Basic Occupational Health Services in Agriculture: a strategy to increase interventions for rural workers and reduce health inequalities in rural areas

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CONTENTS

• The past….
• The Present
• The global situation: some numbers
• OHS coverage in agriculture: existing data/estimates
• Health priorities in the sector
• Possible solutions

AGRICULTURE IN ANCIENT TIMES

PRE-COLUMBIAN DEITIES OF AGRICULTURE

ORIGINS OF RURAL WORKERS PROTECTION

"[villicum sauciatus] in valetudinarium confestim deducat et convenientem ei ceteram curationem adhiberi iubeat".

Columella, De Re Rustica XI, 1, 18

LUCIUS SIVIUS MODERATUS COLUMELLA

MIDDLES AGES

Urbanization: epidemics, famines and wars led workers to move from countryside to urban centers

"A fame, peste et bello, libera nos Domine"

BENEDETTO ANTELAMI
(1150 – 1223)

BAPTISTRY OF PARMA
EARLY MODERN AGE: DIET OF FARMERS

The New World
New food

BERNARDINO RAMAZZINI (1633-1714) -1

Bernardino Ramazzini
“De Morbis Artificum” (1700)
“De agricolarum morbis” (# 39)
- List of diseases
- Possible causes
- Possible treatments

BERNARDINO RAMAZZINI (1633-1714) -2

• “These illnesses basically have two causes: the weather and a poor diet”

• “It is almost ridiculous to suggest medical remedies for our farmers to avoid illness, since they hardly ever turn to a doctor, if at all, and if one is proposed, they paid no attention”

• “Their bodies, broken down by toil and a poor diet, must not be weakened by extensive and repeated blood-letting or purgatives”

AT THE ORIGINS OF THE PROTECTION -1

Edward Jenner (1749-1823)
“I cannot take the smallpox, for I have had the cowpox”

THE NEW AGRICULTURE REVOLUTION

The rise of mechanization: the tractor

UNDERSTIMATION AND NEW RISKS

WARNING PESTICIDES
Fire will cause toxic fumes
AGRICULTURE: THE SPECIFICITIES

THE SPECIFICITY
Activity linked with the wellbeing of entire nations
• Risk of soil depletion and pollution
• Agricultural workers are a patrimony of their countries!
• Need of healthy, trained and well educated agricultural workers

THE SCENARIO

ALL INCOME LEVELS (2009)

Total number: more than 3 billions
East Asia & Pacific: 38%
South Asia: 20%
Europe & Central Asia: 8%
North America: 6%

250 million children engaged in child labour
170 million are working in agriculture

THE SCENARIO

Number of subjects economically active in the world:

- Low income (385 millions)
- Middle income (2.245 millions)
- Heavily indebted poor countries (262 millions)
- High income (346 millions)

THE SCENARIO

RURAL CONTRIBUTION

- Agriculture: 55.7%
- All sectors: 19%

THE SCENARIO

OHS Coverage in the World: some estimates

- In typical developing regions the OHS coverage ranges from 5% to 10% at best
- Agriculture, the self-employed, small-scale enterprises and the informal sector are usually not covered at all
- In European regions wide variation among countries: 5-90%; Central and Eastern Europe: in transition
- USA, Canada, Japan, Australia, Israel: coverage comparable to Western Europe
- Agricultural and self-employed underserved
- The problem of family subsistence agriculture, daily paid labourers in plantations, seasonal or migrant workers and child labourers

The «land of inequalities»

Only a small proportion of agricultural workers provided with health surveillance at the workplace

Among those who are exposed at the same levels of risk only a small proportion is provided with occupational health care

Same levels of risk exposure addressed in different ways

DENIED A BASIC HUMAN RIGHT, THE RIGHT TO HEALTH

UNDERREPORTING OF OCCUPATIONAL DISEASES AND ACCIDENTS

HEALTH RISKS IN AGRICULTURE

Chemicals

Biological agents

Physical risks

Muscle skeletal workload

APP IN THE WORLD: SOME ESTIMATES

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>YEAR</th>
<th>WORLDWIDE ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO</td>
<td>1973</td>
<td>500,000 (5,000 deaths) in 1972</td>
</tr>
<tr>
<td>WHO (from Litchfield et al., 2005)</td>
<td>1985</td>
<td>1,000,000 (20,000 deaths)</td>
</tr>
<tr>
<td>Jeyaratnam</td>
<td>1985</td>
<td>220,000 (deaths)</td>
</tr>
<tr>
<td>Garcia et al</td>
<td>1998</td>
<td>500,000 – 1,500,000 (3,000 - 28,000 deaths)</td>
</tr>
<tr>
<td>Goel et al</td>
<td>2007</td>
<td>300,000 deaths</td>
</tr>
</tbody>
</table>

Patterns in APP

<table>
<thead>
<tr>
<th>Where</th>
<th>Cases</th>
<th>Intentional</th>
<th>Accidental</th>
<th>Occupational</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>India, Civil Hospital of Ahmedabad</td>
<td>190 cases of OP acute poisoning</td>
<td>67.4 %</td>
<td>15.8 %</td>
<td>16.8 %</td>
<td>Agarwal et al., 1993</td>
</tr>
<tr>
<td>Turkey, Afyonkarahisar district</td>
<td>220 patients admitted to the local hospital 1995–2004; diagnosis of APP</td>
<td>75.9 %</td>
<td></td>
<td></td>
<td>Yuremez et al., 2007</td>
</tr>
<tr>
<td>Turkey</td>
<td>63 cases of pesticide poisonings</td>
<td>53 (84 %)</td>
<td>10 (16 %)</td>
<td></td>
<td>Ozor et al., 2007</td>
</tr>
<tr>
<td>Jordan</td>
<td>144 fatalities due to pesticides recorded in a 4-year survey</td>
<td>64.3 %</td>
<td></td>
<td>24.1 % (accidental + homicidal)</td>
<td>Abdulai et al., 2006</td>
</tr>
<tr>
<td>Ethiopia, Tikur Anbessa Hospital</td>
<td>50 cases of OP poisonings in 6 years</td>
<td>94 %</td>
<td></td>
<td></td>
<td>Abebe et al., 1991</td>
</tr>
</tbody>
</table>

STUDIES ON APPs IN AGRICULTURE

Some Thoughts

Data from only a few countries

Extrapolations from small-scale research

Non comparable data

Incidence of occupational poisonings on all poisonings

<table>
<thead>
<tr>
<th>Region</th>
<th>% Poisoning Requiring Hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA 1987</td>
<td>5-8% (Blondell, 1997)</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>38% (Leveridge, 1998)</td>
</tr>
<tr>
<td>UK</td>
<td>25% (Thompson et al., 1994)</td>
</tr>
</tbody>
</table>

Sub-Saharan Africa 13%

Middle East 11%

India 59%

China 9%

Asia (other regions) 55%

Latin America 27%
But not only pesticides...

Reptile and insect bites and stings as significant cause of fatal acute poisoning in developing world and tropical countries

Scorpion sting: 15th cause of death in Mexico
(J. Morales, opening ceremony of the 30th ICOH Congress)

Epidemiological data in agriculture: an overview

Mortality for all causes and neoplasms lower than expected. In particular:

- Lower mortality for cardiovascular diseases
- Lower mortality for malignancies: esophagus, lung, bladder, colon

Other risk factors in agriculture

- Noise and vibrations (TRACTOR AND OTHER RURAL VEHICLES and tools): burden unknown
- Pesticides (high prevalence of acute poisonings, mainly in the developing world)

Epidemiological data in agriculture...on the other hand....

- Higher incidence of:
  - Hodgkin and non-Hodgkin lymphoma
  - Leukemia
  - Multiple myeloma
  - Stomach cancer
  - Prostatic cancer
  - Melanoma
  - Skin cancer
  - Connective tissue cancer
  - Brain cancer

No strong association with tobacco smoke

Immune deficit conditions

Hearing loss: results of active search of cases

- Examined the official data showing the yearly number of hearing loss reports in agriculture

Questions: does it exist an underestimate of cases?
ASBESTOS: OCCUPATIONAL RISK IN AGRICULTURE

- TRACTOR AND OTHER RURAL VEHICLES MAINTENANCE (Brake maintenance)
- USE OF JUTA BAGS
- CEMENT-ASBESTOS ROOF OR RURAL BUILDINGS

CANCER RISK FACTORS IN AGRICULTURE

- Ultraviolet radiation
- Mineral oils and solvents
- ONCOVIRUSES
- PESTICIDES
- ASBESTOS

CANCER MORTALITY IN AGRICULTURE

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>NUMBER</th>
<th>SIR (IC 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All neoplasms</td>
<td>2587</td>
<td>0.88 (0.84-0.91)</td>
</tr>
<tr>
<td>Lip Sun</td>
<td>25</td>
<td>1.43 (0.93-2.11)</td>
</tr>
<tr>
<td>Biliary tract</td>
<td>8</td>
<td>3.26 (0.97-4.45)</td>
</tr>
<tr>
<td>Ovary Trigone</td>
<td>8</td>
<td>2.9 (1.28-5.85)</td>
</tr>
<tr>
<td>Prostate Trigoneta</td>
<td>1046</td>
<td>1.26 (1.18-1.33)</td>
</tr>
<tr>
<td>Thymus</td>
<td>29</td>
<td>1.29 (0.77-1.76)</td>
</tr>
<tr>
<td>Multiple myeloma</td>
<td>43</td>
<td>1.16 (0.97-1.81)</td>
</tr>
<tr>
<td>Melanoma Sun</td>
<td>67</td>
<td>1.64 (1.27-2.09)</td>
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<table>
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<tr>
<th>CAUSE</th>
<th>OBS</th>
<th>SMR (IC 95%)</th>
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<tr>
<td>Neoplasm</td>
<td>187</td>
<td>1 (0.9-1.2)</td>
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<tr>
<td>Oral cavity and pharynx</td>
<td>3</td>
<td>5.3 (1.1-15.6)</td>
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<tr>
<td>Nose, nasal sinuses</td>
<td>2</td>
<td>8.7 (1-31.1)</td>
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<tr>
<td>Oesophagus</td>
<td>4</td>
<td>4.1 (1.1-10.6)</td>
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POSSIBLY CARCINOGENIC AGENTS

- RETROVIRUSES: AVIAN LEUKOSIS/SARCORMA VIRUSES, RETICULOENDOTHELIOSIS VIRUSES, ...
- PAPILLOMA VIRUS
- VAPORS Emitted by PACKAGING MACHINERY (PVC WELDING)
- POLICYCLIC AROMATIC HYDROCARBONS Emitted in FOOD SMOKING PROCESSES
- NITROSAMINES (FOOD AND FEED PRESERVATION)
- WOOD DUSTS
- FORMALDEHYDE

BALTIMORA UNION POULTRY COURT

- MORTALITY STUDY REALIZED ON A COHORT OF 2580 POULTRY ABATTOIRS WORKERS

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Pesticides and Cancer

Conclusions of the Symposium on “Agricultural exposures and cancer”, Oxford, UK, November 2002

“... to date the results of epidemiologic studies have been inconsistent.”

Alexander et al., 2005
**PESTICIDE: OPEN POINTS**

- Absence of an acceptable evidence of increased cancer risk (apart from carcinogenic agents such as arsenicals)
- Reduction of overall mortality and cancer mortality in agricultural workers (with some exceptions: skin and lip, prostate, Hodgkin and non Hodgkin lymphoma, brain, leukemia, myeloma)

- The issue is not an "emerging", one, but...

**EXAMPLE 1: Cow Milker’s Nodule**

**DIAGNOSIS**: reached in close collaboration with the agricultural enterprise veterinarian

*Pseudopoxvirus infection in human*  
*Pseudopoxvirus infection in cow*

**EXAMPLE 2**

"Tulip Finger": frequent contact dermatitis consequent to sensitization against tulipine  
Students, housewives, emigrants

**EXAMPLE 3: POLYNEUROPATHY AMONG PIG ABATTOIRS**

15 cases in one plant, followed by 8 cases in another plant


**EXAMPLE 4: the emerging risk “HEV”**

RNA hepatitis virus  
Types 3-4: possible zoonotic agent  
Main reservoirs: pigs and wild boars  
HEV in pigs faces: from 5-6% to 75% in farms with more than 4,000 pigs  
Anti HEV IgG positive pig breeders: up to 40% (USA)

Our study on 103 agricultural workers  
IgG anti HEV (Kit 1): 1/103 positive  
Same group tested with kit 2: 23/103  
In South France: 52% positive  
Among HEV effects: 25%, mortality in pregnant women; PERIPHERAL NEUROPATHY; synergy with hepatotoxicity.

**FURTHER PROBLEMS**

- Emerging of new risks
- Emerging of new diseases
- Unheeded signals

Mannetje et al, 2011: Farming, growing up on a farm, and haematological cancer mortality (OEM 2011)  
(studies mostly from developed countries)
SPECIFIC HIGH CONCERN ISSUES IN AGRICULTURE

- Occupational injuries
- Acute poisonings from chemicals, or insect and reptile biting
- Allergic dermatitis
- (Early) miscarriage
- Infectious diseases
- Musculo-skeletal disorders
- Neoplasms (brain, leukemia, lip, non Hodgkin lymphoma, multiple myeloma, skin, stomach, kidney, prostate, soft tissues sarcoma, …)
- Neurobehavioral impairment
- Reproductive health
- Respiratory diseases (asthma, allergic alveolitis, chronic bronchitis)

A QUESTION: HOW TO MANAGE???

- Prevalence of self-employed workers against employees
- Remoteness
- Small number of workers per enterprise
- Family work, elderly and retired at work
- Child labor
- Instability of conditions
- Multiple exposures

THE CONTEXT: PRIMARY HEALTH CARE

Essential health care
Practical, scientifically sound and socially acceptable methods and technology
Universally accessible to individuals and families in the community through their full participation
Cost that community and country can afford
First level of contact between national health system and individuals, family and community
Brings healthcare as close as possible to where people live and work.
Alma-Ata Declaration, 1978

Principles of PHC for workers (WHO)

- Responsiveness to specific workers’ health needs
- Prevention of occupational diseases and work accidents
- Quality-oriented
- Interventions that have been proven to be effective, catalyze for change
- Government accountability
- Involvement of workers’, employers and civil society in planning and evaluation of national programmes

Principles of PHC for workers (WHO)

- Social justice
- Those workers that have the highest risks and least access to health services
- Participation
- Workers and employers need to be involved in planning and delivery of services
- Intersectorality
- The closest link between the health sector and other sectors

MANUTENTZIONE (MACCHINE E CAMPAGNA)

PESTICIDE APPLICATION
HERBICIDE TREATMENTS
SEEDING
WATERING
HARVESTING
MAINTANANCE OF MACHINERY AND FIELDS
ANIMAL BREEDING
A SOLUTION: REACHING RURAL WORKERS AT THE WORKPLACE

- Minimum set of instruments
- (ECG; hearing and respiratory function evaluation kits; biological specimens collection kits)
- Adequately trained personnel
- Support from employers and employees...and

- Involvement of rural GPs, often the only providers of PHC to agricultural and rural workers
- Developing pilot experiences of collaboration

SOME KEY WORDS FOR THE FUTURE

- Creating a net of BOHSs in rural areas
- Incorporating Occupational Health in Primary Health Care
- Developing collaboration between OHS physicians and Rural GPs
- Providing training and education specifically addressed to the different actors of prevention in agriculture

A though: occupational health and safety must be implemented where it is necessary, not where it is more comfortable or more paid....

Thank you for your attention