

Health Impact Assessment 2010 Hawai'i County Agriculture Development Plan

A Health Impact Assessment detailing the potential impacts of increasing local commercial food production, promoting farm to school procurement, and supporting school, community and home food production
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Table of Contents

Acknowledgements.....	iii
Executive Summary.....	vi
I. Introduction.....	1
II. Screening.....	6
III. Scoping.....	7
IV. Assessment.....	11
A. Current Conditions: Food Security and Nutrition Security.....	11
B. Current Conditions: Obesity.....	13
C. Current Conditions: Food-Borne Illness.....	14
D. Current Conditions: Economy.....	18
E. Current Conditions: Cultural Connections to Land, Water, and Health.....	20
V. Analysis: How Agriculture Development Plan Policies Will Impact Health.....	23
A. Increased Institutional Buying.....	23
1. Potential Health Impact: Food Security and Nutrition Security.....	28
2. Potential Health Impact: Obesity.....	29
3. Potential Health Impact: Food-Borne Illness in Schools.....	30
4. Potential Health Impact: Economy.....	31
B. Expanded Commercial Production.....	34
1. Potential Health Impact: Food Security and Nutrition Security.....	37
2. Potential Health Impact: Obesity.....	37
3. Potential Health Impact: Food-Borne Illness.....	38
4. Potential Health Impact: Economy.....	39
5. Potential Health Impact: Other (Occupational Health).....	40
C. Promotion of Home, Community, and School Gardening.....	42
1. Potential Health Impact: Food Security and Nutrition Security.....	43
2. Potential Health Impact: Obesity.....	44
3. Potential Health Impact: Food-Borne Illness.....	45
4. Potential Health Impact: Economy.....	46
5. Potential Health Impact: Well-Being and Cultural Connections.....	46
VI. Recommendations.....	49
A. Increased Institutional Buying.....	49
B. Expanded Commercial Production.....	53
C. Promotion of Home, Community and School Gardening.....	56
VII. Conclusion.....	58
VIII. Monitoring Plan.....	59
IX. Agriculture Success Stories.....	61
X. Reference List.....	73
Appendix A: Draft Scope for Health Impact Assessment of the Agriculture Plan.....	82

List of Figures

Figure 1: Determinants of Health.....	5
Figure 2: Pathway Diagram: Projected Changes Resulting from Agriculture Development Plan Recommendations.....	9
Figure 3: Supply Chain for Food, From Field to Table.....	15
Figure 4: Where the Money Flows for School Meal Programs.....	25
Figure 5: Hawai'i School Lunch Cost Breakdown.....	26

List of Tables

Table 1: Diseases Associated with Food.....	17
Table 2: Trends in the Value of Crop Sales in Hawai'i Counties.....	19
Table 3: Estimated Acreage of Land Use by Hawai'i County.....	20
Table 4: Sources of Payment for School Lunches in Hawai'i.....	26
Table 5: Food Handling Practices to Decrease Risk of Microbial Contamination of Fresh Produce.....	31
Table 6: Economic Impact of Additional HDOE School Food Sourced Locally.....	32
Table 7: Summary Impact of Increased Institutional Food Purchasing by the HDOE.....	33
Table 8: Economic Contribution of Agriculture to Hawai'i's Economy.....	34
Table 9: Farm Output Statistics.....	35
Table 10: Net Farm Income in the State of Hawai'i.....	35
Table 11: Comparative Agricultural Measures, Hawai'i Counties.....	35
Table 12: Summary Impact of Increased Local Commercial Food Production.....	41
Table 13: Summary Impact of Increased School, Community, and Home Gardening.....	48
Table 14: Indicators to be Monitored.....	59

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About Health Impact Assessment Project Partners

The Health Impact Project

The Health Impact Project (www.healthimpactproject.org), a collaboration of the Robert Wood Johnson Foundation (www.rwjf.org) and The Pew Charitable Trusts (www.pewtrusts.org), is a national initiative designed to promote the use of health impact assessments (HIAs) as a decision-making tool for policymakers.

The Kohala Center

The Kohala Center (TKC) is a not-for-profit organization based in Waimea on Hawai'i Island. TKC was established in direct response to the request of island residents to create greater educational and employment opportunities by caring for—and celebrating—Hawai'i Island's natural and cultural landscape. TKC conducts basic and applied research, policy research, conservation and restoration initiatives, public outreach and education in the core areas of food self-reliance, energy self-reliance and ecosystem health—all carried out through local, regional, national and international partnerships. Through these partnerships and by recognizing that Hawai'i Island is a model physical and social environment, The Kohala Center helps communities on the island, in the Pacific and around the world thrive—ecologically, economically, culturally, and socially. For a sense of the purpose and scope of The Kohala Center's work, see <http://www.kohalacenter.org>.

For the Hawai'i Agriculture Plan HIA, TKC provided project and grant management, on-island administrative and logistical support for the analysis team, connections to local community members, meeting facilitation, public education and community outreach services.

Key HIA Research Partners

The key research partners who worked on the Hawai'i Agriculture Plan HIA were Ameena Ahmed, MD, MPH, Research Scientist with Kaiser Permanente Center for Health Research, Hawai'i, who provided primary epidemiological and health services expertise; Matthew K. Loke, PhD, Administrator of the Agricultural Development Division, Hawai'i Department of Agriculture, who provided agricultural economic expertise; and Kim Gilhuly, MPH, Celia Harris, MPH, and Jennifer Lucky, MPH, from Human Impact Partners, technical assistants who specialize in the health impact assessment process.

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Hawai'i Department of Agriculture

The Hawai'i Department of Agriculture (HDOA) works statewide to support, enhance, and promote Hawai'i's agriculture and aquaculture industries. In addition, the department protects the state's agricultural interests with inspection for invasive species of incoming plant material and animals, safeguarding animal and plant health, supporting farmers with affordable land and water, providing financial assistance to farmers, and assuring quality of produce. The mission of HDOA is to re-establish agriculture as essential to the well-being of Hawai'i's island society by rejuvenating the economy, protecting important resources, and gaining greater self-sufficiency in food production and alternative energy development.

Human Impact Partners

Human Impact Partners strives to create a world in which health is considered in all decision-making. This means that every decision-maker who plays a role in shaping public policies and planning decisions should understand the health impacts of their decisions before they are implemented, and should use this information to protect and promote the health of all populations. Human Impact Partners is the only organization in the United States focused on capacity building for HIAs—offering policymakers, project leaders, public agencies, community groups, and advocacy organizations the support they need to conduct health impact assessments and to use their HIA results to make informed choices.

Kaiser Permanente Center for Health Research, Hawai'i

For nearly a half-century, the Center for Health Research (CHR) has been making key connections between lifestyle and wellness, between disease and its effect on people's lives, between treatment and outcome. CHR pursues a vigorous agenda of patient-centered, population- and practice-based research. CHR conducts professionally independent, public domain research and disseminates its findings in the scholarly literature and to the scientific community.

Executive Summary: Health Impact Assessment of the 2010 Hawai'i County Agriculture Development Plan

Background

The current Hawai'i County Agriculture Development Plan (the Agriculture Plan) was commissioned by the Hawai'i County Department of Research and Development in 2008 and approved by the Hawai'i County Council in 2010. The purpose of the Agriculture Plan is to serve as a guide for county government, local advocacy groups, and local businesses to revitalize agriculture as a basis for economic development.

Hawai'i Island is the largest of the Hawaiian Islands. With 185,079 residents, it has the second-largest population of the archipelago, but the fourth highest population density (behind O'ahu, Maui, and Kaua'i). Hawai'i County (the same land mass as Hawai'i Island) accounts for 63% of the farmland and 40% of existing farm employment in the state. Abundant fertile lands and a 12-month growing season create the potential for a high level of food self-reliance, yet the island imports an estimated 85% of its food.

Abundant fertile lands and a 12-month growing season create the potential for a high level of food self-reliance, yet the island imports an estimated 85% of its food.

About This Health Impact Assessment

While the importance of the Agriculture Plan to economic development and land use is well-recognized, the impact of agriculture policy on health has not been considered until recently. To fill this gap in information, The Kohala Center applied a formal process, health impact assessment (HIA), to evaluate the potential positive and negative impacts of Agriculture Plan policies on the health of Hawai'i Island residents. Note that "health" in this context includes socioeconomic as well as physical health. For the purposes of the following discussion, we will use the World Health Organization definition of **health** as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity and **determinants of health** that include the social and economic environment, the physical environment, and individual characteristics and behaviors.

Between March 2010 and December 2011, The Kohala Center, together with researchers from Kaiser Permanente Center for Health Research, Hawai'i and the Hawai'i Department of Agriculture, as well as local stakeholders in agriculture, health, and public policy, conducted a HIA of three Hawai'i County Agriculture Development Plan policy recommendations with strong potential impact on health:

- 1. Institutional buying:** increase the ability of federal, state, county, and local NGO institutions to buy locally grown and produced food, utilizing the prototype of farm-to-school programs;
- 2. Commercial expansion of food agriculture:** through public-private partnerships increase the amount of food produced on Hawai'i for the local market, to reach a goal of 30% Hawai'i Island food self-reliance in 2020; and
- 3. Home production:** promote the expansion of home, community, and school gardening through public education.

This report summarizes the findings of the health impact assessment. The goal of the HIA is to inform legislative and regulatory decision-making so that these three Agriculture Plan policies are implemented in ways that maximize health benefits and minimize health risks for Hawai'i Island residents. In particular, this HIA examines the impact of each of the three Agriculture Plan policies on five health outcomes or determinants of health, from the range of personal, social, economic, and environmental factors that can affect the health status of individuals or communities:

1. Food security;
2. Obesity;
3. Food-borne illness;
4. Economy; and
5. Well-being and cultural connectedness.

The HIA process first assesses current health conditions, and then combines data from a variety of sources, including published reports and research analyses, expert local opinion, and new analysis, to predict the potential impacts of each of the three selected Agriculture Plan policies on each of the five health-related factors or outcomes. Finally, the HIA offers recommendations to maximize health benefits and minimize health risks associated with implementation of each of the three selected Agriculture Plan policies.

This HIA is supported by a grant from the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts. The opinions are those of the authors and do not necessarily reflect the views of the Health Impact Project, the Robert Wood Johnson Foundation, The Pew Charitable Trusts, Human Impact Partners, the Hawai'i Department of Agriculture, or Kaiser Permanente Hawai'i.

Current State of Agriculture in Hawai'i County

Hawai'i County ranks third in the state behind the City and County of Honolulu and Maui County in the value of crop production, with \$138.7 million worth of crops produced in 2008. The value of Hawai'i County crop production has declined from a high of \$152.3 million in 2006. Crops such as seed, coffee, macadamia nuts, and flowers represent the vast majority of the total dollar value of the state and Hawai'i County agriculture output. In 2009, fruit and vegetables accounted for only 9.6% of the dollar value of Hawai'i state crops.

Institutional purchasers represent a large potential market for local produce. For example, the Hawai'i State Department of Education's School Food Services Branch provides about 100,000 lunches per day at schools throughout the state and the federal dollars to the HDOE for meal and snack programs amounted to approximately 40 million dollars a year.

Current State of Agriculture Plan Policies Studied in this HIA

1. Institutional buying is currently limited with large additional potential

The largest public school food authority does not currently purchase significant amounts of locally raised food, but selected Hawai'i public schools statewide participate in the USDA Fresh Fruit and Vegetable Program, which could be an initial avenue for buying up to 1.5 million dollars of local produce.

2. Food agriculture for the local market: small amount and growing

- There are currently 30 farmers markets on Hawai'i Island that range in size from small neighborhood markets to large regional markets with up to 100 vendors. Local products for sale include fruits and vegetables as well as value-added or gourmet items such as macadamia nuts, tea, coffee, honey, and preserves.
- There are at least six community supported agriculture (CSA) programs on Hawai'i Island. Typically, people pay a subscription for a share and receive a regular delivery of whatever is in season at that farm.
- Local grocery stores stock and advertise an increasing supply of local produce, typically tropical fruits such as apple bananas, avocados, and some citrus fruit. Local produce is displayed prominently in some stores.

3. School, home, and community gardening: growing number of school and community gardens; home data unknown

- There are about 60 school gardens in Hawai'i County public, private, and charter K-12 schools. At many of them, students eat the food they grow. The size of the gardens varies greatly ranging from start-ups to garden programs producing significant amounts of food.
- There is increasing interest in home and community gardening, and there has been at least one crop share program on Hawai'i Island which allowed residents to exchange their surplus garden produce.
- There is no existing data on the number of Hawai'i Island households that garden.

Current State of Health on Hawai'i Island

1. Food security. When a family worries about having enough food to eat, the term that government and research organizations use to describe that family's condition is "food insecure." At its most severe, food insecurity means chronic hunger. The number of Hawai'i Island residents who do not always have nutritious food available (i.e. food insecure) has increased over the past four years.

Nearly one quarter of Hawai'i Island residents and an even larger percentage of its children are food insecure.

According to the United States Census Bureau, 14.5% of Hawai'i County residents had incomes less than 100% of the federal poverty level in 2009. In 2007, 11.8% of residents participated in the Supplemental Nutrition Assistance Program (SNAP) (formerly known as Food Stamps). By 2009 the number of SNAP participants had increased to 16% of the population of the island, including 31% of children. Preliminary estimates indicate that 23% of Hawai'i Island residents received SNAP benefits during the third quarter of 2011. That is, nearly one quarter of Hawai'i Island residents and an even larger percentage of its children are food insecure. As of October 2010, approximately 66% of Hawai'i Island public and charter school students were receiving free or reduced cost school meals.

In addition to causing disability, disease, and earlier death, obesity is associated with higher costs.

2. Obesity. Obesity is among the most significant public health problems in the United States and in Hawai'i. Obesity results from an imbalance between the energy consumed as food and the energy spent through physical activity. Overweight and obesity lead to increased disease and to premature death.

Being obese increases the likelihood that a person will suffer from many chronic health conditions, including diabetes, high blood pressure, heart attack, stroke, cancer, obstructive sleep apnea, osteoarthritis, and depression. Children who are overweight or obese are at increased risk even during childhood of having diabetes, elevated cholesterol, high blood pressure, and earlier maturation compared to their normal weight peers. Overweight children often face social stigma and can be targets for bullying. The additional costs of medical care due to obesity in the state of Hawai'i were an estimated \$290 million in 2003 dollars. Indirect costs, including lost income due to sickness and decreased productivity, add to the economic costs of obesity.

While Hawai'i as a whole has one of the nation's lowest rates of obesity (57.2% of residents are overweight or obese) the burden of obesity falls disproportionately on Native Hawaiian, rural, and lower income people. These factors are concentrated among Hawai'i Island residents. Hawai'i Island is home to the state's highest concentration (30% of island residents) of Native Hawaiians and the lowest per capita income. The 2004 Hawai'i Health Survey found that the prevalence of adult overweight or obesity was 67% among Native Hawaiians compared to 49% for whites and Filipinos, 44% for Japanese and 31% for Chinese. These disparities are also reflected in the fact that Native Hawaiians and other Pacific Islanders have the shortest life expectancy (68 years) of any ethnic group in the United States.

In addition to causing disability, disease, and earlier death, obesity is associated with higher costs. On average, health care costs for obese children are \$320 per year higher than for children of normal weight. In 2003, obesity-related medical expenses for the State of Hawai'i were estimated to be \$290 million.

3. Food-borne illness. *Food-borne illness* is defined as disease transmitted by food or water contaminated with toxins or microbes. A *food-borne disease outbreak* is defined as two or more people who develop a similar illness resulting from eating a common food.

During the scoping phase of this HIA, stakeholders identified food-borne illness as a health outcome of concern. Stakeholders were concerned about the potential for a repeat of a disease cluster in 2009 due to *Angiostrongylus* (rat lungworm), a parasite that can be transmitted to humans by eating food with slime residue from infected snails and slugs. Following food safety practices including washing produce thoroughly before eating can remove the slime and the threat of *Angiostrongylus*.

Each year, up to 30% of people in the U.S. get sick from food and water they consume. Most of these illnesses are short-lived bouts of gastroenteritis (stomach flu), with symptoms of nausea, vomiting, and diarrhea that resolve in a few days with no long-term effects. Food-borne illness is almost always due to contamination at the time of food preparation or serving rather than contamination at the time of growing or harvesting. Nationwide, only 2.2% of all food borne illness outbreaks from 1990 to 2007 were associated with the growing, packing, shipping or processing of produce.

Between 2003 and 2007, there were 1,277 reported incidents of food-borne illness in the State of Hawai'i. Of these, 6.5% were due to contaminated produce, 59% were due to contaminated fish, and 34.5% were caused by other foods. Between 1999 and 2008, none of the food-borne outbreaks in Hawai'i were due to produce which had been contaminated during harvest and processing.

4. Economic health and employment. Employment and income are strongly linked to health. Poor health leads to unemployment and decline in economic status, and in turn, underemployment leads to poor health. Not having stable employment is associated with poorer mental health and shorter lives; compared with employed people, those with unstable employment are more likely to have anxiety, depression, and other nervous symptoms. People with higher socio-economic status, which depends on a combination of factors that includes occupation, education, income, wealth, and place of residence, have better overall health.

Employment and income are strongly linked to health.

While the State of Hawai'i is recovering slowly from recession, the economy on Hawai'i Island is not strong. The statewide unemployment rate dropped to 6% in May 2011, while the unemployment rate for Hawai'i County remained much higher, at 9.2%.

According to the U.S. Census Bureau, the median household income for Hawai'i County in 2009 was \$50,739, compared to \$63,741 for the state. In Hawai'i County in 2009, 14.5% of residents were below the poverty level, significantly higher than the statewide rate of 10.4%. As discussed above, almost a quarter of Hawai'i County residents now receive Supplemental Nutrition Assistance Program (SNAP) benefits.

5. Well-being and cultural connectedness. A large body of evidence shows that having friends and a good social network improves mental and physical health and increases longevity. The physical environment also affects well-being. Sitting in gardens improves stress, decreases anxiety, and has therapeutic benefit for people with a variety of physical and mental illnesses. Being in nature, whether at a beach or in a small garden plot, is a way to slow down and feel more grounded.

Hawaiian traditions take a holistic view of health. That is, health involves physical wellness, spiritual well-being, as well as the health of the family and the social and physical environment. In Hawaiian tradition, health, food, and land are interrelated and interconnected. Hawaiian culture is particularly well suited to a return to greater home and community gardening because of the historic sense of place and belonging, importance of stewardship of resources, and the tradition of making do with what is available at hand. Families understand the concept of *'āina*, meaning anything which nourishes, including the land, ocean, and family, and the idea that you eat what you have (*'ai ka mea loa*).

Health Impact Assessment Key Findings

1. Expansion of Farm-to-School programs would:

- Improve food security and improve the nutritional quality of food consumed by Hawai'i Island children; and
- Create Hawai'i Island jobs in agriculture and food processing, thereby strengthening the local economy.

2. Increased production of fresh food for the local market would:

- Improve community food security and improve the nutritional quality of food consumed by Hawai'i Island residents; and

- Create jobs, increase farm output, and increase farm earnings in Hawai'i County and increase state tax revenues. As estimated at the state level, replacing purchase of only 10% of imported foods with locally produced food could amount to some \$313 million, or \$94 million at the farm-gate, assuming a 30% farmshare. Taking into account the multiplier effects this \$94 million would generate an estimated economy-wide impact of \$188 million in sales, \$47 million in earnings, \$6 million in state tax revenues, and more than 2,300 jobs.

3. Promotion of home gardening would:

- Have a large impact on improving food security and nutrition security, particularly among low-income Hawai'i County residents;
- Increase consumption of fruit and vegetables and increase physical activity; and
- Improve individual well-being and community cultural connectedness.

Summary of Health Effects of Implementing Agriculture Plan Policies

The three tables that follow provide point-by-point summaries of the projected impacts of each plan policy on the five health outcomes. Note that the magnitude of impact will depend on the level of implementation of recommended actions and policies.

Summary Impact of Increased Institutional Food Purchasing by the HDOE

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security (absence of hunger)	Δ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	*
Nutrition Security (healthy diet, not just absence of hunger)	ΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	**
Obesity			
Child overweight and obesity	Δ +	Children on free and reduced lunch program, children of working parents	***
Adult overweight and obesity	ΔΔ +	Rural; Native Hawaiian and Pacific Islanders; lower income families	****
Food-borne illness			
Cases of food-borne illness	0	School-age children	**
Economy			
Job creation	Δ +	Agricultural and food production workers	*
Tax revenue	Δ +	State of Hawai'i	***
Other			
Local pride and connectedness	Δ +	Children who eat locally produced food	*
Child learning and educational outcomes	ΔΔ +	Children on free and reduced lunch program	*
Legend			
ΔΔΔΔ Strong impact on many	**** 10+ strong studies		
ΔΔΔ Strong impact on few or small impact on many	*** 5-10 strong studies or economic data analysis		
ΔΔ Moderate impact on many or strong impact on few	** 5 or more weak or moderate studies, or mixed results		
Δ Small impact on few	* Fewer than 5 studies, but claim consistent with public health principles		
0 Negligible impact			

Summary Impact of Increased Local Commercial Food Production

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security	Δ to ΔΔΔ +, depending on implementation	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	*
Nutrition Security	Δ to ΔΔΔ +, depending on implementation	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	***
Obesity			
Child overweight and obesity	Δ +	Children on free and reduced lunch program, children in families on SNAP	****
Adult overweight and obesity	Δ to ΔΔΔ +, depending on implementation	Families on SNAP	**
Food-borne illness			
Cases of food-borne illness	0	Hawai'i County residents	***
Economy			
Job creation	ΔΔΔΔ +	Agricultural and food production workers	***
Tax revenue	ΔΔΔΔ +	State of Hawai'i	***
Other			
Wellbeing	Δ +	Newly employed families	**

Legend	
ΔΔΔΔ Strong impact on many	**** 10+ strong studies
ΔΔΔ Strong impact on few or small impact on many	*** 5-10 strong studies or economic data analysis
ΔΔ Moderate impact on many or strong impact on few	** 5 or more weak or moderate studies, or mixed results
Δ Small impact on few	* Fewer than 5 studies, but claim consistent with public health principles
0 Negligible impact	

Summary Impact of Increased School, Community, and Home Gardening

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security	ΔΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	****
Nutrition Security	ΔΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	****
Obesity			
Child overweight and obesity	ΔΔ +	Children on free and reduced lunch program, children on SNAP; Native Hawaiian and Pacific Islanders	**
Adult overweight and obesity	ΔΔΔ +	Rural populations; Families on SNAP	****
Food-borne illness			
Cases of food-borne illness	Δ -	People who garden	***
Economy			
Job creation	0	Agricultural and food production workers	N/A
Tax revenue	0	State of Hawai'i	N/A
Family Economy	Δ +	Families who garden or glean	***
Other			
Wellbeing	ΔΔΔ +	Families who garden	****
Cultural pride	ΔΔΔ +	Families who garden	****
Child learning and educational outcomes	ΔΔΔ +	Children who garden	****
Cultural food security	ΔΔ +	Families who garden	****

Legend	
ΔΔΔΔ Strong impact on many	**** 10+ strong studies
ΔΔΔ Strong impact on few or small impact on many	*** 5-10 strong studies or economic data analysis
ΔΔ Moderate impact on many or strong impact on few	** 5 or more weak or moderate studies, or mixed results
Δ Small impact on few	* Fewer than 5 studies, but claim consistent with public health principles
0 Negligible impact	N/A Not applicable

Key Recommendations

Highlighted below are those HIA recommendations that are likely to maximize benefits and minimize risks to health in implementing the policies and reaching the goals articulated in the Hawai'i County Agriculture Development Plan:

- Expand Hawai'i Island food production so that 30% of its residents' demand for food can be supplied by local producers by 2020.
- Promote and support educational programs that provide the opportunity for agricultural industry participants of all sorts to productively, profitably, and sustainably expand Hawai'i's agricultural systems.

1. To enable farm-to-school programs to buy more local produce:

- Hawai'i Department of Education should fully utilize funds available under the U.S. Department of Agriculture's Fresh Fruit and Vegetable Program (FFVP) to purchase local produce.
- The Hawai'i state legislature should amend Act 175 SHL 2009 and/or modify associated procedures to remove barriers to procurement of local produce by the Hawai'i Department of Education School Food Authorities and other state agencies. Increasing the procurement of locally grown produce by Hawai'i's schools may require preferential pricing and procurement strategies, along with dedicated staffing to assist with procurement processes.
- In order to tailor an institutional purchasing program that fits Hawai'i's unique circumstances, supports economic development, and leads to positive student health outcomes, the Hawai'i Department of Education should make school food program expenditures available for analysis and modification.
- Hawai'i Department of Education and local schools, together with culinary experts from the University of Hawai'i, should revise school lunch and breakfast menus to incorporate locally produced foods. Begin by targeting specific foods such as Okinawan sweet potato that are cultivated exclusively in Hawai'i. Pilot at least one salad bar in a Hawai'i Island Department of Education school complex by 2013.

2. To increase the amount of food grown for the local market:

- Hawai'i Department of Education and the University of Hawai'i should substantially increase promotion and support for agricultural career pathways into farming and ranching by allocating additional resources for secondary and community college level agricultural training.
- Hawai'i County should facilitate collaborations between business, non-government organizations, and the Hawai'i Department of Human Services to increase acceptance of cash vouchers, EBT and credit cards at island farmer's markets.
- Hawai'i state, counties, USDA, and the private sector should collaborate to expand capacity of harvesting, marshalling, processing and distribution facilities to support local agricultural enterprise.

3. To increase home, school, and community gardening:

Hawai'i Department of Education and the University of Hawai'i should continue and expand school and community gardening programs to educate students and families about safely growing and preparing fresh food.

HIA Conclusion

The Health Impact Assessment of the 2010 Hawai'i County Agriculture Development Plan underscores the health-promoting benefits of greater production and consumption of locally grown food. Increased consumption of produce is linked to decreased rates of obesity and associated chronic diseases such as diabetes, colon cancer, osteoarthritis, congestive heart failure, coronary heart disease, hypertension and stroke which are well-known causes of premature death. Home production provides the additional benefits of more physical activity and improved mental health. Increased local food production can improve community food security, improve the nutritional quality of the food available to island residents, and have positive economic impacts in terms of jobs, family income, and state tax revenues. The potential health risks of consumption of local fresh produce include food-borne illness (mediated by toxins or microbes) only if produce is not properly handled at and after harvest. Overall, the benefits of increased consumption of fresh local produce are much greater than the risks.

Greater production and consumption of locally grown food is overall health-promoting.

I. Introduction

Hawai'i Island is the largest island in the most remote populated archipelago on earth. Though there are abundant fertile lands and a 12-month growing season, a recent report estimates that the island imports as much as 85% of its food.¹ This is the legacy of former plantation agriculture coupled with globalization of the food supply. Hawai'i's geographical isolation, coupled with the state's current reliance on imported goods, means that the island's food supply and its agricultural export industry are particularly vulnerable to natural disasters and other events beyond the control of local markets and local government. In addition, the contamination of imported food and the introduction of invasive species via imports create significant risks to the state's food supply.

Over the past forty years, Hawai'i Island's economy, along with that of the State of Hawai'i, has transitioned from one based on producing agricultural commodities for export and raising basic fruit, vegetables, and protein for the local population in a relatively decentralized manner to a socioeconomic structure based on the tourism industry and an imported food supply that contains the typical array of US processed items. With energy, transport, and input costs rising in the face of greater global competition for material resources, there is a growing urgency to address economic and food security by re-establishing a local food system in Hawai'i to increase island self-sufficiency.

Hawai'i County (the same land mass as Hawai'i Island) accounts for 63% of farmland and 40% of existing farm employment in the state, and it is widely recognized that the effects of agricultural expansion on the island's economy could be significant. The positive economic impacts of expanded agricultural production are often discussed, but the health impacts of expanded local production have not previously been evaluated.

During the plantation era, residents were dispersed in rural towns and villages located around Hawai'i Island. Work was relatively close to home and entailed a good deal of physical labor. Fresh food could be readily obtained from local producers and in home gardens. The transition from a plantation economy to a visitor industry economy and the general concentration and globalization of the food industry since the 1970s have caused major lifestyle changes for residents of Hawai'i's rural communities. Because of the island's size, the concentration of visitor industry employment on the leeward side of the island, and dramatically rising land prices near the leeward resort areas, many residents no longer work close to their homes. Working hours are extended by long commutes with less time for gardening, shopping, and food preparation, and fewer workers are engaged in strenuous physical labor. Packaged, processed, and fast foods are more readily available than are fresh produce and protein in many rural areas.



Economic health is lowest among Hawai'i County residents. Of the residents living in Hawai'i County in 2007, 41.5% lived in rural areas compared to 8.4% statewide.² Hawai'i County residents have the lowest median income (\$50,739 compared to \$63,741 statewide in 2009), the highest percentage of residents living in poverty (14.5% compared to 10.4% statewide in 2009), and the highest percentage of uninsured

residents (8.1% vs. 4.6% statewide).^{3,4} The low wages of a visitor industry economy coupled with a cost of living significantly higher than on the mainland U.S. exacerbates these effects, especially among Native Hawaiians and other Pacific Islanders who have lower income and economic status than other groups.

As lower socioeconomic status and lower income are associated with higher rates of obesity, it is not surprising that Hawai'i County now has the highest rate of adult obesity (21.7% vs. 20.5% statewide) and rates of death due to cancer (199 per 100,000 vs. 175 per 100,000 statewide) and major cardiovascular disease (280 per 100,000 vs. 241 per 100,000 statewide).³ Similar to findings among adults, 28.5% of children entering kindergarten in the state in 2002-2003 and 27.8% of Hawai'i's teenagers surveyed between 2005-2009 were overweight or obese.^{5,6} Adolescents with ethnicity Other Pacific Islander (43.9%) or Native Hawaiian (37.4%) had the highest prevalence of overweight, while white adolescents had the lowest (16.1%). As children who are overweight are more likely than normal weight children to become adults who are obese, these findings portend a continued obesity epidemic in Hawai'i.⁷

County of Hawai'i Agriculture Development Plan

Although the Hawai'i State Constitution calls for the conservation and protection of agricultural land—as well as for the promotion of diversified agriculture and an increase in agricultural self-sufficiency—these principles have not been fully implemented. The University of Hawaii-College of Tropical Agriculture and Human Resources (UH-CTAHR) and Hawai'i Department of Agriculture (HDOA) found that from 1995 to 2005, the amount of food consumed in the state grew at a faster rate than local food production. That is, Hawai'i became less food self-sufficient.⁸ A white paper issued by the same agency reported that this trend of increased reliance on imported food must be reversed in order to provide a more reliable, secure food supply for the state.⁹ In 2007 the Rocky Mountain Institute estimated that Hawai'i Island, similar to the state as a whole, was importing approximately 85% of the food consumed on the island.¹

With its extensive arable lands and rich farming/ranching traditions, Hawai'i County is uniquely positioned to correct this imbalance. Government support of agriculture is key to preserving this industry as one of the island's primary economic drivers. Understanding this, in the spring of 2008 the Hawai'i County Department of Research and Development sought proposals for the preparation of an updated Agriculture Development Plan (hereafter, referred to as the Agriculture Plan). The previous Hawai'i County Agriculture Development Plan was prepared in 1992 and reflects the dominant role sugar production formerly played in the island economy. With the demise of the sugar plantations, the County Department of Research and Development recognized the need for a re-examination and the potential for re-invention of island agriculture.

The Kohala Center assisted the Hawai'i County Department of Research and Development in preparing an update of the 1992 plan to address market and societal changes and to provide a template for County government officials' future decision-making about the agriculture sector.¹⁰

In preparing the Agriculture Plan update, The Kohala Center employed a process designed to maximize input from both the community at large and from members of the agricultural sector. Thirteen public listening sessions and four industry feedback sessions were conducted in order to solicit input. Additionally, an ad hoc committee was formed to provide plan development oversight. This committee met several times to review and discuss the ongoing process. The ad hoc committee helped to craft the plan's vision statement: ***A thriving and sustainable agriculture industry is a vital contributor to Hawai'i County's economy, rural lifestyle, and character, by producing food, fiber, energy, and ornamentals for local consumption and export.*** The Plan was presented to the County Council for adoption by resolution. The Hawai'i County Council officially adopted the 2010 Hawai'i County Agriculture Development Plan on April 19, 2011.

The purpose of the Agriculture Plan is to serve as a guide for how the County can revitalize agriculture as a basis for economic development. The plan lays out priorities for County actions in the domains of agriculture policies, allocation of resources, and advocacy for the growth of agriculture on Hawai'i Island.

Many of the comments provided by the agricultural industry and community members were included in the final plan, including the following Agriculture Plan recommendations:

- Expand Hawai'i Island food production so that a minimum of 30% of its residents' demand for food can be supplied by local producers by 2020.
- Remove impediments that currently exist between local agricultural producers and export markets.
- Protect local agriculture from the introduction of invasive species and pathogens.
- Promote and support educational programs that provide the opportunity for agricultural industry participants of all sorts to productively, profitably, and sustainably expand Hawai'i's agricultural systems.

The more than 60 specific actionable recommendations in the Agriculture Plan fall under at least one of these 4 overarching goals. The Agriculture Plan is intended to guide county legislative and regulatory actions, as well as public and private agricultural business investment, for the next five years or longer. Because so many decisions regarding agriculture and the economy in general are made at the state level, the Agriculture Plan also speaks to Hawai'i County's role in advocating for specific policies at the state level. For instance, the State of Hawai'i 2050 Sustainability Plan (www.hawaii2050.org) also calls for an increase in the locally produced food supply.¹¹

Health Impact Assessment of the County of Hawai'i Agriculture Development Plan

In the course of updating the Agriculture Plan, The Kohala Center recognized the profound impacts of agricultural policies on human health. In 2010, The Kohala Center made the decision to conduct a formal Health Impact Assessment (HIA) to determine how selected Agriculture Plan provisions would impact human health on Hawai'i island. This HIA project was supported by a grant from the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts.

The Hawai'i Agriculture Plan HIA project was conducted by a team comprised of staff from The Kohala Center, Kaiser Permanente Center for Health Research, Hawai'i, the Hawai'i State

Department of Agriculture, and California-based Human Impact Partners, in consultation with community stakeholders who are listed in the Acknowledgements section.

The Agriculture Plan Health Impact Assessment was developed through a collaborative process which incorporated input and feedback from many Hawai'i organizations, agencies, and community members. The HIA team began working together in March 2010. An initial two-day health impact assessment training and scoping exercise in June 2010 was attended by 35 community participants. After considering community input provided at the initial meeting, The Kohala Center organized a second stakeholder meeting in April 2011 at which preliminary HIA findings and recommendations were presented. Stakeholders were encouraged to discuss the merits of HIA recommendations and to provide additional suggestions to be incorporated into the HIA. In April - May 2011 an internet survey collected each participant's input on the prioritization of specific policies to be analyzed through the HIA. In July 2011 a group of key community stakeholders, legislators, and public officials met to refine the recommendations to be included in the HIA and to develop a strategy for the communication of HIA findings and the adoption of HIA recommendations. Individual stakeholders have provided input on an informal level throughout the HIA process.

What is an HIA?

(From the Health Impact Project website¹² <http://www.healthimpactproject.org/hia>)

Every day, policy makers in many sectors have opportunities to make choices that—if they took health into account—could help stem the growth of pressing health problems like obesity, injury, asthma, and diabetes that have such a huge impact on our nation's health care costs and on people's quality of life. Health Impact Assessment (HIA) is a fast-growing field that helps policy makers take advantage of these opportunities by bringing together scientific data, health expertise and public input to identify the potential—and often overlooked—health effects of proposed new laws, regulations, projects and programs. It offers practical recommendations for ways to minimize risks and capitalize on opportunities to improve health.

Health Impact Assessment:

- looks at health from a broad perspective that considers social, economic and environmental influences;
- brings community members, business interests and other stakeholders together, which can help build consensus;
- acknowledges the trade-offs of choices under consideration and offers decision makers comprehensive information and practical recommendations to maximize health gains and minimize adverse effects;
- puts health concerns in the context of other important factors when making a decision; and
- considers whether certain impacts may affect vulnerable groups of people in different ways.

HIA is a structured but flexible process that has six steps. These are:

- *Screening* determines whether or not an HIA is warranted and would be useful in the decision-making process;
- *Scoping* collaboratively determines which health impacts to evaluate, the methods for analysis, and the workplan for completing the assessment;

- *Assessment* includes gathering existing conditions and predicting future health impacts using data, expertise, and experience along with qualitative and quantitative research methods;
- *Recommendations* engages partners in prioritizing evidence based proposals to mitigate negative or elevate positive health outcomes of the policy;
- *Reporting* communicates findings; and
- *Monitoring* tracks the effects of the HIA on the decision and its implementation as well as on health determinants and health status.

Note that “health” in this context includes socioeconomic as well as physical health. ***For the purposes of the following discussion, we will use the World Health Organization definition of health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.***

As shown in Figure 1, health is determined by a hierarchy of influence, acting on levels from the individual, to the family and society, to larger political, social, and economic structures. (Image courtesy of Human Impact Partners 2010).

Figure 1: Determinants of Health



II. Screening

Health Impact Assessment (HIA) is a process that brings together scientific data, health expertise, and public input to identify potential health effects of proposed new laws, regulations, projects, and programs. The first step of the HIA is screening. *Screening* determines whether or not an HIA is warranted and would be useful in the decision-making process. That is, screening determines whether a proposed HIA meets criteria of feasibility, timeliness, and usefulness in guiding future decision-making.

In April 2010, the HIA research partners (representatives of The Kohala Center, the Center for Health Research Hawai'i, the Hawai'i Department of Agriculture, Human Impact Partners, and the Health Impact Project) conducted an initial screening. At this time, the Plan was under development by the County of Hawai'i Department of Research and Development.

The HIA research partners determined that an HIA of the Agricultural Plan met criteria of feasibility, timeliness, and potential to inform future decision-making. HIA research partners determined that the Agriculture Plan had clear impacts on health, most of which had not yet been considered in decision-making. Agriculture policy affects food production, access to quality food, economic growth, and environmental conditions. Each of these factors, in turn, is an important determinant of human health and well-being.

In the second stage of the screening process, Kohala Center staff consulted with members of the Hawai'i County Department of Research and Development, the Hawai'i Department of Agriculture, the Hawai'i County Council, and a variety of agriculture, community development, and health-related organizations. All agreed that a closer examination of the potential impacts of plan recommendations would be a valuable undertaking, given both the groundswell of community interest in reviving agriculture and the desire among policy makers to understand consequences of plan implementation on family and community well-being. The strong support expressed by stakeholders and government agencies, along with the financial and technical resources provided by the Health Impact Project, led TKC and its HIA partners to conclude that an HIA was both feasible, timely, and would contribute to decision-making for several years.

In order to determine which of plan recommendations were most important to evaluate, The Kohala Center hosted a meeting and training for stakeholders in June 2010. This meeting initiated the second step in the HIA process, called scoping.



III. Scoping

Scoping collaboratively determines an outline for a HIA by deciding which health impacts to evaluate, the methods for analysis, and the workplan for completing the assessment.

The Hawai'i County Agriculture Development Plan is an extensive document which sets forth over 60 specific recommendations for county and state action. One of the important tasks of the scoping process for this HIA was selecting a small number of policies whose health impacts could be feasibly evaluated. In the scoping process, TKC, HIA research partners, and 35 representatives of over 19 organizations (listed in the Acknowledgements) came together to identify those Agriculture Plan recommendations with the greatest potential influence, either positive or negative, on the health of the people of Hawai'i County. During a two day June 2010 HIA training workshop, this group identified eleven Agriculture Plan recommendations with potential impact on health:

- a general commercial expansion of fresh fruit and vegetable production;
- an expansion of grass fed beef, dairy, and/or egg production;
- an increase in the organic production of fresh fruit, vegetables, and protein;
- an increase in home food production;
- an increase in biofuel production to reduce island dependence on fossil fuel;
- import substitution as a strategy for the control of invasive species introduction;
- an expansion in the size of the workforce of farmers and farm workers;
- construction of new on-farm housing as a stimulus to the availability of farmers/farm labor;
- an increase in institutional buying, particularly local and state government programs, including farm-to-school programs at the pre-K-12 level;
- marketing efforts that more effectively increase local demand for fresh fruit, vegetables, and protein, e.g. more and expanded farmers markets, EBT acceptance at farmers' markets, etc.; and
- infrastructure development to facilitate increased generation of value-added products.

Based on feedback from this stakeholder meeting, the HIA research team chose four Hawai'i County Agriculture Development Plan¹¹ recommendations to examine through the HIA:

- an increase in institutional buying of local fresh fruits and vegetables, specially purchasing by the Department of Education for its school food programs;
- an expansion of commercial production of fresh fruit, vegetables and protein;
- increased support for home, school, and community food production; and
- an increase in biofuel production to reduce island dependence on fossil fuel.

The following is a summary of the research team's discussions regarding the inclusion of these four policy recommendations as subjects of the HIA:

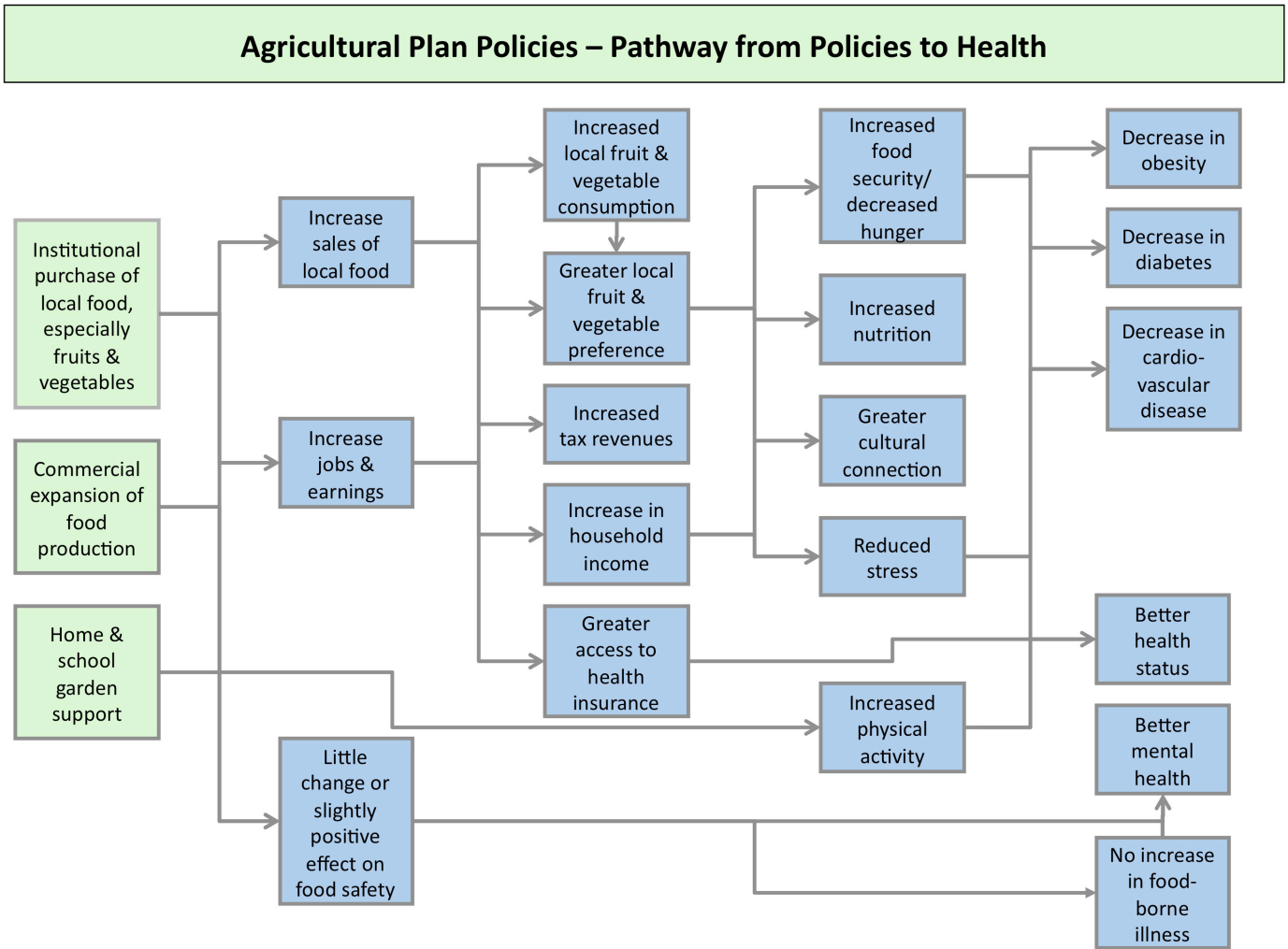
Institutional Buying: Recommendation from the Hawai'i County Agriculture Development Plan, Appendix F, Section III: B. (2): Sales to county, state, and federal agencies - Lead by example; convene a working group to meet with Hawai'i County and Hawai'i Department of Education food purchasing agent(s) to facilitate the sale of Hawai'i Island grown agricultural products for the school lunch programs.

The HIA research team chose to examine the impacts of institutional purchasing of fresh local food by schools (also known as “farm to school” or F2S) with a focus on the impacts on Hawai'i Island's vulnerable populations. These populations include 1) the 26% of residents who are currently eligible for the USDA Supplemental Nutrition Assistance Program (SNAP) and therefore are food insecure or at risk of being food insecure (Personal communication, Hawai'i County Dept of Research and Development); and 2) Native Hawaiian and Pacific Islanders, who make up 30% of the Hawai'i Island population¹³ and who are at highest risk for negative health outcomes that compromise quality of life and shorten life expectancy. There is significant overlap between these two groups. Though there were clearly other institutional buyers to examine in terms of an expansion in government procurement—such as the prison, hospital, and university systems—the research team decided that because the school system serves children and youth, it might present the most striking opportunity to affect long-term health outcomes. Further, farm-to-school programs are in operation in 48 other states, setting a precedent for growth of farm-to-school programs in Hawai'i. School breakfasts and lunches are a significant source of food for low-income children; the HIA team decided that substitution of local for imported food could have significant health impact on children who eat 2 of 3 meals at school, as well as for Hawai'i farms who stand to reap economic benefits from sourcing food locally.

Commercial Expansion: From Hawai'i County Agriculture Development Plan primary goals: Expand Hawai'i Island food production so that a minimum of 30% of its residents' demand for food can be supplied by local producers by 2020 and Appendix F, Section III B. Economic Sustainability, Objective: Increase profitability of Hawai'i Island's agricultural businesses through cost reduction strategies and greater market share for local products.

The policy of a general increase in local farm production, primarily for local consumption, was selected for evaluation through this HIA because it combines several recommendations which were at the core of the Agriculture Plan. The HIA research team created the pathway diagram below to help map out potential impacts associated with switching consumer preference (and purchasing) to local food in Hawai'i County.

Figure 2: Pathway Diagram: Projected Changes Resulting from Agriculture Development Plan Recommendations



Home Production: From the Hawai'i County Agriculture Development Plan: Appendix F, Section III C. Food Self Reliance and Food Security, Objective: Increase the local production of food consumed on Hawai'i Island by growing crops and marketing commercial crops to substitute those being imported and encouraging island residents to grow some of their own produce.

Home production has the capacity to be a significant contributor to family and community food supply in Hawai'i County, where there is a year-round growing season and the majority of residents have the yard space to cultivate a home garden. Home production was selected as a policy for assessment due to concern expressed by stakeholders about the potential connections between gardening and *Angiostrongylus* (rat lungworm).

Biofuel Production: From the Hawai'i County Agriculture Development Plan: Appendix F, Section H, (3) (b) Biofuel Energy Production: Support research and development of large-scale biofuel projects that will supply renewable transportation fuels and power for Hawai'i Island in ways that are community-supported, sustainable, ecologically sound, and complementary to food production.

An increase in biofuel feed stock production and processing was of secondary importance to the stakeholder group. The research team determined that examining the implications of potential food-biofuel land use tradeoffs was an important and complex issue, but that assessment would not be feasible given the resources and time available for this HIA. The Kohala Center subsequently received resources from the Hawaiian Electric Company to conduct a scoping exercise to create a list of research questions that would be necessary to examine potential effects of local biofuel production on community well-being. This scoping document presents a wide range of questions for evaluating biofuel feedstock options in terms of Hawai'i's climate and resource conditions and for evaluating the potential placement of biofuel processing facilities. This document reinforced our understanding that extensive further analysis, beyond the scope of this HIA, should be conducted to fully examine the potential health effects of biofuel production on Hawai'i Island.

The second task of the June 2010 meeting was to determine which health impacts to examine, using criteria of importance to Hawai'i Island residents and availability of data. The HIA research team and community stakeholders decided to examine the impact of the three selected Agriculture Plan policies on five health outcomes or determinants of health from the range of personal, social, economic, and environmental factors that can affect the health status of individuals or communities:

1. Hunger (food security) and diet quality (nutrition security);
2. Obesity;
3. Food-borne illness;
4. Economy; and
5. Well-being and cultural connectedness.

IV. Assessment

The third step in the HIA process is assessment. *Assessment* involves gathering existing conditions and predicting future health impacts using data and expertise. Both qualitative and quantitative research methods may be employed.

Methods

The HIA research team employed a systematic review of English-language literature in peer reviewed journals, publicly available data (Centers for Disease Control and Prevention, USDA, U.S. Department of the Census), and the gray (published but not peer-reviewed) literature. We also contacted experts at USDA, the Hawai'i Office of Child Nutrition Programs, and the Kōkua Hawai'i Foundation to access additional Hawai'i-specific data that have not been published online or in print. Our literature review was supplemented by discussion about potential sources of data with Upstream Public Health, which was at the time conducting a HIA of farm to school and school garden legislation in the state of Oregon.¹⁴

Estimates of economic impact were determined by applying an input-output analysis using the multipliers derived from the 2005 State of Hawai'i Input-Output (I-O) Study.¹⁵ The Hawai'i State I-O Model provides a meaningful inter-industry analysis and economy-wide impact for new funding entering into a given economy.

We presented data for the State of Hawai'i as a whole when county-specific measures were not available.

Current conditions were compiled and assessed for five distinct parameters: food security and nutrition security, obesity, food-borne illness, economy, and others which were relevant to only one or two policies (cultural connection, cultural food security, well-being, academic achievement). A discussion of current conditions for each of these parameters follows.

A. Current Conditions: Food Security and Nutrition Security

What is food security? Food security is the condition “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life.”¹⁶ Simply put, a food secure family has the means to provide its members with nutritious, safe food. Food secure families are not hungry and do not worry about having enough money to buy groceries at the end of the month. Conversely, households that are food insecure experience hunger and are concerned about not having enough food to eat.

What is nutrition security? Nutrition security implies that a family is not only food secure (has enough calories [food energy] to not be hungry), but also has access to a balanced diet that provides adequate vitamins, minerals, and nutritional quality.¹⁷ A food secure family has enough *quantity* of food, while a nutrition secure family has both *quantity* and *quality* of food.

How does food insecurity affect health? Food insecurity is associated with lower dietary quality and increased risk of obesity among adults.¹⁸⁻²⁴ Children who live in homes that are food insecure have poorer performance in school, more academic delays, lower educational achievement, poorer social adjustment, and more behavior problems than their food secure counterparts.²⁵ Adolescents who are food insecure are more likely to have depression and

suicidal symptoms. Adults who are food insecure have more physical and mental health problems than food secure adults do.¹⁶

What is the current state of food insecurity in Hawai'i? In 2009, 15% of households in the United States and 17% of households in the State of Hawai'i were food insecure. Food insecurity affects 51% of Hawai'i's households with children who qualify for free or reduced price lunch programs, 52% of the state's Pacific Islander households²⁴ and a little less than a third of the state's Native Hawaiian households (29%). As is the case nationwide, rural populations in Hawai'i are at increased risk of food insecurity.²⁶ Hawai'i Island has the highest rate (22%) of food insecurity statewide.²⁴

The percentage of food insecure residents of Hawai'i Island has increased over the past four years. According to the USDA's Economic Research Service (ERS), 22,394 (13%) of Hawai'i County residents had incomes less than 100% of the Federal Poverty Level (FPL), and 20,320 (11.8%) participated in the Supplemental Nutrition Assistance Program (SNAP) in 2007. This was a relative increase of 8.6% over the previous year.²⁷ By 2009, the number of SNAP participants had increased by 56%, to 29,186 (16% of the entire population of the island), including 31% of children.²⁸ Estimates from the Hawai'i County Department of Research and Development indicate that 26% of Hawai'i Island households were eligible for SNAP benefits in the last quarter of 2011. In October 2010 approximately 66% of Hawai'i Island public and charter school students were receiving free or reduced price lunches.²⁹

What is cultural food security? Cultural food security means that residents have ways of obtaining food that both satisfy their family's nutritional needs and maintain cultural and social ties.³⁰ Cultural food security is often enhanced by practices which fall outside of the government or formal sector, such as exchanging labor for meals, or drawing upon traditional resources and direct interaction with the environment, as in subsistence agriculture, fishing, or hunting.³¹ Residents of rural areas may increase food security by sharing food through their existing social networks³² and by glean-ing surplus agricultural or wild crops, a vehicle for sharing knowl-edge and building community, as well as procuring food.³³



Cultural food security exists in addition to individual, household, and community food security, which are more commonly recognized. Cultural food security relies upon traditions passed from one generation to the next, particularly in direct engagement with the natural environment. Thus, cultural food security is more than a form of food security; it is also a form of cultural security. Practices that enhance food security through culturally traditional means also help to maintain culture and build community. In the Hawai'i Island context, hunting wild pigs, cultivating taro, and fishing are three examples of practices that improve cultural food security. For people who are severely isolated, resource-poor, or working multiple jobs, even sustaining traditional hunting or fishing practices may be difficult to afford³⁴ and not feasible because of time. To the best of the knowledge of the authors of this HIA, no published data are available on cultural food security in Hawai'i.

B. Current Conditions: Obesity

Obesity is the most significant nutritional problem in the United States. In adults, overweight and obesity are often defined using the body mass index (BMI), a ratio of weight to height. A normal BMI is considered to be 18.5-24.9. Overweight is defined as a BMI of 25-29, and obesity as a BMI of 30 or greater. For instance, an adult who is 6'0" and weighs 184 to 220 pounds is overweight. An adult who is 6'0" and weighs 221 lbs has a BMI of 30 and is considered obese.

Overweight and obesity lead to increased disease and to premature death. Being overweight or obese increases the likelihood that a person will suffer from a long list of chronic health conditions, including diabetes, high blood pressure, heart attack, stroke, cancer, obstructive sleep apnea, osteoarthritis, and depression. Children who are overweight or obese are at increased risk even during childhood of having diabetes, elevated cholesterol, high blood pressure, and earlier maturation compared to their normal weight peers. Further, they face social stigma due to being overweight.³⁵

In addition to adverse health impacts, obesity is associated with increased costs. On average, obese children incur health care costs that are \$320 greater per year than normal weight children.³⁶ The additional costs of medical care due to obesity in the state of Hawai'i were an estimated \$290 million in 2003 dollars.³⁷ Indirect costs, including lost income due to sickness and decreased productivity, add to the economic costs of obesity.³⁸

Among adults, the prevalence of overweight or obesity nationwide has increased from 46% in 1960-62 to 74% in 2005-2006.³⁹ Since 1971, the prevalence of overweight has increased four-fold among children ages 6 to 11 years and nearly three-fold among adolescents age 12 to 19 years.⁴⁰ These data, collected on the National Health Examination Survey (NHES I, 1960-62) and the 2005-6 National Health and Nutrition Examination Survey (NHANES), are especially troubling because virtually the entire increase in prevalence among adults occurred among those who were obese (BMI at least 30), rather than overweight (BMI 25.0-29.9).³⁹

While Hawai'i as a whole has one of the nation's lowest rates of obesity, large ethnic and socioeconomic disparities exist. The national epidemic of childhood obesity disproportionately affects native, rural, and lower socioeconomic status populations, factors which are concentrated among Hawai'i Island residents. Many low-income people adapt to cycles of food shortages by eating more high calorie (and low nutrient) foods when they can. Over time, repeated cycles of food shortage and food access lead to excessive weight gain and obesity.⁴¹

Hawai'i Island has the state's highest percentage (30%) of Native Hawaiians. The prevalence of adult overweight or obesity on the 2004 Hawai'i Health Survey was 67% among Native Hawaiians compared to 49% for Whites and Filipinos, 44% for Japanese and 31% for Chinese.⁴² Due to differences in survey sampling, these numbers are somewhat higher than the rates of adult obesity statewide (20.5%) on the Hawaii Community Needs Assessment.³ However, they address the higher risk of obesity among Native Hawaiians than other groups. Native Hawaiians and other Pacific Islanders have the shortest life expectancy (68 years)^{43,44} of any population in the United States.

Similar to findings among adults, 28.5% of Hawai'i's children entering kindergarten in 2002-2003 and 27.8% of Hawai'i's teenagers surveyed between 2005-2009 were overweight or obese.^{5,6} Adolescents with ethnicity Other Pacific Islander (43.9%) or Native Hawaiian (37.4%) had the highest prevalence of overweight, while White adolescents had the lowest (16.1%). As children who are overweight are more likely than normal weight children to become adults who are obese, these findings portend a continued obesity epidemic in Hawai'i.⁷

Prevailing cultural norms among certain communities in Hawai'i equate large size with strength, good health, and attractiveness.⁴⁵ In these communities, levels of obesity that are damaging to health may be considered normal and the associated health risks may not be recognized.

C. Current Conditions: Food-Borne Illness

Food-borne *illness* is defined as disease transmitted by the consumption of toxin- or microbial-contaminated food or water. A food-borne *disease outbreak* is defined as two or more people who develop a similar illness resulting from the ingestion of a common food.

During the scoping phase of this HIA, stakeholders identified food-borne illness as a health condition of concern. Stakeholders were worried about the potential for a repeat of a disease cluster in 2009 due to *Angiostrongylus* (rat lungworm). This is a rare cause of meningitis (inflammation of the brain and spinal cord) that is transmitted by the slime of snails and slugs. All of the 2009 cases on Hawai'i Island were attributed to consumption of home grown produce which had been consumed after inadequate washing. Most people who come in contact with food covered with slime from infected snails typically have either no symptoms or self-limited symptoms. A concerted effort by the Hawai'i Department of Health and other local organizations has aimed to educate people to remove or exclude snails and slugs from gardens and to properly wash or cook the produce they grow. *Angiostrongylus* is prevalent in the tropical Pacific Islands, and *Angiostrongylus* is a disease that has occurred in Hawai'i occasionally over the years.⁴⁶ Sporadic cases are likely to continue to occur unless universal food handling and preparation (i.e., washing or cooking) is practiced.

Each year, up to 30% of U.S. citizens get sick from food and water they consume.⁴⁷ Most of these illnesses are short-lived bouts of gastroenteritis, with symptoms of nausea, vomiting, and diarrhea that resolve in a few days with no long-term sequelae. The CDC's national surveillance systems for food-borne outbreaks found that from 1998-2002, nearly one-quarter of reported food-borne outbreak illnesses originated from food consumed at a private residence and three-fifths of such illnesses originated from food consumed at restaurants.⁴⁸

Food-borne illness is almost always due to contamination at the time of food preparation or serving rather than contamination at the time of growing or harvesting. Nationwide, only 2.2% of all food borne illness outbreaks from 1990-2007 were associated with the growing, packing, shipping, or processing of produce.⁴⁹ 10% of the outbreaks were due to contamination of produce during food preparation or storage. The remaining 88% were due to consumption of foods other than produce. Data on attribution of food borne illnesses (not just outbreaks) is not available, as most of these result in short-lived symptoms and are never reported. A large proportion of food-borne illnesses go unreported, since people who are not seriously ill usually do not seek medical attention.

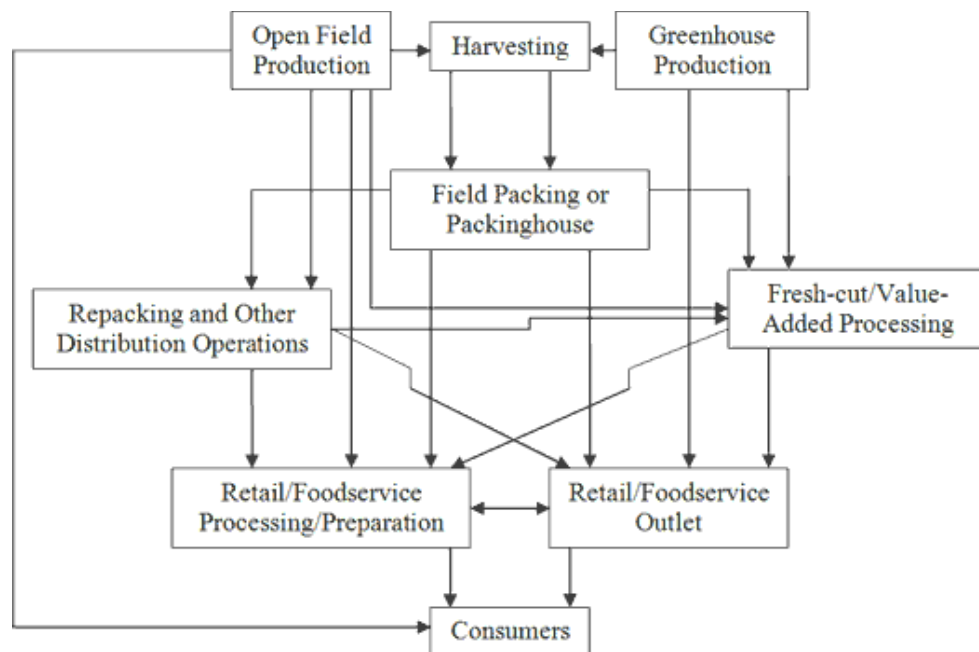
Between 2003-2007, there were 1,277 reported incidents of food-borne illness in the State of Hawai'i. Of these cases, 6.5% were due to contaminated produce, 59% were due to contaminated fish, and 34.5% were caused by other foods. Between 1999 and 2008 none of the food-borne outbreaks in Hawai'i were due to produce which had been contaminated during harvest and processing.⁵⁰

Economic costs of food-borne illness include direct (medical expenditures) and indirect (lost productivity, lost wages, premature mortality) components. In 2009 dollars, the estimated direct costs of food-borne illness in the State of Hawai'i were \$54 million, and the estimated indirect costs were \$656 million.⁵¹

It is difficult to isolate points of contamination in the global food system, between farm and fork.⁵² Investigation of food-borne illness often revolves around the last step in the food chain—where the food was prepared—without necessarily distinguishing the point in the farm-to-fork chain at which the food was initially contaminated.

Figure 3: Supply Chain for Food, from Field to Table.

Each box and arrow represents a potential source of introduction of contaminants that may cause food borne illness. *From* Food and Drug Administration Center for Food Safety and Applied Nutrition.⁵³



Contamination at farms can be due to problems arising from site selection, irrigation, or field management practices. Site selection and irrigation issues occur when crops are exposed to animal manure that has not been properly composted and still contains microbial pathogens from animal digestive systems, when crops are harvested too soon after manure has been spread, or when soils have had previous microbial contamination that has not been remediated. Irrigation issues occur when food producing acreage is situated downwind or downstream from sources of animal wastes or contaminated water, and these contaminants then come into contact with food crops. Field management and handling issues occur when soil remains on

foods during the packing process, when food is harvested after it has dropped to the ground, when animals have roamed in food producing fields, when farm workers do not have access to toilet facilities separate from the fields, or when harvesting, storage, and transportation equipment has not been properly sanitized.⁵⁴

Table 1 presents a comparison of common food-associated illnesses. These include obesity (overnutrition), hunger (lack of nutritious food), and food-borne illness (diseases transmitted by the consumption of toxin- or microbial contaminated food or water). In Hawai'i County, an estimated 55% of adults are obese⁵⁵ and 22% suffer from food insecurity. Food insecurity and obesity are the source of long-lived and profound diseases and suffering, as compared with food-borne illnesses. The overwhelming majority of people who contract food-borne illness experience hours to days of vomiting, diarrhea, and/or abdominal pain, and then return to normal health. In contrast, obesity is a chronic disease which leads to disability and premature death. Similarly, food insecurity is typically experienced over a long period of time, sometimes over an entire lifetime.

Table 1: Diseases Associated with Food

	Definition	Causes: Immediate	Causes: Distal	Chronic Effects
Obesity	Overweight due to excess body fat, usually a body mass index of 30 or more Body mass index is: $\frac{\text{Weight in kg}}{(\text{Height in m})^2}$	<ul style="list-style-type: none"> - Lack of access to nutritious food - Eating more calories (energy) than the body needs - Sedentary lifestyle (TV watching, desk jobs) 	<ul style="list-style-type: none"> - Poverty - Lack of knowledge of preparing and cooking healthy foods - Easy access to calorie-rich, calorie-dense food (fast food, processed foods) - Lack of space, opportunity, or motivation for physical activity in daily life - Nutrient-poor school meals (many children eat most of their calories at school) 	<ul style="list-style-type: none"> - Diabetes - Diabetes complications such as nerve damage, vision loss - Hypertension - Coronary heart disease - Stroke - Liver and gallbladder disease - Kidney disease - Joint pain - Sleep apnea and chronic pulmonary disease - Cancer (colon, breast, endometrial) - Depression
Insecurity and Nutrition Insecurity	At risk of not having enough food, or not having enough nutritious food to eat	<ul style="list-style-type: none"> - Poverty - Lack of access to nutritious food 	<ul style="list-style-type: none"> - Lack of job opportunities - Lack of space or knowledge about growing one's own food 	<ul style="list-style-type: none"> - Hunger - Vitamin, mineral, or micronutrient deficiencies - In adults, associated with obesity - In children, associated with poorer school performance, effects on growth
Food-Borne Illness	Illness ("stomach flu") caused by eating or drinking food contaminated by microbes (bacteria, viruses, protozoa) or toxins (naturally produced or human-made)	<ul style="list-style-type: none"> - Handling or storing food improperly - Not washing hands after toilet use - Toxins: ciguatera produced in some reef fish, chemicals used in agriculture 	<ul style="list-style-type: none"> - Lack of access to clean water - Lack of access to fresh, pure food - Lack of knowledge of proper food handling and storage methods (anywhere that food is handled, including farms, stores, homes, restaurant kitchens) - Lack of access to facilities for washing and storage (refrigeration) of food - Contamination of water where people fish 	<ul style="list-style-type: none"> - Uncommon (rare diseases, such as rat lung disease, cause severe illness in a handful of people each year) - Potential long-term side effects depend on the illness or toxin

D. Current Conditions: Economy

The strength of the economy is linked to physical and mental health. Individuals who are employed have better health than those without jobs, and individuals with higher socioeconomic status (one component of which is income) have better than those of lower socioeconomic status. Poor health leads to unemployment and decline in economic status, and underemployment leads to poor health. Employment precariousness is associated with poorer mental health, with people with unstable employment having 1.5 to 2 times the odds of nervous symptoms, psychological distress, and suboptimal mood.⁵⁶⁻⁵⁸ Further, people who are unemployed or whose employment is unstable have higher mortality than those whose employment is stable and continuous.⁵⁹⁻⁶²

Hawai'i's economy is improving as reflected in the labor market conditions. After 10 consecutive quarters of declines in jobs from the second quarter of 2008 to the third quarter of 2010, Hawai'i jobs increased for the fifth time on a quarterly basis. In May 2009, one month before the National Bureau of Economic Research (NBER) declared that the Great Recession had ended, the Hawai'i State Legislature reduced the state's budget by \$800 million and abolished 200 state positions. Two months later, in July 2009, then-Governor Linda Lingle announced a reduction-in-force of 1,100 state workers, statewide furloughs, and a hiring freeze to offset further declines in state revenues.

Although Hawai'i did not experience the Great Recession as catastrophically as some mainland states, and Hawai'i's unemployment rate remained below the national unemployment rate, the count of non-farm jobs declined by almost 5% over 4 years, from 617,100 jobs in 2006 to 586,900 jobs in 2010. The reduction in non-farm jobs in the County of Hawai'i was noticeably higher, with a decrease of more than 7% during the same time period.⁶³

The economy of Hawai'i County is weaker than the economy of the state as a whole. The statewide unemployment rate dropped to 6% in May 2011 with a workforce count of 635,100 individuals. But the May 2011 unemployment

Agriculture Success Story

Roy Y. Honda Farm

Reflections from Roy Y. Honda, Hawai'i Island Farmer

"In order to be successful as a farmer," says Roy Honda, "you have to persevere. You can't give up when times are hard." Honda has been farming on Hawai'i Island for the past 39 years, so he knows how to survive hard times.



In his early years, Honda grew only tomatoes, which he sold to local wholesalers and shipped to O'ahu for sale. "Over time, it became clear to me that the way we were farming—monoculture—was not sustainable," explains Honda. In the late 1980s Honda lost half of his crop when the fungicide he used killed the plants. Honda made a commitment to transition to more sustainable agricultural practices, using compost instead of synthetic chemicals to fertilize his plants. Honda diversified his crops to include bell peppers, eggplants, and Japanese cucumbers, as well as tomatoes. "There were a lot of small farmers doing the same thing at the same time, and I realized that there was only a small window of opportunity for me to find my niche in the market," he says. "I decided to focus on quality and taste, as well as on using only safe farming practices."

Honda also decided to concentrate on supplying local markets and to stop shipping food off island. He notes that demand for local produce soared after the Farm Bureau launched the Keauhou Farmer's Market about six years ago. "The market provided a great venue for local farmers to share our products, which helped increase demand in the community," he says.

Read more about Roy Honda's approach to producing for the local market on Page 61.

rate for Hawai'i County remained much higher, at 9.2%. A second economic challenge facing Hawai'i County is population growth. The 2010 Population Census showed that Hawai'i County has experienced a rapid 24.5% increase in its population base (to 185,079) since the year 2000. Statewide population growth was estimated at 12.3%, roughly half the growth rate experienced by Hawai'i County over the past decade. The median household income for Hawai'i County in 2009 was \$50,739 compared to \$63,741 statewide. The count of persons below the poverty level for Hawai'i County in 2009 was 14.5%—once again significantly higher than the statewide rate of 10.4%. On the positive side, Hawai'i County's homeownership rate for 2005-2009 was 65.7%, 7% higher than the statewide rate of 58.1%.

Hawai'i County accounts for 2,573,400 acres of land (including inland water), or 62.5% of the statewide total as reported by the Hawai'i State Land Use Commission (LUC). The "Big Island" also accounts for the majority of statewide lands zoned for conservation and agricultural uses. In 2008, Hawai'i County accounted for 670,000 acres of farmland, or 60.4% of the state total of 1.11 million acres.

Though Hawai'i County is the site of the majority of agricultural land in the state, it ranks third behind the City and County of Honolulu and Maui County in the value of crop production, with \$138.7 million worth of crops produced in 2008. The value of crop production has declined from a high of \$152.3 million in 2006, when Hawai'i County's production surpassed that of both the County of Honolulu and the County of Maui (Table 2). There were 2,359 hired farm workers recorded in Hawai'i County in 2008, the highest in the state, accounting for 38% of the total statewide.

Table 2: Trends in the Value of Crop Sales in Hawai'i Counties, 2003-2008.

County	2003	Rank	2004	Rank	2006	Rank	2008	Rank
Hawai'i	\$ 132,331	2	\$ 143,972	1	\$ 152,302	1	\$ 137,086	3
Kaua'i	\$ 47,077	4	\$ 47,652	4	\$ 60,352	4	\$ 74,646	4
Maui	\$ 128,043	3	\$ 129,200	3	\$ 141,017	3	\$ 143,728	2
Oahu/ Honolulu	\$ 154,229	1	\$ 138,878	2	\$ 146,013	2	\$ 166,679	1
STATE TOTAL	\$ 461,680		\$ 459,702		\$ 499,684		\$ 522,139	

Livestock value is excluded. Data is from USDA's National Agricultural Statistics Service (2009).

With so much land designated for agriculture, not all of which is in cultivation, (Table 3) there is great potential for agricultural development in Hawai'i County.

Table 3: Estimated Acreage of Land Use by Hawai'i County, 2006.

County	Total Area	Classification by State Land Use Commission			
		Urban	Conservation	Agricultural	Rural
State Total	4,112,388	197,663	1,973,631	1,930,224	10,870
Hawai'i	2,573,400	53,722	1,304,347	1,214,040	1,291
Maui	750,900	28,619	311,601	402,354	8,326
Kaua'i	400,000	14,558	199,169	185,020	1,253
Oahu/ Honolulu	386,188	100,764	156,614	128,810	-
Other Islands	1,900	-	1,900	-	-

* The Northwestern Hawaiian Islands, from Nihoa to Kure Atoll, excluding Midway.

Source: 2010 State of Hawaii Data Book, Table 6.04⁶⁴

E. Current Conditions: Cultural Connections to Land and Water and Traditional Hawaiian Concepts of Health

Based on reflections provided by Puni Freitas from Kokua Kalihi Valley on O'ahu

Hawaiian traditions take a holistic view of health. That is, health involves physical wholeness and well-being, spiritual well-being, as well as the wellness of the family and the social and physical environment. In Hawaiian tradition, health, food, and land are interrelated and interconnected concepts. To maintain health involves achieving balance between three levels, often referred to as the *Lōkahi* triangle:

- *Akua* – The understanding that land, food, fish, forest, and other aspects of the environment are our sacred ancestors;
- *‘Āina* – That which nourishes, including land, ocean, family, etc.; and
- *Kanaka* – Humans.

Key elements of the traditional Hawaiian relationship to food and food sources include:

- *Akua* – As above, understanding that the land, food, fish, environment, forest, etc., are our sacred ancestors;
- *Ahupua‘a* – A balanced ecosystem from sky to mountain top along ridgelines, down valleys and out into the ocean; all life is centered around water (the stream, the rain, the ocean) and all human life is a functioning, integral part of this balance; and
- *Wao* – realms: The *wao kanaka* is where humans grow food and build our homes; the *wao akua* is the realm of forest and deity, where medicine grows, where sacred plants flourish, and where the watershed builds its wealth. There are many more *wao*, but these two set up a *ka‘ina*, or an order and a relationship that help each to flourish.



Agriculture Success Story

Center for Agricultural Success

Reflections from Jim Cain, founder of King Laulau Poi Factory



The Cain family (Jim and his wife Gretchen, and their two children Sierra and Kaua) started farming taro in Waipío Valley in 1993. “It was our desire to make a living and to connect to Waipío’s

deep roots,” says Cain, “so we restored some vacant lo’i (terraces), followed the direction of our Waipío kupuna (elders), and became taro farmers. Taro farming has brought so much positive energy into our lives by allowing us to make a living as farmers and poi processors, by connecting us to the land and our Waipío ancestors, and by enabling us to provide this awesome ancestral nutritious food to our friends and neighbors.”

Cain believes that this is a time of great opportunity for small-scale family farms in Hawai‘i. “This is a huge potential market,” says Cain. “But for small scale farmers to survive they must develop strategies to access some of the 80 cents of the food dollar that is not currently supporting the farm. This is accomplished through a combination of direct marketing techniques, value-added processing, and niche market development.”

Cain has a deep commitment to training new farmers to make a living and supply Hawai‘i Island with food. He has been instrumental in creating the newly formed Center for Agricultural Success (CAS) in Hamakua. CAS is a collaborative effort of public and private entities to ensure the success of small-scale diversified farms by providing education, training, and support services.

Read more about the Cain family businesses and the Center for Agricultural Success on Page 62.

The Hawaiian sense of familial relationship to land does not prioritize the needs of humans over those of other beings. The traditional Hawaiian relationship to land is not about bending and forcing our environment to yield the greatest short-term harvest. Rather, the traditional Hawaiian relationship to land involves humans serving as familial caregivers of the ‘āina, enjoying the food that the land provides while loving and caring for the land with respect and reciprocity. In practice, this respectful and loving relationship is predicated upon responsible harvesting, alignment with seasonality, and ensuring that balanced land-human relationships were maintained through culturally sanctioned prohibitions (*kapu*).

Traditionally, Hawaiian healing methods are entirely food related and applied to all family members. These traditions, while known to some, are not widely practiced today. The revitalization of traditional Hawaiian values about food could help improve the health of all people. Honor the place where you live, honor the culture of that place, and both the land and the people will be strong.

Even today Hawaiian children are taught simple stewardship ideas at very young ages: ‘*ai i kekāhi, mālama i kekāhi* (eat part today, save some for tomorrow); ‘*ai i ka mea i loa‘a* (eat what you have), and ‘*o ka ‘āina ke ali‘i, ‘o ke kanaka ke kauā* (the ‘āina is our *ali‘i* [master] and we are her servants). These basic paradigms, if taken to heart, can protect the ‘āina for perpetuity.

Traditional Hawaiian communities work together to ensure community access to healthy ‘āina—land, sky and ocean—for the single intention of *mālama* (stewardship),

because the ‘āina is family and we must care for one another in order to thrive. For Hawaiians the land is grandmother and the *kalo* (taro) is brother. If the land is family, it is easy to understand that community health depends on the health of the land and on maintaining a healthy connection between the two. From this perspective Hawaiians would not choose to use

herbicides and pesticides in our food crops or in our forests, because we would not poison our grandmother. We would not manipulate the genes of our food plants, because we respect the genealogy of our brother. We would plant diverse food crops and multi-storied forests, because we understand that plants are most healthy when they live in a community with multiple gifts. We would not need chemical fertilizers, because we *‘ai i kekāhi, mālama i kekāhi*, eat some now and some later, and by creating healthy soil, we can sustain many generations.

Several lessons flow from these cultural concepts of health. These include:

- Caring for plants, animals, and the land on which they depend with *aloha* (love). People inherit the *mana* (life force) that we invest in our *‘āina* (land);
- Managing our island ecosystems so as to maintain their ability to sustain us by producing food and yielding water. Each ecosystem is a reflection of human relationships to our ancestors;
- Diversified agriculture and complex forests reflect how plants grow naturally and can be kept healthy; and
- Maximizing our ability to sustain ourselves with food cultivated locally. We *‘ai i ka mea i loa‘a* (eat what we have) rather than relying on food imported from elsewhere.

V. Health Impact Analysis:

How Agriculture Development Plan Policies will Impact Health

A. Increased Institutional Buying

Institutional buying refers to the purchase by local institutions of locally grown produce for use in meals prepared by those institutions. Institutions include schools, hospitals and clinics, prisons, detention facilities, and employers such as hotels that provide food service for employees. Provisions in the Agriculture Plan in support of institutional buying include a recommendation that Hawai'i County "lead by example" in its own food procurement processes and assist food producers to gain access to additional government markets such as schools, social services, and the military.¹⁰ This HIA focused its analysis on farm to school programs--a model of institutional buying that has proven successful across the nation. Farm to school programs connect schools to local farms in order to improve student nutrition by providing healthy school meals, support local farmers by creating a stable local market for agricultural food products, and create educational opportunities in agriculture.

Existing Conditions

Under the Child Nutrition Act, which was reauthorized by congress in 2010, federal money for school meals and all other child nutrition programs is allocated by the USDA to each state's child nutrition agency. The state agency for Hawai'i is the Office of Hawai'i Child Nutrition Programs (OHCNP). OHCNP authorizes the establishment of new School Food Authorities (SFAs) and monitors contracts with existing SFAs. OHCNP reimburses SFAs for a portion of the costs of school meals. Additional funds come from each state as well as from students' share of the cost for meals. Most procurement decisions are made at the SFA level, and procurement rules are designed to ensure open and competitive procurement in accordance with federal, state, and local regulations. In Hawai'i's case, current Hawai'i State Department of Education regulations are stricter than federal regulations for small purchases (defined as less than \$25,000 for state regulations versus \$100,000 for federal purchases), so state level regulations take precedence.

The Hawai'i State Department of Education is the tenth largest school district in the nation. In 2009-10, the latest year for which we could obtain firm figures, it educated 178,189 kindergarten through 12th grade students (including about 23,300 in Hawai'i County) in 255 regular public schools, two special schools, and 31 charter schools.⁶⁵ The largest School Food Authority in the state is the Hawai'i Department of Education School Food Service Branch (SFSB). The SFSB is the only state-wide SFA in Hawai'i, serving 174,030 students in 261 schools during the 2011-12 academic year, approximately 96% of public school students.²⁹ In 2011-12 there were also 42 other SFAs in Hawai'i consisting of 24 public charter schools, 10 private schools, and 8 residential child care institutions, serving a total of 8,933 students statewide. The SFSB receives approximately \$38 million annually from the federal government to support its school breakfast, lunch, and snack programs and serves approximately 100,000 lunches daily during school sessions, (Personal communication, Sue Uyehara). Much of the following discussion of institutional buying focuses on the



SFSB due to its large size (hence, large potential impact of any changes) and its accountability as a state-wide public system.

The nutritional content of school meals has a significant impact on the health of many children in the state. For the 54.5% of public school children in the State of Hawai'i who qualified for free or reduced-price lunches in 2010-2011 (Personal communication, Sue Uyehara) the two meals a day they eat at school provide a significant share (two-thirds or more) of their daily nutrition. This significance is even higher for Hawai'i Island public and charter school students, approximately 66% of whom were qualified for free or reduced price lunches in 2010-11.²⁹

One identified barrier to creating significant institutional school purchasing of local foods is the passage of Act 175 SLH 2009. State procurement law requires that bidding be conducted through a centralized process under a Request for Proposal (RFP). Prior to 2009, procurement of perishable foods (fresh vegetables, fruit, and meat) by state agencies, including SFSB, was exempt from Hawai'i State procurement regulations. That is, procurement of perishable foods was exempt from the competitive bidding process. The SFSB could negotiate directly with local suppliers to procure fresh fruit, vegetables, or meat from any local producer. As large mainland producers can often sell for a lower price than local producers, Act 175 essentially cut off local producers from selling to the SFSB or any other institutional purchasers. Act 175 did give a 15% price preference to Hawai'i products. However, local producers' prices can be more than 15% higher than those of large agro-business on the mainland. Within the HDOE, this means that all bidding is now conducted through the Hawai'i Department of Education Procurement Office. Individual cafeteria managers lack the time or bureaucratic know-how to go through the process of applying for and evaluating competitive bids. Due to limited staffing,

From Farm to School: Challenges and Opportunities

Reflections from Dexter Kishida, School Food Coordinator for 'AINA In Schools, Kōkua Hawai'i Foundation

Dexter Kishida serves as School Food Coordinator for the Kōkua Hawai'i Foundation and is a key advocate for the farm-to-school movement in Hawai'i. 'AINA In Schools is an initiative of the Kōkua Hawai'i Foundation with a mission to "Actively Integrate Nutrition and Agriculture ('AINA) In Schools." Kōkua Hawai'i Foundation's 'AINA program focuses on three main goals: (1) addressing health issues through nutrition education and by encouraging healthy eating habits, (2) creating a sense of stewardship by connecting students to the land and sea, and (3) creating a market for local farmers. 'AINA is currently working directly with 12 O'ahu elementary schools and developing resources that can be shared with any interested school.

"I think that changing our school menus begins with changing demand and shifting what it is our children want to eat. We need to start marketing healthy foods to our children right NOW," said Kishida. "We live in a fast and easy culture when it comes to food, and yet we need depth and wholesomeness to thrive. We need to rebuild our relationship to growing our own food. Since we don't have BILLIONS of dollars to spend on marketing like the fast food industry does, we have to rely on the grass roots efforts of farm to school education through our school gardens," he said.

Kishida believes that we need to recreate more wholesome food systems. "Why can't schools function as food hubs?" he asked. "School gardens can host bountiful farmers markets which can serve as great hands-on learning tools for reinforcing the basics of math and social studies. Community Supported Agriculture deliveries to school sites can serve as fundraisers and as a great access point for families and neighbors to come together at their local schools," remarked Kishida.

Read more about Dexter Kishida and his work with 'Aina In Schools on Page 64.

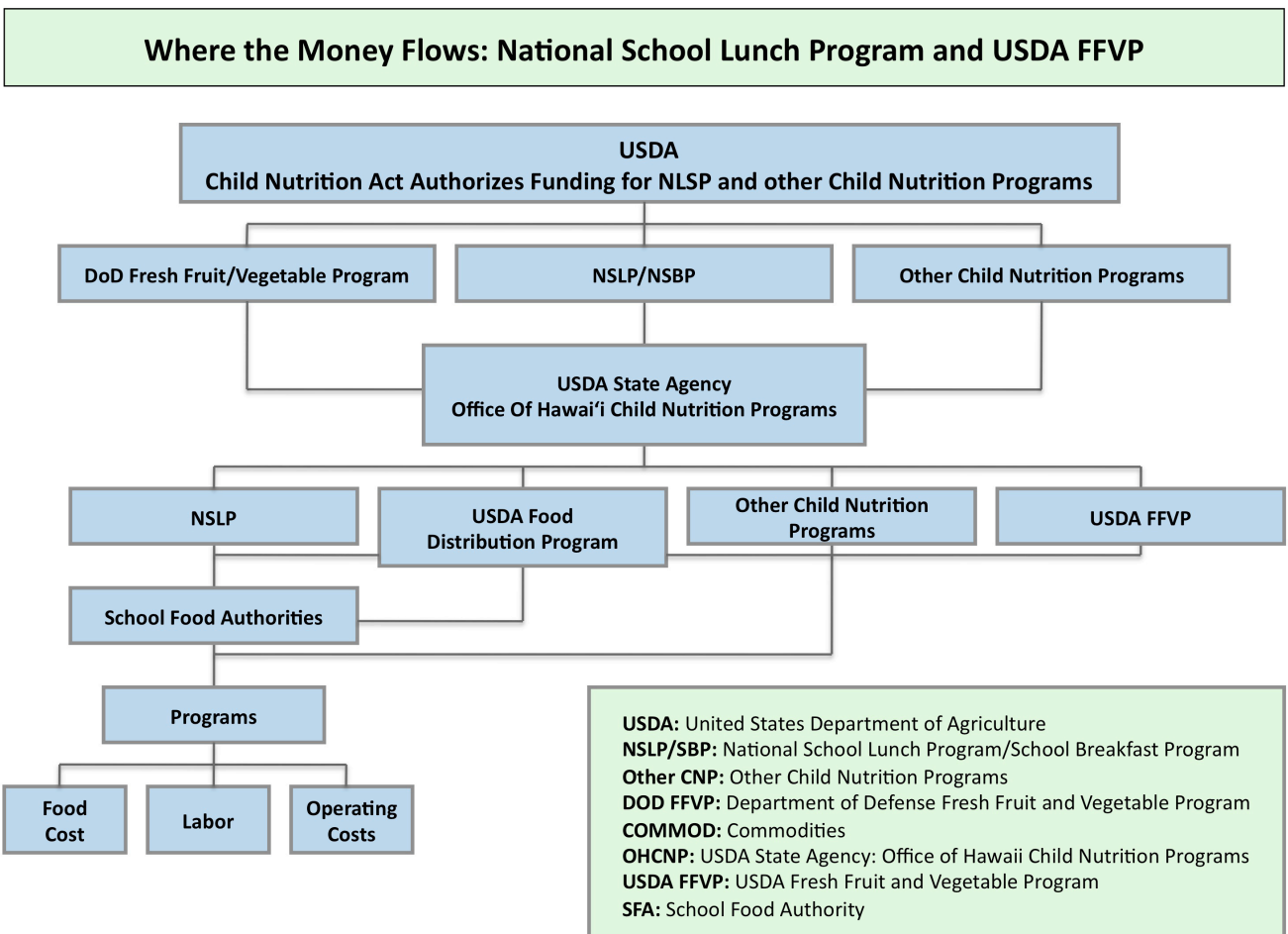


bidding is done for large quantities of produce, which are usually beyond the capacity of a single local producer or small supplier.

Another barrier to farm-to-school programs involving the HDOE is the current requirement that food suppliers sign contracts for periods of two months or longer and often have to answer bids several months before the start of the school year. Hawai'i produce vendors cannot obtain quotes for purchasing local food far in advance of delivery because farm input costs fluctuate and make it difficult for local farmers to predict the price at which they can profitably sell in the future (Personal communication, James Nakatani, HDOA). Since the passage of Act 175 SLH 2009, there have been no responses to the SFSB produce solicitations for 6-month contracts (Personal communication, Glenna Owens, SFSB).

Four main programs serve Hawai'i's school children: the National School Lunch Program (NSLP), the National School Breakfast Program (NSBP), the Afterschool Snack Program (ASP) and the Summer Food Service Program (SFSP). The USDA Fresh Fruit and Vegetable Program (FFVP) also serves Hawai'i public schools but is funded separately. Commodities and the Department of Defense (DoD) Fresh Fruit and Vegetable Program are entitlements to the NSLP. Figure 4 diagrams how federal funds flow from USDA to OHCNP to School Food Authorities.

Figure 4: Where the Money Flows for School Meal Programs



1) National School Lunch Program

The National School Lunch Program (NSLP) program is essentially a reimbursement program. To receive NSLP reimbursements, each school site must keep records of how many students ate within each eligibility category (i.e., free, reduced, or paid breakfasts and lunches). Each SFA submits a monthly claim for reimbursements to OHCNP. SFAs then use the reimbursements they receive to cover labor, food, and operating costs.⁶⁶

The cost to the HDOE SFA for producing school lunches is \$4.70 per student. This includes approximately \$1.40 in food costs and \$3.30 in overhead, including staff salaries. As shown in Table 4 Hawai'i state funds make up the difference between actual costs and NSLP reimbursement and student price.

In school year 2011-12 the USDA National School Lunch Program reimburses up to \$3.25 per free lunch, \$2.85 per reduced-price lunch, and \$0.31 per paid lunch to SFAs that follow regulations promulgated by the Hawai'i Office of Child Nutrition Programs and federal agencies.⁶⁷ The state of Hawai'i contributions and student price are the other two sources of funds for school lunches (Table 4).

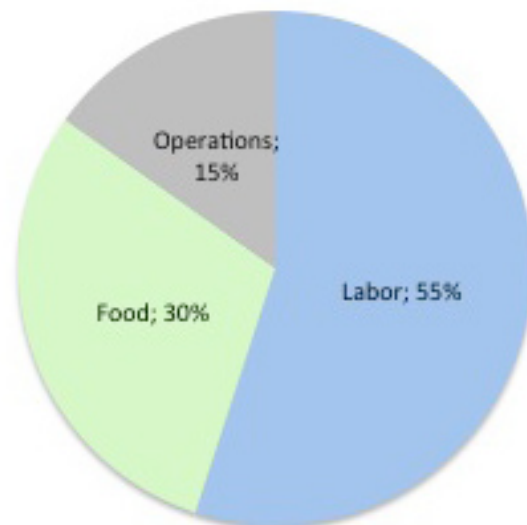
Table 4: Sources of Payment for School Lunches in Hawai'i (School Year 2011-12)

Category	Student Price	USDA reimbursement ⁶⁸	State contribution (estimated)
Paid	\$2.25	\$0.31	\$2.14
Reduced	\$0.40	\$2.85	\$1.45
Free	\$0	\$3.25	\$1.45

Figure 5 shows the cost breakdown for a Hawai'i HDOE school lunch. 55 % of the total cost is spent on labor, 30% on food, and 15% on operating costs.

Figure 5: Hawai'i School Lunch Cost Breakdown

Labor \$2.57
 Food \$1.39
 Operations \$0.74



2) Department of Defense (DoD) Fresh Fruit and Vegetable Program

The Department of Defense (DoD) Fresh Fruit and Vegetable Program (DoD FFVP) provides fresh fruit and vegetables to students who participate in the National School Lunch Program. The USDA partners with the DoD to offer this program, and funding for the DoD program comes from the USDA commodity allotment.⁶⁹

As one of the largest procurement agencies in the nation the Department of Defense has enormous buying power. Despite DoD policies to encourage local procurement,⁶⁹ the majority of food (\$122 million total in 2009) procured by the DoD in Hawai'i is imported from the U.S. mainland. As of 2009, the DoD had a contract with Los Angeles-based Coast Produce to provide fruits and vegetables to Hawai'i military commissaries. Coast Produce sources from Southern California growers and imports produce from Asia through its Seoul, Korea gateway. It is uncertain whether Hawai'i producers contribute to Coast Produce's supply chain.⁷⁰

The DoD Fresh Fruit and Vegetable Program allotment provides produce for the National School Lunch Program and Breakfast Program in Hawai'i. The NSLP can prescribe a geographic preference for fresh fruit and vegetables, but because the majority of NSLP produce is procured through the DoD, the Hawai'i Department of Education (HDOE) does not currently decide what items are procured from which producers.

3) USDA Fresh Fruit and Vegetable Program⁷¹

The federally-funded Fresh Fruit and Vegetable Program (FFVP) encourages FFVP elementary schools to provide fresh fruit or vegetables to students a minimum of twice a week. At least half of children at the school must be eligible for free or reduced-price school meals in order to participate in the FFVP.

OHCNP makes an allotment to each School Food Authority to operate its USDA Food Distribution Program (FDP) and its USDA Fresh Fruit and Vegetable Program (FFVP). If an SFA has multiple sites, as does the DOE School Food Service Branch, then USDA FFVP and FDP funds are allocated to each DOE school site. The FFVP Coordinator (often the school Vice Principal) and the Cafeteria Manager make decisions about which fresh fruits and vegetables to purchase for each school. This food allotment can be spent on any type of fresh fruit or vegetable, but federal rules require open and competitive procurement.

The USDA FFVP program provides funds to purchase fruits and vegetables that may be served any time during the school day other than scheduled meal times. Current USDA FFVP



funding in the State of Hawai'i is approximately \$1.9 million, of which \$1.7 million is allotted to the DOE SFA. No more than 10% of the \$1.7 million in funding may be used for administrative costs. Thus, DOE schools have about \$1.5 million to be spent on fresh fruits and vegetables for this program. The 2011-12 FFVP allotment for the 21 participating SFSB Hawai'i Island schools is \$584,168, including \$525,751 for food. There are an additional seven Hawai'i Island SFAs with \$59.635 awarded in 2011-12.

Schools that participate in the USDA FFVP program may prescribe a geographic preference. Geographic preference is not a mandate, and it is not defined by any ceiling or floor in percentage points or dollars. For example, an institution can choose to designate a 40% geographic preference for bananas, which means that a local farmer can submit a bid which is 40% higher than a mainland counterpart and still win the contract. This is allowable so long as the geographic preference does not impede competition and so long as it is only used to purchase fresh fruits and vegetables. Thus, fresh cut fruits and vegetables can be procured by schools through the USDA FFVP program by establishing geographic preferences for these items.

The FFVP has fewer regulations than the school lunch program, making it a logistically easier mechanism through which to create and expand a farm to school program in Hawai'i and a potential vehicle for increasing institutional purchasing of locally produced vegetables and fruit.

1. Potential Health Impact: Food Security and Nutrition Security

An increase in institutional buying of local produce, achieved through implementation of a farm to school program in the State of Hawai'i, is likely to have a net positive impact on the health of children and their families.

Schools are a natural environment in which to model and reinforce healthy eating behavior. Children spend five days a week and eat one or two daily meals at school.^{72,73} A healthy diet (one with adequate fruit and vegetable [FV] intake) is associated with FV availability and accessibility. Children eat more of whatever food is most available and least expensive.⁷⁴⁻⁸¹ Many current and former Hawai'i public school attendees, including participants in the HIA stakeholder meetings, report that they rarely ate the unpalatable canned or otherwise processed produce that constituted the required fruit and vegetable servings in school meals. A recent focus group, conducted by the HIA research group with sixth grade students, confirms a strong preference for fresh, uncooked fruits and vegetables. Providing fresh local produce in school breakfasts, lunches and snacks makes healthy, tasty food available and affordable, thereby improving nutrition security.⁸² A review of seven studies that examined the rate of participation in school meal programs in response to the inclusion of local food found increases of 1.3% - 16% (average 9.3%) in school meal participation rates.⁸³ Further, youth value autonomy of food choice. Increasing the range of food available in school lunches and other social spaces may lead to increased consumption through appeal to youth's desire to exercise their autonomy in making food choices.⁸⁴ Provision of free, daily fruit has been shown to result in a net increase (compared to no free fruit) of 0.6 fruit and vegetable servings/day after one school year, and a persistent increase of 0.4 FV servings/day three years later.⁷⁶ That is, providing free fruit to children led them to eat more fruit at least three years into the future, after the free fruit distribution program had concluded. This is an example of how providing fresh fruits and vegetables to children can expand their palate. Two studies found nutritional improvement for children participating in Farm to School and School Garden Programs, including increases in intake of vitamin A, vitamin C, and fiber.⁸⁵

Conclusion:

If schools purchase more locally grown fruits and vegetables for school meals, fewer children will go hungry (as rates of school meal program participation will increase) and more children will get better nutrition. Put in policy terms, an increase in institutional buying of locally grown

Agriculture Success Story

Nalo Greens School Mix

Reflections from Dean Okimoto, Owner of Nalo Farms

“Hawai‘i has such high rates of childhood obesity,” says Dean Okimoto, owner of Nalo Farms in Waimanalo. “As a community, we have come to understand that foods grown here in the islands are more nutritious, tastier, and better for you. This consciousness should apply to our kids too.”

About two years ago, Okimoto was approached by administrators at Iolani School in Honolulu to provide his Nalo Greens salad mix for their school cafeteria. Okimoto was already providing Nalo Greens for special events at the school, but this was the first time that the greens had been offered to students as part of their regular lunch fare.

“We found that the kids really liked the tenderness and flavor of our baby lettuces,” says Okimoto. “When I visit the second and third graders at Iolani School, I let them taste our salad mix. They are surprised how much they like the way it tastes,” he says. “By serving our mix in the school cafeteria, students have begun eating and appreciating salads. This is improving the health of our kids.” Okimoto hopes to expand distribution of his product to Oahu’s public schools, but he notes that “navigating the DOE procurement system is a big challenge.”

Next on Okimoto’s horizon is a plan to experiment with school dressings to decrease their sugar content and make them more palatable. “This is what we gotta do if we want to turn our childhood obesity statistics around,” he says.



Read more about Dean Okimoto and Nalo Farms School Salad Mix on Page 67.

and processed produce would have a net positive effect on food and nutrition security among Hawai‘i Island residents because it would increase the amount of fresh, free food in the school diet, and because increases in fruit consumption will continue for at least 3 years. Residents who are lower income, rural, or of Native Hawaiian ancestry will benefit the most from this policy change, since these residents are most at risk of food insecurity at baseline.

2. Potential Health Impact: Obesity

Farm to School programs will provide fresh local vegetables and fruit to Hawai‘i Island children. To the extent that fresh produce replaces less palatable canned or otherwise processed vegetables and fruit in school meals, children are likely to increase their vegetable and fruit consumption. Increased consumption of low fat, high fiber and high vitamin-content foods, such as fruit and vegetables, is important in obesity prevention and treatment.⁸⁶ Among children who are overweight, encouraging increased consumption of healthy food leads to greater weight loss (or stabilization) than promoting decreased consumption of junk food.⁸⁷ Thus, increased institutional buying of fresh fruit and vegetables should, over time, help prevent childhood obesity in Hawai‘i. In the short term, this policy will result in the substitution of local for imported sources of produce. Thus we anticipate no more than a small change in the number of calories consumed in the short run.

Further, research has found no strong effects of any environmental intervention on short-term childhood obesity prevention.^{72,88,89} Twelve articles examining association between fresh fruit and vegetable

consumption and overweight/obesity show mixed results, with the preponderance of evidence demonstrating a small benefit of eating a diet high in fruit and vegetables during childhood to lower risk of overweight or obesity in adulthood.^{86,90-96} As discussed under *Potential health*

impact: food security, above, increasing the amount of locally sourced food in school meals increases the rate of student participation in school meal program. Participating in school breakfast programs is associated with lower rates of obesity.⁹⁷ Additional health benefits of increased fruit and vegetable consumption include lower risk of death from heart disease⁹⁸ and with lower risk of several cancers, stroke, and hypertension in adulthood.⁹⁹

Conclusion:

An increase in institutional purchasing will have a small long-term positive effect on the prevention of childhood obesity. No changes are expected in the first few years, since changes in diet result in changes in the body slowly, as children grow and mature. In the short term after implementation of this policy, we can reasonably expect that children will eat approximately a half a serving more of fresh fruit and vegetables (see study cited in nutrition security section above). As childhood eating habits track into adulthood, children eating more fresh fruit and vegetables in childhood have less obesity and nutrition-related disease as adults. Thus, this policy can be expected to result in short term change in eating patterns and longer-term improvements in adult health.

Children who are lower income, rural, or of Native Hawaiian ancestry will benefit the most from this policy change, since these children are most at risk of obesity at baseline.

3. Potential Health Impact: Food-borne Illness in Schools

A 2002 national study documented an average of 25 school-based food borne illness outbreaks per year nationwide from 1973-1997. In 99% of these outbreaks, the site of preparation (i.e., the cafeteria kitchen) was indicated as the source of the contamination.¹⁰⁰ A change in the source of produce will not impact the food safety protocols which govern food preparation at school cafeterias. Replacement of processed, imported fruit and vegetables with locally grown fruit and vegetables should, therefore, have a negligible impact on cases of food-borne illness stemming from school cafeterias.

It is possible that an increase in locally grown FV will result in a decrease in food-borne illness in Hawai'i. This would be attributable to there being fewer points for introduction of pathogens to locally-grown FV as compared to imported produce. Imported produce is more likely to have been collected from multiple farms, to have been handled by more people, to be less fresh due to time involved in trans-oceanic transport, and to have passed through more locations—thereby making it more prone to contamination en route than local produce.

Proper field management, harvesting, and food handling procedures are essential to decrease the risks of food-borne illness. To reduce the risk of food-borne illness in schools, Hawai'i's school cafeterias should follow established food safety protocols (Table 5).¹⁰¹

Table 5: Food Handling Practices to Decrease Risk of Microbial Contamination of Fresh Produce¹⁰¹

Action	Method
Wash hands	<ul style="list-style-type: none"> – Use warm water and soap. – Wash at least 20 seconds before and after handling fresh produce.
Clean and sanitize utensils and facilities	<ul style="list-style-type: none"> – Before and between preparing each food item, wash cutting boards, dishes, utensils, and counters with hot soapy water. – Sanitize with dilute bleach solution (1 tsp. household bleach per quart of water) or kitchen disinfectant after cleaning. – Do not mix soaps or other cleansers with chlorine-based sanitizer.
Clean fresh produce properly	<ul style="list-style-type: none"> – Rinse thin-skinned produce with cold water. – Scrub firm-skinned produce with a soft-bristled brush while rinsing. – Drying produce after washing may decrease bacteria levels. – Pre-washed produce does not benefit from being rewashed.
Avoid cross-contamination of fresh produce	<ul style="list-style-type: none"> – Use separate cutting boards for fresh produce and for raw meat, poultry, and seafood. – Do not place produce on counters until they have been cleaned and sanitized. – Use only clean, dry containers to store or serve fresh produce.
Cook produce to safe temperature, if appropriate	<ul style="list-style-type: none"> – If cooking produce, heat to 135⁰ F in order to kill disease-causing microorganisms.
Refrigerate cut produce properly	<ul style="list-style-type: none"> – Refrigerate produce within 2 hours if kept at room temperature. – Refrigerate produce within 1 hour if kept at temperature of 90⁰ F or higher. – Refrigeration is more important after peeling or cutting produce open—cut melons and tomatoes are particularly potentially hazardous. – Keep refrigerators at 40⁰ F or colder to limit growth of potential disease-causing microorganisms.

Conclusion:

Increasing institutional buying will have negligible effects on food-borne illness. There is no evidence that substituting locally grown for imported produce will change cafeteria practices. As the cafeteria is the source of introduction of most food-borne pathogens, changing the source of produce is likely to have no anticipated effects on the incidence of food-borne illness.

4. Potential Health Impact: Economy

Implementation of a farm to school program would create a stable new market for Hawai'i farmers and other agricultural producers, which would lead to the creation of jobs in farming, food processing, and food preparation. Job creation would result in increased family income, which would, in turn, improve food security in the state.

The Hawai'i Department of Education School Food Services Branch (SFSB) administers a budget of \$82 million a year to run and maintain over 200 full-service cafeterias across the

state. The program serves approximately 100,000 plus meals on a daily basis or 24 million meals a year (Personal communication, Glenna Owens, SFSB).

According to the DOE’s latest available Financial Report (2010), between 34% and 37% of the School Food Services Program (SFSP) budget is spent on food.¹⁰² In FY 2007-2008, the HDOE spent \$31.7 million on food and another \$31 million in FY 2008-2009. From these statistics, we can infer that the HDOE spends about \$31.39 million annually for food in its school food services program. While changes to the HDOE menu has been made recently to include more local and seasonal produce (watercress, won bok, papayas, melons and corn), the quantity or value of food sourced locally has not been determined by the SFSB at this point in time.

If we were to assume that 10% of the SFSP food budget is sourced locally (\$3.14 million), the remaining 90% or \$28.25 million is sourced from producers outside the state. Assuming amendments to state procurement laws were implemented and appropriate logistics were available to support such an effort, and if we were to replace 10% of the SFSP food expenditure from produce currently sourced outside the state with produce that are sourced locally, this would translate into \$2.825 million in purchase value each year. Assuming the farm gate percentage is 30% of the purchase price, this translates to additional revenue of \$847,500 at the farm level. Applying a sales multiplier effect of 2.0, an earnings multiplier of 0.5 and a job multiplier of 25 per \$1,000,000 increase in farm gate value, the additional revenue would generate an estimated state-wide impact of \$1.7 million in sales, \$423,800 in earnings and 21 new jobs created. (Note that the farm gate estimates and multipliers used in this assessment are to be found in a paper by Leung and Loke (2008) listed in the references at the end of this document).⁸ Table 6 below presents various scenarios of HDOE food expenditures and their respective projected statewide economic impacts.

Table 6: Economic Impact of Additional HDOE School Food Sourced Locally

Additional Food Value Sourced Locally	Value Accruing to Local Farms and Ranches (\$ 1,000)	Statewide Sales Impact (\$ 1,000)	Earnings Impact (\$ 1,000)	Jobs Created Statewide
10%	\$847.50	\$ 1,695.0	\$ 423.8	21
20%	\$1,695.0	\$ 3,390.0	\$ 847.5	42
30%	\$2,542.5	\$ 5,085.0	\$ 1,271.2	64
50%	\$4,237.5	\$ 8,475.0	\$ 2,118.7	106

Conclusion:

Increasing institutional buying will provide a positive stimulus to the local economy. For example, implementation of a farm-to-school program that replaces 10% in dollar value the proportion of produce that is imported for SFSP to local produce will result in yearly increases of \$847,500 in farm gate value for Hawai'i farmers and producers, \$1.7 million in sales state-wide, \$423,800 in earnings and the creation of 21 new jobs.

Table 7: Summary Impact of Increased Institutional Food Purchasing by the HDOE

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security (absence of hunger)	Δ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	*
Nutrition Security (healthy diet, not just absence of hunger)	ΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	**
Obesity			
Child overweight and obesity	Δ +	Children on free and reduced lunch program, children of working parents	***
Adult overweight and obesity	ΔΔ +	Rural; Native Hawaiian and Pacific Islanders; lower income families	****
Food-borne illness			
Cases of food-borne illness	0	School-age children	**
Economy			
Job creation	Δ +	Agricultural and food production workers	*
Tax revenue	Δ +	State of Hawai'i	***
Other			
Local pride and connectedness	Δ +	Children who eat locally produced food	*
Child learning and educational outcomes	ΔΔ +	Children on free and reduced lunch program	*

Legend	
ΔΔΔΔ Strong impact on many	**** 10+ strong studies
ΔΔΔ Strong impact on few or small impact on many	*** 5-10 strong studies or economic data analysis
ΔΔ Moderate impact on many or strong impact on few	** 5 or more weak or moderate studies, or mixed results
Δ Small impact on few	* Fewer than 5 studies, but claim consistent with public health principles
0 Negligible impact	

B. Expanded Commercial Production

According to the Hawai'i Agriculture Development Plan, a key recommendation that will support the island's agricultural sector and move Hawai'i County toward greater food security is an expansion of commercial food production for local sale and for export. Because of the large amount of farmland available on Hawai'i Island and the beneficial weather conditions for farming, this recommendation makes sense from both an economic and a health standpoint. This HIA examines the potential for Hawai'i Island to benefit financially from commercial expansion of food production, as well as the potential for county residents to realize health benefits in terms of improved food security and nutrition security.

Existing Conditions

Available data on the agriculture sector of Hawai'i County's economy is scant, though there is some useful data at the state level. A 2008 joint UH-College of Tropical Agriculture and Human Resources (CTAHR) and Hawai'i Department of Agriculture (HDOA) publication examined the contribution of agriculture statewide for year 2005. This joint study (Table 8) estimated that, including distribution margins, the agriculture sector accounted for 2.7% of sales, 1.7% of state gross domestic product (GDP), 3.4% of employment and 2% of labor income statewide.¹⁰³

Table 8: The Economic Contribution of Agriculture to Hawai'i's Economy including Distribution Margins, 2005¹⁰³

Measure	Amount	% of Hawai'i's Economy
GDP ¹ or value added (\$ million)	928	1.7
Employment (number of jobs)	28,587	3.4
Labor income (\$ million)	707	2.0
Sales ² (\$ million)	2,364	2.7

Source: UH-CTAHR, The Contribution of Agriculture to Hawaii's Economy: 2005 (EI-13).

Notes:

¹Gross Domestic Product

²Includes distribution margins (\$464 million) such as transportation, wholesale and retail margins in delivering the agricultural products and services to the final consumers.

Total agriculture sales, including farm production, forestry, fishing and related activities as well as food product manufacturing, increased from \$1,643,000 in 1997 to \$1,836,000 in 2002 and to \$1,900,000 in 2005. Agriculture sales as a share of total Hawai'i sales decreased slightly from 2.8% in 1997 to 2.6% in 2002 and 2.1% in 2005. This decrease is attributable to a slower rate of growth in agricultural sales than in total sales statewide.

Farm output statistics are currently only available for the state of Hawai'i as a whole, not stratified by county. The top ten commodities grown in the state of Hawai'i in 2008, by value of production are shown in Table 9.

Table 9: Farm Output Statistics

1. Seed crops	\$176.6 million
2. Sugarcane	\$44.2 million
3. Macadamia nuts	\$33.5 million
4. Coffee	\$29.6 million
5. Cattle	\$24.3 million
6. Algae	\$15.7 million
7. Papayas	\$14.3 million
8. Eggs	\$8.7 million
9. Bananas	\$8.0 million
10. Basil	\$6.8 million

Source: Statistics of Hawai'i Agriculture 2009, Summaries

Table 10: Net Farm Income in the State of Hawai'i (2004-2008):

2004	\$151.2 million
2005	\$162.6 million
2006	\$144.7 million
2007	\$143.6 million
2008	\$144.4 million

Source: USDA-NASS, Statistics of Hawai'i Agriculture 2009, Farm Financial Indicators

As shown in Table 11, Hawai'i County is the site of 63% of agricultural land and 38% of farm labor jobs, but produces only 26% of the dollar value of agricultural production. The count of 2,350 farm laborers in Hawai'i County in 2008 is lower than the 2,700 workers recorded in 2004. The average wage rate for these farm workers was \$13.22 per hour. For farms with 1-9 workers, the average wage rate was lower, at \$11.73 per hour.¹⁰⁴ In May 2011, the civilian unemployment rate in Hawai'i County was 9.2%, the highest statewide (statewide average, 6.0%). The City and County of Honolulu recorded the lowest civilian unemployment rate, 5.3%, in May 2011.¹⁰⁵

Table 11: Comparative Agricultural Measures, Hawai'i Counties

County	Agricultural Land	% of Total	Ag Labor Count	% of Total	Value of Ag Production	% of Total
Hawai'i	1,214,040	62.9%	2,350	37.9%	\$137,086	26.3%
Kaua'i	185,020	9.6%	550	8.9%	\$74,646	14.3%
Maui	402,354	20.8%	1,700	27.4%	\$143,728	27.5%
O'ahu	128,810	6.7%	1,600	25.8%	\$166,679	31.9%
Total	1,930,224	100.0%	6,200	100.0%	\$522,139	100.0%

Source: Hawai'i DBEDT, Land Use Commission records; Hawai'i Agricultural Statistics, 2009; U.S Census 2010.^{64,104}

Impact Assessment: Commercial Expansion

Commercial expansion of food agriculture, if implemented with an eye to equitable access to fresh local food, has the potential to yield health benefits to residents by making fresh local produce more available to low income and rural families on Hawai'i Island. Lack of available and affordable fresh produce and other healthy food presents significant barriers for low-income and rural families to maintain a healthful diet.¹⁰⁶ Due to the thousands of miles and time of transport from field or store, produce imported from the mainland or other countries to Hawai'i is neither affordable nor fresh. Further, rural areas of Hawai'i may be considered food deserts, as residents live far from the nearest grocery store.¹⁰⁷ Local production could address this problem. Research shows that children who live in homes where fruits and vegetables are accessible eat more fruits and vegetables than children who live in homes without produce.^{108,109} Among girls, 35% of the variance in consumption is due to differences in accessibility and availability at home.

A 2011 national study reports that the state of Hawai'i ranks 5th in the nation in difficulty of people and families accessing and affording fresh fruits and vegetables.¹¹⁰ A Healthy Food Hawai'i study (2004) found that access to fresh foods for low-income families on Hawai'i Island is limited by three primary factors: convenience, availability, and cost.^{111,112} Nationally, increased availability of fresh local food at farmers markets that accept SNAP-EBT payments has been shown to increase low income households' purchase of fresh fruits and vegetables.¹¹³ This seems to be the case in at least one remote low income rural community on Hawai'i Island as well. Food vendors at the S.P.A.C.E. Farmers Market in lower Puna, which only allows the sales of local products, increased their sales by an estimated average of 30% the first year the market accepted EBT payments. In a survey of customers, residents noted that full-service food markets were distant from where they lived and that the proximity of the farmers market increased the availability, accessibility, and affordability of fresh food for their families.

Agriculture Success Story

Adaptations Inc.



Reflections from Maureen Datta, Hawai'i Island Farmer

Tane and Maureen Datta started farming 7.5 acres on Hawai'i

Island in 1979 on a very small-scale, growing mostly herbs, edible flowers, and specialty vegetables for Chef Peter Merriman. "We grew incrementally, step by step," recalls Maureen. "We were always humble and patient, waiting to see what worked."

When the Dattas tried marketing their specialty herbs to local wholesalers, "they couldn't be bothered," Maureen says. "We thought our farm would be better served if we distributed our products ourselves." So in 1992, the Dattas incorporated as Adaptations, Inc. and began consolidating the products of their farm with the harvests of three other growers for sale at local restaurants and markets. Now, nearly 20 years later, Adaptations works with about 100 growers around the island and employs nine people to work in their food consolidation, distribution, and community supported agriculture (CSA) subscription program. "For a long time, having a consistent supply was an issue for us," recalls Maureen, "but not anymore. Every one of our suppliers is local, and the food we market is harvested fresh to order—they don't have a lot of miles on them."

Adaptations has shown that there is demand, appreciation, and value in the local market to support CSAs. "Though other farms may not easily be able to replicate the 20 years Adaptations has spent building our island wide supply network, we have shown that local farms can successfully supply their neighbors with food," says Maureen.

Read more about the development of Adaptations on Page 68.

1. Potential Health Impact: Food Security and Nutrition Security

There are two pathways through which commercial expansion might impact food security and nutrition security: increasing accessibility of locally produced food, and increasing the ability to afford a diversity of foods. This can be achieved through increasing household income or decreasing the cost of healthy food, thereby increasing access.

The impact of an increase in commercial production on nutrition security among Hawai'i Island residents depends on how the expansion is accomplished. If the increase in commercial production is among staple crops that are sold at affordable prices, this will result in increased nutrition security for county residents. Produce needs to be accessible to families that rely on SNAP in order to increase consumption among this group. If, on the other hand, the expansion in commercial production is only among produce that is sold at specialty markets that cater to tourists or sold in the export market, an expansion of commercial production will have little effect on nutrition security among Hawai'i Island residents.



An expansion of commercial agricultural production will improve food security and nutrition security by creating new jobs for workers in the agricultural and food processing sectors. These additional jobs will provide additional income, and thus improved food security, to these Hawai'i Island residents and their families. Maximum benefits can be achieved by targeting technical and policy support to small producers in the county, who are primarily producing food for local consumption, rather than large agri-businesses which focus on the export market.

Conclusion:

Commercial expansion has the potential to have a net positive impact on food security and nutrition security among Hawai'i County residents. In order to achieve these positive impacts, policies that promote expansion in the production of affordable and accessible food for the local market need to be implemented. An increase in production of crops for export or for high-priced specialty outlets will have little benefit to food security and nutrition security. Commercial expansion would address health equity as well, since new jobs in the agriculture and food processing sector will primarily employ lower income residents of Hawai'i County.

2. Potential Health Impact: Obesity

In a national study people reporting poor health status had four times the challenge of accessing and affording fresh fruit and vegetables than those who reported excellent health status and those who were of normal weight had lower rates of challenge of accessibility and affordability than those who were obese.¹¹⁰

Potential beneficial effects of commercial expansion on decreasing risk factors for obesity can be achieved by targeting production for the local market and making sure that families of all income levels have access to locally produced fresh fruits and vegetables. Anecdotal evidence noted above suggests that when fresh produce is readily available and affordable in remote communities, it is purchased in greater quantities. While an expansion in export-oriented

Agriculture Success Story

The Mountain Apple Brand

Reflections from Derek Kurisu, Executive Vice President of KTA Superstores

Mountain Apple Brand was launched by KTA in 1991 to assist island dairies in marketing their milk. Since its founding by Derek Kurisu, Mountain Apple Brand has expanded to encompass 60 business partnerships, including large farmers and wholesalers, as well as many small farmers around the island. “My boss, Tony Taniguchi, reminded me that KTA was responsible for helping our former sugar plantation workers when the sugar industry collapsed,” recalls Kurisu. “The sugar plantations had always been a big supporter of KTA, and we wanted to revive the agriculture industry and give plantation workers something they could do to make a living.” says Kurisu.

“We knew how vulnerable we were to interruptions in shipping – whenever there was a strike, we had no rice or toilet paper,” explains Kurisu. “We were so dependent on imported food, even for our highly perishable fresh foods. We knew that our former plantation workers could grow produce, and so we expanded Mountain Apple Brand to include vegetables and fruit. Then we expanded to include value-added products like pickles, which gave our local farmers something to do with their excess veggies. Our Mountain Apple Brand has encouraged more farmers to sell their products locally and more island residents to buy local products. Buying local creates jobs, strengthens the economy, and makes our island more secure,” says Derek.

Read more about Derek Kurisu and the Mountain Apple Brand on Page 70.



agriculture will improve income and thereby prevent hunger, in the absence of support for production of produce for the local market, residents will likely continue to purchase the foods that are currently most accessible: imported, highly processed, high energy density, and low nutrient density foods that will not address the problems of obesity in Hawai'i County.¹¹⁴

Conclusion:

Commercial expansion, if targeted to producers of food for the local market and made available to residents of all income levels, should have a net positive impact on decreasing rates of obesity over the long term.

3. Potential Health Impact: Food-Borne Illness

Food-borne illness is almost always due to contamination at the time of food preparation or serving, not due to contamination at the time of growing or harvesting. Nationwide, only 2.2% of all food borne illness outbreaks from 1990 – 2007 were associated with the growing, packing, shipping, or processing of produce.⁴⁸ Proper field management, harvesting, and food handling procedures are essential to decreasing the risks of food-borne illness. To reduce the risk of food-borne illness as a result of commercial expansion of agricultural production, Hawai'i's farmers should follow established food safety protocols.

Food safety certification audits are one mechanism that may be employed to

minimize the risk of food-borne illness. Farms on Hawai'i Island may apply (and pay) for food safety certification audits conducted by inspectors from the Hawai'i Department of Agriculture, the USDA, or PRIMUS. There is also a voluntary risk assessment program, established through HB1471 in 2009. Farm level risk assessments analyze soil, water, and produce samples for chemical and biological contaminants and conduct mock audit farm visits to highlight high-risk activities that might lead to food safety problems.¹¹⁵

Conclusion:

Since only a very small percentage of food-borne illness is caused by contamination at the time of growing or harvesting, an expansion of commercial production in Hawai'i County should have a negligible impact on incidence of food-borne illness in the county.

4. Potential Health Impact: Economy

An expansion of commercial production will open up new production acreage and increase the volume of fresh fruits, vegetables, and livestock produced within Hawai'i County. This expansion will both increase the island's food production capacity and provide the food manufacturing industry with increased volume and variety of inputs for value-added products. These activities will directly (through farm production) and indirectly (through agriculture and food processing and distribution job creation) contribute to increasing food self-sufficiency and food security in the county and the state. New jobs in farm production and food manufacturing will increase the income of families, thereby increasing their ability to purchase healthy food.

Some 85% of the food consumed in Hawai'i is imported. Put another way, \$3.1 billion leaves our state each year to support agribusinesses elsewhere. Replacing purchase of only 10% of these imported foods with locally produced food would amount to some \$313 million, or \$94 million at the farm-gate, assuming a 30% farm share.^{8,9} Taking into account the multiplier effects (average sales multiplier of 2.0, earning multiplier of 0.5, sales tax multiplier of 0.06, and job multiplier of 25),¹⁰ this \$94 million would generate an estimated economy-wide impact of \$188 million in sales, \$47 million in earnings, \$6 million in state tax revenues, and more than 2,300 jobs. This is not a trivial amount.

Hawai'i County, which accounts for 63% of the farm land in the state and where the urbanization pressures are far less than on O'ahu or Maui, is well situated to lead the commercial expansion of agriculture.

An expansion of commercial production, especially in food crops and animal proteins, will require additional labor resources both at the farm level as well as in allied industries such as food processing, manufacturing, wholesaling, warehousing, packaging, and shipping. The County of Hawai'i has the highest proportion of farm employment (2,350 hired workers in 2008 – about 38% of all hired farm workers in the entire state) and the highest level of unemployment amongst the counties in the state (9.2% in Hawai'i County vs. 6% in the state). Additional agriculture sector jobs will provide increased employment opportunities for Hawai'i's residents.

People who are employed have better health than those who are unemployed, and people who have stable employment have better health than those whose employment is unstable.⁵⁶⁻⁵⁸ Thus, job creation in Hawai'i County will improve the health of those individuals who are newly employed. Further, jobs in agriculture and food processing often involve physical activity, which is a health-promoting activity. On the other hand, jobs in agriculture also incur risks associated with exposures to pesticides and other toxic chemicals, as well as risk of physical injury. As the benefits of job creation will be felt by all individuals newly hired, and the risks of occupational injury only by a few, the net effect of commercial expansion will be to improve health.

Conclusion:

An expansion of commercial production is likely to increase farm output, farm earnings, and state tax revenues. Further, an expansion of commercial production is likely to increase the level of employment in Hawai'i County, both at the farm level and in allied agricultural industries. As noted above in the discussion of current conditions, employment and income are strongly linked to health. Poor health leads to unemployment and decline in economic status, and in turn, underemployment leads to poor health. Not having stable employment is associated with poorer mental health and shorter lives; compared with employed people, those with unstable employment are more likely to have anxiety, depression, and other nervous symptoms. People with higher socio-economic status, which depends on a combination of factors that includes occupation, education, income, wealth, and place of residence, have better overall health.

New agriculture jobs will increase income for county residents, and, consequently, in addition to improving nutrition security immediately, will improve health over the long term.

5. Potential Health Impact: Other (Occupational Health)

An expansion of agriculture jobs will impact the distribution of occupational injuries. Farming has the second-highest occupational fatality rate and is associated with risk of injury due to



tractors and other heavy tools as well as exposure to pesticides and other toxic chemicals. The nationwide rate of occupational fatality was 21.3 fatalities per 100,000, as compared to 3.9 fatalities per 100,000 across all industries.¹¹⁶ In Hawai'i the rate of illness or injury in 2010 was slightly higher in agricultural occupations (5.4%) than for the construction industry as a whole (4.4%).¹¹⁷ We acknowledge that occupational health is an important health impact that fell outside the scope of this HIA. This important issue requires further analysis and study.

Table 12: Summary Impact of Increased Local Commercial Food Production

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security	Δ to ΔΔΔ +, depending on implementation	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	*
Nutrition Security	Δ to ΔΔΔ +, depending on implementation	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	***
Obesity			
Child overweight and obesity	Δ +	Children on free and reduced lunch program, children in families on SNAP	****
Adult overweight and obesity	Δ to ΔΔΔ +, depending on implementation	Families on SNAP	**
Food-borne illness			
Cases of food-borne illness	0	Hawai'i County residents	***
Economy			
Job creation	ΔΔΔΔ +	Agricultural and food production workers	***
Tax revenue	ΔΔΔΔ +	State of Hawai'i	***
Other			
Wellbeing	Δ +	Newly employed families	**

Legend	
ΔΔΔΔ Strong impact on many	**** 10+ strong studies
ΔΔΔ Strong impact on few or small impact on many	*** 5-10 strong studies or economic data analysis
ΔΔ Moderate impact on many or strong impact on few	** 5 or more weak or moderate studies, or mixed results
Δ Small impact on few	* Fewer than 5 studies, but claim consistent with public health principles
0 Negligible impact	

C. Promotion of Home, Community, and School Gardening

The third Agriculture Development Plan recommendation we assessed is increased support for home, school, and community food production. Specific Agriculture Plan provisions to support home and school food production include development and maintenance by Hawai'i County of a Hawai'i County Agriculture web site which will serve as an educational resource and site for dissemination of information on gardening to individuals and commercial farms. Specific Agriculture Plan provisions to support community gardens include property tax incentives, removing legal and regulatory impediments, and providing education to policy-makers about the benefits to the public of community gardens. This HIA analyzed the health impacts of generally encouraging home, community, and school gardens, rather than these specific provisions. We believe the web site, tax incentives, removing impediments, and educating about the benefits is important and a good start. Further recommendations are provided below.



Existing Conditions

Hawai'i has a year-round growing season and most rural families in Hawai'i County have access to land for home gardening. With a 600 square-foot garden, a family can produce an estimated 300 pounds of produce in a 3-4 month season, or 1200 pounds, valued at \$1200 (very conservatively estimated) with a 12-month growing season.^{118,119}

As noted previously, the majority (85%) of food consumed on Hawai'i Island is grown elsewhere.¹ Food costs are approximately 50% higher in Hawai'i than the mainland average, constituting a larger part of family income than in most of the U.S.¹²⁰ Food costs in Hawai'i rose 6.1% in the first half of 2008,¹²¹ while the economy slowed and unemployment increased.¹²² High food costs are further exacerbated by increases in shipping costs due to rising fuel costs. For many food-insecure households in Hawai'i County, ensuring that there is enough food to eat is a greater imperative than obesity prevention.

Home production of produce responds to the immediate need of families to make sure they have enough to eat, as well as engaging people in the physical activity of gardening and promoting increased consumption of fresh produce, both of which have health benefits. The enhanced financial incentive provided by the combination of rising prices and the current economic recession presents a unique opportunity for establishing home gardens in Hawai'i County and initiating significant, beneficial dietary changes, especially amongst food insecure households on the island.¹²³⁻¹²⁵

Gardening, whether active undertakings such as planting and cultivating crops or passive activities that involve spending time in green space, has benefits to mental health and well-being. Gardening reduces stress and has benefit for people with depression or dementia.¹²⁶⁻¹⁴⁰

In 2007, The Kohala Center helped to found the Hawai'i Island School Garden Network (HISGN), which now provides technical and material assistance to 60 school gardens in Hawai'i County. HISGN provides support for the cultivation, harvesting, and consumption of

produce in schools; support for the establishment and maintenance of community gardens; and support for gleaning programs. The goal of HISGN is to help island schools build gardening and agricultural programs that will significantly contribute to the increased consumption of locally produced food by involving students, their school communities, and their family networks in food production.

1. Potential Health Impact: Food Security and Nutrition Security

Though the Hawai'i County Agriculture Development Plan primarily addressed issues relevant to the commercial agriculture sector, there was a section of the plan that called for additional support for agricultural education in order to revive robust career pathways into commercial agriculture and a recommendation to increase support and remove barriers to school, community, and home gardening for two primary reasons: to increase community food supply to meet County goals of increased island food self-reliance and to increase the long-term demand for commercially produced local food by generating a taste for this food in the resident population. Selected members of the Hawai'i County Agriculture Development Plan stakeholder group also wanted to be sure that the status of traditional subsistence farming, regardless of the recorded cash income, was included as an agricultural venture in County considerations.

Increased home production is a feasible intervention that addresses the needs of Hawai'i Island's rural and low-income populations to obtain accessible, affordable, and healthy food.^{119,141} People who garden consume more fruits and vegetables than people who do not.¹⁴²⁻¹⁴⁵ Adult family members of gardeners eat fruits and vegetables 1.4 more times daily than family members of people who don't garden.¹⁴⁶ That is, people who garden provide food not just for themselves but for their families.

Agriculture Success Story

Discovery Garden

Reflections from Danny Garcia, Principal, Kohala Elementary School

While touring the school campus during his first week on the job as new principal of Kohala Elementary School, Danny Garcia paused at the grassy gulch on the mauka side of campus. "What's this area?" he asked the school's head custodian. "That used to be where the Future Farmers of America agriculture classes planted macnut trees and pastured their animals," replied the custodian. Wheels began turning in Garcia's head – why not take this fallow land and transform it into a school garden for use by K-5 students at the school?

Community volunteers and a group of eighth grade students helped prepare the land and by summer's end, the Discovery Garden was ready for planting. In the first school year Kohala Elementary School students harvested over 300 pounds of produce. Some of this produce was used in an after school cooking class to create homemade salads, stir fries, smoothies, and soups; some produce was sold at a farmer's market booth with profits reinvested in the garden; some of the surplus went to feed elders in the community, and some was brought home by the students to share with their families. "Our larger goal is to start a garden at every child's home," says Garcia.

At the start of the school year, 25% of the students reported that they ate fresh fruits and vegetables on a regular basis. By the end of the year that figure had jumped to 70%. "We are learning about food," says Garcia, "and raising awareness about the importance of eating fresh fruits and vegetables. The Discovery Garden is engaging our elementary students in hands-on learning, and we are creating a foundation upon which to build agriculture and science career pathways for our youth leading right up to college."



Read more about the Kohala Elementary School Discovery Garden on Page 71.

Schools are a natural environment in which to model and reinforce healthy eating and physical activity behaviors, as children spend five days a week and often consume two meals a day there. School-based gardens serve as a living classroom in which children can learn core academic subjects, while also getting a hands-on education in nutrition and food cultivation, harvesting, and preparation. School-based garden programs that include the cultivation, harvesting, and food preparation of edible produce have been shown to increase fruit and vegetable consumption.^{85,147}

Children who live in homes where fruits and vegetables are accessible eat more fruits and vegetables than children who live in homes without produce.^{108,109} Among girls, 35% of the variance in consumption is due to differences in accessibility and availability at home. In low-income or rural communities, the availability of fresh produce and other healthy food is often limited.¹⁰⁶ School gardening programs allow children to learn the skills to establish home or community gardens, thereby increasing their fruit and vegetable consumption and preventing hunger.

Conclusion:

Increased home, school, and community food production has a high likelihood of improving food security and nutrition security in Hawai'i County. There is strong evidence that people who garden consume more fruits and vegetables than people who do not, and that they share their harvest with their family. The greatest benefits will accrue to low-income children and families, who are at highest risk of being food insecure (i.e., hungry) and of having low nutrition security (i.e., unreliable access to nutritious food). Among families who establish home gardens, the net positive impacts on health will be extensive, as the year-round growing season and tropical climate generate large yields of edible produce.

2. Potential Health Impact: Obesity

Despite success at improving nutrition knowledge, most childhood obesity prevention programs have failed to change eating behavior.^{72,88,148,149} One shortcoming of many programs is that they assume that changes in knowledge will lead to changes in individual behavior, without addressing the family and community context in which children live. Though parents may know that eating more vegetables is healthy, if they cannot afford to purchase fresh produce or if produce is not available where they shop, then their knowledge about vegetables may not result in a change in what their family eats. Availability and affordability of fresh produce is key to changing eating behavior.

Garden-based learning offers promise as an innovative intervention to prevent childhood obesity.¹⁵⁰⁻¹⁵⁴ Garden-based nutrition education improves children's nutrition knowledge, expands their eating preferences,¹⁵⁵⁻¹⁵⁷ and increases their consumption of fruit and vegetables.^{85,147,158} There is also evidence from one recent study that weekly gardening increased the percentage of grade K-8 children who reported daily physical activity.¹⁵⁸

Home, school, and community gardening provide a ready source of fruits and vegetables. The health benefits of higher fruit and vegetable consumption include decreased rates of obesity and associated chronic disease (colorectal cancer, stroke, coronary heart disease, type 2 diabetes, osteoarthritis, congestive heart failure, hypertension, and stroke), and decreased risk of

death from coronary heart disease.^{98,159-164} Some of these benefits are directly associated with increased consumption of raw, but not processed, fruit and vegetables.¹⁶⁰

Childhood dietary and physical activity behaviors establish patterns that track into adolescence and adulthood.^{165-167,168} Thus, programs that improve childhood dietary behaviors and prevent childhood overweight may prevent adult disease, in addition to providing immediate benefits during childhood.¹⁶⁹⁻¹⁷¹ Through school gardening programs and home gardening, children learn eating and food cultivation (i.e., physical activity) behaviors that will both ensure their food and nutrition security and decrease their risk of obesity and related diseases in the future.

Conclusion:

Increased home production, achieved through community instruction and expansion of school gardening programs, promotes increased fruit and vegetable consumption and increased physical activity in the short term—behaviors which can have significant long-term effects on reducing rates of obesity.



3. Potential Health Impact: Food-Borne Illness

Between the 1970s and the 1990s the percentage of food-borne illness outbreaks in the United States due to consumption of contaminated produce grew from 0.7% to 6% and the median number of people who fell ill per outbreak doubled from 21 to 43.¹⁰¹ Two factors which have contributed to this increase are centralized production with widely dispersed areas of distribution and an increase in global trade, which may introduce uncommon microbiota into new locations.¹⁷² By increasing consumption of locally grown produce and by de-centralizing production through home gardening, we would eliminate these two risk factors. Consequently, we would expect the number of cases of food-borne illness to decrease over time.

However, to minimize the risks of contamination, the promotion of home, school, and community gardens should include education on basic crop and food safety practices for participants.

Conclusion:

Promotion of home, school, and community food production, if accompanied by basic food safety instruction, is likely to decrease the number of cases of food-borne illnesses in the County of Hawai'i by reducing risk factors associated with the importation of produce.

The recent outbreak of human infection due to the parasite *Angiostrongylus* (rat lung worm) highlights the need for continued education of community members about food safety. The benefits of home, school, and community gardening largely outweigh the risks. Further, individuals have control over the practices they maintain in their home gardens and kitchens, whereas they do not have control over the farm or packaging practices of the commercial growers, packers, and distributors of store-bought produce.

4. Potential Health Impact: Economy



Photo Credit: Roger Doiron,
Kitchen Gardeners International

According to the 2010 Census, the median household income for Hawai'i County in 2009 was \$50,739. Assuming that the average household on Hawai'i Island could save 2% of its income by replacing a portion of its store-bought food with home-grown food, the average island household would save \$1,200 per year simply by cultivating a home garden.

In addition to providing an affordable source of healthy food, home gardens make fresh produce more accessible to island residents, since procuring fresh fruits and vegetables requires only a short walk from their home to their garden. It is well established that students who are well fed perform better in school, and, likewise, workers who are well-nourished are typically more productive than those who are hungry.

Conclusion:

Home gardening may be a wealth-building strategy for low-income families. At the family level, promotion of home and community food production will have a net positive economic impact; money previously used to purchase food will be available to make other purchases. Home and community gardens are an affordable and accessible source of healthy produce for island residents, thereby contributing to the food and nutrition security of workers and their families.

Economic benefit will be accrued by those who maintain a food garden, and the greatest benefit will be felt by those who are food insecure (i.e. at risk of going hungry) or on food or financial assistance programs. On an island-wide level, there are no data available that allow us to make predictions about economic impact. If residents substitute other purchases for food purchases, the effect on tax revenue will be small. If residents deposit the money saved into financial accounts, tax revenue may fall but family wealth will increase. Home gardening and production do generate a tangible value but are not included in measures of the formal economy or GDP. Hence, government agencies have never viewed these as priority areas.

5. Potential Health Impact: Well-Being and Cultural Connections

In addition to the material benefits of providing food, gardening also improves well-being. Gardening decreases stress more than similarly relaxing sedentary activities.¹³⁹ Many health-promoting and healing settings employ a variety of passive¹⁷³ and active¹³⁴ garden interventions to promote mental and physical health. Gardening or horticulture programs have been proposed or implemented in hospitals, long-term care facilities, and communities nationwide.¹³² These healing garden programs are designed to promote general wellness or relaxation among elders¹³¹, improve the health of people with chronic diseases including diabetes and cardiovascular disease,^{174,175} provide therapeutic settings for people with mental illness¹³⁰ or dementia^{126-128,134} and promote rehabilitation for people with stroke.¹³⁶

Studies have demonstrated the utility of school gardens as classroom extenders. That is, school gardens serve as sites for hands-on learning in which didactic lessons in math, science,

ecology, and other core subjects can be taught.¹⁵¹⁻¹⁵⁴ This experiential learning may be particularly valuable for children who have difficulty in traditional classroom settings.⁴⁵

In the cultural setting of Hawai'i, gardening has meaning beyond its instrumental value in producing food. Cultivating food, particularly traditional foods such as taro or sweet potato, can be culturally validating to the extent that people in Hawai'i view this practice as a means of connecting to the land and to historical traditions of food cultivation. In the Hawaiian world view, food, land, and health are related, interconnected, or even one and the same.

Conclusion:

Promotion of home and community production in Hawai'i County will have a net positive impact on individual well-being and may promote child academic achievement. Further, home and community production, by validating historical traditions of food cultivation and allowing people to embody the Hawaiian tradition of connection between food, land, family and health, will enhance cultural food security and community cohesion.



Table 13: Summary Impact of Increased School, Community, and Home Gardening

Health Factor or outcome	Magnitude and direction of impact	Distribution (populations most affected)	Quality of evidence
Diet and Nutrition			
Food Security	ΔΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	****
Nutrition Security	ΔΔΔΔ +	Children on free and reduced lunch program; families with low-wage jobs; Native Hawaiians and Pacific Islanders	****
Obesity			
Child overweight and obesity	ΔΔ +	Children on free and reduced lunch program, children on SNAP; Native Hawaiian and Pacific Islanders	**
Adult overweight and obesity	ΔΔΔ +	Rural populations; Families on SNAP	****
Food-borne illness			
Cases of food-borne illness	Δ -	People who garden	***
Economy			
Job creation	0	Agricultural and food production workers	N/A
Tax revenue	0	State of Hawai'i	N/A
Family Economy	Δ +	Families who garden or glean	***
Other			
Wellbeing	ΔΔΔ +	Families who garden	****
Cultural pride	ΔΔΔ +	Families who garden	****
Child learning and educational outcomes	ΔΔΔ +	Children who garden	****
Cultural food security	ΔΔ +	Families who garden	****
Legend			
ΔΔΔΔ Strong impact on many ΔΔΔ Strong impact on few or small impact on many ΔΔ Moderate impact on many or strong impact on few Δ Small impact on few 0 Negligible impact		**** 10+ strong studies *** 5-10 strong studies or economic data analysis ** 5 or more weak or moderate studies, or mixed results * Fewer than 5 studies, but claim consistent with public health principles N/A Not applicable	

VI. Recommendations

The following recommendations were derived by combining the assessment of potential health impacts presented in the preceding section with stakeholder input. Stakeholder input to prioritize these recommendations was compiled through face-to-face meetings as well as through an online/phone survey of key stakeholders. On April 7, 2011, The Kohala Center convened a stakeholder meeting in Waimea, Hawai'i, to present preliminary HIA findings and recommendations, to elicit feedback and to compile additional recommendations suggested by the group. The Center then surveyed all stakeholders through the internet (SurveyMonkey) or by telephone. Survey respondents were asked to prioritize the recommendations for each of the three key policies (institutional purchasing, expanded commercial production, and promotion of home production) and to distinguish which recommendations they felt were 1) most important to health and 2) most feasible to implement in Hawai'i County. On July 29, 2011, the HIA research team met again with stakeholders to present the results of the survey and to further refine HIA recommendations.

In large part, the HIA research team and the stakeholders endorsed similar recommendations. The recommendations presented below were endorsed by both national and local experts. The fact that the group reached consensus lends strength to these recommendations, though we understand that not all recommendations will be endorsed by every individual expert or stakeholder.

Highlighted below are those HIA recommendations that are likely to 1) have the greatest positive impact on health or 2) best mitigate any negative health consequences of implementing policies to reach the following goals articulated in the Hawai'i County Agriculture Development Plan:

- Expand Hawai'i Island food production so that 30% of its residents' demand for food can be supplied by local producers by 2020; and
- Promote and support educational programs that provide the opportunity for agricultural industry participants of all sorts to productively, profitably and sustainably expand Hawai'i's agricultural systems.

A. Increased Institutional Buying

Recommendations

1. Hawai'i Department of Education School Food Authorities should fully utilize funds available under USDA's Fresh Fruit and Vegetable Program (FFVP) to purchase local produce.
2. The Hawai'i state legislature should modify Act 175 SHL 2009 and/or associated procedures to remove barriers to procurement of local produce by the Hawai'i Department of Education School Food Service Branch and other state agencies. Increasing the procurement of locally grown produce by Hawai'i's schools may require preferential pricing and procurement strategies, along with dedicated staffing to assist with procurement processes.

(Continued on next page).

3. In order to tailor an institutional purchasing program that fits the unique circumstances of Hawai'i, supports economic development and improves student nutrition, the Hawai'i Department of Education School Food Service Branch and Department of Accounting and General Services should make detailed school food program expenditures available for analysis.
4. The Hawai'i Department of Education School Food Service Branch, together with culinary experts, should revise school lunch and breakfast menus to incorporate locally produced foods, beginning with the targeting of specific foods such as Okinawan sweet potato that are cultivated exclusively in Hawai'i.
5. Pilot at least one salad bar in a Hawai'i Island Department of Education school complex by 2013.
6. Through the Hawai'i Association of Independent Schools, encourage independent and charter schools to pilot food delivery systems to increase the amount of fresh, locally grown food in their school lunch programs.
7. Convene a working group to facilitate the implementation of Farm to School and other institutional buying programs within Hawai'i County under the auspices of the Mayor's Agricultural Advisory Commission.

Discussion

1. Fully utilize funds available under USDA's Fresh Fruit and Vegetable Program (FFVP) to purchase local produce.

The HIA research team and stakeholder group focused on implementation of a Hawai'i Farm to School program as one of the most effective ways to stimulate institutional purchasing and increase children's access to healthy food throughout Hawai'i. Maximizing utilization of available funds under USDA's Fresh Fruit and Vegetable Program (FFVP) is one of the most feasible ways to immediately expand farm to school in Hawai'i. The FFVP allocates funds to selected schools to provide fresh fruit and vegetables at any time other than during the lunch period. Twenty-eight Hawai'i Island schools participate in the FFVP. Though there are still centrally managed procurement challenges and the FFVP represents a small portion of food purchases for school children, this program has less complexity in terms of procurement and food preparation than do the National School Breakfast or Lunch Programs. Therefore, the FFVP is a good place to begin the farm to school effort in Hawai'i.



- 2. The Hawai'i state legislature should amend Act 175 SHL 2009 and/or modify associated procedures to remove barriers to procurement of local produce by the Hawai'i Department of Education School Food Authorities and other state agencies. Once these regulatory barriers have been addressed, the Hawai'i State Legislature should allocate funding for a Farm to School Coordinator at the Hawai'i Department of Education to assist in the effort to incorporate local food into HDOE meal and snack programs.**

A 2009 report entitled *The Feasibility of Establishing a Farm to School Program in Hawai'i's Public Schools: A Report to the Twenty-sixth Legislature in Response to SCR 121 SD1 HD1* states: "Without a change of the purchasing practices of the (Hawai'i) Department of Education, and potentially, legislation, establishing a state-wide farm-to-school program that involves state-wide procurement of locally produced fruits and vegetables for the entire program, this effort is not feasible. To be fair to the Department of Education School Food Services Program, the size of the entire system makes this difficult. The federal regulations regarding food subsidies related to free and reduced cost meals as part of the NLSP (National School Lunch Program) hamper change. However, with creativity and cooperation, improvements can be made."⁷⁰

Increasing the procurement of locally grown produce by Hawai'i's schools may require preferential pricing and procurement strategies. Amendment of Act 175 SHL 2009 or changes in procedures should be made that allow state agencies, including the Department of Education School Food Services Branch, to more easily negotiate contracts directly with suppliers who specialize in providing local agricultural products.

There are significant institutional and cultural challenges at the state and farmer level involved in making a transition from the current public school food procurement practices to a system which incorporates more local foods. A modest increase in staffing will facilitate increased public and private stakeholder engagement and farm-to-school implementation in Hawai'i. A position at the Department of Education to facilitate farm to-school and school garden initiatives, collaborating with an existing Farm-to-School Working Group that includes representatives from the Hawai'i Department of Agriculture to facilitate the production and sourcing of local foods for HDOE consumption, could engage both School Food Authority and agriculture interests to achieve a successful Hawai'i DOE farm-to-school program. One potential source of funding for this position is the Agriculture Development Special Fund which is financed through a "Barrel Tax" surcharge on all oil imported into the State of Hawai'i.

- 3. The Hawai'i Department of Education School Food Services Branch (SFSB) and Hawai'i Department of Accounting and General Services should make detailed school food program expenditures publicly available for analysis.**

Making available detailed, accurate information about the expenditures of SFSB, Hawai'i's largest school food authority, would allow for tailoring a farm-to-school program that fits the unique circumstances of Hawai'i, supports economic development, and improves student nutrition. The availability of this data is needed in order to make sound recommendations to increase the procurement and preparation of local food for student consumption.

4. The SFSB, together with culinary experts, should revise school lunch and breakfast menus to incorporate locally produced foods, beginning with foods that are cultivated exclusively

For example, as Okinawan sweet potato is not grown commercially elsewhere in the United States, Hawai'i farmers and distributors would be awarded contracts through the competitive bidding process. This recommendation would require incorporation of specific menu items (for instance, baked sweet potato fries) into school food menus and might also necessitate processing of these food items prior to their delivery to school cafeterias given the current limited ability of cafeteria staff to prepare fresh food.

5. Pilot at least one salad bar in a Hawai'i Island Department of Education school complex by 2012-2013.

Operating a salad bar at a Department of Education SFSB school cafeteria will have an immediate effect on children at the school complex--who will have expanded access to fresh fruit and vegetables--as well as an immediate impact on the local businesses which grow and process the produce served in the salad bar. The quantity of produce needed by a school complex could be provided by existing agricultural producers on Hawai'i Island, making this a highly feasible recommendation.

6. Through the Hawai'i Association of Independent Schools (HAIS), encourage independent and charter schools to pilot food delivery systems to increase the amount of fresh, locally grown food in their school lunch programs.

Hawai'i Island independent and charter schools have greater flexibility than do public schools in instituting change in their cafeteria systems. Thus, sourcing additional local foods is a feasible goal for these independent schools. Increased procurement of fresh, local produce for independent school lunch programs could have immediate positive health impacts on children who attend these schools. Additionally, increased local procurement by independent schools will contribute to the economic health of Hawai'i Island by creating new agricultural and food processing jobs.

7. Convene a working group to facilitate the implementation of Farm-to-School and other institutional buying programs within Hawai'i County. This working group could be a subcommittee of the Mayor's Agricultural Advisory Commission.

Increased purchasing of local produce by a variety of organizations and agencies on Hawai'i Island, including preschools, childcare centers, hospitals, prisons, and elderly programs, would provide avenues other than farm-to-school to create a local institutional market for Hawai'i farmers. The Hawai'i County Department of Research and Development (R&D) is interested in supporting expanded institutional buying county-wide, though progress is hampered by the fact that there is only one agricultural development staff member currently employed by the County. A working group composed of diverse stakeholders could assist County R&D and the Mayor's Agricultural Advisory Commission in designing and implementing institutional purchasing initiatives.

B. Expanded Commercial Production

Stakeholders and the HIA research team agreed upon both supply-side and demand-side recommendations to maximize the health benefits of increasing local commercial production of food for the island market and making local food products more accessible to residents of all income levels.

Recommendations

1. Hawai'i Department of Education and the University of Hawai'i should substantially increase promotion and support for agricultural career pathways into farming and ranching by allocating additional resources for secondary and community college level agricultural training. As a first step, the Hawai'i Department of Agriculture and the University should work with the Hawai'i Department of Education to support a pilot secondary-level agricultural education program on each major Hawai'i island. These pilot programs would be career-oriented, production-focused, and food safety certified, so that food produced by students could be used within the school system. Pilot programs should be funded for initial implementation during the 2012-13 academic year with enough resources allocated for a three year period of implementation and evaluation.
2. Hawai'i County should facilitate collaborations between business, non-governmental organizations, and the Hawai'i Department of Human Services to increase the acceptance of cash vouchers, EBT, and credit cards at Hawai'i Island farmers markets.
3. County and state government should increase outreach and support to enable food agriculture-related businesses to fully utilize special Enterprise Zone incentives to increase the cultivation, processing, and distribution of food for the local market.
4. Hawai'i state, counties, USDA, and the private sector should collaborate to expand capacity of harvesting, marshalling, processing and distribution facilities to support local agricultural enterprise.
5. University of Hawai'i agricultural extension services should focus on both staple and high value food production for local markets and should assist farmers in utilizing off-grade farm output to create value-added products.
6. A stakeholder group of public and private organizations, representing landowners and farmers, should research and create model legal structures to make small public and private land parcels available to those who want to farm on a family enterprise scale, so that both land owners and farmers are fairly served by the arrangements.

Discussion

- 1. The Hawai'i Department of Education, the University of Hawai'i, and agricultural not-for-profit organizations should strengthen agricultural career pathways into farming and ranching and allocate additional resources for secondary and community college level agricultural training.**

The University of Hawai'i should work with the Hawai'i Department of Education to support a pilot secondary-level agricultural education program on each major Hawai'i island. These pilot programs would be career-oriented, production-focused, and food safety certified, so that food produced by students could be used within the school system. Pilot programs should be funded for initial implementation during the 2012-13 academic year with enough resources allocated for a three year period of implementation and evaluation.

This recommendation aligns directly with the Agricultural Development Plan goal to revitalize educational and vocational pathways for young people to pursue careers in agriculture. Training young farmers to join or replace the current cohort of working farmers, whose median age is close to 60 years old, is essential if agriculture is to expand in Hawai'i County and statewide.

- 2. Hawai'i County should facilitate collaborations between business, non-governmental organizations, and the Hawai'i Department of Human Services to increase the acceptance of cash vouchers, EBT, and credit cards at Hawai'i Island farmers markets.**

Increasing the capacity of farmers markets to accept EBT, cash vouchers, and credit cards will provide immediate health benefits to low-income residents of Hawai'i Island by giving them greater access to fresh produce at an expanded number of locations. EBT is already accepted at several Hawai'i Island farmers markets demonstrating that this is feasible. Further, this action will increase the pool of potential customers at farmers markets and result in health benefits to growers and Hawai'i Island residents through associated economic growth.

- 3. County and state government should increase outreach and support to enable food agriculture-related businesses to fully utilize special Enterprise Zone incentives to increase the cultivation, processing, and distribution of food for the local market.**

Enterprise Zones are currently underutilized in Hawai'i County. The effort of County and State representatives to mount an educational and technical assistance campaign would encourage agricultural ventures to take better advantage of existing tax incentives in Enterprise Zone regulations.

- 4. Hawai'i state, counties, USDA, and the private sector should collaborate to expand capacity of harvesting, marshalling, processing and distribution facilities to support local agricultural enterprise.**

5. University of Hawai'i agricultural extension services should focus on both staple and high value food production for local markets and should assist farmers in utilizing off-grade farm output to create value-added products.

HIA stakeholders cited the need for technical support and investment in infrastructure to assist farms, orchards, ranches and associated businesses that grow, process, and distribute food for the local market. Implementation of these two recommendations will lead to an expansion of the supply of fresh food available in the local market, which will increase local access to healthy produce. Industry sources estimate that 40% of local fruit and vegetable crops do not enter the market. An increase in value-added processing capacity will allow farmers to use and sell their excess and off-grade products, even selling these into institutional markets. An increase in the market share of locally-grown, as opposed to imported, produce and protein (eg. grass-fed beef) will also lead to positive health impacts through an expansion of the local economy as well as increased access to fresh food.

6. A stakeholder group of public and private organizations, representing landowners and farmers, should research and create model legal structures to make small public and private land parcels available to those who want to farm on a family enterprise scale, so that both land owners and farmers are fairly served by the arrangements.

On Hawai'i Island there are extensive fallow agricultural lands which could be cultivated to increase local food production. There are also aspiring farmers who cannot afford to purchase land at its current fee simple cost. HIA stakeholders felt that model legal structures should be developed to facilitate agreements between owners (public and private) and cultivators/ranchers in order to facilitate the use of fallow land in the county for food production and other agricultural purposes.

C. Promotion of Home, Community, and School Gardening

Recommendations

1. The Hawai'i Department of Education and the University of Hawai'i should continue and expand school and community gardening programs to educate students and families about safely growing and preparing fresh food.
2. The Hawai'i County Council should enact legislation allowing for a set-aside of land for community gardening in county parks and in all Section 8 housing, senior housing, or other housing developments in Hawai'i County which are subsidized by public funds or eligible to accept Section 8 housing vouchers.

Discussion

- 1. The Hawai'i Department of Education, the Hawai'i Department of Health and the University of Hawai'i should continue and expand school and community gardening programs to educate students and families about safely growing and preparing fresh food.**

Educating students and families about growing and preparing fresh food will directly impact the health of Hawai'i's children and adults by providing them with the practical knowledge and skills to grow and eat fresh food in accordance with recognized food safety protocols. Further, the physical activity involved in gardening is health-promoting.

Existing non-profit organization-sponsored school gardening networks in each county, including the Hawai'i Island School Garden Network and a Hawai'i School Garden Hui at the state level, coordinate advocacy, best practices, curriculum development, and professional education for school and community gardening programs throughout the state. These organizations are well-positioned to incorporate information in teacher training materials, publications and public outreach about the benefit of gardening to the health of students and families. This knowledge may lead more residents to grow their own food at home or in community gardens, thereby improving dietary quality, increasing food security, decreasing hunger, and increasing physical activity and mental well-being.

A long-term institutional investment of staff and funding on the part of the Hawai'i Department of Education will make it possible to sustain and expand school and community garden programs at Hawai'i's public schools. Nearly 55% of public school children statewide and 66% on Hawai'i Island qualify for free or reduced price lunches. This is a marker for food insecurity. Continued investment of public institutions in school gardening instruction provides an essential mechanism to promote healthy eating, provide nutritious food, and prevent long-term health consequences to the most vulnerable members of Hawai'i's community.

2. The Hawai'i County Council should enact legislation allowing for a set-aside of land for community gardening in county parks and in all new Section 8 housing, senior housing, or other housing developments in Hawai'i County which are subsidized by public funds or eligible to accept Section 8 housing vouchers.

The Hawai'i County Council can maximize regulatory conditions to be favorable for home and community gardening. For instance, existing regulations prohibit some public housing residents from planting in the ground. While residents may plant in pots, this requires more effort and money (as pots need to be purchased) than planting in the ground. Some County park lands not currently used for recreational purposes could be made available to community groups for gardening and urban orchards, providing both opportunities for healthful physical activity and for supplementing the community food supply.



VII. Conclusion

The Health Impact Assessment of the 2010 Hawai'i County Agriculture Development Plan underscores the health-promoting benefits of greater production and consumption of locally grown food. Increased consumption of produce is linked to decreased rates of obesity and associated chronic diseases such as diabetes, colon cancer, osteoarthritis, congestive heart failure, coronary heart disease, hypertension and stroke which are well-known causes of premature death. Home production provides the additional benefits of more physical activity and improved mental health. Increased local food production can improve community food security, improve the nutritional quality of the food available to island residents, and have positive economic impacts in terms of jobs, family income, and state tax revenues. The potential health risks of consumption of local fresh produce include food-borne illness (mediated by toxins or microbes) only if produce is not properly handled at and after harvest. Overall, the benefits of increased consumption of fresh local produce are much greater than the risks.

VIII. Monitoring Plan

The Kohala Center will seek additional funding to track and document actions taken by agricultural and health industry stakeholders, agricultural and educational administrators as well as county and state legislators that support HIA recommendations. This would determine:

- What policies have changed/been enacted?
- How have activities and policies increased production and purchase of local food at the commercial, home, and institutional levels?
- What evidence is there for changes in individual, family, and community health as a result of HIA recommended actions?

Table 14: Indicators to be Monitored

Indicator	Agency Responsible for Monitoring	Timing
INCREASED INSTITUTIONAL BUYING		
Hawai'i County establishes a farm-to-school working group	Hawai'i County Agriculture Advisory Committee	2012
Hawai'i State Legislature modifies Act 175 and/or regulations for state food procurement	The Kohala Center/Hawai'i State Department of Agriculture	2012
Hawai'i State Legislature allocates funds for a Farm-to-School/School Garden Coordinator at the Hawai'i Department of Education	Hawai'i School Garden Hui	2013
HDOE food purchasing data available for analysis	Hawai'i County Agriculture Advisory Committee	2012
Increase in purchase of local food for the schools' Fresh Fruit and Vegetable Program (FFVP)	The Kohala Center / Hawai'i County Agriculture Advisory Committee	2012 -ongoing
Increase in locally produced food in school breakfast and lunch menus	Kōkua Hawai'i Foundation	2012 - ongoing
Establishment of a model Hawai'i Island public high school agricultural education program aimed at food production	The Kohala Center	2013
A salad bar in HDOE school complex on Hawai'i Island by 2013	The Kohala Center Hawai'i Island School Garden Network	2013
Increase in fresh locally produced food served by Hawai'i Island independent schools	Hawai'i Association of Independent Schools	2012 - ongoing

(Continued on next page)

EXPANDED COMMERCIAL PRODUCTION		
Expanded secondary and college agricultural training opportunities at the DOE, UH, and through other institutions	The Kohala Center	2012 - ongoing
Increase in Hawai'i Island farmers markets' acceptance and processing of EBT transactions	County of Hawai'i Department of Research & Development	2012 - ongoing
Increased use of Hawai'i Island Enterprise Zones by local agriculture businesses (farms, food processing, etc.)	County of Hawai'i Department of Research & Development	2012 - ongoing
Increased production of Hawai'i Island value-added products using off-grade fruits and vegetables	Hawai'i State Department of Agriculture/County of Hawai'i Department of Research & Development/USDA-RBS VAG program.	2012 - ongoing
Increase in available agricultural infrastructure, such as marshaling yards, processing facilities and slaughterhouses on Hawai'i Island	County of Hawai'i Department of Research & Development	2012 - ongoing
Increase in land being actively farmed/ranched for food production on Hawai'i Island	Hawai'i State Department of Agriculture	2012 - ongoing
Increase in the production of food on Hawai'i Island and in state-wide consumption of food produced on Hawai'i Island	Hawai'i State Department of Agriculture	2012 - ongoing
Increase in Hawai'i Island's farm and ranch employment	Hawai'i State Departments of Agriculture and of Labor	2012 - ongoing
Increase in consumption of fresh produce by Hawai'i Island residents	Hawai'i County Department of Research & Development/HDOH in biennial survey	2012 - ongoing
PROMOTION OF HOME, COMMUNITY, AND SCHOOL GARDENING		
Increase in public/private financial support for school gardening programs in Hawai'i public schools	Hawai'i School Garden Hui	2012 - ongoing
Increase in home gardening and home production on Hawai'i Island	Hawai'i County Department of Research & Development/HDOH in biennial survey	2012 - ongoing

IX: Agriculture Success Stories

Roy Y. Honda Farm Reflections from Roy Y. Honda, Hawai'i Island Farmer



Photo: Roy Y. Honda

“In order to be successful as a farmer,” says Roy Honda, “you have to persevere. You can’t give up when times are hard.”

Honda has been farming on Hawai'i Island for the past 39 years, so he knows how to survive hard times. After graduating from The University of Hawai'i, Manoa with a degree in horticulture, Honda dreamed of becoming an extension agent for the university. But there were no openings, so he accepted a position at Sure Save Supermarket as produce manager. He

soon realized that he could either work hard for someone else, or he could work hard for himself as a farmer.

At the time, Honda's father operated one of the state's largest tomato farms, which produced more than 1,000 cases per week. Honda applied for a \$75,000 new farmer loan from the State of Hawai'i and used this capital to terrace and construct greenhouses on a portion of his family's land in Kona. In his early years, Honda grew only tomatoes, which he sold to local wholesalers and shipped to O'ahu for sale.

“Over time, it became clear to me that the way we were farming—monoculture—was not sustainable,” explains Honda. In the late 1980s Honda lost half of his crop when the fungicide he used killed the plants. Honda made a commitment to transition to more sustainable agricultural practices, using compost as instead of synthetic chemicals to fertilize his plants. “The transition was time consuming and costly,” says Honda, “and I was on the brink of bankruptcy.” Honda diversified his crops to include bell peppers, eggplants, and Japanese cucumbers, as well as tomatoes. This diversification helped to improve the health of the soil and it opened new markets to Honda, leading to an increase in dollar sales.

“There were a lot of small farmers doing the same thing at the same time, and I realized that there was only a small window of opportunity for me to find my niche in the market,” he says. “I decided to focus on quality and taste, as well as on using only safe farming practices.”

Honda also decided to concentrate on supplying local markets and to stop shipping food off island. Honda estimates that he produces an average of 100 cases of vegetables each week. He knows that even if he doubled his current production, there would still be a demand for his product.

Although Honda knows that he could increase his sales if he expanded production, he chooses to stay small in order to maintain his quality of life. “My wife helps on her day off, my



*Photo: Jean Kadooka
and Roy Y. Honda*

sister helps, and I have student interns and a few on-call employees,” Honda says. “Staying small means less headaches for me,” he says.

Since 1986 Honda has participated in the Japan Agricultural Training Program, which is a partnership between Honda’s farm, Big Bend Community College in Washington State, and the University of California, Davis. Honda hosts one or two student interns through this program in 13-month work study placements on his farm. The students spend another 5 months taking courses at the two participating college campuses.

Honda notes that demand for local produce soared after the Farm Bureau launched the Keauhou Farmer’s Market about six years ago. “The market provided a great venue for local farmers to share our products, which helped increase demand in the community,” he says.

Honda speculates that new farmers here could make a profit on locally grown produce in as little as one year, provided they have adequate land, labor, and capital. “From an economic standpoint,” he says, “I have no complaints.”

Center for Agricultural Success Reflections from Jim Cain, founder of King Laulau Poi Factory

The Cain family (Jim and his wife Gretchen, and their two children Sierra and Kaua) started farming taro in Waipi’o Valley in 1993, about four years after they moved to the valley. Waipi’o Valley has been rooted in agriculture for centuries. Taro is the traditional staple crop, and Waipi’o is synonymous with taro and poi.



Photo: Jim Cain

“It was our desire to make a living in Waipi’o and to connect to Waipi’o’s deep roots,” says Cain, “so we sought out and restored some vacant *lo’i* (terraces), followed the direction of our Waipi’o *kupuna* (elders), and became taro farmers. Taro farming has brought so much positive energy into our lives, by allowing us to make a living as farmers and poi processors, by connecting us to the land and our Waipi’o ancestors, and by enabling us to provide this awesome ancestral nutritious food to so many of our friends and neighbors. Being taro farmers has become who we are. It has taught our family many lessons, most of them rooted in respect: respect for land, water, culture, elders, family, hard work, honesty, and the list goes on and on.”

By working together as a family, the Cain *’ohana* (family) has managed to build and expand their taro growing and processing business, the King Laulau Poi Factory, over the past 18 years. Cain remembers the many challenges his family has overcome, including floods, keeping up with the multitude of tasks on the farm (planting, maintenance, and harvesting), and maintaining a consistent supply of taro for their poi business. “So far, so good,” said Cain. “After doing this for so long we have worked out a good system, but certainly back in the

beginning, coming up with the required consistent output was challenging,” he recalled.

Putting together a good marketing plan, experimenting with and learning different growing techniques, and staying mentally and physically focused were all skills that the Cains had to master in order to survive. “Being self-employed,” said Cain, “you have to be very self-motivated to keep things going.”

Cain believes that this is a time of great opportunity for small-scale family farms in Hawai‘i. “While we have to deal with rising costs of things like gas, the price of food has also risen very sharply, thus leveling the playing field for smaller farmers who can sell locally,” he says. “The trick is to understand the local market and develop strategies to access that market.”



Photo: Gretchen Cain planting taro

Over 200,000 are on Hawai‘i Island on any given day, including approximately 180,000 full-time residents, 20,000 visitors, and 1,000-2,000 military personnel. This translates to approximately 600,000 meals, plus snacks, consumed on Hawai‘i Island every day.

“This is a huge potential market,” said Cain, “and yet, of every food dollar spent by the buying public, Hawai‘i’s farmers receive less than 20 cents. The rest is spent on processing, wholesale distribution, and retail operations.

For small scale farmers to survive,” he continued, “they must develop strategies to access some of the 80 cents of the food dollar that is not currently supporting the farm. This is accomplished through a combination of direct marketing techniques, value-added processing, and niche market development.”

Cain has a deep commitment to training new farmers to make a living and supply Hawai‘i Island with food. He has been instrumental in creating the newly formed Center for Agricultural Success (CAS) in Hamakua. CAS is a collaborative effort of public and private entities to ensure the success of small-scale diversified farms by providing education, training, and support services. In addition to new farmer training, CAS will provide continuing education for established farmers and will serve as an information clearinghouse for resource development, co-operative marketing strategies, and value-added opportunities. CAS will also promote the development of related industries such as bio-fuels and other alternative energies, and sustainable fertility resources such as composting and biochar.

“I got involved in CAS because I sincerely believe that a family farm-based economy provides a solid foundation for our rural community, as well as the many benefits associated with producing healthy local food,” says Cain. “When we started farming, many people encouraged, supported and taught us,” Cain recalled. “It is now our turn to share our experience with others. With all this recent talk about increasing our local food production, improving food security, and supporting our rural communities, the bottom line is we need more farmers. The Center for Agricultural Success will provide the support family farmers need to succeed,” said Cain.



Photo: Grinding taro into poi—it’s a family affair



Photo: Keoluwai, Waipi'o, Hawai'i

Cain thinks that the biggest challenge that new farmers in Hawai'i face is understanding the business side of farming. "Though the potential market is huge, accessing the market in a way in which you can actually make a living is not easy," he said. "Understanding how to best access the market is key to farm planning. I won't sugar coat it, it is not easy. But, yes, a young, energetic, smart farmer can most definitely make a living here."

From Farm to School: Challenges and Opportunities Reflections from Reflections from Dexter Kishida, School Food Coordinator for 'AINA In Schools, Kōkua Hawai'i Foundation

Dexter Kishida serves as School Food Coordinator for the Kōkua Hawai'i Foundation and is a key advocate for the farm-to-school movement in Hawai'i. 'AINA In Schools is an initiative of the Kōkua Hawai'i Foundation that focuses on bringing nutrition education, garden-based learning, environmental stewardship, and fresh and local food choices to Hawai'i's schools. 'AINA's mission is to "Actively Integrate Nutrition and Agriculture (AINA) In Schools." Kōkua Hawai'i Foundation's 'AINA program focuses on three main goals: (1) addressing health issues through nutrition education and by encouraging healthy eating habits, (2) creating a sense of stewardship by connecting students to the land and sea, and (3) creating a market for local farmers. 'AINA is currently working directly with 12 O'ahu elementary schools and developing resources that can be shared with any interested school.

Kishida has identified three major challenges to incorporating fresh local produce into school lunch menus. To build a successful farm to school program in Hawai'i, Kishida believes we need:

1. More food safety certified farms – The DOE requires that farms it purchases from be food safety certified, and most distributors require a food safety certification from farms they purchase from as well. By increasing the number of certified farms, we can also increase the amount of locally produced food in the distribution stream.

"The biggest roadblock to increasing the number of food safety certified farms and improving product alignment between farms and institutional buyers is that most Hawai'i farms function as independent businesses, and our farmers like being independent!" said Kishida. "Many of our farmers have a 'don't tell me what to do' mindset, and they prefer to grow what they grow rather than catering to the needs and/or requirements of institutional purchasers," Kishida explained.

However, Kishida believes that there is a new generation of farmers entering the market place in Hawai'i. These younger farmers, as well as some of Hawai'i's immigrant farmers, see institutions as a potential market that is largely untapped. While this market may not yield high profit margins, it is more stable than the restaurant and hotel market.

2. Greater product alignment – Many products currently grown are ‘high value crops’ and out of the price range of the DOE and other institutional purchasers. To change this will require collaboration between the DOE and local farmers. The DOE needs to include items on their menus that a) grow well, b) are available in quantity, and c) are available at a close price point. And farmers need to grow items that the DOE can use. For example, while including dragon fruit on the school lunch menu may not be feasible, including beans, tomatoes, and leafy greens certainly is.

To increase the procurement of fresh local produce by Hawai‘i’s schools, both the buyers, i.e. School Food Authorities (SFAs), and the suppliers, i.e., farmers and food distributors, are potential targets of advocacy efforts. “SFAs would benefit from education on procurement, including how to best utilize various bidding strategies and how to better engage various sellers in the process,” Kishida said. “Hawai‘i’s produce growers and distributors would benefit from instruction on how to navigate the state procurement system and how to supply products that meet the safety regulations of DOE and other schools and institutions,” he added.

The Lieutenant Governor has created a task force to assess which food items Hawai‘i’s farms should be focusing on as promising candidates for sale to institutional buyers like the DOE. Items like leafy greens, cabbage, beans, tomatoes, and bananas could be among the products that the task force identifies as promising candidates. In time, items like locally grown Okinawan sweet potatoes could be processed, either by an outside party or in our school cafeterias, and added to school lunch menus in the state.

“Before more fresh foods can flow into Hawai‘i’s school kitchens, additional training for school kitchen employees is needed,” Kishida cautioned. “It is dangerous to have undertrained staff preparing fresh salad bars. The potential for food borne illness is greater if school food service workers are not properly trained in how to handle food safely,” he said.

3. To change children’s taste – The DOE does not want to waste its funding on foods that children will not eat. “If we create expensive trash cans filled with uneaten fresh local produce,” explains Kishida, “the DOE will turn back to the fries and chicken model that seems to ‘work.’ It will take marketing and education to adjust our collective taste buds so that our children and families desire good clean food again,” he said.

Kishida believes that this third challenge, changing children’s palates, is perhaps the most straightforward to address. School Garden Networks on each island offer children the opportunity to grow fresh, healthy foods themselves and to build a relationship with their food.

“I firmly believe we need to introduce garden education in all our elementary schools and garden/ecoliteracy classes in all our middle schools,” Kishida said. “This may be accomplished by having garden education woven into current academic subjects, but a more effective approach is to hire a garden instructor who functions as a specialized subject teacher. A professional garden teacher can skillfully interweave garden lessons into the school curriculum, including lessons on the health and nutrition benefits of eating the fresh food the students are growing in their school gardens,” Kishida explained.

“Allowing children to play with their food by cooking and creating their own meals, including salad bars, gives children the chance to build a relationship with their food,” said Kishida. “Over a period of one school year, children who were initially unwilling to eat vegetables can change their behavior to regularly and eagerly eating vegetables they helped to grow,” he added.

Kishida also identified placing mobile cooking carts in all schools as a good investment, “if teachers could be trained in how to effectively utilize the carts. Training is needed, as cooking at home is VERY different than cooking with 28 kids!” he noted.

“I think that changing our school menus begins with changing demand and shifting what it is our children want to eat. We need to start marketing healthy foods to our children right NOW,” said Kishida. “We live in a fast and easy culture when it comes to food, and yet we need depth and wholesomeness to thrive. We need to rebuild our relationship to growing our own food. Since we don’t have BILLIONS of dollars to spend on marketing like the fast food industry does, we have to rely on the grass roots efforts of farm to school education through our school gardens,” he said.

Kishida also believes that we need to recreate more wholesome food systems. “Why can’t schools function as food hubs?” he asked. “School gardens can host bountiful farmers’ markets which can serve as great hands-on learning tools for reinforcing the basics of math and social studies. Community Supported Agriculture deliveries to school sites can serve as fundraisers and as a great access point for families and neighbors to come together at their local schools,” remarked Kishida.

Kishida believes that by changing the foodscape of our communities through our schools, we can lay the foundation for changing what kind of food is served in Hawai‘i DOE cafeterias. “As school menus are changed to reflect more local produce, then DOE procurement will automatically change. The DOE can single-handedly change our school lunch menus, once the motivation to do so mounts in communities across our state,” he said.

“In my mind, these are the first, second, and third steps that we should take right now to increase the amount of fresh local food that our kids eat at school,” said Kishida.

“Step 1: Establish gardens in all elementary schools.

Step 2: Establish salad bars in all schools at least once a week.

Step 3: Expand salad bars to serve local ingredients five days a week.”

Prior to implementing these three steps, Kishida thinks that the focus should be on introducing healthy snack programs at Hawai‘i’s schools. He also wants to encourage schools to host farmraiseras as fundraising opportunities, instead of selling holiday wrapping paper or candy bars.



Nalo Greens Salad Mix Reflections from Dean Okimoto, Owner of Nalo Farms

“Hawai‘i has such high rates of childhood obesity,” says Dean Okimoto, owner of Nalo Farms in Waimanalo. “As a community, we have come to understand that foods grown here in the islands are more nutritious, tastier, and better for you. This consciousness should apply to our kids too.”

About two years ago, Okimoto was approached by administrators at Iolani School in Honolulu to provide his Nalo Greens salad mix for their school cafeteria. Okimoto, an alumnus of Iolani School, was already providing Nalo Greens for special events at the school, but this was the first time that the greens had been offered to students as part of their regular lunch fare.



Photo: Dean Okimoto

The Nalo Greens mix was designed for high-end restaurant clientele at Roy’s and Alan Wong’s, and it was composed of 12 to 14 lettuces and greens. “What we found was that when we served this mix to the school kids, they didn’t like the stronger, spicier flavors of some ingredients, like the arugula and mustard greens. So we cut these ingredients out and added more lettuces to create a special school mix that would appeal to the kids,” explains Okimoto.

Nalo Greens school mix consists of six varieties of lettuce and three varieties of greens. “We found that the kids really liked the tenderness and flavor of our baby lettuces,” says Okimoto. “When I visit the second and third graders at Iolani School, I let them taste our salad mix. They are surprised how much they like the way it tastes,” he says. “By serving our mix in the school cafeteria, students have begun eating and appreciating salads. This is improving the health of our kids.”

Soon after Iolani School began serving Nalo Greens to their students, administrators at Punahou School contacted Okimoto to procure Nalo Greens for their school cafeteria as well. “Punahou is a strong advocate for sustainable food systems, and teachers there ask me to come into their classes and talk to the students about sustainable local agriculture,” says Okimoto. “When I ask them, the kids tell me they are eating the salad at the school cafeteria. And their families and teachers at the school eat it too!”

Nalo Farms grows all of the ingredients used to create their Nalo Greens school mix. As Nalo Farms enters the second year of supplying their salad daily to Punahou School’s cafeteria, Okimoto reports that he is making a modest profit on this contract.

Nalo Farms is food safety certified, so they are able to sell their products to school cafeterias. Okimoto notes that many smaller farms are not food safety certified, which presents a challenge if they hope to supply institutional purchasers such as schools. Another challenge is that Nalo Farms is not able to purchase products from other farmers at a margin that makes it feasible to utilize their products in the schools. “We can sell their produce to the restaurants, but pricewise, we cannot market these products in the schools,” Okimoto says.

Okimoto hopes to expand distribution of his product to Oahu's public schools, but he notes that "navigating the DOE procurement system is a big challenge." Okimoto would like to work with AINA in Schools and Hawai'i Education Matters, two Oahu-based non-profits, to introduce his Nalo Greens to the cafeterias of two charter elementary schools on that island, Wai'ala'e Elementary and Aikahi School. "Many of the charter schools have corporate backing," explains Okimoto. "For example, Sheraton Hotels supports Wai'ala'e Elementary School. My goal is to encourage the corporate backer to help subsidize the cost of providing Nalo



Photo: Nalo Greens Mix

Greens to students at that school." This strategy will allow students to enjoy the benefits of eating fresh local greens for lunch while the school cafeteria can stay within budget.

Next on Okimoto's horizon is a plan to experiment with the salad dressings that are served in schools to decrease their sugar content and make them more palatable. "This is what we gotta do if we want to turn our childhood obesity statistics around," he says.

Adaptations Inc. Reflections from Maureen Datta, Hawai'i Island Farmer

Tane and Maureen Datta started farming 7.5 acres on Hawai'i Island in 1979 on a very small-scale, growing mostly herbs, edible flowers, and specialty vegetables for Chef Peter Merri-man. "We grew incrementally, step by step," recalls Maureen. "We were always humble and patient, waiting to see what worked."

When the Dattas tried marketing their specialty herbs to local wholesalers, "they couldn't be bothered," Maureen says. "They knew what basil and mint were, but they weren't familiar with Thai basil and chocolate mint. We thought our farm would be better served if we distributed our products ourselves."

In 1992, the Dattas incorporated as Adaptations, Inc., and they began consolidating the products of their farm with the harvests of three other growers for sale at local restaurants and markets. Now, nearly twenty years later, Adaptations works with about 100 growers around the island and employs nine people to work in their food consolidation/distribution and community supported agriculture (CSA) subscription program.

"The Adaptations model helps to build community, because we have created a framework in which farmers no longer see themselves as competitors, but rather as a mutual support network. By working together, we are able to provide a consistent, year-round supply of fresh produce to local restaurants and residents," explains Maureen.



Photo: (from left to right) Maureen, Amber Wai'alea, Tane Datta, and Saffron Pu'uhonua

At any time, Adaptations may have 100 different items from which to choose when filling orders. The farm works with 30 to 40 suppliers each week, some of whom provide just one product, such as tangerines or dragon fruit. “We have worked hard to find farmers in appropriate climate zones around the island with adequate acreage to grow the various crops that we sell,” explains Maureen. Adaptations has also established convenient drop off points for producers, utilizing a refrigerated vehicle that makes a weekly circle island tour to pick up fresh produce from growers. “For a long time, having a consistent supply was an issue for us,” recalls Maureen, “but not anymore.”

In 2002, Dawn Velasquez, an Adaptations employee who was enrolled at Hawai‘i Community College, revised the traditional CSA business model to consolidate products from several small family farms rather than just one. The Dattas mentored Dawn in devising a way to implement her model to satisfy her course requirements, and the Adaptations CSA was born.

The “Fresh Feast” CSA now serves 30 families from South Kona to North Kohala, with four pick up points throughout West Hawaii. When asked what the most appealing feature of the CSA is to her clients, Maureen responded that she thinks folks like the freshness/quality of the produce, the convenience of delivery, and the fact that they know and trust the farmers who are growing the food they will eat. “Every one of our suppliers is local, and the food we market is harvested fresh to order—they don’t have a lot of miles on them. Our farmers have integrity and they abide by organic beliefs and practices,” Maureen says.

Within the next six months, the Dattas hope to launch a new Web site that will enable CSA customers to manage their accounts online. Customers will be able to purchase subscriptions with credit cards and pay off their subscription fees incrementally, to manage their vacations, and to make changes to their food packages such as adding products like coffee, honey, and macadamia nuts to their weekly orders. Maureen thinks that this web site will greatly simplify her administrative role and allow Fresh Feast to expand to include 75 families.

Adaptations has shown that there is demand, appreciation, and value in the local market to support CSAs. “Though other farms may not easily be able to replicate the 20 years Adaptations has spent building our island wide supply network, we have shown that local farms can supply their neighbors with food,” says Maureen.

“This is our identity and our mission,” Maureen says. “We are dedicated to ecologically sound community and land development based on organic farming, alternative energy, and complimentary medicine. We will not cease operations if suddenly things don’t go well. We take the long view, and, for us, family farming is a life-style commitment.”

Maureen notes that several Adaptations employees are in their 20s and have the “necessary idealism” to keep the Datta’s vision alive for many years to come.



Photo: Lacinate kale growing at Adaptations Farm

The Mountain Apple Brand Reflections from Derek Kurisu, Executive Vice President of KTA Superstores



The Mountain Apple (‘ohi‘a-‘ai) was one of a handful of seedlings brought to Hawai‘i by early Polynesian settlers and nurtured to thrive in their new home. The rich and fertile soil, gentle island rains, pure air and tropical sun of this island land are gifts used well by our local farmers and creators of Hawai‘i’s special products. We share their pride in offering you and your family the Mountain Apple Brand. –excerpted from the side panel of Mountain Apple Brand orange juice.

Since its founding by Derek Kurisu in the early 1990’s, Mountain Apple Brand has expanded to encompass 60 business partnerships, including large farmers and wholesalers, as well as many small farmers around the island. “My boss, Tony Taniguchi, reminded me that KTA was responsible for helping our former sugar plantation workers when the sugar industry collapsed,” recalls Kurisu. “The sugar plantations had always been a big supporter of KTA, and we wanted to revive the agriculture industry and give plantation workers something they could do to make a living. Back then there were no small farms on the island, no nothing for folks living on the plantations to do,” says Kurisu.

Mountain Apple Brand was launched by KTA in 1991, in response to the request of competitor Safeway for permission to import milk from the US Mainland. Local dairies were concerned about their ability to remain competitive, and Kurisu spearheaded discussions with four island dairies to market their milk under the Mountain Apple Brand. All four signed on. Two of these dairies have since closed their doors, but the remaining two dairies on Hawai‘i Island still market their milk through KTA’s Mountain Apple Brand label.

“We knew how vulnerable we were to interruptions in shipping – whenever there was a strike, we had no rice or toilet paper,” explains Kurisu. “We were so dependent on imported food, even for our highly perishable fresh foods. We knew that our former plantation workers could grow produce, and so we expanded Mountain Apple Brand to include vegetables and fruit. Then we expanded to include value-added products like pickles, which gave our local farmers something to do with their excess veggies,” says Kurisu.

The Mountain Apple Brand brings down costs and increases profits for local farmers in multiple ways, including 1) allowing them to increase the volume of their operations, 2) eliminating charges for shelf space in KTA stores, and 3) giving local products preferential placement in KTA stores.

Kurisu estimates that twenty years ago, 20% of the produce and 5% of the beef sold at KTA was locally produced. Today the figures are much greater, with over 95% of KTA’s leafy greens and 40% of its beef sourced from local farms and ranches. “And we still have plenty of small farmers bringing us five pounds of beans or papayas,” says Kurisu. “I can’t tell you exactly how many of these folks we buy from, but it’s plenty.”

“I am really proud of what we did,” says Kurisu. “We were at the forefront of the sustainability movement, and what we did had a ripple effect throughout the island. Our Mountain Apple Brand has encouraged more farmers to sell their products locally and more island residents to buy local products. Buying local creates jobs, strengthens the economy, and makes our island more secure. We told everyone what we were doing on the side panel of our first milk cartons,” he says, “and we are still doing the same thing today.”

Discovery Garden

Reflections from Danny Garcia, Principal, Kohala Elementary School

While touring the school campus during his first week on the job as new principal of Kohala Elementary School, Danny Garcia paused at the grassy gulch on the mauka side of campus. “What’s this area?” he asked the school’s head custodian.

“That used to be where the Future Farmers of America agriculture classes planted mac nut trees and pastured their animals,” replied the custodian.

Wheels began turning in Garcia’s head – why not take this fallow land and transform it into a school garden for use by K-5 students at the school? As a professional educator and a father of two young children, Garcia knew the value of hands-on, project-based learning, and he knew that such learning results in students who are engaged in school and therefore more successful.

Two weeks later, Garcia attended a presentation by Nancy Redfeather, the Coordinator of The Kohala Center’s Hawai’i Island School Garden Network, who offered to come to Kohala Elementary School and help bring Garcia’s idea to fruition. “Nancy’s help was invaluable to us in starting our school garden,” recalls Garcia. “Nancy helped me to crystallize the vision for the garden so that I could explain why this was important to teachers. She took me to visit model school gardens in Waimea and in Pa’auilo, and she helped us to obtain funding for fencing and materials. She also helped us to create a job description for our school garden teacher and to recruit an outstanding sustainability educator, Ms. Koh Ming Wei. The Kohala Center provided matching funds so that we were able to hire Ming Wei on a full-time basis.”

It didn’t take long for the coconut wireless to spread the news of the school garden throughout the Kohala community. Volunteers helped the school to grade and prepare the land, Surety Kohala donated fencing to enclose the garden and keep feral pigs out, and a local artisan donated bamboo to construct an outdoor classroom within the garden. In the summer of 2010, a group of eight high school students enrolled in a six-week Workforce Development program helped construct the garden. These students received academic credit and paid wages for building a platform for the outdoor classroom and installing the garden’s perimeter fencing. By summer’s end, the Discovery Garden was ready for planting.

When school began in the autumn of 2010, each grade level was assigned their own section of the garden. Students engaged in projects directed by Koh Ming Wei for at least one hour each



Photo: Students and teachers in the garden

week. The fifth grade students decided to utilize their area for two circular pizza gardens, where they planted herbs, spices, and vegetables to be used as pizza toppings. At the end of the school year, the students harvested the fruits of their labor and brought them to the Zest Kitchen restaurant in Hawi, where they prepared, cooked, and feasted on pizzas made with their homegrown ingredients.

Kohala Elementary School students harvested over 300 pounds of produce from the Discovery Garden in its first year. Some of this produce was used in an after school cooking class to create homemade salads, stir fries, smoothies, and soups. Some produce was sold at a farmer's market booth at the school's Spring Fair; with profits reinvested in the garden to purchase new gloves and tools. Some of the surplus produce went to feed elders in the community, and some was brought home by the students to share with their families. "Our larger goal is to start a garden at every child's home," says Garcia.

At the start of the school year, Ming Wei surveyed all 384 students at the school. Just 25% of the students reported that they ate fresh fruits and vegetables on a regular basis. By the end of the school year, that figure had jumped to 70%. "We are learning about food," says Garcia, "and raising awareness about the importance of eating fresh fruits and vegetables. And we are rekindling Kohala's historic ties to the land by reviving the K-12 agriculture program that once existed here. The Discovery Garden is engaging our elementary students in hands-on learning, and we are creating a foundation upon which to build agriculture and science career pathways for our youth leading right up to college."

What's next on Garcia's plate? The school has just finished fencing in the second phase of the Discovery Garden, again utilizing materials donated by Surety Kohala. This new area is designated as a cultural garden where area kupuna (elders) will be invited to share their foods and cultural traditions with students. Phase Two will include a Japanese garden, a Chinese garden, and a Hawaiian garden, for starters. "All of this gardening is creating a healthier community and a healthier Kohala," says Garcia.

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Appendix A

Draft Scope for Health Impact Assessment of the Agriculture Plan

Appendix A

Draft Scope for Health Impact Assessment of the Agriculture Plan for the County of Hawai‘i (November 2010)

Policy: Increased institutional procurement (and serving in K-12 school meals) of locally produced FFVP by Hawaii Department of Education					
Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
Nutritional deficiency	<ul style="list-style-type: none"> • % of children consuming 5 FV servings daily • % FV servings consumed at school, for kids on NSLP 	<ul style="list-style-type: none"> • What are the personnel barriers for schools to purchase food locally? • What equipment or facilities limitations prevent purchase and preparation of FFV? • What is the DOE food budget (per meal) and where/how is the DOE buying now? • What is FV content of existing DOE meals (average per week)? • What percent of FV served are purchased fresh? • How many pounds of each type of FFVP are needed to serve all DOE schools on-island? • How many schools serve local FFVP (list types of FFVP)? To what extent? • What other funds are available for FFV in schools? • What is the cost of local compared to imported FFVP for schools? • What is the current production capacity of all local farms and how are their products currently distributed? • Relationship between FFV served and FFV consumed in school setting • Relationship to FFV introduced at school and changes in palate • Relationship of FVP freshness to palatability and nutrition 	<ul style="list-style-type: none"> • Would this policy affect nutritional deficiency? • Would this policy affect children’s FV consumption? • Would this policy affect children’s caloric intake? 	<ul style="list-style-type: none"> • Research existing schools, where they purchase FFVP, costs of FFVP, barriers to serving locally grown FFVP • Determine FV content, cost, reimbursement for NSLP-subsidized meals. • Research needed infrastructure changes in schools to accommodate FFVP preparation; what would the costs of equipment, materials, labor be? • Investigate models of farm to school in other places • Research USDA programs for FFVP subsidy in schools • Create economic model for transition to FFVP service in one large Hawaii Island school or region (e.g, North Kohala) 	<ul style="list-style-type: none"> • U.S. Census data • DOE pupil data: enrollment, ethnicity, free and reduced lunch statistics • Interviews with USDA child nutrition administrator, Sue Uyehara • School lunch data collected by Kokua Foundation, Dexter Kishida • Dept. of Defense (HI-DOE purchases food through U.S. DoD)

Policy: Increased institutional procurement (and serving in K-12 school meals) of locally produced FFVP by Hawaii Department of Education

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
<p>Food security/hunger:</p> <ul style="list-style-type: none"> • academic performance • behavioral issues 	<ul style="list-style-type: none"> • Food security measures (CPS-FSS) 	<ul style="list-style-type: none"> • What is the current rate of food insecurity on Hawaii? For adults? For children? • What are the contributing factors to food insecurity on Hawaii? • Which populations are disproportionately affected by food insecurity? 	<ul style="list-style-type: none"> • Would this policy impact children's food security? • Would this policy affect adult food security? • How would schools buying local FFVP impact the retail value of local FFVP in local markets? 	<ul style="list-style-type: none"> • Locate existing data on HI food insecurity and relationship to income and geographic area • Determine how increased local FV in school meals will affect childhood food security 	<ul style="list-style-type: none"> • CPS-FSS (USDA) • CDC literature review
<p>Obesity (over-nutrition)</p>	<ul style="list-style-type: none"> • Prevalence of childhood obesity • Prevalence of adult obesity • Lower levels of obesity and diabetes? 	<ul style="list-style-type: none"> • Relationship of family income to family diet quality and obesity • Which populations are disproportionately affected by obesity and related diseases in Hawaii? 	<ul style="list-style-type: none"> • Would this policy impact (through increased FV consumption) prevalence of childhood obesity? 	<ul style="list-style-type: none"> • Literature research re: FFV consumption in early years to impact childhood and adult obesity • How does a decrease in obesity affect life expectancy? • How would a decrease in childhood obesity affect the state's cost of providing health care? • How would a decrease in obesity affect business costs, 10 years down the road, for obese adults? 	<ul style="list-style-type: none"> • CDC literature review

Policy: Increased institutional procurement (and serving in K-12 school meals) of locally produced FFVP by Hawaii Department of Education

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
<p>Economic health:</p> <ul style="list-style-type: none"> • Jobs/family income (stress, access to health insurance) • Contribution to island gross product; multiplier effects of buying local 	<ul style="list-style-type: none"> • County multiplier effects generated in sales, labor earnings, tax revenues, and new jobs created • Number of people who acquire health insurance 	<ul style="list-style-type: none"> • How many additional jobs would be directly created (farm managers, farm labor, distribution, food service) by substitution of local for imported FV purchasing? • What would be the farm gate value of FFVP sold to local distributors and then the DOE? • What is the multiplier effect of DOE demand on jobs created, purchases made through the value chain? • What might be the contribution to the tax base? 	<ul style="list-style-type: none"> • How would schools buying local FFVP impact volume and farm gate value of local FFVP produced and sold overall? • How would schools buying local FFVP impact the retail value of local FFVP in local market? • How would the DOE's purchase of local FFVP impact Hawaii Island's economic health in terms of job growth, family and island income growth, tax revenues, and new farms and distribution ventures? • What types of jobs, types of businesses, wage levels would be impacted by DOE purchases and food preparation? • How many new farms and/or distributors could be created to supply the needs of local schools for FFVP? Are currently existing local farms able/ willing to scale up? How many new employees would they need? What would their costs be? 	<ul style="list-style-type: none"> • Research different existing local farms on Hawaii: employment rates, employment benefits, farm gate/jobber/retail prices, costs, and methods of distribution, volume of goods sold, median income of farmers • Multiplier effect analysis (local farm FFVP & imported FFVP) 	<ul style="list-style-type: none"> • Matthew Loke, Hawaii State Dept. of Agriculture, has access to data for analysis • Literature review

Policy: Increased institutional procurement (and serving in K-12 school meals) of locally produced FFVP by Hawaii Department of Education

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
<p>Increase in availability of local food supply for community food security</p>	<ul style="list-style-type: none"> Volume and proportion of food grown and sold locally 	<ul style="list-style-type: none"> What is the level of food supply on Hawaii Island? How would DOE demand assist in stabilizing/increasing local farm production capacity and food availability/storage in general? 	<ul style="list-style-type: none"> How would schools buying local FFVP impact volume and farm gate value of local FFVP produced and sold overall? How many new farms and/or distributors could be created to supply the needs of local schools for FFVP? Are currently existing local farms able/willing to scale up? How many new employees would they need? What would their costs be? How would schools buying local FFVP impact the retail value of local FFVP in local markets? 	<ul style="list-style-type: none"> Research re: existing food supply stocks on Hawaii Island Estimates of whether/how/how much increased DOE demand would increase production and availability of food on Hawaii Island 	<ul style="list-style-type: none"> Surveys/Interviews/focus groups with local farmers, distributors, & markets
<p>Local health care costs</p>	<ul style="list-style-type: none"> Number or % of insured children/adults? 	<ul style="list-style-type: none"> How might changes in nutrition at school, leading to changes in childhood obesity, affect obesity-related health care costs? How might increased access to healthcare through jobs and higher family incomes affect workers and family health? What is farmworker/farm family/distributor/food prep worker access to health care coverage like currently? What is the incidence of food borne illness in Hawaii County? What is the incidence of injuries in a recent year related to the production/distribution/preparation of food? 	<ul style="list-style-type: none"> How would a decrease in childhood obesity affect the state's cost of providing health care? Would the nutritional impacts of the DOE purchasing/serving healthy food impact the long-term health of students and families? How would this policy affect the number of insured workers and dependents? 	<ul style="list-style-type: none"> Current health care insurance coverage rates for farm laborers/distributors/preparers and estimates of increases with the new jobs estimated in issue #4 analysis (above) 	<ul style="list-style-type: none"> Health care coverage statistics, State Insurance Commissioner CDC, Bureau of Labor Statistics

Policy: A General Commercial Expansion of FFVP Production

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
Food security	<ul style="list-style-type: none"> • Current retail price of staple FFV in Hilo and in Honolulu • Current retail price of eggs, dairy, & meat in Hilo & Honolulu • Per capita consumption (PCC) of staple FFVP • Proportion of imported staple FFVP • Other food security measures (CPS-FFS, USDA) • Farm gate value of locally produced staple FFVP sold • Proportion of food produced locally 	<ul style="list-style-type: none"> • What is the current retail price of staple FFVP? • What is the current PCC of staple FFVP? 	<ul style="list-style-type: none"> • How would commercial expansion in production change consumption of staple FFVP in Hawaii County? • How would the proportion of imported staple FFVP change as a result of commercial expansion in production in Hawaii County? 	<ul style="list-style-type: none"> • Define staple FFV and FFVP • Seek comparable commodities • Secure price data on FFVP in Hawaii County and in Metropolitan Honolulu • Analyze and make inferences on data collected that relates to food security in Hawaii County 	<ul style="list-style-type: none"> • Surveys at retail stores and/or advertisement search of FFVP at retail stores • Interviews with wholesalers, rendering plants, processors, and farmers • Hawaii Department of Business, Economic Development, and Tourism (DBEDT) • Hawaii Department of Agriculture (HDOA) • USDA-ERS; USDA-NASS

Policy: A General Commercial Expansion of FFVP Production

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
<p>Supply availability of locally grown FFVP</p>	<ul style="list-style-type: none"> Volume of locally produced staple FFVP sold 	<ul style="list-style-type: none"> What is the level of food supply in Hawaii County? 	<ul style="list-style-type: none"> Would an increase in supply of locally grown FFVP provide greater access to local consumers? 	<ul style="list-style-type: none"> Research, review and compile estimates on volume and farm gate value of staple FFVP produced by HDOA and USDA-NASS for Hawaii County 	<ul style="list-style-type: none"> HDOA/USDA-NASS
<p>Economic health:</p> <ul style="list-style-type: none"> Level of food self-sufficiency Expenditures on food County wide, economic impacts (sales, earnings, tax revenues, and jobs) 	<ul style="list-style-type: none"> Household expenditures on food County multiplier effects generated on sales, labor earnings, tax revenues, and new jobs created 	<ul style="list-style-type: none"> What are the levels of food self-sufficiency and household expenditures on food in Hawaii County? What is the county multiplier effect of increasing commercial FFVP production – in terms of sales, labor earnings, tax revenues, and new jobs created? 	<ul style="list-style-type: none"> What is the proportion of food grown locally and how much is spent annually by households in Hawaii County? How would commercial expansion change the proportion of food grown locally? What are the county wide impacts of increasing food self-sufficiency on economic health? 	<ul style="list-style-type: none"> Research, review, and compile estimates on food self-sufficiency in existing literature and household expenditures in Hawaii County Compute and derive county wide impacts arising from a switch in consumption from imported to locally grown and produced food in Hawaii County – in terms of sales, labor earnings, tax revenues, and new jobs created. 	<ul style="list-style-type: none"> Bureau of Labor Statistics (BLS) Consumer Expenditures Survey Statistics for Hawaii Agriculture – HDOA Hawaii Department of Business, Economic Development, and Tourism (DBEDT) Hawaii Food Bank: http://www.hawaiifoodbank.org/page4.aspx Food Research and Action Center (FRAC): http://frac.org/reports-and-resources/reports-2

Policy: A General Commercial Expansion of FFVP Production

Relevant Health Issues	Indicators	Existing Conditions & Data Needed	Questions for HIA	HIA Research Methods & Tasks	Sources of Data
Food safety	<ul style="list-style-type: none"> • Cases per 100,000 people/year of food borne illness • Count of FFVP producers and handlers in Hawaii County with food safety certification • Count of FFVP producers and handlers in Hawaii County with food safety certification for three consecutive years 	<ul style="list-style-type: none"> • What is the incidence of food borne illness in Hawaii County? • How many FFVP producers and handlers in Hawaii County are food safety certified? • What is the track record of FFVP producers and handlers with food safety in Hawaii County? 	<ul style="list-style-type: none"> • Would consuming locally produced food affect the incidence of food borne illness? • How would commercial expansion change the incidence of food borne illness in Hawaii County? 	<ul style="list-style-type: none"> • Current prevalence of food borne illness and how to estimate potential increase/decrease from increased use of FFVP in Hawaii County 	<ul style="list-style-type: none"> • Current prevalence of food borne illness and how to estimate potential increase/decrease from increased consumption of FFVP • UH-CTAHR (food safety coach) • HDOA (food safety certifiers)



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