How Global Nutrition Collaborations Impact Change: Lessons from Four Continents

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International Collaborations

The “Double Burden”

ONE GLOBAL ISSUE!

The Bill, Please
(for 5 chronic diseases for 20 years)
N.B. These numbers are TRILLIONS

Table 14: The anticipated economic toll of NCDs in staggering Economic burden of NCDs, 2011-2030 (Billions of US$ 2016), based on EPIC model 1

<table>
<thead>
<tr>
<th>Country income group</th>
<th>Diabetes</th>
<th>Chronic Respiratory Diseases</th>
<th>Cancer</th>
<th>Mental Illness*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Upper middle</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Lower middle</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Low</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>World</td>
<td>1.7</td>
<td>15.0</td>
<td>4.3</td>
<td>0.3</td>
<td>10.3</td>
</tr>
</tbody>
</table>

The figures for mental Illness were obtained by adding the economic burden of all other diseases in that associated income group to that of 20% of their income. The burden for other diseases was projected using the relative size of the corresponding DALY numbers at the other conditions.
Collaborations in Europe

How are n-3 different from other fatty acids?

“Protective” Mechanisms of n-3 FA in Cardiovascular Disease

Protective

Chang, CL and Deckelbaum, RJ; Curr Opin Lipidol 2013

The Trilogy of Abraham: Health and Science as Win-Win Modalities Towards Brotherhood

Deckelbaum RJ, in The Meeting of Civilizations, Sussex Academic Press, 2009
"An hour’s study of nature is better than a year’s prayer," declared the Prophet. He directed his followers to ‘listen to the words of the scientist and instill unto others the lessons of science.’

From a Commentary by Ziauddin Sardar

Barriers to Scientific and Medical Advancement for the Children of Abraham
- Religious restrictions
- Inequalities in infrastructure, trained personnel, scientific research support, access to health services, health budgets
- Political restrictions
- Security/safety concerns
- Mistrust
- ……, ……., ……
Folate
Fe
B12,
B1, B2, B6
Niacin
Zn
Vit A and D

Flour fortification in the West Bank

<table>
<thead>
<tr>
<th>District</th>
<th>6-12</th>
<th>12-24</th>
<th>24-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syria</td>
<td>77</td>
<td>80</td>
<td>67</td>
</tr>
<tr>
<td>Jordan</td>
<td>66</td>
<td>63</td>
<td>45</td>
</tr>
<tr>
<td>W. Bank</td>
<td>71</td>
<td>66</td>
<td>35</td>
</tr>
<tr>
<td>Gaza</td>
<td>82</td>
<td>75</td>
<td>55</td>
</tr>
<tr>
<td>Lebanon</td>
<td>76</td>
<td>77</td>
<td>59</td>
</tr>
</tbody>
</table>
Serum Folate – West Bank Children
(Massad S, in preparation)

- Median folate: 16.1 ng/ml
- 0.3%: <3.1 ng/L (Very low)
- 2.3%: <7.0 ng/L (NTD risk)
- 72.3%: 7-20 ng/L (Normal)
- 25.1%: >20 ng/L (High)
- 8.5%: >30 ng/L (High)

>33% of West Bank school children have "high" serum folate levels
Adapted from Couch S… Deckelbaum R; AJCN, 2000

International Comparison of Risk Factors in Childhood for Lifestyle Related Diseases: The Danone RISK Study (Takemoto K, Deckelbaum RJ, 2015)

Goal: To compare lifestyle factors and phenotypic markers for chronic diseases in children in 5 countries

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Steven Shea MD
Leonardo Pessali MD
Supawadee Likitmaskul MD

Supported by The Danone Institute of Japan

Mean Serum Cholesterol Levels in Boys

(USA vs JAPAN)

Cholesterol (mg/dl)

USA

JAPAN

25th Percentile

6/25/2018

Predictions from the Hegsted Equation

\[ \Delta \text{Cholesterol (mg/dl)} = 2.16 \Delta S - 1.65 \Delta P + .068 \Delta C \text{ mg/day} \]

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain vs U.S.</td>
<td>+8 to +20</td>
<td>+9 to +15</td>
</tr>
<tr>
<td>Japan vs U.S.</td>
<td>-8 to -28</td>
<td>+5 to +11</td>
</tr>
</tbody>
</table>

Adapted from Couch S… Deckelbaum R; AJCN, 2000
Danone RISK Project

Significance

• Differential relationships of lifestyle and phenotypic factors related to risks for chronic diseases between countries

• Data will help understand mechanistic differences in lifestyle responses between populations

• Need for population specific guidelines and interventions
Thrifty Genes!!
Interactions between genes, lifestyle, and epigenetics

Social and Economic Impact of Child Undernutrition
(Annual Losses)

Egypt
3.7 billion
1.9% GDP

Ethiopia
4.7 billion
16.5% GDP

Uganda
899 million
5.6% GDP

Swaziland
92 million
3.1% GDP

COHA Study, WFP 2014
Deaths from CVD/100,000 35-64yrs (2000)

<table>
<thead>
<tr>
<th>Country</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>71</td>
<td>49</td>
</tr>
<tr>
<td>India</td>
<td>81</td>
<td>56</td>
</tr>
<tr>
<td>S Africa</td>
<td>97</td>
<td>68</td>
</tr>
<tr>
<td>USA</td>
<td>56</td>
<td>28</td>
</tr>
</tbody>
</table>

Adapted from: Leeder S et al, Race Against Time, 2004

Sauri Sublocation
10 villages
5200 people, 950 households
Hunger periods 3-7 months
64% below poverty line
25-30% HIV-AIDS
Malaria parasitemia (43%)
Anemia <5yrs (85%)
Anemia +malaria <5yrs (46%)
No health clinic, no electricity

MVP - Concomitant Intersectoral Community Participation

Training – empowerment, management, governance, technical aspects
Water
Agriculture
Health
Electricity/Energy
School
Environment
Business
Fewer Researchers in Sub-Saharan African Countries

- Build local capacity for science – linking health with nutrition, agriculture, and “biotechnology”
- Use graduates for TOT – trainers of trainers, ... and students
- Economic development with scientific development
- Diminish “brain drain”
- Bring African universities into the respected group of top science training institutions

Seasonal hunger ..........; intersectoral solutions needed

- Under- and Over-nutrition
  - Molecular actions of nutrients in soil, plants, animals, humans
  - NCDs: metabolic syndrome, Type 2 diabetes, CVD, cancer
  - Reproductive health, stunting

- Nutrition and Emerging Health Problems
  - Seasonal starvation and epigenetics
  - Resilient crop selection and genetics
  - Food safety (aflatoxins, microbes, water)
  - Provision of quality nutrients/foods
  - Integrating with One Health
ANSRC - Integrating Biotechnology into Nutrition and Agricultural Sciences

Laboratory Based Education/Training

“Path to Action”

Public Health/Food Security Building Human and Economic Capacity

Links to the private sector

ANSRC – Higher Education for Africa

Partnerships:
- African Development Bank
- Pan African University
- BECA/ILRI CoE in Health Sciences and Bioengineering
- New Einstein Initiative
- AERC, CARTA(APHRC),
- African Academies of Science
- Columbia University, UW(Madison),
- 14 African universities

Political buy-ins established

Ready to operationalize in 3-4 mos

Lessons Learned

• Build local capacity
• Do the lab work locally
• Listen first – talk later
• Include other sectors and disciplines
• Encourage “south-south” collaborations
• Be “apolitical”
• ......, ......, ........

Concluding messages....
What are the costs of doing nothing?????

"Think of things that can go right"
...and do them!!

Make a Difference - Plan and Build Nutrition Partnerships Together!

Thanks to our partners! Thank you!