Food Security & Sustainability 
with special reference to the 
Mediterranean Diet

Elliot M Berry MD, FRCP
Dept of Human Nutrition and Metabolism
Braun School of Public Health, 
Hebrew University – Hadassah Medical School
Jerusalem, Israel

Tel Aviv, July, 2016

Hungry & Homeless and living in Rubbish Dumps 
2015

[Images of hungry and homeless individuals in various locations, including Mumbai and Kumasi]
Food Security & Insecurity with reference to the Mediterranean Diet 2016

Elliot M Berry
elliotb@ekmd.huji.ac.il

This Pulitzer prize photo was taken during the Sudan famine in 1994. The child is crawling to a UN food camp some kms away. The vulture is waiting for him to die, to eat.

No one knows what happened to the child.

*The photographer, Kevin Carter left immediately after. He committed suicide 3 months later from depression*

Food Security & Public Health Nutrition

**A Well-Fed Nation is a**

**Healthy Nation is a**

**Productive Nation**

elliotb@ekmd.huji.ac.il
Outline

Lecture 1
1. What is Food Security?
2. Measurement: The Food and Nutrition Security Index
3. Promoting Food Security

Lecture 2
1. Coping with Food INSecurity: Introducing the Sociotype
2. POSITIVE DEVIANCE: How it changed my life...

Lecture 3
1. Sustainable Diets
2. Why the Mediterranean Diet ??
3. Intervention studies in Schools
4. Socio-Cultural Aspects

Conclusions

Food & Nutrition Security
Committee on World Food Security Oct 2012

Food and Nutrition Security
“exists when all people at all times have:
- physical, social and economic access to food,
- which is safe and (is) sufficient quantity and quality
- to meet their dietary needs and food preferences,
- and is supported by an environment of adequate sanitation, health services and care,
- allowing for a healthy and active life”

-Utopian....
-Note: there is enough food in the world to feed everyone...
The Elements of Food (In)Security

**Level**
- National
- Household
- Individual

**Time**
- Stability
- Temporary Food Insecure
- Food Secure
- Positive Coping
- Negative Coping
- Chronic Food Insecurity

**Level**
- Food Secure
- Temporary Food Insecure
- Chronic Food Insecurity

The Elements of Food (In)Security

**Loss**
- Availability

**Waste**
- Accessibility
- Utilization
- Food Secure
- Temporary Food Insecure

**Level**
- Agricultural Production Imports
- Physical Economic
- Quality Quantity Health

**Time**
- Accessibility
- Utilization
- Food Secure
- Temporary Food Insecure
- Chronic Food Insecurity

Building a Food and Nutrition (Composite) Security Index

FaNSI
Methodology for Development of a Composite Index

- Purpose of Index: Study Population, children, pregnant women, elderly... Food Security
- Choice of indicators: Standardized collection, available, valid, reliable, frequency, cost...
- Scoring for each component
- Weighting for each component: PCA, Intra dimension
- Aggregation of scores assigned to components: Inter dimension weighting
- Summation & Total Score
- Test & Validate

Criteria for selecting indicators

1. Relevant: to the needs of potential users
2. Valid: is the best scientific indicator currently available to answer the question.
3. Data that are Accurate, Accessible, Available over time and responsive to change
4. Understandable and easy to Interpret
5. Comparable: with indicators developed in other countries and Visually Graphic
6. Cost-effective: for repeated measures and time trends

after Kourlaba & Panagiotakos, 2009

after Watson et al., 2010
Food Security & Insecurity with reference to the Mediterranean Diet

Elliot M Berry
elliottb@ekmd.huji.ac.il

Indicators for FAO Food Security Index

**Availability**

- Average Dietary Energy Supply Adequacy
- Average Value of food Production
- Share of Dietary Energy Supply derived from Cereals, Roots and Tubers
- Average Protein Supply
- Average Supply of Protein of Animal Origin

*FAO. The State of Food Insecurity in the World 2014*

---

Indicators for FAO Food Security Index

**Access**

- Percent of Paved Roads over Total Roads
- Road Density
- Rail lines Density
- Gross Domestic Product per capita (purchasing power equivalents)
- Domestic Food Price Index
- Prevalence of Undernourishment

*Share of Food Expenditure of the Poor*
*Depth of Food Deficit*
*Prevalence of Food Inadequacy*

*Indicator not yet included in the corresponding dimensional index

*FAO. The State of Food Insecurity in the World 2014*
### Indicators for FAO Food Security Index

#### Utilization

- Access to Improved Water Sources
- Access to Improved Sanitation Facilities

- \% of Children < 5 yrs with Wasting
- \% of Children < 5 yrs with Stunting
- \% of Children < 5 yrs who are Underweight

- \% of Adults who are Underweight

  - Prevalence of Anemia among Pregnant Women
  - Prevalence of Anemia among Children < 5 yrs
  - Prevalence of Vitamin A deficiency in the Population
  - Prevalence of Iodine Deficiency in the Population

*Indicator not yet included in the corresponding dimensional analysis*

FAO. *The State of Food Insecurity in the World 2014*

---

### Indicators for FAO Food Security Index

#### Stability/ Vulnerability

- Cereal Import Dependency Ratio
- \% of Arable Land equipped for Irrigation
- Value of Food Imports over Total Merchandise Exports

- Political Stability and absence of Violence/ Terrorism
- Domestic Food Supply Volatility
- Per capita Food Supply Variability
  - *Per capita Food Production Variability*

*Indicator not yet included in the corresponding dimensional analysis*

FAO. *The State of Food Insecurity in the World 2014*
Weights assigned to the indicators in the FaNSI

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator weight on each sub-dimension (from PCA)</th>
<th>Indicator weight on each food security dimension</th>
<th>FOOD SECURITY DIMENSIONS</th>
<th>Indicator weight on the FaNSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Dietary Energy Supply (DES) Adequacy</td>
<td>50%</td>
<td>25%</td>
<td>AVAILABILITY</td>
<td>6%</td>
</tr>
<tr>
<td>Average Value of Food Production</td>
<td>50%</td>
<td>25%</td>
<td>AVAILABILITY</td>
<td>6%</td>
</tr>
<tr>
<td>Share of DES derived from cereals, roots and tubers</td>
<td>30%</td>
<td>15%</td>
<td>ACCESS</td>
<td>4%</td>
</tr>
<tr>
<td>Average protein supply</td>
<td>33%</td>
<td>17%</td>
<td>ACCESS</td>
<td>4%</td>
</tr>
<tr>
<td>Average supply of protein of animal origin</td>
<td>37%</td>
<td>19%</td>
<td>ACCESS</td>
<td>5%</td>
</tr>
<tr>
<td>Percent of paved roads over total roads</td>
<td>25%</td>
<td>8%</td>
<td>ACCESS</td>
<td>2%</td>
</tr>
<tr>
<td>Road density</td>
<td>34%</td>
<td>11%</td>
<td>ACCESS</td>
<td>3%</td>
</tr>
<tr>
<td>Rail lines density</td>
<td>41%</td>
<td>14%</td>
<td>ACCESS</td>
<td>3%</td>
</tr>
<tr>
<td>Domestic Food Price Level Index</td>
<td>50%</td>
<td>17%</td>
<td>UTILIZATION</td>
<td>4%</td>
</tr>
<tr>
<td>Gross Domestic Product per capita (in ppp)</td>
<td>50%</td>
<td>17%</td>
<td>UTILIZATION</td>
<td>4%</td>
</tr>
<tr>
<td>Prevalence of Undernourishment</td>
<td>100%</td>
<td>33%</td>
<td>UTILIZATION</td>
<td>8%</td>
</tr>
<tr>
<td>Access to improved water sources</td>
<td>50%</td>
<td>25%</td>
<td>UTILIZATION</td>
<td>6%</td>
</tr>
<tr>
<td>Access to improved sanitation facilities</td>
<td>50%</td>
<td>25%</td>
<td>UTILIZATION</td>
<td>6%</td>
</tr>
<tr>
<td>Stunting</td>
<td>30%</td>
<td>15%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
<tr>
<td>Wasting</td>
<td>33%</td>
<td>15%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
<tr>
<td>Underweight</td>
<td>39%</td>
<td>19%</td>
<td>STABILITY</td>
<td>5%</td>
</tr>
<tr>
<td>Cereal import dependency ratio</td>
<td>40%</td>
<td>20%</td>
<td>STABILITY</td>
<td>5%</td>
</tr>
<tr>
<td>Percent of arable land equipped for irrigation</td>
<td>32%</td>
<td>16%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
<tr>
<td>Value of food imports over total merchandise exports</td>
<td>28%</td>
<td>14%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
<tr>
<td>Political stability and absence of violence/terrorism</td>
<td>28%</td>
<td>14%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
<tr>
<td>Domestic food price volatility</td>
<td>43%</td>
<td>22%</td>
<td>STABILITY</td>
<td>5%</td>
</tr>
<tr>
<td>Per Capita food supply variability</td>
<td>28%</td>
<td>14%</td>
<td>STABILITY</td>
<td>4%</td>
</tr>
</tbody>
</table>

Building a Composite Index for Food and Nutrition Security (FaNSI)

Dimension Score

Availability
- Variables
  - Avail 1, Avail 2...

Accessibility
- Variables
  - Access 1, Access 2...

Utilization
- Variables
  - Ut 1, Ut 2...

Stability
- Variables
  - Stab 1, Stab 2...

**Composite Score FaNSI**

**Intra-Dimensional Weighting Each Σ100%**

**Inter-Dimensional Weighting Total = 100%**
The inter-dimensional weightings for food security according to the affiliation of 187 respondents

Distribution of FaNSI by group
178 Countries in 2012

Very Low Food Security
Low Food Security
Medium Food Security
High Food Security
Very High Food Security
FaNSI and its dimensions: examples from different groups

Very Low food security: 1 to 1.99
Low food security: 2.00 to 2.99
Medium food security: 3.00 to 3.6
High food security: 3.6 to 4.2

FaNSI and its dimensions: examples from the highest group
What does this say about Malnutrition??
The concept of food security implies that:

1. Production & distribution of food are **sustainable**
2. Production & consumption of food are grounded in, and governed by, **social values** that are:
3. Just, equitable, morally & ethically sound
4. Food is nutritionally adequate, & personally & **culturally acceptable**
5. Food is obtained (& consumed) in a manner that **upholds basic human dignity**

*World Food Day cited in Understanding Food Security through Community Mapping, 1995*
Ways to solve the problem

1. Increasing agricultural production by modern methods of farming, since most of the world’s poorest people depend on it as the main source of their income (Availability)

2. Maldistribution: raising food production levels at a rate to keep pace with population increases (Availability, Accessibility)

3. Faster, less expensive forms of national & international communication & transportation to improve commerce (Availability, Accessibility)

4. Nutritional education, especially WOMEN + Empowerment (Accessibility, Utilization, Stability)

Green Revolution: Norman Borlaug
Ways to solve the problem

5. Reducing rural poverty is a major target
   \(\text{(Accessibility, Stability)}\)

6. Food fortification & supplementation
   \(\text{(Accessibility, Utilization)}\)

7. Control of communicable & non-communicable diseases
   \(\text{(Utilization)}\)

8. In parallel, it is important to control birth rate
   \(\text{(All dimensions) (the elephant in the room...)}\)

This is not an easy task & involves social, ethical, health, economic & political considerations – ramifications for EVOLUTION

Examples of Implementation Tools in Food & Nutrition Security at different social levels

<table>
<thead>
<tr>
<th>Social Level</th>
<th>Availability</th>
<th>Accessibility</th>
<th>Adequate Utilization</th>
<th>Stability</th>
</tr>
</thead>
</table>
| Macro        | • Agriculture & Trade policies  
               • Birth control Programs | • Price policy  
               • Food Stamps | • Safe Motherhood Programs  
               • Food Stamps | • Saving & Loan Policy  
               • Micro Finance |
| Meso         | • Small scale irrigation projects  
               • School-Feeding Programs | • Measles, Polio immunization campaigns | • Community Planning Committees |
| Micro        | • Use of Fertilizer  
               • Breast Feeding Coaching | • Latrine Construction  
               • Growth Charts | • Food Storage |

Copenhagen – Global Challenges: *The Skeptical Environmentalist – Bjorn Lomborg*

To Prioritize the Top 10...

- Access to education
- Malnutrition & hunger
- Clean water - Sanitation
- Climate change
- Communicable diseases
- Conflicts
- Financial instability
- Subsidies & trade barriers
- Governance & corruption
- Migration

*Relate to Food Security*

Coping with Food Insecurity: the role of the Sociotype
Definition of Food Insecurity

Food Insecurity exists whenever the availability of nutritionally adequate and safe foods, or the ability to acquire acceptable foods in socially acceptable ways, is limited or uncertain.


Vulnerable Groups for FOOD INSECURITY

- Victims of Natural Disasters
- Victims of Conflict
  - IDPs, Refugees, War victims
- Migrant Workers & Families
- Marginal Populations in Urban Areas
  - Unemployed, Homeless, Orphans, Street Children
- At-risk social groups
  - Minorities, Illiterate, Patients, Prisoners, Addicts
- Low-Income Households, 1- parent families
- Dependents
  - Servants, Elderly, Handicapped, Special needs, Pregnant & Nursing women, CHILDREN
Introducing the Sociotype

Q: How do we **COPE** with “LIFE” in general and chronic disease and Food Insecurity in particular?

A: Well, it all depends on your **SOCIOTYPE**…….

Multi-Disciplines: Anthropology, Medicine, Nursing, Physiology, Psychology, Sociology, & more...

*Berry EM. The role of the sociotype in managing chronic disease: Integrating bio-psycho-sociology with systems biology. Medical Hypotheses 77: 610, 2011*

*Berry EM & DeGeest S. Tell me what you eat and I will tell you your sociotype: coping with diabesity. RMMJ 3:e0010, 2012.*

Background: Sociotype & Coping

Adler, Erikson, Engel, Horney, Antonovsky, Frankl, Fromm, McEwen, Hirsch, Bandura, Freud, Maslow, Rogers

**NB:** List is not exhaustive… Arendt, Bowlby, Harlow, Jung, Levi-Strauss, Lorenz, Marx, Seligman, Winnicott

**Empirical Evidence**
**Sociotype** x **Genotype** *determines* **Phenotype**

- **Sociotype**
  - Relatively Unchanging Input
- **Genotype**
  - Constantly Changing Inputs
- **Individual**
- **Relationships**
- **Context**

**PHENOTYPE**
- Observable Characteristics
- Behavior Patterns
- Personality
  - e.g. **COPING**

**Why you are, how you are & Why you do, what you do...**

**in utero** ➔ Childhood ➔ Adolescence ➔ Adult ➔ Middle Age ➔ Old Age

**EXPERIENCE**

---

The Ecological model of the Sociotype

**CONTEXT**
- Geographic Location
- Culture
- Political System
- Education System
- Socio-Economic Situation
- Employment
- Living & Working Conditions
- Leisure Sport...

**RELATIONSHIPS**
- Friends, Family
- Social Networks
- Friends, Family
- Upbringing
- Physical, Spiritual, Mental
- Well-Being
- IQ, EQ

**INDIVIDUAL**
- Work
- Community
- Professional Advisers
- Carers
- Religion
- Health Care System
- Employment
- Living & Working Conditions
- Leisure Sport...

**in utero** ➔ Childhood ➔ Adolescence ➔ Adulthood ➔ Middle Age ➔ Old Age

**EXPERIENCE**
1. **Individual / Health**

   **Intra-personal**

   - Nutrition, Growth & Development
   - Physical Health & Well Being
   - Psychological / Mental / Emotional Health
   - Sense of Humor
   - Spiritual Belief System(s)
   - Coping strategies throughout the life cycle for disease, aging & misfortune

2. **Relationships**

   **Inter-personal**

   **Family:**
   - With Parents
   - With Siblings
   - With Cousins
   - With Spouse (mate selection)
   - With Children

   **Friends:** Social Networks

   **Work**

   **Sexual Partners / Lovers**
3. Context - Community

Education

Employment

Economic Situation

Environment
  • Home
  • Leisure Time
  • Work

Political System
  Migrants / Strangers

Ideological Beliefs & Societal values

Some questions for Sociotypic research: from the 3 Domains

INDIVIDUAL / HEALTH
– How would you have been different if 5cms ↑ or ↓ in height?
– How to live with Special Needs, blindness, stuttering, deformity?
– Are you hungry in your Head or your Stomach?
– How to cope with Aging, Chronic Disease - Diabesity, CVA, IBD, Arthritis, Colostomy, Post-Transplant or post Traffic accident?

RELATIONSHIPS
– At what age do you stop trying to please your parents?
– What determines how we choose our partners?
– Do people change?
– How do families cope with a sick child?
– How to deal with, Divorce, Bereavement (child)?
– How to care for a parent/spouse with dementia?

CONTEXT
– How to deal with Job Dismissal, Retirement?
– How to deal with Economic crises, Wars, Natural Disasters?

Questions may overlap domains, Answers may CHANGE with TIME, & are NOT given by RCTs
Practical Example of Sociotype in Action:
A kid falls over in the playground & cries -
Mothers’ responses & UPBRINGING

1. “Oh it’s really nothing, just a scratch. Be a MAN - Boys don’t cry…”
2. “I know it hurts, Let me kiss it better. Let’s clean it with water, put on a plaster & you will be just fine....”
3. “It’s MY fault, I should not have let you go wild. Oh how terrible! We must go to the doctor immediately, and get anti-tetanus, then the ER and a Hematologist…”
4. “It’s YOUR fault for not being more careful…”

Which Mother said what?
Russian, American, Nordic, Jewish, English, Polish, Other…. (Affection & Justification)

Consider also:
• Juggling the # & type of those balls.....
• Soles of your shoes....

FUEL = NUTRITION
?Octane

“BAGGAGE” Experiences, Load/Unload

LIFE TASK
(of Sisyphus?)

Individual
Behaviour
<Health>

Change in
<Relationships>
<Context>

Sociotype

P Fuska napkin, Restaurant Geneva 2001
Nutritional & Sociotypic Influences through the life cycle in Health & Disease

Old Age
- Caloric Restriction

Maturity
- Diet x Gene
  - "Stress**
  - CVD
  - Cancer
  - DIABESITY*

Nutrition

Pregnancy
- Programming
  - Fetal Origins*
  - Epigenesis

Childhood
- Breast Feeding (-)
- Bonding
- Likes/Dislikes
- Intestinal Bacteria*

Adolescence
- Eating Disorders
- Food & Mood

Fertility
- Mate selection

Cultural norms
- Body image

Gene x Environment / Sociotype Interactions: Obesity in Pima Indians depends on location

Body Mass Index (kg/m²)

Pima Indians

Maycoba, Mexico
- Traditional Living

Arizona
- Indian Reservation, Casinos...

P <0.0001

after Ravussin E et al. Diabetes Care 17:1067, 1994
Development of Obesity –
depends on Genotype x Sociotype

Genotype A
  Sociotype A
  BMI

Genotype B
  Sociotype A
  BMI

Genotype C
  Sociotype A
  BMI

What is the Gene that makes everyone believe that everything is Genetic???

Body weight (= Input [FOOD] – Output [ACTIVITY])
according to economic status

Percentage of population

Global
Least developed countries
Developing countries
Economies in transition
Developed market economy countries

LOW SES

WHO 2000

Development & SES

Development & SES
Coping & Mastery skills are lower in less educated, the poor & the ill: data from 1328 subjects

Berry in preparation 2016

Correlations between the Sociotypic Domains and Coping in Total Population (n = 1296)

Context

Sociotype Coping Score

Relationships

Individual / Health

Correlations between the domains
0.353 – 0.421

Berry et al, submitted 2016
The influence of Sociotypic Domains on Coping in 572 Men and 724 Women

- Individual / Health
  - Men: 35.8%
  - Women: 26.6%

- Relationships
  - Men: 19.9%
  - Women: 14.5%

- Context
  - Men: 19.6%
  - Women: 16.2%

- Total
  - Men: 75.3%
  - Women: 57.3%

*Berry et al, submitted 2016*

Nutritional & Sociotypic Influences through the life cycle in Health & Disease

- Old Age
  - Caloric Restriction

- Maturity
  - Diet x Gene
    - "Stress*"
    - CVD
    - Cancer
    - DIABESITY*

- Nutrition
  - Fertility
    - Mate selection
    - Cultural norms
    - Body image
  - Adolescence
    - Eating Disorders
    - Food & Mood
  - Pregnancy
    - Programming
    - Fetal Origins*
    - Epigenesis
  - Childhood
    - Breast Feeding (-)
    - Bonding
    - Likes/Dislikes
    - Intestinal Bacteria*
Some questions for Sociotypic research: Regarding Coping for Food INSecurity

INDIVIDUAL / HEALTH
– How to keep up food quality and prevent malnutrition?
– How to deal with constant Hunger?
– How to eat previously unacceptable food – culture / religious taboos?

RELATIONSHIPS
– How to decide to whom to distribute the Food?
– How to cope if someone falls ill?

CONTEXT
– How to borrow or get credit?
– How to beg?
– Consequences of economic hardship?

Answers: CHANGE with TIME, & not given by RCTs

Coping strategies for Food Insecurity classified by Sociotypic Domain

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dietary Change</strong></td>
<td>Physiologic mechanisms in response to hypocaloric intake</td>
</tr>
<tr>
<td>Increase short-term Food</td>
<td>Reduce number of meals eaten in a day</td>
</tr>
<tr>
<td>Availability</td>
<td></td>
</tr>
<tr>
<td>Decrease # of people</td>
<td></td>
</tr>
<tr>
<td>Rationing Strategies</td>
<td>• Feed according to working members of HH</td>
</tr>
<tr>
<td></td>
<td>• Restrict consumption by adults in favor of small children</td>
</tr>
<tr>
<td></td>
<td>• Periodic fasts</td>
</tr>
</tbody>
</table>
## Coping strategies for Food Insecurity classified by Sociotypic Domain

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Individual</th>
<th>Relationships</th>
<th>Context</th>
</tr>
</thead>
</table>
| Dietary Change            | Physiologic mechanisms in response to hypocaloric intake                    |                                                                               | • Rely on less tasty & expensive foods  
|                           |                                                                           |                                                                               | • Ration the money to buy prepared food                                                       |
| Increase short-term Food  | Reduce number of meals eaten in a day                                       | Borrow food, or rely on help from a friend or relative                         | • Gather wild food, hunt, or harvest immature crops  
| Availability              |                                                                           | Purchase food on credit                                                         | • Consume next season’s seed stock  
|                           |                                                                           |                                                                               | • Purchase food on credit  
|                           |                                                                           |                                                                               | • Sell Assets                                                                              |
| Decrease # of people      |                                                                           | Send children to eat with neighbors                                            | Send household members to beg                                                                 |
| Rationing Strategies      | • Feed according to working members of HH  
|                           | • Restrict consumption by adults in favor of small children  
|                           | • Periodic fasts                                                           | Limit portion size at mealtimes                                                      | Unacceptable Behaviors...  
|                           |                                                                           |                                                                               | Steal Trash cans  
|                           |                                                                           |                                                                               | Sex 4 Food                                                                               |
Sociotype is involved with both the dynamic assessment of the stress of food insecurity and coping with it...

Constant Negative Feedback

**SOCIOTYPE**

**Individual: Relationships: Context**

Food Insecurity ↑

Primary Secondary Assessment → Livelihood Assets & Experiences → Coping Strategies

Repeated Cycles

Food Insecurity ↓

How Positive Deviance Changed my Life...
The Power of Positive Deviance

Solutions before our very eyes!!

The Premise:

In every community there are certain individuals whose uncommon practices/behaviors enable them to find better solutions to problems than their neighbors who have access to the same resources.

Marsh et al. BMJ 329, 1177, 2004

Positive Deviance (PD) Approach

Identifying Solutions to Community Problems Within the Community - Today

The Key Question?

What enables some members of the community (the “Positive Deviants”) to find these better solutions?
Food Security & Insecurity with reference to the Mediterranean Diet 2016

Elliot M Berry
elliotb@ekmd.huji.ac.il

Only those behaviors/strategies accessible to all are kept

The rest are “TBU,” True but Useless (i.e. not accessible to all) & are discarded

Malnutrition in Vietnam

PD Inquiry (PDI) How are some children well – nourished?????

<table>
<thead>
<tr>
<th>Gathering vegetables</th>
<th>“Stealing”</th>
<th>“TBU”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money from outside</td>
<td>“TBU”</td>
<td></td>
</tr>
<tr>
<td>All family thin….</td>
<td>“TBU”</td>
<td></td>
</tr>
<tr>
<td>Breast feeding etc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Project aim

**Child Malnutrition**

**Setting**

**Vietnam 1999 - 2000**

**PD Behaviors**

- Eating Fruits & Vegs, Shrimp, snails, Breast milk, beans, peanuts
- Boiling Drinking water
- 5-6 meals/d active feeding
- Mosquito bed net
- Immunization
- Daily bath
- Early care seeking for illness

---

### Positive Deviance asks who are the successful patients coping with a problem???

Positive Deviants find successful solutions in the SAME environment and with the SAME resources.
The Road to Positive Deviance

Determine Deviants

Discover

Define Challenge

Design & Do

Learn Self-Management from the Food Secure POSITIVE DEVIANTS

Solution already WORKS...

Community & Culturally valid

Health Promoting Schools - Improving Health & Hygiene in the Korogocho Slums of Nairobi, Kenya

Osnat Keidar
From PhD Dissertation 2011

They said it could not be done......
Before

After

Toilets

Before

After

Wash fruits before eating
**Student BMI improved just through hand washing!!**

![Bar graph showing BMI improvement](image)

*Student BMI improved just through hand washing!!*

*Sustainable Diets case study:*

**The Mediterranean Diet**
The “Pillars” of Food Security and Sustainability

The Food Security Pathway and its long-term time dimension - Sustainability

Food Security → Stability “Short term” Vulnerability “Long Term” SUSTAINABILITY → GENERATIONS

National Policy

after Berry et al., 2015
Sustainable Diets position Sustainability in the Food Security Pathway

- **FOOD SECURITY**
  - Availability
  - Accessibility
  - Utilization
  - Person-Centered

- **SUSTAINABILITY**
  - Natural Resources & Climate
  - Environment
  - Economy
  - Socio-Cultural

**Short Term Stability**

**Long Term**

*after Berry et al. Public Health Nutrition, 2015*

---

Low Environmental Impact
- Protect / Respect
- Biodiversity
- Ecosystems

Nutritionally Adequate
- Healthy, Safe
- Long-term

**Sustainable Diet**

- Economically
  - Fair & Affordable

- Cultural Acceptability

Optimize Natural & Human Resources

*FAO, 2010*
Sustainable Development Goals 1 (adapted from FAO)

1. No Poverty – c80% of poor people live in rural areas
2. Zero Hunger – Enough food for all, but c800 million go hungry...
3. Good Health & Well-being – Good Health starts with Nutrition (-9 months)
4. Quality Education – Nutritious food is critical for Learning
5. Gender Equality – Women produce ½ world’s food, but lack access to land
6. Clean Water & Sanitation – Sustainable agriculture and re-cycling addresses water scarcity
7. Affordable & Clean Energy – Modern food systems rely heavily on fossil fuels
8. Decent Work & Economic Growth – Agricultural growth in low-income economies can reduce poverty by half
9. Industry, Innovation & Infrastructure – Agriculture accounts for 25% of GDP in Developing Countries
Sustainable Development Goals 2

10. *Reduced Inequalities* – Land reforms can give fairer access to rural land
11. *Sustainable Cities and Commodities* – Rural investment can deter unmanageable urbanization
12. *Responsible Consumption & Production* – 1/3 the food produced is lost or wasted
13. *Climate Action* – Agriculture is key to responding to climate change
14. *Life below Water* – Fish give 3bn people 20% of daily animal protein
15. *Life on Land* – Forests contain >80% of terrestrial biodiversity
16. *Peace, Justice & Strong Institutions* – Ending hunger can contribute to greater stability and peace
17. *Partnerships for the Goals* – To raise the voices of the hungry

**SUSTAINABLE FOOD (SECURE) SYSTEMS & SD GOALS**

**ENVIRONMENT**
- Regional

**AVAILABILITY**
- National

**ACCESSIBILITY**
- Household

**UTILIZATION**
- Individual

Multi-Stakeholders: Government, Local Authorities, Farmers, Industry, NGOs, Academia, Civil Society … Consumers

THE CHALLENGE: How to MEASURE and MONITOR!!
Why the Mediterranean Diet???:
the ONLY diet with scientific evidence for health benefits

- Decreased Overall Mortality (-9%)
- Decreased Cardiovascular Mortality (-9%)
- Decreased Incidence & Mortality Cancer (-6%)
- Decreased incidence Parkinson's disease (-13%)
- Decreased Incidence Alzheimer's disease (-13%)

Food Security & Insecurity with reference to the Mediterranean Diet 2016
Elliot M Berry
elliotb@ekmd.huji.ac.il


• **EVERY MAIN MEAL** contains 3 basic elements:
  - **Cereals:** 1-2s, preferably whole grain (processing removes fiber and nutrients such as Mg, Fe, vitamins).
  - **Vegetables:** ≥2s, at least 1 serving consumed raw.
  - **Fruit:** 1-2s, as dessert.
  - Also - **Olive oil**: central, principal source of lipids.
  - Emphasis on variety in **colors & textures**.
  - The pyramid “core” – plant-origin foods – for prevention of many chronic diseases and for weight control.
Updating the Mediterranean Diet Pyramid: a Sustainable Lifestyle for today...

Food Pyramid vs Environment Pyramid

Barilla CFN
MEASURING ENVIRONMENTAL IMPACT: THE ECOLOGICAL FOOTPRINT ANGLE

SUPPLY = BIOCAPACITY
How much bioproductive area is available to us?

DEMAND = ECOLOGICAL FOOTPRINT
How much bioproductive area do we use?

ECOLOGICAL BALANCES: NATIONAL FOOTPRINT VS. NATIONAL BIOCAPACITY
WHAT IS DRIVING THE ECOLOGICAL FOOTPRINT OF MED COUNTRIES?

- Main drivers of the regional Footprint in 2010 were food consumption (~35%), transportation (~28%) and housing (~9%).
- The share of food Footprint ranges from as low as 20% (Slovenia) to as high as 70% (Morocco).
- Food is a basic need, on which family budgets are first spent.

Sustainability of food products: Responsibility of the whole food chain

INPUT

Agriculture
soil
feed
water
pesticides
energy

Food processing
water, energy
additives
refrigeration
packaging

Transport
fuel
refrigeration

Distribution
energy
refrigeration
packaging
fuel

Domestic preparation
water
energy
refrigeration
packaging

OUTPUT

Loss of soil
Polluting
Greenhouse Gases
emissions
Waste water
Organic waste

Waste water
Greenhouse gases
Polluting emissions

Greenhouse gases
Polluting emissions

Greenhouse gases
Polluting emissions
Food and Packaging waste

after A-M Giusti
FOOD FOOTPRINT OF MEDITERRANEAN COUNTRIES, IN 2010

- Protein-intensive food products (e.g., meat and dairy) have a higher footprint (per kcal) than plant-based food products.
- Egypt (and Slovenia) high calorie provision and low Footprint is due to low protein diet and high crop productivity (decreasing dependence on imported food).
- Portugal (and Malta) high Footprint is due to a protein-intensive diet rich in fish (44% of food Footprint) and meat products (16%).

Footprint Intensity of main food products

- Atlantic cod
- Yellowfin tuna
- Atlantic mackerel
- Beef meat
- Chicken meat
- Pig meat
- Cow Cheese
- Cow Milk (Skimmed)
- Yoghurt
- Eggs
- Fruits
- Vegetables
- Wheat
- Rice

Footprint intensity (gha per 1'000 kcal)

Global Footprint Network
Food Security & Insecurity with reference to the Mediterranean Diet

Elliot M Berry
elliotb@ekmd.huji.ac.il

CONCLUSIONS: Ecological Footprint & MeDiet

- Since Food is one of the key basic human needs, resource needs from consumption can only be shifted (+/-) to a small extent.
- Population growth and a shift towards protein-based, energy rich diets are likely to increase globally adding pressure on ecosystem services.
- Thus, future food security depends on efficiency improvements, reduction of food waste and promotion of healthier and less resource-intensive diets.

- Added Value of the MeDiet
  - Typical local products (e.g., oil, vegetables) by small-scale producers
  - Balanced food supply (in kcal)
  - Less carbon-intensive/mechanized agriculture
  - Nutritional/health quality of food
- Valorizing the MeDiet depends on food quality control, traceability (reduced producer-consumer distance), as well as increased market opportunities for small local, traditional producers.

Some Indicators for Sustainability Diets

<table>
<thead>
<tr>
<th>Environment</th>
<th>Economy</th>
<th>Socio-Cultural</th>
<th>Nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Foot print Management</td>
<td>Cost of Living Index</td>
<td>Traditional Products Seasonality</td>
<td>Fruits and Vegetables</td>
</tr>
<tr>
<td>*Carbon Ft-print</td>
<td>GDP / capita</td>
<td>Outside Meals</td>
<td>Diet Diversity</td>
</tr>
<tr>
<td>N₂ Ft-print</td>
<td>Household Expenditure Food</td>
<td>Ready-to-Eat meals</td>
<td>**Biodiversity</td>
</tr>
<tr>
<td>Arable land / cap</td>
<td>Food Losses &amp; Waste</td>
<td>Mass media Processed food</td>
<td>Nutrient density / quality</td>
</tr>
<tr>
<td>*Transport</td>
<td>**Biodiversity</td>
<td>Women's Literacy, Empowerment</td>
<td>Food Insecurity: Coping strategies</td>
</tr>
<tr>
<td>Farmers’ input</td>
<td>Community Gardens</td>
<td>Diet-related morbidity, mortality</td>
<td></td>
</tr>
<tr>
<td>Fertilizer use</td>
<td>Physical Activity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

More...... More...... More...... More......

after Berry et al., Public Health Nutrition, 2015
Building a Composite MEDIT Sustainability Index (MSI)

**Nutrition Variables**
Nutr 1, Nutr 2...

**Environment Variables**
Env 1, Env 2...

**Socio-Cultural Variables**
Sc 1, Sc 2...

**Economic Variables**
Ec 1, Ec 2...

**Intra-Dimensional Weightings**  \( \Sigma 100\% \)

**Inter-Dimensional Weightings**  \( \text{Total} = 100\% \)

**Composite Score**
MSI

**Dimension Score**

**Example: Sustainability Index**

- **Country A**
- **Country B**
- **Country C**
- **Country D**

**Other Considerations...**
- Smallholder productivity and income (especially women)
- Access to Food
- Malnutrition
- Food Loss and Waste
- &...more...
Food Security & Insecurity with reference to the Mediterranean Diet

Elliot M Berry
elliottb@ekmd.huji.ac.il

Synthesis of Indices:
The Methodology to build the FaNSI Composite Index may be readily applied to construct a relevant SUSTAINABILITY INDEX

Food and Nutrition Security Index (FaNSI)
SoFI, 2014

Sustainability Index (SI)

Indices: Right and Wrong

Right
- Help and “Pressure” Decision Makers (soft power),
- Inform Civil Society, Industry, Public Officials and all Stakeholders
- Measure Progress towards defined goals
- Priorities for Aid
- E.g. PISA – Progress for International Student Assessment
- TIP – Trafficking in Persons
- FaNSI ??

Wrong
- How can a country be represented by one number?
- How to lie with indices – Ranking the Rankings for Performance indices (Economist Nov 8th 2014)
- Political one-upmanship
- Misuse: “Name and Shame”
- E.g Global Slavery Index
Food Security & Insecurity with reference to the Mediterranean Diet 2016

Elliot M Berry
elliotb@ekmd.huji.ac.il

Mediterranean Diet AVAILABLE

Challenges
Too Many Food Choices
Food Prices
NO Time For Cooking
Women’s Roles...

Mediterranean Food EATEN

“Bottle Neck”
ECONOMIC
SOCIO-CULTURAL

Trends over past 40 yrs in the Mediterranean Adequacy Index

Ratio Mediet kcals: non-Mediet kcals

Alberta-Fidanza et al, 2004 & Mediterr 2012
Promoting the Mediterranean Diet Lifestyle: Interventions in Kindergartens & Junior Schools

Ronit Jakobovich, Asia Levita & Elliot M Berry in preparation, 2015
Maha Nubani PhD 2015. M Donchin, Ziad Abdeen & E M Berry

Changing Behaviours in EARLY CHILDHOOD – relevance for preventing Obesity and promoting the Mediterranean lifestyle

1890 Kindergarten CHILDREN aged 4-6 years
74 KINDERGARTEN TEACHERS
52 hour training Program

Intervention group: 1048 Children
42 Kindergarten teachers

Control group: 842 Children
32 Kindergarten teachers

Evaluation after 9 months Intervention
If a child can say to himself/herself:
“If I eat healthy food and do my physical exercises, then I’ll stay healthy”

Then, we have achieved our goal...

**Conclusion:**
It is possible to change behaviours towards a **Mediterranean Lifestyle** – even in Kindergartens
An Intervention Program for Promoting Healthy Eating & Physical Activity among Palestinian Girls in Grades 4 & 5

- Needs Assessment in 7 Intervention & 7 Control Schools
  - 897 Pupils,
  - 373 Teachers &
  - 744 Mothers
- 2 Interventions of 10 months

Maha Nubani PhD 2015. M Donchin, Ziad Abdeen & E M Berry

Changes in Behavior: Nutrition and Activity

![Graph showing changes in behavior:Nutrition and Activity](image)
At 2 years follow-up, the programme is still running in 6 / 7 of the intervention schools, is being implemented in 5 / 7 of the control schools. Additionally, several other schools are requesting to start the programme too…

**Possible Solutions to Improve Adherence to MEDIET**

- **Updating** the MEDIET and LIFESTYLE (MEDAL) to stimulate interest of the young in it as a contemporary, accessible, “fashionable” and sustainable healthy lifestyle. ROLE MODELS
- **More Education in schools**, in nutrition, cooking skills and exercise, with easy, quick meal choices within the MEDIET
- **Social networking & web-based communication and information**
- **Bringing more market produce** into supermarkets – health aisles…
- **Effective labelling** for consumers of principal foods groups of the MEDIET
Socio Cultural Aspects

Food Culture: The Culinary Triangle: (Lévi Strauss & Leach)

- Sushi (Raw),
- Smoked Salmon (Smoked),
- Chicken soup (Boiled),
- Mutton (Roast),
- Souffle (Cooked),
- Stilton / Gorgonzola Cheese (Rotten)

Mediterranean Diet????
Food Security & Insecurity with reference to the Mediterranean Diet 2016

Elliot M Berry
elliotb@ekmd.huji.ac.il

The ANATOMY of a MEAL

1. Purchase:

2. Preparation:
   Menu Planning, By Whom?, How?

3. THE MEAL:
   Which?, When? Where?, With whom? Quantity?, Duration?

4. Post Meal:
   Washing-Up Waste, Re-Use, Activity

Determinants of Food Choices

Physiology: Hunger, Blood Sugar, Insulin
Habits Experience
Taste Smell
Aesthetics Setting
Price

Food Choices
It is culturally unacceptable to lose weight in Kumasi, Ghana. ... and other culture icons.

Pets of obese people are fatter than pets of lean people.

Cultural and lifestyle elements

- **Moderation**: serving size, more foods from the “core” (provide satiety and moderate energy) and less from the top (high fat and simple sugar)
- **Socialization**: cooking, Wine (social beliefs), time devoted to meals (Slow food). Strengthens identity of communities
- **Physical activity**: ≥30 min. throughout the day, complements the diet by balancing energy intake. Not just sports, but also NEAT (non-exercise activity thermogenesis)
- **Adequate rest**: adequate night sleep, short sleep after eating (siesta) as a healthy Mediterranean tradition

Seasonality: seasonal, fresh and minimally processed foods maximize nutrient content.

Traditional, local, eco-friendly and biodiverse products: food chain contributes to the preservation of Mediterranean landscape and sea. The MD as a plant-centered dietary pattern contributes to reduction in animal consumption.
**Homo sapiens**
Who-ever you are
Where-ever you live
What-ever you eat

The main storage fatty acid in the human body is
**OLEIC ACID**
Olive Oil, Almonds, Avocado

Oleic Acid is the link between the Socio-Biology and Culture of the Mediterranean Diet

*Berry, 1997*

---

**CONCLUSIONS:**

FOOD SECURITY
&
INSECURITY
&
SUSTAINABILITY
&
SOCIOTYPE
= PUBLIC HEALTH NUTRITION
Berry's “E - Messages”
for Public Health Nutrition by Sociotype

Individual / Health
• EATING for ENJOYMENT
• EXERCISE

Relationships
• EMPOWERMENT
• EQUITY

Context
• EDUCATION
• EMPLOYMENT
• ECONOMICS
• ENVIRONMENTAL ENGINEERING

Education is THE number 1 Priority
Empowerment in The Philippines

Positive Deviance approach to FGM - Egypt

Empowerment Micro financing in Nepal

Empowerment of Kenyan Women in small farm Agriculture
Ben Gurion University Deworming Project in Ethiopia led by Prof Zvi Bentwich

Cultural Disbeliefs – “Healers”, Wonder drugs
Food Security & Insecurity with reference to the Mediterranean Diet 2016

Elliot M Berry
elliott@ekmd.huji.ac.il

+ Globalisation

Albert Einstein: "I fear the day when technology will outpace humanity. Then, the world will have a generation of idiots."

The curse of mobile phones.....

BUT...they are the future for Food Security!!!
Survey Data, Health care and Farmer’s markets and more...
Corruption is Everywhere – BUT Has INDIA “succeeded” better than AFRICA??

Yes, it can be done!!!
Yes, it can be done!!!
Lesson from my lab in Jerusalem

Food Security & Public Health Nutrition

A Well-Fed Nation is a
Healthy Nation is a
Productive Nation

elliotb@ekmd.huji.ac.il
Sustainability requires Vision AND Political Will ...

“What we need today, for the sake of survival of this planet, is long-term vision. Can governments whose very survival depends on immediate, extractive, short-term gain provide this? Our inability to live entirely in the present (like most animals do) combined with our inability to see very far into the future makes us strange in-between creatures, neither beast nor prophet.

... We plunder the earth hoping that accumulating material surplus will make up for the profound, unfathomable thing that we have lost.

Sustainability requires Vision AND Political Will ...

Political Will + People’s Will

= Sustainable Will

Isatou Jallow,
Las Palmas, 2014

Born in The Gambia, former Chief of Women, Children & Gender Policy for the UN World Food Programme (WFP) a major advocate for Gender Equality and the Empowerment of Women.

The Sociotype & Coping with Food Insecurity

INDIVIDUAL / HEALTH:
“Tell me what YOU eat and I will tell you what YOU are”

RELATIONSHIPS:
“Tell me how a FAMILY eats and I will tell you how it FUNCTIONS”

CONTEXT:
“Tell me how a NATION eats and I will tell you its VALUES”

Do kids go to bed hungry??

= COPING with FOOD INSECURITY & SOCIAL JUSTICE & SUSTAINABILITY
FOOD SECURITY (Public Health):
Food should be AVAILABLE & ACCESSIBLE & ADEQUATE & ENJOYABLE for ALL: MEDITERRANEAN LIFESTYLE

NUTRITION:
“MODERATION in all things, including MODERATION”
(David Berry z”l)

SOCIOTYPE:
...It is more important what comes OUT of your mouth than what goes IN..... (Matthew 15.11)

COPING: (3-fold cord)
How you cope is the life-long interaction between your Genotype ➔ Phenotype ← ➔ SOCIOTYPE

Supplementary Reading List

1. Kafka: The Hunger Artist  ✔
2. Knut Hamsun: Hunger
3. Damon Runyon: A Little Piece of Pie