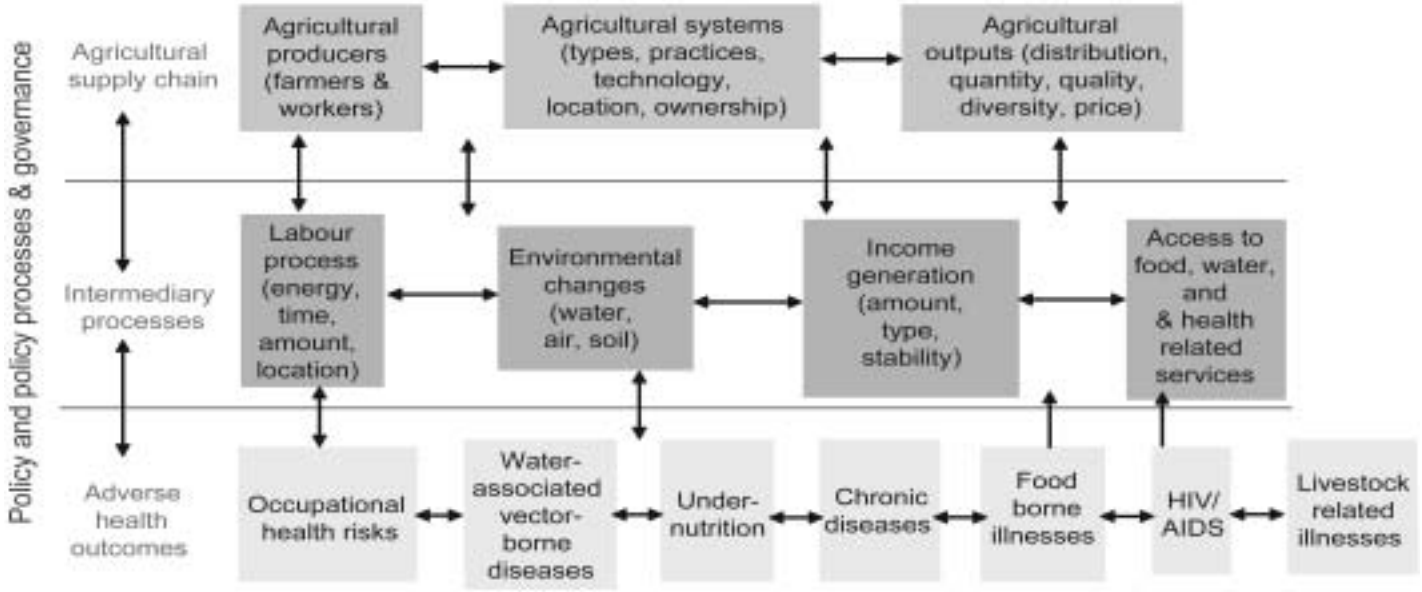
IAASTD
International Assessment of Agricultural Knowledge, Science and Technology for Development

Issues in Brief

Human Health and Nutrition

Good health is fundamental to living a productive life, meeting basic needs and contributing to community life. Good health is an enabling condition for the development of human potential.

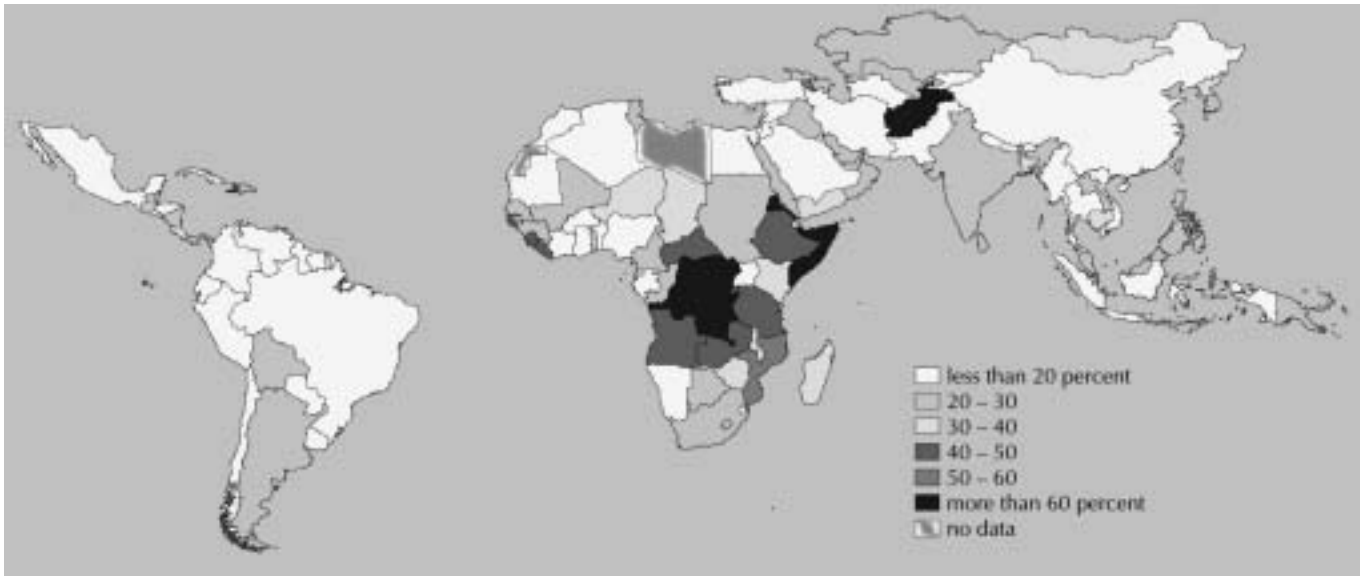


Linkages between agriculture and health. Source: Hawkes and Ruel, 2006.

The components of health are multiple and their interactions complex. The health of an individual is strongly influenced by genetic make-up, nutritional status, access to health care, socioeconomic status, relationships with family members, participation in community life, personal habits and lifestyle choices. The environment – natural, climatic, physical, social or workplace – can also play a major role in determining the health of individuals. Agricultural knowledge, science and technology (AKST) can play an important role in improving human health and nutrition.

Although current global production of food calories is sufficient to feed the world's population today, millions die or are debilitated every year by hunger and malnutrition, making them vulnerable to infectious diseases, e.g., HIV/AIDS, malaria, tuberculosis, and diarrheal diseases. In many developing countries, hunger and health risks are exacerbated by extreme poverty and poor and dangerous working conditions. About 50% of the health burden of malnutrition is attributable to unsafe water, unimproved sanitation and hygiene.

In contrast, in industrialized countries, over-nutrition and food safety issues, including foodborne illnesses affecting human health as well as impacts associated with agricultural production systems, are predominant concerns. There is also a significant incidence of undernutrition among the poor, and a higher burden of both infectious and non-communicable diseases associated with metabolic syndromes, such as diabetes and obesity.



Proportion of the population unable to acquire sufficient calories to meet their daily caloric requirements, 2003 estimates. Source: Rosegrant et al., 2006

Undernutrition

AKST has an important role to play in both developing and industrialized countries in contributing to food security and food sovereignty, and breaking the *malnutrition/poor health/low productivity* cycle.

Food insecurity arises when people do not have physical and economic access to sufficient safe, nutritious and culturally acceptable food to meet their dietary needs. An adequate intake of calories does does not ensure that the need for micronutrients has been met. Being underweight due to wasting (i.e., low weight-for-height, indicating acute weight loss) or stunting (i.e., low height-for-age, indicating chronic restriction of a child's nutrition), micronutrient deficiencies, as well as being overweight, are forms of malnutrition.

> Approximately 852 million people around the world are unable to obtain enough food to lead healthy and productive lives.

Undernutrition in children is responsible for an increased risk of illness and death from many infectious diseases, causing nearly 3.6 million deaths, including some attributed to diarrhea, pneumonia, measles and malaria. The prevalence of malnutrition and infectious disease among the young has important implications for the health and well-being of the population, because ill health in childhood can affect an individual's physical and mental development, susceptibility to disease, and capacity for work. The HIV/AIDS epidemic is a compelling example of the interactions among poverty, illness, food insecurity and loss of productive capacity. HIV/AIDS has become a major factor in the pervasiveness of food insecurity, as it undermines rural families' ability to cultivate adequate food. Irregular and poor quality nutrition, in turn, hastens the onset of AIDS in those weakened by HIV and increases vulnerability to opportunistic infections. The global labor force had lost 28 million economically active people to AIDS by 2005; this number is expected to increase to 48 million in 2010 and 74 million in 2015. Two-thirds of those labor losses will be in Africa. Fewer workers mean more families without providers, more children without parents, and the loss of transmission of knowledge, skills, and values from one generation to the next.

Chronic Diseases

Over-nutrition is associated with increasing rates of worldwide obesity and chronic diseases, including heart disease, diabetes, stroke and some cancers. These chronic diseases account for nearly half of the global burden of disease, with the burden

growing fastest in low- and middle-income countries. More sedentary, urbanized lifestyles are expected to contribute to the trend. In addition, the overall large increase in calorie availability in developing countries is expected to further increase the prevalence of obesity and associated diseases. It is estimated that by 2020, 60% of the disease burden in developing countries will result from non-communicable diseases exacerbated by obesity. Chronic health conditions, such as various cancers and neurological, developmental, reproductive and endocrine-disrupting effects, have also been shown to be associated with exposure to chemical pesticides.

Roughly 40% of the world's grain supply is consumed in animal feed, with grain-to-livestock ratios conservatively estimated at two kilos of grain to produce one kilo of chicken, four kilos to produce one kilo of pork and seven kilos to produce one kilo of beef. Increased consumption of animal protein contributes to the burden of chronic disease as well as

Avian influenza control. Source:FAO.

to undernourishment when grain production is insufficient or distributed in ways that affect food availability for those at risk of undernourishment. Demand for livestock products is projected to double by 2050 in sub-Saharan Africa and South Asia, increase in South America and countries of the former Soviet Union to OECD levels, and remain essentially the same in most OECD countries.

Infectious Diseases

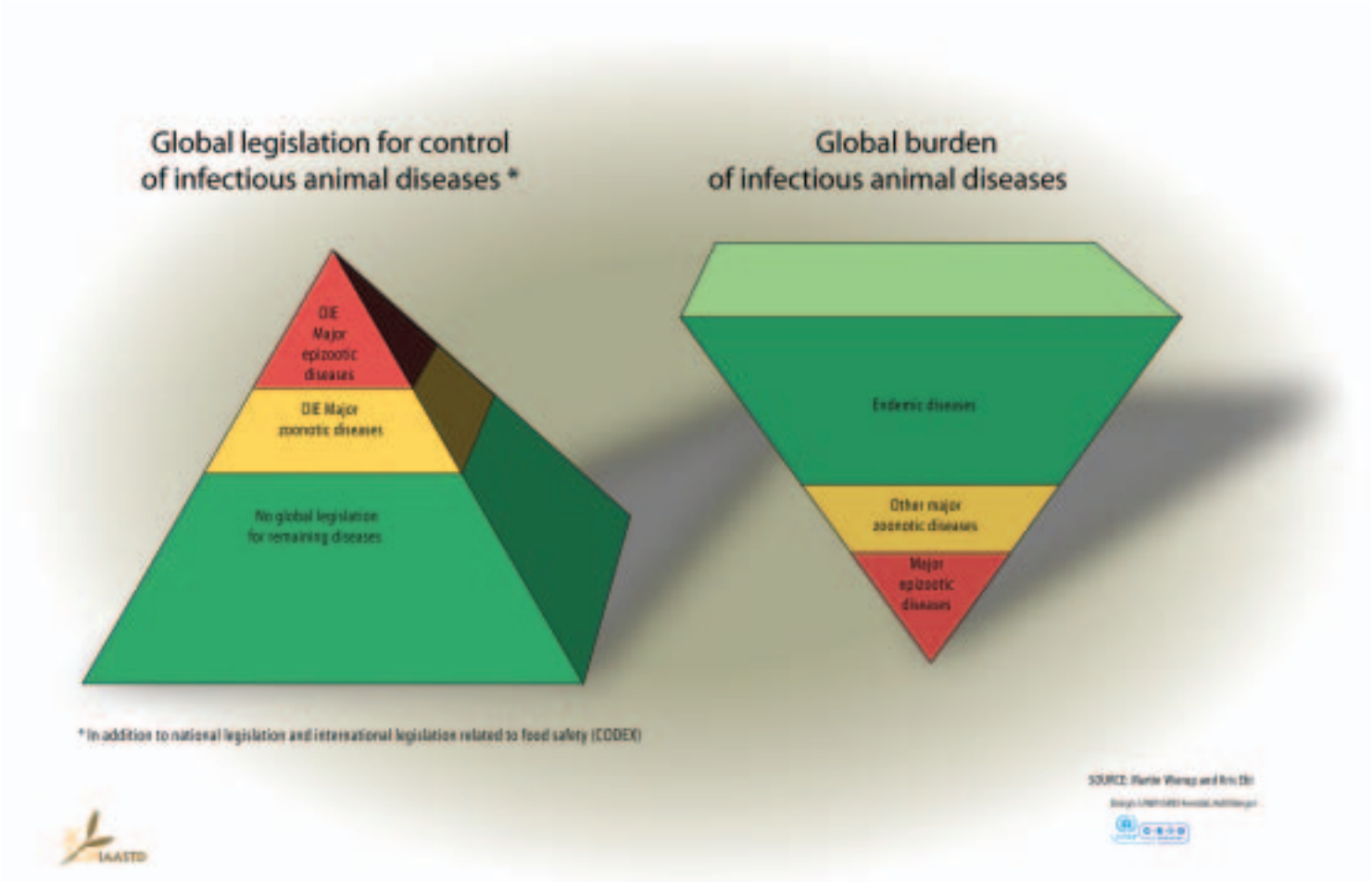
Communicable diseases are the primary cause for variations in life expectancy across countries. AKST is important for three broad categories of infectious diseases whose incidence is affected by agricultural systems and practices, e.g., malaria and bovine spongiform encephalopathy (BSE), foodborne zoonotic diseases, and epidemic zoonotic disease, e.g., avian influenza.

In the future, pathogens that infect more than one host species are more likely to emerge than those that target a single-host species. Factors driving disease emergence include intensification of crop and livestock systems, economic factors (e.g., expansion of international trade), social factors (changing diets and lifestyles), demographic factors (e.g., population growth), environmental factors (e.g., land use change and global climate change), and microbial evolution. Most of the factors that have contributed to disease emergence in the past will continue, if not intensify, this century. The increase in disease emergence will affect both high- and low-income countries.

Serious socioeconomic impacts can occur when diseases spread widely within human or animal populations, or when they spill over from animal reservoirs to human hosts. Animal diseases also affect animal and welfare. They influence perceptions of food safety; result in trade restrictions; adversely affect rural incomes, livelihoods and non-livestock rural industries; have detrimental environmental effects; and adversely affect national economies in countries heavily dependent on agriculture. Even small-scale animal disease outbreaks can have major economic impacts in pastoral communities.

Food Safety

Foodborne diseases are estimated to affect 30% of the population annually in industrialized countries and to account for an estimated 2.1 million deaths in developing countries. More than 200 known dis-



eases are transmitted by food; however, the true burden of most foodborne illnesses is obscured by under-reporting, illnesses caused by unknown pathogens, and other factors. The proportion of the population at high risk of illness or death from foodborne pathogens is increasing in many countries due to increasing age, the prevalence of chronic diseases and immuno-suppressive conditions. The need for strict food safety standards from the farm to the table has been highlighted by a wide range of sanitary and phytosanitary issues, including well-publicized outbreaks of BSE, hoof-and-mouth disease, avian influenza, salmonella and E. coli; acute poisonings and deaths associated with pesticide residues; and concerns regarding the effects of genetically modified organisms on human health. A severe constraint is that there is no adequate mechanism for financing the public health costs resulting from trans-border foodborne illnesses. Developing countries adopt few international food standards into domestic legislation because they lack the resources and technical capacity to implement and enforce the standards. The normative framework and technical assistance planning for food safety in developing countries is largely a function of trade policy or of the economics of private markets. Funds and capacity to carry out pathogen and pesticide residue testing at port of entry, for example, has also been sharply curtailed even in industrialized countries, leading to increasing incidence and outbreaks of food and chemical poisoning. Challenges for the next decades will be to ensure safer food and raise the quality of life without creating market entry barriers to agricultural exports from poor countries.

Globalization of the food supply, accompanied by market share concentration of food distribution and processing companies and growing consumer awareness increase the need for effective, coordinated and proactive national food safety systems.

Health concerns that could be addressed by AKST include the presence of pesticide residues, heavy

metals, hormones, antibiotics and various additives in the food system as well as those related to large-scale livestock farming. Strengthened food safety measures are important and necessary in both domestic and export markets, but can impose significant costs. Some countries may need help in meeting food control costs such as monitoring and inspection, and costs associated with market rejection of contaminated or otherwise unsafe commodities and food products.

Occupational Health

Worldwide, agriculture accounts for at least 170,000 occupational deaths each year; in other words, half of all fatal occupational accidents. This is twice the average accident rate for other industries. Machinery and equipment, such as tractors and harvesters, account for the highest rates of injury and death, particularly among rural laborers. Other important health hazards include agrochemical poisoning, transmissible animal diseases, toxic or allergenic agents, and noise, vibration and ergonomic hazards. The World Health Organization estimates that there are between two and five million cases of pesticide poisoning each year affecting pesticide applicators and rural communities.

Improving occupational and public health requires a greater emphasis on health protection through development and enforcement of health and safety regulations including international treaties to phase out and ban highly hazardous pesticides. Policies should explicitly address tradeoffs between livelihood benefits and environmental, occupational and public health risks, and should promote agricultural production systems that simultaneously meet health, environmental, social and economic goals.

Practices and policies for moving toward improved health and nutrition

- Use an integrated agroecosystem and human health approach to increase food security and safety, decrease the incidence and prevalence of infectious and chronic diseases, and decrease occupational exposures, injuries and deaths.
- Invest in robust agricultural, public health, and veterinary detection, surveillance, monitoring and response systems to identify the true burden of ill health and cost-effective, health-promoting strategies and measures.
- Promote policies and programs to improve micronutrient intake and diversify diets.
- Increase food safety via effective, coordinated and proactive national and international food safety systems; legislative frameworks for identification and control of biological and chemical hazards; and farmer-scientist partnerships for the identification, monitoring and evaluation of risks.
- Support policies that explicitly recognize the importance of improving human health and nutrition, including regulation of food product formulation and pesticides in foods and drinking water; international agreements and regulations for food labeling and health claims; and creation of incentives for the production and consumption of healthy foods.
- Strengthen the capacity of agricultural, veterinary, and public health systems to reduce the spread of infectious diseases, reduce exposure to immune-compromising factors and toxicants, and develop and deploy AKST to identify, monitor, prevent, control and treat diseases.
- Improve occupational and public health by developing and enforcing health and safety regulations (including pesticide regulations), enforcing cross-border regulations regarding illegal or excessive use of toxic agrochemicals, and conducting health risk assessments and full-cost accounting that make explicit the tradeoffs between maximizing livelihood benefits, protecting the environment and improving health.

- On an international level, establish an independent body dedicated to assessing major new technologies and providing an early warning and early listening system to help policy makers and stakeholders monitor and assess the introduction of new technologies and their potential socioeconomic, health and environmental impacts.

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) provides information on how agricultural knowledge, science and technology can be used to reduce hunger and poverty, improve rural livelihoods and human health, and facilitate equitable environmentally, socially and economically sustainable development. The full set of IAASTD reports includes a Global and five sub-Global reports and their respective summaries for Decision Makers as well as a Synthesis Report, including an Executive Summary. The reports were accepted at an Intergovernmental Plenary in Johannesburg in April 2008.

The assessment was sponsored by the United Nations, the World Bank and the Global Environment Facility (GEF). Five UN agencies were involved: the Food and Agriculture Organization (FAO), the UN Development Program (UNDP), the UN Environment Programme (UNEP), the UN Educational, Scientific and Cultural Organization (UNESCO) and the World Health Organization (WHO).

IAASTD Issues in Brief are taken directly from the IAASTD Reports published in 2008 by Island Press.

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