

# REPORT OF THE TASK-FORCE ON DIET NUTRITION AND LONG-TERM HEALTH OF THE INTERNATIONAL UNION OF NUTRITIONAL SCIENCES

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4. Plenary manuscript: Durban congress, 2005 ....	<b>Error! Bookmark not defined.</b>

**(i) Participation**

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The IUNS Task-Force on Diet, Nutrition and Long-Term Health was organized in response to a mandate from the IUNS Council. A chairperson and a total of 12 members were invited to serve, distribute from six regions as shown in the table below:

<b>I. <i>US/N. America</i></b>	<b>Benjamin Caballero; Terrence Forrester</b>
<b>II. <i>MesoAmerica</i></b>	<b>Roxana Valdés-Ramos, Noel W. Solomons</b>
<b>III. <i>South America</i></b>	<b>Manuel Ruz; Ana Lydia Sawaya</b>
<b>IV. <i>Europe</i></b>	<b>Annie Anderson; Jaap Seidell; Klaus Schuemann</b>
<b>V. <i>Asia</i></b>	<b>Mabel Yap; Anura Kurpad</b>
<b>VI. <i>Africa</i></b>	<b>Ruth Nduati; Karen Charlton</b>

I-III New World/W. Hemisphere

IV-VI Old World/E. Hemisphere

#### **b. Contributing individuals**

A series of professionals from around the world facilitated the activities of the Task-Force over the four years of its mandate. **Marieke Vossenaar**, of the Netherlands, UK, and Guatemala during various phases of the quadrennial mandate, including discussions in Rome and editorial assistance on compiling the Report. **Manolo Mazariegos**, of Guatemala, assisted with the workshop on the WHO documents in Guatemala. **Ruchika Mehta**, India, facilitated hospitality for Task-Force members for the Wellness Workshop in New Delhi. **Colleen Doak** and **Maiza Campos**, the Netherlands, participation in discussion and with the structured evaluation of the WHO documents for the Netherlands. **Colleen** also participation in Task-Force discussion in Rome.

**Ascensión Marcos**, Spain, was a facilitator to the Wellness Workshops in Havana and Acapulco. **Arturo Ojea Rodriguez**, Cuba, was the local host and facilitator to the Wellness Workshop in Havana. **Youfa Wang**, USA, is helping with discussion and with the structured evaluation of the WHO documents.

In addition, the Task-Force received support and guidance from **Phillip James**, Vice President of the IUNS, and **Osman Galal**, Secretary General. Supportive guidance and conversations have been provided by **Mark Wahlqvist**, IUNS President, and **Ricardo Uauy**, IUNS President-Elect.

**EVENTS CALENDAR: IUNS TASK-FORCE ON DIET, NUTRITION AND LONG-TERM HEALTH DURING THE QUADRENNIUM (2001-2005)**

Asian Workshop on Diet and Wellness, February 25, 2003, New Delhi, India (in conjunction with the Asian Congress on Nutrition {FANS})

Cuban Workshop on Diet and Wellness June 24, 2003, Havana, Cuba (in conjunction with the II Cuban Nutrition Congress and the International Congress of the Latin American Federation for Parenteral and Enteral Nutrition {FENELAPE})

Meeting of the Task-Force Chairs with the IUNS Council, September 30, 2003, Rome (in conjunction with the European Nutrition Congress)

International Gathering of Task-Force Membership, October 1, 2003, Rome

European Workshop on Diet and Wellness, October 3, 2003, Havana, Cuba

Latin American Workshop on Diet and Wellness, November 11, 2003, Acapulco, Mexico

Visit with Mexican Member in Toluca, Mexico, December 27,28, 2004

Visit with Mexican Member in Toluca, Mexico, January 2005

Visit with Brazilian and Chilean Member, Santiago, Chile, April 21,22, 2005

Visit with the President Elect in Santiago, Chile, April 23, 2005

Visit with German Member in Geneva, Switzerland, May 20,21, 2005

Visit with Dutch Member in Amsterdam, the Netherlands, May 22, 2005

Visit with the Indian Member in Paris, May 24, 2005

Visit with the US Member in Baltimore, USA, June 2, 2005

[Failed visit with the Jamaican Member]

Visit with the Singaporean and Indian Member in Singapore, June 15,16, 2005

Visit with the President Elect in Guatemala City, Guatemala, July 19, 2005

Anticipated attendance by eight Task-Force members at International Congress on Nutrition, Durban, South Africa, September, 2005

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## **(ii) Preamble**

The International Union of Nutritional Sciences created a series of Task-Forces at the Council's meeting in Osaka, Japan in March 2002. The generic mandate of the Task Forces was: 1. to conduct scholarly activities; 2. to take research initiatives; 3. to provide reports on regional or international meetings; and 4. fostering Afro-Asian-Latin American linkages.

The specific mandate for the IUNS Task-Force on Diet, Nutrition and Long-Term Health, posted on the official IUNS website is:

*To consider, in a cohesive fashion, how nutrition from conception, through childhood and adolescence to adulthood and the reproductive years and into later life can enhance health and well being.*

*To take account of the work of other task forces, notably to do with Nutrition in Transition and Nutrition and Resistance to Infection.*

### **The Task-Force Process:**

The major value of a corps of professionals with diverse geographic origins and diverse scientific interests as a Task-Force is to assess and synthesize problems that are part of their daily pursuits. On the scientific understanding side, it can highlight the trends of new observations, new insights, and new paradigms as well as track any substantial reversals in thinking on previous theories regarding the theme of nutrition, diet and long-term health. It can make judgments about the validity of the relevant areas.

### **Task-Force Mission:**

1. Define the extent and dimensions of the issues of "long-term health" in terms of theme.
2. Assess the state-of-knowledge regarding the issues imposing on long-term health.
3. Frame the issues in a global context with regard to geography, ethnicities, sex, generations, and socio-economic status and in terms of research-rich and research-poor settings.

A sequential framework for how investigation leads evidence which informs policy which gives rise to programs to impact on health, in this case long-term health, was envisioned, presented with the factors of concern in each of the serial steps.

Process	Nominative (concern)
notion of inquiry → hypothesis testing	Research design & execution ( <b>concern:</b> inspiration; competence)
hypothesis testing → research findings	Analysis and interpretation ( <b>concern:</b> relevance)
research findings → policy consensus	Policy formation ( <b>concern:</b> congruence)
policy consensus → program / practices	Health implementation ( <b>concern:</b> feasibility; cost)
program / practices → improved health outcomes	Impact evaluation ( <b>concern:</b> effectiveness)

At best, it facilitates making generalizations about the nature of the international advance of the research and public health address. The present process of the Task-Force decided with its selection of priorities on the agenda which dealt with the concept of "wellness," with diet and cancer, with obesity and the metabolic syndrome, and with developmental and life-course origins of lasting health throughout the life-span, all in the framework of selection of diet and achievement of nutritional status.

**Multidisciplinary Approach Needed:**

The limits and limitations of the disciplinary prism exclusive to the nutritional sciences community, i.e. diet and nutrition, were also recognized across the four-year process. The constituency of the IUNS can provide their expertise in these two broad domains. The comprehensive solution to long-term health, however, requires expertise and contributions from the professional disciplines involved with physical activity (exercise physiology, sports medicine, kinesiology), environment (environmental sciences, toxicology), and genetics (human genetics, molecular genomics). It is important to refine and develop the areas of selective advantage for the nutritional sciences, while forging coalition for research and action with the scientists and professionals in the complementary disciplines, realizing that dietary and nutritional interventions can only achieve part of a solution for long-term health.

**Diversity and Complexity of the Problems:**

The fundamental judgment concerning the biological, epidemiological and public policy is that diversity -- rather than homogeneity -- is the rule when nutritional health issues are viewed across societies, ethnicities and geography. Even within multi-ethnic communities, differences in risk factor profiles and in responses to dietary, nutritional and environmental exposures will result from the variance in genetic constitution and diversity in life-pursuit activities. It is likely that the most effective prevention and control for problems of long-term health will come where effective attention to addressing the modifiable risk factors for non-communicable diseases and disabilities is synthesized on the basis of an evaluation locally of the problems with the greatest prevalence or severity of impact reflected upon the available resources and infrastructure to promote the specific preventive measures identified by evidence-based recommendations. Even there, the various complexities and diversities may dictate a



lower efficacy of the measures, than expected, under the particular ecological and societal situation of each location of interest.

The inquiry into strategies for long-term health can borrow on the aphorism of "think globally, act locally." In a paraphrase of the quote that "all politics is local," our considerations lead to the conclusion that "all application of 'evidence-base' is local." The basic principle remains, however, that their applicability or priority in any give local situation must be separately assessed. The safety and security for instituting interventions must be assessed in terms of any local realities in which the actions might impose untoward risks or extraordinary expense along with any benefits. A consequence of this realization is the need to develop a mechanism for diffusing and disseminating information on the larger "generic" relationships and remedial solution, and combining this with the development of local professional competence in research (to amplify the generic information in terms of particular geographical and social settings) and in policy (to adapt intervention strategies to the particularities of the causal relationships in the area and the cultural nuances for response).

The basic biological paradigm that underlies the mission of the Task-Force is that of a broad relationship between what we eat, how we are nourished, and long-term health outcomes. Within the strict relationship of micronutrients too few (deficiency) and too many (excess) have adverse effects on health. Similarly, the imbalance between energy intake and energy expenditure in both directions, resulting in underweight and inanition or overweight and obesity, has been recognized as productive of states of nutritional ill health, per se.

Nutritional science and policy for many decades were dominated by the narrow paradigm of nutrient balance. In fact, until only recent decades, there was widespread resistance to inquiry of relationships between eating and health beyond dietary nutrient imbalance and human nutritional deficiencies and excesses. If microbiologically safe, than foods were considered inherently benevolent for health, or at least neutral or harmless with respect to causing disease. This was despite the robust postulations that saturated fats and cholesterol were pathogenic in coronary heart disease, dating to the 1950s, and that numerous factors in foods acted to promote or prevent cancer, emerging in the 1970s. The mission of the IUNS Task-Force on Diet, Nutrition and Long-Term Health signifies the firm recognition of food-health interactions as important bases for deriving public health policy, and the need for the policy to be guided by scientific evidence.

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### **(iii) Topic-priority agenda**

The product in this section on topic-priority agenda is derived from the working interest of the members of the Task-Force. The four selected topics are listed below:

- a. Diet, nutrition and wellness: towards a research agenda?**
- b. Diet and cancer: staying with the state-of-the-art**
- c. Obesity and the metabolic syndrome: new insights during the quadrennium**
- d. Diet, nutrition and development: early-life influences and late-in-life consequences**

In an operational sense, the "wellness agenda" comes from a collective exercise, and is summarized in **Annex 2**. For the remaining areas of the topic-priority agenda, Task-Force members were polled to provide an annotated report of their **own** writing over the quadrennium and selected literature considered as important and contributory. The annotation was to frame and interpret in terms of the wider long-term health agenda. In this Section (iii), the individual annotation communications from across the Task-Force membership have been compiled and synthesized by the Chairperson.

#### **a. Diet, nutrition and wellness: towards a research agenda?**

The original designation of the title and mandate of a task-force activity, authorized by the incoming IUNS Council in late 2001 for the 2001-2005 quadrennium period was "Nutrition and Long-Term Health." In the initial negotiations of establishment, permission to add "Diet" to the title was conceded. After the formation of the membership and initial internal discussions, a conceptual framework for "Long-Term Health" was sought. The literature and policy documents were found to frame as a problem and in pathological/pathophysiological terms: chronic disease; non-transmissible disease (NTD); or non-communicable disease (NCD). Our charge was in a more positive framework of "health." The background discussion raised the question of whether "health" could be equated with the "absence of disease." The 1978 Alma Ata Declaration had commented on "health" as is more than *"a state of complete physical, mental and social well-being, and is not merely the absence of disease or infirmity."*

This led to yet another issue of semantical equation: was there a difference between -- or a synonymy of -- the terms "health" and "wellness"? Some members of the task-force felt there was an equation of the two terms; others felt they were different in connotation. It was decided to make it a project of the Task-Force to explore the semantic and conceptual questions outside of the membership, but across the larger nutrition community in different regions of the globe.

Over the course of the calendar year 2003, at four venues corresponding to regional (n = 3) or national (n = 1) nutrition congresses, the IUNS Task-Force on Diet, Nutrition and Long-Term Health organized and sponsored the series of international Workshops on Diet, Nutrition and Wellness. **See Annex 1.**

**2003 Workshops on Diet, Nutrition and Wellness**

Date	Venue	Facilitators
Feb, 2003	New Delhi, India	N.W. Solomons; K. Schuemann
June, 2003	Havana, Cuba	R. Valdés-Ramos, N.W. Solomons, A. Ojea-Rodriguez, A. Marcos
Oct, 2003	Rome, Italy	R. Valdés-Ramos, A.S. Anderson, N.W. Solomons
Nov, 2003	Acapulco, Mexico	R. Valdés, N.W. Solomons, A. Marcos

With respect to the emerging science, positive attitudes in early and young life are associated with longevity and health in later life demonstrated in religious communities (nuns). Positive affect is associated with lower inflammatory and neuroendocrine responses.

In our workshop-based surveys, there was general accord that "health" and "wellness" were not synonymous, at least as considered by the lay public in most cultures. Wellness, as distinct from health, is important to people. The interaction of wellness to diet is unknown and could be bi-directional: with better wellness, food consumption improves; with improved diet and nutrition, wellness is enhanced. At least within the nutritional community, there was little expertise or security as to how to create **objective** variables for wellness, or whether something with the subjective tones of "wellness" can enter into the reductionist paradigm of the empirical scientific method at all.

**b. Diet and cancer: staying with the state-of-the-art**

Since 1981, there has been a concerted effort within the nutritional epidemiology community, in associations with public health authorities, to characterize the risks for cancer derived from eating in one or another fashion. This includes considerations of any protective substances in certain foods, any carcinogenic elements in foods and beverages, and any generation of carcinogens in the manner in which foods are grown, stored, or prepared for consumption. Basic biology provides the mechanistic insights while case-control and cohort studies develop the epidemiological insights. The bounty of literature is enormous, and has accelerated apace in the present quadrennium. A few basic paradigms and emerging ideas are worthy of mention.

Foods of special interest with regard to preventing or provoking cancer have been: fruits and vegetables; red meats and other meat items; and dairy items. Not all reports have consistent findings. In general, recent reports provide much strong evidence for an effect of higher fruit and vegetable consumption to prevent **some**, but not all cancers. The

association of meat with increased risk of colorectal cancer has reached the level of firmly convincing. Dairy consumption seems to cut both ways -- protective or adverse -- depending upon the anatomical sites of interest. Extended observations with populations not based in Europe or North America, such as the Singapore Chinese Health Study, raise questions about the generic universality of the associations uncovered in the West.

For the vitamins, folic acid and vitamin D have captivated publishing interest in the most recent literature. Much new literature surrounds the influence of higher folic acid intake on risk of colonic cancer. A paradoxical situation emerges as evidence suggests that the stage of dysplasia (pre-dysplastic, already dysplastic) determines whether more folate consumption will push cancer risk back or move it forward. Vitamin D and its interaction with its nuclear receptors, also reflected around genetic polymorphism, has emerged as a Brave New World for discoveries related to cancers of the colon, breast and prostate among others.

In the Singapore Chinese Health Study, insights on diet and cancer risk, in a transitional nature context are emerging. Soy consumption among Chinese in Singapore reduced mammographic breast density, with potential implications for breast cancer risk. Omega-3 fatty acids appear to be cancer protective for breast, whereas omega-6 fatty acids are promoting for colon and breast tumors. Genetic polymorphisms, specifically for vitamin D receptors, interact with diet in cancer risk among Singapore Chinese. Divergence from the principles of cancer risk of diet, physical activity and environment reported from Western countries is being demonstrated among the Chinese of Singapore.

Specific to the public health mobilization in favor of behaviors to prevent cancer is the need for monitoring and assessing the dietary and life-practice behaviors. Work has advanced in the quadrennium to refine the ways in which questionnaire instruments (interview, self-administered) can be used in evaluation of compliance and concordance with cancer-protective behaviors.

#### **Changing dietary patterns:**

Changing individuals' dietary patterns to bring them into greater accord with provisions of dietary recommendations has been assessed in terms of the cultural and psychological underpinnings of food choice. Attitudinal research indicates that identifiable psychosocial factors determine motivation and response to counseling for greater consumption of fruits and vegetables.

The biological and epidemiological evidence on what dietary practices favor a minimal risk of cancer determine the goals for food selection, preparation and consumption. The degree to which the recommendations are accepted and executed across the public are related to individual determinants of food choice which are imbedded in social considerations including economic position, ethnicity, marital status, geographic location, age and sex. Research within this theory is need to identify potential areas for resistance and change in dietary intervention programs.

### **Evolution of strategies and guidelines for dietary contributions to reduced cancer risk:**

The European Prospective Interinvestigation into Cancer and Nutrition (EPIC), a multinational study focusing on the risk factors for cancer in the European population has begun to inform the public health community on the dietary, behavioral and environmental factors of that region during the present quadrennium. Before the present period, in 1997, the World Cancer Research Fund (WCRF) and American Institute for Cancer Research (AICR) published the comprehensive guidelines in *Food, Nutrition and Prevention of Cancer: A Global Perspective*. As we end the present quadrennium, the same to organizations are past the mid-point in the revision and updating of this process toward a new product to be published (current estimate) in 2007. It is notable that the WCRF process first introduced the transparency of assigning criteria (convincing, probable, possible, insufficient) to the strength of evidence -- a feature adopted by virtually all subsequent expert panel processes.

### **c. Obesity and the metabolic syndrome: new insights during the quadrennium**

The epidemiology of two interwoven epidemics -- that of obesity and that of metabolic syndrome -- has captivated attention during the quadrennium. The issues have surrounded diagnostic definitions, underlying causes, and prevalences across populations in affluent and low-income populations have been the hallmarks.

#### **Diagnosis and definitions:**

With respect to diagnosis and definition, an evolving understanding of the use and utility of the body mass index (BMI, weight in kg divided by stature in meters, squared). Universal criteria for its interpretation for both underweight (chronic energy deficiency) and excess mass had been defined and codified by an expert panel for the World Health Organization, published in 1995. As universally disseminated, a BMI between 25 and 29.9 kg/m<sup>2</sup> is considered "overweight" for both sexes; a BMI in excess of 30 kg/m<sup>2</sup> defines "obesity." This applies to adults, aged 18 years and older. For juveniles, it was not until 2000, that a semi risk-based convention for interpreting BMI for the 2 to 20 y age-range was generated, this by the Center for Disease Control and Prevention (CDC) of the United States (CDC2000), now having taken on an international dimension. Since absolute BMI units are a function of normative aging, the cut-offs are based on centiles of a normative reference distribution, with BMIs in the 85-94.9 percentiles signifying a risk of overweight, and BMIs at the 95th percentile or above signifying overweight. As discussed below, research in Asian populations suggested that certain adverse risk appears in these ethnicities at lower BMIs, allowing for **provisional** (region specific) cut-offs at 23 kg/m<sup>2</sup> for Asians to be considered overweight.

Singapore has three ethnic groups (Chinese, Malay, Indian) living in a confined island area and provides an opportunity for comparative studies. Prediction equations for the estimation of body fat including anthropometry, bioelectrical impedance and hydrometry across the Singaporean ethnicities were validated, but at the same time this highlighted the ethnic differences in partition of lean and fat mass. Studies on the fat percentage comparing Singaporeans versus other nationalities, and Singaporeans among its ethnicity, which are

partially explained by body build, served as the basis for the development of population-specific BMI cut-off points for obesity in Singaporeans. This was extended to a wider discussion of the appropriateness of the classical WHO cut-off points across southern Asian populations in general. These modified cut-off points have been formally adopted for use in Singapore. Indian adults also have increased fat and decreased lean mass, which distorts the reflection of BMI for universal fattiness, and metabolically (see below) may explain the "Indian Paradox" of increased vascular-disease and glucose-intolerance incidents at lower than cut-off BMI levels.

The **distribution** of body fat to the central (abdominal) region as visceral adipose deposits has an impact on health, risk of adverse cardiovascular events and high blood pressure, glucose tolerance and mortality. Sophisticated radiographic imaging techniques (Dual Emission X-ray Absorptometry, Computerized Tomography, Magnetic Resonance Imaging) can now be used to quantify the mass of adipose tissue in distinct anatomical regions of the human body. A more practical, inexpensive, generalizable and less invasive approach to assess relative deposition of fatty tissue in the trunk and abdomen is to measure the abdominal circumference (waist circumference), which is tantamount to determining one's belt size. Many studies have found little additional contribution to assessment of prediction by including the hip circumference to create the waist-circumference/hip-circumference ratio (WHR).

Normative standards for abdominal circumference for adults have been developed by gender. Various competing standards have been proposed for reference. Abdominal circumference norms for adults have been established with international recognition since the mid 1990s: women, "overweight" 80-88 cm, "obese" >88 cm; men, "overweight" 94 cm, "obese" >102 cm. George Bray proposed in 2004 the following cut-off criteria: women, "high," 100-120 cm, "very high," >120 cm; men, "high," 90-110 cm, "very high," >110 cm. Individuals of Asian descent have high visceral fat and associated risk at lower waist dimensions. Ethnicity-specific cut-off norms for abdominal circumference are likely to be necessary as shown by inter-ethnic regression models among Caucasian, Asian, Hispanic, and Afro-American population samples.

More refined methods for determining the partition of fat and lean mass exist, but they are tedious, expensive, or both. An experience of multicentric international studies using stable-isotope dilution methods (deuterium dilution to determine total body water) has been published. This technique represents the current gold standard against which the anthropometric screening methods can be measured.

With respect to the metabolic syndrome, the concept was originally developed in the 1980s by Gerald Reaven, as a series of functional abnormalities in glucose disposal, vascular resistance and lipid metabolism related to a defect in insulin resistance. The current semantic convention is to use Metabolic Syndrome (MS), although Insulin Resistance Syndrome (IRS) is still employed in the literature. There are two "competing" definitions for metabolic syndrome. The earliest was proposed by the World Health Organization, and is composed of measures regarding four components: obesity, hypertension, glucose homeostasis, dyslipemia (WHO definition). A more complex and intricate classification by

phenotypic variables was created in the Third report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) published in 2001 (NCEP).

### WHO clinical for the metabolic syndrome

In order to make a diagnosis of the metabolic syndrome a patient must present with glucose intolerance, impaired glucose tolerance (IGT) or diabetes and/or insulin resistance, together with two or more of the following components:

- Impaired glucose regulation or diabetes
- Insulin resistance (under hyperinsulinaemic euglycaemic conditions, glucose uptake below lowest quartile for background population under investigation)
- Raised arterial pressure  $\geq 140/90$  mm Hg
- Raised plasma triglycerides ( $\geq 1.7$  mmol/L; 150 mg/dL) and/or low HDL cholesterol ( $< 0.9$  mmol/L, 35 mg/dL men;  $< 1.0$  mmol/L, 39 mg/dL women)
- Central obesity (males: waist to hip ratio  $> 0.90$ ; females: waist to hip ratio  $> 0.85$ ) and/or BMI  $> 30$  kg/m<sup>2</sup>
- Microalbuminuria (urinary albumin excretion rate  $\geq 20$ g/min or albumin:creatinine ratio  $\geq 30$  mg/g)

### ATP II clinical identification of the metabolic syndrome

Three or more of the following five risk factors	
Risk factor	Defining level
Central obesity • Men • Women	Waist circumference $> 102$ cm ( $> 40$ in) $> 88$ cm ( $> 35$ in)
Triglycerides	$\geq 150$ mg/dL (1.7 mmol/L)
HDL cholesterol • Men • Women	$< 40$ mg/dL (1.03 mmol/L) $< 50$ mg/dL (1.29 mmol/L)
Blood pressure	$\geq 130/ \geq 85$ mm Hg
Fasting glucose	$\geq 110$ mg/dL (6.1 mmol/L)

Much of the discussion in the literature, **unfortunately**, has been about the differences between the two classification schemes and the fact that applying both to the same population results in discrepancies in the classification of metabolic syndrome in the population. More to the point, and to the interest of the IUNS, is the **biological** determinant in the original Reaven process of decreasing insulin sensitivity associated with phenotypic

manifestations all of which enhanced the risk of cardiovascular disease and its adverse outcomes. The take-home message is that physical and behavioral characteristics that preserve normal insulin sensitivity are conducive to long-term health.

**Occurrence of obesity:**

In classical literature in almost all cultures, wealth was associated with gluttony and obesity, and poverty with hunger and underweight. The last quadrennium has emphasized the reality of a nutrition paradox--underweight and obesity in developing countries. In regions such as North America and Europe, serial national surveys have shown serial doubling of the prevalences of overweight. Turning attention to developing and transitional nations has revealed variable, but increasing prevalences of overweight and obesity in low-income societies, as well. On a worldwide basis, there are currently an equal number of the earth's inhabitants classified by BMI criteria as overweight, and classed as underweight by weight-for-age criteria.

Juvenile obesity was found to be exceedingly prevalent in reservation-dwelling Native Americans. Among American Indian children, the gamut from sedentary to active daily activity patterns was a strong determinant of body composition. In Chile, the average BMI percentiles for schoolchildren were ~68th, in relation to the 50th for the CDC2000 reference, after accelerated change in rates of obesity in recent years. The prevalence of obesity in Chilean pre-schoolers increased 2-fold in the 15 years prior to 2000. In this country, low intakes of dairy items was associated with obesity risk. Physical activity was generally sedentary.

**Collateral Risk Factors for Obesity:** Genetic factors clearly modulate the development of overweight and obesity in a given context of intake, activity and environment, making some individuals relatively more susceptible to energy accumulation and others relatively more resistant. A broad and growing array of lipostatic, glucostatic and neurogenic apocrine and endocrine hormones are involved in the subtle background of energy regulation and dysregulation, and polymorphisms are being identified and reported on a monthly basis. Heritability of obesity-related traits among Nigerians, Jamaicans and US black people has been studied. Obesity prevalences increased in a step-wise fashion from 5% in Nigerians, to 23% in Jamaicans, to 39% in African Americans, and the heritability of total mass, BMI, fat mass and percent body fat was high.

Acquired factors, such as impaired linear growth in childhood, influences overweight/obesity risk in adults and children. This has been documented to different degrees in Brazilian populations in various regions.

**Physical Activity and Socio-Environmental Factors:** Behaviors, other than the pattern and quantity of eating, influence the prevalence rates for obesity. Environmental obesity risk can come from the pricing and offering of food items in stores, which influences variety and energy-density of foods. In Chile, for instance, the percentage of children's energy from snack foods increased by 30% over the 2-decades following 1997.



In a Jamaican sample, men with higher incomes tended to be more obese, whereas women in all income groups had high prevalences of obesity. Within the obesity group, especially those with central obesity, the CVD risk factors of hypertension and diabetes were prevalent, but income was not associated with the risk factors. In North-East Brazil, there was no predictive association between the amounts of foods consumed and the prevalence of obesity.

### **Occurrence of Metabolic Syndrome and its Components:**

A growing number of surveys around the world are being conducted to identify the prevalence of the metabolic syndrome by its phenotypic elements. Many of the surveys are aimed at the simultaneous comparison of metabolic syndrome rates if one (NCEP) or the other (WHO) diagnostic criteria is applied. The take-home message can be a broad panorama in which complete or partial manifestations of the metabolic syndrome criteria are found across the world, more so in urban populations than rural, and much more commonly among the overweight and obese than among persons with adequate body weight.

The metabolic syndrome is not only restricted to adults; juvenile populations manifest this condition. In a sample of obese US children in the State of Connecticut, 33% have 3 or 4 components of the WHO (obesity, hypertension, glucose homeostasis, dyslipemia).

**Stress reaction and metabolic syndrome:** Recent evidence erases any doubt of an important primary or intermediary role exercised by cortisol secretion in the metabolic syndrome. Systemic inflammation may play a role in the origin of metabolic syndrome independent of obesity, CVD and insulin resistance; it could both be caused by low-grade inflammation and the inflammation could be an aggravant of the associated co-morbid conditions.

**Lean and fat mass:** Adult protein-energy malnutrition is the lot of some adults in India; it is a cause of decreased physical activity. Aside from severe dietary deprivation of macronutrients, the muscle mass of chronically undernourished persons was lower than that in well nourished subjects; this is a type of "sarcopenia" and may have implications for the epidemic of diabetes in developing, but transitioning countries where extra fat on a frame with low muscle mass may well determine a steeper slope on the insulin resistance-fat mass curve.

**Phenotypical manifestations:** Elevated blood pressure is one of the phenotypical manifestations of the metabolic syndrome. Genetic polymorphism for enzymes associated with angiotensin I-converting enzyme and other salt-responding metabolic pathways. Blood pressure is associated with basal metabolic independent of body size. Currently in Mexico, Uruguay and Chile, reported mortality from **cerebrovascular** disease exceeds that for **coronary** vascular disease. Sodium reduction favorably affects blood pressure in combination with a diet high in plant sources in various ethnic groups in an emerging number of intervention trials.

**Collateral Risk Factors for Obesity:** There are broad and varied interactions (cross-over) between the metabolic syndrome/insulin resistance and other health issues including a history of cancer and risk of cancer. This could be related to a tropic hormonal connection with proliferation. Having the metabolic syndrome imposes a 3-fold increased adjusted risk for hepatocellular cancer. MS/IR is associated with elevation of harmful circulating homocysteine levels.

**Mitigation of metabolic syndrome:** Several studies demonstrate mitigation of the metabolic syndromes and its cardiovascular consequences by certain dietary intake patterns including a "Mediterranean diet" and consumption of red wine. In Sweden, wine consumers had a 40% reduction in metabolic syndrome. Even more potent in modifying the risk of the metabolic syndrome than dietary factors (above) are variables of cardiorespiratory fitness and physical activity in juveniles, young adults and older adults.

Remedial action for childhood obesity is being explored. Education for physical activity to reach 60 minutes of vigorous energy output daily, is a goal of a coalition of pediatric health professionals. Consuming a greater numbers of fruits and vegetables has been effective in other settings. Even national feeding programs aimed to protect against food security have effected weight-for-age and weight-for-height, but not linear growth and are associated with increasing average body weight, as was shown in the Chilean experience.

#### **d. Diet, nutrition and development: early-life influences and late-in-life consequences**

A life-course approach to viewing problems from research findings to policy and programs has been consolidated in the present quadrennium. The basic tenet is that one cannot examine nutritional biology or public health in any single life-stage in isolation of those coming before and after. An important tension is to consider diet and nutrition in terms of consequences **for** or **from** another phase of the life-course (e.g. the implications of in utero or early-life nutritional status for adult life circumstances, or the determination in later life by earlier dietary behaviors) and to consider the implications for the contemporary period, itself. There is also a need not to polarize the associations to such a degree that one often ignores the consequences of one life-stage for the phase immediately adjacent. Nevertheless, in terms of investigative focus and publication, the themes of early-life influences in the consequence of "developmental origins of adult disease" and of gerontological nutrition.

#### **Early-Life Influences:**

The maternal-infant dyad has emerged as the unit of focus as, recently **peri-conceptual** influences, i.e. based on the nutritional status and dietary practices of the parents (primarily the mother) on reproductive tissues and cells at the time of conception, has joined that of in utero/fetal influence.

One core of the theory is the term "programming," popularized by the Southampton, UK research group of Prof. David Barker. In biological anthropology terms,

this can be seen as plasticity, that is an adaptive change in the phenotype, not reversible within the life span of an individual. Further borrowing from biological anthropology adaptation theory, a more general conceptualization of "developmental origins" has come out of New Zealand in terms of a 'mismatch theory'. It is based on the predicate that in utero fetal development can appropriately 'sense' the postnatal and life-long environment in which the individual will eventually have to grow and develop. The adaptive prediction of later life conditions by in utero conditions, sensed by the fetus through the mother's exposure to ambient conditions. A 'thrifty' gene scenario, in which the metabolic prediction is for scarcity and the adaptation for nutrient conservation would be appropriate with appropriate matching to the eventual adult condition and **mismatched** if abundant availability of macronutrients is in fact the adult reality. The dietary evolution to greater energy density, characteristic of nutrition transition, favors the mismatch.

Two early phenotypes (underweight and overweight) are associated increased long-term risk of chronic diseases. In both situations, however, a relative excess of fat tissue seems to predominate. The elements of the metabolic syndrome are a consequence of overly small or big neonates. The manifestations of increased risk can emerge as early as childhood.

Poor growth after gestation and infancy is also a factor in developmental origins of health and diseases. This is being documented and amplified in studies of linear growth-retarded children in deprived areas of Brazil. In Brazilian children, stunting in early life predicts higher blood pressure at various intervals from the initial linear growth retardation. Such children have reduced basal metabolism, faster weight gain, and greater relative accumulation of fat. There is also evidence for impaired intake regulation and increased sensitivity to high-fat diets in stunted children.

Questions still exist with respect to the rapidity of catch-up growth. The plasticity adaptations of permanently enhanced or suppressed hormonal cascade responses may be a consequence of imprinting during an early period of rapid linear or ponderal growth, adjusting from the small size at birth to a normative position on the population growth curve.

Studies are now being conducted still in childhood for consequences and associations with small size at birth and in childhood. Among Jamaicans, childhood insulin resistance and cold-induced elevation of forearm vascular resistance and elevated circulating insulin-like growth factor (IGF-I) and IGF-binding proteins in adults are associated with body size at birth.

In regions of Africa in which transmission of the HIV is hyperendemic, this infection represents a challenge to long-term health. The feeding of infants of HIV-seropositive mothers has long-term health implications, given the possibility of vertical transmission. Other aspects of breast-feeding by such mothers have short-term health implications as stress on severely undernourished lactating women with AIDS and a low safety margin for artificial formula prepared under unsanitary conditions have been documented in this mother-infant dyad context.

Empowering women both for their own peri-conceptual and pre-natal care and for improved caring practices for the care of their newborns and infants, moreover, seems to be a generic strategy at the heart of any long-term solution to improving long-term health and wellness outcomes.

When questions about developmental origins are formulated, it becomes clear that a multi-sectorial and multidisciplinary approach -- beyond the strict confines of the nutritional science expertise -- is required. A coalition strategy among disciplines, not only of nutrition and food sciences, but also across the fields of physiology, toxicology, environmental and social sciences, will be needed to fathom the complex relationships that link behaviors and exposures in one epoch of the lifespan with risks of disease and disability in subsequent ones.

### **Diet and Nutrition in Later Life:**

The fastest growing subsegments of the population in most areas of the world are in the age-groups over 60 years. For instance, with each day that passes, the unprecedented number of centenarians in the world increased more. Intrinsic senescent processes occur at the cellular level. A host of diseases are statistically more common in older persons. The maximal human life-span is estimated at 120 years. Growing older is tantamount to approaching the end of life, although the process ranges from "successful aging" to extreme "fragile aging." Gerontological nutrition has been a traditional concern of the IUNS through cycles of the operation of the Committee on Ageing and Nutrition, chaired by Prof. Mark Wahlqvist.

The practical public and private health concerns with the demographic extension of the older population is the financial costs and personal suffering associated with chronic disease and functional disabilities common with advancing age. The quadrennium has seen an increasing use of the DALYs (Disability-Adjusted Life Years), to quantify the potential positive or negative effects of circumstances or interventions. DALYs help to focus us on mobilizing nutrition and dietary practices to the goal of compressing morbidity and adding "life to years," such that each individual has only a minimal period of disability and dependence prior to his or her decease.

Recent epidemiological follow-up analyses from the IUNS Committee on Ageing and Nutrition in survivors in the cohorts of the Food Habits in Later Life (FHILL) multicenter study begin to address the controversy as to whether or not there is ongoing influence of dietary habits in promoting health, function and survival. At least with respect to mortality, the older individuals in the FHILL cohorts, independent of their national origins, who consumed a more 'Mediterranean' cuisine, had longer 5-year survivals after first enrollment. The nutritional condition of the elderly is dynamic in other ways. Obesity exerts excess risk for cardiovascular events even in later life. Exercise can be beneficial in many ways, including reducing systemic oxidative stress. This is important since oxidized HDL is a risk factor for vascular events.

Independence of the elderly may have an apparently paradoxical relation to the quality of diet in later life. The nutritional balance and meal consistency for older persons cared for by caretakers (who exercise control on the selection of foods) may be superior to that in more autonomous individual who must prepare or choose their own dietary fare. In Chile, a middle-income transition society, dietary intakes of the elderly were appropriate in general, with contributions from fat below 26%. Moreover, in one survey in Chile, 73% of elders assessed to have food insecurity and a deficient intake of macro- and micronutrients, were overweight or obese, whereas in another estimated energy intakes were <1500 kcal/day and protein <56 g/day and elders showed the ravages of associated undernutrition. Stable isotope technology has been used to assess energy requirements in older subjects, and the predicted requirement is actually **greater** than had previously been estimated.

Evidence for folic acid deficiency as a risk-factor for multiple classes of dementia has accumulated steadily through the quadrennium. Aggressive measures to improve folate status, however, produce the dilemma of simultaneous positive **and** negative consequences for the older segment of the population. Again in relation to the elderly, the wheat flour fortification in Chile in an cohort of elderly followed over the first 6 months of the national program had a series of effect; serum folate increased, homocysteine levels fell, but a 27% prevalence of deficiency vitamin B<sub>12</sub> levels remained constant, setting a stage for the masking of this condition.

Musculoskeletal health is important in later life in terms of two aspects of disability. Pain and limitation of motion from osteoarthritis is a major factor in decreased occupational and recreational activities in the aged. Chronic back pain due to compression fractures of the vertebral column, and short- and long-term disability from extremity fractures (wrist, hip) and risk of mortality from the surgery and immobility associated with femoral fractures are a consequence of underlying osteoporosis and the frequency of falls. The risk of osteoporosis at older age has antecedents in nutritional patterns in early life (sun-exposure, dietary vitamin D intake in insufficiency; preformed vitamin A in excess). A series of non-dietary risk factors relating smoking, physical activity, environment and ethnicity-genetic factors also intercede in the development of bone demineralization and osteoporosis.

Continuing with the theme of altering risk by modifying intake patterns in **later life itself**, evidence is equivocal as to whether remedial effects to halt or reverse the osteoporotic process can be made by changing calcium or vitamin D nutriture. Also, confirmation of beneficial effects of dietary soy phytoestrogens to retard menopausal bone loss is lacking. Finally, it remains a question as to whether the Dequeker paradox of reciprocal risk and protective factors for osteoarthritis and osteoporosis would present itself with interventions against osteoporosis in later life.

Muscle strength plays an important role in avoiding the falls that expose osteoporotic limbs to fractures. A senescent condition of skeletal muscle (sarcopenia), is characterized by simultaneous loss of muscle fiber mass and infiltration of muscle bundles with adipose tissue. Sarcopenia seems to reduce the capacity of elderly to negotiate there activities of daily living. The condition may be inflammatory in origin, but responds in

elderly persons to regimens of resistance training. Whether any specific dietary practices -- prophylactic (in early life) or therapeutic (in later life) -- can favorably influence sarcopenia has yet to be established.

In the present quadrennium, there has been advancing understanding of the caveats and pitfalls for the valid assessment of nutritional status (anthropometric, hematological, biochemical, functional) in older persons due to confounding by aspects of senescence and chronic disease. The fallacies associated with selective mortality (selective survival) on interpreting cross-sectional findings in terms of longitudinal changes in elderly populations seems to be increasingly well understood by authors of epidemiological research on the elderly.

#### **e. Miscellaneous Issues and Insights Contributed in the Process:**

Hemochromatosis is a hereditary disease with strong environmental and dietary correlates insofar as higher or lower exposure to iron (dietary, adventitious) is determinant of the phenotype. Hemochromatosis clearly is a chronic disease, and genetic insights may have lessons for the gene-diet-environment interplay in other conditions. This is particularly true for **iron** with regard to exposing a disconnect between molecular regulation of the metal and its uptake. Dietary constituents not only exert their effects on metal absorption within the lumen but in transcellular transport.

Inflammatory processes, often associated with tissue and cellular oxidation, have emerged in the quadrennium as a cross-cutting and unifying issue for both the phenotypical issues of the metabolic syndrome and cardiovascular disease and for cancer. It is also suspected of an interaction with aging, notably in sarcopenia. Tissue iron is the mediator of oxidation, inciting an inflammatory response, and stronger evidence for iron excess and myocardial infarction and colon cancer risk has emerged in the quadrennium.

Ethical issues for collaborative research in developing countries. This was the topic of a treatise by one of the Task-Force members (BC), and it signifies the need, as more nations and regions reach out to one another for coordinated research collaboration, the basic principles of bioethics must be reinforced, while making sure that disparities of power and influence among participating nations do not act to overwhelm the autonomy of the more disadvantaged partners.

With respect to encouraging or evaluating **regional integration**, at least in the Latin American region, there is **not** yet an integration for training in public health nutrition across the few countries that offer training at the professional graduate level. The Nutrition Leadership Program (NLP) has taken roots, now, in all of the world's regions (North America, Latin America, Europe, Africa and Asia). As exemplified by activities at this Congress, a thrust toward inter-regional coordination among the NLPs is moving forward. We identify this movement as a potentially important and productive template to realize the integration for the mandate of the IUNS Task-Force on Diet, Nutrition and Long-Term Health.

#### (iv) **Members derived-agenda**

##### **a. Task-force contributions: considerations and consenses**

In the course of the consultation with members of the Task-Force, a common exercise was conducted either in an interactive fashion or in writing. The interactive discussion occurred on the Chair's visits to the members in their distinctive regions or nations (see Calendar, Section (i)). This was to fill in a life-course scheme that extended from pre-conceptual issues through the various stages of the human **life course**. In a systematic fashion, the members focused on each successive stage and offered opinions and considerations in four general domains related to dietary intake and/or human nutriture and long-term health:

<b>Novel Findings and Emerging Concepts:</b> Evidence presented for new scientific discoveries with potential importance for long-term health, or the emergence of innovative concepts or theories on the origins of health and disease
<b>Retractions or Reversal of Consensus:</b> Evidence mobilized during the quadrennium to reverse a previously widespread scientific conviction either back to uncertainty or to a different consensus
<b>Important Unresolved Queries:</b> Questions occurring upon reflection that apparently have no current resolution, but that were considered important to resolve with further inquiry
<b>Policy/Action Initiatives Taken in the Past Quadrennium:</b> What local, regional or international policy strategies or action programs have been initiated since 2001

There was wide and deep brainstorming on the part of the members which are presented in bullet-point summary form. Many of the same points and same concerns were expressed repeatedly in discussions in the various regions.

#### **Universal and Overriding Concepts**

- That the issues of diet, nutrition and long-term health were complex and intricate, beyond resolution and solution by simple or simplistic monolithic solutions.
- That ethnicity, environment and geographic settings are important differentiating factors regarding which health problems are emergent and what interventions will be safe and effective.
- That a "Newton's Second Law" (for every action, there is an equal and opposite reaction) paradox applies to interventions in the nutrition transition. Non-targeted intervention for food security can have a detrimental consequence of provoking excess on the upper end of the distribution; interventions to combat overweight can have a detrimental consequence for provoking undernutrition at the lower end of the distribution. As yet unresolved is how to intervene so as to narrow the dimensions of the distribution moving all parts of the population within normative limits.

- That metabolomics (and the other 'omics such as genomics, proteomics, etc) are a powerful and attractive investigative tool with an intrinsic dimension to resolve **individual** diagnoses. The service to the collective, **public** health of discoveries in the 'omics field is to be encouraged.
- That important discoveries from **basic** science may hold keys for innovative and new departures to involve diet and life-practices in the preservation of long-term health, notably investigation into metabolic uncoupling and overload of cellular mitochondria in relation to energy balance and the epigenetic regulation of gene expression by nutrients and food constituents in the area of methylation of genetic material and by other mechanisms.

### Stage 1. Preconception

#### *Recent Findings/Concepts:*

- That the nutritional and metabolic condition surrounding the gametes can influence the health of the conceptus

#### *Retractions/Reversals of Consensus:*

- None identified

#### *Queries:*

- What additional nutrients, besides folic acid, have a determinant protective role against congenital anomalies?
- Have we identified all of the nutrients or dietary constituents that produce conceptional damage when consumed in excess in the peri-conceptional period?

#### *Policy/Action Initiatives*

- Folic acid fortification mandated in many countries throughout the world

### Stage 2. In Utero Gestation

#### *Recent Findings/Concepts:*

- Percentage body fat at birth is a predictor of long-term risk of metabolic syndrome

#### *Retractions/Reversals of Consensus:*

- From studies in Europe, it was considered that smallness at birth due to intrauterine growth retardation was the conditional factor for developmental risk of later-life disease; emerging is the counter-proposal that **prematurity** (preterm birth) can also set the stage for increased disease-risk in later life.

#### *Queries:*

- What are the dimensions of the trade-off between encouraging increased fetal growth and higher birth weights, on the one hand, and the obstetrical risks of obstructed labor in women with short stature and low pelvic dimensions, on the other hand?



- Does zinc deficiency of the mother influence fetal development?

***Policy/Action Initiatives***

- None specific

**Stage 3. Infancy**

***Recent Findings/Concepts:***

- The concept has emerged from Gluckman and Hanson that in uterine life "senses" the external environment into which the fetus will be born and adapts the metabolic programming for the genetic expressions best suited to maintain adequate nutrient balance in such an environment.

***Retractions/Reversals of Consensus:***

- It may not be the smallness of size in fetal growth or at birth, but rather a rapid velocity of growth ('catch-up') that sets the stage for long-term metabolic plasticity.
- The professed protective role of breast feeding against later life obesity may not be universal, but an artifact of the societies in which studies have been conducted.

***Queries:***

- Since exclusive breast-feeding is to be considered to be the universal norm for infants' feeding, what intervention directed at lactating mothers can be invoked to maximize the nutritional quality of human milk?
- Is it feasible to manipulate the offering of infant feeds so as to intentionally **moderate** the growth velocity of a small infant?
- Are there complementary-feeding patterns with specific benefits for long-term health?
- Will the total duration of receiving breast milk (exclusive or partial as part of a mixed diet) have consequences for long-term health?

***Policy/Action Initiatives***

- Refining the WHO recommendation for **exclusive** breast-feeding to 6 months of age
- WHO guidelines on complementary feeding

**Stage 4. Toddler and PreSchool**

***Recent Findings/Concepts:***

- None identified

***Retractions/Reversals of Consensus:***

- none identified

***Queries:***

- Are there long-term consequences of the fatty acid pattern and total energy contribution from fat before 6 years of age?

- What are the behavioral and dietary impacts of food advertising to children as young as below 6 years of age?
- What are the long-term impacts of helminthic and protozoal infections on health in later life?
- What are the long-term consequences of obesity before 6 years of age?
- What are the effects of zinc deficiency on long-term health?
- What are the long-term health consequences of surviving HIV-positive children treated with anti-retroviral therapy?

***Policy/Action Initiatives***

- none identified

**Stage 5. School-Age**

***Recent Findings/Concepts:***

- The metabolic syndrome is common in obese juveniles
- Rehabilitation of malnourished children has implications for susceptibility to the metabolic syndrome
- Abundant fruit and vegetable consumption impacts the risk of overweight in children
- Rapid growth during childhood has implications for vascular and neoplastic disease risk in later life
- Risk for later breast cancer arises in dietary and physical activity patterns of childhood

***Retractions/Reversals of Consensus:***

- none identified

***Queries:***

- What are the consequences of globalization (food trade, consumer goods) for long-term health in developing and transitional societies?
- What are the consequences of rural-to-urban migration?
- What is the consequence of moving from a dominant staple to a varied diet?
- What is the consequence of increased consumption of refined sugar and milled cereals?
- What is the consequence of increasing dietary fat intake in nutrition transition?
- What are the long-term health consequences of surviving HIV-positive children treated with anti-retroviral therapy?

***Policy/Action Initiatives***

- WHO 2004 Diet, *Nutrition and the Prevention of Chronic Diseases*, Technical Report Series 916
- For US population, 2005 *Dietary Guidelines* and *USDA MyPyramid* interactive website
- Five-a-Day (vegetables and fruits) for the Americas (PAHO).

## **Stage 6. Adolescence**

### ***Recent Findings/Concepts:***

- Obesity prevalence in adolescents is increasing
- Stunting is a risk factor for adolescent obesity and metabolic syndrome
- Abundant fruit and vegetable consumption impacts the risk of overweight in adolescents
- Risk for later breast cancer arises in dietary and physical activity patterns of adolescence

### ***Retractions/Reversals of Consensus:***

- none identified

### ***Queries:***

- What are the consequences of globalization (food trade, consumer goods) for long-term health in developing and transitional societies?
- What are the consequences of rural-to-urban migration?
- What is the consequence of moving from a dominant staple to a varied diet?
- What is the consequence of increased consumption of refined sugar and milled cereals?
- What is the consequence of increasing dietary fat intake in nutrition transition?
- Are body-image issues less determinant for avoiding excess weight gain in lower-class or rural-resident adolescents?

### ***Policy/Action Initiatives***

- WHO 2004 Diet, *Nutrition and the Prevention of Chronic Diseases*, Technical Report Series 916
- For US population, 2005 *Dietary Guidelines* and *USDA MyPyramid* interactive website
- Voluntary and/or mandated food regulations to eliminate *trans* fatty acids in food processing
- Five-a-Day (vegetables and fruits) for the Americas (PAHO).

## **Stage 7. Young and Mid-life Adulthood**

### ***Recent Findings/Concepts:***

- Abundant fruit and vegetable consumption impacts the risk of multiple non-communicable diseases.
- It is difficult to achieve protective levels of some nutrients (vitamin D, folic acid) without supplements or fortificants
- African-Americans maintain lower circulating concentrations of vitamin D than Caucasians.
- More abundant nutriture with vitamin D is associated with decreased of several cancers and of vascular diseases.
- Dairy intake is related to risk of prostate cancer.

- The distribution of body fat, as determined by waist circumference, adds predictive power to assessment of health risk related to adult body size, often beyond that of body mass index alone.
- Cut-off criteria for BMI and waist-circumference for concern/action are different across ethnicities, and specifically may be lower in persons of southern Asian ascent.
- A **clinical** definition for metabolic syndrome, introduced by the International Diabetes Federation, may resolve and rationalize some of the discrepancies and disparities deriving from the application of the WHO or the NCEP ATP III criteria sets.
- Heritable traits in obesity vary by ethnicity and geographic location.

***Retractions/Reversals of Consensus:***

- The notion that the evidence against abundant iron stores producing increased risk of vascular damage and carcinogenesis was conclusive has been unsettled by more recent biological and epidemiological studies pointing to iron-related oxidative damage as contributory to ill health.
- There is a growing consensus that the hip circumference measure, to generate waist-hip ratios, adds little predictive value in diagnosis of central obesity

***Queries:***

- What are the strength of intergenerational effects on risk of chronic diseases in different ethnic groups and geographic settings?
- What are the consequences of globalization (food trade, consumer goods)?
- What are the consequences of rural-to-urban migration?
- What is the consequence of increase on-the-job and monetary financial demands and stress?
- What is the consequence of moving from a dominant staple to a varied diet?
- What is the consequence of increased consumption of refined sugar and milled cereals?
- What is the consequence of increasing dietary fat intake in nutrition transition?
- What is the role of strength conditioning to prevent metabolic disease?
- What are the barriers to adopting healthful dietary practices, especially in the poorer segments of society?
- Are body-image issues less determinant for avoiding excess weight gain in lower-class or rural-resident adolescents?
- What are successful community based interventions to inculcate and sustain healthful practices?

***Policy/Action Initiatives***

- WHO 2004 Diet, *Nutrition and the Prevention of Chronic Diseases*, Technical Report Series 916
- For US population, 2005 *Dietary Guidelines* and *USDA MyPyramid* interactive website
- Voluntary and/or mandated food regulations to eliminate *trans* fatty acids in food processing

- CARMEN: *Conjunto de Acciones para la Reducción Multifactorial de las Enfermedades No Transmisibles* [Conjoint Actions for the Multifactorial Reduction of Non-Transmissible Diseases] initiative of the Pan American Health Organization, for the Americas

### **Stage 9. Older Age**

#### ***Recent Findings/Concepts:***

- Common occurrence of folate primed reduction in homocysteine levels
- Vitamin-responsive hyperhomocysteinemia may be associated with incidence of dementia
- Sarcopenia (senile muscle loss) may be reversed by conditioning exercise, but not by dietary changes alone.

#### ***Retractions/Reversals of Consensus:***

- The notion that the dietary pattern was no longer strongly influencing on health in later life, is being reversed by evidence of differential survival with certain dietary practices

#### ***Queries:***

- What are the consequences of globalization (food trade, consumer goods)?
- What are the consequences of rural-to-urban migration?
- What is the consequence of transition from joint, extended families to nuclear families and decreased social support?
- Are the elderly more susceptible to imbalances and deficiencies of nutrients with dietary regimens to reduce dietary risk factors for chronic diseases?
- >What is the role of strength conditioning to prevent metabolic disease?
- In sanitary Western environment, can chronic low-intake and low BMI in fact be healthy and conducive of longevity?

#### ***Policy/Action Initiatives***

- WHO 2004 Diet, *Nutrition and the Prevention of Chronic Diseases*, Technical Report Series 916
- For US population, 2005 *Dietary Guidelines* and *USDA MyPyramid* interactive website

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**(v) Summary of regional policy analysis: focus – WHO technical report 916 and WHA57.17 World Health Organization Assembly Resolution**

The ultimate, applied purpose of all of the biological and epidemiological investigation on the relationship of diet and nutrition to health and disease is to improve health, reduce disease risk, and enhance function and well-being for the populace. That is, the valid findings from research should be used to inform **policy**, and to guide **programs**. Policy and program initiatives can be part of public policy and investment, or come from the non-governmental and private sectors. The initiatives can be directed at structural bases, such as altering the environment to reduce hazardous exposures or promote protective exposures or changing pricing and taxing structures to make some food items (noxious) less available while making others (beneficial) more accessible.

Other important areas to which research can contribute to health is to inform individuals and groups within society to take positive steps to alter their behaviors regarding eating, activities, and living practices. The appropriate practices to participate in positive behaviors (i.e. eating certain items, being active in certain ways) and to eschew negative behaviors (i.e. avoiding consuming certain items, abstinence from tobacco, moderation in imbibing ethanol).

The compendia of recommendations for individual and public action are often generically called "guideline documents" and are derived from governmental or supra-governmental sources, such as individual nations or United Nations agencies, or from private non-governmental foundations. In the prior quadrennium of IUNS activities (1997-2001), two landmark guideline processes led to documents: "*Food, Nutrition and Prevention of Cancer: A Global Perspective*" (WCRF 1997); and "*American Heart Association Dietary Guidelines: Revision (2000)*" (Krauss et al, 2000). The former has a universal and international applicability; the latter could be considered more narrowly directed to a upper North American populace.

The current period has seen two important guideline processes embracing diet and health. One was international, with a base at the World Health Organization, and produced WHO Technical Report 916 "*Diet, Nutrition and the Prevention of Chronic Diseases.*" One was national, with a base in the United States, which was the *U.S. Dietary Guidelines* (2005) which also spawned a revision of the 1992 USDA guideline emblem Food Pyramid into an internet (web-based) interactive website, [www.MyPyramid.gov](http://www.MyPyramid.gov).

A notable feature of the deliberation processes of most recent guidelines has been increased transparency. This has taken the form of expressed criteria for arriving at conclusions and explicit documentation of the information evaluated. The World Cancer Research Fund can be credited with the innovation of the criteria with its 1997 document. All of the published evidence reviewed was assigned a strength (Conclusive, Probable, Possible, Insufficient). This innovation has been picked up by other deliberative bodies including the Expert Panel convened by the World Health Organization to produce a

technical report on diet and health (916), to update and extend (and in fact supplant and replace) a previous version "Technical Report 797."

The WHO guideline documents had the import of Task-Force Chair took on the goal of compiling analyses of the provisions, guidelines, and implications of the WHO Technical Report 916 *Diet, Nutrition and the Prevention of Chronic Diseases* and the WHA57.17, the assembly resolution *WHO Global Strategy on Diet, Physical Activity and Health* at the 57th WHO Assembly in Geneva in 2004. The format was to select and assemble a group of professionals who would be considered "informed" and "interested" with respect to the nutrition, food security and health situation of a nation, or even a region. They should be selected from the sectors of: academia, health care, government (health, agriculture), professional associations and industry, among others. Electronic copies of the documents were distributed for analysis, and a meeting (or submission of written responses in one case) was documented in a rapporteur's report. The analysis was guided by -- but not restricted to -- four questions: two on quality, two on relevance.

<b>Considerations on Quality</b>
In terms of technical quality on the compiling of evidence, what do you consider the <b>strengths</b> of the documents?
In terms of technical quality on the compiling of evidence, what do you consider the <b>weaknesses</b> of the documents?
<b>Consideration on Relevance</b>
In terms of your own setting/situation (national, regional), which of the provisions of the documents to you find <b>most</b> relevant and appropriate?
In terms of your own setting/situation (national, regional), which of the provisions of the documents to you find <b>least</b> relevant and appropriate?

**Annex 3** provides the offerings from across the various sites of origin of the Task-Force. As of the date for submission of this Quadrennium Report, information has been received from Guatemala (Vossenaar, Mazariegos), India (Kurpad), Mexico (Valdés-Ramos), Singapore (Yap) and South Africa (Charlton), but others have been commissioned, but could not be completed by the Congress dates and are left as *pending*.

Several common themes emerge (**Annex 3**). The individual goals and guidelines appeared to be too extensive and comprehensive for simultaneous attention. A need to prioritize at the individual national level was seen. In MesoAmerica (Mexico, Guatemala), a certain resignation that their governmental authorities have severe constraints and would be reluctant to take on such a wide array of initiatives. However, to the extent that rural populations still had traditional diets and life-practices, some of the provisions of the recommendations were currently in place as part of the culture.

In Singapore, where resources are more abundant, a careful evidenced-based-for-Singapore analysis of health activities had already been made. The exercise there was more of a comparative nature, seeking how much in the Singaporean national plan was shared with the WHO documents. The financial issues related to differential taxation to

drive down consumption of certain items deemed less healthful was viewed as controversial at all sites, especially by representatives from industry. The South African member commented that South Africa had been part of a process for the Western Pacific, but this was conducted in 2003, **prior to** the formal emission of the technical report and assembly resolution in 2004. Its content was deliberative, but not really reflective within the mandate.

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## **(vi) Summary Principles**

The IUNS Task-Force on Diet, Nutrition and Long-Term Health has completed its odyssey of the 2001-2005 quadrennium. It moved from the outline of the generic mandate for IUNS task-forces and its titular mandate, to conforming a group of members from around the world, balanced for gender and age. There was a development of a mission, a selection of topic areas and identification of two specific exercises: the sponsorship of workshops on diet and wellness (2003) and of regional/national processes to evaluate two WHO guideline documents (post 2004). Visits were made, where feasible by the Chair, where feasible, to the homes nations or regions to get intake on the personal insights and contributions to the academic and applied themes relevant to long-term health, specifically emerging and taking form in the present quadrennium. The final stage was the compiling of the present Report, which is still a work-in-progress, and appending the Annexes, as the 18th International Congress on Nutrition is convened in Durban. An appropriate format to close is with the postulation of what might be the summary principles to be derived from the process and contribution of the IUNS Task-Force on Diet, Nutrition and Long-Term Health.

- It will continue to be more efficient, effective and equitable to address the health problems of the public with collective approaches aimed at societal groups -- rather than individuals -- as the targets, and with a prophylactic and preventive -- rather than a therapeutic and curative -- focus.
- Most of the world's population, the 80% resident in the low-income societies, still suffers from food insecurity and micronutrient malnutrition, but this is increasingly accompanied by nutrient imbalance and increasing rates of overweight and its associated co-morbidities.
- The predominant disciplinary and expertise domains of the International Union of Nutritional Sciences are dietary intake and nutritional status.
- Human health concerns extend to many other scientific domains, including physical activity physiology, environmental sciences and clinical and molecular genetics, that are not the central concerns of the IUNS membership. Multidisciplinary collaborations beyond our field are needed to cover all of the public health concerns for long-term health.
- Health guidelines, including dietary and nutrition guidelines, should be evidence based. The transparency regarding the literature bases and the rating of strength of scientific evidence in creating panel recommendations is advancing.
- Many guideline documents for policy and program are extensive and comprehensive in their coverage of different goals and recommendations, but they insist on execution of all components across the board in all locations.

- Resources and infrastructure in low-income societies are generally limited, and priorities for the application in any given setting should be based on an assessment of the gradient of needs. The diseases and conditions that are most manifest should receive the greatest outlay of effort in the preventive intervention initiatives.
- Assessing the degree to which behavioral or environmental realities are already concordant with the array of recommendations or not is recommendable prior to instituting programs. Some actions may be aimed toward effecting change; others may be directed toward maintaining the (favorable) status quo.
- Assessing the current prevalences of different disabilities, conditions and diseases at the nations and local level will help set rational priorities for selection of one recommendation over another under resource constraint conditions.
- Monitoring the outcome of implementing policy and programs should be conducted to assess the effectiveness of interventions against the targeted health issue, but it should also embrace an inquiry on potential long-term adverse effects.
- The title and mandate of the Task-Force had, as its focus, Long-term *Health*. The exercise of the Task-Force in four settings across three regions (Asia, Europe, Latin America) confirmed that the public at large manages definitions of "Wellness" or "Well-being" which are not strictly synonymous in their connotations with "health"; it is a further challenge to harmonize or extend the mandate toward in inquiry about how diet and nutrition derive from the wellness states of individuals and populations and how eating and nutritional status contribute to what societies consider as wellness.

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