-Moto mines (Janssens, 1952).

The analysis by post-mortem examinations of the causes of death of 2,714 children (1,873 of them were less than one year old) made by Janssens from 1932 to 1943 in the Kilo-Moto hospital revealed a high percentage of lung diseases (Janssens, 1952):

<table>
<thead>
<tr>
<th>Causes of Death</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia, bronchopneumonia &amp; complications</td>
<td>51.9</td>
</tr>
<tr>
<td>Stillborns</td>
<td>14.4</td>
</tr>
<tr>
<td>Malaria</td>
<td>12.3</td>
</tr>
<tr>
<td>Premature babies, asphyxias 0-1 month</td>
<td>8.3</td>
</tr>
<tr>
<td>TB</td>
<td>2.7</td>
</tr>
<tr>
<td>Digestive diseases</td>
<td>2.1</td>
</tr>
<tr>
<td>Unspecified</td>
<td>3.0</td>
</tr>
<tr>
<td>Others</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Janssens: infant mortality at the Kilo Mines, 1952

Among the deaths by bronchopneumonia, a high number of children of more than one month also had malarial lesions of the liver (20 to 30%). This suggested a direct influence of malaria on lung disorders; a hypothesis which was corroborated by the spectacular decrease in infant mortality and the reduction of deaths from respiratory diseases after routine administration of chloroquine (see also the Chapter Paediatrics, p. 1095).

In that study, Janssens mentioned the role of malnutrition. Before the age of six months, it seemed to have little influence despite a slower weight increase; but at a later age more than two thirds of dead children presented liver abnormalities.

The same author recommended that the doctors should pay attention not only to bacterial and parasitic factors but also to the population’s lifestyle and customs. The individual contact with the mothers, in particular through home visits, made it possible to consider the problem of health globally within a community approach (Janssens, 1952).
Hiernaux and Parent’s work consisted mainly in precise anthropometric measurements made on different ethnic groups. Vincent completed his study on the weight and size of children in Rwanda and Burundi by determining (by X-raying) the age at which ossification sites appeared. He also described the psychological behaviour of the child in his family environment and in the society where he lived (Vincent, 1954 and 1957). All these studies were precise surveys of specific populations.

1.3. From 1955 to 1960: ORAMEI

This period was marked by the creation in 1955 and the launching in 1957 of the Oeuvre Reine Astrid pour la Mère et l’Enfant Indigènes (Queen Astrid Charity for Native Mother and Child) or ORAMEI. This charity, sponsored by FOREAMI, aimed to coordinate and improve the activities in favour of both mothers and children.

The action for the child covered four main sectors: care for sick children, prevention of diseases by vaccination and education, orphanages, and experimental stations as described below in 1.3.4.

1.3.1. Improving the care of sick children

The medical director of ORAMEI decided to develop paediatric services, and to build separate hospital departments for infectious diseases. He also recommended separation of the external consultations for children from those of adults, because of the necessary systematic examinations of throat, ears and weight, as well as for the particular drug dosage. The link between the preventive check-ups and those for sick children requires easy access to the records which monitor the children’s health.

1.3.2. Preventive clinics, vaccinations, health and nutrition education

Prevention consisted of vaccination campaigns, with BCG applied in maternity clinics (see the vaccination calendar in the chapter Immunizations p. 737). Regular monitoring of children’s growth up to two or three years of age guaranteed the early detection of malnutrition.

Preventive clinical sessions took place monthly. Regular attendance was rewarded by a gift (bar of soap, item of clothing, booties, etc.) to attract the mothers who found it hard to understand why they should bring their apparently healthy children to preventive check-ups. However, when a competent doctor checked each child personally such gifts were unnecessary.

The infant clinics were supported by the government who granted an allowance according to whether a doctor attended them monthly, occasionally or not at all. The check-ups in remote areas without permanent staff were made by a mobile unit.

The running of the infant check-ups varied according to the location:
- some check-ups were limited to registering attendance and distributing an antimalarial drug. This was done by a health auxiliary who went from village to village;
- others accepted only the children born in maternity clinics in order to encourage delivery in these installations;
- others weighed the children regularly;
- at the best clinics, the child’s development was carefully followed: educational sessions took place regularly and vaccinations were given according to the calendar designed by the national ORAMEI director.

The efficiency of these infant check-ups is difficult to estimate, since a long-term effect must be measured by the child’s survival or nutritional condition. It also remains to be proved whether the educational advice was well understood and implemented by the mothers.

1.3.3. Orphanages

They were organized with much dedication by charities and missionary posts. The latter admitted motherless infants until they could be fed by the family.

The contact with families was facilitated by having a building close to the orphanage, with accommodation and cooking facilities for family members visiting the children.

All orphanages suffered from three main problems: high mortality due to the absence of breast-feeding, infections spread by close contacts between several dozens of children, and slow development through lack of stimulation. Children deprived of their mothers often become apathetic.

1.3.4. Experimental stations

In addition to the research undertaken by specialized institutes such as IRSAC, FOREAMI and the universities (see the chapter Nutrition pp. 380 and 388), practical medical and sociological methods of prevention were tested by the child welfare clinics at two experimental stations: one in an urban area, at Usumbura (Ruanda-Urundi), and the other in a rural area at Pay-Kongila (Kwango).
Holemans' studies (1960) in the Kwango FORE-AMI revealed that:
- mother's milk keeps its composition throughout the lactation period, and continues for up to two and a half years to provide half the calories required by the child;
- the growth curve of the child does not follow those found in northern countries;
- the supplementary food of the breast-fed child may consist of a well-cooked gruel of cassava flour to which a protein-rich local food such as peanut is added;
- some form of economic and agricultural development must accompany the efforts of the medical service, and nutrition education must be integrated into the sociocultural context.

Research by IRSAC (Institute of Scientific Research in Central Africa) revealed the physiopathologic mechanisms of nutrition and the efficiency of treatment using vegetable proteins, peanuts, beans and soya (DeMeyer and Vanderborgh, 1958), see the chapter Nutrition p. 381.

Different PhD and doctoral theses on children's problems were presented at the University of Zaire and at Belgian, French and other universities (Nkidiaka Dimbukia Kanda, 1974; Tshibemba, 1985).

1.4. After 1960

Under-fives clinics continued to function with practically no government support.

The AMDC granted no more subsidies to the dispensaries and the African women's groups had to close, except for that of Kalina in the capital which was presided over by Mrs Kasavubu, wife of the President. In 1961, AMDC became the charity AMDAC (Aide aux Maternités et Dispensaires d'Afrique centrale) and continued to give an allowance to child and maternity clinics under the patronage of Queen Fabiola. In 1964, AMDAC received new subsidies from the National Lottery and later from the Office de coopération au Développement (Belgian Development Aid), from FOMETRO (Fonds Médical Tropical) and finally from Medicus Mundi.

AMDAC, anxious to adapt to the new situation after the independence of Central African countries, supported the populations' efforts and moved toward nutrition and health education. That is why in 1972 AMDAC became ESNAC (Education Sanitaire et Nutritionnelle en Afrique Centrale or Health and Nutrition Education in Central Africa). Auxiliaries were trained and granted subsidies in order to guarantee an education in the growing of vegetables and soya, cooking, and home and environmental sanitation. The ESNAC budget amounted to 12 million Belgian francs, 75% of which were granted by AGCD (Administration Générale de la Coopération au Développement or Overseas Development Administration).

Between 1963 and 1970, child welfare clinics were reorganized in Kusai, in the Equateur province, in Rwanda (the pilot Centre of Kibirizi assisted by WHO), and in Kivu where they were supervised by FOMULAC and CEMUBAC.

Different projects of MCH and Family Planning were financed by UNICEF, UNFPA (United Nations Fund for Population Affairs), the World Bank and the AGCD, especially in Rwanda and Burundi.

2. Antenatal clinics and maternity hospitals

Maternal health developed with a certain delay as compared with the interventions for children. Both pregnancy care and delivery remained very much the domain of the native women. Progress was spread over three successive phases.

2.1. Before 1935: missionary sister-midwives

The action in favour of mothers began as soon as the missionary sister-midwives could start to care for the African women.

A pregnant woman continued to carry out all her tasks in the fields and at home. Special care was traditionally limited to wearing amulets around her waist and using lotion on her breasts.

The woman delivered either alone in the forest or in a hut with the help of another woman. Healers recommended infusions of herbs to facilitate expulsion of the placenta; these infusions sometimes had a tetanizing effect.

It took time before Western midwives could prove to the future mothers that delivery in a medical installation offered more security, both for the mother and for the child. However the women did fear difficulties arising during a traditional delivery, and the consequent painful handling they had to endure from local midwives; and more than one woman must have wished to be rid of an unwanted aide.

Nevertheless, the main reason for which they turned to the medical service was sterility. Dubocage, assistant at the University of Leuven, was sent to the Congo (Zaire) thanks to a grant by the Belgian Ministry of Colonies, noted as a cause of sterility the frequent endometrium infections and uterine retroversions. Treatment of these problems often resulted in a pregnancy (Dubocage, 1929). The other reasons for women turning to the
medical services were lacerated perineum, prolapse of the uterus and vesicovaginal fistulae (Dubocqage, 1934; see also the chapter Surgery p. 1225).

In 1928, following the visit by King Albert and Queen Elisabeth to the Congo (Zaire), FOREAMI was created to strengthen the medical action in some regions. The mothercraft schools, the maternity units and clinics established were later placed under government supervision (see p. 123).

Among the sister-midwives, we must mention the important role of the congregation of the Soeurs de la Charité Maternelle de Metz. This congregation was aimed at helping women in labour and had a high proportion of midwives. Some sisters of this order had been sent to the medical services of the Kilo-Moto gold mines in Ituri, where they travelled throughout the mining camps and villages of the area in order to win the trust of the women by antenatal and child examinations. A maternity clinic was built in 1928, at the Kilo-Moto medical complex; but the first two deliveries only took place two years later, followed by five in 1931, 90 in 1932 and 224 in 1933. The sister in charge of this clinic was the instigator of the establishment of maternity clinics adjacent to (but separate from) the hospitals, in all the medical centres of the Congo and Ruanda-Urundi.

There were 30 of the mission posts with a nurse-midwife in 1930, and 120 in 1935.

In many medical institutions with a maternity clinic, young African girls were trained as birth attendants; but their level of schooling was not yet adequate for them to train as qualified nurse-midwives.

European sister-midwives were trained for Africa by the Medical Missionary Institute of Würzburg in Germany.

2.2. From 1935 to 1955

During this period, many maternity clinics were established by Catholic or Protestant missions, industrial companies and private institutions such as FOMULAC. At the same time the number of women who delivered within medical facilities increased regularly.

From 1947 onwards, the intervention of the FBEI was very important, leading to the construction of 125 maternity clinics and eleven schools for birth attendants.

The Congo administration resolutely promoted the policy of deliveries in maternity clinics. Such a policy, adopted by the colonial government, is rather unusual and surprised foreign doctors who visited the country. The choice was available because of the level of economic development, which made it possible to build premises and to provide equipment. At the same time the Congolese health infrastructure was able to ensure the running of the clinics. In 1955, there were more than 10,000 maternity beds available; and this number was very close to the theoretical needs. Moreover, more than 40% of the estimated deliveries for the whole country occurred in maternities.

The support of the AMDC consisted mainly of providing equipment, linen, medication, and allowances.

Studies on the factors of sterility and the decrease in natality were undertaken by many researchers (Baker, 1944; Ledeni, 1944; Schivers, 1944 and 1945; Lambillo and Drumel, 1950; Van Riel and Allard, 1955; Bouckaert and Reul, 1955; see also the chapter Demography, p. 22).

Schemes for the education of women, both through social centres and by schools of home economics, spread progressively throughout the country.

L’Oeuvre pour la Mère et l’Enfant (The Charity for the Mother and Child) or OMEI, set up in 1939 to coordinate the projects started by charities, religious missions, industrial companies and government institutions, only developed fully when ORAMEI was created.

2.3. From 1955 to 1960

ORAMEI (Oeuvre Reine Astrid pour la Mère et l’Enfant, or the Queen Astrid Charity for the Mother and Child) was instituted by a Royal decree dated August 13, 1955 as a section of FOREAMI, similar to the section for leprosy control.

Its objective was to coordinate the activities of various public and private bodies; and it made delivery safer for both mother and child. Doctors aimed to increase the competence of medical personnel, and a doctor specialized in preventive medicine is to be appointed in each province.

A well-organized system of working with careful selection on the part of the auxiliary midwives, reduce the load of specialist’s screening and handling of difficult deliveries, which is reserved for the most competent personnel.

Different kinds of maternity units could be found:
- the maternity clinics of provincial towns provided with full equipment and qualified staff;
- the maternity units attached to the medical and surgical centres of Van Hoof-Duren’s type (see the chapter Evolution of Health Services, p. 139);
- isolated maternity centres, staffed by a nurse-midwife;
- rural maternity centres and those located on the periphery of towns, staffed by birth attendants.
The tasks of the birth attendants were well-defined and limited to normal deliveries, possibly episiotomies and sutures, except when muscle tissue was lacerated. The vacuum extractor could be used in isolated maternity units if the staff knew how to handle it.

In case the birth attendants could not handle themselves the deliveries, these were referred to maternity centres or clinics; the birth attendants had to accompany them, so as to improve their knowledge and obtain sound advice.

Unsolved problems were of two kinds: first the training of qualified female staff in sufficient number, and secondly the regular support of the auxiliary staff in peripheral posts by qualified personnel.

In 1957, the African staff included 15 graduate nurse-midwives and 250 birth attendants. The three schools for nurse-midwives had few pupils, and these did not always reach graduation standard (see the chapter Medical education p. 191).

Because of the small number of graduate staff, many responsibilities were given to auxiliary nurses who, therefore, needed consistent support. Unfortunately the country did not have sufficient obstetricians and nurses-midwives to supervise the auxiliaries working in the field.

Next to each maternity unit, a house for expectant mothers was built, with a large sheltered area to enable cooking in the traditional way. Some women came there before the term of their pregnancy, either spontaneously or else sent by the medical personnel if they foresaw an abnormal delivery. Some women even came there to rest, a few days and sometimes some weeks before the date of the delivery. In these cases, it was observed that the newborn babies had a higher birthweight.

After 1960, maternity clinics with qualified missionary staff continued their activities. At different places, midwifery schools were opened; and the number of pupils progressively increased, thus causing a greater number of births to take place in maternity hospitals.

J. Vuylsteke and H. Van Loon

MAJOR CHALLENGES

1. Mother and Child Health in Central Africa

Maternal and Child Health (MCH), was originally initiated and developed in many countries by philanthropic and volunteer associations; however, on rare occasions, it was directly organized by local authorities.

Preventive clinics were often run by the staff of maternity or general hospitals, or by personnel of health centres, and embraced a well-defined area. These consultations were also organized in remote areas, which could be reached only by some means of transport, such as bicycles, ambulance vans and even motorbikes. Only the main activities of these preventive clinics will be examined. The field of nutrition education quite often depended on personal initiatives which are hard to describe or to evaluate. A most important factor, the training of staff in MCH and in Paediatrics, was often neglected.

Health protection of mothers was often separated from that of the child during confinement and the antenatal period, much to the disadvantage of the newborn baby. Nowadays, family health care services aim to keep mother and baby together, to foster teamwork among specialized staff, to organize consultations simultaneously for mother and child in separate rooms, and if necessary to introduce day care centres.

1.1. Premarital consultations, problems of sterility and falling birthrate

In countries where the value of a woman is assessed on her childbearing capacity, preparation for marriage still remains quite traditional and either involves an initiation or is simply based on self-explorations by the children.

However the involvement of health care services would be useful; indeed not only would the couple be warned of the dangers of sickle cell anaemia (whose hereditary implications are not unknown to Africans, (see the chapters Anaemia, p. 435 and Paediatrics, p. 1110) but also sexually transmitted diseases could be better controlled. Apart from cases of male and female primary sterility, the causes of sterility and a falling birthrate are always genital infections. Treatment of these infections, whether or not of sexual origin, could help many a couple (see the chapters Gynaecology p. 1076, STDs and AIDS pp. 646 and 661).

There are, nevertheless, traditional problems to take in account, arising from social factors such as the bride’s dowry and a reward for every birth. These factors, together with long absences of the head of the family in search of work in towns, may influence the stability of the family.
1.2. Antenatal clinics (AC)

The efficiency of antenatal examinations depends on clearly defined objectives and on the confidence the female patient has in the staff of the maternity clinic she is attending.

The medical examination is made up of five elements:
- Assessment of the stage of pregnancy, general examination of the mother (heart, lungs, abdomen), and information on previous obstetrical history;
- Identification of small women for whom difficult deliveries are frequent;
- Screening for foeto-pelvic disproportion, examination of heartbeats of the foetus and its position, checking blood pressure of the mother, investigation for possible pretibial oedema, albumin, anaemia, or vaginal infections;
- Weighing, to check weight increase, palpation of the arm, which reveals the same indications as in the child (see 5.2. below): it allows the amount of subcutaneous fat to be assessed, and shows the degree of available reserves as well as muscular mass (subcutaneous fat and particularly muscle are sources of material and energy for the foetus);
- Tetanus immunization to prevent umbilical tetanus in the infant.

As well as this physical check-up, it is important to provide some education and information.

Education involves instructions on hygiene during confinement and care of the newborn baby, if the delivery takes place at home; the following procedures should then be followed: sterilization of linen through ironing, elementary resuscitation of the newborn baby, severing of the umbilical cord with a clean instrument or a new razor blade, and protection of the newborn against cold.

Instructions on the mechanism of the delivery should also be given, particularly the need for the mother to have periods of rest in order to avoid fatigue, the importance of taking liquids and energy-rich food (tea or local infusion, sweet or salty), emptying the bladder and getting medical help if the confinement is not progressing normally, or if there is a tear. This is important, as to avoid emptying their bowels while they are striving to push the baby out, women often stop eating when contractions start and are likely to become exhausted.

The organization of antenatal consultations includes recording the at-risk women to check their periodic attendance, the detection of problem cases by assistant midwives, distribution of iron and folic acid tablets where or when necessary and possible, and referral to a skilled birth attendant.

1.3. The delivery

In Central Africa, the traditional midwives were usually willing to follow the advice given, to avoid the risks of infection. They also accepted any equipment likely to improve their performance, since they were thus more appreciated by the people and acquired a reputation which was matched by their skill.

An antenatal shelter was set up close to the maternity hospital, for women who lived in remote areas and for those at possible risk of obstetrical complications, usually referred to medical staff. The safety of the mother and newborn baby was ensured by auxiliary staff.

At remote peripheral maternity clinics, a well-trained assistant midwife should be able to perform an episiotomy, or sew up a tear if the muscles have not been damaged. The birth attendant should also be able to listen to the heartbeats of the foetus or the newborn and avoid a lengthy confinement. The assistant midwife should never intervene in a way which may prove traumatic for the child and should be able to apply resuscitation if necessary. To clear the respiratory passages, a simple aspiration (a flexible catheter attached to the filter of a perfusion kit), and assisted breathing, even by mouth-to-mouth resuscitation, is recommended if needed.

The weight of the newborn baby reflects the socio-economical progress of the country. However, in Central Africa, one cannot consider the 5th percentile of the weight of the newborn baby in industrialized countries as an appropriate indicator of risk or of low birthweight. In Zaire, the risk of death increased with a birthweight of below about 2.250 kg (Tshibemba, 1985).

The confinement period is the best time to give mothers some instruction on desirable births and birth spacing. Breast-feeding and its frequency allows a certain period of infertility, beneficial to both mother and baby (Van Balen et al., 1985; Delvoye et al., 1978; Pagezy, 1983; Robyns et al., 1985; Hennart et al., 1985).

1.4. Breast-feeding and other foods

1.4.1. Breast-feeding

Breast-feeding has for many years been the most efficient and most natural way of feeding a baby. Even in developed countries there is a return to it; while in developing countries the period of breast-feeding tends to be reduced, the colostrum is often discarded and there is a tendency to give the newborn baby sweetened water to drink during the first few hours after birth. These habits are not justified and
often have detrimental results; when educating mothers, the importance of breast-feeding the baby from the first few hours of life should be emphasised.

Correct breast-feeding occurs on demand and will totally satisfy the baby’s needs until he is five or six months old and sometimes even longer. One should not rely on the growth pattern of children in the northern hemisphere as these references were made for bottle-fed babies.

The value of the mother’s milk is due to:
- its composition and its adaptation to the needs of the baby,
- the psychological satisfaction it gives to the baby,
- the anti-infectious factors it contains (antibodies, white blood cells, IgA and lysozymes) and the anti-allergic agents it transmits to the baby,
- the fact that it is always available, at the right temperature, free of germs and costs nothing,
- its inhibition of ovulation – beneficial to both mother and child.

1.4.2. Complementary feeding and weaning foods

The quantity of breast-milk becomes inadequate when the child reaches a weight at which its food requirements are beyond the quantity of milk the mother can supply. The amount of calories needs to be complemented as to answer the requirements.

To stop breast-feeding has in French a negative connotation by the word serrer (to separate), whereas the English term weaning comes from a Saxon word “wenian” that means to get used to another food. This better illustrates that the child has to proceed gradually from exclusive breast-feeding to adult foods.

The main problem for the young child is the period of transition between exclusive breast-feeding and sharing the family meal, throughout the period of additional feeding.

It is as well to know that breast-feeding requires far more effort than bottle-feeding. The latter should be discouraged because, although easier than breast-feeding, it does not offer the same benefits and, very often, exposes the baby to many infections and diarrhoea.

It is difficult to assess the exact time when another food should be introduced, because a child’s nutritional need depends on the development of its digestive system and enzymes. These begin to function only at a certain stage in the course of the baby’s development. The most suitable food should be mashed to a smooth gruel. Even if the baby’s growth is slowing down, starting him on supplementary foods too early could on the one hand expose him to infection by introduced germs, and would on the other hand reduce the production of breast-milk.

The mother who decides to stop breast-feeding usually does so because she is pregnant. This decision would probably result in the secretion of a thinner milk and in a belief that her milk is not good for her child. Furthermore, the child often shows signs of hunger, and at times also of diarrhoea.

In some areas, a particular test, known as the ant test, is often used to show if the milk is “off”: an ant is placed on a drop of the mother’s milk and, if it drowns, this means that the surface tension of the milk is insufficient and cannot support the weight of the insect, based probably on a decrease in fat content.

If a pregnant woman wishes to continue breast-feeding her baby, there is no reason why she should not. There are also cases when a mother, breast-feeding her newborn infant, allows her older child to share the flow of milk when it is abundant.

The nature of the foods given as a supplement to breast-milk depends on the available food products in the area and the preparation time needed. This is an important consideration for a busy mother with a heavy workload (see the chapter Nutrition, p. 375).

The first supplementary food given to the child is often watery and undercooked. For a long time, the need for proteins was believed to be the priority; however, about 20 years ago, it was discovered that first and foremost the child is in need of calories (MacCance and Widdowson, 1968).

Additional foods present five problems:
1) the volume of mashed food the child can consume depends on the capacity of his stomach, which is limited, although growth and increasing physical movements do raise the requirements;
2) the foods must be well cooked into a gruel or puree so as to be easily swallowed and digested;
3) the caloric density of the preparation;
4) the number of meals needed, apart from breastfeeds, represents extra work for the mother who is usually very busy;
5) the child eats slowly and has a shorter arm of smaller hand than adults who compete much more quickly for the food in the family dish.

1) Quantity of calories according to volume

A gruel containing 20% flour by weight is already very thick; and yet it contains barely as many calories as mother milk, or about 70 kcal for 100 ml. In fact a gruel is generally made up of only 10% to 12% of flour; so this raises the problem of the caloric content according to volume, known as the caloric density.
The preparation of staple foods for adults already involves a time-consuming and lengthy process of pounding and sifting. Once ready, the flour must be cooked. The adult likes the food to be solid and to “cling to his stomach”. Such a meal is too undercooked, too indigestible and too heavy for the child. On the other hand, the gruel specially prepared for the child is often over-diluted. Moreover the cooking of food requires wood which is time-consuming to collect, or some other fuel which is expensive to obtain.

However the mothers are generally far more skilled in cookery than the doctors and their staff – trained along Western lines – can imagine. For example the women know that cassava flour liquefies if it is heated for too long, although they cannot explain that this occurs because the starches break down into simple sugars, nor that the resulting soup causes osmotic diarrhoea.

They also know that, when preparing the cereal flour, they can take out a small quantity of the mixture when it has been cooking for a short time, let it cool, and then use it when the remaining flour is being added. This procedure prevents lumps from forming and means that more flour can be added without thickening the paste too much. Amylases are probably to be found in the cooling gruel; and the mothers know that this first gruel is very suitable for the young child. All these facts should be considered carefully before advice is given to the mothers about how to prepare an infant’s meal.

Most mothers have no pre-cooked flour, no mixtures with amylases and of course, no mixer. The addition of oil increases the calories in the gruel and makes it smoother, but the oil must be well blended in.

There are some manufactured local foods, including soya or other beans which contain, according to WHO’s recommendations, 20% to 25% of proteins. These foods, known as weaning foods, tend to be rather expensive because of packing and transport, and are beyond the means of the families who need them most. Furthermore, they may not necessarily be high in calories. Imported baby foods have a certain glamour but consume so much of the family’s income that the amount given to the child tends to dwindle towards the end of the month, until pay-day.

It is therefore essential that all medical staff find out, through close observation, how the mothers who have not lost their babies through malnutrition managed to feed them adequately. It is more important to discover why some children are well-fed by their mothers than to analyse why others are malnourished, see below 1.7.

2) Swallowable food and digestibility

Easy digestion of foods depends not only on cooking which splits up complex products into simpler ones but also on their mechanical reduction into small particles and on several digestive juices (among them mother’s saliva) such as occurs in pre-chewing. The mother’s teeth also act as a mixer, while the infant has no molars, cannot chew, and can only moisten the food very little with his saliva. However small local grinders can also be used and are considered more hygienic. In summary, foods should:

- be mashed, especially vegetable fibre,
- be moistened by adding a liquid or oil,
- contain as many calories as possible in proportion to volume particularly by adding oil or fat.

Pre-chewing of the food by the mother may indeed be beneficial. Perhaps it was unwise to stop this practice on the grounds that it was unhygienic. The ban probably prevented very few infections, but may have contributed to malnutrition by depriving the child of well-chewed food containing its mother’s saliva enhancing the digestibility.

3) The number of meals

The number of meals needed to supplement breast-feeding cannot be defined by a figure. It is reasonable to advise that, at least from the age of eight months to one year, the child should receive solid food a few times in the day. For example it might be given two meals of gruel rich in calories, and bits of food from the family table. This is what the mother usually does by rolling some of the cereal paste into small balls, dipping the balls in water or chewing them before giving them to the child.

4) Competition for the family dish

As the family dish is consumed much more quickly by adults, it is advisable to propose a particular portion and cup for the child, although this might contradict in some way the tradition.

1.5. Follow-up of young children through child welfare clinics

Measures likely to maintain and improve the health of young babies demand repeated consultations at intervals dictated by the age and growth of each infant as well as by the quality of the environment in which the infant lives. As well-baby clinics also cover children up to the age of five years, the term “Consultations des nourrissons” used in French-speaking countries is misleading.

Despite the fragility of the newborn baby in the first days of his life because of the physiological upheaval
of birth itself, he is not too vulnerable up to the age of six to eight months as he can enjoy an almost total immunity, nesting against the warmth of his mother's body and drinking her milk.

Quite often, mother and child are asked to attend the clinic every month, until the mother begins to wonder why she should continue bringing a child who is now becoming too heavy to carry.

However, there are certain times when it is important to keep an appointment:
1) for vaccinations that have to be carried out at specific intervals (see the chapter Immunizations, p. 737),
2) at the time the child begins to crawl, to explore the ground and to pick up infections and worms, which is also the time when the intestinal flora is modified by the introduction of supplementary foods,
3) at the time these supplements become necessary and the mother requires advice,
4) finally, when breast-feeding is stopped completely, which is often a time of psychological trauma if both parents have too little time to spend with the child to compensate for the special relationship he previously had with his mother, and particularly if weaning has been abrupt.

Any infection has a serious effect on nutrition not only because the child loses his appetite but also because of digestive troubles linked to the illness or to the diet forced upon him because of his disease.

The best form of follow-up starts when any infection occurs or when the child shows signs of growth retardation. Too rigidly scheduled check-ups do not go along with physiological development and do not necessarily answer the needs of every child.

The child’s file should always be available so that any illness and its progress can be noted. Some clinics keep the files on the premises (where they are not always readily found); others entrust them to the mothers, who may forget or damage them.

1.5.1. Organization of regular check-ups

Child welfare clinics involve far more than just checking the child’s weight. This exercise tends to be centred on a standard weight curve, despite the fact that each child has his own individual rhythm of development which always includes both spurts and standstills.

Children should be grouped by age as much as possible, to help detect any anomalies.

The organization of well-baby clinics incorporates several stages:
1) at the start of or even before the individual examination, the staff in charge should circulate among the mothers and children so that they can spot any eye irritation, pallor, accelerated breathing, temperature and so on. At the same time they should palpate the arms of the babies and mothers (see below, arm circumference), and listen for coughing, especially if indicating whooping cough. In this way they can quickly decide which cases need isolating and which need special attention;
2) next the auxiliaries will sort out those children who have not attended the clinic for a long time, or have failed to get all the necessary doses of vaccine; they also make routine checks of weight, arm circumference and if necessary height;
3) once the children have been sorted, the professional in charge will thoroughly examine those children referred to him, and will also decide on specific treatments and on the educational advice to be given to the mother;
4) if specific education is to be given, the mothers are gathered in preferably small groups (see 1.7.1 Nutrition education p. 763).

1.5.2. Interpretation of systematic examinations

The child grows up in a specific environment with nutritional, infectious and psychological problems, which affect his physical and psychomotor development.

- Weight changes have the advantage of being quickly detected; increases or decreases must be compared with previous results as well as with the height of each child. However even a local reference curve only shows average figures, which need not necessarily be reached by every child. As long as the child’s growth is progressing, the fact that his individual curve is lower than the standard is not so significant.

The reference curve recommended by WHO is the one established by the NCHS (National Centre for Health Statistics) in the USA. A standard deviation grid can help compare levels on the weight and the height curves. The standard deviation is an arithmetical quantity used to compare the biological variations of the development in both kilograms and centimetres.

- Height for age of the child, also in standard deviation, helps to indicate whether any backwardness in development is the result of the adaptation of height to the weight the child has reached, because of the amount of food and calories he/she has received. In Mexico, this balance was called homeorhesis by Ramos Galvan (1965).

- The arm circumference reveals different tissue components: the bone and the vasculo-nervous layer which do not vary much in volume; the subcutaneous fat attached to the skin; and the muscles. The last two
components can be assessed by lifting, between the thumb and the forefinger, a double layer of skin and subcutaneous fat on the one hand, and by palpating the muscle mass in depth on the other. This reveals whether there is a loss of subcutaneous fat, a wasting of muscle mass, or both.

This examination should be carried out halfway up and at the back of the extended arm, between the top of the shoulder and the elbow. If the subcutaneous layer of fat is thin and the skin can be lifted easily this indicates a lack of food; if deep palpation reveals a firm muscle mass then the nutritional status is probably satisfactory, but a flabby arm or a very meagre muscle show that muscle has been used as a source of calories or of proteins, sign of advanced malnutrition.

The growth of the child may slow down in various ways:
- the weight may be stable or decrease, in which case it should be determined whether the child has lost some body fluid (through acute diarhoea), subcutaneous fat or muscle, by palpation as above;
- the increase in height may slow down only three or four months after a loss in weight; this is worked out by examining the arithmetical difference between the standard deviation in weight and the one in height;
- delay in psychomotor development or in the maturation of ossification centres.

The growth retardation can be made up very quickly (catching up), with an adequate diet, unless some serious and long illnesses occur. However, at times, there may be discrepancies between the chronological age of a child, his height/weight level and even his psychomotor and mental development; this difference may last for months and sometimes years in developing countries as compared with statistics of children in a more favourable environment. Such a setback does not necessarily mean that the child will be permanently handicapped, because recovery is possible, even after puberty.

Head circumference is not by itself a useful means of measuring development, because, being linked to bone growth, it simply registers a delay similar to (but slower than) that of height. It is not directly related to the mental development of the child, which depends first and foremost on a stimulating parental and sibling environment.

1.6.4. Chemoprophylaxis and systematic treatment against worms

For years, preventive measures against malaria saved many non-immune infants from death. Better-fed children are more vulnerable to a pernicious attack, which can kill them within hours. It was also observed that, in areas where malnutrition was prevalent, plasmodia seemed to multiply in greater numbers after foods had been distributed and caused attacks of malaria (Murray et al., 1978).

In recent years, because the plasmodia were showing an ever increasing resistance to antimalarial drugs, WHO recommended that systematic prophylaxis be discontinued and that drugs be used only for the treatment of attacks, thus giving the child the opportunity to develop immunity and reach a state of self-protection.

The question of systematic reduction of intestinal wormload, remains debatable. Although the presence of Giardia, nematodes and ancylostoma requires specific action, there are on the other hand some ascarids that seem to be tolerated, apart from the mechanical obstructions that they tend to cause. It would certainly be necessary to reduce their number. The treatment of ascaridiasis could be useful from a psychological viewpoint because eliminated worms are often visible.

1.7. Nutrition education, birth-spacing and primary health care

These three activities are often entrusted to a peripheral auxiliary staff. In order to use the appropriate techniques, they should be well-acquainted with the mentality and culture of the peoples they visit; and they need to receive support and precise instructions from qualified supervisory staff.

It is essential before trying to teach the mothers, how, according to the theory, they should prepare food for their children, to assert the cookery procedures they know with the experience gained from generations before them. These procedures are often unknown to trained staff, as their formal education and their modern life-style made them unfamiliar with traditional practices.

Therefore every nutrition education effort should start with patient observation of mothers living in traditional settings. Instead of looking only to desperate mothers who have a malnourished child, one has to go to mothers in the same surroundings, who are not experiencing malnutrition in their offsprings. Careful observations of these example mothers would help at least to identify basic concepts as cornerstones to build up a socratic type education (Jelliffe, 1968). Such observations need much attention for details which might appear too ordinary, if not backward; personal experience showed that camera snapshots taken systematically to fix every step in the food preparation were an excellent way to dialogue on the procedure, as the demonstrating mother stops at each step of her routine practice, the clicks of the camera
shutter have proven that the picture was taken. By this way a few important movements are identified, even if dozens or hundreds of snapshots had to be taken; what is more, by fixing some details, the mothers are prone to give an explanation that she had forgotten to mention during the procedure, which seems evident to her, because it is repeated daily (see above p. 760, the skills of mothers to increase the caloric density).

1.7.1. Nutrition education

Nutrition education is often based on principles used in the northern hemisphere, quite unsuited to the ecology of Central Africa.

Breast-feeding and the living conditions prevent cases of avitaminosis C and rickets, which are quite rare; but lack of vitamin A is a danger to watch out for, particularly in the case of measles and in savannah areas, where palm oil, rich in carotene, is scarce.

Nutrition education in Africa has basically to deal with prolonged breast-feeding and additional food, when it appears a must. This last point is really difficult to define in terms of age. It depends on each child and on the socio-economic conditions.

The message to be conveyed through nutrition education schemes must fulfil four conditions:
- it must be based on a deep understanding of what mothers do, or can do, within their own environment and take into account what improvements to suggest; and this exercise requires great experience;
- it should identify accurately the real problem of each child and the ability of the mother to adapt the diet to the child’s needs;
- a clearly understandable message must be repeated time and time again in the vernacular, with practical activities to be discussed among the mothers themselves;
- it is important never to make a mother feel guilty about a nutrition problem in her child. On the contrary, she should be made aware of the benefits the child will gain through a more suitable diet.

It is usually recommended that there should be two groups, in order to hold all the mothers’ attention:
- the first consists of mothers in need of specific advice on problems relating to their own children. Each mother should be addressed individually but, on occasions, two more mothers with similar problems could be asked to join in so they all have the opportunity to hear the same advice at least twice over.
- the second type involves mothers to whom general advice is given, such as being careful to prevent a child from catching cold after a bath or the importance of mosquito nets in regions where malaria is endemic. Small group education is always more efficient.

1.7.2. Birth-spacing

Several methods of birth-spacing are available; but they are neither accepted by nor acceptable to the women, not only because of the local culture but also because of their possible side-effects (see the chapter Gynaecology, p. 1078).

The interval between two births is probably due to breast-feeding which, when extended, is certainly beneficial to the child. The factor which influences a woman’s infertile period most strongly is the number of times per day her child suckles: 13 to 15 feeds, spaced less than three to four hours apart (Van Balen et al., 1975; Delvoye et al., 1978; Robyn et al., 1985; Hennart et al., 1985). In some areas, there is a useful tradition of dusting nursing mothers with a red powder; and woe betide them if they become pregnant again before their child is two years old (Pagezy, 1983).

The relation between prolonged nursing and ovulation seems more obvious among undernourished populations. Neurological and psychic factors can also play their part, as in the rural Kivu highlands and despite of a lower level of seric prolactine, amenorrhoea after birth is longer than in urban areas.

Whenever possible, breast-feeding up to the age of two years should be encouraged and women should be made to understand that, in urban areas, social pressures and the way of life tend to shorten the period of lactation, much to the disadvantage of the child.

1.7.3. Primary health care and Mother and child health

Primary health care aims to offer an efficient medical service, extending to the most remote areas. To be implemented, such a scheme must be well-organized with auxiliaries visiting homes at regular intervals, the means to transfer serious cases to a general hospital or special clinics, and a supportive team of qualified supervisors.

As planners decided that auxiliaries could and should tackle every contingency, the local staff were expected to cure the sick, to prevent diseases and to educate the people; moreover, they were to be responsible for vaccinations, the control of endemic diseases and the protection of mother and child health. Auxiliaries ended up by doing a little part of everything, but superficially and finally inefficiently.

Experience showed that, by limiting the workload of auxiliaries to specific tasks, chosen among selected priorities divided sensibly among the auxiliaries, the efficiency could prove more satisfactory. The aim was not to turn different auxiliaries into specialists in particular fields, nor to split up their various responsibilities so they had quiet periods in each working day, but to distribute the work among the available staff.
without overloading them. Therefore accurate job-descriptions would be drawn up with the help of at least a paediatrician and a gynaecologist-obstetrician, who would advise, according to the progress made in medical science, on the most appropriate activities for the local problems.

The application of specific techniques clearly demands a pattern of selective care. Total integration of all branches of health care would result in lower standards of work, with every member of the peripheral staff having to perform all possible duties. Moreover, the number of tasks to be undertaken would probably dishearten any auxiliary.

Considering the vast field of maternal and child health, the auxiliaries cannot be expected to detect all diseases or to perform all the educational tasks. The key to success rests on regular visits by well-trained staff, whose job is to advise the local auxiliary on how to apply the most appropriate treatment and to provide consistent support. Some therapeutic treatments can be handled by the family. An example is oral rehydration with salts and sugar, using a solution which may either be obtained ready-made or else be prepared at home (Brasseur et al., 1984; WHO/UNICEF, 1985; see also the chapters Diarrhoal Diseases and Paediatrics, pp. 628 and 1098-1099).

From an organizational viewpoint, mother and child health is an excellent example of a health service which is decentralized but which requires the comprehensive involvement of specialists in obstetrics and paediatrics. It is they who must identify the tasks required of the auxiliary personnel; and it is their consistent support of these auxiliaries that will ensure the quality and efficiency of the service. In the preparation of programmes, sociologists and social workers would play an important part as would statisticians and economists, who could evaluate cost-effectiveness in terms of lives saved and quality of life.

1.8. Maternal and child health in community medicine

The mother and her child should be considered as a “whole”. After its birth, the child lives in a state of “extero-gestation”, like the kangaroo, for a period of six to nine months and even longer. With human offspring it is difficult to pinpoint the exact time when the intimate bond between mother and child begins to relax, because the dyadic mother/child relationship continues through love and education. In Central Africa, a male child stays with the mother until he is six; at which point he becomes the responsibility of the father. A daughter stays with the mother, to help with household work.

Through the mothers and their children, the health services not only gain easy access to the community; they are also in contact with the adults of tomorrow.

J. Vuylsteke and H. Van Loon

2. Mother and Child Health and Family Planning after 1960

2.1. Introduction

The structures for mother and child health protection in Zaire, Rwanda and Burundi deteriorated after the colonies gained their independence. Only sporadic initiatives by some rural hospitals or health centres persisted, for better or for worse, in the absence of general rules governing such programmes. One of the facilities that continued to operate more or less satisfactorily for over two decades was the FOREAMI centre in Bujumbura.

However, between 1963 and 1970 some medical groups already felt the need to reinstate structured Maternal and Child Health (MCH) activities. This was the case with the CEMUBAC medical team working from the IRSAC centre at Lwiro, in Kivu Region. Some work was begun in Kasai Region; while similar efforts, sponsored by the World Health Organization, made considerable headway at Kibirizi Centre, near Butare in Rwanda, as well as at the public health centre attached to Butare’s medical school.

One of CEMUBAC’s medical goals had been to develop a network of MCH clinics in the highlands of Kivu Region. Family planning (desirable parenthood services) came later, in the mid-seventies. These activities therefore concerned infants, pregnant and nursing women, and couples seeking family planning advice. The network was initially restricted to Idyi Island and the Lwiro health centre; but later included the network of health centres that had developed in the city of Bukavu as well as the hospitals of Kirotse, Masisi and Rutshuru and their satellite health centres.

Obviously not all of these activities were launched simultaneously. The major public health problem in Kivu Region, for example, was protein-energy malnutrition (PEM), striking children mainly between the ages of two and six years. Thus the first phase of operations focused on the trio of malnutrition, parasitic disease (intestinal parasites and malaria), and infectious disease (gastroenteritis in particular).
As soon as the MCH activities became specific, medical record forms were designed and distributed. These related to prenatal care, childbirth and infant development.

Their purpose was twofold:
— first, they provided health workers with a complete overview of the course of the pregnancy, history of deliveries, and growth of the infant at each consultation;
— and secondly they were an invaluable source of data on the health status of the most vulnerable segment of the population, that is mothers and young children. Later, with the advent of family planning (FP), the MCH consultation records were assembled to form a family file, for the father had also to be brought into the picture.

Definite structured projects concretizing these MCH and FP goals did not emerge until well after the Central African countries’ independence. Not until 1974-1975 was the first project, funded by the AGCD, started in the Kigali prefecture in Rwanda.

Various United Nations agencies (UNICEF, UNFPA, the World Bank) funded similar projects in Rwanda and Burundi at the start of the eighties. For instance, the UNFPA (United Nations Fund for Population Activities) set up national MCH/FP programmes in conjunction with CEMUBAC in Rwanda and Burundi.

Combined MCH/FP programmes were considered necessary because the relevant authorities had come to the conclusion that the health status of mother and child was one entity, hence devise separate activities was pointless. Understanding had dawned at both national and international level that it was useless to help children alone while continuing to ignore their mothers; the mother-child pair had to be cared for as a single unit. Given this context, family planning programmes were incorporated into MCH services to ensure long enough intervals between births so as to maximize the health benefits for both the mother and her latest child.

Today, as in the past, protein-energy malnutrition (PEM) is the main public health problem facing rural populations in Central Africa. A number of studies have confirmed this opinion. Malnutrition, affecting children and pregnant women or nursing mothers first and foremost, has repeatedly been reported in Kwango District, the Kivu highlands, and even Rwanda and Burundi over almost the past half-century.

2.2. Mother’s condition and birth-spacing

The MCH/FP programmes implemented in Central Africa are based on some currently well-codified major objectives, although the directives concerning pregnant women and birth are generally not as complete as those concerning infants and young children.

The mother’s nutritional status depends not only on the amount and quality of the food she eats, intestinal parasites, and infections, but also on her energy expenditure (household tasks, work in the field) and her reproductive cycle. Among the various factors influencing a woman’s nutritional status during the childbearing years, both intestinal parasites and malaria are important forms of parasitic infestation. We have little information on the physical work performed daily by African women, but we do know it is comparable to that of female athletes and ballerinas in Western Europe and the United States. Pagezy made a meticulous study of the daily work of Oto and Twa women around Tumba Lake (1982; 1983).

Most of the investigations carried out in Central Africa have shown that fertility is to a great extent natural, and women are either pregnant or lactating throughout their childbearing years. There are very few single women and very few cases of female sterility. However, the endemic chronic malnutrition prevailing in these areas is responsible for high infantile and child death rates. Fifteen or so years ago a country woman in the Kivu highlands or Rwanda had an average of six to seven live-born children, one third of whom died before they reached the age to be married which was about 20 to 21 years old for girls. In other words, four out of every six live-born children were still alive at the age of 20, from which it was hypothesized that the population was doubling every 20 to 22 years. This was indeed the case, for the population’s annual growth rate was about 2.7%. The situation was thus one of a high population growth rate, despite a low fertility rate and a high death rate.

The population increase in rural Black Africa is the result of natural fertility. There are basically two natural regulators of fertility, namely malnutrition and lactation. While it has been proved that endemic chronic PEM shortens the duration of female fertility (late puberty and early menopause), its influence on birth-spacing via postpartum amenorrhoea is still not certain. The latter is dependent on lactation.

In the rural areas of the Kivu highlands and Rwanda, prolonged breast-feeding (8 to 24 months) is the universal practice. Feeding is on demand, and the infant is in close contact with its mother both by day and by night. The number of feedings per 24 hours is thus high, usually above ten. This breast-feeding pattern, so different from what may be seen in industrialized countries, results in high levels of the hormone prolactin in the mother’s bloodstream. To maintain a constantly high level of this hormone, the number of feeds must exceed eight in 24 hours with at least three night feeds. The high prolactin levels inhibit ovulation. When the number of feeds is reduced, the mother’s prolactin level falls and ovulation resumes
(Robyn et al., 1985; Van Balen et al., 1975). The period of infertility following birth (postpartum amenorrhoea) is thus largely dependent on the mother’s breast-feeding behaviour.

In Kivu in particular one is struck by the fact that the mother’s nutritional balance is remarkably well preserved during pregnancy or lactation, although the level is fairly low compared with that of industrialized countries. Although weight loss could be expected in mothers living under very unfavourable conditions, such as those of Kabare, in fact no significant changes in weight or serum albumin concentrations are seen.

A lactating woman must have been pregnant, thus she meets R. Frisch’s minimum weight criteria to be able to conceive. One must then agree that the duration of postpartum amenorrhoea in such women is controlled only by the maternal plasma prolactin concentration, which depends directly on the frequency of stimuli by suckling over 24 hours and therefore on the mother’s breast-feeding behaviour.

For effective lactational control of postpartum amenorrhoea the breast must be given “on demand”. This means that the mother and child cannot be separated, but must remain in close contact day and night. In other words, the mother must carry her infant wherever she goes during the day and sleep with it at night; and this is where social and cultural pressures pose a problem. A traditional rural mother is not a free agent, and has several obligations towards society. She must give birth to and ensure the survival of her progeny (reproduction); she must expend large amounts of energy to take care of her household (collecting firewood and water, etc.) and, in some cases, work in the field (agricultural production).

Traditional populations generally do not use family planning. If a woman is not sterile she will, throughout her reproductive years, be either pregnant or lactating; both of which conditions raise her food requirements.

Both productive and reproductive demands affect the mother’s nutritional status which, as we have seen, remains stable. If for some reason one of the two demands increases, generally as a result of socio-economic pressure from the production sector, the mother, who can no longer satisfy both needs without sacrificing her own nutritional condition, must make a choice.

This socio-economic pressure results from the fact that, at times of malnutrition, additional physical effort is required of the entire population.

All the studies so far conducted show that in these circumstances the mother tends to maintain her nutritional balance by abandoning her infant for several hours a day. In doing so, she reduces the frequency of suckling and her prolactin level falls, with the risk that ovulation resumes.

Observations in industrialized countries have indicated that physical effort may have a direct effect on reproduction. In countries where nutrition is adequate, it occurs often that very active women, such as athletes and ballet dancers, either fail to start menstruating or become amenorrhoeal some time after puberty. The bodies of such women are characterized by little subcutaneous fat but well-developed muscles. The physical effort required of African women in rural communities is on a par with that of athletes and dancers. Postpartum amenorrhoea in African women may consequently be controlled, besides by lactation, by excessive energy expenditure.

Thus, by changing breast-feeding patterns (and the number of feeds per 24 hours) the mother influences birth-spacing. Her behaviour is of utmost importance to the process. However in traditional societies this behaviour is influenced by social pressures, which may act in either direction. If the population is malnourished, the mother will orient herself towards the production sector; but if, on the contrary, the population’s nutritional status is good, she will return to the reproductive function, with a strict taboo on sexual intercourse and a ban on heavy work.

However in towns and cities the environment is no longer traditional, and breast-feeding tends to be losing ground; less as a result of social pressure than because of choices of personal convenience made by the mother, who initially is called upon to exert much less physical effort than in the country, no longer carries her child all day long, and moreover often no longer sleeps with her infant. In a population characterized by natural fertility rates, the combination of these two circumstances (a poor rural environment requiring great physical effort and the easier urban environment) will lead to shorter intervals between births and a faster population growth rate. The annual population growth rate in Rwanda, for example, rose from 2.7% to 3.5% in 15 years. We attribute this to a shorter duration of breast-feeding and perhaps a decline in the physical effort required of women and of mothers in particular. These lowered energy demands result from the start of noticeable improvement in economic conditions throughout the country, hence the absolute necessity of introducing modern contraceptive methods to replace breast-feeding as a means of ensuring adequate intervals between births.

2.3. Infant’s health and development

The infant’s nutritional status in Central Africa depends on a number of factors.
Infant care must be built around the following five points (UNICEF programme): monitoring weight, breast-feeding, diarrhoea control, expanded programme of immunization, birth-spacing policies (GOBI FF), see p. 694.

2.3.1. Monitoring weight

Birth weights are low – 3 kg at most – in developing countries in general, and Central Africa is no exception. The infant weight curve has a very special outline: a break in the weight gain curve occurs, depending on circumstances, between the first and the sixth month of life. As a result, the weight curves of infants in developing countries will never catch up with those of infants in industrialized countries. The explanation traditionally offered for this phenomenon is that, given the steady rise in the infant’s nutritional requirements and the steady decline in milk production, there comes a point when the child’s nutritional needs are suddenly no longer covered. However this does not explain why the average break tends to occur at different times in various parts of the world although the quantities of breast milk are more or less the same.

The weight curves in rural areas in the Kivu Region and Rwanda show this drop-off characteristic of disadvantaged Third World populations before the third month of life. Accordingly, at 12 months of age (and probably earlier), these children are clearly below the third percentile of the weight curve for Belgian boys.

The growth curve for height falls off later, between the seventh and eighth months, while the break in the growth curve for head circumference occurs only around the age of eighteen months.

How should the differences in the trends of these three anthropometric parameters be interpreted? Nutritional deficits affect children differently from adults, since the former are growing. A low-energy diet will cause gradual weight loss in adults. This same energy deficit will be reflected in changes in growth and a slower growth rate, with the tissues maturing at a later chronological age than if the environment and food intake were more favourable. We have called this situation relative malnutrition. It usually prevails among the poor and can ultimately lead to nutritional dwarfism in the entire population. It reflects the combination of the depressed growth curve and a slower rate of growth.

Weight gain often tends to slow down earlier than the growth curves for height and head circumference. The falling off in all three cases is due to quantitatively and qualitatively insufficient food intake, a situation aggravated by the negative effects of pathogenic germs and parasites introduced by contaminated food supplements. These infections and parasitic infestations have a greater impact on weight gain than on increases in height or head circumference.

The Central African infant’s nutritional status depends on a number of factors:
- Parasites: worms, malaria
- Nutritional intake: quantity and quality
- Infections, especially gastro-intestinal, measles, low birth-weight.

For determining the main risk factors of malnutrition and mortality in children in Kivu, besides protection against infections (measles, gastro-intestinal diseases, etc) only two simple criteria turned out to be usable. One was the short interval between births and the other was stunting (small length for age) compared to the norms. We believe that small size is a permanent adaptation of growth to an unfavourable environment; while underweight is more a reaction to acute phenomena.

The surveillance of anthropometric parameters during MCH clinics is thus important. However, plotting these measurements on a graph should not be viewed as a simple technical act. It should be seen as a means for health workers to learn how mothers assess growth, and should contribute to the dialogue with them during consultations. This dialogue will help health professionals to understand how the mothers know when and why their children are growing normally or not, and how they promote their children’s growth.

2.3.2. Breast-feeding

Breast-feeding is still the universal practice in developing countries, especially in the poorer sectors of the population. All mothers breast-feed their children for at least a year, but often most of them for 18 to 24 months. This is true of the rural inhabitants in the Central African interlacustrine region. Breast-feeding serves three purposes, namely:
- it provides the infant with good quality food. The nutrient composition of human breast milk meets all the infant’s needs.
- it provides the infant with protective elements against infection, the most important of them being secretory immunoglobulin A. Secretory IgA synthesis is triggered by the presence of sensitized lymphocytes in the milk; and these lymphocytes are sensitized by contact in the mother’s intestinal mucosa when foreign germs or proteins are present in the digestive lumen. The sensitized lymphocytes migrate through the lymph and then the bloodstream towards the sites that harbour IgA (salivary glands, bronchial tubes, etc.), and thus also towards the mammary glands of
the lactating woman. The infant’s intestinal mucosa does not contain IgA for several weeks after birth. Through the maternal entero-mammary lymphocyte cycle, the infant is provided passively with the immunoglobulins it lacks. Consequently the mother gives her child maximum protection only if she has been sensitized to the germs that infect it. To achieve this, a very close mother-child contact is necessary. The secretory IgA also neutralize the proteins and large peptides in the food that would not be digested in the jejunum. These large molecules can trigger allergic reactions in subjects with an atopical constitution. Diarrhoea and vomiting are one manifestation of such an allergy, corresponding to an allergic reaction in the jejunal mucosa where it is associated with more or less serious atrophy with a resultant malabsorption syndrome. In addition to immunoglobulins, breast milk contains a number of other molecules, such as lysozyme and lactoferrin, which protect against infection.

- finally, as already mentioned, long periods of breast-feeding can have a key role in controlling population growth, and also ensures adequate birth spacing which benefits the last born child.

The most important maternal and child health problem in rural Central Africa today is the production of breast milk. All mothers in the Kivu highlands and Rwanda breast-feed their children from birth. Shortly thereafter, as early as the second or third week, they supplement the infant’s diet with bananas, sorghum gruel, or sometimes cassava paste. During its first year of life the child suckles an average of 13-15 times a day, and 60% of two-year-olds in rural areas are still breast-fed. Most of the time breast-feeding stops when the next pregnancy begins and the child is completely weaned. As we have seen, the mother is protected against another pregnancy by postpartum amenorrhoea which is conditioned by her breast-feeding behaviour.

One must be aware that these rural populations do not use any special diet to smooth the transition from breast-feeding to a normal adult diet. The adult’s diet in Kivu, Rwanda and Burundi in particular, but also in Kwango District, is extremely deficient in good-quality protein. Hence, during the early years of life, when the body’s protein requirements are greatest, the child would be in danger of receiving very little protein were it not for its mother’s milk. The quantity of breast milk produced is therefore of utmost importance for the infant.

The 24-hour milk secretion levels generally depend, during the infant’s first months of life, on the amount of fat the mother was able to store during pregnancy, and her protein and energy intakes during lactation. Women in rural Central Africa normally gain four to five kg at the most during pregnancy, compared with an average gain of 12.5 kg for European women. Consequently they have no fat reserves to use for milk production during the first months of lactation; which explains why the yield of breast milk depends on such an extent on food intake, which is seasonally variable. Breast milk production will be highest during harvest and lowest during the “hungry months” just prior to the new harvest; yet the amount of milk produced will remain constant for a 12 to 15 month period in a given season, whether the child is exclusively breast-fed or receives supplementary food. This is based on bananas, cassava or sorghum in the Kivu Region and Rwanda, and is richer in proteins in the Central Basin where it often consists mostly of meat, fish and palm oil (Tumba Lake).

The figures showing the amount of breast milk produced are compiled from both old and recent investigations, and indicate that yields vary greatly from place to place and from season to season in a given locality. The amount of milk produced in 24 hours may range from 350 to 750 g in different places, depending on circumstances, while seasonal variations in the same locality are about 150-250 g. These differences are apparent in a number of scientific papers and seminars, such as a compilation edited by Whitehead (1983) and a WHO report on breast-feeding (WHO, 1985). Parasites and infections also have a considerable effect in deprived environments (see p. 420; yet international investigations have shown that breast milk nitrogen levels are very similar (at least in global terms) for different countries or regions. If the incidence of infection is high, a large fraction of the milk’s nitrogen will be incorporated into IgA and other protective factors at the expense of the milk’s nutrient content. Extreme situations (which conditions in Central Africa approach) can lead to malnutrition. Thus, paradoxically, one may come across infants suffering from protein malnutrition although breast-fed by their mothers.

2.3.3. Gastroenteritis and rehydration

The proven efficacy of oral rehydration therapy (ORT) consisting of a glucose-electrolyte solution among Bengali patients infected with the cholera vibrio in 1971 has led several authors to extend this treatment to infants, children, and adults with acute non-cholera diarrhoea.

The form of PEM found in Kivu and Rwanda is always attended by serious episodes of non-cholera diarrhoea which results from more or less marked atrophy of the intestinal mucosa (see pp. 385 and 623). Changes in the intestinal mucosa’s brush border
villi lead to a generalized malabsorption syndrome, further increased by the disappearance of lactase activity. This enzyme is necessary to break down lactose, the sugar contained in milk, and it is ordinarily found in the tips of the villi. This malabsorption syndrome is known as tropical enteropathy in children and tropical sprue in adults. *D. Brasseur* showed that almost 90% of breast-fed infants (receiving, it is true, supplementary food as well) in Kivu showed signs of complete or partial atrophy of the intestinal mucosa at the age of two years. Almost all of them, therefore, suffered from tropical enteropathy.

The treatment for episodes of diarrhoea, very often of infectious origin, consists of intensive administration of a glucose-electrolyte oral rehydration solution (ORS), as developed by WHO and UNICEF. The dosage and composition of the solutions used in ORT have been slightly modified. The solutions are remarkably effective, easy to use, and in most cases replace expensive intravenous rehydration which is often difficult. The electrolytes are absorbed thanks to the presence of sugar in the form of glucose or saccharose. Mothers can prevent dehydration in their infants by administering a solution of sugar and table salt (sodium chloride) at the onset of diarrhoea. More serious episodes of diarrhoea require the addition of sodium bicarbonate and a potassium salt (see p. 628).

The ORS is an example of an effective therapy first used in developing countries that subsequently spread to industrialized countries. It is now recognized as a basic weapon in the paediatric therapeutic arsenal.

2.3.4. The Expanded Programme on Immunization (EPI)

The World Health Organization launched the Expanded Programme on Immunization (EPI) in 1978 in conjunction with UNICEF, to coordinate work in different countries and to assist governmental efforts to control tuberculosis, diphtheria, tetanus, pertussis (whooping cough), poliomyelitis and measles. The EPI has set itself the task of reducing morbidity and mortality due to the above-mentioned diseases, as well as controlling and eventually eradicating tetanus neonatorum by the vaccination of pregnant women.

The EPI’s target groups are all infants under one year of age and pregnant women. The EPI must be incorporated into general public health work. International bodies collaborate closely with the vaccination programmes by supplying vaccines, laboratory equipment and vaccination materials, especially refrigerators to keep the vaccines up to their use in a cold chain, and also by providing training for national health personnel.

Governments are consequently asked to include vaccination in maternal and child health clinics so as to improve surveillance of the rate of vaccination against the so-called target diseases.

The vaccines used to immunize against the six EPI target diseases are obtained from either killed pathogens (pertussis, Salk vaccine for poliomyelitis) or attenuated live viruses or bacteria (BCG, Sabin vaccine for poliomyelitis, measles) subjected to repeated tissue subculturing.

The toxins of some pathogens are processed to produce an anatoxin that can be used for vaccination (diphtheria, tetanus).

a. **Vaccination against tuberculosis**

BCG – bacille-Calmette-Guérin – is an emulsion of live *Mycobacterium bovis* attenuated by repeated subculturing on a glycerin-bile-potato medium. More than 13 years and 200 subcultures were required to perfect it. A lyophilized vaccine is used today. It confers cellular immunity and reliable protection in 80% of cases, and has been given to children since 1922.

BCG is administered routinely in developing countries as soon as possible after birth and before the effects of malnutrition set in, with weakened cellular immunity and interference due to other mycobacteria.

b. **Vaccination against Diphtheria-Tetanus-Pertussis (DTP)**

- The diphtheria vaccine is prepared from the toxin secreted by *Corynebacterium diphtheriae*, the causal agent of diphtheria. The toxin is treated with formal and heat to yield an antigenic anatoxin devoid of pathogenicity.

- The tetanus antitoxoid is prepared from raw *Clostridium tetani* toxin treated with 5% formal and heated to 40°C to eliminate its neurotropic and haemolytic action. Aluminum salts are used to potentiate the immunological response to the antitoxoid. A tetanus booster is recommended when the child is five years old and another at 15 years old. The optimum tetanus immunization schedule for pregnant women is two doses given at least four weeks apart, the first after the fourth month of pregnancy and the second at least four weeks before term. The IgG antitoxin crosses the placental barrier to guarantee a sufficiently high foetal serum antitoxin concentration that is effective in preventing tetanus neonatorum.

- The pertussis vaccine is prepared from a suspension of killed phase 1 *Bordetella pertussis* bacilli grown on Bordet-Gengou culture medium. *B. pertussis* has a four-phase growth cycle on this special agar; only the first three encapsulated phases are virulent. The bacilli triggers the production of opsonizing IgA antibodies that do not cross the placenta. Thus the neonate does not receive passive immunity and can be struck by the disease at a very early age, despite the
protection that can be provided by specific secretory IgA in the mother’s milk. 

*B. pertussis* acts through several cell components and the production of several toxins, i.e., a dermonecrotic toxin, a factor promoting lymphocytosis, and a tracheal cytotoxin.

— The triple diphtheria, tetanus and pertussis vaccines are usually administered together (adsorbed DTP vaccine).

A single vaccination will not confer immunity against diphtheria and tetanus, but two doses administered one to two months apart will give 88-100% protection. Three doses confer effective immunity for at least ten years.

c. *Vaccination against poliomyelitis*

The poliomyelitis vaccine is prepared from the three enteroviruses that cause the disease: type I (the most virulent because it is the most neurotropic), type II and type III.

Two types of vaccine are used. The Salk vaccine is made of killed viruses absorbed on calcium phosphate and protects the central nervous system. The Sabin vaccine uses live attenuated viruses to confer localized protection in the digestive tract, preventing the propagation of the wild virus. It triggers the production of circulating antibodies.

Both the oral and the injectable vaccines must be administered three times at one-month intervals for maximum effectiveness. Vaccination can begin at the age of three months. Breast milk, acute diarrhoea and interference from other enteroviruses may render the oral vaccine ineffective, but these are not contra-indications for vaccination. One should simply allow for a sufficient lapse of time between administering the vaccine and the breast-feeding.

d. *Measles vaccine*

The measles vaccine is prepared from a highly attenuated strain of measles virus (paramyxovirus, RNA). The Schwartz strain used is attenuated by repeated subculturing on chicken fibroblasts. The attenuated virus behaves like an asymptomatic natural infection, producing the necessary interferon and an IgG humoral reaction. Immunity is long-lasting in 95% of cases. Group immunity can be obtained if more than 90% of the community is vaccinated.

Measles is a major MCH problem; it is also closely linked to malnutrition, since the vast majority of cases occur before the age of 24 months or even 18 months. The mortality rate, which may extend to 25% of the sick children, is higher in those under 18 months of age. The young infant’s passive immunity disappears earlier in developing countries than in industrialized countries.

The age at which children should be vaccinated against measles is a matter of controversy. The age-specific seroconversion rate also varies from one country to another. In view of the disease’s epidemiology and the age-dependent variability of the vaccine’s effectiveness, the general feeling is that children should be vaccinated at nine months and not be given a booster. Some specialists feel that infants should be vaccinated at six months and be given a booster a year later. However, the latter solution encounters two obstacles, namely, the cost of such a campaign and the difficulty of retrieving the children a year later.

The technical developments of the EPI cold chain, vaccine coverage, etc., are beyond the scope of this chapter. The reader should consult Ngabonziza (1985), who gives a full description of these aspects of the programme.

A typical vaccination schedule (used in Rwanda) for infants would be:
- at birth: BCG after the first 24 hours.
- as soon as possible, between three and eight months: three DTP injections and three doses of polio vaccine at four week intervals.
- as soon as possible between 8 and 24 months: single injectable measles vaccine.

For pregnant women the schedule is: as soon as possible between the third and eight months of pregnancy, two injections of tetanus anatoxin four weeks apart.

2.3.5. *Family planning*

The above details show that family planning is essential to protect the health of mother and child; and Zaire, Rwanda and Burundi have accepted this point of view. Rwanda has set up a National Population Office (*Office National de la Population*), which demonstrates the concern of the political authorities. However a philosophic debate remains open regarding the methods (*medical or natural*) to be used; although there is agreement that the influence of breast-feeding on birth-spacing should be replaced by some other method, which should at least be kept in reserve if breast-feeding still appears effective.

World literature on this question is abundant and accessible, so it is only touched on here.

H.L. Vis
MOTHER AND CHILD HEALTH

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**SPECIAL DOCTORAL THESIS**


**DISSERTATION AT THE UNIVERSITY OF KINSHASA**


**ANNOTATED BIBLIOGRAPHY**

MOTHER AND CHILD HEALTH

Following his mission to identify the need for preventive services for mother and children, the author describes the current set-up of MCH services in Central Africa. He also underlines the general principles to be applied and the administrative organization of committees at provincial and central levels. He stresses also the need for control by a medical officer; and suggests ways to raise funds for the organization (ORAMEL).


The author describes the demographic and social situation in Kwango, and the population’s food; and gives details of breastfeeding and breast milk. The consumption of foodstuffs is compared with the needs, and the health condition of mothers and children is described in terms of blood and weight analyses. Then follow the different aspects of mother and child protection; and maternity clinics, antenatal and infant clinics, paediatrics wards, orphans and social activities are described.


1,036 nursing mothers were observed from the point of view of their breastfeeding behaviour and nutritional status. Their menstrual cycle was also examined. Sixty-one of these women were Swedish, 4,567 belonged to the urban population of Bukavu and 518 lived in the rural region of Kabare in Kivu.

This study shows the role of the breast-feeding behaviour on one hand; and on the other hand the role of the nutritional status of the mother. On the latter depends the secretion of lactogenic hormones and the resumption of the menstrual cycle during lactation.


Among the papers read during the seminar, we may mention: “The United Nations Fund’s Population Activities” (Nzokirishaka), the project called, “Intergated Development of Maternal and Infant Health, Family Planning and Health Education” (Legrain), “Why A Population Policy in Burundi?” (Van Mels); “Protein-Energy Malnutrition, Breast Milk and Breastfeeding” (Vis), “The Definition of Family Planning, Induced Sterility and the Relationship between Lactation and Contraception” (Delvoye); “Mechanical and Hormonal Methods of Contraception, Some Intrauterine Contraceptive Devices, Natural Contraception Methods and Periodic Abstinence” (De Faape); “The Objectives of the Expanded Programme of Immunization and Results in Burundi” (Seruzingo); “The Importance of Acute Diarrhea and of the Oral Rehydration Therapy” (Ntame), with simple methods to prepare an oral rehydration and various ways to apply the treatment”.


This report starts with a global analysis of the nutritional situation near the Great Lakes of Central Africa: Rwanda, Burundi, Shi and Hava’s populations in Kivu (VIS).

Carael suggests the use of a folder containing a Rwandan weight curve of the child with the explanation of its interest. Different authors mention the nutritional problems: the nutritional status of the mother and child (Hennart); the problem of malnutrition in Rwanda (Dushimimana); breastfeeding (Sindikubwabo); historical development of Nutritional Centres in the world, and in Rwanda the impact of these centres on children’s nutritional status, disappearance of tabous; promotion of small animal husbandry and the employment policy (Mbonyumvumvi).

Karekezi presents the programme of the ministry of Agriculture, Animal Breeding and Forestry to guarantee self-sufficiency for food. Infectious disorders and the importance of diseases on Family Health, nutrition and on lethality, and the role of MCH structures are described (Bosuyt). Lepage reports on acute diarrhoea in children, their frequency and impact, and adds some recommendations.

Then follows the role of sexually transmitted diseases on reproduction (Bugingo); the expanded programme of immunization in Rwanda (Moloubia, Vimont-Vicary), problems in antenatal care, ruptured uterus (Declerq); methods and techniques of reversible contraception, the experience in Rwanda with hormonal injections (Robyn, Questiaux); maternal and child protection in traditional Rwanda (Ndangiza); fertility disorders in Rwanda (Mukantabana).

A last chapter analyses research on population and family health, the realisation of “ONAP” (National Population Office) by Boneza, the importance of a prospective demographic survey to prepare population programmes (Lohle-Tart), the objectives for national family health programme (Hakizimana).


This book is divided into three parts. In the first part, different authors try to analyze the role of birth control and fertility, and describe some anthropologic aspects. The second part mentions the findings of various studies on reproduction carried out in African countries. Caraël develops the problems of birth control, ecology and nutrition in the province of Kivu. Lala-Diakanda, Ngondo A. Pitshandenge, Tabutin and Vilquin study the same problem for the western part of Zaire.

The last part of the book is devoted to the political consequences of the change in customs.

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This contribution gives a general idea on endocrine mechanisms which can prevent nursing mothers to become fertile. The child's suckling seems related to the number of feedings and perhaps to their intensity. But other neurological or psychological factors are not excluded, since in a rural environment, despite lower levels of serum lactogenic hormones, the post-partum amenorrhea is longer.

RUCHABABISHA-MIGABO (1979), Etude quantitative de la production de lait par les mères dans une ville africaine, mémoire de pédiatrie, Université de Bruxelles, 57 p.

Analysis of the infant's nutritional needs in the rural environment of Bukavu. Those needs are covered by breastfeeding until the age of six months. The infant's weight curve is progressing satisfactorily during that period. Thanks to the immunization substances in breast milk, the baby is protected against diseases, and presents fewer risks of a severe metabolic disorder during brain growth. The introduction of supplementary foods should take place as late as possible; preferably after the age of six months.


In the first booklet, the author describes the health activities for mothers and children, and gives details as regards organization of these activities and the main preventive problems to be solved.

The second booklet is constituted by annexes: forms and reports, recommendations concerning the use of different milk preparations for children, equipment, the system of subsidies and the conditions for their application.


Within the geographic and demographic context, the author presents a synthesis of food surveys that were carried out in the area of the Great Lakes. He distinguishes between the rural area, the organized rural area (farms) and towns. He examines the economic situation in a self-subsistence regime and the entailed nutritional situation. A well-adapted method for those regions seems to consist in “promoting prolonged breast-feeding, which is the only way to provide children with high quality proteins in Central Africa.”


In 1978, during the cholera epidemic in Kivu, the author and his team used the oral rehydration therapy (ORT). On the basis of his experience, the glucose electrolyte solution was used for some patients in Brussels. The author gives the results of those experiences in Kivu and in Brussels and concludes that this solution is very effective in controlling diarrhea. The composition of the solution must, however be adapted according to the local situation: the types of dehydrations prevailing, and the baby's nutritional status.


The authors present the findings of their study on breast-feeding among the Shi and the Havu in the Kivu highlands. They give a historical survey of the evolution of customs with regard to breast-feeding, and they analyse the influence of the Western way of life on the traditional usage of breastfeeding.