HOME, COMMUNITY AND SCHOOL VEGETABLE GARDENS: NUTRITION-SENSITIVE FOOD SYSTEM INTERVENTION FOR CHANGING RURAL AND URBAN LIVELIHOODS IN EAST AND SOUTHEAST ASIA

Robert J. Holmer

Regional Director
AVRDC – The World Vegetable Center, East and Southeast Asia
P.O. Box 1010 (Kasetsart), Bangkok 10903, Thailand
robert.holmer@worldveg.org

Robert J. Holmer is regional director of AVRDC - The World Vegetable Center's Office for East and Southeast Asia, which is located in Bangkok, Thailand. His areas of expertise are sustainable vegetable production, postharvest and marketing in community and school-based settings of Southeast Asia, with a particular focus on the nexus between agriculture, nutrition and health. He holds a Ph.D. in agricultural sciences from the TU München, Germany.

ABSTRACT

As populations continue to shift from rural to urban areas in East and Southeast Asia, increasing and changing demands for food will have strong but unpredictable effects on rural and urban livelihoods. East and Southeast Asia have achieved significant economic progress in the past three decades, but this progress has not translated into improved nutrition in several countries in the region. While these countries continue to deal with the problems of infectious diseases and undernutrition, such as deficiencies in energy, protein, essential vitamins and minerals, they are at the same time experiencing an upsurge in noncommunicable disease risk factors such as obesity and overweight, particularly in rapidly growing urban areas. Ensuring safe, nutritious and culturally appropriate food is available, accessible and affordable year-round is a pressing concern, and the situation is aggravated by climate change, which poses a major risk for the region and exacerbates existing development problems such as population growth, rapid urbanization, increasing competition for natural resources, and environmental degradation.

Agriculture, nutrition and health are intrinsically linked with significant implications for the prosperity of people, especially for the poor and other vulnerable groups. Negative health impacts can be minimized by reducing environmental health risks, while at the same time improving nutrition. Vegetable gardens can improve food and nutrition security in the region, generate additional income, contribute to better health, and promote gender equity. Home and community gardens can provide a variety of fruits and vegetables throughout the year, thus contributing significantly to a nutritious diet for family members, and also offering opportunities for income generation through sale of extra produce. School gardens encourage the production and consumption of a diversity of vegetables and fruit, which is particularly important when persuading children to favor a balanced and nutritious diet as part of a healthy lifestyle. School-based approaches to implement health and nutrition programs are considered effective since the existing infrastructure of the educational system can often offer a more cost-effective route for delivery of health and nutritional interventions than the health system can. The paper discusses examples of home, community and school garden interventions in the region, including success stories and failures, and closes with a set of recommendations for scientists, extension workers and policy makers to harness the potential of these gardens as a nutrition-sensitive food system intervention for changing rural and urban livelihoods in East and Southeast Asia.

KEYWORDS

sustainable diets, climate-smart horticulture, resilience, community-based, urbanization

Home, Community and School Vegetable Gardens:

Nutrition-sensitive Food System Intervention for Changing Rural and Urban Livelihoods in East And Southeast Asia

Robert J. Holmer
Regional Director
AVRDC –The World Vegetable Center
East and Southeast Asia
Bangkok, Thailand
<robert.holmer@worldveg.org>

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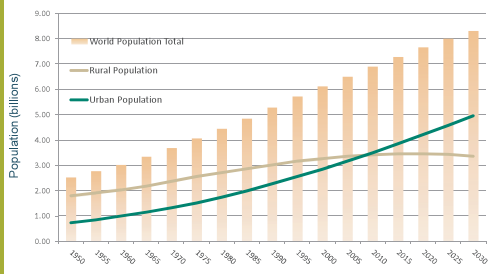
Feeding and Nourishing a Rapidly Urbanizing World



The Urban and Rural Population of the World (1950 to 2030)

United Nations, Department of Economic and Social Affairs, Population Division (2006)

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Urbanization

Deutsches Zentrum für Luft- und Raumfahrt (2010)

Manila 1975

3

Urbanization

Deutsches Zentrum für Luft- und Raumfahrt (2010)

Manila 1988

4

Urbanization

Deutsches Zentrum für Luft- und Raumfahrt (2010)

Manila 2001

5

Urbanization

Deutsches Zentrum für Luft- und Raumfahrt (2010)

Manila 2010

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Home, Community and School Vegetable Gardens in Southeast Asia

Double burden of disease

For example in the Philippines:
26 % of children underweight

Source: FNRI 2008

Malnutrition & non-communicable diseases co-exist

27 % of adults overweight or obese

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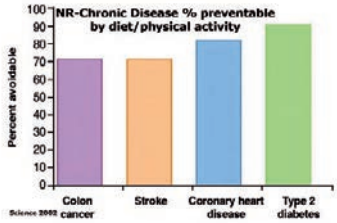
Home, Community and School Vegetable Gardens in Southeast Asia

Non-communicable diseases



Lifestyle is the major underlying factor in the major chronic non-communicable diseases. We do not have an "obesity epidemic", but rather an "epidemic of physical inactivity and poor nutrition"

Prof. Jaap C. Seidell, PhD, Professor of Nutrition and Health, Director Institute of Health Sciences, Vrijem Universiteit Medical Center in Amsterdam.

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Home, Community and School Vegetable Gardens in Southeast Asia

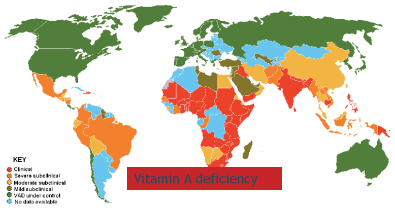
Malnutrition: "Hidden Hunger"

Each Year

- 2.7 million deaths due to insufficient intake of micronutrients

Each Day

- 300 mothers die in childbirth due to iron deficiency
- 4,000 children die from effects of vitamin A deficiency



Source: WHO Data 2006

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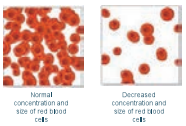
Malnutrition: "Hidden Hunger"

- Vitamin A deficiency
  - causes **blindness** and **impairs the immune system** of about **40 % of the children under the age of five** in developing countries
- Iron-deficiency anemia
  - Anemia among children can impair health and development, limit learning capacity, impair immune systems and reduce adult work performance.



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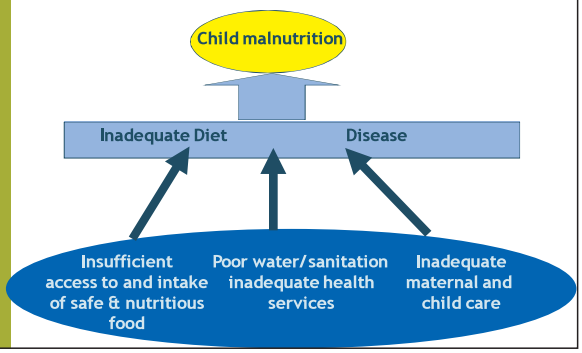
Home, Community and School Vegetable Gardens in Southeast Asia

Causes of malnutrition



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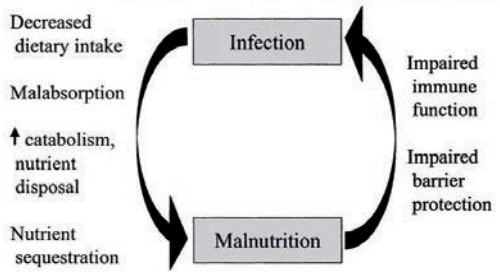
Home, Community and School Vegetable Gardens in Southeast Asia

Malnutrition and infection



Source: Brown (2003)

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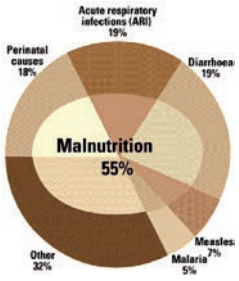
Malnutrition and child mortality

Causes of child deaths



Source: WHO, based on C.J.L. Murray and A.D. Lopez, The Global Burden of Disease Harvard University Press, Cambridge (USA) 1996 and American Journal of Public Health 1985;85.

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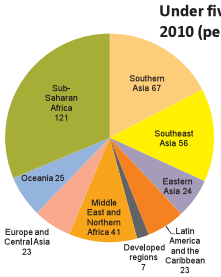
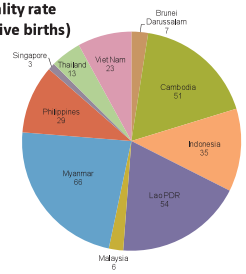
Malnutrition and child mortality

Under five mortality rate 2010 (per 1,000 live births)



Global



Southeast Asia

United Nations Children's Fund 2011, Levels and Trends in Child Mortality.

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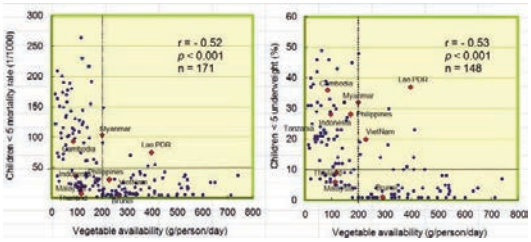
Home, Community and School Vegetable Gardens in Southeast Asia

Regional issues

Low vegetable availability and intake



Proxy indicator of malnutrition in children

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Home, Community and School Vegetable Gardens in Southeast Asia

Why vegetables?

- High value crops
- Relatively easy to grow in different environments
- Provide micronutrients, vitamins, dietary fiber, phytochemicals and protein
- Contribute to balanced diets
- Provide employment, especially for women and other vulnerable groups

Vegetables

3-5 servings a day

1 serving = 80g

240 – 400g a day

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Home, Community and School Vegetable Gardens in Southeast Asia

Why vegetables?

Vegetable production can take place in small spaces and can still be productive. Ingenuity is the key!

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Home, Community and School Vegetable Gardens in Southeast Asia

Why home, school and community gardens?

- Home, school and community gardens increase access to nutritious and healthy food, improve diets and contribute to household economy

Indonesia's first lady Ani Yudhoyono visits home gardens

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Home, Community and School Vegetable Gardens in Southeast Asia

Why home gardens?

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Home, Community and School Vegetable Gardens in Southeast Asia

Anything new?

Reichstag, Berlin (1946)

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Home, Community and School Vegetable Gardens in Southeast Asia

Anything new?

Berlin, 1946

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Anything new?

Allotment Garden in Zurich, Switzerland

Allotment Garden in Munich, Germany

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Initiatives in the region

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Allotment Gardens Philippines

Using Asset-Based Community Development (ABCD) as a tool

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Why school gardens?

- A school usually is the center of each community

Healthy diets begin with knowledge

- A place where government programs on good health practices can be taught and implemented to achieve behavioral changes at home

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Home, Community and School Vegetable Gardens in Southeast Asia

Advantages of school-based programs

- Promoting good health and nutrition before and during school age is essential to effective growth and development

Good health and nutrition are prerequisites for effective learning

- The pre-existing infrastructure of the educational system offers a cost-effective route for delivery of simple health interventions

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School garden objectives

- **Educational**
  - biology, mathematics
- **Nutritional**
  - better information about healthy food choices

Healthy diets begin with knowledge

Successful school garden projects not only target pupils, but also school administrators, teachers, and parents

- **Economic**
  - providing nutritious food for the school canteen
- **Multiplier effects**
  - establishment of vegetable gardens at home

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Strategies for implementation

- Successful school garden programs cannot be created in isolation, but have to be linked with education and environmental interventions

Synergy between the health, agriculture and education sectors is indispensable

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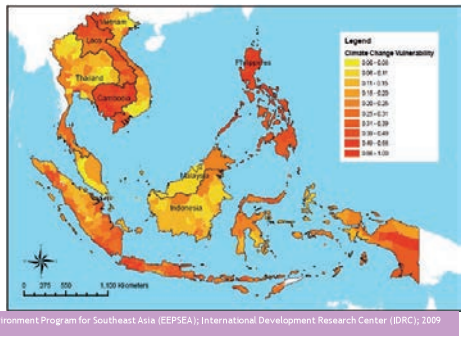
Regional issue: Climate change vulnerability



Economy and Environment Program for Southeast Asia (EEPSEA); International Development Research Center (IDRC); 2009

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Climate-smart Horticulture

- Approach for responding to **climate variability and change**, which should:
  - Nourish people
  - Enhance resilience
  - Reduce emissions

"Every drop counts" by Pepito D Frias

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Home, Community and School Vegetable Gardens in Southeast Asia

Coping with climate uncertainties

No. of accessions	59,294
No. of species	435
No. of countries of origin	155
Total lines dispatched	6,119

AVRDC Genebank: The world's largest public sector collection of vegetable germplasm

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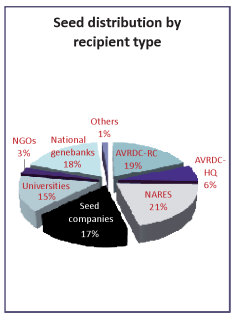
Home, Community and School Vegetable Gardens in Southeast Asia

Contribution to global vegetable diversity



Thousands of genebank accessions and breeding lines are dispatched annually

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Coping with climate uncertainties

Wild tomato - source of drought tolerance

High yielding tomato variety

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Coping with climate uncertainties

Protecting a variety with good yield and quality but is otherwise susceptible to soil-borne diseases or flooding by **grafting** onto a rootstock with desirable resistance

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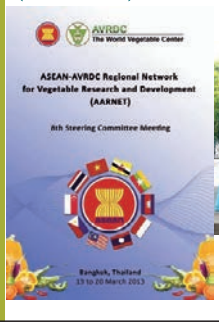
Home, Community and School Vegetable Gardens in Southeast Asia

ASEAN-AVRDC Regional Network for Vegetable Research and Development (AARNET)



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Home, Community and School Vegetable Gardens in Southeast Asia

Activities in the region

- Expert Consultation on home, school, public facility vegetable gardens
  - More than 30 participants from the regions
  - Small pilot projects developed for 7 countries

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Home, Community and School Vegetable Gardens in Southeast Asia

Activities in the region

- Vegetables-go-to-School Project
- Small projects:
  - Integrated student school and home gardens (Cambodia)
  - Urban home and school gardens in Vientiane City (Lao PDR)
  - School gardens in the rural area of Nay Pyi Taw (Myanmar)
  - School, community and temple gardens in Thailand
  - School-based vegetable garden models in flood-prone areas of Metro Manila (Philippines)
  - Demonstration of home garden models in peri-urban districts of Hanoi (Vietnam)

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Home, Community and School Vegetable Gardens in Southeast Asia

Challenges

- Cross-sectoral collaboration between nutritionists, agronomists, economists and social scientists
- Collaboration between health, agriculture and the education sector
- Development of sound indicators to verify impact of agricultural interventions on nutrition and health impacts

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Home, Community and School Vegetable Gardens in Southeast Asia

http://www.avrdc.org

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Chair Nakahara: Good afternoon, ladies and gentlemen. We are going to start Session 4. In this session we have three invited speakers and another presentation from me. The first speaker is Dr. Robert J. Holmer from AVRDC - The World Vegetable Center, Office for East and Southeast Asia in Bangkok. And his area of expertise is in sustainable vegetable production, post-harvest and marketing in community and school-based settings in Southeast Asia, and he holds a PhD in agricultural science from the TU München, Germany. So, please.

Dr. Robert Holmer: Dr. Nakahara, thank you. I also want to extend my gratitude to JIRCAS for inviting me to this prestigious event. I will talk about "Home, Community and School Gardens: Nutrition-sensitive Food System Intervention." You saw these numbers yesterday in the keynote speech of Mr. Konuma. The world population is growing but since 2010 more people live in cities than in rural areas which have some also dramatic impacts on nutrition issues, particularly in developing countries.

In the next set of slides I will show you how megacities in Asia have grown with the example of Manila. This is Manila in 1975, 1988, 2001, 2010, and it keeps on growing now with I think about 12 million. For Jakarta it looks even more dramatic, but I think it visualizes the incredible pressure on natural resources and that land that has been used for food production is converted into housing residential areas and industries, and it will become really a challenge on how to feed millions of people in these large cities.

One new phenomenon that has emerged is the so-called double burden of disease, that we have malnutrition and so-called non-communicable diseases next to each other in the same countries. Here is an example of the Philippines where one-fourth of children are malnourished, but at the same time also one-fourth of those are overweight and obese and this number is rapidly increasing. And one contributing factor is city life where we sit in cars, spend a lot of time in traffic, sit in offices, don't move anymore, and fast food and junk food are easily available, and we heard yesterday also in Japan similar trends. People lose their ability to cook and depend more on ready-to-eat food, but this has dramatic effects on the health status of people.

And if you see these slides I list some of the major non-communicable diseases, colon cancer, stroke, heart disease, and Type 2 diabetes, and the study from *Science* and you see how much percent could be avoided of those diseases if people just have a proper diet and more physical activity.

However, I want to talk a little bit more about the so-called hidden hunger and malnutrition which still causes almost 3 million deaths a year. Every day 300 mothers die in childbirth due to iron deficiency and 4,000 children die from the effects of vitamin A deficiency. And just if you look at this map of vitamin A deficiency, you see in Asia it's still very orange and red, and this is an avoidable disease.

Vitamin A deficiency can cause blindness among children and impairs also the immune system of about 40 percent of children under the age of five in developing countries. And iron deficiency, anemia, can impair health and overall development. And Mr. Konuma mentioned it yesterday, particularly it can impair cognitive development and reduces adult work performance, and it's a huge challenge for countries to develop economically if the full potential of children cannot be harnessed because of malnutrition.

Actually, the same effect happens with obesity and overweight. There are studies available from the UK that intake of high fat, high sugar can have negative effects on IQ development.

What are the causes of child malnutrition? This can be either inadequate diet or diseases such a diarrhea, and this can be caused by insufficient access to an intake of safe and nutritious food, water and sanitation plays a big role, and inadequate maternal childcare, and I will talk about the intake of nutritious food.

What I show you here is the vicious cycle of malnutrition and infection. I think all of you when you are sick you don't feel very hungry, so this means you already take less food in, for example if you have diarrhea the nutrients

are flushed out. If children are infested with intestinal worms, a lot of the nutrients are taken up by the worms and not by the body so you have malabsorption of nutrients which leads to malnutrition. If a body is malnourished our immune system is impaired, which means the body is also much more susceptible to other diseases such as pneumonia and others.

And if you look here, I listed you the causes of child death, such as acute respiratory infections, diarrhea, measles, et cetera, and you see malnutrition contributes to more than 50 percent of these child deaths.

And here I have the numbers of children that die before they reach the age of five, so these are the numbers how many children out of 1,000 die before they reach the age of five. And here you see the global scale, still the highest numbers in Sub-Saharan Africa, but numbers are also very high in South Asia and Southeast Asia, with less in East Asia. I clustered here the numbers for Southeast Asia with lowest numbers for Singapore and Malaysia but in Myanmar, Laos, Indonesia, Cambodia, Philippines, the death rates or mortality rates are I think unacceptably high.

In this draft I tried to give some proxy indicators for vegetable intake. Every dot here is a country. These are data from FAO and WHO. Here is the child mortality below five. This lists the vegetable availability in gram per person per day plotted versus the child mortality, and you really see the lower the vegetable availability, the higher is the rate of child death below five. And we have a similar trend for underweight under five occurrence. So this is a proxy indicator that at least 200 grams of vegetables per day should be consumed, and these are the numbers that also WHO and FAO are recommending, and that translates into about 72 kilograms vegetables per year. Japan went down to 88 and I was worried because Japan used to be the country with the highest vegetable intake, about 120 kilos, and therefore yesterday I was a little bit alarmed that Japanese vegetable consumption is going down.

Why vegetables? They are high-value crops, meaning if you have even a small area they can be highly productive. We have a saying you cannot grow yourself out of poverty with rice because you need large areas to get enough income. Vegetables can be easily grown in different environments. They can be grown without soil, so-called hydroponics. They provide not only micronutrients and vitamins, but what is often overlooked, also dietary fiber which is very important for the health in our gut where we have trillions of microorganisms living inside and they need this fiber to dwell and provide for good digestion. And phytochemicals are antioxidants, and also protein if you talk about leguminous vegetables. They contribute to a balanced diet, so we do not promote being vegetarians but a balanced diet means you have nutrient recommendations like here. Half of it should be fruits and vegetables, then protein and carbohydrates.

And they provide employment, particularly for women, in horticulture, and mostly we have more women employed. And it’s also suitable for other vulnerable groups. There are specific techniques that are also for example handicapped people can grow vegetables. You can design when you sit in a wheelchair they have elevated tables. So vegetables are very flexible and are socially inclusive.

And sometimes people tell me, Robert, I have no space, I have no land, I cannot grow vegetables, so I say I don’t accept this because you can grow vegetables even in small containers. This is southern Thailand on a raft in old tires and these are old water containers. As I said, you can grow them on rooftops, on walls, so lack of space or lack of land is not an excuse not to grow them.

Now why home, school, and community gardens? There is sufficient evidence that growing vegetables close to your home increases intake. Usually, we have some studies that if vegetables are grown at home the intake doubles, about 70 percent, 60 or 70 percent of vegetables grown at home are consumed by the family. There are 5 percent maybe given away to friends and neighbors, and very often the remaining 20 percent are sold to neighbors.

And this is a picture from the First Lady in Indonesia because Indonesia is now promoting a large-scale home garden program and right now I think they have already under this program established 6,000 home gardens. I will talk later also about the Philippines. They also changed. There is a presidential decree also to establish school gardens in all 40,000 public schools of the country.

I have here some numbers. I do not know if you can see them. This is from the US. This is First Lady Michelle Obama, and maybe you heard that she converted part of the lawn at the White House into a vegetable home garden, again, also to promote higher intake of vegetables because especially in the US obesity is very high, particularly among children. And the number of home gardens in the US has increased to about 43 million.

And if you talk about the economic impact, this is a study here as the reference. Each of the home gardens has a net economic value of about 500 dollars, so home gardens annually contribute about 21 billion dollars, so it has a rather big effect, and also for the industry that caters to home gardens, specific seed packages, et cetera. So home gardens are very important but often not recognized in statistics.

Is this something new? Do we have to reinvent the wheel? The picture here shows you, this is the center of Berlin one year after the end of World War II. This is our parliamentary building in Berlin, totally destroyed, and during this time Germany was at its lowest point economically and socially, and people had nothing to eat so the Allied Forces allowed Berliners to grow vegetables around this building just to have sufficient food, and they also grow them in containers, tomatoes and cabbages. My mother was 17 years old and she told me, Robert, without these home gardens or community gardens we would not have survived the war.

But these gardens continue to exist. Some of them are more than 150 years old. This is for example in Munich. I took this picture by myself from the Olympic Tower, so this is a community garden where you have small cottages. This one is in Zurich. Sometimes when I show this picture people ask me, Robert, is this a shanty area in Zurich? I say, no, these are people who live in condominiums but they have their garden nearby in open spaces so they also provide a lot of ecological benefits and people grow their own food but it's also a leisure activity.

And you can find that also in Singapore. This is a map of community gardens in Singapore. In Jakarta are also similar initiatives. This is a project we did in the Philippines, allotment gardens or community gardens on empty spaces in the city, and they all have proven to have social and economic benefits.

Why school gardens? It's the last type of gardens I want to present to you. Every school is usually a center of each community and this is a place where government programs on good health practices can be taught and implemented to achieve also behavioral change at home. So children are getting familiar with a variety of crops they can eat which they maybe only know from the supermarket.

And schools have also a preexisting infrastructure and that offers a cost-effective route for the delivery of simple health interventions, so most schools have nurses, et cetera, and can offer nutrition education.

And I list some here of what school gardens can do, so educationally important. Nutritionally. Also they have some economic benefits, and we also know that they have multiplier effects so when there is a school garden in the community, often children bring seeds home and establish then home gardens there. And I put here but there are some challenges which we maybe can later discuss in our discussion.

They cannot be created in isolation but they need synergy between the different sectors of health, agriculture, and education.

A challenge is climate change in Southeast Asia. I have put here a map of the vulnerability, and the red dots, the higher the vulnerability, therefore we need climate-smart technologies. One is for example providing varieties

with adaptation to climate change. AVRDC has here this Genebank and we distribute improve varieties across the globe. This is for example developing tomatoes that are more drought tolerant using genes from native sources. Another one is grafting where you have for example a resistant root stock to flooding and bacterial diseases and it's a tomato and it is for example highly spread in Vietnam where about 7,000 hectares are grown with these technologies.

At AVRDC also collaborates with ASEAN and has this so-called Regional Network for Vegetable Research and Development, AARNET. We meet regularly and last year we had an expert consultation on this home, school, and community gardens, and we have implemented a number of projects in the different countries that are listed. So basically all Southeast Asian countries, home, school, and community gardens are recognized as important interventions for nutrient-sensitive food systems.

And I just put here some of the challenges, that we have to go out of our intellectual silos and we really need this collaboration between nutritionists, agronomists, economists, social scientists, and also have maybe to develop some good indicators that we can really verify the impact of these agricultural interventions on nutrition and health.

And I did not, I put it in Chinese. I did not know that maybe I should also put it in Japanese, "Eat more vegetables!", after I heard yesterday's presentation. So with this I want to end my presentation and I want to thank you for your attention.

Chair Nakahara: Thank you very much, Dr. Holmer.