

## The Conquest of Iodine Deficiency in Cameroon 1990 - 2007

Daniel, LANTUM

Fellow of the Cameroon Academy of Sciences

### RESUME

Il s'agit revue de programme de lutte contre les troubles dus à la carence en iode qui était un problème important santé publique au Cameroun avant 1991. L'article souligne la collaboration entre les scientifiques et les preneurs-de-décisions. Tandis que les premiers ont joué le rôle de chercheurs qui ont mise en évidence une endémie, les autres, sur la base d'évidence ont formulé la politique et de programme de la lutte contre cette fléau. Le document est présente thématiquement en sept phases: énoncé de problème; l'assemblage de l'évidence; le restitution; la formulation de politique et programme; la mise en œuvre, le suivi et évaluation; l'identification des stratégies des pérennisation; récapitulation de procès cyclique de réalisation; les points fortes de la collaboration entre les scientifiques et les preneurs des décisions dans la solution d'un problème de développement. En générale, cette article est un compte-rendu d'une histoire de grande réussite de la conquête de malnutrition due a la carence en iode au Cameroun entre 1990-2007.

**Mots clés:** Iode, carence, problème, santé, scientifique, preneurs-de-décisions, collaboration, évidence, control, réussite.

### ABSTRACT

The paper reviews the Cameroon programme for the control of Iodine Deficiency Disorders which was an important public health problem before 1991. it focuses on the relationship and interactions between the scientists who provided the evidence and the health-policy and decision makers who accepted the evidence and collaborated with scientists to formulate policy and programmes for implementation, follow-up and monitoring, evaluation and sustenance. This is done under seven sub-heads: Problem definition; Assembly of relevant scientific evidence; communication to policy makers; formulation of relevant policies and programmes; implementation, monitoring and evaluation; identification of sustainability strategies; presentation of effort as a revolving process; and lessons learnt from the continual interaction between scientists and policy-makers in problem solving for development. It is a summary of the success story of the conquest of iodine deficiency malnutrition in Cameroon 1990-2007.

**Key words:** Iodine, deficiency, problem, health scientist, policy-makers, collaboration, evidence, control, success.

**OBJECTIVES OF THE PRESENTATION**

To foster a collaborative relationship between the Academy/Scientists and health policy-makers for evidence-based policies.

To demonstrate the challenges and opportunities for interaction between health-policy makers and scientists/academics in formulating evidence-based policies for development.

**WHAT WAS THE PUBLIC HEALTH PROBLEM REQUIRING EVIDENCE FOR POLICY TOWARDS PREVENTION AND CONTROL?**

**Manifestations of iodine deficiency malnutrition**

Iodine Deficiency Disorders (IDD) are quite a wide range of clinical syndromes most of which are detectable only by experts or specialist

clinicians. The commonly known ones are Goitre and Endemic Cretinism. In large-scale surveys, we usually study prevalences of Goitre and Cretinism as indicators of IDD endemicity since they are all manifestations of one metabolic principle and usually occur together depending on the degree of iodine deficiency in a area. As it is very important to focus our minds on the IDD problem as a whole, even when we are conducting clinical goiter surveys and collecting urine and blood samples for biological investigations of iodine deficiency, it is useful and necessary to keep in mind the IDD manifestations spectrum rendered here in English and French.

To these we could add other qualitative and socio-economic consequences:

- Poor school performances
- High school drop out rate
- Low socio-economic productivity
- Esthetic deformity

**Table 1: IDD Spectrum**

Life Phase	Clinical Syndromes	Syndromes Cliniques
FOETUS	Abortions still births Congenital Anomalies Perinata Mortality Infant Mortality Neurological Cretinism - Mental deficiency - Deaf mutism - Spastic Diplegia - Squint Myxoedematous Cretinism - Dwarfism - Mental Deficiency Psychomoto Defects	Avortement, mort-nés Anomalies congénitales Mortalité Périnatale Mortalité infantile Crétinisme neurologique - Retard mental - Surdimudité - Paraplegie spastique - Strabisme Crétinisme Myxoedemateux - Nanisme - Retard mental Deficits Psychomoteurs
NEONATE	Neonatal Goitre Neonatal Hypothyroidism	Goitre neonatal Hypothyroidie néonatale
CHILD AND ADOLESCENT	- Goitre - Juvenile Hypothyroidism - Impaired mental development - Retarded physical development	- Goitre - Hypothyroidie juvénile - Retard mental - Retard de la croissance
ADULT	- Goitre with its complications - Hypothyroidism - Impaired mental development - Retarded physical development - Iodine-induced Hyperthyroidism	- Goitre et ses complications - Hypothyroidie - Fonctionnement mental retardé - Développement phisique retardé - Hyperthyroïde provoquée par surdosage en iode

(Source Hetzel B, 1989 p 84, adapted)

- A dull population

All the above manifestations can be prevented in a population by the correction of the iodine deficiency in the soil, water and food. Most can be reversed except those which have caused irreversible brain damage in foetal life or adults. Hence in urgent prevention and control programmes, the priority groups are:

- Pregnant women to prevent cretinism
- Children 0-5 years
- Adolescent and young adults 16-45 years

#### **a) IDD in the Foetus**

In iodine deficiency zones, high levels of spontaneous abortions and still-births rates are often observed.

Low birth weight is also often associated with iodine deficiency situations; similarly are congenital anomalies among which cretinism and hypothyroidism are extreme manifestations. Carefully planned research is required to establish all these. They can be prevented by mothers consuming iodized salt.

#### **b) IDD in the Neonate**

Neonatal goiter is generally seen in regions with severe iodine deficiency. It can be treated with increased iodine intake by mothers.

Neonatal hypothyroidism is often the cause of mental retardation. It is due to poor brain development following the deficiency of the thyroid hormone "Thyroxine" at the critical development phase. As a matter of fact, a third of cerebral development takes place during the first two years of life. It is therefore necessary to ensure adequate "Thyroxine" levels during pregnancy and after delivery. Neonatal hypothyroidism is diagnosed when the Thyroxine level is inferior to 3 microgm/dl of cord blood.

In iodine deficiency areas, if the iodine urinary excretion level is inferior to 25 microgm/gr of creatinine for more than 50% of the population sample tested, the incidence of neonatal hypothyroidism will be of the order of 75 to 115 per 1000 births. In developed countries, neonatal

screening for blood thyroxine levels is carried out routinely 4 to 5 days after birth. If the level is low, thyroxine administration is started and sustained for long to prevent mental retardation and poor physical development. As this routine testing is very expensive and sophisticated, most developing countries cannot yet introduce it into their routine services. Where iodine deficiency is endemic and established by other parameters, neonatal hypothyroidism can be prevented by mass prevention campaigns using iodized oil or iodized salt.

#### **c) IDD in children and youth**

Iodine deficiency is often manifested in humans in terms of goiter prevalence, and this increases with age reaching the peak at adolescent 12-16 years.

Poor school performance (low educability) has been signaled in several studies in IDD endemic areas and is associated with IDD. The classical case reported was that of Jixian village (village of idiots) in China. This can both be prevented and corrected.

Iodine deficiency also impedes psychomotor development in children. Appropriate treatment can correct the situation, but the prevention approach with Universal salt Iodization (USI) is the best.

#### **d) IDD in Adults**

The commonest of visible IDD syndromes is Goitre. It is the enlargement due to hyperplasia of the follicles of the thyroid gland following repeated stimulation for a long time by the Thyroid Stimulating Hormone (TSH) of the Pituitary body. TSH is sensitive to low blood Thyroxine levels and reacts to stimulate the thyroid gland to produce more when iodine is deficient. Goitre prevalence therefore tells the story of TSH activity over a long period in iodine deficiency areas (except where there is adequate iodine but is blocked by other factors called goitrogens). In normal conditions, the TSH blood levels are low and there is no goiter - a situation called Euthyroid. TSH tends to rise in clinical hypothyroidism or in biological hypothyroid state

where iodine urinary excretion level is below normal range.

Some goiters do recede on their own when the body physiology adjusts to a slower rate after puberty. Oral iodised oil administration in minimal doses of 120mg, 240mg have been shown to cause goiter regression by 90% within 2 years in Djottin/Oku District of Bui Division of Cameroon (Ngum, 1990). Iodised salt has been shown to have similar effects. Even for long standing goiter in adults, these prophylactic measures often show a palpable regression and softening. Hence, USI is recommended.

### e) Cretinism

This is an extremely damaging manifestation of IDD. While some cretins die early, others remain to consume huge amounts of resources in their care. But what is worst, they never will be normally socio-economically productive. The high frequency of cretinism in a community signals severe endemic cretinism or simply severe endemic IDD. While there is a wide clinical gradation of cretinism, two extreme clinical forms or types have been classified:

- a) Myoedematous cretinism or hypothyroid cretinism which are predominant in Africa and Heitan, Sinjiang - China
- b) Neurological Cretinism which are well described to be present in Latin America and part of China e.g. Chenade.

Myoedematous cretinism is associated with:

- i) Symptoms and signs of poor mental and neurological development
- ii) Growth development problems resulting in dwarfism
- iii) Clinical and biological signs of hypothyroidism
- iv) Dull and innocent look of stupidity (mask face)

If Iodine is administered before the age of four years, these clinical manifestations can disappear. If after four years, they will persist as it is too late as the thyroid gland seems destroyed and inactive towards the 5th year for yet unexplained reason. Some opinion holds it that mysoedematous cretinism results from the

combined effect of iodine deficiency and feeding with goitrogenous food after weaning.

According to Hetzel (1989),

*"Evidence is now available that there is an excess quantity of thiocyanate in the blood of these severe hypothyroid cretins in Zaire. The results from the detoxication by the liver of Cyanide which results from hydrolysis of Linamarin from cassava in the gut. The thiocyanate causes an excessive loss of iodine through the kidneys. Extensive observations indicate that goiter and myoedematous cretinism appear when the urine iodide/ thiocyanate ration exceeds four. In this area in Zaire, it is usually greater than seven. The mysoedematous cretinism probably arise from fetal hypothyroidism produced as a result of excessive cassava consumption by the mother, as other foods are scarce. It is maintained following birth by cyanide ingestion from breast milk. Hence the stage is set for infant hypothyroidism, with severe effects on physical and mental development"* pg 45.

Using ultrasound studies, an atrophic state of the thyroid gland has been described for myoedematous cretins in China. Looking at the problem from a general population nutritional perspective, wherever severe IDD manifest, there is a high risk of brain damage for all newborns, and the focus of control should be on the prevention of brain damage for the entire population at risk rather than the specific syndromes manifesting on individuals.

### HOW WAS SCIENTIFIC EVIDENCE ESTABLISHED?

According to Lantum (1990), by 1990 fragmentary information already existed to place Cameroon on the African map as an IDD endemic country. The quasi-national IDD survey carried out by a team of Faculty of Medicine Scientists sought to assemble existing information, interpret it in light of current knowledge and control practices, and to complete the earlier efforts. This would then be presented to planners and decision-makers to motivate them to take appropriate measures. In one sense, although the Cameroon Academy of Sciences was not yet born, the team of Scientists in the faculty constituted an informal nucleus to that body. It is relevant to cite their report in

extenso. I cite:

The first record of the presence of goiter in Cameroon was made by the Germans in 1906 in the Western Grass fields (now North West Province). But the first systematic survey conducted on a large scale was carried out in the East Province by F.R. Masseyeff in 1954 under the auspices of ORSTOM. J. Pele - a Nutritionist reported on his findings of goiter in Akonolinga and Dourou plain in the Adamawa Province in 1967.

The following year (1968), the World Health Organisation for African Region sent out Loweinstein to update their knowledge on endemic goiter in East Cameroon. No sooner had he submitted his report than F. Stephanie and collaborators fitted out an expedition in 1970 to carryout another extensive survey which covered more territory beyond the communities earlier studied. Richir Clement (1972) reported on some aspects of the work of Stephanie et al (1970).

By 1973, Prof. Robert Aquaron of the Biochemistry Department of the University Centre for Health Sciences, accompanied by Dr. Pool-Gouater pre-occupied themselves with the study of Biochemical aspects of endemic goiter in East Province. The year 1974 saw J.R. Lewis visiting Menchum Division and conducting a goiter survey. He began control measures with iodized oil in that endemic focus.

While Dr. Martineau who was the W.H.O resident nutritionist continued other surveys in other communities in East Province, Aquaron and collaborators extended their activities to other parts of Cameroon, notably Bamum, Bamumgun and even Kribi between 1977 and 1978.

In 1976 Pierre Ngwessi carried out for his MD thesis titled "The biological and epidemiological aspect of goiter in Batouri" under the joint supervision of Professors Aquaron and Lantum. Le Françoise studied the iodine and thiocyanate content of some local foods in East Cameroon in 1978.

In 1989, Prof. Lantum dispatched Lache Ben

Enow to investigate the goiter endemia of Ndog plain for his MD thesis. But it was Tembon Andi Chi who described the Mbembe goiter region in 1986. Dr. D.N. Nfonfu of the Health Ministry summarized the existing information and presented a paper in 1987 at the OCEAC conference. The Faculty of Medicine in 1988 then selected 20 convenient zones as sentinel sites to carryout IDD studies and establish a national diagnosis, and to conduct investigations on control measures with iodised oil and iodised salt. Dr. V. Verla and J. Ngum worked on the Djottin/ Oku zone, Dr. John Kwa Kedze (1990) investigated Menchum; Tchakounte was assigned the District of Sassa-Mbesi-Mbe in Vina Division; Dr. Joseph Ave revisited Akonolinga.

In 1990/91, the Faculty of Medicine trained 50 final year medical students on IDD survey techniques. These were supported by an iodine laboratory funded by the World Health Organization in 1989. In October 1988, the WHO/ICCIDD sent out a Salt Consultant to Cameroon by name Mr. V. Mannar and he and Prof. Lantum found that SELCAM was the principal salt producer; and that this private company was prepared to iodized all its salt for IDD control if authorized. We reported our findings to the Minister of Health, Prof. Joseph Mbede, who had replaced Prof. Victor A. Ngu. Thanks to Prof. Mbede's note Number 69/A/MSP/SG/DSFM/DSSF/SN of 15 May 1991, an authorization was granted to market iodized salt in IDD endemic regions (East, West, North West, Far North and Adamawa).

In summary the National community diagnosis of IDD in Cameroon had thus been established by Scientists, and the Decision to use Universal Salt Iodization and consumption had been officially issued by the policy makers. The private industrial set up was to supply and market the product, while the Faculty of Medicine and the Ministry of Health were to do the monitoring and eventual evaluation in collaboration with other partners (See Table 2 for the Diagnosis and Annex AI for authorization.

**NATIONAL COMMUNITY DIAGNOSIS 1991**

**Table 2:** Estimated population at risk of IDD in Cameroon in 1991.

Province	Population	Sites surveyed	Clinical prevalence	Mean	Population at risk
Extreme North,	1,880,866	Mokolo Doukoula	36% 75%	56.5%	1,880,862
North	833,103	Pitoea	12.5%	12.5%	227,701
Adamawa	491,042	Vina	45%	45%	491,042
North West	1,237,804	Wum Jakiri Djottin/Oku Oshie	13.3% 45.9% 41.4% 64.0%	44.4%	1,237,804
West	1,331,201	Bamoungoum Bafang Mbouda Noun	29% 5.4% 5.2% 65%	13.3% 65%	347,942 287,375
Littoral	1,351,827	Edea	?	?	?
South West	840,883	Limbe Tiko Mamfe	0.2% 2.8% 12.6%	1.5%	30.000 72.000
Centre	1,655,540	Eseka Akonolinga Efok	13.5% 16.5% 6.22%	12%	506,000
East	516,733	Batouri	14.5% (iodised oil)	14.5%	516,733
South	377,237	Ebolowa	6.0%	6.0%	56,585
<b>Total</b>	<b>10,516,236</b>	<b>21 sites</b>	<b>AV 26.25%</b>	-	<b>5,654,044</b>

For 1991, with population annual growth of 2.92%, add 10%. Pop at risk "Multiplier" is 2.5.  
(Source = 1987 Census, Cameroon national IDD Survey 1990-91, By Lantum et al 1991).

**COMMUNICATION TO POLICY MAKERS**

Between 1985 and 1995 - two faculty members were serving as Ministers of Public Health, namely Professor Victor A. Ngu - a Professor of Surgery, and Professor Joseph Mbede - Professor of Pediatrics. Due to their professions as physicians, they understand to a good extent the nature of Iodine deficiency disorders since they had at one time or other been diagnosing and clinically managing some of their manifestations. More importantly and relevantly, they both knew that the epidemiology and community health updates on IDD lay with Professor Dan Lantum in the Department of Public Health and Community

Medicine and they encouraged him to collect and compile information on this problem of IDD which Resolution WHA 43.2 had requested member states to eliminate by the year 2000.

It was Professor V.A. Ngu who facilitated Prof. D. Lantum to attend the first ICCIDD/WHO/UNICEF Regional Conference on IDD in Kathmandu, Nepal 1986, and to serve as the Chairman of the National Organization Committee in Cameroon to host the first African Regional ICCIDD/WHO/UNICEF Conference on IDD at Yaounde on 23-26 March 1987. Thus Professor DN. Lantum constituted the main bridge between the Faculty of Medicine and Biomedical

Sciences (and the Cameroon Academy of Sciences) and the Ministry of Public Health. He maintained this relationship for over two decades (1986-2006). This was the beginning of the Coalition which was later formalized as the National Committee for Prevention and Control of IDD using the Universal salt Iodization and consumption strategy.

The relevant principal activities of the scientist were then to summarize existing information on IDD endemicity, determine the severity by zones and communicate the information to the Minister of Health. To this effect, the Scientist wrote a pamphlet entitled "Iodine Deficiency Disorders in Cameroon in 1990/91 (25 Questions and Answers) / Les Troubles Dus a la Carence en ode au Cameroon en 1990/1991: 25 Questions et Reponses)". The authorities were very pleased with it. He further took part in the conception and formulation of the policy instrument which defined the organization and the functioning of the National IDD programme from 1991.

It was necessary to inform the Iodised salt Producers and Importers of the private industrial sector that when food grade salt was iodised, it was no longer a simple "food commodity" marketed under the Ministry of Commerce but a medicament of high interest for the Ministry of Health. Hence, both ministries needed to collaborate in supervising iodised salt production, importation, marketing and consumption. Further, that quality assurance and quality control at production and ports of entry for imported salt product were now a joint responsibility of both (in addition to Customs Department of the Finance Ministry). Furthermore, that besides internal quality control, periodic inspections would be carried out by scientists from research institutions particularly the Faculty of Medicine and Biomedical Sciences in collaboration with the National Center for Research in Food and Nutrition (CNRAN) which had set up Iodine Laboratories. The Centre Pasteur could also perform iodine analysis in salt and urine as occasion would demand.

By 1991, as the Company "SEL du Cameroun"

(SELCAM) was the only salt producer in the country, they agreed with the Scientists to adapt their refinery for salt iodization and to receive assistance for Quality control such as Rapid Test kits and laboratory titrimetric methods. Further, their annual turnover of iodized salt had to increase from 12,000 metric tones to 40,000 to satisfy the estimated national consumption needs. These commitments were to be monitored by the Faculty of Medicine Scientists. In 1974, the World Bank liberalized Iodized salt trade. Then the other economic operators joined in to import iodized salt from Senegal and Europe to supply to the wider Central African Sub-Regional market, since all the countries had IDD problems of public health dimensions. These issues were discussed at meetings held in the Ministry of Industrial Development and Commerce to which Scientists were invited. Thus an Iodized Salt Trade Coalition emerged consisting of: World Bank, WHO, UNICEF, WFP, FAO, MINDIC, MPH, Salt producers and the University. The radio, television and press media were widely used to inform the general public and to solicit cooperation.

## POLICY INSTRUMENTS AND IMPLEMENTATION

- 1) The key instrument was the text creating and organizing the national programme for the prevention and control of Iodine Deficiency manifestations all over the national territory. Arrete N° 0133/A/MSP/SG/DSPM/SDSF/SN du 29 Mai 1991. (Annex A)
- 2) The second instrument was " Decision N° 255/D/MSP/SG/DSPM/SDSF/SN du 14 Fevrier 1995," creating a National Coordination and Consultative Committee in charge of Micronutrient Deficiency Control Programme. (Annex B)
- 3) The third instrument followed when during monitoring some importers of iodized salt were found to be importing salt iodized with Potassium Iodide and not Potassium Iodate. The latter has the advantage of durability and gives specific reaction to the standard Rapid Test Kit from MBI, Madrass, India, designed to test for iodate only.

- Arrete N° 096/A/MSP/SG/DSFM/SDSF/



SNIBCDA du 16 Mai 1995 - modifying and completing Arrete N° 0133/A/MSP/SG/DSPM/SDSF/SN du 29 Mai 1991. (Annex C)

- Arrete N° 012/MINFI/MINDIC du 10 Mars 1992 sur les produits chimiques et son Annexe sur la Tarif de la Taxe interieur. (Annex D)

### **Adopted Relevant Norms For Monitoring Universal Salt Iodization programme (USI)**

4. The provisional norms laid down by ICCIDD/WHO/UNICEF on 26 March 1987 specifying levels of iodine in salt at factory level, importation, rural market and kitchen level for various climatic regions of Africa (based on ecological and cultural information). (Annex E)
5. Specifications on Iodized Food Grade Salt were those laid down in Standard Codex Alimentarius N° 150-1985 (Recent Revisions 1-1997, Amend 1-1999; Arnend 2-2001) UEMOA code 001: Juillet 2005). (Annex F)
6. Laboratory Technique for determining Iodine in Iodized Food Grade salt using Potassium Iodate. (Annex G)
7. Dr Jeanne Yonkeu Ngogang et Lantum D.N (Sept 1990). "Techniques Biochimiques Elementaires pour la diagnostic des Troubles Dus a la Carence en Iode", Centre Universitaire des Sciences de la Sante, Universite de Yaounde, Cameroun. Methode appliquee dans l'analyse d'urine et eau. (Karmakar's Technique)

### **IMPLEMENTATION AND PROCESS MONITORING**

Whereas for many national health programmes, it is the Ministry of Health that mobilizes the necessary resources to get activities moving for the national IDD/USI programme, it is the private industrial sector that drives it, with the authorities merely supervising the process and assessing the health impact on the population which is not necessarily of industrial interest. The major components of monitoring the programme had to include:

- Production of Iodized salt at the refinery, its marketing all over the national territory, and

its consumption at the household. The relevant aspects of these comprise: Quality Assurance, proper iodization with stipulated chemical, packaging for iodine conservation, and Quality control. All these were provided for by the relevant regulations (No 0133 of 9 May 1991). The Ministry of Health team and faculty of Medicine collaborators had to do industrial inspection at least yearly to check and answer the following relevant questions:

- Where does the crude salt come from?
- What is the quality at point of importation and what are the constraints?
- What is the yearly production and how far does this meet the national needs?
- What are the Quality Assurance practices at production and storage?
- What are the Quality Control techniques at production and marketing?
- What is the Marketing System in practice to cover the national territory?
- What is the proportion of households consuming iodized salt?
- What are the kitchen methods of conserving iodized salt?
- How informed is the population on the availability of iodized salt?
- What other salt brands are imported into the country?

Reports of several surveys exist to testify that most of the above questions were answered either yearly or on periodic basis. The limiting factors included the trained personnel and the financial support to carry out regular monitoring exercises. The system of monitoring using sentinel zones was adopted.

One outcome of Quality Control monitoring was the detection of the importation of some salt iodized with Potassium Iodide (not iodate) which could not respond to the Standard Test Kit. This finding called for policy amendment and the enforcement of the regulation. Indeed non-iodated salt was held back at the port of entry, and channeled to the Refineries for proper iodization.



## IMPACT MONITORING AND EVALUATION

As iodized salt was being marketed, it was important to find out how far it had reached the remote comers of the national territory, whether its consumption was causing any change on the health status of the population. Thanks to sentinel zone investigation, it took about two years for iodized salt to replace most of the non-iodized variety previously sold as a food commodity, and variable quantities of the latter continued to be smuggled in from neighbouring countries for some years.

Thus, the Universal Salt Iodization and Consumption coverage as a percentage of household rose steadily, reached 81 % by 1995, 90% by 2000 and vacillated between 91 and 97% for different regions between 2002-2005. Thus the target of 90% was attained by 1999.

Total Goitre Rates decreased steadily from their baseline levels in sentinel zones towards the 5% - 10% range, thanks to surveys on school children. Simultaneously with increase in USI coverage, the urinary iodine excretion levels in school children living in sentinel zones consistently increased over the years between 1995 and 2002. The national median value was fluctuating between 150ug/L and 200ug/L which is indicative of virtual elimination of iodine deficiency malnutrition.

Concerning the endemic cretinism indicator, whereas the elderly ones found at baseline surveys continued to live, the number of new-born cretins decreased with time, and none was reported by the 2003 evaluation which adopted the house to house recruitment of children 6-12years as the study sample. Some endocrinologists did report the transient epidemic of Iodine- Induced- Hyperthyroidism or Jod-basedlow Syndrome for the period 1995 to 2003.

The national IDD/USI Impact Evaluation carried out by the Ministry of Health and Partners in 2003 confirmed the above effective trends and this led to the declaration that Iodine Deficiency Disorders had been virtually eliminated from Cameroon and that the existing complex control programme component should be sustained.

Other impact parameters by 2003 included the increased awareness of the population about the availability of iodized salt and its health effects, particularly the virtual disappearance of goiter on young people living in former hyper-endemic regions. The increase in demand for iodized salt had thus been created. For all this, thanks must be accorded to the effectiveness of the communications component of the national IDD/USI programme which consisted of: periodic publicity over the mass media (Press, radio, Television); the wide distribution of IDD literature by partners, particularly International Council for the Control of Iodine Deficiency Disorders (ICCIDD) and United Nations Children's Fund (UNICEF); the inclusion of IDD elements in school curricula, and the publications in the popular periodical: BIODIANOSTICS AND THERAPY"

## SUSTAINABILITY FACTORS IN PLACE (2003-2007)

The continued presence of IDD/USI regulations assure the continuity of the programme and provide effective measures to sustain the prevention and control. There is evidence that the Nutrition Service of the Ministry of Health continues to monitor iodized salt production and importation in collaboration with ICCIDD partners, the Commerce Ministry and Customs Service of the Ministry of Finance. They all monitor Quality Assurance and Quality Control practices. The Chamber of Commerce ensures that only informed economic operators are given authorization to import iodized salt into or to produce adequately iodized salt in Cameroon for the Central African Region (CEMAC).

The permanent presence of the International Reference Laboratory for Iodine (IRLI) analysis, in the National Center for Food and Nutrition Research of the Institute for Medical Research and Study of Medicinal Plants (IMPM) in the Ministry of Scientific Research and Innovation, which is often solicited for titrimetric estimations of iodine in salt, water and urine by Cameroon and neighbouring countries is an important sustainability resource for the national IDD/USI operational research and control programme. The Centre-Pasteur of Yaounde, classified as the

national Public Health laboratory can also perform iodine analysis in food and urine.

There are currently major iodized salt producers at the Douala Port Area, namely, "Societe de la Purification du Sel" (SOCAPURSEL), "Societe de la Transformation du Sel" (SOTRASEL) and "Africa Salt Company" producing AIGLE brand of Iodized Salt. The pioneer salt refinery in Cameroon, namely "Sel du Cameroun" (SELCAM) which closed down since 2002 has been refurbished for re-opening by end of 2006. Their entire output taken together far supersedes the Cameroon salt needs of about 65,000MT per year. And, despite high tariffs on imported refined salt there were still three major importers of iodized salt in the business, namely SOREPCO Ltd, Andre Souhaing Group, Fokou Group. An Association of Salt producers and Importers is being mooted to negotiate iodized salt business periodically with concerned authorities (Finance, Commerce, Health)

Existing in the Epidemiologic Unit of the Ministry of Health is an IDD/USI data bank which is periodically fed with relevant reports. The Nutrition Service of the Health Ministry and the National Centre for Food and Nutrition Research are data reservoirs, but the Faculty of Medicine

and Biomedical Sciences Library is also a useful resource.

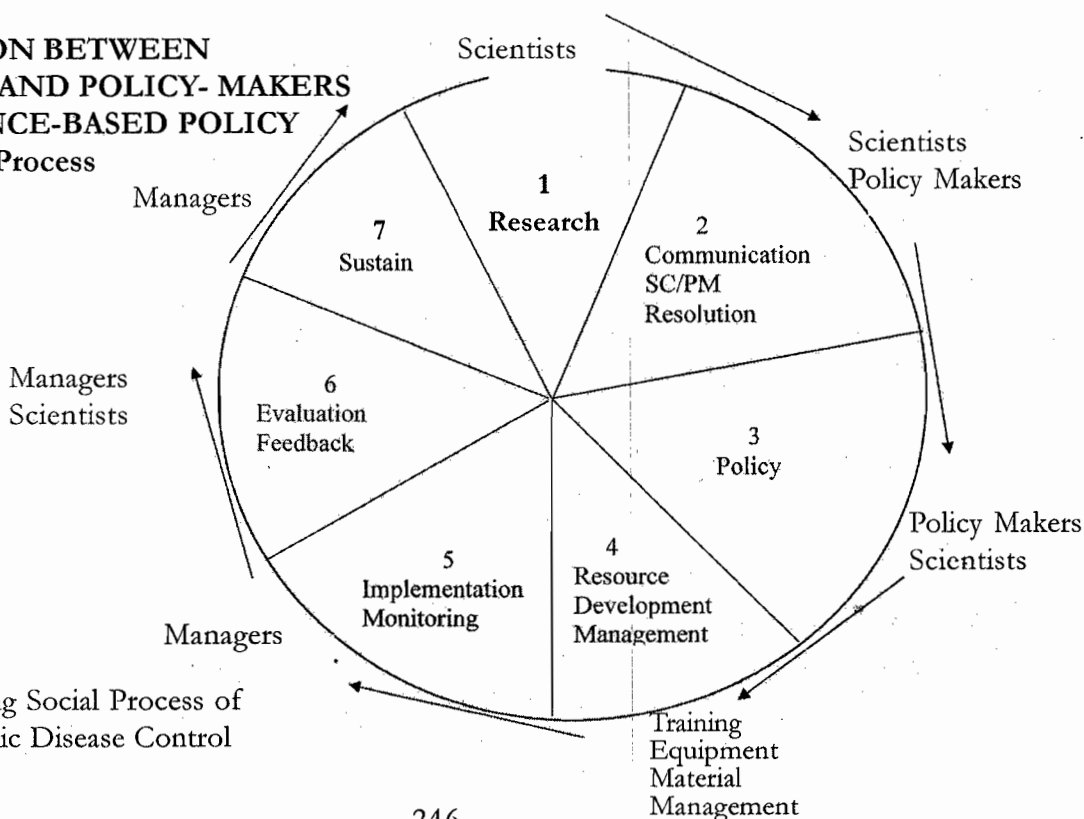
Several currently practicing doctors in the Health Ministry carried out research on IDD when they were medical students at the Faculty of Medicine, and they constitute a reservoir of trained personnel who can sustain the IDD/USI programme. Some of them are regular readers of the IDD NEWS LETTER. However they need retraining.

Apart from the Information, Education and Communication literature widely circulated by ICCIDD all over the country since 1991, some information is already in the School Curricula, particularly those of Vocational Schools.

In the National Epidemiologic Surveillance System which publishes the yearly report of Activities of the Health Sector, some IDD indicators such as "goiter" and "cretins" are included.

With all the above relevant services in place, and the periodic reporting of USI coverage by health District nutrition technicians, the sustainable elimination of iodine deficiency and its manifestations can be assured in Cameroon.

**INTERACTION BETWEEN SCIENTISTS AND POLICY-MAKERS FOR EVIDENCE-BASED POLICY - A Revolving Process**



**Fig. 1:** Revolving Social Process of Chronic Endemic Disease Control

If we assume that public health problems usually present like endemic diseases in a country, we can envision the interaction of scientists and science academies on the one hand and policy-makers on the other as a revolving or cyclic process in seven phases, with either party intervening as the required skills and know-how require them.

In phase one, it is the Scientists, either in isolation or in academies who define and quantify the problem thanks to their research activities. Usually their findings are verified by peers and finally published in Scientific Journals patronized by special interest groups. When a development individual gets access to the information, he could raise an alarm and request that it be more widely spread.

In the second phase, the scientist is called to present the results of his work to a wider audience of other scientists and some policy-makers and decision-makers. In such "restitution" meetings, it is the practice to draw up and adopt Resolutions on what needs to be done, and these are addressed to the policy-makers. This is a major communication phase.

In the third phase, policy-makers, scientists and legal experts translate the resolution into a policy which is eventually adopted by the authorities who are interested in solving the problem.

In the fourth phase, management experts are requested to translate the policy into projects or scheduled programmes which require resources development: Human resources, material and equipment, Finances and Infrastructure. These are quantified and scheduled over a time period to constitute an Action Plan.

In the fifth phase, once the resources are available, the plan is implemented. During this phase, scientists are still required to define the modalities of monitoring so that useful information can be collected. With the regular monitoring of the process, data are collected and compiled to assess the progress and other outcomes.

In phase six, a major evaluation exercise takes place under the leadership of a Scientist and a

Project manager, and the findings are interpreted by the Scientist and presented to the Manager and Policy-maker. Some useful feedback information is derived for Project/Programme orientation.

If the Project/programme is yielding good results in terms of achieving the stated goals, it should be sustained till the original health problem has been solved. If the project does not yield the desired impact, it should be completely revamped or appropriately adapted. In any case, the decision is best tackled during a communication meeting between scientists and policy-makers.

The interaction between the scientists and policy-makers should be continual and complementary with one providing the technical know-how and the other applying the authority of his position to move the Action programme until the public health problem is eliminated.

### LESSONS LEARNT

From the Cameroon case of successful interaction between Scientists/Academy and the Public Health Policy-Makers we could derive certain principles. It is important that Scientists must first be aware and concerned with the need for development in general and be willing to contribute to it in a meaningful manner in their appropriate field of expertise. As such they apply their know-how in applied research to generate data that can lead to development questions or answer development questions already posed by the Public Health Sector. That was very much the case with the Cameroon IDD Programme.

Occasionally, scientists are appointed to policy-making responsibilities. With their susceptibilities they collaborate easily with their peers (scientists) and could even call upon them to conduct research to justify certain service programmes or provide the basis for their orientation. This was also a case in point. Such a facility of communication offers opportunity for interaction as well as accelerates the formulation of evidence-based policy since both the scientific and service sectors are together in championing the cause of solving a public health problem, to wit, the sustainable elimination of iodine deficiency disorders by Universal salt Iodization and Consumption.

The initial link of the scientists with industrialists to win their support for the IDD/USI programme must be saluted as the break-through for the national IDD programme. The evident commercial and economic advantage of the monopoly of a big business line were conducive to the industrialist accepting to cooperate with the health sector provided his former business boss of the Ministry of Commerce would also collaborate and authorize. The situation called for an interministerial policy enactment, to wit Health, Commerce and Finance; and with the Minister of Health being the programme leader the communication ran through the Government Cabinet networks with rapidity and an appropriate policy was enacted to iodize salt, and the three ministries did collaborate in the enforcement for public health purposes.

The involvement of and collaboration of the Ministry of Public Health with the University faculty of Medicine and Public Health Institutes is one high-way for enhancing research for evidence-based policies. This was an obvious source of strength in the IDD/USI programme. Quite often it was UNICEF and WHO partners in the national IDD Coalition which facilitated the communication and collaboration between Scientists and the Health Ministry by sponsoring and financing some foreign Consultants to work with the national team.

In our experience the major weaknesses of the interaction in the IDDIUSI programme consisted of (1) the absolute refusal of some technical personnel in the Health Ministry to collaborate with Scientists from the Faculties of Medicine and Science in carrying out together relevant operational research projects. It is also the habit of health personnel in the ministry to treat research reports as confidential and render them un-accessible to collaborating scientists and researchers. Similarly the attitude of policy-makers in top positions of the Administration was unfavourable to the growth and functioning of the Cameroon Academy of Science, and as such the Academy remained for long lame and ineffective in influencing government health policies. With time, this attitude has given way and the Cameroon Academy of Science is being

considered as a resourceful partner in development.

## CONCLUSION

With the success of the national IDD/USI programme as a collaborative venture over a period of twenty years, the importance and relevance of collaboration between Scientists and Policy-makers in evidence-based policy enactment is well demonstrated. The strengths, weaknesses and opportunities are clearly high-lighted, and it is our hope that such efforts should be replicated when conceiving public health development programmes at any level. Indeed, this experience has been replicated with equal success at Madagascar and Central African Republic, and it has been adopted as the ICCIDD method of setting up and monitoring IDD/USI programmes all over the world.

## REFERENCES

1. **Lantum D.N., Ngum J.W. and Ngogang J.** (1991), National baseline Survey of Iodine Deficiency Disorders in Cameroon, Public Health Unit, CUSS University of Yaounde. (Also see Report of Inter-country Workshop on Management of IDD programmes in Africa Francophone, Yaounde 8-24 April 1991).
2. **Lantum, D.N.** (1991) Iodine Deficiency Disorders in Cameroon in 1990-1991 (25 Questions and Answers) Bilingual, Public Health Unit, CUSS University of Yaounde.
3. **Lantum, D.N.** (1992) Production, Distribution and Consumption of Iodized Salt in Cameroon: Evaluation One Year After (1991-1992) Public Health Unit, UCHS/CUSS/University of Yaounde, August 1992 (Republic of Cameroon, National IDD Control Series N° 2)
4. **Lantum, D.N.** (1994), National Iodine Deficiency Disorders (IDD) Control Programme: Evaluation by 1993, UNICEF and PHU/UCHS, University of Yaounde I, Cameroon.
5. **Lantum, D.N.** (1995) National Iodine Deficiency Disorders (IDD) Control Programme: Evaluation by May 1995, P.H. Unit Univ of Yaounde I, October 1995.
6. **Lantum, D.N.** (1995) Action Towards Elimination of IDD in Republic of Cameroon 1990-1995, P.H. Unit, FMBS, Univ of Yaounde I, Oct. 1995.
7. **Ministry of Health** (1995) Survey on the Availability, Quality, Price and the Distribution of Iodized Salt in Cameroon, Nutrition Service and UNICEF.
8. **Lantum, D.N. et al** (1996), The Conquest of Iodine Deficiency in Cameroon, P ;H ;Unit, FMBS, University of Yaounde I, March 1996. Published in Biodiagnostics and Therapy, Sept 1999 N° 006 pp 20-24.
9. **Ministry of Health** (2003) Impact Evaluation of Universal Salt Iodization in Cameroon, Nutrition Service, Ministry of Health Yaounde, Cameroon.
10. **Lantum, D.N.** (2002) Let's eat Iodized Salt for Vitality, High Intelligence and Brilliance. It Prevents Goitre, FMBS, Univ of Yaounde I. (Bilingual Edition French/English).