

Executive Summary

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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A project of The Kohala Center in collaboration with Kaiser Permanente Center for Health Research, Hawai'i and the Hawai'i Department of Agriculture and funded by the Health Impact Project—a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts

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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.¹

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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 2006.² 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.³

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.⁴
- 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.⁵

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.⁶ 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).⁷ 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.⁸ Indirect costs, including lost income due to sickness and decreased productivity, add to the economic costs of obesity.⁹

While Hawai'i as a whole has one of the nation's lowest rates of obesity (57.2% of residents are overweight or obese¹⁰) 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.¹¹

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.¹² 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.¹³ 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.¹⁴

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;¹⁵ 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%.¹⁶

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%.¹⁷ 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.¹⁸

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.

The full report can be found here: <http://www.kohalacenter.org/research>.

Executive Summary Key References, Short Form

Complete reference information is available in the full report at: <http://www.kohalacenter.org/research>.

- (1) Page C, Bony L., Schewel L. Island of Hawai'i Whole System Project Phase I Report, 2007. Boulder, CO. Rocky Mountain Institute
http://www.kohalacenter.org/pdf/hi_wsp_2.pdf
- (2) USDA National Agricultural Statistics Service and Hawai'i Department of Agriculture: Statistics of Hawai'i Agriculture, 2008
http://www.nass.usda.gov/Statistics_by_State/Hawaii/Publications/Annual_Statistical_Bulletin/all2008.pdf
- (3) USDA National Agricultural Statistics Service: Hawai'i Annual Statistics Bulletin, 2009
http://www.nass.usda.gov/Statistics_by_State/Hawaii/Publications/Annual_Statistical_Bulletin/stat09-07.pdf
- (4) Hawai'i Homegrown Food Network: Farmers Markets, CSAs, and Community Gardens
<http://www.hawaiihomegrown.net/farmers-marketscsas>
- (5) Hawai'i Homegrown Food Network: Third Annual Local vs. Imported Supermarket Produce 2011
<http://www.hawaiihomegrown.net/reports/272-third-annual-local-vs-imported-supermarketproduce-2011->
- (6) Hawai'i Island School Garden Network and The Kohala Center: Characteristics of School Gardens on Hawai'i Island, 2011
<http://www.kohalacenter.org/HISGN/pdf/SGSurveyReportSummary.pdf>
- (7) USDA Economic Research Service: Supplemental Nutrition Assistance Program (SNAP) Data System
<http://www.ers.usda.gov/Data/SNAP/>
- (8) State of Hawai'i Dept. of Business, Economic Development and Tourism, 2007 State of Hawai'i Data Book
<http://hawaii.gov/dbedt/info/economic/databook/db2007/>. 2008. 9-24-2008.
- (9) Kaiser Foundation Health Plan of Hawai'i. Hawai'i Community Health Needs Assessment: Community Voices on Health. 1-42. 2010. Honolulu, HI, Kaiser Permanente.
- (10) Centers for Disease Control and Prevention: Behavioral Risk Factor Surveillance System: Prevalence and Trends Data for Overweight and Obesity, 2010
<http://apps.nccd.cdc.gov/brfss/list.asp?cat=OB&yr=2010&qkey=4409&state=HI>
- (11) State-level estimates of annual medical expenditures attributable to obesity. Obesity Research 2004;12:18-24
<http://www.ncbi.nlm.nih.gov/pubmed/14742838>
- (12) Centers for Disease Control and Prevention: Angiostrongyliasis
<http://www.dpd.cdc.gov/dpdx/HTML/Angiostrongyliasis.htm>
- (13) Centers for Disease Control and Prevention: Estimates of Foodborne Illness in the United States
<http://www.cdc.gov/foodborneburden/index.html>
- (14) Centers for Disease Control and Prevention OutbreakNet: Foodborne Outbreak Online Database
<http://wwwn.cdc.gov/foodborneoutbreaks/>
- (15) Exposure to nonpermanent employment and health: analysis of the associations with 12 health indicators. Journal of Occupational and Environmental Medicine June 2011.
<http://www.ncbi.nlm.nih.gov/pubmed/21654436>
- (16) USDA Economic Research Service: County-Level Unemployment and Median Income for the Hawai'i
<http://www.ers.usda.gov/data/unemployment/RDList2.asp?ST=HI>
- (17) U.S. Census Bureau State and County QuickFacts: Hawai'i County
<http://quickfacts.census.gov/qfd/states/15/15001.html>
- (18) Leung, P and Loke, M. Economic Impacts of Improving Hawaii's Food Self-Sufficiency. Economic Issues, University of Hawaii, Manoa; EI-16, 1-7. 2008



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