metals, hormones, antibiotics and various addi-
tives in the food system as well as those related to
large-scale livestock farming. Strengthened food
safety measures are important and necessary in
different 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 rejec-
tion of contaminated or otherwise unsafe commodi-
ties 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. Machin-
ery and equipment, such as tractors and harvesters,
account for the highest rates of injury and death, parti-
cularly among rural laborers. Other important health
hazards include agrochemical poisoning, transmissible animal diseases, toxic or allergenic
eriotics, and noise, vibration and ergonomic haz-
ards. The World Health Organization estimates that
there are between two and five million cases of pe-

cise poisoning each year affecting pesticide appli-
cators 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 ben-

safety, decrease the incidence and prevalence of
infectious and chronic diseases, and de-
crease occupational injuries, illnesses and deaths.

• Invest in robust agricultural, public health, and
veterinary detection, surveillance, monitor-
ning and response systems to identify the true
burden of ill health and cost-effective, health-

• Promote policies and programs to improve mi-

• Increase food safety via effective, coordina-
ated and proactive national and international
food safety systems; legislative frameworks
for identification and control of biological and
chemical hazards; and farmer-scientist part-
nerships 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 for drink-
ing water; international agreements and regu-
lations for food labeling and health claims; and
creation of incentives for the production and
consumption of healthy foods.

• Strengthen the capacity of agricultural, vet-
inary, and public health systems to reduce the
spread of infectious diseases, reduce ex-
posure to immune-compromising factors and
toxins, and develop and deploy ARS to
identify, monitor, prevent, control and treat dis-
ea.

• 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 agrochemi-

cals, and developing new technologies and their
potential socioeconomic, health and environ-
mental impacts.

• On an international level, establish an inde-
pendent body dedicated to assessing major
health risks and providing an early warn-
ing and early listening system to help policy
makers and stakeholders monitor and assess the
shocks and stressors, new technologies and their
impact on health, nutrition, and the environment;
and in doing so, consider the tradeoffs between
livelihood benefits and environmental, occupational and
health risks, and should promote agricul-
ture benefits and environmental, occupational and
human health, and facilitate equitable envi-
ronmentally, socially and economically sustainable
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cal, 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 meet the nutritional require-
ments of populations, food insecurity, malnutri-
tions 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 coun-
tries, hunger and health risks are exacerbated by
extreme weather and poverty and dangerous living
conditions. About 50% of the burden of mal-
nutrition is attributable to unsafe water, unpro-

In contrast, in industrialized countries, over-nutrition
and food safety issues, including bovine illnes-
es affecting human health as well as impacts asso-
ciated with agricultural production systems, are
preponderant concerns. There is also a significant
increase in undernutrition among the poor, as
a higher burden of both infectious and non-in-
fectious diseases associated with metabolic syn-

dromes, such as diabetes and obesity.
Infectious Diseases

Communicable diseases are the primary cause for variations in life expectancy across countries. AKST is important in 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 changes and climate change), and microbial evolution. Most of the factors that have contributed to disease emergence in the past will continue to act at the same intensity, 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 welfare. They influence perceptions of food safety; result in trade restrictions; adversely affect livestock systems and practices, and non-farmland rural industries; have detrimental environmental effects; and adversely affect national economies in countries highly 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 globally each year and to account for an estimated 2.1 million deaths in developing countries. More sedentary, urbanized lifestyles are expected to 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.

More than 852 million people around the world are unable to obtain enough food to lead healthy and productive lives. Approximately 852 million people worldwide 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 safety 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 increases 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, and E. coli, acute poisonings and deaths associated with pesticide residues; and concerns regarding the effects of genetically modified organisms on human health. A core constraint is that there is no adequate mechanism for financing the public health costs resulting from trans-border foodborne diseases. Developing countries adopt few international food standards into domestic legislation because they lack the resources and technical capacity to implement and enforce the standards.
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 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 not ensure that the need for micronutrients has been met. Being underweight due to wasting (i.e., low weight-for-height), including adult weight loss or stunting (i.e., low height-for-age), indicating chronic 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.

Chronic Diseases

Overnutrition 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 of all non-communicable diseases exceeding that of all communicable diseases, accidents, and violence combined.

Infectious Diseases

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

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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.
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 not ensure access to other food groups containing essential nutrients such as protein, vitamins, and minerals. Food insecurity can be measured by food availability, affordability, access, and stability. Food insecurity affects not only the quantity and quality of food but also the nutritional status of individuals and households. It is closely linked to poverty, social and economic status, and environmental conditions. Food insecurity is a major challenge in many parts of the world, particularly in developing countries, where the majority of the population depends on agriculture for their livelihood. It affects not only the physical health of individuals but also their mental well-being and productivity. The consequences of food insecurity are far-reaching, affecting not only individuals and families but also communities, countries, and even the global economy. It is estimated that about 800 million people globally suffer from chronic hunger, and another 2 billion people suffer from hidden hunger, characterized by deficiencies in essential nutrients such as protein, vitamins, and minerals. Food insecurity is a major contributor to malnutrition, which is a leading cause of mortality and morbidity, particularly among children and pregnant women. It also increases the risk of non-communicable diseases, such as diabetes, heart disease, and cancer, and reproductive health problems, such as low birth weight and maternal mortality. Food insecurity is a multidimensional problem that requires a comprehensive approach, involving social, economic, and environmental policies. It is a priority for international organizations, governments, and civil society organizations, and it requires a collective effort to tackle it effectively.
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.

The components of health are multiple and their interactions complex. The health of an individual is strongly influenced by genetic make-up, nutritional status, lifestyle factors, personal behavior, socioeconomic status, relationships with family members, participation in community life, personal habits and lifestyle.

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.

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• Promote policies and programs to improve micronutrient intake and diversify diets.
• Increase food safety via effective, co-ordinated 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 recognise the importance of improving human health and nutrition, including regulation of food product formulation and pesticides in foods drinks; international agreements and regulations for food labelling 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 toxins, 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 agrichemicals, and conducting health risk assessments and full-cost accounting that make explicit the trade-offs 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 emergence of new technologies and their potential socioeconomic, health and environmental impacts.

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