

INTRODUCTION TO THE ISSUES

“Earlier this year I launched the ‘Zero Hunger Challenge’, which is now the focus of our High Level Task Force on Food Security. The Challenge requires action on five fronts: ensuring access to food; ending childhood stunting; building sustainable food systems; doubling the productivity and income of smallholder farmers; and finally, reducing food waste. Waste, be it in field, factory or kitchen, is tragic. These different initiatives share the same goal: ending hunger in our lifetime. Achieving this goal depends on forging partnerships that make a difference. It calls for harnessing the creativity of scientists and economists. It requires developing new approaches and technologies to respond to climate change, water scarcity and desertification. And it requires better global governance...Ending hunger and malnutrition can be done. It is the right thing to do, the smart thing to do, the necessary thing to do. It is what we must do.”

- United Nations Secretary-General Ban Ki-moon
*At the 2012 World Food Prize Laureate Award Ceremony,
Des Moines, Iowa, USA*

Background:

There are strong, direct relationships among agricultural productivity, hunger, and poverty. Families with the financial resources to escape extreme poverty rarely suffer from chronic hunger; while poor families not only suffer the most from chronic hunger, they are also the segment of the population most at risk during acute food shortages. Improvements in agricultural productivity and food availability benefit the poor first. As rural farmers and urban gardeners are able to grow and access more and better food, improved diets and health and higher family incomes and improved livelihoods result.

About 70% of the world’s poor live in rural areas, especially in Africa and Asia. Most countries in these regions are falling short of their commitments to reduce hunger and poverty levels in half by 2015, and the number of poor people in them is increasing. The majority of these poor subsist on about 450 million smallholder farms (five acres or less). The most critical and immediate improvements in the livelihoods of smallholders can be achieved through agriculture-led economic growth and improved nutrition and health. If systematic scientific, agronomic, economic, and policy solutions are to be successful, they will have to be adapted to local circumstances and guided by, and available to, smallholder farmers.

While the technologies and policies exist to overcome the challenges of hunger and poverty, many countries continue to lack the political will and leadership to make necessary investments and implement key reforms. Supportive trade and domestic policies, economic reform, public-sector infrastructure development and private sector investment, good governance and political leadership will be necessary for the targeted implementation of measures appropriate to the unique challenges and constraints faced by each country.

What is Food Security?

Food security is when people do not live in hunger or fear of starvation. Food insecurity exists when people are undernourished as a result of the cost or physical unavailability of food and adequate nutrition. Worldwide, more than 925 million people – one seventh of the world population – are without enough food to eat on a regular basis and six million children die of hunger annually. Two billion people face sporadic food insecurity throughout the year, and there are 22 countries, 16 of which are in Africa, where more than one-third of the population is malnourished.

YOUR MISSION: Select ONE developing country (see **STEP 1**) and ONE of the key factors affecting food security (see **STEP 2**) as the focus of your research. You will then prepare your paper using the guided questions (see **STEP 3**), presenting your research findings and recommendations for increasing food production and availability in ways that improve food security and household livelihoods in your chosen country.

STEP 1. SELECT ONE OF THE COUNTRIES BELOW AS THE FOCUS OF YOUR RESEARCH:

Example: *If you consider the Indian Subcontinent, your research will focus on a factor affecting food security in ONE of these countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan or Sri Lanka*

North Africa: Algeria, Canary Islands (Spain), Egypt, Libya, Morocco (including Western Sahara), Tunisia

Central Africa: Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sudan, South Sudan, Zambia

East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Reunion, Rwanda, Seychelles, Somalia, Tanzania, Uganda

West Africa: Benin, Burkina Faso, Cape Verde islands, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé & Príncipe, Senegal, Sierra Leone, Togo

Southern Africa: Botswana, Lesotho, Namibia, South Africa, St. Helena (U.K.), Swaziland, Zimbabwe

Caribbean: Anguilla (U.K.), Antigua & Barbuda, Bahamas, Barbados, Bermuda (U.K.), Cayman Islands (U.K.), Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique (France), Montserrat (U.K.), Netherlands Antilles, Puerto Rico (U.S.), St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago, Turks & Caicos (U.K.), Virgin Islands (U.K., U.S.)

South America Tropical: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela

South America Temperate: Argentina, Chile, Falkland Islands (U.K.), Uruguay

Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama

Indian Subcontinent: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

East Asia: China, Hong Kong S.A.R. (China), Japan, Democratic People's Republic of Korea (North), Republic of Korea (South), Macao S.A.R. (China), Mongolia, Taiwan

Southeast Asia: Brunei, Darussalam, Burma (Myanmar), Cambodia, East Timor, Indonesia, Lao People's Democratic Republic (Laos), Malaysia, Philippines, Singapore, Thailand, Vietnam

Central Asia: Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan

Middle East: Bahrain, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen

Eastern Europe: Albania, Armenia, Azerbaijan, Belarus, Bosnia/Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Serbia/Montenegro, Slovakia (Slovak Republic), Slovenia, Ukraine

South Pacific: Christmas Island, Cook Island, Federated States of Micronesia, Fiji, French Polynesia (Tahiti), Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Samoa, American Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wake Island, Wallis & Futuna



STEP 2. SELECT ONE KEY FACTOR AFFECTING FOOD SECURITY FROM THE FOLLOWING:

Biology, Environmental & Agricultural Sciences

Factors 1-11

1. **Plant Science** Increasing crop yields and improving disease/drought resistance through research and breeding of improved plant varieties
2. **Water Scarcity** Managing water scarcity and adapting farming practices to reduced water supplies with improved irrigation technologies and conservation practices
3. **Biofuels** Balancing the demand on global food and energy supplies and ensuring that developing nations also benefit from the use of biofuels
4. **Animal Health** Preventing the transmission of disease in livestock and poultry with improved management, investments in vaccine development, and proper application of medications to avoid antibiotic-resistance
5. **Climate Change** Responding to climate change by adapting agricultural practices and policies to increase carbon sequestration and support ecological resilience to erratic weather, rising temperatures/drought, and shifting plant diseases and pest infestations
6. **Sustainable Agriculture** Developing and implementing sustainable agricultural practices (no-till, crop rotation, integrated pest management, etc.) to combat erosion, desertification and soil depletion and reduce pesticide/herbicide use and minimizing environmental degradation associated with industrial agricultural practices (improved animal waste disposal, conservation buffers, etc.)
7. **Animal Agriculture** Implementing sustainable practices for raising livestock and poultry (management intensive grazing, integrated livestock/poultry grazing and poultry/vegetable production systems, fish pond farming systems, etc.)
8. **Spoilage & Waste** Reducing spoilage and improving the quality and shelf life of food products with improved food preservation techniques and increased processing capacity (flash-heating, aseptic processing, freeze drying, bulk storage, etc.)
9. **Water & Sanitation** Increasing access to safe, potable water supplies and education on proper sanitation/hygiene and food preparation techniques to reduce the transmission of food and water-borne disease
10. **Dietary Diseases** Addressing obesity and other dietary diseases through nutrition education, access to nutritious foods, and healthy behavior (dietary diversification, food selection, portion-size control, exercise, etc.)
11. **Malnutrition** Alleviating micronutrient deficiencies (iron, vitamin A, iodine, zinc) and protein-energy malnutrition through improved access to nutritious food, fortification, supplementation, school-feeding programs, nutrition education, emergency therapeutic feeding, etc.
12. **Demographics** Addressing the challenges and opportunities posed by population growth and urbanization
13. **Conflict Resolution** Preventing and resolving political and armed conflict with diplomatic initiatives
14. **Human Rights** Addressing gender, cultural and economic discrimination and improving access to credit and securing property rights for the poor and marginalized
15. **Education** Investing in education, training and extension for improved implementation of agricultural research and technology
16. **Good Governance** Reducing corruption by promoting the rule of law, government accountability, democratic principles and transparency
17. **International Trade** Removing discriminatory international trade policies to improve market access, promote fair trade and increase economic development
18. **Foreign Aid** Assisting vulnerable populations and improving the effectiveness of humanitarian relief and food aid in conflict zones and disaster sites
19. **Farm to Market** Improving access to markets through infrastructure development (roads and railways, internet, mobile technologies, electricity)

Social Studies & Geography

Factors 10-18

Economics & Business

Factors 15-19



STEP 3. ANSWER THE FOLLOWING QUESTIONS TO DEVELOP YOUR PAPER:

1. Choose ONE of the countries listed under STEP 1 as the focus of your research.
2. Define a typical subsistence farm family or poor urban family in your country:
 - a. family size and composition, diet, education and access to health care;
 - b. farm size, crops grown, and agricultural practices (if researching a farm family) or employment and wage, and where they typically purchase food and have access to private or community gardens (if researching an urban family); and
 - c. major barriers to improving agricultural productivity, employment and earning a living wage, and gaining access to food markets and adequate nutrition.
3. Select ONE of the key factors listed under STEP 2 as the focus of your research.
4. Answer the following questions to develop your paper and understand how your selected factor affects food security in your country:
 - a. How does the factor you selected affect agricultural productivity, household income or food availability and quality in your chosen country? Discuss the following:
 - i. What role does the factor presently play in causing your family to not produce enough food, earn sufficient income to purchase food, or access adequate nutrition?
 - ii. What is the present status of this factor? How severe is the situation? Is the environment being degraded? Are women, rural or urban poor, or developing countries particularly disadvantaged? If so, how?
 - iii. Are the trends for this factor improving, worsening, staying the same? How are the trends for this factor measured? Do these measurements indicate the situation is changing? If so, how? Because of potential change, or no change, is the situation for your rural farm or urban family getting worse, improving or staying the same?
 - b. How would improving or resolving this factor increase the amount or quality of food or income available to your family? Preserve the environment sustainably? Lead to economic development and poverty reduction? Benefit women, smallholder farmers or urban dwellers in your country of focus?
 - c. How will other major issues (climate change, population growth, water scarcity, urbanization, energy demand, pollution, etc.) affect your chosen factor and the wellbeing of your family and their community in the decades ahead?
 - d. Based on your research, give your recommendations on how to effectively address your selected factor to improve the food security of your rural or urban family in the country on which you have focused. What Millennium Development Goals and associated policies, technologies, practices or investments do you recommend to solve this situation by 2015? Describe one or more local projects in your focus country that could be scaled up successfully.
 - e. Give your suggestions for the appropriate role of communities, the national government, corporations and other organizations (United Nations, World Bank, international research agencies, non-governmental and civic organizations, etc.) in implementing your recommendations in your country. How should rural farm and urban families be involved as key players in implementing these recommendations?

RESEARCH PAPER CHECKLIST

As you review your paper, use this checklist to ensure you have completed all of the guided instructions:

Country selected: _____

- Define a typical family
 - Family size and composition
 - Diet
 - Education
 - Access to health care
- Describe a typical farm OR urban area
 - Typical Farm
 - Farm size
 - Crops grown or animals raised
 - Agricultural practices
 - OR Urban Area:
 - Employment and wages
 - Access to purchased food
 - Urban food production
- Describe major barriers facing the typical family
 - Barriers to improving agricultural productivity
 - Barriers to employment at a living wage
 - Barriers to accessing food markets and adequate nutrition

Factor selected: _____

- Describe how the factor you selected affects agricultural productivity, household income, OR food availability and quality
 - Describe the effect of the factor on the typical family in your country
 - Describe the present status of this factor
 - Describe the trends for this factor (improving, worsening, or constant)
 - Describe how improving this factor would benefit your country
- Describe how other major issues (climate change, population growth, water scarcity, energy demand, pollution, etc) will affect your chosen factor

Give recommendations on how to effectively address your factor to improve food security for the typical family in the country you have selected:

- Describe one or more local projects in your focus country that could be scaled up successfully
- Give suggestions for the appropriate role of communities, the national government, and organizations in implementing your recommendations
- Describe how the typical family can be involved in implementing your recommendations

PAPER FORMAT REQUIREMENTS

Be sure to review the *Introduction to the Issues* and instructions on *How to Write Your Paper* before beginning your research, and follow the *Paper Format Requirements* below, as all papers will be evaluated on both content and formatting. A list of suggested references can be found in the *Sample Resources*, and the *Sample Paper* provides an example of how to format and structure your paper.

Students selected to attend the 2013 Global Youth Institute as a state delegate will have their research papers peer-reviewed and published online by the World Food Prize Foundation.

FORMAT REQUIREMENTS

Papers must include:

- **Identification in the upper left-hand corner** of the first page providing the name of the student author, high school name, school city, school state, selected country and factor number, and essay title (in bold)

Example: Dhrooti Vyas
Valley High School
West Des Moines, IA
Afghanistan, Factor 18

Afghanistan: Social business to build infrastructure and empower farmers

- **Body of approximately 4-5 pages** in length including:
 - an introduction and conclusion, each of which must be at least one-half page
 - word count of approximately 2200 to 3500 words, excluding bibliography
- **Bibliography page with at least five sources and in-text citations** using the standards set by the Modern Language Association (MLA). Note: footnotes are not required for high school papers in the MLA format.
- **MLA Style Guide:** owl.english.purdue.edu/owl/resource/747/01/

Papers must be submitted as a Word (.doc or .docx) file and meet the following page format requirements:

- **One-inch page margins** (top, bottom, left, right)
- **Eleven-point (11) font, Times New Roman**
- **Single-space text, no indentation**
- **Double-space between paragraphs**

SUBMISSION:

Submit papers electronically through the online registration form as instructed in the “How to Participate” box on your state web page.

DEADLINE FOR RECEIPT OF ONLINE REGISTRATION AND PAPER SUBMISSION: FRIDAY, MARCH 8, 2013.

2013 WORLD FOOD PRIZE YOUTH INSTITUTE PAPER

ENDING HUNGER IN OUR LIFETIME: A CALL TO ACTION

SAMPLE RESOURCES

Below are suggested resources, both general and organized by factor, to aid your research. Note: This is not a full resource list and use of additional resources will be needed to meet the requirements of the paper.

The World Food Prize Foundation does not endorse any particular point of view represented in these resources.



MAPS, FACTS & FIGURES

Central Intelligence Agency - The World Factbook: Background information by country.
www.cia.gov/library/publications/the-world-factbook/

Millennium Development Goals Monitor & Tracking Map

Track how countries are progressing in their efforts to achieve the Millennium Development Goals (MDGs)
www.mdgmonitor.org/index.cfm www.mdgmonitor.org/map.cfm?goal=0&indicator=0&cd

Interactive Hunger Map & Country Database

World Food Programme (WFP), the United Nations' frontline agency in the global fight against hunger
www.wfp.org/hunger

2012 Global Hunger Index

International Food Policy Institute (IFPRI), Concern Worldwide, Welt Hunger Hilfe, 2012.
www.ifpri.org/publication/2012-global-hunger-index

Rural Poverty Portal - select country from drop down menu for statistics and articles

International Fund for Agricultural Development (IFAD)
www.ruralpovertyportal.org/web/guest/region

Famine Warning System Network (FEWS NET) - provides timely and rigorous early warning and vulnerability information on emerging and evolving food security issues.

www.fews.net/Pages/default.aspx



GENERAL RESOURCES

THE RESOURCES IN THIS SECTION PROVIDE AN OVERVIEW OF FOOD SECURITY ISSUES

Can We Feed Seven Billion People? Opinion, Sir Gordon Conway, Huffington Post, October 28, 2011

www.huffingtonpost.co.uk/professor-sir-gordon-conway/can-we-feed-seven-billion_b_1063464.html

Food and Agriculture Organization of the United Nations: The food security arm of the UN, the FAO provides a global perspective on agricultural challenges and development.

www.fao.org/index_en.htm

The State of Food Insecurity in the World 2012 (SOFI)

www.fao.org/publications/sofi/en/

UN Zero Hunger Challenge Website (Resources & Documents)

www.un.org/en/zerohunger/resources.shtml

Millions Fed: Proven Successes in Agricultural Development

David Spielman, Rajul Pandya-Lorch. International Food Policy Research Institute (IFPRI), 2009.
www.ifpri.org/sites/default/files/publications/millionsfedbooklet.pdf

Innovations in Action (supplement to the Worldwatch Institute's 2011 State of the World Report):

(paste link into browser if you have a problem accessing document)

www.worldwatch.org/system/files/NtP-Innovations-in-Action.pdf



BOOKS

Acker, David and Gasperini, Levinia. Education for Rural People – The Role of Education, Training and Capacity Development in Poverty Reduction and Food Security. Food and Agriculture Organization (FAO), Rome, 2009.

Beckmann, David. Exodus from Hunger: We Are Called to Change the Politics of Hunger. John Knox Press, Louisville, 2010.

Conway, Gordon and Wilson, Katy. One Billion Hungry: Can We Feed the World?. Cornell University Press, Ithica, 2012.

Conway, Gordon. The Doubly Green Revolution. Penguin Books USA Inc., New York, 1997.

McGovern, George. The Third Freedom: Ending Hunger in Our Time. Simon & Schuster, New York, 2001.

Runge, C. Ford, Senauer, Benjamin, Pardey, Philip and Rosegrant, Mark. Ending Hunger in our Lifetime - Food Security and Globalization. Johns Hopkins University Press, Baltimore, 2003.

Sachs, Jeffrey. The End of Poverty: Economic Possibilities for Our Time. The Penguin Press, USA, 2005.

Swaminathan, M.S. and Medrano, Pedro (Eds). Towards Hunger Free India: From Vision to Action. East West Books, Chennai, 2005.

Thurow, Roger, Kilman, Scott. Enough: Why the World's Poorest Starve in an Age of Plenty. PublicAffairs, USA, 2009.

Worldwatch Institute. State of the World 2012: Moving Toward Sustainable Prosperity. Worldwatch Institute, Washington DC, 2012.

Yunus, Muhammad. Creating a World without Poverty. PublicAffairs, New York, 2008.

High School and College Textbooks can also be used for background information on relevant scientific subjects, for example, nutrition, public health, molecular biology, genetics, botany, agriculture, sociology, economics, ecology and geography.



MASS MEDIA & NEWSFEEDS

Newspapers can often initiate awareness about current events, issues and ideas on food security at local, national, regional and international levels. *The New York Times* publishes a Science Section every Tuesday. *Yahoo! News*, on the Internet, has daily science and world headline articles that are taken from Reuters Press Agency and other sources. Other news sources to consult include:

IRIN Humanitarian News & Analysis
www.irinnews.org

Inter-Press News (African smallholder farming news)
www.ipsnews.net/new_focus/farmingfuture/index.asp

BBC News
www.bbc.co.uk/news/

Voice of America News
www.voanews.com

National Public Radio
www.npr.org



RELEVANT ORGANIZATIONS & INFORMATIONAL WEBSITES

Bangladesh Rural Advancement Committee (BRAC)

www.brac.net

Bread for the World

www.bread.org

The Chicago Council on Global Affairs

www.thechicagocouncil.org

The Coalition for Adolescent Girls (*Check out the “Knowledge” section to access the: “Girls Count Reports”, “Global Girl Facts” and “Girls Discovered Global Map”*) www.coalitionforadolescentgirls.org/

Consultative Group on International Agricultural Research (CGIAR)

www.cgiar.org

EarthTrends: Environmental Information from the World Resources Institute

www.wri.org/project/earthtrends/

Grameen Bank

www.grameen-info.org

HarvestPlus

www.harvestplus.org

Heifer International

www.heifer.org

International Assessment of Agricultural Science and Technology for Development (IAASTD)

www.agassessment.org

International Food Policy Research Institute (IFPRI)

www.ifpri.cgiar.org, www.ifpri.org/countries, www.ifpri.org/publications

The New Partnership for Africa's Development (NEPAD)

www.nepad.org/

Oxfam International

www.oxfaminternational.org

Partnership to Cut Hunger and Poverty in Africa

www.partnership-africa.org/

United Nations Children’s Fund (UNICEF)

www.unicef.org

United Nations Development Programme (UNDP)

www.undp.org

The UN Millennium Project

www.unmillenniumproject.org

United States Agency for International Development (USAID)

www.usaid.gov

The World Bank

www.worldbank.org <http://blogs.worldbank.org/youthink/>

(Click [here](#) for the Students & Teacher's page – view Youthink! About Development “Issues Briefs” section)

World Food Programme (WFP) of the United Nations

www.wfp.org

Worldwatch Institute

www.worldwatch.org



RECOMMENDED INTERVIEWS, SPEECHES & PANEL DISCUSSIONS

Seven Billion And Counting On Point, NPR Audio Archives, 27 October 2011

<http://onpoint.wbur.org/2011/10/27/seven-billion>

Global Food Price Spikes On Point, NPR Audio Archives, 9 February 2011

<http://onpoint.wbur.org/2011/02/09/global-food-price-spikes>

“Take it to the Farmer”: Reaching the World’s Smallholders – Proceedings of the 2010 Borlaug Dialogue

(Kofi Annan, Chair, Alliance for a Green Revolution in Africa; Howard Buffet, President, the Howard G. Buffet Foundation; Nozal Gondal, Minister of Agriculture, Republic of Pakistan; Mohammad Rahimi, Minister of Agriculture, Republic of Afghanistan; Tom Vilsack, U.S. Secretary of Agriculture; Florence Chenoweth, Minister of Agriculture, Republic of Liberia; Christopher Flavin, President, Worldwatch Institute; Dr. Phillip Nelson, 2007 World Food Prize Laureate; and other international experts) World Food Prize International Symposium, Video and Audio Archives, 15-17 October 2010

www.worldfoodprize.org/en/borlaug_dialogue//previous_years/2010_borlaug_dialogue/

Silent Tsunami: Global Food Crisis (John McArthur, Executive Director, Millennium Promise; Raj Patel, Visiting Scholar, University of California at Berkeley/Author of “Stuffed and Starved;” and Joia Mukherjee, Medical Director, Partners in Health) On Point with Tom Ashbrook, NPR Archive, 5 May 2008.

<http://onpoint.wbur.org/2008/05/05/silent-tsunami#>

Giving Africa Infrastructure for Growth Talk of the Nation, NPR Audio Archives, 5 April 2006

www.npr.org/templates/story/story.php?storyId=5325397

How Can Scientists Help Address Poverty? (Per Pinstrup-Andersen, 2001 World Food Prize Laureate; and other experts) Talk of the Nation, NPR Audio Archives, 17 February 2006

www.npr.org/templates/story/story.php?storyId=5221063

The Problems of Preventing Famine (Natasha Quist, West Africa Regional Director, OXFAM; Marc Cohen, Research Fellow, IFPRI; and Jason Beaubien, NPR News) Talk of the Nation, NPR Audio Archives, 26 July 2005

www.npr.org/templates/story/story.php?storyId=4771717

Addressing Hunger and Poverty (Jeffrey Sachs, Director, Earth Institute, Columbia University; and Lester Brown, President and Founder, Earth Policy Institute) Talk of the Nation, NPR Audio Archives, 20 May 2005

www.npr.org/templates/story/story.php?storyId=4660415

UNICEF’s Voices of Youth Digital Diaries

First-person accounts by young people from around the world on issues affecting their lives

www.unicef.org/voy/takeaction/takeaction_2692.html



RESOURCES LISTED BY FACTOR

Factor 1 - Plant Science

Plant Breeding: The Business and Science of Crop Improvement

The British Society of Plant Breeders, 2006

www.bspb.co.uk/BSPB%20Handbook.pdf

Agricultural Biotechnology and Genetically Engineered Crops - Policy Briefs

US Agency for International Development (USAID), 2004

www.absp2.cornell.edu/resources/briefs/documents/warp_briefs_eng_scr.pdf

Factor 2 - Water Scarcity:

Water-Short World Will Need “More Crop per Drop” - Experts

Megan Rowling, Alertnet, 2012

www.trust.org/alertnet/news/water-short-world-will-need-more-crop-per-drop-experts/

Beyond More Crop per Drop

Frank Rijberman and Nadia Manning. International Water Management Institute (IWMI), 2006

www.iwmi.cgiar.org/Publications/Other/PDF/Beyond_more_crop_per_drop.pdf

Factor 3 - Biofuels:

Biofuels and Sustainable Development

Henry Lee, William Clark, and Charan Devereaux. 2008

www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/2008_events/S_Servolo/San_Servolo_Biofuels_Report_FIN_AL.pdf

The State of Food and Agriculture 2008: “Biofuels: Prospects, Risks, and Opportunities”

Food and Agriculture Organization (FAO), 2008

Summary: ftp.fao.org/docrep/fao/011/i0100e/i0100e01.pdf

Full Report: www.fao.org/docrep/011/i0100e/i0100e00.htm

Factor 4 - Animal Health:

Transboundary Animal and Plant Pests and Diseases

Food and Agriculture Organization (FAO), 2009

ftp://ftp.fao.org/docrep/fao/meeting/018/k6361e.pdf

Combating Infectious Diseases of Livestock for International Development

BBSRC and UKAid, February 2010

www.bbsrc.ac.uk/web/FILES/Publications/100215-cidlid-brochure.pdf

Factor 5 - Climate Change:

Micro-level Practices to Adapt to Climate Change for African Small-Scale Farmers

Till Below, Astrid Artner, et al. International Food Policy Research Institute (IFPRI), 2010

www.fao.org/fileadmin/user_upload/rome2007/docs/Micro-level_Practices_to_Adapt_to_Climate_Change.pdf

Climate Change Response Strategies for Agriculture: Challenges and Opportunities for the 21st Century

Francesco Tubiello, Josef Schmidhuber, et al. World Bank, 2008

www.fao.org/fileadmin/templates/em2009/docs/World_Bank_2008c_.pdf

Factor 6 - Sustainable Agriculture:

Agricultural Sustainability and Intensive Production Practices

David Tilman, Kenneth G. Cassman, Pamela A. Matson, Rosamond Naylor, and Stephen Polasky. Nature, 2002
www.cedarcreek.umn.edu/biblio/fulltext/t1860.pdf

The Paradigm of Conservation Agriculture

J. Dumanski, R. Peiretti, J. Benetis, D. McGarry, and C. Pieri. Proceedings of World Association of Soil and Water Conservation, 2006
www.unapcaem.org/publication/ConservationAgri/ParaOfCA.pdf

Factor 7 - Animal Agriculture:

Sustaining intensification of smallholder livestock systems in the tropics

J.J. McDermott, S.J. Staal, H.A. Freeman, M. Herrero, and J.A. Van de Steeg. Livestock Science, 2010
<http://dels.nationalacademies.org/resources/static-assets/banr/AnimalProductionMaterials/McDermottSustainingIntensification.pdf>

Revisiting Mixed Crop-Livestock Systems: Smart Investments in Sustainable Food Production

M. Herrero, P. K. Thornton, A. M. Notenbaert, S. Wood, S. Msangi, H. A. Freeman, D. Bossio, J. Dixon, M. Peters, J. van de Steeg, J. Lynam, P. Parthasarathy Rao, S. Macmillan, B. Gerard, J. McDermott, C. Seré, M. Rosegrant. Science, 2010 (Must create free "Science" sign-in for free access to full article)
www.sciencemag.org/content/327/5967/822/reply#sci_el_13136

Factor 8 - Spoilage and Waste:

Increasing Food Availability by Reducing Postharvest Losses of Fresh Produce

A.A. Kader. Acta Horticultura, 2005
ucce.ucdavis.edu/files/datastore/234-528.pdf (paste link into browser if you have a problem accessing document)

Postharvest losses and waste in developed and less developed countries: opportunities to improve resource use

R.J. Hodges, J.C. Buzby, and B. Bennett. Journal of Agricultural Science, 2010
www.bis.gov.uk/assets/foresight/docs/food-and-farming/science/11-561-sr15-postharvest-losses-and-waste.pdf

Factor 9 - Water and Sanitation:

Water Quality

UN Water, Policy Brief, 2011
www.unwater.org/downloads/waterquality_policybrief.pdf

Compilation of 13 Factsheets on Key Sustainable Sanitation Topics

Elisabeth von Münch, Rahul Ingle, Doreen Mbalo, Leonie Kappauf. Sustainable Sanitation Alliance, 2012
www.sswm.info/sites/default/files/reference_attachments/MUENCH%20et%20al%202012%20Compilation%20of%2013%20Factsheets%20on%20Key%20Sustainable%20Sanitation%20Topics.pdf

Factor 10 - Dietary Diseases:

Chronic Diseases Growing in Developing Nations: WHO

Kate Kelland, Reuters (posted on Huffington Post), July 16, 2012
www.huffingtonpost.com/2012/05/16/chronic-disease-developing-nations_n_1520195.html

The Nutrition Transition and Obesity in the Developing World

Barry Popkin, American Journal of Clinical Nutrition, 2001
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