# Arizona Foodshed: Estimating Capacity to Meet Fresh Fruit and Vegetable Consumption Needs of the Arizona Population

by

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ABSTRACT

Fruit and vegetable (FV) consumption continues to lag far behind US Department of Agriculture (USDA) recommendations. Interventions targeting individuals' dietary behaviors address only a small fraction of dietary influences. Changing the food environment by increasing availability of and excitement for FV through local food production has shown promise as a method for enhancing intake. However, the extent to which local production is sufficient to meet recommended FV intakes, or actual intakes, of specific populations remains largely unconsidered. This study was the first of its kind to evaluate the capacity to support FV intake of Arizona's population with statewide production of FV. We created a model to evaluate what percentage of Dietary Guidelines for Americans (DGA) recommendations, as well as actual consumption, state-level FV production could meet in a given year. Intake and production figures were amended to include estimates of only fresh, non-tropical FV. Production was then estimated by month and season to illustrate fluctuations in availability of FV. Based on our algorithm, Arizona production met 184.5% of aggregate fresh vegetable recommendations, as well as 351.9% of estimated intakes of Arizonans, but met only 29.7% of recommended and 47.8% of estimated intake of fresh, non-tropical fruit. Much of the excess vegetable production can be attributed to the dark-green vegetable sub-group category, which could meet 3204.6% and 3160% of Arizonans' aggregated recommendations and estimated intakes, respectively. Only minimal seasonal variations in the total fruit and total vegetable categories were found, but production of the five vegetable sub-groups varied between the warm and cool seasons by 19-98%. For example, in the starchy vegetable group, cool season (October to March) production met only 3.6% of recommendations, but warm season (April to November) production supplied 196.5% of recommendations. Results indicate that Arizona agricultural production has the capacity to meet a large proportion of the population's FV needs throughout much of the year, while at the same time remaining a major producer of dark-green vegetables for out-of-state markets.

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# Chapter 1

# INTRODUCTION

In 2009, only 23.5% of the U.S. population and 24.1% of Arizonans met the 2005 USDA Dietary Guidelines for Americans recommendation for fruit and vegetable (FV) consumption (Grimm et al., 2010; Li et al., 2011) a disturbing statistic given that diets high in FV are associated with decreased risks of cardiovascular disease, stroke, and some cancers (He, 2007; He, et al., 2006; Rautianen et al., 2012; Hung et al., 2004; Riboli and Norat, 2003). Antioxidant components, like carotenoids, vitamins C and E, polyphenols, and flavonoids; fiber content; and generally high nutrient density of FV may together explain some of the reductions in chronic disease risk through synergistic processes (Jacobs et al., 2011). Antioxidants, for example, inhibit the formation of, and neutralize existing, harmful free radicals in the body (Chang et al., 2010). Fiber acts to lower cholesterol (Veldman et al.,1997; Haskell et al., 1992), decrease cardiovascular heart disease risk (Rimm et al., 1996), reduce colorectal (Murphy et al., 2012) and renal cell carcinoma cancers (Daniel et al. 2013), and improve markers of glycemic control in diabetics (Chandalia et al., 2000). Other nutrients, such as potassium, calcium, and magnesium may also play a role in lowering blood pressure (Joffers et al. 1987) and risk of stroke (Ascherio et al., 1998).

Given the variety of beneficial health outcomes associated with FV intake, researchers have sought improvements in FV intake through a variety of interventions. Among them are individual-centered school nutrition education programs (Howerton et al., 2007; te Velde et al., 2008) for children and teens, as well as a variety of health behavior change theory-based programs targeting adults (Thomson and Ravia, 2011;

Ammerman et al., 2002; Pomerleau et al., 2005). However, interventions focusing on behavior change primarily through influencing individual choice produce only limited (Thomas and Ravia, 2011) and short-lived (Chapman, 2010), as well as put the burden of change on the individual, possibly leading to victim-blaming (McLeroy et al., 1988). The socio-ecological model (SEM) includes factors that influence food choice, but moves beyond the individual to include interpersonal, institutional, community, and public policy factors (McLeroy et al., 1988). With this broadening of focus, researchers have begun evaluating approaches that introduce changes in the food environment in which people make food-purchasing decisions, with the hope that this strategy might facilitate more effective behavior change interventions in the future (Lucan and Mitra, 2011; Blitstein et al., 2012; Svasticalee et al., 2012; Whaley et al., 2012; Slusser et al., 2007; Backman et al., 2007; Robinson, 2008; Abusabha et al., 2011). The National Cancer Institute describes the food environment as including food stores, restaurants, schools, and worksites (National Cancer Institute, 2012). As such, interventions at the level of the food environment have the potential to reach broader swaths of the population.

Existing data already suggest that aspects of the food environment are associated with dietary outcomes, specifically FV consumption. In a study of the perceived food environments of Philadelphia neighborhoods, 33.8% of respondents reported poor supermarket access and 22.2% reported poor grocery quality (Lucan and Mitra, 2011). People who perceived their food environments negatively had lower FV intakes and higher fast food consumption than those who did not (Lucan and Mitra, 2011). A similar study in six low-income, primarily minority neighborhoods in Chicago found that individuals who strongly agreed or agreed that they had adequate and convenient access to a variety of reasonably priced FV were significantly more likely (OR=4.42 and 2.13, respectively) to consume three FV servings per day than those who were not happy with their shopping options (Blitstein et al., 2012). Children are also affected by their food environments. In a Danish cross-sectional study of health and health behaviors in 11-, 13-, and 15-year-old children, middle- and low-income students attending schools with a combined high fast food outlet and low supermarket exposure were most likely to report low fruit intake; low vegetable intake was reported most frequently among low-income children (Svasticalee et al., 2012).

Intervention studies focused on altering the food environments of both children and adults have also demonstrated impacts on dietary outcomes. Providing elementary school children from low-income households with a salad bar for lunch, for example, has been shown to increase FV consumption (Slusser et al., 2007). Likewise, Backman et al. (2007) found significant increases in both fruit and vegetable intake among low-wage employees following a 12-week trial, when enough fruit to provide one serving per workers was delivered to their worksite three times a week. Researchers in Troy and Albany, NY, evaluated the Veggie Mobile, a traveling vegetable truck selling produce to seniors in neighborhoods with limited produce availability at costs, on average, 48% lower than grocery stores (Abusahba et al., 2011). Seniors in this study showed a trend of increased FV consumption, but this increase was not statistically significant (Abusabha et al., 2011).

A more recent and trending strategy to improve healthy food access and food environments is the development and promotion of local foods programs and retail venues. Community gardens, farmers' markets, and community supported agriculture, among other programs, have been associated with increased FV consumption by improving the local food environment, as well as through cultivating positive attitudes towards FV (Alaimo et al., 2008; Ohri-Vachaspati and Warix, 1995; Evans et al., 2012; McCormack et al., 2010; Johnson et al., 2004; Harris et al., 2012; Izumi et al., 2010). Cross-sectional data from the National Cancer Institute's Food Attitudes and Behaviors (FAB) Survey conducted between October and December 2007 indicated that 27% of grocery shoppers utilized farm-to-consumer venues (e.g., farmers' markets, roadside stands, pick-your-own produce farms, or community-supported agriculture programs) at least weekly during summer months (Blanck et al., 2011). These sites have the potential to reach a growing number of Americans. The number of farmers' markets, for example, increased by 78% between 1994 and 2012 (Agriculture Marketing Service [AMS], 2012). Given the focus on the sale of whole, healthy foods, local food markets can augment the food environment of neighborhoods by offering fresh, quality foods direct to consumers, or perhaps through supplementing grocery stores' stocks with local produce (Blanck et al., 2011).

Local foods programs also have the potential to change attitudes in a variety of populations. In a review by McCormack et al. (2010), women enrolled in the Women, Infants, and Children (WIC) supplemental Farmers' Market Nutrition Program (FMNP) placed a higher value on FV and viewed FV preparation and price more favorably compared to non-FMNP participating WIC women. Individuals taking part in the Senior Farmers' Market Nutrition Program (SFMNP) had more positive attitudes towards FV preparation and had increased FV consumption compared to baseline data as well (McCormack et al., 2010). WIC FMNP and SFMNP participants perceived the quality of produce to be just as good as, or better than, that found at the grocery store (McCormack et al., 2010). Similarly, college students in Twin Cities, MN, who placed high importance on local, sustainable, and organic food production, consumed 1.3 more servings of FV combined, compared to those who placed low importance on these practices (Pelletier et al., 2013).

Despite the growing interest in local foods and associations with increased intake of FV, a generally accepted definition of the term ‘local’ does not exist. ‘Local’ may indicate a specific distance travelled from farm to table or in terms of markets, such as farmers’ markets, community supported agriculture (CSA) programs, and farm-to-school or farm-to-institution arrangements (Martinez et al., 2010). On a theoretical level, ‘local’ is often described in terms of foodsheds. Foodsheds define the flow of food into and out of an area and differ from conventional food systems in that they must have the following characteristics: they are embedded in a moral economy; are used to build a commensal community; employ the concepts of self-protection, secession, and succession; use nature as a measure; and lastly bring together producers and consumers within close proximity (Kloppenburg et al., 1996).

A number of researchers have developed models to evaluate the production capacity of various foodsheds (Desjardins et al., 2010; Colsanti and Hamm, 2010; Peters et al. (b), 2009; Morrison et al., 2010; and Giobolini et al., 2011). In these circumstances, however, ‘local’ is defined in more practical, spatial terms, delineated by political boundaries (Desjardins et al., 2010), regions, or miles from a specific location (Clancy and Ruhf, 2010). Recommended (Giobolini et al., 2011), or recommended and current (Colsanti and Hamm, 2010; Peters et al. (b), 2009; Desjardins et al., 2010), intakes of FV

(Colsanti and Hamm, 2010) or other food groups (GIobolini et al., 2011; Peters et al.(b), 2009; Morrison et al., 2010; Desjardins et al., 2010) of particular populations can be compared to the amount and type of food produced in the area (Morrision et al., 2010; Peters et al.(a), 2009; Desjardins et al., 2010; Gioboilini et al., 2011; Colsanti and Hamm, 2010). For example, Peters et al.(a), 2009, found that New York State could meet 34% of its population's total FV needs locally, while the agricultural production of Willamette Valley, Oregon, can supply 67% grain, 10% vegetable, 24% fruit, 59% dairy, 58% meat and beans, and none of the daily oil requirements for its citizens (Giobolini et al., 2011). If low biointensive farming techniques (i.e., those that limit external inputs of nutrients and water) are used to grow and store field crops without using season extension tools, 65% of fresh vegetables and 39% of non-tropical fruits consumed by Detroiters could be produced on half of the available vacant lots in the city, during the growing season (Colasanti and Hamm, 2011). Although such studies provide insight into localized agricultural capacity, the results of foodshed analyses are unique to the specific location studied and cannot be extrapolated to other areas. This is due to differences in local natural and human environments, as well as in spatial distances evaluated.

Meanwhile, the local food movement is gaining in popularity with the writings of Kingsolver et al., (2007), Smith and MacKinnon (2007), and Pollan (2006), without the benefit of understanding the viability of such systems in specific locations. In addition, estimates of production or potential production, like those made by Desjardin et al. (2010) that determined ~10% shift in a region's production of commodity crops to under-consumed foods like FV would be meaningful nutritionally and have limited agricultural impact, could influence food policy decisions. In light of very low FV intake levels

(Guenther et al., 2006; Lorson et al., 2009; Michels Blanck et al., 2008) and the related incidence and cost of chronic disease (He, 2007; He et al., 2006; Rautianen et al., 2012; Hung et al., 2004; Riboli and Norat, 2003), it is important to understand the extent to which local food production can contribute to the overall demand for FV of a community or region, a prerequisite for improving healthy food access, consumption, and health outcomes.

No such analyses have been conducted for the state of Arizona. We therefore developed a model to estimate fresh FV production capacity of the Arizona foodshed. Arizona includes geographically diverse production regions, with the most productive agricultural region lying in the desert lowlands ("Climate of Arizona," n.d.). Yuma county, for example, supplies the United States with 94% of its winter leaf vegetables ("Farming and Ranching," n.d.), but this production is limited by seasonality. Similarly, the amount and timing of production for other vegetables or fruits has not been estimated.

Thus, the primary objectives of this study are to determine the following:

1. What percentage of the fresh portion of recommended fruit and vegetable intake of Arizona's population can be met through the state's current agricultural production?

2. What percentage of the fresh portion of estimated fruit and vegetable intake by Arizona's population can be met through the state's current agricultural production?

To answer these questions, we developed an algorithm to estimate production and consumption of FV in Arizona. This analysis progressed in five broad steps: 1) calculating aggregated, yearly fresh FV recommendations for the Arizona population; 2) estimating total yearly fresh FV intake for the Arizona population; 3) estimating yearly fresh FV production in the state; 4) assessing fresh FV production by season; and 5) calculating the percentage of recommendations and estimated intake that could be met by production. Only fresh FV were considered in the model because the origins of processed products can be difficult to define and long shelf lives complicate determining the amount available at a given time. Tropical fruits were also excluded since they cannot be grown locally. Estimates of losses that occur from production to consumption were accounted for, so all FV data are compared at the consumption level. USDA does not provide FV recommendations for infants (0-2 years old), so these individuals were omitted from both the recommendations and estimated intakes for the Arizona population.

Chapter 2

REVIEW OF LITERATURE

## American Fruit and Vegetable Intake

Americans do not consume adequate amounts of fruits and vegetables (FV). The most current Centers for Disease Control and Prevention (CDC) data from 2009 showed that 32.5% of the U.S. population ate fruit at least twice a day and only 26.3% consumed vegetables at least three times a day (Grimm et al., 2010). The 2010 Dietary Guidelines for Americans are more personalized, taking into account age, gender, and physical activity level. Based on these factors, suggested intakes range from four to 13 servings of FV per day. USDA has also broken the vegetable group down into five subgroups: dark green, red/orange, beans and legumes, starchy, and other (U.S. Department of Agriculture [USDA] (b), 2010). Based on the new standards, and using National Health and Nutrition Examination Survey (NHANES) 1999-2000 24hr diet recall data, less than 11% of individuals in most sex-age groups met their FV needs (Guenther et al.,2006). A third or less of the population consumed adequate amounts of dark green, red/orange, or beans and legumes, while nearly 75% of individuals across sex-age groups consumed excess starchy vegetables, mostly white potatoes (Guenther et al.,2006).

These disappointing statistics do not seem likely to improve soon. NHANES 1999-2002 data on children two to 18 years old found that children's diets seem to deteriorate with age. Two- to five-year-olds were 2.7 times more likely to meet fruit recommendations and 1.5 times more likely to meet vegetable standards than six- to 11-year-olds. Adolescents were four times more likely to consume inadequate amounts of fruit and 2.5 times less likely to consume an adequate amount of vegetables when compared to two- to five-year-olds (Lorson et al., 2009). Michels Blanck et al. (2008), using the CDC Behavioral Risk Factor Surveillance System (BRFSS) data from 1994-2005, found that FV consumption in adults has remained fairly constant over recent years, with no statistical difference in intake between 1994 and 2005. In 1994, Americans consumed 3.43 servings per day on average, but that figure dropped slightly to 3.24 servings per day by 2005 (Michels Blanck et al., 2008). The small decline was due to a lower intake of fruit juice and non-fried potatoes (Michels Blanck et al., 2008).

**Fruit and Vegetable Consumption Associated with Decreased Chronic Disease Risk**

Poor FV intake among Americans of all ages is an important issue in relation to combating chronic diseases and related expenses. In fact, the CDC cites poor nutrition and limited numbers of individuals meeting FV recommendations as one of the four modifiable health risk behaviors linked to chronic disease (Centers for Disease Control and Prevention [CDC], 2012). Chronic disease causes the majority of death and disability in the United States. In 2005, eight out of 10 American deaths were from chronic diseases, with heart disease, cancer, and stroke accounting for greater than 50% of all deaths (CDC, 2012). Meanwhile, kidney failure, non-traumatic lower-extremity amputations, and blindness among adults, aged 20-74 years were most commonly caused by diabetes (CDC, 2012). A Milken Institute study (2007) conducted in 2003 found the cost of treatment for the seven most common chronic diseases (cancer, diabetes, hypertension, stroke, heart disease, pulmonary conditions, and mental disorders) to be

$277 billion for non-institutionalized individuals. Absenteeism, loss of productivity, and other indirect costs related to these diseases totaled $1.1 trillion (DeVol et al., 2007).

FV provide protection against common and costly chronic disease through multiple mechanisms. Specific components of FV; such as antioxidants, potassium, magnesium, calcium, and fiber; serve varying defensive functions against chronic diseases. These FV constituents, along with other bioactive elements and nutrients, may also work together to create a greater impact on health outcomes than any individual component, a concept known as food synergy (Jacobs et al., 2011). FV have been linked to decreased risk of cancer, coronary heart disease, stroke, and type 2 diabetes.

*Antioxidants:* Antioxidants can interrupt the oxidative process, preventing the endogenous formation of free radicals, as well as scavenging and neutralizing free radicals formed though metabolism or from environmental contaminants like ultraviolet rays (Chang et al., 2010). Free radicals can damage cells and even DNA. Unrepaired DNA can lead to replication errors and mutations that promote disease. Examples of antioxidants commonly found in FV include carotenoids, vitamins C and E, polyphenols, and flavonoids. Trace minerals required for the endogenous synthesis of antioxidative enzymes, like superoxide dismutase, are also found in FV (Chang et al., 2010). The resulting oxidative stress has been linked to insulin resistance, the metabolic syndrome (a set of risk factors for heart disease, stroke, and type 2 diabetes), and diabetes (Avignon et al., 2012).

*Potassium, magnesium, and calcium:* Research has shown that the minerals potassium, magnesium, and calcium (PMC) are linked to lowered stroke risk and blood pressure. Many of the foods highest in these nutrients are FV. Green leafy vegetables and beans contain high levels PMC; tomatoes are high in potassium and magnesium; and orange juice, raisins, date, and grapefruit are high in potassium (Agriculture Research Service (ARS), 2012). Potassium, calcium, and vegetables were significantly associated with a decreased risk of additional stroke in a study population of single stroke survivors for those in the upper quartile of intake compared to the lowest (Park, 2010). In this same study, however, fruit intake was not correlated to stoke risk (Park, 2010). The Ascherio et al. (1998) multivariate analysis of collected Health Professionals Follow-up Study data found that hypertensive men in the top quintile of dietary potassium consumption, as compared to the lowest quintile, had a significant reduction in stroke risk; similar results were found with magnesium, but not calcium. Potassium and magnesium supplements, conversely, were not associated with stroke risk (Ascherio et al., 1998).

PMC also affects blood pressure. Potassium is the most abundant intracellular ion, and is part of the sodium/potassium pump in cellular membranes that generate energy for the cell. The pump also produces an electrical charge that leads to a reduced movement of calcium into the smooth muscle cells. When this process occurs in vascular smooth muscles, it leads to relaxation and dilatation of the vessel. A wider vessel facilitates increased blood flow and decreased blood pressure. Low concentrations of potassium in the blood results in vasoconstriction and increased blood pressure (Haddy et al.,2005). Although the mechanisms are not entirely understood, magnesium may participate in vasodilation by inhibiting the movement of calcium into cells. Low magnesium levels may also cause an increase in extra-cellular calcium and vasoconstriction (Sontia and Touyz, 2007).

While calcium channel blockers lower blood pressure, so do calcium supplements. Calcium may lower blood pressure by modulating the relationship between sodium and potassium. Using NHANES data, Gruchow et al. (1988) derived estimated nutrient intakes from 24-hour diet recall interviews. When calcium intake was low (<400miligrams/day in men and <800milligrams/day in women), the ratio of sodium to potassium was significantly related to blood pressure, but at higher calcium intakes, there was no relationship (Gruchow et al.,1988). The main source of calcium in Western diet is dairy (Ganmaa et al., 2002), but there are FV sources and a greater percentage of the calcium from beans and most greens is absorbed than from dairy products (Keller et al., 2002).

Data from the prospective study of coronary heart disease and stroke, the Honolulu Heart Program, provides epidemiological evidence for the effect of PMC on blood pressure. Structured interviews and 24 hour recall were used to gather diet data, which were then analyzed for individual nutrient content and calculated and arranged into quartiles. Based on the difference between the highest and lowest quartiles of consumption, magnesium was significantly associated with both systolic and diastolic blood pressure (Joffers et al., 1987). Dietary calcium was also correlated with both systolic and diastolic blood pressure, as was potassium (Joffers et al.,1987)

*Fiber:* Fiber has been associated with a decreased risk of cardiovascular disease (CVD), certain cancers, and diabetes. Epidemiological evidence supports the link between dietary sources of fiber, including that from FV, and a reduced risk of CVD. Using data collected in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention (ATBC) study in Finland, researchers evaluated the correlation between dietary fiber and the risk of stroke in male smokers 50 to 69 years of age. Participants were separated into quintiles of fiber consumption. Those in the highest quintile had a significantly lower risk stroke than those in the lowest fiber consuming quintile (Larsson et al., 2009). Rimm et al. (1996) examined the relationship between fiber and coronary heart disease based on data collected from the Health Professionals Follow-up Study of 51529 male health professionals 40 to 75 years of age. Fiber was analyzed based on source, with total fiber, fruit fiber, vegetable fiber, and grain fiber tested separately. Vegetable fiber, but not fruit fiber was significantly correlated with a decreased risk of myocardial infarction (Rimm et al., 1996).

A clinical study by researchers in Germany examined the effects of fiber on cholesterol levels and fibrinogen in relation to mechanisms for the nutrient's risk reduction properties. Twenty hyperlipidemic, but otherwise normal weight and healthy men 25 to 60 years old were randomly assigned to the control group or the pectin, a soluble fiber found in citrus, apples, and other fruits, supplement group. After four weeks of consuming a 15 gram pectin supplement, significant positive changes were seen in total cholesterol, LDL-cholesterol, and HDL-cholesterol (Veldman et al., 1997). Fibrinogen is a pre-cursor to fibrin, important in blood clotting, and elevated levels have been linked to increased risk of atherosclerosis, cardiovascular heart disease and stroke. Participants consuming the pectin experienced significant changes in fibrinogen conversion to fibrin, as well as in a shift in fibrin networks believed to be less atherosclerotic (Veldman et al., 1997). A previous study conducted by Haskell et al. (1992) had also established a link between water-soluble dietary fibers (pectin, psyllium husks, guar gum, and locust bean gum) and cholesterol levels through an eight-week cross-over randomized control trial of men and women with hypercholerolemia. Fifteen grams of fiber supplement a day for four week led to significant reductions from baseline for total cholesterol and LDL-cholesterol (Haskell et al., 1992).

Dietary fiber has also been shown to improve metabolic markers in people with diabetes. Data gathered from the European Prospective Investigation into Cancer and Nutrition, an on-going prospective cohort study with 521,448 participants (of which roughly 70% are women), were analyzed for a connection between fiber from cereals, fruits, and vegetables, and colorectal cancers. Based on information from a diet and lifestyle questionnaire and a computer-based 24-hour diet recall, participants were organized into quintiles of fiber consumption. When comparing the highest and lowest quintiles, total fiber showed a significant reduction in colorectal cancer risk (HR 0.76) (Murphy et al., 2012). When fiber was separated into cereals and FV, those from the highest quintile of FV fiber intake had a significant reduction in total colorectal cancer s and colon cancer alone, but not rectal cancer (Murphy et al., 2012).

Similarly, the National Institutes of Health and the American Association of Retired Persons prospective study of people aged 50 to 71 years compared dietary fiber intake with renal cell carcinoma. Based on a food frequency questionnaire, participants were split into quintiles of fiber intake. Participants in the highest vs. lowest quintiles for total fiber intake and fiber from legumes had a 15–20% lower risk of renal cell carcinoma (Daniel et al., 2013). Total fruit and vegetable intake of fiber did not affect risk, but there were significant reductions when cruciferous vegetables and whole citrus fruit were considered separately (Daniel et al., 2013).

Dietary fiber has also been shown to improve metabolic markers in people with diabetes. Chandalia et al. (2000) tested the standard American Diabetes Association diet, composed of eight grams soluble fiber and 16 grams insoluble fiber to a high fiber diet of 25 grams soluble fiber and 25 grams insoluble fiber. All meals were provided for the 12-week cross-over trial. Sources of soluble fiber were mostly FV, such as cantaloupe, citrus, zucchini, okra, and sweet potatoes. After the six-week high fiber diet, patients had lower mean plasma glucose concentration, mean daily urinary glucose excretion, and plasma insulin, as well as lower fasting plasma total cholesterol concentration, plasma triglyceride concentration, and a lower plasma VLDL cholesterol concentration (Chandalia et al., 2000). The high-fiber diet also limited the amount of cholesterol absorbed during digestion (Chandalia et al., 20000).

*Food synergy:* The protective benefits of FV against chronic disease may be attributed to food synergy, a process comprising multiple beneficial effects of a variety of components of FV. Food synergy assumes that the combination of nutrients and bioactive components in whole foods work together to influence health outcomes. Isolated nutrients are important in treating nutrient deficiency, but often cannot explain the full impact of foods or account for the effects of some supplements (Jacobs et al., 2011). Studies from Roswall et al. (2010) and Al Solaiman et al. (2010) compared whole diets to supplements in prevention of chronic disease. Roswall et al. (2010) used data from the Diet, Cancer and Health prospective study (1993 to 1997) of 57,053 Danes 50–64 years old to study the effects of diet and supplements on lung cancer risk. Based on data from a food frequency questionnaire that included questions on supplements, researchers found that dietary vitamin E, but not supplemental vitamin E, provided a significant protective effect against lung cancer (incidence rate ratio=0.55). By contrast, risk of lung cancer was significantly higher when respondents took supplemental beta-carotene (incidence rate ratio=1.64) (Roswall et al., 2010).

Similarly, a cross-over trial was conducted comparing the effects of the Dietary Approaches to Stop Hypertension (DASH) diet and a usual diet supplemented with the same amount of potassium, magnesium, and fiber on blood pressure in 15 obese hypertensives and 15 normal weight normotensives. Participants were asked to follow a usual low fruit and vegetable diet for three weeks, then were randomized to either the usual diet with supplement or DASH diet for three weeks, and finally switched treatment diets for an additional three weeks. Blood pressure did not significantly change across diets in the normal weight normotensive group, but was significantly decreased in the overweight hypertensive group following the three-week DASH diet as compared to the usual diet and the usual diet plus supplement (Al Solaiman et al., 2010). Researchers indicated the possibility that the potassium, magnesium, and fiber found in the high amount of FV in the DASH diet may be interacting with other components in FV to produce a greater effect than the nutrients alone (Al-Solaiman et al., 2010).

*Cancer:* No matter what the mechanism, however, there is evidence to support a relationship between FV intake and cancer, stroke, heart disease, and diabetes, as discussed below. Cancer is a collection of disorders caused by the abnormal and uncontrolled division of cells, with different etiologies. FV intake was associated with a decrease in risk of developing certain cancers, according to a Riboli and Norat (2003) meta-analysis of case control and cohort studies. The effect of increases of 100 grams per day of fruit or vegetables was evaluated in relation to various types of cancer and yielded disparate results. For instance, a 100-gram-per-day increase of fruit and vegetables was correlated with a decreased risk of esophageal cancer and gastric cancer, but only fruit was associated with a decreased risk of bladder cancer (Riboli and Norat, 2003). The cohort studies included in the analysis showed weaker associations between different cancers and FV intake than the case control studies illustrated. The prospective cohort studies may not be as strong due to only minor differences in intakes between individuals in the cohorts, imprecise measures of diet used, and accidental misclassification of individuals as not having cancer when they actually did. Case control studies may overestimate association due to potentially unreliable diet recall and participant selection bias (Riboli and Norat, 2003).

The Riboli and Norat (2003) meta-analysis did not include ovarian cancers, but there does appear to be a significant link between FV intake and the prognosis of women with the disorder. A four-year follow-up longitudinal study of women diagnosed with ovarian cancer found that women with pre-diagnosis diets rich in fruits and vegetables had significantly higher survival rates, while those consuming diets rich in red and processed/cured meats and dairy had more than double the hazard ratio for death (Dolesek et al., 2010).

*Coronary Heart Disease (CHD) and Stroke:* FV intake also has been shown to provide a reduction in relative risk (RR) for patients with CHD and stroke. He et al. (2007) completed a meta-analysis of 12 prospective studies describing 13 cohorts comparing CHD RR with FV intake levels. FV intake was standardized into three groups: those who consumed <three servings per day, three to five serving per day, or more than five servings per day. Researchers found a dose response to FV intake. Individuals who

consumed three to five servings of FV a day had a 7% decrease in RR of CHD, and those eating more than five serving of FV a day had ~17% decrease in RR compared to the group that had fewer than three servings a day (He, 2007). Another meta-analysis of eight studies on nine cohorts linking FV consumption and stroke by He et al. (2006) similarly showed a dose response effect. There was an 11% drop in RR for stroke between those who consumed three to five servings of FV a day and those who ate fewer than three servings a day. Those who ate more than five servings of FV a day had a 26% lower RR than the three-servings-per-day group (He, et al., 2006). Combining stroke and CHD into cardiovascular disease (CVD) generally, Nurses' Health Study and Health Professionals Follow-Up Study data showed a 28% drop in RR for CVD in participants consuming more than five servings a day of FV compared to those consuming <1.5 servings per day (Hung et al., 2004). Just one serving of leafy green vegetables resulted in an 11% decrease in CVD RR (Hung et al., 2004).

*Type 2 Diabetes:* Consumption of fruits, vegetables, or FV combined had no impact on the incidence of type 2 diabetes, according to the Carter et al. (2010) meta-analysis. Green leafy vegetables, however, may be effective, as some data have shown that an increase of 1.15 servings a day was associated with a 14% decrease in incidence of type 2 diabetes (Carter et al., 2010). Similarly, the Cooper et al. (2012) meta-analysis comparing the highest and lowest categories for FV intake did not find a statistically significant relationship between risk of type 2 diabetes and fruits or vegetables separately, with only a minimal effect of combined FV intake (RR=0.93) and a significant inverse relationship with green leafy vegetables (RR=0.84) (Cooper et al., 2012).

**Factors Associated with Fruit and Vegetable Intake**

In light of the multiple potential health benefits, as well as the high cost of treatment of chronic diseases, efforts should be made to improve FV intake. As such, the possible causes of low intake must be considered. The perceived benefits and barriers to FV intake were analyzed in a qualitative study of Canadian women 20-49 years of age (Maclellan et al., 2004). Barriers included: lack of knowledge about a variety of FV and how to prepare them, lack of familiarity with recommendations and serving sizes, excessive effort required to prepare FV, disinterest among family members about FV consumption, lack of or negative childhood experience with FV, lack of availability due to seasonality, limited offerings in restaurants, and cost (Maclellan et al., 2004). The following factors increased consumption: making FV part of a routine diet, mood, guilt, knowing certain foods "should" be eaten, being pregnant or having children, being diagnosed with a health condition, and moving away from home (Maclellan et al., 2004).

Individuals' reasoning behind food choices may be influenced by demographic factors and be indicative of FV intake levels. Differences in many of these factors occur between demographic groups but, in general, when choosing what to eat people value taste the most, followed by, in descending importance, cost, nutrition, convenience, and weight control (Glanz et al., 1998). Cost and convenience were more important to younger people with lower incomes. Nutrition and weight control were more important to older women. Older people living "healthy" lifestyles (e.g., good diet, adequate exercise, moderate alcohol, and no smoking) consumed the most FV. Younger people, African Americans, and low-income individuals ate the most fast food. Those who most valued convenience ate fewer FV and more fast food (Glanz et al., 1998). Socio-economic status

(SES) can also affect FV intake. For every one standard deviation above the reference value in SES, FV intake was increased by 0.24 servings per day (Dubowitz et al., 2008)**.** Even after controlling for SES**,** negative perceptions of the food environment, including supermarket accessibility and poor grocery quality, were correlated with lower FV intake and more fast food consumption (Lucan and Mitra, 2012)

Since children do not regularly purchase food, the factors driving their consumption are different from those of adults. For children, home and school environments strongly influence their level of FV intake. In children six to 11 years of age, parental intake and modeling were most strongly associated with increased FV and fruit juice consumption, while home availability, family rules, and parental encouragement were also important (Pearson et al., 2009). For adolescents 12 to 18 years of age, parental intake was also linked to FV intake, as well as parental occupation status and parents' education (Pearson et al., 2009). In review of school-based nutrition education programs by Howerton et al. (2007), researchers found increases FV intake of 15-36%. Youth's likelihood to identify, taste, and enjoy the flavor of vegetables, especially when a garden component is included were also improved through school nutrition education (Morgan et al., 2010). Total vegetable consumption has also been correlated to a child's predilection for commonly eaten vegetables. Because children have an innate taste preference for sweetness, improving fruit intakes has been shown to be easier (Blanchette and Brug, 2005). Based on data from Pro Children interventions in the Netherlands, Spain, and Norway, free or subscription fruit and vegetables provided as snacks or as part of the school meal have shown promise. Newsletters and computer programs targeting parents and encouraging positive role modeling and providing nutrition information were also found to be effective (te Velde et al., 2008).

## Creating Healthy Food Environments

Traditionally, interventions designed to increase FV intake have targeted individual behavior change. Several studies evaluated the effectiveness of theory-based individual behavior change intervention trials and programs in adults to improve FV intake. A systematic review by Thomson and Ravia (2011) of interventions based on a variety of behavior change theories in healthy adults showed that such interventions result in an average increase in FV of 1.1 servings per day, while Ammerman et al. (2002) found only a 0.6 servings per day improvement in FV intake. In another review of behavioral interventions, researchers found an average of 1.1 and 0.39 servings-per-day improvement in FV consumption for healthy adults and children, respectively (Thomson and Ravia, 2011), while another review showed increases across studies of 0.13-0.7 servings per day (Pomerleau et al., 2005). Programs targeting individuals with health conditions had the greatest improvements; with a review of individuals with pre-existing conditions finding increases of 0.27-4.9 servings per day (Pomerleau et al., 2005), and the Ornish program for CVD patients has produced a 24.1% increase in FV intake (Ammerman et al., 2002).

Behavioral interventions, however, have their critics. It is difficult to motivate people to begin changing unhealthy behaviors, like a diet low in FV, even when they plan to do so. Effective clinical interventions often may not translate well into real-life situations or continue to be successful when scaled-up to reach more individuals.

Maintenance in the long-term is even more challenging (National Institutes of Health [NIH], 2013). In a review by Chapman (2010), all but one intervention resulted in statistically significant increases in FV intake for the treatment vs. control group. The improvements in FV intake, however, were maintained for a year, but progressively decreased thereafter (Chapman, 2010).

Even in effective interventions, the results tend to be fairly modest. In the previously mentioned Thomas and Ravia (2008) review, researchers found that while the change in FV intake was, in most studies, statistically significant compared to baseline or the control group, it was still not enough to reach recommended levels of intake. For adults, FV intake ranged between 0.29 servings/day to 2.74 servings/day, so the 1.13 servings/day average increase in intake could not bring FV consumption rates up to the average five FV servings per day recommended (Thomas and Ravia, 2008).

In response to the relatively short-lived and modest results of individual focused interventions, some researchers have chosen to concentrate on the many underlying social and environmental factor influencing health behavior choices. For example, McLeroy et al. (1988) proposed a socio-ecological model (SEM) that includes an intrapersonal level focused on individual behaviors, but also interpersonal, institutional, community, and public policy layers to capture social and environmental influences.

Changing the food environment, using means available at all levels of the SEM, may be an effective alternative or supplement to individual behavior change education and counseling to generate more sustainable results. Utilizing pre-collected data from the 2004 Southeastern Pennsylvania Household Health Survey, perception of food environments in Philadelphia neighborhoods was analyzed (Lucan and Mitra, 2011).

Individual-level data were aggregated at the level of census tracts. Of all survey respondents, 33.8% reported poor supermarket access and 22.2% described having poor grocery quality. Perceived poor supermarket accessibility, poor grocery quality, and poor produce availability were all significantly associated with both low FV consumption and high fast food intake (Lucan and Mitra, 2011). A similar study in Chicago, IL, used data collected from the 5-4-3-2-1-Go! Campaign, a program designed to change parental behaviors in low-income neighborhoods to combat childhood obesity. Satisfaction with food environments was based on convenience, quality, and selection. Researchers found that participants who did not feel they had adequate and convenient access to a variety of reasonably priced quality foods, compared to those who agreed or strongly agreed that they had convenient access, were 2.13 times and 4.42 times less likely to eat three FV servings per day, respectively (Blitstein et al., 2012).

It is not only adults, but also children's diets that can be impacted by their food environments. A Danish study used data collected from Danish students who participated in the international Health Behavior in School-aged Children study (HBSC) of health and health behaviors in 11-, 13-, and 15-year-old children. Researchers mapped supermarkets and fast food restaurants within a 300-meter radius of schools and compared those data to food frequency data from the HBSC. Students from low- to middle-income households were more likely to report low fruit intake if they attended schools with both a high concentration of nearby fast food outlets and low supermarket exposure. Low-income children who attended schools surrounded by a low supermarket and high fast food restaurant density reported low vegetable intake most frequently (Svasticalee et al., 2012).

The public policy, institutional, and community components of the SEM model can address food environment issues such as these, but they can also go beyond food outlet density. Interventions designed to affect change at each level have been undertaken. An example of a public policy initiative to increase FV intake is the recent set of changes to the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). WIC food packages now include cash value vouchers (CVV) for FV that are worth six dollars for children and $10 for women and can be used to purchase fresh, canned, or frozen fruits and vegetables (Whaley et al., 2012). A survey of a random sample of California WIC participants, after adjusting for the socio-demographic variables, found a significant increase in the percentage of families that reported eating more vegetables compared to six months prior to the WIC food package changes, but there was no significant change in the proportion of families eating more fruit (Whaley et al., 2012). The other measure of FV consumption used (mean frequency of intake) yielded the opposite results, with fruit intake rising significantly while vegetable intake did not. In both cases, however, there was a trend toward higher total FV intake (Whaley et al., 2012).

At the institutional level, providing elementary school children from low-income households with a salad bar for lunch has been shown to increase FV consumption. Second to 5th graders at three Los Angeles Unified School District schools were given 24-hour food recall questionnaires in 1998 before salad bars were introduced and again in 2000 after they had been put in place. After the salad bars were installed, frequency of FV intake was significantly increased (2.97 to 4.09), with 84% of the rise due to higher lunch FV intake (Slusser et al., 2007).

The workplace is also an institution that can be utilized to improve FV intake. Backman et al. (2007) conducted an intervention in six low-wage apparel manufacturing and food processing worksites and three control worksites in Los Angeles. Enough fruit was delivered to each intervention worksite for each worker to receive one serving three times a week for 12 weeks. Participants were asked to fill out validated questionnaires with a 30-day recall period at baseline, and again at four, eight, and 12 weeks that covered FV intake and shopping habits, as well as other criteria like workplace satisfaction. Even though the intervention only included fruit, significant increases in total FV intake were noted (Backman et al., 2007).

At the community level, studies have been conducted to assess the impact of grocery store density on FV intake, in addition to the impacts of alternative shopping venues, like mobile markets. Robinson (2008) reviewed articles on FV consumption in low-income African Americans. Women with access to supermarkets ate more FV than those with only access to independently owned stores. According to a focus group, local stores may not have specific products and produce, so the women would have to travel across town, usually to the suburbs, to purchase these items. With a limited income, travel can be prohibitive (Robinson, 2008). In Troy and Albany, NY, researchers evaluated the ‘Veggie Mobile.’ The Veggie Mobile is a traveling vegetable truck that sells produce to seniors in neighborhoods with limited produce availability at costs, on average, 48% lower than grocery stores. Participating seniors showed a trend of increased FV consumption, but only the change in vegetable intake was significant (Abusabha et al., 2011).

**Local Food Movement**

Another possible method of improving access to FV may be the emerging local food movement. There is no universally accepted definition of 'local,' but the U.S. Congress in the 2008 Food, Conservation, and Energy Act defined a product as 'local' if it travelled less than 400 miles from origin to consumer. Often, 'local' is seen in terms of markets, such as farmers' markets, community supported agriculture (CSA) programs, and farm-to-school or farm-to-institution arrangements (Martinez et al., 2010). Cross-sectional data from the 2007 National Cancer Institute's Food Attitudes and Behaviors (FAB) Survey indicated that 27% of American grocery shoppers utilized farm-to-consumer venues (e.g., farmers' markets, roadside stands, pick-your-own produce farms, or community-supported agriculture programs) in the summer at least weekly (Blanck et al., 2011). These sites have the potential to reach a growing number of Americans with the number of farmers' markets, for example, increasing by 78% between 1994 and 2012 (AMS, 2012). Likewise, community gardens are local sources of food and increasing in popularity around the country. In 2008, one million American households participated in community gardens and an estimated five million households were extremely or very interested in having a garden started near their homes, according to the National Gardening Association (Todd, 2009).

Local food is also a small but growing percentage of the food market. Direct-to-consumer market sales rose from $551 million in 1997 to $1.2 billion in 2007, accounting for 0.8% of agricultural sales (Nile and Zepeda, 2011). Organic agriculture, another related alternative to conventional farming, was once trivialized (Starr, 2010), but in 2009, consumers spent nearly $25 billion on organic food, 4% of total U.S. retail food sales. Supermarkets sold more organic products than natural food stores in 2006, indicating their emergence as a mainstream product (Nile and Zepeda, 2011).

Whether and how often an individual utilizes local foods, the system is generally viewed favorably with similar motivating factors and barriers listed across studies. Several studies evaluated opinions of local food among the general population and local food shoppers. National data gathered from the Food Marketing Institute (FMI) found that the majority of respondents cited freshness (82%), support for the local economy (75%), and knowing the source of the product (58%) as motivating factors in purchasing local food from direct markets or grocery stores ("U.S. Grocery Shopper Trends," 2009). The most recent FMI report indicated that 48% of participants looked for local food when shopping ("U.S. Grocery Shopper Trends," 2012). Focus groups conducted in the U.K found low rates of purchasing, but pervasive enthusiasm for local foods across socioeconomic levels. Similar to the results from the FMI, the participants viewed local foods as fresher and tastier than conventionally grown products and cited a need and effort to support local farmers (Chambers et al., 2007). Researchers in New England conducted focus groups and individual interviews on local food as well. Freshness and taste were again mentioned, but also distrust of industrial farming and an impression of increased food safety with limited to no middlemen (Berlin et al., 2009). Seyfang (2008) conducted semi-structured interviews and distributed surveys to customers of Eostre, a British organic producer cooperative that supplies a CSA, farmers' markets, and food service for local schools and a hospital. Nearly all respondents (94%) felt that food from Eostre was "better for the environment" in general, in particular because of their efforts at "cutting packaging waste" and "reducing food miles" (Seyfang, 2008).

Despite these positive opinions and a general feeling that shopping for local food would be a worthwhile and enjoyable experience, several barriers have been identified. Chambers et al. (2007) conducted four focus groups, two with low socio-economic status (SES) individuals and two with participants reporting higher SES. Most individuals across groups thought local foods were more expensive than those in supermarkets. Participants also felt that regularly shopping at local food outlets would be inconvenient due to lack of time and opportunity (Chambers et al., 2007). Eostre farmers' market customers felt the major drawback to purchasing 'local' compared to buying foods at supermarkets was convenience and accessibility (56%), followed by higher prices (26%) and surprisingly, poorer quality of produce (20%). The Eostre CSA customers cited limited choice and inability to select produce as the greatest disadvantage to supermarket shopping (50%), as well as price (20%) (Seyfang, 2008).

Within the local food movement, there is a slowly evolving shift in beliefs and values around food and an expanding inclusivity, mainly by addressing issues with price (Starr, 2010). Local food has been criticized as an elitist endeavor that perpetuates inequalities (Blake et al., 2010; Hinrichs, 2000)**.** Consumers who are wealthier are more likely to cook with raw ingredients and be aware of and willing to purchase local food (Blake et al., 2010). Farmers' markets and CSAs are sometimes focused on as the specific niche of "exclusive products and exclusive customers" (Hinrichs, 2000). Farmers may choose to charge a premium for their products, because people will pay for it with the value-added effect of a direct relationship, thereby becoming too expensive for lower income shoppers (Blake et al., 2010**;** Hinrichs, 2000)

Elitism in local food, however, is only part of the story. In New York City, ‘Greenmarkets,’ the largest network of urban farmers’ markets in the country, locate in some higher-income neighborhoods to offer specialty products, but they also provide a much-needed source of fresh produce for neighborhoods lacking access (Severson, 2006)**.** Low-income communities are also creating community gardens and farm-related youth education projects (Starr, 2010)**.** Other organizations, such as the Food Trust, work within low-income communities to establish farmers’ markets and healthy corner stores to increase the amount of fresh, healthy, and affordable food to small, neighborhood stores (Starr, 2010). The movement has reached the point where the U.S. government has gotten involved, with the 2008 Farm Bill diverting more money away from corporate agriculture to farmland protection, conservation, and local food systems research (Starr, 2010).

**Local Foods to Improve Fruit and Vegetable Consumption**

With growing popularity, market share, and inclusivity, local food systems may be a viable option for providing or supplementing access to and intake of fresh FV. At the most fundamental level, local food could be the production of one’s own produce. Likewise, Alaimo et al. (2008) found community gardeners in Flint, MI, consumed FV 1.4 times more per day than non-gardeners and were 3.5 times as likely to eat FV at least five times a day. Cleveland urban gardeners consumed 7.5 servings of FV in the fall and 6.3 servings in the spring of 1995 (Ohri-Vachaspati and Warix, 1995), indicating both an increase in intake and a residual effect after the growing season. Litt et al. (2011) suggested the impact of community gardening on diet was due to the creation of connections between gardeners, their physical and social environment, and food production.

As previously mentioned, 'local' often refers to direct markets. Literature on farmers' markets and FV intake seems mostly focused food deserts. Food deserts are urban neighborhoods or rural areas with limited access to healthy, fresh, and affordable food. Lack of access to healthy foods, like FV, contributes to lower diet quality (AMS, 2013; Lucan and Mitra, 2012). In Austin, TX, a longitudinal pilot study was conducted to measure the impact of the introduction of two farm stands in low-income neighborhoods without adequate grocery store access. Within the two neighborhoods, 92 individuals were recruited for the study and completed *the Farmers' Market Questionnaire*, in either English or Spanish, which included FV intake questions based on the National Cancer Institute seven-item screener food frequency questionnaire. The stands were open for two to three hours, one day a week for 12 weeks. Statistically significant improvements in fruit, fruit juice, green salad, tomatoes or salsa, and other vegetables (excluding potatoes) were found among participants according to post-test surveys (Evans et al., 2012).

McCormack et al. (2010) reviewed farmers' market studies that reported nutrition-related outcomes. Participants enrolled in both the WIC program and associated FMNP that provides coupons for fresh produce placed a higher value on FV and viewed FV preparation and price more favorably compared to non-FMNP women. Individuals taking part in SFMNP also had more positive attitudes towards FV preparation and had increased FV consumption compared to baseline data. WIC FMNP and SFMNP participants perceived the quality of produce to be just as good as, or better than, that at the grocery store. Also, these individuals reported planning on returning to the farmers' market after their coupons were gone and many made purchases in excess of coupon value with their own money (McCormack et al., 2010). In a Michigan WIC FMNP intervention study (Anderson et al., 2001) and a WIC FMNP Ohio cross-sectional study (Kropf et al., 2007), participants increased their FV intake significantly compared to only those enrolled in WIC. A Seattle, WA, pilot program delivering SFMNP baskets to homebound seniors showed increased FV intakes by 1.04 servings per day, addressing the issue of difficulty in transportation for redeeming SFMNP coupons (Johnson et al., 2004).

The City Fresh program in Cleveland, OH provides “Fresh Stops” in low income neighborhoods to improve access to FV. Fresh Stops are run partly as Farmers’ Markets and partly as CSAs (Ohri-Vachaspati et al., 2009). In CSAs, typically customers purchase a share of a farmer’s harvest for a season in advance. Every week or month, the customer gets a box or bag of fresh, local produce (Wilkinson, 2001). Customers pay for a Fresh Stop shares in advance, weekly or seasonally, at either a regular or reduced price if they live at ≤185% of the poverty line. Unlike traditional CAs, however, customers can choose their own produce instead of receiving a pre-designated box or bag of FV. Recipes, food samples, and nutritional information are also offered on a ‘learning table’. Based on pre- and post- survey data, low-income individuals experienced a statically significant increase in consumption of FV a snacks, eating more than one type of V/day, and ingesting at least five servings FV/day. While not statically significant, there was a trend in increased affordability of FV (Ohri-Vachaspati et al., 2009).

Farm-to-Institution (FTI) programs can also be utilized to align an organization’s food service operation with its health and sustainability ideals. FTI programs bring together farmers and members of institutional communities, like worksites, schools, colleges, hospitals, museums, and faith-based organizations. Often, locally produced farm products are incorporated into the cafeteria menu. Cooking classes, cafeteria promotional materials, field trips to farms, and taste tests can be utilized as means of accentuating local foods' freshness and quality as means of increasing FV intake. Institutions can also host farmers' markets to increase convenience of purchasing local foods, as well as reducing the cost of operating the markets by providing space at minimal prices or for free (Harris et al., 2012).

In 2013, the USDA will be distributing the first farm-to-school grants worth a total of $4.5 million to bring together farmers and school food service, impacting children in 37 states and the District of Columbia (Food and Nutrition Service, 2012). Anecdotal evidence has indicated students will eat more FV when they were sourced directly from farmers, presumably due to flavor, encouragement from staff excited about local food, and direct interactions with growers (Izumi et al., 2010). Michigan school food service directors were found to have some concerns about local food, namely cost, reliability, and seasonality of FV, and lack of local producers from whom to purchase. If price and quality were competitive with current suppliers, however, 83% were interested in buying directly from local farmers (Izumi et al., 2006)

**Defining and Describing Foodsheds**

One way to spatially define a local food system is through foodsheds. Permaculturalist Arthur Getz used the term foodshed as analogous to a watershed, in terms of conceptualizing the flow of food into and out of an area as a means of understanding the system (Kloppenburg et al., 1996). Kloppenburg et al. (1996) described five fundamental principles implicit in foodsheds: they are embedded in a local economy; are a part of a commensal community; are self-protectionist, secessionist, and successionist; use nature as a measure; and put producers and consumers into close proximity.

Foodsheds are embedded in a moral economy focused on food as central to life, a concept around which relationships can be established (Kloppenburg et al., 1996). Farmers' markets are perfect examples of how market relationships work within the moral economy. The farmer is able to earn a greater proportion of the income generated by his or her crops, gain greater control over what is produced, and enjoy visiting with customers and the value-added price that goes along with it. Consumers get high-quality, fresh produce at a reasonable price, and they establish ties with the producers. If either feels they are not getting enough value for their efforts or money, they will no longer participate in the system (Hinrichs, 2000)

Another foodshed principle is building a commensal community. Commensal communities involve the establishment of social ties beyond the market among producers and consumers, and between producers and consumers. Kloppenburg et al. (1996) cites small-scale cooperatives, CSAs, and community gardens as examples.

Foodsheds should employ the concepts of self-protection, secession, and succession, as well. Self-protection refers to a refusal to simply submit to the globalized, industrial food system (Kloppenburg et al., 1996). The La Via Campesina movement of farmers to gain "food sovereignty" and "the right to feed oneself" is one example of the concept (Starr, 2010), as are the Amish, home gardeners, seed savers, and food co-op members (Kloppenburg et al., 1996). Secession is removal of oneself from the global system and creating an alternative. Succession is the transfer of resources and commitments from the old system to the new, local one. Secession and succession should be based around small and mid-size farms or operations, since economies of scale have led to a low-value commodities market with high-profit processor middlemen (Kloppenburg et al., 1996)

Proximity is the fourth principle. Foodshed boundaries will likely be fluid and shift to enable the community to be more self-reliant, or reduce dependence on external trade. Close proximity of producers and consumers would make the stewardship of the land, energy efficiency, and social welfare a collective responsibility of more immediate and practical concern (Kloppenburg et al., 1996)

The last foodshed principle is “nature as measure.” Nature should be appreciated for its limits and opportunities, with diets shifting seasonally and between regions. Industrial agriculture currently uses often environmentally damaging technology to override natural constraints (Kloppenburg et al., 1996). Global food prices are rising, in part due to the impacts of climate change, climbing energy prices, and the use of land to produce biofuels instead of food. Agriculture faces a huge challenge in meeting the populations’ nutrient needs and increasing food security while using less fossil fuel (Peters et al. (b), 2009).

**Application of the Foodshed Concept**

Foodsheds, and local food systems in general, appear to offer healthier alternatives to the conventional agriculture system in terms of nutrition from increased access to, and consumption of, fruits and vegetable, stronger social structures, and more environmental integrity (Kloppenburg et al, 1996; Hinrichs, 2000). The degree to which these systems can meet local communities' needs, however, requires further exploration. Several studies have been conducted to assess local food capacity and a place's ability to feed its population.

To begin producing such estimates, a land area has to be designated as 'local,' a subjective term that could be based on distance or various political boundaries (Desjardins et al., 2010). Clancy and Ruhf (2010) argue that a regional approach to 'local' should be taken to increase sustainability. 'Local' is often defined by small geographic areas, from 50-400 mile radii or on the scale of towns, counties, or portions of states. Expanding 'local' to a regional area of a state or many states increases self-reliance (supplying as much food as possible in an area without degrading the natural resources), food security (generally, the ability to produce enough food to meet a population's needs), sustainability, economic viability, and resilience due to diversity. Diversity includes type of products produced but also various scales. Regional trade economies should be supported and encouraged to help shift the focus from the global to the local marketplace (Clancy and Ruhf, 2010). The regional approach was taken in a British Columbia, Canada, study (Morrison et al., 2010) as well as a New York State model (Peters et al. (b), 2009). Researchers in the Waterloo region of Canada and Willamette Valley, OR, chose to evaluate smaller areas with distinct identities and senses of place (Desjardins et al., 2010; Giobolini et al., 2011). The assessment of food capacity in a study in Detroit, MI, was focused on the ability of urban agriculture on vacant lots in this deindustrialized and depopulated city to feed the city's population (Colasanti and Hamm, 2010).

Once a study area is designated, information on food consumption and population is collected. Population demographic data are available from census records (Colasanti and Hamm, 2010; Peters et al. (b), 2009; Desjardins et al., 2010; Giobolini et al., 2011). Estimates of actual food consumption may be derived from the USDA Economic Research Service Loss-Adjusted Food Availability database's daily average servings of FV per capita (Colasanti and Hamm, 2010; Peters et al. (b), 2009) or food disappearance data (Desjardins et al., 2010). The Giobolini et al. (2011) study included only recommended intakes and the Morrison et al. (2010) study in British Columbia, Canada, did not consider intakes, only agricultural capacity. Other studies (Colasanti and Hamm, 2010; Peters et al. (b), 2009**;** Giobolini et al., 2011) used the USDA Dietary Guidelines as outlined by My Pyramid to obtain recommended intakes, while the researchers in the Waterloo Region study utilized Canada's Food Guide (Desjardins et al., 2010).

The spatial and temporal variability in food production was determined for British Columbia, Canada, in the Morrison et al. (2011) study. Some agricultural yields remain relatively stable year after year and so require only a single year of data, while others vary greatly over time and require multiple years of data to determine an average. Data were gathered from Statistics Canada, including the Agricultural Census and Food statistics. Productive farmland was mapped, along with distribution of food on a food group basis. Researchers found that while farmland was well distributed throughout the province, food groups and individual products were more isolated to small regions.

In the Desjardins et al. (2010) study, researchers evaluated the Waterloo region of Ontario, Canada. Researchers first estimated the current and forecasted 2026 population's recommended FV, legume, and whole grain needs based on *Canada's Food Guide*. Researchers focused on these food groups because they are currently under-consumed. "Current food intake" was derived from food disappearance data and compared to recommendations to come up with "optimal intake ratios." These ratios showed the significant increases in food groups required to meet recommendations. Next, a list of foods that could be grown in the Waterloo region and for which there was a market was developed. The land area required to produce the quantities of these foods required for the population to meet recommendations by 2026 was calculated. Converting ~10% of currently cropped hectares to the production of under-consumed foods would be feasible agriculturally, considering the environmentally undesirable conversion of pastureland and seasonality, as well as significant in increasing local availability of FV, legumes, and whole grains (Desjardins et al., 2010).

In the analysis of the New York state (NYS) foodshed, the complete diet needs per capita that could be met within the shortest distance were mapped. Human Nutrition Equivalents (HNE) were developed and comprised all food groups combined in certain proportions to meet nutrient recommendations for one year and included only commodities produced in the state. Land requirements for each commodity were estimated by converting food needs into quantities used in agriculture (i.e., pounds or bushels versus cups or ounces) and dividing by average NYS yields. GIS Maps were created using soil data from the Soil Geographic Database and Master Soils list and of land in agricultural production using the 1992 National Landcover data set. Combined, the maps displayed potential productivity of land. Agricultural land prone to erosion was designated for forage crops and all other land for high value crops (Peters et al. (a), 2009).

A computer model was used to match population with food production, using the minimum number of food miles possible. The population of NYS was separated into urban areas and rural population centers, while the land was partitioned into five kilometer by five kilometer production zones. The results were uneven due to the uneven distribution of population (concentrated in the southeast) and production (concentrated mostly in the west). Only 2% of New York City's needs could be met, while 84% of other urban areas and 98% of rural population centers' needs could be met (Peters et al. (a), 2009). On average, 34% of NYS's total needs could be met within the state (Peters et al. (a), 2009). The average distance food had to travel was 49km, although this figure was much smaller in rural areas and much further for NYC (Peters et al. (a), 2009).

In the Colasanti and Hamm (2010) study, the amount of available vacant land in Detroit that could be used to grow a significant amount of the population's fresh FV intake and consumption was assessed. Information was gathered on seasonal availability of crops from the Michigan State University (MSU) Student Organic Farm, MSU Extension 2004 Michigan Availability Guide, and conversations with two staff members from the Michigan Food and Farming Systems nonprofit organization. Vacant land parcels that could theoretically be turned into growing space were identified using a 2008 dataset on vacant lots from the City of Detroit and cross-referenced against 2005 aerial images from the Michigan Geographic Data Library. Researchers found 4,848 acres of publicly owned, vacant, non-park land. Based on three growing methods (high biointensive, low biointensive, and commercial) and three production scenarios (field only; field and storage; and field, storage, and season extension methods), During the growing season, Detroit could produce 65% of fresh vegetables and 39% of fresh, non-tropical fruits currently consumed on less than half the available land (1,839 acres) at low productivity levels or the same percentages of recommended FV at high productivity without season extension methods on roughly the same amount of land (1,831 acres) (Colasanti and Hamm, 2010).

The Giobolini et al. (2011) study calculated the percentage of food group recommendations for those living in Willamette Valley, OR, that could be met through current agricultural production in the region. Information on agricultural yields was collected from the Oregon State University Extension Service's database, Oregon Agricultural information network, for 2004-2008. Researchers included all food groups in their analysis, using Kantor's tables (Kantor, 1998) to convert serving sizes to food production units. In 2008, Willamette Valley agriculture production theoretically met 67% of annual required grains, 10% of vegetable needs, 24% of fruits, 59% of dairy, 58% of meat and beans, and 0% of dietary oil requirements (Giobolini et al, 2011).

Foodshed models, however, have inherently low generalizability due to difference in population and environmental conditions. The capacity of Arizona to meet its' populations needs has yet to be determined and is the purpose of this study. In the Arizona Foodshed model, much of the methods from the previous literature were adopted and expanded upon by including an analysis of vegetable sub groups and production on a monthly and seasonal basis to provide a depiction of changing local food availability throughout the year.

**Arizona: Geography, Climate, and Agriculture**

The foodshed in Arizona is a product of the state's geography, climate, and position in the national food system. Arizona encompasses 113,909 square miles. Within the state are three main topographical areas: a high plateau (5,000 and 7,000ft elevation) in the northeast, a mountainous region oriented southeast to northwest (9,000 and 12,000ft elevation), and low mountain ranges and desert valleys in the southwestern portion of the state. The high plateau receives approximately 10 inches of precipitation annually, with mostly sagebrush and native grasses as vegetation. Arizona consists of Ponderosa Pine forests in the mountainous region from the southeast to the northwest of the state. This region receives the most precipitation, up to 25-30 inches of rain and melted snow. The southwestern desert valleys are an extension of the Sonora Desert of Mexico and elevations are as low as 100ft in the Lower Colorado River Valley. The desert receives only three to four inches of rain per year. Temperatures in the state can range from well below zero in the high plateau and mountainous regions of central and northern Arizona during winter to over 125 degrees F in the desert during the summer. The daily range between minimum and maximum temperatures during dry portions of the year can be 50 to 60 degrees F ("Climate of Arizona," n.d.)

Elevation and season mostly dictate precipitation throughout Arizona. In November to March, the higher mountains of central and northern Arizona are subject to winter storms originated over the Pacific Ocean, often with heavy snows. Snow can accumulate to 100 inches deep or more, and the snowmelt during the spring supplies the rivers of the state with water. Reservoirs built on the streams and rivers supply water to the heavily farmed desert areas in the lower Salt River Valley and the lower Gila River

Valley areas. Summer rains, originating in the Gulf of Mexico or Gulf of California, occur between early-July until mid-September (“Climate of Arizona,” n.d.).

Over one million acres of land are devoted to agriculture in Arizona. Almost one-half of the acreage is in Maricopa County, about one-quarter in Pinal County, and 18% in Yuma County. Storage reservoirs created by the Roosevelt Dam on the Salt River, Horseshoe Dam, and Bartlett Dam on the Verde River, Carl Pleasant Dam on the Agua Fria, and Coolidge Dam on the Gila River supply the water required for growing crops. The Colorado River is the primary source of Yuma County’s water (“Climate of Arizona,” n.d.)

A growing season is defined as the period between freezes and varies greatly in Arizona. In the higher areas of northern and eastern Arizona, it may be as short as three month, while desert valleys can have several successive years without a freeze. The desert valley’s irrigated crops constitute the majority of fruit, vegetable, and commodity production and are important to the economy of the state. Cotton, grain, alfalfa, citrus fruit, melons, head lettuce, and other vegetables are grown throughout the year (“Climate of Arizona,” n.d.).

Ranching and agriculture are Arizona's second largest source of revenue, contributing $10.3 billion to the state’s economy. The state is the nation’s second and third largest producer of lemons and tangerines, respectively. Arizona farmers produce close to 20 million pounds of apples a year, and the pecan crop is worth $52 million. Yuma is the world’s winter lettuce capital. Between November and March, the county supplies roughly 95% of the United States’ head lettuce, leaf lettuce, and romaine lettuce, in addition to a variety of other seasonal vegetables. Arizona is also second in the U.S. in cauliflower and broccoli production (“Farming and Ranching,” n.d.). As a major agricultural producer, Arizona seems well situated to providing a sizable portion of its population’s FV needs.

# Chapter 3

# METHODS

To develop a comprehensive model assessing the extent to which Arizona agriculture can meet recommended and current consumption of fresh FV of Arizonans, disparate datasets, estimates and assumptions were used. Using these data and including assumptions where appropriate, three main components to the model were developed: calculation of total weight of recommended FV intake for all Arizonans, calculation of total weight of estimated intake of FV, and calculation of total fresh FV production. Each component required several steps (see figure 1), using a number of data sets that are all available in the appendices. FV will refer to F, V, and VSGs. ‘Fresh’ will refer to both fresh FV and non-tropical F.

**Recommended AZ Fresh FV Intake (Step 1):** Fresh fruit and vegetable recommendations were calculated for Arizonans in pounds per year by multiplying the population of Arizona by FV recommendations by age and gender groups and physical activity level. To do so, we gathered population data from the 2010 Arizona Census as the basis of the total population needs for the state. FV recommendations were derived from the 2010 Dietary Guidelines for Americans (DGAs) (USDA (a), 2010).. The DGA recommendations are provided by age, gender, and physical activity level, so we gathered physical activity data, also listed by age and gender, from Trojano et al. (2008). Gender, age, and FV recommendations by physical activity level were combined to provide total Arizona population-level FV recommendations. Details of these calculations are described below.

*STEP 1a*

*Population:* Daily fruit (F) and vegetable (V) and weekly vegetable sub-group (VSG) recommendations were calculated. As previously mentioned, Arizona population data were derived from 2010 U.S. census counts from the most recent estimates (April 2010) and were listed in five-year age cohorts and by gender (Appendix A) (U.S. Census Bureau [USCB], 2012). FV recommendations do not exist for individuals 0-2 years old, so they were excluded from the model. The census cohort of 0-4 year-olds was divided by five to determine the number of people for each year of life represented, assuming equal distribution across ages. The figure representing two years' worth of people was subtracted from the total population for the 0-4 year-old cohort.

*Physical Activity:* Because DGA recommendations incorporate physical activity level along with age and gender, we applied assumptions regarding physical activity level across the Arizona population. We gathered physical activity data published from NHANES (2003-2004) surveys and accelerometer data, which provided national estimates by age and gender of the percentage of individuals adhering to physical activity recommendations (Trojano et al., 2008) (Appendix B). The definition for "active" was based on CDC recommendations of 30 minutes of at least moderate-intensity activity for adults or 60 minutes of such exercise for youth on at least five days a week (USDA, 2011). Trojano et al. (2008) considered an adult to have met the recommendation if they acquired their 30 minutes of exercise in modified 10-minute bouts. For youth ages 6–19 years old, every minute of at least moderate intensity activity counted toward their recommended 60 minutes per day. The study did not differentiate between moderately

Figure 1

*Steps to Evaluate the Arizona Foodshed's Capacity to Meet the Fruit and Vegetable Needs of the Arizona Population*

| **Step** | | **Sub-step** | | **Variable/Data sets** |
|---|---|---|---|---|
| ***STEP 1:***<br><br>*Calculated fresh fruit and vegetable recommendations for Arizonans (pounds per year)* | → | **1a:** Daily fruit (F) and vegetable (V) and weekly vegetable sub-group (VSG) recommendations were calculated<br><br>**1b:** Recommendations were adjusted to only include the % of FV likely consumed fresh<br><br>**1c:** Recommendations were converted to pounds per year and summed across census cohorts | → | **1a**<br>• Population/ 2010 Arizona Census;<br>• Physical activity/ Trojano et al 2008<br>• FV recommendations/ 2010 Dietary Guidelines for Americans<br>**1b:**<br>• % FV likely to be consumed fresh/ USDA Economic Research Service (ERS)<br>• % non-tropical F consumed/Food Intakes Converted to Retail Commodities database |
| ***STEP 2:***<br><br>*Calculated estimated actual intake of fresh fruits and vegetables for Arizonans (pounds per year)* | → | **2a:** Arizona F, V, VSG intake estimates were calculated in grams per day at the retail level<br><br>**2b:** Intakes were converted to pounds per year at the retail level<br><br>**2c:** Intakes were adjusted to only include the % FV likely consumed fresh<br><br>**2d:** Intakes were adjusted to remove loss estimate | → | **2a:**<br>• Intake estimates/ Food Converted to Retail Commodities Database<br>**2c:**<br>• % of FV likely to be consumed fresh/ USDA ERS<br>• % non-tropical F/ Food Intakes Converted to Retail Commodities database<br>**2d:**<br>• Loss estimates/ Kantor (1998) and USDA ERS |

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| | | | | |
|---|---|---|---|---|
| ***STEP 3:***<br><br>*Calculated fresh fruit and vegetable yearly production for Arizona (pounds per year)* | → | **3a:** Arizona fresh F, V, and VSG were calculated in pounds per year<br><br>**3b:** Production was adjusted to remove loss estimates from the total | → | **3a:**<br>• Acres harvested for the fresh market/ 2007Arizona Census of agriculture<br>• Yield per acre/ 2009-2011 USDA Economic, Statistics, and Market Information annual summaries<br>**3b:**<br>• Loss estimates/ Kantor (1998) and USDA ERS |
| ***STEP 4:***<br><br>*Calculated the monthly and seasonal fresh fruit and vegetable production for Arizona (pounds per year)* | → | **4a:** Monthly Arizona fresh, consumption level FV production was calculated, based on months each crop is in season<br><br>**4b:** Seasonal Arizona fresh FV production was calculated, based on two seasons: warm (April-September) and cool (October-March) | → | **4a:**<br>• Months in season/ Arizona Harvest Calendar from the Arizona Nutrition Network/ USDA lettuce statistics/ USDA carrot statistics/ Watson (2011) |
| ***STEP 5:***<br><br>*Compare calculated Arizona recommendations and intake to production of fresh fruits and vegetables* | → | **5:** Percentages of fresh FV recommendations and intakes that could be met by production were calculated | → | **Not Applicable** |

and vigorously active individuals; for the purposes of this study, therefore, the proportion of people who met the recommendations were considered moderately active. Also, Trojano et al. (2008) did not include data on people less than six years of age, so for the purposes of this study, it was assumed the cohort was 100% active.  There are no specific USDA recommendations for children 0-5 years old (USDA, 2011). The Arizona population per year of age was multiplied by the percentage of physically active and sedentary individuals, assuming Arizonans exercised at the same rates as those in the Trojano et al. (2008) study. When census and physical activity age cohorts did not match, the physical activity percentages were averaged and applied to the age cohort. Calculated population numbers of active and inactive people were rounded to the nearest person.

*Recommendations:* FV recommendations were derived from 2010 DGA data in cups per day by age cohort and gender for inactive individuals (Appendix C-F) and for active individuals based on calorie need and listed by individual year of age and gender (Appendix D). The five vegetable sub-groups are dark green, red-orange, beans and legumes, starchy, and other. The age and gender cohorts for inactive recommendations did not match those from the census. As such, recommendations were averaged across census cohorts. To determine recommendations for active individuals, we matched the estimated calorie needs for moderately active individuals (Appendix E) with daily F and V and weekly VSG recommendations in cups per day by calorie range (Appendix F) according to data from the 2010 DGA report. Active recommendations are listed by year of age and were averaged across each census cohort. Recommendations for each census cohort and physical activity level were then added together for total cups per day recommended for the AZ population (Appendix G and H).

*STEP 1b*

*Fresh, Non-Tropical Fruit:* Recommendations were adjusted to only include the percent of FV likely consumed fresh. The origins of processed products can be difficult to determine and some crops cannot be grown locally, so this model included only fresh, non-tropical FV estimates. The average American diet, nonetheless, consists of both processed and fresh produce components in estimable proportions that need to be accounted for to obtain realistic fresh recommendations. Based on a three-year (2008-2011) average of food availability derived from the United States Department of Agriculture (USDA) Economic Research Service (ERS), Americans consumed 48.5% of their F in fresh form (Economic Research Service [ERS] (a), 2012). The F servings in cups per day were multiplied by this figure to get the total recommended fresh F consumption amounts. Those numbers were then further amended to account for tropical F consumption. Tropical F accounted for an average of 4.59% of total F consumption in the United States. Included in the tropical fruit category are: guava, lychees, mangoes, mango juice, papayas, passion fruit, passion fruit juice, pineapples, pineapple juice (Bowman et al., 2011) (See Table 2).

*Fresh Vegetables:* For V, the five-year (2006-2010) average of food availability showed Americans consumed 47.65% of their V in fresh form (ERS (a), 2012). The V servings in grams per year were multiplied by 47.65% to get the total fresh V recommended consumption amounts. Since these figures are based on national data, it was assumed that Arizonans consumed fresh and processed FV and tropical and non-tropical F in the same proportions as the American average. It was also presumed that people would eat the same percentage of each VSG as all vegetables in fresh form (See Table 2).

*STEP 1c*

*Conversion to grams:* The fresh FV recommendations from step 1b were then converted to pounds per year. Recommendations, estimated intakes, and production were all calculated in pounds per year, so they could be compared to one another. To estimate total pounds of yearly fresh FV requirements for the Arizona population, servings in cups for FV were first converted into grams using the conversion factors provided by Kantor (1998) (Appendix I and J), based on previously published methodology (Giombolini et al., 2010; Colasanti and Hamm, 2010), as well as USDA ERS data (ERS (c), 2012) (Appendix K) (See Table 2).

The F and V groups' serving weights in grams per cup were averages of fresh F or V used in this study to estimate production for the state. Most data were available from the Kantor (1998) tables, but blackberries and raspberries were not listed, so we used the grams per cup of strawberries as a proxy. Weights of winter squash and summer squash were derived from the USDA ERS "Fruit and Vegetable Prices" database (ERS (c), 2012). Kantor (1998) did not include pumpkin and USDA ERS provides only the weight for canned, so winter squash weight was substituted. The VSG grams per serving are averages of the weights of the V included in the V group calculation, categorized by sub group. The vegetables by sub group are as follows: dark green (broccoli, lettuce [head, romaine, leaf], and spinach); red-orange (carrots, pumpkins, squash [summer and winter], and tomatoes); beans (dry, edible excluding lima beans); starchy (sweet corn and potatoes); and other (snap beans, cabbage, cauliflower, celery, dry onions, and

*Conversion to pounds per year:* After FV recommendations in cups were multiplied by average grams per cup, they were converted to pounds per year. First, the total grams per FV group were multiplied by 0.002 (the number of pounds per gram) to obtain pounds per day. Next, the V and F categories were multiplied by 365 to obtain average recommended pounds per year. The VSG recommendations are weekly, so the estimations for those groups were multiplied by 52 to arrive at pounds per year (See Table 2).

**Estimated AZ Fresh FV Intake (Step 2):** In order to determine the extent to which AZ FV production could meet current consumption levels, estimated intake of fresh FV for Arizonans were calculated in pounds per year. Arizonans, on average, do not meet FV recommendations (CDC, 2010), so we included intake in our model to account for the amount of FV that *is* consumed, as well as recommendations. FV intake was calculated using national per capita figures in grams of retail-level foods. These figures are estimates from mean dietary intake data by age cohort for Americans over two years old found in Food Intakes Converted to Retail Commodities Databases (FICRCD), 2001-2002 (Appendix N and O) (Bowman et al., 2011). The FICRCD were jointly developed by USDA's Agricultural Research Service (ARS) and Economic Research Service (ERS) and are based on a one-day diet recall from the following three surveys: Continuing Survey of Food Intakes by Individuals 1994-1996 and 1998, National Health and Nutrition Examination Survey 1999-2000, and What We Eat In America, National Health and Nutrition Examination Survey 2001-2002. Combination foods, like pizza or casseroles, listed on surveys are broken down into separate food group components based on how much of each food group is present in 100 grams of a survey food. All foods within a group are converted to the raw form; for example, all frozen, canned, and dried carrots consumed were listed as raw carrots. Orange juice and apple juice were listed and removed from the calculation of fruit, since only whole fruit was considered. Total V and total F were available from these data, but vegetable sub-groups were determined by adding together individual recorded V in each group. The V by sub-group were as follows: dark green (total leafy vegetables and 0.5 of total brassica); red-orange (carrots and tomatoes); beans (dry, edible legumes including lima beans); starchy (sweet corn, green peas, and total roots and tubers); and other (celery, cucumber, green peas, onions, pepper, and 0.5 brassica). The brassica group included: broccoli, cauliflower, brussel sprouts, cabbage, chard, collards, cress, kale, mustard greens, radish, rutabagas, turnips, and turnip greens. The total roots and tubers category mostly consisted of potatoes but also contained small amounts of beets, cassava, jicama, kohlrabi, parsnips, sweet potatoes, tapioca, taro, and yams. Some of these vegetables were not categorized as starchy, so the results may have been overestimates.

To justify using national per capita data for F V intake, we compared adult BRFSS data for Arizona to BRFSS data for the United States and our calculated mean intakes of FV to Arizona BRFSS data. To calculate mean daily intake of FV for women and men, grams per day were added together for total intake for Arizonans ≥18 years old. The total FV consumption for AZ adults was multiplied by one minus the average loss percentage to get total estimated intake. These figures were then divided by grams per cup of FV derived from Kantor (1998) and ERS tables to get intake in cups per day. The total cups per day were then divided by the adult population of Arizona, 4,757,009.

*STEP 2a*

*Intake Estimates by Cohort:* AZ FV intake estimates were calculated in grams per day at the retail level, as a first step in converting consumption to pounds per year to be compared to production results. The intake data were broken down in age-gender groups (Bowman et al., 2011). These groups did not match the cohorts from AZ census data. The intake of individuals within census cohorts were therefore averaged and multiplied by the cohort population. The totals across cohorts were summed to get total AZ FV intake in grams. The calculations are available in Appendix P and Q.

*STEP 2b*

AZ FV intakes were converted to pounds per year at the retail level. The grams per day of all FV groups were multiplied by 365 to obtain estimates per year and then converted to pounds by multiplying by 0.002 (the number of pounds in a gram) (See Table 4).

*STEP 2c*

Intakes were adjusted to only include the percent of FV likely consumed fresh. As mentioned in recommendations, processed product origins are difficult to determine and tropical fruits cannot be grown in AZ. Fruit consumption was adjusted for tropical fruit (4.59%) (Bowman et al., 2011) and fresh fruit (48.5%) (ERS (a), 2011). All vegetables and vegetable sub-groups were adjusted for fresh vegetable intake (47.65%) (ERS (a), 2011) (See Table 4).

*STEP 2d*

Intakes were then adjusted to remove loss estimates, so the final intakes would only include the portion of FV likely consumed. The intakes from FICRCD are at the retail level. An estimated percentage of the weight of FV purchased is not consumed. The Kantor (1998) tables of retail level food intakes list loss percentages by crop including: loss from primary (farm level) to consumer weight, nonedible share, cooking loss, retail loss, and food service and consumer loss. We wanted to compare FV from recommendations, intake, and production at the consumption level. We therefore removed all losses, except loss from primary to consumer weight, from the estimated AZ fresh FV intakes, as they were reported at the retail level. Estimated loss percentages were calculated as averages of the losses for the individual FV used in production by group (F,V,VSG). Squash (summer, winter, and pumpkin) was not listed in the Kantor (1998) tables, so estimates of inedible shares and cooking losses were gathered from the USDA ERS (ERS (c), 2012). An additional 32% loss from retail and foodservice and consumer loss was removed from the squashes because it was constant across the Kantor (1998) tables and could be assumed to be the same for those crops. Loss estimates calculations can be found in Appendix L and M.

**AZ Fresh FV Production (Step 3):** To determine Arizona's capacity to meet its' populations FV needs, fresh FV yearly production for the state were calculated in pounds per year. Acres harvested for fresh markets, yield per acre, and estimated loss percentages were used to calculate Arizona fresh FV production. Data on Arizona fresh acres harvested were obtained from the 2007 Arizona Census of Agriculture (ACA) (Census of Agriculture [CA], 2012) (Appendix R-T). To be considered in the census, a farm must earn $1000 or more per year of agricultural products produced or sold (CA, 2012). Data on those who grow FV for themselves or make less than $1000 on production sales were therefore missing. For some crops, information on number of acres was withheld to avoid disclosing data on a single farm. Other acreage information was either unavailable or was less than half of an acre and so omitted. Due to the above stated factors, production figures calculated here are likely underestimates.

Yields per acre of the most common AZ grown crops were obtained from the 2012 USDA, Economic, Statistics, and Market Information (ESMI) annual summaries (Appendix U-X) by the National Agriculture Statistics Service (NASS). The ESMI annual summaries contain information on area planted, area harvested, yield per acre, total production, and value of product for selected crops on the national scale and by state for 2009-2011. The yields were listed as hundred weight (cwt) or 100 pounds, or 1,000 cwt or 100,000 pounds (National Agriculture Statistics Service [NASS] (a), 2012; NASS (b), 2012; NASS (c), 2012; NASS (d), 2012). We averaged the yields over the listed three years, from 2009 to 2011, then converted from cwt to pounds, so they could be compared with recommended and estimates intakes, both in pounds.

*STEP 3a*

*Annual Yield by Crop:* Arizona fresh FV were calculated in pounds per year, so that intake, recommendations, and production are in the same units and able to be compared. Fresh acres harvested by individual vegetable were listed in the ACA tables. The ACA does not, however, provide yield per acre or production figures. The "Vegetable Production" (2012) annual summary provided Arizona state specific yield per acre for the following vegetables: cabbage, head lettuce, leaf lettuce, romaine lettuce, spinach, broccoli, and cauliflower; as well as for total vegetables (NASS (d), 2012). National yields from the annual summaries were used for other, less common Arizona crops (carrots, pumpkins, winter and summer squash, tomatoes, sweet corn, celery, dry onions, and peppers), so that all vegetable sub-groups could be represented (NASS (d), 2012). Arizona dry, edible bean and potato yields were listed under the "Crop Production" (2012) annual summary (NASS (b), 2012). The individual crops were combined into vegetable sub-groups.

For fruit, the ACA contained harvested acres for melons (Appendix R), non-citrus and citrus crops (Appendix S), and berries (Appendix T). Arizona yield per acre data for melons was found in the "Vegetable Production" annual summary (NASS (d), 2012); data for apples were found in the "Non-Citrus Production" annual summary (NASS (c), 2012); and data for lemons, tangerines, and mandarins were found in the "Citrus Production" annual summary (NASS (a), 2012). Lemons yields were reported by 2009-2010, 2010-2011, and 2011-2012 groupings, so we took the average yield for these three years. National yields were used for apricots, cherries, grapes, peaches, and grapefruits (NASS (a), 2012; NASS (c), 2012). Grapefruit and lemon yields were given by the box. AZ-specific data for pounds per box of lemons were found in the "Citrus Production" (2012) annual summary, but only California, Florida, and Texas data were available for grapefruit (NASS (a), 2012). We used the California figures for grapefruit pounds per box. Yield per acre for dates, figs, olives, and plums were only available from California, and raspberries and blackberry yields were only available for Oregon (NASS (c), 2012).

*STEP 3b*

*Loss-Adjusted Total Yield:* Production was adjusted to remove loss estimates from the total, so that production only includes the amount likely eaten and not wasted. Loss estimates were calculated using the figures from Kantor (1998) and USDA ERS

(Appendix L and M). Losses were similar to those subtracted from the estimated intake calculations, but included all forms of loss (primary/farm to consumer, nonedible shares, cooking loss, retail loss, foodservice and consumer loss) to bring the figures down to approximately the amount that may have been eaten. Loss estimates were subtracted from the total yearly production in pounds by individual FV crop. The loss-adjusted yields were added together for FV categories to obtain consumption level production in pounds per year. Calculations for total fresh FV yield and loss-adjusted yields can be found in Appendix Y and Z.

**Seasonal Production (Step 4):** The monthly and seasonal fresh fruit and vegetable production for Arizona was calculated in pounds per year. Most FV cannot be grown year-round. We wanted to capture the seasonal fluctuations in FV production. An Arizona harvest calendar developed by the Arizona Nutrition Network was obtained and used to determine the seasonality of each crop. On the calendar, Arizona was separated into warm and cool climates to determine harvest dates (Arizona Nutrition Network [ANN], 2011) (Appendix AA). Romaine lettuce harvest dates were found on the USDA "U.S. lettuce statistics" (2011) site (ERS (a), 2011) (Appendix BB) and harvest dates for carrots were found on the USDA "U.S. carrot statistics" (2011) site (ERS (b), 2011) (Appendix CC). Pear and plum harvest months were listed on a local foods website (Watson, n.d.) (Appendix DD). Monthly production for the FV not on the harvest calendar were all listed under warm, since these sources did not differentiate between warm and cool climates.

*STEP 4a*

*Monthly Production:* Monthly Arizona fresh, consumption level FV production was calculated, based on months each crop is in season. This is the first step in determining seasonal production rates to expose any oscillations in the amount of type of FV available in AZ throughout the year. The loss-adjusted annual yields by crop were divided by the number of months the crop could be harvested in both warm and cool climates, assuming yields were evenly distributed. For example, apples are harvested in warm climates from July to November (five months) and in cold climates from August to November (four months), so apples would be considered in harvest for nine months. Calculations of production by number of months in season are available in Appendix EE and FF.

The yields from both warm and cool climates were added together for total yields per month. For apples, the calculated monthly yield would be listed under both warm and cool climates, so the total yields for months in which production occurred in both types of climates simultaneously would be double that for months during which production occurred in only one climate. All the V and F yields per month were added together for total monthly V and F availability, respectively. Representative crops were summed for each VSG. Appendix GG and HH display calculated AZ fresh FV monthly production data (See Table 6).

*STEP 4b*

*Seasonal Production:* Seasonal Arizona fresh FV production was calculated based on two seasons: warm (April-September) and cool (October-March) to show variations in FV availability. The seasonal breakdown was provided on the University of Arizona's Climate Assessment for the Southwest, Arizona Climate and Weather fact sheet

(“Climate of Arizona,”n.d.). The fresh FV production from April to September were added together to calculate the warm season’s overall production, and those from October to March were added to calculate the cool season’s total production.

*Dark-Green Vegetables:* In addition to the process explained above, the dark-green VSG were calculated based only on the number of months the V were in season in the warm climate (Appendix II). Yuma County, situated in the desert valley of southwestern AZ, supplies 95% of the country’s lettuce between November and March (“Climate of Arizona,” n.d.;  ”Farming and Ranching,” n.d.). Lettuce is in season in the cool climate of Arizona from May to September (ANN, 2011; ERS (b), 2011), but presumably much less is grown at this time, skewing the seasonal availability for dark-green V.

**Comparing Recommendations to Production and Intake (Step 5):** We wanted to determine to what degree Arizona production could theoretically meet the Arizona population’s needs. Calculated Arizona fresh FV recommendations and intake were compared to the state’s FV production. Arizona recommendations, estimated intakes, and production were all calculated in pounds per year with all applicable loss percentages removed. With losses removed, the figures represent consumption-level data. Recommended and actual intake figures were also adjusted by removing amounts representing processed and tropical fruits and vegetables. Production was based on the number of acres harvested for the fresh market.

*STEP 5*

Percentages of fresh FV recommendations and intakes that could be met by AZ production were calculated. Recommendations and intakes were compared to yearly and seasonal production. Table 7 displays comparisons of aggregate recommendations, expressed as pounds/ year, as well as estimated FV intake in pounds/year, to yearly AZ production. The percentages listed indicate the percentage of recommended FV and estimated actual FV intakes that could be met by production annually. Table 8 compares aggregate recommendations to seasonal production to demonstrate seasonal variation in meeting recommendations needs and actual consumption needs. The warm season extends from April to September and the cool season runs from October to March. To get seasonal recommendations, the yearly recommendations were divided by two, since each season is six months long. Lastly, Table 9 presents the sub-analysis of the dark-green VSG, only considering warm climate seasonality, compared to recommendations.

# Chapter 4

# RESULTS

Many tables were created in the process of building the model. Male and female recommendations and intake were calculated using the same methods, but the sample tables below (Tables 1 and 3) are only for females. Male FV recommendations can be found in Appendix G.  For recommendations, separate tables were also created for active and inactive males and females, as well as for F and V and VSGs for a total of eight recommendation tables. Table 1 shows recommendations for active females for F and V. Since male and female and active and inactive recommendations were calculated separately, they are listed independently in Tables 2 and male and female intakes are listed individually in Table 4. Table 5 is a sample from Appendix Y and lists only results for dark-green vegetables, although the other FV categories were calculated in the same way. Likewise, Table 6 is a sample from Appendix GG and only shows monthly yield results for total vegetables, dark-green vegetables, and red-orange vegetables for January, February, and March; although the full table includes all FV categories for every month of the year. All results can be found in the appendices.

## Recommended AZ Fresh FV Intake (Step 1):

*Table 1, Step 1a, Sample from Appendix G:* In step 1a of the methods, daily FV recommendations were calculated. Table 1 is a sample from Appendix G that shows recommendations for active females by age cohort. For the two to 4 year old cohort, for instance 1,607,000 cups per day of fruit are recommended. All cohort recommendations for active females were added together for each FV category and carried forward to Table

2. The same was done for inactive females and active and inactive males. For this step, the daily recommended F for Arizona include: 529,335.1 cups for active females, 4,387,428.6 cups for inactive females, 722,858.2 cups for active males, and 5,152,347.7 cups for active males.

*Table 2: Steps 1b and 1c:* Recommendations were adjusted to only include the percentage of FV likely consumed fresh and were converted to pounds per year (see Table 2). The top of the table shows the male/female, active/inactive recommendations

*Sample from Appendix G*

Table 1
*Physically Active Arizona Females' Fresh Fruit and Vegetable Recommendations*

| Age | Cohort Pop | PA % | Active Pop | Fruit: per capita (c/d) | Fruit: Avg per capita (c/d) | Fruit: Cohort recs (1,000 c/d) | Vegetables: per capita (c/d) | Vegetables: Avg per capita (c/d) | Vegetables: Cohort recs (1,000 c/d) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 133892 | 100.0% | 133892 | 1.0 | 1.2 | 160.7 | 1.0 | 1.3 | 178.5 |
| 3 | | | | 1.0 | | | 1.5 | | |
| 4 | | | | 1.5 | | | 1.5 | | |
| 5 | 222434 | | 106234 | 1.5 | 1.5 | 159.4 | 1.5 | 1.8 | 191.2 |
| 6 | | 34.7% | | 1.5 | | | 1.5 | | |
| 7 | | | | 1.5 | | | 2.0 | | |
| 8 | | | | 1.5 | | | 2.0 | | |
| 9 | | | | 1.5 | | | 2.0 | | |
| 10 | 219669 | | 31984 | 1.5 | 1.8 | 57.6 | 2.5 | 2.5 | 80.0 |
| 11 | | | | 1.5 | | | 2.5 | | |
| 12 | | 3.4% | | 2.0 | | | 2.5 | | |
| 13 | | | | 2.0 | | | 2.5 | | |
| 14 | | | | 2.0 | | | 2.5 | | |
| 15 | 224302 | | 11215 | 2.0 | 2.0 | 22.4 | 2.5 | 2.6 | 29.2 |
| 16 | | 5.4% | | 2.0 | | | 2.5 | | |
| 17 | | | | 2.0 | | | 2.5 | | |
| 18 | | | | 2.0 | | | 2.5 | | |
| 19 | | | | 2.0 | | | 3.0 | | |

*Abbreviations: Physically active (PA), population (pop), average (avg), cups (c), day (d)

Table 2

*Arizona Fresh Fruit, Vegetable, and Vegetable Sub-Group Recommendations*

| | Fruit* | Vegetables* | Dark-Green * | Red-Orange * | Starchy* | Bean * | Other* |
|---|---|---|---|---|---|---|---|
| **Females**** (1,000 cups/day) | | | | | | | |
| Active | 529.3 | 654.1 | 417.9 | 1376.8 | 1374.2 | 324.7 | 1081.0 |
| Inactive | 4387.4 | 6256.1 | 4116.2 | 13264.4 | 12558.6 | 3480.9 | 10372.3 |
| **Males**** (1,000 cups/day) | | | | | | | |
| Active | 722.9 | 963.5 | 651.9 | 1988.7 | 2004.4 | 555.4 | 1599.6 |
| Inactive | 5152.3 | 7297.4 | 4692.4 | 15112.5 | 14632.6 | 4654.6 | 11989.8 |
| **Total** (1,000 cups/day) | 10792.0 | 15171.1 | 9878.5 | 31742.4 | 30569.8 | 9015.6 | 25042.8 |
| **Fresh vegetable % (47.65%)** (1,000 cups) | | 7229.0 | 4707.1 | 15125.2 | 14566.5 | 4295.9 | 11932.9 |
| **Fresh fruit % (48.5%) and Non-tropical % (95.41%)** (1,000 cups/day) | 4993.9 | | | | | | |
| **Conversion factor (grams)** | 147.6 | 129.1 | 57.2 | 178.8 | 152.0 | 74.0 | 140.0 |
| **Total** (1,000 grams) | 737093.7 | 933267.4 | 269246.6 | 2704393.8 | 2214112.0 | 317898.5 | 1670602.9 |
| **Conversion (grams x .002)** (1,000 pounds) | 1474.2 | 1866.5 | 538.5 | 5408.8 | 4428.2 | 635.8 | 3341.2 |
| **Conversion factor** | 365.0 | 365.0 | 52.0 | 52.0 | 52.0 | 52.0 | 52.0 |
| **Yearly total** (million pounds/year) | 538.1 | 681.3 | 28.0 | 281.3 | 230.3 | 33.1 | 173.7 |

*Fruit and vegetable recommendations are per day and vegetable sub-groups are recommended by week derived from the previously mentioned tables from Appendices G and H. The yearly total of F and V recommendations for Arizonans are 538.1 million pounds and 681.3 million pounds per year, respectively. For recommendations for the VSGs, yearly calculated recommendations are: red-orange 281.3, starchy 230.3, other 173.7, beans 33.1, and dark-green 28 million pounds/year.

**Estimated AZ Fresh FV Intake (Step 2):**

*Table 3, Step 2a, Sample from Appendix P:* Arizona FV intake estimates in grams per day at the retail level can be found in Table 3, which is a sample from Appendix P and shows FV intake for Arizona Females. For the female cohort of 2-4 year-old, 50.1 million grams per day were estimated to have been consumed. Total daily estimated intake for the AZ population were calculated to be 996,334,632.4 grams for females and 1,142,514,313 grams for males.

*Table 4, Steps 2b, c, and d:* FV intakes in pounds per year at the retail level, adjusted to only include the % FV likely consumed fresh, and adjusted to remove loss estimate percentage can be found in Table 4 to estimate total estimated yearly intake. Female and male intakes derived from the tables in Appendices N and O are listed at the top of the table. The bottom row is total estimated intake for Arizonans in million pounds/year: fruit 334.5, vegetables 357.2, dark-greens 28.4, red-orange 139.0, starchy 86.6, beans 13.5, and other 51.9.

*Sample from Appendix P*

Table 3

*Arizona Females' Fresh Fruit and Vegetable Intake**

| Age | Cohort Pop | Fruit | | | Vegetables | | |
|---|---|---|---|---|---|---|---|
| | | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) |
| 2 | | 374.0 | | | 207.0 | | |
| 3 | 133892 | 374.0 | 374.0 | 50.1 | 207.0 | 207.0 | 27.7 |
| 4 | | 374.0 | | | 207.0 | | |
| 5 | | 374.0 | | | 207.0 | | |
| 6 | | 363.0 | | | 228.0 | | |
| 7 | 222434 | 363.0 | 365.2 | 81.2 | 228.0 | 223.8 | 49.8 |
| 8 | | 363.0 | | | 228.0 | | |
| 9 | | 363.0 | | | 228.0 | | |

*Intake based on retail-level national estimates (Bowman et al., 2011)
Abbreviations: Population (pop), average (avg), grams (g), day (d), million (mil)

## AZ Fresh FV Production (Step 3)

*Table 5, Steps 3a and b Sample from Appendix Y:* Table 5 shows only calculations from the dark-green VSG Arizona fresh FV in pounds per year and adjusted to remove loss estimates from the total. For broccoli, the yearly loss-adjusted yield estimate was 22.1 million pounds/year and the total for the dark-green vegetable group was 1,197.1 million pounds/year. Total vegetable loss-adjusted yield estimate was 1,256,739,167 pounds/year.

Table 4

*Arizona Fresh Fruit and Vegetable Intake**

| | **Fruit** | **Vegetables (V)** | **Dark-Green V** | **Red-orange V** | **Starch V** | **Bean V** | **Other V** |
|---|---|---|---|---|---|---|---|
| **Female** (**million grams/day) | 996.3 | 9983.2 | 103.1 | 308 | 371.8 | 19.2 | 152.9 |
| **Male**** (million grams/day) | 1142.5 | 1229 | 86.7 | 418.4 | 486.9 | 27 | 165.8 |
| **Total** (million grams/ day) | 2138.8 | 11212.2 | 189.9 | 726.5 | 858.7 | 46.2 | 318.7 |
| **Convert to yearly totals (million grams x 365)** (million grams/ year) | 78067 9.9 | 812964.2 | 69295.9 | 265159.1 | 313415. 1 | 16858.5 | 116325.7 |
| **Convert to million pounds** (grams x .002) | 1561.4 | 1625.9 | 138.6 | 530.3 | 626.8 | 33.7 | 232.7 |
| **Fresh Vegetable % (47.65%)** (million pounds/year) | | 774.8 | 66 | 252.7 | 298.7 | 16.1 | 110.9 |
| **Fresh Fruit % (48.5%) and Non-tropical % (95.41%)** (million pounds/ year) | 722.5 | | | | | | |
| **Estimated Loss %***** | 53.70 % | 53.90% | 57.00% | 45.00% | 71.00% | 16.00% | 53.20% |
| **Total Estimated Intake** (million pounds/ year) | 334.5 | 357.2 | 28.4 | 139 | 86.6 | 13.5 | 51.9 |

*Intake based on retail-level national estimates (Bowman et al., 2011)

**Only individuals ≥ 2 years old were included in the calculations

***Loss includes: non-edible share, cooking, retail, and foodservice and consumer loss

**Seasonal Production (Step 4)**

*Table 6, Step 4a, Sample from Appendix GG*: Table 6 displays monthly production by climate zone for total vegetables, dark-green vegetables, and red-orange vegetables. In January, broccoli is only in season in the warm climate with an estimated monthly production of 2,457 thousand pounds. The total January production for the dark-green VSG was calculated as 53,961.4 thousand pounds. Total vegetable production for January was 61,612.6 thousand pounds/year. This information was assessed for every month of the year and for each FV category.

*Sample from Appendix Y*

Table 5
*Arizona Fresh Vegetable Loss Adjusted Yield Estimates*

| **Crop** | **Acres Harvested for Fresh Market** | **Yield per Acre** (pounds) | **Production** (million pounds/year) | **Estimated Loss %*** | **Loss Adjusted Yield Estimate** (million pounds/year) |
|---|---|---|---|---|---|
| **Dark-Green Vegetables** | | | | | |
| Broccoli | 7800.0 | 13500.0 | 105.3 | 79.0% | 22.1 |
| Lettuce, head | 34000.0 | 34333.0 | 1167.3 | 55.0% | 525.3 |
| Lettuce, leaf | 7900.0 | 21833.0 | 172.5 | 60.0% | 69.0 |
| Lettuce, romaine | 18033.0 | 34333.0 | 619.1 | 60.0% | 247.7 |
| Spinach | 7200.0 | 18500.0 | 133.2 | 75.0% | 333.0 |
| **Total** | | | **2197.4** | | **1197.1** |

**Comparing Recommendations to Production and Intake (Step 5):**

*Table 7, Step 5:* Table 7 illustrates the percentage of yearly recommendations and estimates of intake based on national-level per capita data, for the Arizona population that could be met by Arizona FV production. Specifically, Arizona FV production met 29.7% of fruit recommendations and 47.8% of estimated actual intake; 18.1% of red-orange recommendations and 36.7% of estimated actual intake; 18.2% of starchy recommendations and 48.3% of estimated actual intake; 27.5% of other recommendations and 92.2% of estimated actual intake. For the beans VSG, production only met 60.3% of recommendations, but exceeded estimated actual intake, providing 147.8% of estimated actual intake. Because Arizona produces a considerable amount of dark-green vegetables, yields met 3204.6% of recommendations and 3160.0% of estimated actual intake.

*Table 8, Step 4b:* Seasonal Arizona fresh FV production warm (April-September) and cool (October-March) are shown in table 8. Seasonal production estimates showed inconsistent variability between warm and cool season production for the FV groups. Cool season production met 30.4% of fruit recommendations and warm season production met 30.3%, a difference of less than 1%. Total vegetable production was likewise very consistent between seasons, with 162.3% of recommendations met in the cool season and 148.3% met in the warm season. Production was 19% higher in the cool season than in the warm season for both the dark green and red-orange VSG. Cool production for the red-orange VSG met 20.1% of recommendations and in the warm season, 16.2% of recommendations were met.

*Sample from Appendix GG*

Table 6

*Arizona Loss Adjusted, Fresh Total Vegetable, Dark-Green Vegetable, and Red-Orange Vegetable Monthly Production by Climate Zone (1,000 pounds/month)*

| **Month** | **Total Vegetables** | **Dark-Green Vegetables** | | | | | | **Red-Orange Vegetables** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Climate Zone | | Broccoli | Lettuce, head | Lettuce, leaf | Lettuce, romaine | Spinach | **Total** | Carrots | Pumpkins | Squash, summer | Squash, winter | Tomatoes | **Total** |
| **January** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **61612.6** | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | **53961.4** | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | **4804.3** |
| **February** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **136654.7** | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | **129003.5** | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | **4804.3** |
| **March** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **138904.5** | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | **129003.5** | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | **5147.6** |

Table 7

*Arizona Fresh Fruit and Vegetable Needs Theoretically Met by Arizona Fresh Produce Yields*

| | **Fresh Yield** (million pounds/year)** | **Recommended** (million pounds/year) | | **Intake** (million pounds/year)** | |
|---|---|---|---|---|---|
| | | Weight | % Met | Weight | % Met |
| **Fruits^** | 159.8 | 538.1 | 29.7% | 334.5 | 47.8% |
| **Vegetables^** | 1,256.7 | 681.3 | 184.5% | 357.2 | 351.9% |
| Dark green ^ | 897.4 | 28.0 | 3204.6% | 28.4 | 3160.0% |
| Red-orange^ | 51.0 | 281.3 | 18.1% | 139.0 | 36.7% |
| Starchy^ | 41.9 | 230.3 | 18.2% | 86.6 | 48.3% |
| Beans^ | 20.0 | 33.1 | 60.3% | 13.5 | 147.8% |
| Other^ | 47.8 | 173.7 | 27.5% | 51.9 | 92.2% |

* Yields are determined by group according to the following crops: total fruit yield: cantaloupe, honey dew, watermelon, grapefruit, lemons, oranges, tangerines and mandarins , blackberries, raspberries, apples, apricots, sweet cherries, dates, grapes, peaches, pears, and plums; vegetables yield, total listed in Arizona Census of Agriculture; dark green yield: broccoli, lettuce, and spinach; Red/orange yield: carrots, all squash, pumpkins, tomatoes; beans: dry, edible-excluding lima; starchy Vegetables yield: sweet corn, potatoes; *other yield: Cabbage, cauliflower, celery, onions, snap beans, and all peppers

^Adjusted by removing tropical fruit and processed fruits and vegetables

**Losses subtracted from yield and retail level consumption, so data is at the consumption level for all categories

Seasonal variability was found for the bean, other, and starchy VSG, all with higher warm season availability. In the bean category, 80.5% of recommended amounts were met in the warm season compared to 40.2% during the cold season. For the other VSG, 36.8% of recommendations were met in the warm season and 22.0% in the cool season. The largest difference in seasonal availability was calculated for the starchy VSG, with a 98% difference between warm and cool season production. Production in the warm season provided for 96.5% of recommendations, while only 3.6% of recommendations were met in the cool season

*Table 9, Step 4, Adjustment for Dark-Green Production:* When both warm and cool climate months in season are both considered, dark-green VSG cool season

Table 8

*Arizona Loss Adjusted Fresh Fruit and Vegetable Monthly and Seasonal (Warm/Cool) Production Compared to Recommendations (Recs) (million pounds per month and season)*

| | Fruit* | | Vegetables*^ | | Dark-Green * | | Red-Orange* | | Starchy * | | Bean * | | Other * | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yield | % Rec Met | Yield | % Recs Met | Yield | % Recs Met | Yield | % Recs Met | Yield | % Recs Met | Yield | % Recs Met | Yield | % Recs Met |
| **Cool Season**** | **81.8** | **30.4%** | **552.8** | **162.3%** | **495.8** | **3617.1%** | **28.3** | **20.1%** | **4.2** | **3.6%** | **6.7** | **40.2%** | **17.9** | **22.0%** |
| October | 22.3 | 49.7% | 91.3 | 160.9% | 78.4 | 3430.6% | 2.5 | 10.8% | 4.2 | 21.7% | 3.3 | 120.7% | 3.0 | 21.9% |
| November | 11.6 | 26.0% | 62.6 | 110.3% | 51.5 | 2254.5% | 6.2 | 26.4% | 0.0 | 0.0% | 3.3 | 120.7% | 1.6 | 11.9% |
| December | 12.0 | 26.7% | 61.6 | 108.5% | 54.0 | 2362.0% | 4.8 | 20.5% | 0.0 | 0.0% | 0.0 | 0.0% | 2.8 | 21.0% |
| January | 12.0 | 26.7% | 61.6 | 108.5% | 54.0 | 2362.0% | 4.8 | 20.5% | 0.0 | 0.0% | 0.0 | 0.0% | 2.8 | 21.0% |
| February | 12.0 | 26.7% | 136.7 | 240.7% | 129.0 | 5646.9% | 4.8 | 20.5% | 0.0 | 0.0% | 0.0 | 0.0% | 2.8 | 21.0% |
| March | 12.0 | 26.7% | 138.9 | 244.7% | 129.0 | 5646.9% | 5.1 | 22.0% | 0.0 | 0.0% | 0.0 | 0.0% | 4.8 | 35.1% |
| **Warm Season**** | **81.6** | **30.3%** | **505.3** | **148.3%** | **401.5** | **2929.5%** | **22.8** | **16.2%** | **37.7** | **196.5%** | **13.3** | **80.5%** | **29.9** | **36.8%** |
| April | 5.3 | 11.9% | 141.5 | 249.2% | 129.0 | 5646.9% | 5.1 | 22.0% | 4.2 | 21.7% | 0.0 | 0.0% | 3.2 | 23.5% |
| May | 0.1 | 0.2% | 89.8 | 158.1% | 78.4 | 3430.6% | 5.3 | 22.4% | 4.2 | 21.7% | 0.0 | 0.0% | 2.0 | 14.7% |
| June | 12.4 | 27.6% | 106.6 | 187.7% | 87.7 | 3840.0% | 5.6 | 23.9% | 5.4 | 28.1% | 3.3 | 120.7% | 4.5 | 33.5% |
| July | 13.3 | 29.6% | 35.5 | 62.5% | 12.7 | 555.3% | 1.9 | 8.3% | 10.8 | 356.1% | 3.3 | 120.7% | 6.7 | 49.8% |
| August | 25.1 | 56.0% | 28.0 | 49.4% | 9.4 | 409.5% | 2.0 | 8.5% | 6.6 | 34.5% | 3.3 | 120.7% | 6.7 | 49.8% |
| September | 25.5 | 56.8% | 103.9 | 183.1% | 84.4 | 3694.4% | 2.9 | 12.2% | 6.6 | 34.5% | 3.3 | 120.7% | 6.7 | 49.8% |

*Monthly recommendations For the Arizona population: Fruits 44,839,867.1 lbs, Vegetables 56,773,764.4 lbs, Dark Green 2,333,470.5 lbs, Red-Orange 23,438,079.6 lbs, Starchy 19,188,970.7 lbs, Beans 2,755,120.4 lbs, Other 14,478,558.5 lbs.
Six month, seasonal recommendations for the Arizona population: Fruits 269,039,202.9 lbs, Vegetables 340,642,585.4 lbs, Dark Green 14,000,823.2 lbs, Red-Orange 140,628,477.6 lbs, Starchy 115,133,824 lbs, Beans 16,530,722.55 lbs, Other 86,871,351.1 lbs

^The vegetable category is only an average of the individual vegetable crops listed in the study. 198,713,044.4 pounds are unaccounted for, representing 15.8% of the total vegetable production

Table 9

*Arizona Loss Adjusted, Fresh Dark-Green Vegetable Monthly and Seasonal (Warm/Cool) Production in the Warm Climate Zone of the State Compared to Recommendations (Recs)*

| | Dark-Green Vegetables* | |
|---|---|---|
| | Production (million pounds) | % Recs met by Production |
| **Cool Season Total**** | **658.4** | **4803.3%** |
| October | 0.0 | 0.0% |
| November | 52.8 | 2310.1% |
| December | 63.9 | 2795.2% |
| January | 63.9 | 2795.2% |
| February | 239.0 | 10459.8% |
| March | 239.0 | 10459.8% |
| **Warm Season Total**** | **239.0** | **1743.3%** |
| April | 239.0 | 10459.8% |
| May | 0.0 | 0.0% |
| June | 0.0 | 0.0% |
| July | 0.0 | 0.0% |
| August | 0.0 | 0.0% |
| September | 0.0 | 0.0% |

*One month recommendation for Dark Greens for the Arizona population: 2,284,516.4 lbs
Six month recommendation for Dark Greens for the Arizona population 13,707,098.4 lbs
**Cool season and warm season total production are compared to six-month recommendation figures and individual month production is compared to one-month recommendations

production met 3617.1% of recommendations and production in the warm season met 2929.5%. There was a 64% difference between cool and warm season production, with the cool season supplying 4803.3% of recommendations and warm season production meeting 1743.3% of recommendations

*Estimated Intakes for Adults Calculated to be Compared to AZ BRFSS:* We calculated mean intakes of FV from Arizonan adults to be compared to Arizona BRFSS data to justify the use of national FV intake data. The final row in Table 10 show total per capita intake for fruit as 1.07 cups/day and vegetables as 1.38 cups/day for all AZ adults.

Table 10

*Average Arizona Adults (≥18 years) Per Capita Intake of Fruits and Vegetables*

| | **Fruit Intake** | | | | **Vegetable Intake** | | | |
|---|---|---|---|---|---|---|---|---|
| | Total (≥ 18 years old)* | 18-34 years old* | 34-64 years old* | 65 years old + * | Total (≥ 18 years old)* | 18-34 years old* | 34-64 years old* | 65 years old + |
| **Women** | 755.3 | 199.3 | 382.0 | 174.0 | 827.0 | 238.9 | 429.0 | 159.2 |
| **Men** | 870.2 | 303.0 | 424.0 | 143.3 | 1017.0 | 340.6 | 522.0 | 154.4 |
| **Total** (million grams/day) | 1625.5 | 502.3 | 806.0 | 317.3 | 1844.0 | 579.5 | 950.9 | 313.6 |
| **Average Loss %** | 53.7% | 53.7% | 53.7% | 53.7% | 53.9% | 53.9% | 53.9% | 53.9% |
| **Total Estimated Intake** (million grams/day) | 752.6 | 232.6 | 373.2 | 146.9 | 850.1 | 267.1 | 438.4 | 144.6 |
| **Grams per Cup Conversion** | 147.6 | 147.6 | 147.6 | 147.6 | 129.1 | 129.1 | 129.1 | 129.1 |
| **Total** (cups/day) | 5099116.0 | 1575697.5 | 2528217.7 | 995200.8 | 6584612.2 | 2069286.0 | 3395623.2 | 1119703.0 |
| **Total Per Capita** (cups/day)* | 1.07 | 1.27 | 1.06 | 0.89 | 1.38 | 1.67 | 1.42 | 1.00 |

* Total population of Arizonans ≥ 18 years old is 4,757,009; 18-34 years old 1242441; 35-64 years old 2391268; over 65 years old 1123300

# Chapter 5

# DISCUSSION

This research sought to assess the fresh FV production capacity of Arizona in relation to recommendations and estimated consumption for the state's population. Although foodshed models are not generalizable to other regions, our results can be considered in relation to other foodshed analyses to contextualize Arizona's capacity to meet its own FV needs.

If we compare the results from our AZ foodshed study to those previously done, AZ produces a much greater percentage of vegetable recommendations for the population over two years old, as well as estimated intake, although results for fruit are more similar. New York State was shown to hypothetically be able to provide 34% of its population's total needs within 49 kilometers, on average (Peters et al. (a), 2009). Giombolini et al. (2011) found that the Willamette Valley, OR region could potentially meet 10% of vegetable and 24% of fruit recommendations through local production. In the Colasanti and Hamm (2010) study, it was found that 65% of Detroit's fresh V recommendations and 39% of fresh, non-tropical F recommendations could be met using only half the available vacant land if low-intensive methods and storage or high intensive and storage methods were utilized (Colasanti and Hamm, 2010). Arizona theoretically could supply 29.7% and 184.5% of the fruit and vegetable recommendations for the population living in the state over two years old, respectively, and 47.8% of fruit intake and 351.9% of vegetable consumption. Therefore, between one-third to one-half of the F, as well as all the vegetables recommended for and consumed by Arizonans could be sourced locally with excess vegetables available to ship out-of-state.

The other studies did not consider VSGs, but Arizona produces a large amount of dark green vegetables, namely lettuces, enough to provide over 3,000% of the state's recommended and estimated intakes for the VSG. Lettuce accounted for 19.2% of the state's farm receipts and 35.2% of the value of the entire U.S. lettuce crop (ERS (b), 2013). When we look at V production, excluding the dark-green VSG, AZ can only meet 52.8% of yearly recommendations (vs. 184% with dark-greens). As such, overall estimates for meeting vegetable recommendations and estimated consumption amounts are skewed due to this subcategory of vegetable. Arizona may not be able to completely meet the population's V recommendations by sub-group, although the total vegetable production category appears to provide an excess of V.

Results between studies may not be entirely comparable, as we used slightly different methods than the three foodshed articles previously reviewed in attempts to calculate more relevant and accurate data for Arizona. Like the previous studies, we used DGA derived data to determine recommendations and tables from the Kantor (1998) article to define the number of grams per cup of FV, as well as loss percentage estimates. We derived the concepts of including only fresh FV and estimated intake in out model from Colasanti and Hamm (2010). The researchers distinguished between fresh FV and non-tropical F, because it is difficult to determine the exact origins of processed products and tropical F cannot be grown in Michigan, as is also the case in Arizona. Colasanti and Hamm (2010) calculated FV intakes to highlight how well production could meet current estimated intake, as well as the FV recommendations that most Americans fall short of eating (Grimm et al. 2010). Researchers used USDA ERS loss-adjusted food availability data for intake. The present study, by comparison, utilized data from the Food Intakes

Converted to Retail Commodities Databases (FICRCD), 2001-2002. The FICRCD is based on actual consumption as measured by one-day diet recalls from three national surveys.

There were differences in scale and production calculations between the studies. Peters et al. (a) (2009) is most comparable to this research in terms of scale, since their foodshed model was developed at the state level, while the Giomboilini et al. (2011) and Colasanti and Hamm addressed areas, Willamette Valley, OR and Detroit, Michigan respectively. Peters et al. (a) (2009) measured total yearly diet recommendations without a breakdown by FV, whereas we were only interested in FV consumption and production. Researchers in the NYS model, as well as in the Detroit, MI foodshed analysis considered only theoretical production derived from soil quality, GIS data, and/or small-scale either high or low bio-intensive methods. In our model, we analyzed actual commercial yields, much like the Giombolini et al. (2011) study.

The Giombolini et al (2011) and Colasanti and Hamm (2010) studies over-estimated physical activity when calculating recommendations. Giombolini et al. (2011) deemed all citizens to be moderately active, and Colasanti and Hamm (2010) considered the population to be two-thirds inactive and one-third active. According to the Trojano et al (2008) study of physical activity via NHANES (2003-2004) self-report and accelerometer data, this assumption is very inaccurate. Forty-two percent of six to 11 year-old cohort were considered physically active, with physical activity rates then dramatically dropping to 8% for 12-15 year-olds, and down to less than 5% for individuals over 20 years-old (Trojano et al. 2008).

*Seasonal Availability:* None of the studies reviewed provided information on differences in seasonal availability of crops. The figures presented for the Peters et al. (a) (2009), Giombolini et al. (2011), and Colasanti and Hamm (2010) only compare yearly production to recommendations or recommendations and intake. All were conducted in temperate climates, with much shorter growing seasons than we have in AZ. Their results, therefore, are likely somewhat deceptive, since most production would occur in the spring to fall, with little to no production in the winter.

Growing seasons are defined by the time between freezes, and the desert lowlands of the state, where V production is concentrated, can have several successive years without a freeze. The year-round growing season is made obvious in the FV seasonal results. The F and V groups showed very little seasonal fluctuation, with less than 1% and 9% increases in cool vs. warm season production, respectively. Both groups are conglomerations of a variety of FV with different harvest months. When an average is taken across all F and all V, little variation is shown. For F, citrus is in season between December and April and balances the production of melon, stone fruits, grapes, and dates from May to November. In the V category, dark green vegetable production skewed towards the cool season offsets the other VSGs grown primarily in the warm season. When dark-green vegetables are excluded from the V category, instead of slightly higher V production in the cool season, 45.3% more V are harvested in the warm season.

The present assessment of seasonal production in Arizona was, however, only a rough estimate. Specific monthly production numbers by individual FVs were unavailable. FV yields were divided by the number of months the crop can be harvested, in both warm and cool climates, assuming yields were evenly distributed. All seasonal variation was likely not captured; vegetable production is concentrated in the warm climate portion of the state, yields at the beginning and end of a growing season are not as high as the middle peak, and season extension methods (such as high tunnels or greenhouses) and storage were not considered. For example, although a great deal of dark greens, such as lettuce, are produced between November and March, we calculated less than a 20% difference between the cool and warm season production of dark green vegetables (lettuce, spinach, and broccoli). When dark green VSG monthly production was calculated using only warm climate harvest dates, the amount of seasonal variation detected more than tripled to a 64% difference between cool and warm season production. Three of the other VSGs also showed strong seasonal variation, all with higher production rates during the warm season; bean production was 50% higher, the other VSG production was 60%, and starchy vegetable production was 98% in the warm season compared to the cool season.

*Exports and Out-Of-State shipments:* As the dark-green VSG results in particular illustrate (meeting >3,000% of recommendations and intake), while this model shows the theoretical percentage of Arizona fresh FV intake and recommendations that could be met by local production, all FV produced in the state does not stay in AZ. A more accurate picture of local produce consumed by Arizonans would require information on the amount of FV shipped out of state. Unfortunately, out-of-state shipments are not accurately tracked by any state or federal agency. For example, US Customs and Border Protection do not collect data on the weight of U.S. agricultural exports by state of origin. Often times, agricultural exports are produced in inland states and pass through several marketing or processing points before arriving at a port (where export data are collected).

The state of origin often is lost or the product is commingled with similar products from other states in this process. Data that are collected are expressed as export dollar values and are allocated to states based on their shares of U.S. agricultural cash receipts for those products (ERS (a), 2013). Arizona exported $124.4 million in fresh vegetables in 2011, making it the 4th highest ranked state for fresh vegetable exports (ERS (a), 2013). However, converting value to poundage is nearly impossible given market price fluctuation, on-site haggling for purchase of product as it travels through states and to ports, and other variables that disallow accurate estimations. Similarly, monthly and yearly shipment volumes in pounds are only provided at the national level and for specific crops. The figures for domestic shipments are not entirely accurate either, as they may include some imported produce inter-mixed between port and final destination (ERS (b), 2012; ERS (c), 2011). Despite the inability to account for exports and out-of-state, we were able to determine the percentage of FV needs that could be met by current production levels. By excluding dark-green vegetables, the group most likely to be exported/shipped, from the total V category, we found that Arizona could still supply over 50% of the state's V recommendations.

*Compared to BFSS:* In order to justify using national consumption data from 1999-2002, instead of current Arizona intake, we compared our estimated consumption results to data from a validated source, BRFSS. There was no data available in a form we could use on Arizona FV consumption, so we used national data from the FICRCD (2001-2002). The FIRCD incorporates data from surveys conducted in 1994-2002. According to Michels Blank et al (2008) based on BRFSS, FV consumption in adults did not changed significantly between 1994 and 2005. Assuming this has remained the case, the data should still be currently valid.  Comparing BRFSS data from AZ and the United States as a whole, in 2009, the percentage of Arizonans that consumed ≥ 2 fruits  and ≥ 3 was vegetables per day was 33.7% and 24.4%, respectively. There is less than a 2% difference between the AZ BRFSS figures and the American average of 32.5% of the population consuming ≥ 2 fruits and 26.3% and ≥ 3 was vegetables per day.  We then compared 2011 BRFSS mean estimates of cups per day of FV consumed by adults (Arizona Department of Health Services,  2013) to the mean intake of FV by those ≥18 years-old calculated in this study. According to the BRFF, Arizonan adults consumed 1.04 cups/day of F and 1.71 cups/day of V. The average estimated actual intake of F in this study was nearly identical to BRFSS data at 1.04 cups/day, although there was some discrepancy in the V category, calculated to be 1.38 cups/day. Our results for F intake can then be considered more accurate than those for V.

*Study Strengths:* The Arizona foodshed model includes a number of strengths. We used the standard data sources for recommendation (DGA guidelines) and serving weights and loss percentage estimates (Kantor,1998). In calculating recommendations, we utilized data from the Trojano et al (2008) study that assessed physical activity levels by age-gender cohort, as compared to considering everyone to be moderately active (Giombolini et al. 2011) or one-third of the population as active (Colasanti and Hamm, 2010).

Our algorithm calculated seasonal fluctuations in FV production and included VSGs, in addition to total FV. Accounting for seasonality allowed us to see how production levels change throughout the year. Due to the long growing season in the desert lowlands, there is actually very little fluctuation. The inclusion of sub-groups, however, allowed us to quickly identify how the composition of the V category changes over the course of a year. The sub-groups also give a more accurate picture of how well production can meet all V recommendations. These are all important factors to know if one were to utilize this data in programs designed to expand the local food system in general, and specifically if the project was aimed at increasing FV consumption.

*Study Limitations:* There are many limitations inherent in the Arizona foodshed model, as it was built on imperfect data, requiring estimations in certain cases. For example, several assumptions had to be made to calculate the total recommended FV intake for all Arizonans, since Arizona census data, DGA recommendations, physical activity data, and FICRCD age cohorts did not coincide. Also, the DGAs did not provide FV recommendations for individuals from birth to two years of age. As such, recommendations for three- to five-year-olds were imputed. No exercise data were available for children under six years of age, so it was assumed 100% were considered 'active' based on USDA standards.

Error may have been introduced when estimating intake. When converting recommended servings of FV to grams and then pounds, representative and available national level conversion factors were used that may not be entirely accurate. Fresh FV intake, tropical fruit intake, and FV consumption figures were all based on national per capita consumption figures (1994-2002), which were used as a stand-in for actual intake; these data were assumed to be accurate for the Arizona population specifically. As mentioned earlier, BRFSS data shows that Arizonans consume FV at a rate similar to Americans in general, and our calculations of mean daily intake of FV were similar to those provided by the AZ BRFSS. Because the national figures for fresh and non-tropical

FV were not broken down by age or gender, the same consumption rate as a percentage of total FV intake was assumed across the Arizona population. There are likely calculation errors in dark-green estimated intakes, since they surpass recommendations. According to Guenther et al. (2006) and based on NHANES (1999-2000) less than a third of individuals consumed adequate amounts of dark-green vegetables. This may be because half brassica category of intake was considered dark-green and the other half as part of the other VSG. Perhaps people consume considerably more other vegetables (cauliflower, cabbage, turnips) than dark-greens (broccoli, chard, and turnip and mustard greens).

Several possible points of error were introduced when estimating yields as well. Arizona Census of Agriculture yields were not listed in pounds, but only by acreage, requiring conversions to be calculated. Acreage only included production estimates if the owner made >$1000/year in agriculture revenue, resulting in the loss of a minor amount of agricultural production in the state. Arizona-specific average-pounds-per-acre yields were available for some crops, but others had to be derived from national or other states' figures. Yield data in acres or pounds per acre were also incomplete, so only subsets of the FV with highest production levels were used in overall estimates. However, these data sets were the best available. Production was compared to FV recommendations and intake figures at the consumption level, so losses incurred from the farm to the consumer were subtracted from yields, but could only be found on the national level. Seasonality assumptions were not specific as they were based on several sources (ANN, 2011; ERS (a), 2011; ERS (b), 2011; Watson, n.d.).

*Future Research:* More research is needed to evaluate the capacity and feasibility of Arizona's foodshed to meet the fresh FV needs of the population. A major barrier in expanding the local food market is the lack of an adequate distribution system to transport local food into mainstream markets to meet consumer demand (Martinez et al. 2010). Focus groups or interviews of farmers, food distributors, and buyers should be conducted in order to obtain information on challenges and opportunities identified by each group in participating in the local food system within the Arizona context. Computer models like the one used by Peters et al. (a) (2009) to gauge the New York State foodshed, or that of Desjardins et al. (2010) when assessing the Waterloo region in Canada, would allow researchers to identify the location of productive land and, as in the Desjardin et al. (2010) study, estimate a feasible shift in production patterns that could improve local availability of under-consumed foods. Farms, food distributors, and food processing centers, differentiated by scale, could be mapped together, along with direct marketing venues to identify areas requiring local foods infrastructure development. Methods used by Colasanti and Hamm (2010) could be replicated for Phoenix and Tucson to evaluate production capacity of Arizona's major urban centers. Results could be mapped and focus groups conducted with residents in neighborhoods with available vacant lots to determine local interest. All potential research mentioned could be used to inform program and policy making decisions to improve the chances of success in expanding the local food system and increasing FV intake.

# Chapter 6

# CONCLUSION

Our study evaluated Arizona agriculture's capacity to meet fresh FV needs of the state's population. Arizona could supply 29.7% of the amount recommended for fruit intake and 47.8% estimated fruit intake for its population over 2 years of age. It could also provide 184.5% of vegetable recommendations and 351.9% of estimated vegetable intake. The state is the nation's second largest producer of lettuce, with Yuma County providing 95% of the country's lettuce from November to March. Unsurprisingly, we found that recommendations and estimated intakes for the dark-green vegetable sub-group category were far exceeded, with production representing 3204.6% of recommendations at the population level, and 3160% of estimated actual intake at the population level.

Seasonal availability was also calculated for fresh FV. Seasonal production was compared to FV recommendations for six months. F and V category production were found to have low degrees of seasonal variability, although the FV composition of each group changes over the course of a year.  For fruit, the winter citrus harvest is balanced by the harvest of melons, stone fruits, and other fruits. The vegetable sub-groups starchy, other, and beans and peas also showed high levels of seasonality, with greater yields in the warm months. Dark-green and red-orange VSG production is higher in the cool season. The results from all analyses of production and estimated needs indicate that a sizable percentage of the Arizona population's fresh FV needs can be met through local production, without diminishing the state's status as major supplier of dark-green vegetables for out-of-state markets.

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APPENDIX A

2010 ARIZONA POPULATION

| Table 2. Intercensal Estimates of the Resident Population by Sex and Age for Arizona: April 1, 2000 to July 1, 2010 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sex and Age | Intercensal Estimates (as of July 1) | | | | | | | April 1, 2010[2] |
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | |
| **MALE** | **2,746,287** | **2,816,798** | **2,908,266** | **3,003,007** | **3,070,683** | **3,125,084** | **3,153,246** | **3,175,823** |
| Under 5 years | 212,369 | 219,468 | 227,461 | 234,349 | 239,414 | 241,498 | 236,159 | 232,562 |
| 5 to 9 years | 199,628 | 201,849 | 206,255 | 213,558 | 218,850 | 224,569 | 228,217 | 231,246 |
| 10 to 14 years | 210,613 | 213,709 | 217,232 | 221,268 | 223,936 | 226,173 | 227,858 | 228,995 |
| 15 to 19 years | 202,553 | 209,474 | 218,017 | 225,967 | 232,399 | 236,980 | 237,592 | 237,280 |
| 20 to 24 years | 211,198 | 213,772 | 216,575 | 220,164 | 224,031 | 226,581 | 228,031 | 229,562 |
| 25 to 29 years | 199,558 | 206,836 | 215,866 | 226,402 | 230,336 | 231,555 | 228,836 | 225,608 |
| 30 to 34 years | 199,915 | 200,612 | 201,856 | 203,553 | 205,712 | 208,126 | 210,499 | 212,223 |
| 35 to 39 years | 194,518 | 195,138 | 200,928 | 208,825 | 213,202 | 214,831 | 213,047 | 210,224 |
| 40 to 44 years | 201,385 | 205,464 | 208,161 | 209,981 | 207,970 | 206,465 | 204,915 | 205,899 |
| 45 to 49 years | 183,323 | 189,172 | 196,857 | 203,661 | 208,898 | 211,218 | 213,070 | 212,499 |
| 50 to 54 years | 160,887 | 166,074 | 173,163 | 180,491 | 187,568 | 194,502 | 198,530 | 202,411 |
| 55 to 59 years | 138,883 | 147,555 | 158,020 | 168,309 | 170,571 | 172,496 | 175,630 | 178,665 |
| 60 to 64 years | 112,415 | 119,218 | 126,700 | 133,575 | 144,258 | 152,579 | 159,621 | 166,954 |
| 65 to 69 years | 96,687 | 101,180 | 105,811 | 110,786 | 115,594 | 122,428 | 128,972 | 133,599 |
| 70 to 74 years | 85,589 | 86,571 | 88,724 | 91,078 | 93,140 | 96,416 | 100,288 | 102,628 |
| 75 to 79 years | 67,650 | 68,943 | 71,503 | 72,775 | 74,034 | 74,853 | 75,334 | 76,221 |
| 80 to 84 years | 42,965 | 44,612 | 46,053 | 47,174 | 47,914 | 49,507 | 50,330 | 51,509 |
| 85 years and over | 26,151 | 27,151 | 29,084 | 31,091 | 32,856 | 34,307 | 36,317 | 37,738 |
| | | | | | | | | |
| Under 18 years | 744,880 | 760,789 | 782,984 | 806,222 | 822,274 | 832,614 | 831,449 | 831,904 |
| Under 5 years | 212,369 | 219,468 | 227,461 | 234,349 | 239,414 | 241,498 | 236,159 | 232,562 |
| 5 to 13 years | 369,172 | 371,594 | 379,556 | 390,296 | 397,884 | 406,342 | 410,561 | 414,779 |
| 14 to 17 years | 163,339 | 169,727 | 175,967 | 181,577 | 184,976 | 184,774 | 184,729 | 184,563 |
| 18 to 64 years | 1,682,365 | 1,727,552 | 1,784,107 | 1,843,881 | 1,884,871 | 1,914,959 | 1,930,556 | 1,942,224 |
| 18 to 24 years | 291,481 | 297,483 | 302,556 | 309,084 | 316,356 | 323,187 | 326,408 | 327,741 |
| 25 to 44 years | 795,376 | 808,050 | 826,811 | 848,761 | 857,220 | 860,977 | 857,297 | 853,954 |
| 45 to 64 years | 595,508 | 622,019 | 654,740 | 686,036 | 711,295 | 730,795 | 746,851 | 760,529 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 65 years and over | 319,042 | 328,457 | 341,175 | 352,904 | 363,538 | 377,511 | 391,241 | 401,695 |
| 16 years and over | 2,082,880 | 2,139,567 | 2,212,072 | 2,288,370 | 2,342,659 | 2,386,788 | 2,415,705 | 2,437,034 |
| 18 years and over | 2,001,407 | 2,056,009 | 2,125,282 | 2,196,785 | 2,248,409 | 2,292,470 | 2,321,797 | 2,343,919 |
| 15 to 44 years | 1,209,127 | 1,231,296 | 1,261,403 | 1,294,892 | 1,313,650 | 1,324,538 | 1,322,920 | 1,320,796 |
| Median age (years) | 33.4 | 33.6 | 33.8 | 33.9 | 34.0 | 34.2 | 34.5 | 34.8 |
| **FEMALE** | **2,764,077** | **2,835,606** | **2,930,811** | **3,026,134** | **3,096,998** | **3,155,278** | **3,189,908** | **3,216,194** |
| Under 5 years | 204,240 | 210,563 | 219,646 | 225,398 | 230,266 | 232,313 | 227,259 | 223,153 |
| 5 to 9 years | 189,722 | 191,396 | 195,637 | 203,480 | 209,148 | 215,602 | 218,777 | 222,434 |
| 10 to 14 years | 200,580 | 204,458 | 207,998 | 211,933 | 215,225 | 216,528 | 218,109 | 219,669 |
| 15 to 19 years | 186,620 | 193,034 | 201,497 | 209,382 | 215,865 | 221,157 | 223,913 | 224,302 |
| 20 to 24 years | 196,007 | 197,927 | 199,191 | 201,354 | 204,621 | 208,701 | 210,866 | 213,022 |
| 25 to 29 years | 184,301 | 191,984 | 203,100 | 215,474 | 220,007 | 221,050 | 218,266 | 214,390 |
| 30 to 34 years | 187,561 | 188,998 | 191,103 | 192,985 | 195,182 | 197,927 | 201,693 | 204,472 |
| 35 to 39 years | 187,031 | 187,295 | 192,268 | 199,961 | 205,433 | 207,586 | 207,237 | 205,469 |
| 40 to 44 years | 200,264 | 203,763 | 206,736 | 207,042 | 204,918 | 202,829 | 200,589 | 200,902 |
| 45 to 49 years | 188,081 | 193,053 | 200,700 | 207,620 | 211,737 | 213,740 | 215,103 | 214,523 |
| 50 to 54 years | 170,940 | 178,071 | 185,304 | 192,766 | 199,599 | 206,018 | 209,314 | 213,113 |
| 55 to 59 years | 150,108 | 159,130 | 170,691 | 182,682 | 185,991 | 189,339 | 193,794 | 196,603 |
| 60 to 64 years | 125,980 | 133,767 | 141,583 | 148,697 | 159,577 | 167,835 | 175,783 | 184,006 |
| 65 to 69 years | 106,192 | 110,996 | 116,421 | 122,069 | 128,135 | 137,349 | 144,369 | 149,267 |
| 70 to 74 years | 94,843 | 96,148 | 97,860 | 100,032 | 102,716 | 105,793 | 109,553 | 112,398 |
| 75 to 79 years | 82,290 | 82,060 | 83,407 | 84,209 | 84,590 | 84,900 | 85,738 | 86,040 |
| 80 to 84 years | 59,764 | 61,917 | 64,569 | 65,354 | 65,634 | 66,087 | 66,011 | 66,769 |
| 85 years and over | 49,553 | 51,046 | 53,100 | 55,696 | 58,354 | 60,524 | 63,534 | 65,662 |
| Under 18 years | 708,791 | 723,665 | 746,184 | 768,645 | 785,621 | 796,037 | 795,894 | 797,110 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Under 5 years | 204,240 | 210,563 | 219,646 | 225,398 | 230,266 | 232,313 | 227,259 | 223,153 |
| 5 to 13 years | 351,440 | 354,157 | 361,713 | 372,863 | 381,131 | 388,852 | 393,519 | 398,728 |
| 14 to 17 years | 153,111 | 158,945 | 164,825 | 170,384 | 174,224 | 174,872 | 175,116 | 175,229 |
| 18 to 64 years | 1,662,644 | 1,709,774 | 1,769,270 | 1,830,129 | 1,871,948 | 1,904,588 | 1,924,809 | 1,938,948 |
| 18 to 24 years | 268,378 | 273,713 | 277,785 | 282,902 | 289,504 | 298,264 | 303,030 | 305,470 |
| 25 to 44 years | 759,157 | 772,040 | 793,207 | 815,462 | 825,540 | 829,392 | 827,785 | 825,233 |
| 45 to 64 years | 635,109 | 664,021 | 698,278 | 731,765 | 756,904 | 776,932 | 793,994 | 808,245 |
| 65 years and over | 392,642 | 402,167 | 415,357 | 427,360 | 439,429 | 454,653 | 469,205 | 480,136 |
| 16 years and over | 2,131,147 | 2,189,615 | 2,265,018 | 2,342,472 | 2,399,134 | 2,447,024 | 2,482,324 | 2,507,447 |
| 18 years and over | 2,055,286 | 2,111,941 | 2,184,627 | 2,257,489 | 2,311,377 | 2,359,241 | 2,394,014 | 2,419,084 |
| 15 to 44 years | 1,141,784 | 1,163,001 | 1,193,895 | 1,226,198 | 1,246,026 | 1,259,250 | 1,262,564 | 1,262,557 |
| Median age (years) | 35.9 | 36.1 | 36.1 | 36.3 | 36.4 | 36.6 | 36.9 | 37.2 |

[1] The April 1, 2000 Population Estimates base reflects changes to the Census 2000 population from the Count Question Resolution program, legal boundary updates, and other geographic program revisions.

[2] The data source for April 1, 2010 is the 2010 Census count.

[3] The values for July 1, 2010 were produced by applying estimates of change in the population between April 1 and July 1 of 2010 to the 2010 Census counts. Further details on this methodology are available at http://www.census.gov/popest/methodology/2000-2010_Intercensal_Estimates_Methodology.pdf.

Note: Median age is calculated based on single year of age.

APPENDIX B

PHYSICAL ACTIVITY LEVELS

TABLE 5. Prevalence* (% and SE) of the population attaining sufficient† physical activity to meet public health recommendations.

| Approach | Age (yr) | Males | Females | Total |
|---|---|---|---|---|
| Counting every minute | 6–11 | 48.9 (2.8) | 34.7 (1.2) | 42.0 (1.6) |
| | 12–15 | 11.9 (1.7) | 3.4 (0.6) | 8.0 (1.1) |
| | 16–19 | 10.0 (1.6) | 5.4 (1.4) | 7.6 (1.2) |
| Counting only bouts | 16–19 | 7.1 (1.0) | 4.1 (1.0) | 5.6 (0.8) |
| | 20–59 | 3.8 (0.4) | 3.2 (0.3) | 3.5 (0.3) |
| | 60+ | 2.5 (0.4) | 2.3 (0.5) | 2.4 (0.4) |

* Prevalence estimates were based on individuals with one or more valid days of accelerometer data. Adherence definitions were based on age-specific criteria for moderate intensity for ages 6–17 yr; moderate-intensity criterion = 2020 counts per minute for ages 18 and older.

† Adherence: for ages 6–19 yr, 60 or more minutes of moderate- or greater-intensity activity on 5 of 7 d, accumulating every minute above criterion; for ages 16 yr and older, 30 or more minutes of moderate- or greater-intensity activity on 5 of 7 d, accumulated in modified 10-min bouts (8 of 10 min). Ages 16–19 yr were estimated with both definitions.

# APPENDIX C

# MYPLATE VEGETABLE RECOMMENDATIONS

How many vegetables are needed daily or weekly?

**Daily recommendation***

| | | |
|---|---|---|
| **Children** | 2-3 years old | 1 cup** |
| | 4-8 years old | 1½ cups** |
| **Girls** | 9-13 years old | 2 cups** |
| | 14-18 years old | 2½ cups** |
| **Boys** | 9-13 years old | 2½ cups** |
| | 14-18 years old | 3 cups** |
| **Women** | 19-30 years old | 2½ cups** |
| | 31-50 years old | 2½ cups** |
| | 51+ years old | 2 cups** |
| **Men** | 19-30 years old | 3 cups** |
| | 31-50 years old | 3 cups** |
| | 51+ years old | 2½ cups** |

*These amounts are appropriate for individuals who get less than 30 minutes per day of moderate physical activity, beyond normal daily activities. Those who are more physically active may be able to consume more while staying within calorie needs.

| Dark green vegetables | Red and orange | Beans and peas | Starchy vegetables | Other vegetables |
|---|---|---|---|---|

**vegetables**

| | | AMOUNT PER WEEK** | | | | |
|---|---|---|---|---|---|---|
| **Children** | 2–3 yrs old | ½ cup | 2½ cups | ½ cup | 2 cups | 1½ cups |
| | 4–8 yrs old | 1 cup | 3 cups | ½ cup | 3½ cups | 2½ cups |
| **Girls** | 9–13 yrs old | 1½ cups | 4 cups | 1 cup | 4 cups | 3½ cups |
| | 14–18 yrs old | 1½ cups | 5½ cups | 1½ cups | 5 cups | 4 cups |
| **Boys** | 9–13 yrs old | 1½ cups | 5½ cups | 1½ cups | 5 cups | 4 cups |
| | 14–18 yrs old | 2 cups | 6 cups | 2 cups | 6 cups | 5 cups |
| **Women** | 19–30 yrs old | 1½ cups | 5½ cups | 1½ cups | 5 cups | 4 cups |
| | 31–50 yrs old | 1½ cups | 5½ cups | 1½ cups | 5 cups | 4 cups |
| | 51+ yrs old | 1½ cups | 4 cups | 1 cup | 4 cups | 3½ cups |
| **Men** | 19–30 yrs old | 2 cups | 6 cups | 2 cups | 6 cups | 5 cups |
| | 31–50 yrs old | 2 cups | 6 cups | 2 cups | 6 cups | 5 cups |
| | 51+ yrs old | 2 cups | 6 cups | 2 cups | 6 cups | 5 cups |

# APPENDIX D

# MYPLATE FRUIT RECOMMENDATIONS

How much fruit is needed daily?

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**Daily recommendation**

| | | |
|---|---|---|
| **Children** | 2-3 years old | 1 cup** |
| | 4-8 years old | 1 to 1 ½ cups** |
| **Girls** | 9-13 years old | 1 ½ cups** |
| | 14-18 years old | 1 ½ cups** |
| **Boys** | 9-13 years old | 1 ½ cups** |
| | 14-18 years old | 2 cups** |
| **Women** | 19-30 years old | 2 cups** |
| | 31-50 years old | 1 ½ cups** |
| | 51+ years old | 1 ½ cups** |
| **Men** | 19-30 years old | 2 cups** |
| | 31-50 years old | 2 cups** |
| | 51+ years old | 2 cups** |

**These amounts are appropriate for individuals who get less than 30 minutes per day of moderate physical activity, beyond normal daily activities. Those who are more physically active may be able to consume more while staying within calorie needs.

APPENDIX E

ESTIMATED CALORIE NEEDS PER DAY BY AGE, GENDER, AND

PHYSICAL ACTIVITY LEVEL

## **APPENDIX 6.** ESTIMATED CALORIE NEEDS PER DAY BY AGE, GENDER, AND PHYSICAL ACTIVITY LEVEL (DETAILED)

Estimated amounts of calories[a] needed to maintain calorie balance for various gender and age groups at three different levels of physical activity. The estimates are rounded to the nearest 200 calories. An individual's calorie needs may be higher or lower than these average estimates.

| Gender/ Activity level[b] | Male/ Sedentary | Male/ Moderately Active | Male/ Active | Female[c]/ Sedentary | Female[c]/ Moderately Active | Female[c]/ Active |
|---|---|---|---|---|---|---|
| Age (years) | | | | | | |
| 2 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| 3 | 1,200 | 1,400 | 1,400 | 1,000 | 1,200 | 1,400 |
| 4 | 1,200 | 1,400 | 1,600 | 1,200 | 1,400 | 1,400 |
| 5 | 1,200 | 1,400 | 1,600 | 1,200 | 1,400 | 1,600 |
| 6 | 1,400 | 1,600 | 1,800 | 1,200 | 1,400 | 1,600 |
| 7 | 1,400 | 1,600 | 1,800 | 1,200 | 1,600 | 1,800 |
| 8 | 1,400 | 1,600 | 2,000 | 1,400 | 1,600 | 1,800 |
| 9 | 1,600 | 1,800 | 2,000 | 1,400 | 1,600 | 1,800 |
| 10 | 1,600 | 1,800 | 2,200 | 1,400 | 1,800 | 2,000 |
| 11 | 1,800 | 2,000 | 2,200 | 1,600 | 1,800 | 2,000 |
| 12 | 1,800 | 2,200 | 2,400 | 1,600 | 2,000 | 2,200 |
| 13 | 2,000 | 2,200 | 2,600 | 1,600 | 2,000 | 2,200 |
| 14 | 2,000 | 2,400 | 2,800 | 1,800 | 2,000 | 2,400 |
| 15 | 2,200 | 2,600 | 3,000 | 1,800 | 2,000 | 2,400 |
| 16 | 2,400 | 2,800 | 3,200 | 1,800 | 2,000 | 2,400 |
| 17 | 2,400 | 2,800 | 3,200 | 1,800 | 2,000 | 2,400 |
| 18 | 2,400 | 2,800 | 3,200 | 1,800 | 2,000 | 2,400 |
| 19–20 | 2,600 | 2,800 | 3,000 | 2,000 | 2,200 | 2,400 |
| 21–25 | 2,400 | 2,800 | 3,000 | 2,000 | 2,200 | 2,400 |
| 26–30 | 2,400 | 2,600 | 3,000 | 1,800 | 2,000 | 2,400 |
| 31–35 | 2,400 | 2,600 | 3,000 | 1,800 | 2,000 | 2,200 |
| 36–40 | 2,400 | 2,600 | 2,800 | 1,800 | 2,000 | 2,200 |
| 41–45 | 2,200 | 2,600 | 2,800 | 1,800 | 2,000 | 2,200 |
| 46–50 | 2,200 | 2,400 | 2,800 | 1,800 | 2,000 | 2,200 |
| 51–55 | 2,200 | 2,400 | 2,800 | 1,600 | 1,800 | 2,200 |
| 56–60 | 2,200 | 2,400 | 2,600 | 1,600 | 1,800 | 2,200 |
| 61–65 | 2,000 | 2,400 | 2,600 | 1,600 | 1,800 | 2,000 |
| 66–70 | 2,000 | 2,200 | 2,600 | 1,600 | 1,800 | 2,000 |
| 71–75 | 2,000 | 2,200 | 2,600 | 1,600 | 1,800 | 2,000 |
| 76+ | 2,000 | 2,200 | 2,400 | 1,600 | 1,800 | 2,000 |

a. Based on Estimated Energy Requirements (EER) equations, using reference heights (average) and reference weights (healthy) for each age-gender group. For children and adolescents, reference height and weight vary. For adults, the reference man is 5 feet 10 inches tall and weighs 154 pounds. The reference woman is 5 feet 4 inches tall and weighs 126 pounds. EER equations are from the Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington (DC): The National Academies Press; 2002.

b. Sedentary means a lifestyle that includes only the light physical activity associated with typical day-to-day life. Moderately active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life. Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

c. Estimates for females do not include women who are pregnant or breastfeeding.

Source: Britten P, Marcoe K, Yamini S, Davis C. Development of food intake patterns for the MyPyramid Food Guidance System. J Nutr Educ Behav 2006;38(6 Suppl):S78-S92.

APPENDIX F

USDA FOOD PATTERNS

For each food group or subgroup,[a] recommended average daily intake amounts[b] at all calorie levels. Recommended intakes from vegetable and protein foods subgroups are per week. For more information and tools for application, go to MyPyramid.gov.

| Calorie level of pattern[c] | 1,000 | 1,200 | 1,400 | 1,600 | 1,800 | 2,000 | 2,200 | 2,400 | 2,600 | 2,800 | 3,000 | 3,200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fruits** | 1 c | 1 c | 1½ c | 1½ c | 1½ c | 2 c | 2 c | 2 c | 2 c | 2½ c | 2½ c | 2½ c |
| **Vegetables[d]** | 1 c | 1½ c | 1½ c | 2 c | 2½ c | 2½ c | 3 c | 3 c | 3½ c | 3½ c | 4 c | 4 c |
| Dark-green vegetables | ½ c/wk | 1 c/wk | 1 c/wk | 1½ c/wk | 1½ c/wk | 1½ c/wk | 2 c/wk | 2 c/wk | 2½ c/wk | 2½ c/wk | 2½ c/wk | 2½ c/wk |
| Red and orange vegetables | 2½ c/wk | 3 c/wk | 3 c/wk | 4 c/wk | 5½ c/wk | 5½ c/wk | 6 c/wk | 6 c/wk | 7 c/wk | 7 c/wk | 7½ c/wk | 7½ c/wk |
| Beans and peas (legumes) | ½ c/wk | ½ c/wk | ½ c/wk | 1 c/wk | 1½ c/wk | 1½ c/wk | 2 c/wk | 2 c/wk | 2½ c/wk | 2½ c/wk | 3 c/wk | 3 c/wk |
| Starchy vegetables | 2 c/wk | 3½ c/wk | 3½ c/wk | 4 c/wk | 5 c/wk | 5 c/wk | 6 c/wk | 6 c/wk | 7 c/wk | 7 c/wk | 8 c/wk | 8 c/wk |
| Other vegetables | 1½ c/wk | 2½ c/wk | 2½ c/wk | 3½ c/wk | 4 c/wk | 4 c/wk | 5 c/wk | 5 c/wk | 5½ c/wk | 5½ c/wk | 7 c/wk | 7 c/wk |

APPENDIX G

ARIZONA FEMALES' FRESH FRUIT AND VEGETABLE RECOMMENDATIONS

Physically Active Arizona Females' Fresh Fruit and Vegetable Recommendations

| **Age** | **Cohort Pop** | **PA %** | **Active Pop** | **Fruit** per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) | **Vegetables** per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | 1.0 | | | 1.0 | | |
| 3 | 133892 | 100.0% | 133892 | 1.0 | 1.2 | 160.7 | 1.5 | 1.3 | 178.5 |
| 4 | | | | 1.5 | | | 1.5 | | |
| 5 | | | | 1.5 | | | 1.5 | | |
| 6 | | | | 1.5 | | | 1.5 | | |
| 7 | 222434 | | 106234 | 1.5 | 1.5 | 159.4 | 2.0 | 1.8 | 191.2 |
| 8 | | 34.7% | | 1.5 | | | 2.0 | | |
| 9 | | | | 1.5 | | | 2.0 | | |
| 10 | | | | 1.5 | | | 2.5 | | |
| 11 | | | | 1.5 | | | 2.5 | | |
| 12 | 219669 | | 31984 | 2.0 | 1.8 | 57.6 | 2.5 | 2.5 | 80.0 |
| 13 | | 3.4% | | 2.0 | | | 2.5 | | |
| 14 | | | | 2.0 | | | 2.5 | | |
| 15 | | | | 2.0 | | | 2.5 | | |
| 16 | | | | 2.0 | | | 2.5 | | |
| 17 | 224302 | 5.4% | 11215 | 2.0 | 2.0 | 22.4 | 2.5 | 2.6 | 29.2 |
| 18 | | | | 2.0 | | | 2.5 | | |
| 19 | | | | 2.0 | | | 3.0 | | |
| 20 | | | | 2.0 | | | 3.0 | | |
| 21 | | | | 2.0 | | | 3.0 | | |
| 22 | 213022 | | 6817 | 2.0 | 2.0 | 13.6 | 3.0 | 3.0 | 20.5 |
| 23 | | | | 2.0 | | | 3.0 | | |
| 24 | | | | 2.0 | | | 3.0 | | |
| 25 | | | | 2.0 | | | 3.0 | | |
| 26 | | 3.2% | | 2.0 | | | 2.5 | | |
| 27 | 214390 | | 6860 | 2.0 | 2.0 | 13.7 | 2.5 | 2.6 | 17.8 |
| 28 | | | | 2.0 | | | 2.5 | | |
| 29 | | | | 2.0 | | | 2.5 | | |
| 30 | | | | 2.0 | | | 2.5 | | |
| 31 | 204472 | | 6543 | 2.0 | 2.0 | 13.1 | 2.5 | 2.5 | 16.4 |
| 32 | | | | 2.0 | | | 2.5 | | |
| 33 | | | | 2.0 | | | 2.5 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 34 | | | | 2.0 | | | 2.5 | | |
| 35 | | | | 2.0 | | | 2.5 | | |
| 36 | | | | 2.0 | | | 2.5 | | |
| 37 | 205469 | | 6575 | 2.0 | 2.0 | 13.2 | 2.5 | 2.5 | 16.4 |
| 38 | | | | 2.0 | | | 2.5 | | |
| 39 | | | | 2.0 | | | 2.5 | | |
| 40 | | | | 2.0 | | | 2.5 | | |
| 41 | | | | 2.0 | | | 2.5 | | |
| 42 | 200902 | | 6429 | 2.0 | 2.0 | 12.9 | 2.5 | 2.5 | 16.1 |
| 43 | | | | 2.0 | | | 2.5 | | |
| 44 | | | | 2.0 | | | 2.5 | | |
| 45 | | | | 2.0 | | | 2.5 | | |
| 46 | | | | 2.0 | | | 2.5 | | |
| 47 | 214523 | | 6865 | 2.0 | 2.0 | 13.7 | 2.5 | 2.5 | 17.2 |
| 48 | | | | 2.0 | | | 2.5 | | |
| 49 | | | | 2.0 | | | 2.5 | | |
| 50 | | | | 2.0 | | | 2.5 | | |
| 51 | | | | 2.0 | | | 2.5 | | |
| 52 | 213113 | | 6820 | 2.0 | 2.0 | 13.6 | 2.5 | 2.5 | 17.1 |
| 53 | | | | 2.0 | | | 2.5 | | |
| 54 | | | | 2.0 | | | 2.5 | | |
| 55 | | | | 2.0 | | | 2.5 | | |
| 56 | | | | 2.0 | | | 2.5 | | |
| 57 | 196603 | | 6291 | 2.0 | 2.0 | 12.6 | 2.5 | 2.5 | 15.7 |
| 58 | | | | 2.0 | | | 2.5 | | |
| 59 | | | | 2.0 | | | 2.5 | | |
| 60+ | 664142 | 2.3% | 15275 | 1.5 | 1.5 | 22.9 | 2.5 | 2.5 | 38.2 |
| | | **TOTAL** | **351800** | | | **529.3** | | | **654.1** |

*Abbreviations: Physically active (PA), population (pop), average (avg), cups (c), day (d)

Physically Active Arizona Females' Fresh Vegetable Sub-Group Recommendations (Dark-Green and Red-Orange)

| Age | Cohort Pop | PA % | Active Pop | Dark-Green Vegetables per capita (c/d) | Dark-Green Vegetables Avg per capita (c/d) | Dark-Green Vegetables Cohort recs (1,000 c/d) | Red-Orange Vegetables per capita (c/d) | Red-Orange Vegetables Avg per capita (c/d) | Red-Orange Vegetables Cohort recs (1,000 c/d) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 133892 | 100.0% | 133892 | 0.5 | 0.8 | 107.1 | 2.5 | 2.8 | 374.9 |
| 3 | | | | 1.0 | | | 3.0 | | |
| 4 | | | | 1.0 | | | 3.0 | | |
| 5 | 222434 | | 106234 | 1.0 | 1.3 | 138.1 | 3.0 | 3.6 | 382.4 |
| 6 | | 34.7% | | 1.0 | | | 3.0 | | |
| 7 | | | | 1.5 | | | 4.0 | | |
| 8 | | | | 1.5 | | | 4.0 | | |
| 9 | | | | 1.5 | | | 4.0 | | |
| 10 | 219669 | | 31984 | 1.5 | 1.5 | 48.0 | 5.5 | 5.5 | 175.9 |
| 11 | | | | 1.5 | | | 5.5 | | |
| 12 | | 3.4% | | 1.5 | | | 5.5 | | |
| 13 | | | | 1.5 | | | 5.5 | | |
| 14 | | | | 1.5 | | | 5.5 | | |
| 15 | 224302 | | 11215 | 1.5 | 1.6 | 17.9 | 5.5 | 5.6 | 62.8 |
| 16 | | 5.4% | | 1.5 | | | 5.5 | | |
| 17 | | | | 1.5 | | | 5.5 | | |
| 18 | | | | 1.5 | | | 5.5 | | |
| 19 | | | | 2.0 | | | 6.0 | | |
| 20 | 213022 | 3.2% | 6817 | 2.0 | 2.0 | 13.6 | 6.0 | 6.0 | 40.9 |
| 21 | | | | 2.0 | | | 6.0 | | |
| 22 | | | | 2.0 | | | 6.0 | | |
| 23 | | | | 2.0 | | | 6.0 | | |
| 24 | | | | 2.0 | | | 6.0 | | |
| 25 | 214390 | | 6860 | 2.0 | 1.6 | 11.0 | 6.0 | 5.6 | 38.4 |
| 26 | | | | 1.5 | | | 5.5 | | |
| 27 | | | | 1.5 | | | 5.5 | | |
| 28 | | | | 1.5 | | | 5.5 | | |
| 29 | | | | 1.5 | | | 5.5 | | |
| 30 | 204472 | | 6543 | 1.5 | 1.5 | 9.8 | 5.5 | 5.5 | 36.0 |
| 31 | | | | 1.5 | | | 5.5 | | |
| 32 | | | | 1.5 | | | 5.5 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 33 | | | | 1.5 | | | 5.5 | | |
| 34 | | | | 1.5 | | | 5.5 | | |
| 35 | | | | 1.5 | | | 5.5 | | |
| 36 | | | | 1.5 | | | 5.5 | | |
| 37 | 205469 | | 6575 | 1.5 | 1.5 | 9.9 | 5.5 | 5.5 | 36.2 |
| 38 | | | | 1.5 | | | 5.5 | | |
| 39 | | | | 1.5 | | | 5.5 | | |
| 40 | | | | 1.5 | | | 5.5 | | |
| 41 | | | | 1.5 | | | 5.5 | | |
| 42 | 200902 | | 6429 | 1.5 | 1.5 | 9.6 | 5.5 | 5.5 | 35.4 |
| 43 | | | | 1.5 | | | 5.5 | | |
| 44 | | | | 1.5 | | | 5.5 | | |
| 45 | | | | 1.5 | | | 5.5 | | |
| 46 | | | | 1.5 | | | 5.5 | | |
| 47 | 214523 | | 6865 | 1.5 | 1.5 | 10.3 | 5.5 | 5.5 | 37.8 |
| 48 | | | | 1.5 | | | 5.5 | | |
| 49 | | | | 1.5 | | | 5.5 | | |
| 50 | | | | 1.5 | | | 5.5 | | |
| 51 | | | | 1.5 | | | 5.5 | | |
| 52 | 213113 | | 6820 | 1.5 | 1.5 | 10.2 | 5.5 | 5.5 | 37.5 |
| 53 | | | | 1.5 | | | 5.5 | | |
| 54 | | | | 1.5 | | | 5.5 | | |
| 55 | | | | 1.5 | | | 5.5 | | |
| 56 | | | | 1.5 | | | 5.5 | | |
| 57 | 196603 | | 6291 | 1.5 | 1.5 | 9.4 | 5.5 | 5.5 | 34.6 |
| 58 | | | | 1.5 | | | 5.5 | | |
| 59 | | | | 1.5 | | | 5.5 | | |
| 60+ | 664142 | 2.3% | 15275 | 1.5 | 1.5 | 22.9 | 5.5 | 5.5 | 84.0 |
| | | **TOTAL** | **351800** | | | **417.9** | | | **1376.8** |

*Abbreviations: Physically active (PA), population (pop), average (avg)

Physically Active Arizona Females' Fresh Vegetable Sub-Group Recommendations (Starchy, Bean, and Other)

| Age | Cohort Pop | PA % | Active Pop | Starchy Vegetables | | | Bean Vegetables | | | Other Vegetables | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) | per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) | per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) |
| 2 | | | | 2.0 | | | 0.5 | | | 1.5 | | |
| 3 | 133892 | 100.0% | 133892 | 3.5 | 3.0 | 401.7 | 0.5 | 0.5 | 66.9 | 2.5 | 2.2 | 294.6 |
| 4 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 5 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 6 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 7 | 222434 | | 106234 | 4.0 | 3.8 | 403.7 | 1.0 | 0.8 | 85.0 | 3.5 | 3.1 | 329.3 |
| 8 | | 34.7% | | 4.0 | | | 1.0 | | | 3.5 | | |
| 9 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 10 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 11 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 12 | 219669 | | 31984 | 5.0 | 5.0 | 159.9 | 1.5 | 1.5 | 48.0 | 4.0 | 4.0 | 127.9 |
| 13 | | 3.4% | | 5.0 | | | 1.5 | | | 4.0 | | |
| 14 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 15 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 16 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 17 | 224302 | 5.4% | 11215 | 5.0 | 5.2 | 58.3 | 1.5 | 1.6 | 17.9 | 4.0 | 4.2 | 47.1 |
| 18 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 19 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 20 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 21 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 22 | 213022 | | 6817 | 6.0 | 6.0 | 40.9 | 2.0 | 2.0 | 13.6 | 5.0 | 5.0 | 34.1 |
| 23 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 24 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 25 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 26 | | 3.2% | | 5.0 | | | 1.5 | | | 4.0 | | |
| 27 | 214390 | | 6860 | 5.0 | 5.2 | 35.7 | 1.5 | 1.6 | 11.0 | 4.0 | 4.2 | 28.8 |
| 28 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 29 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 30 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 31 | 204472 | | 6543 | 5.0 | 5.0 | 32.7 | 1.5 | 1.5 | 9.8 | 4.0 | 4.0 | 26.2 |
| 32 | | | | 5.0 | | | 1.5 | | | 4.0 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 34 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 35 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 36 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 37 | 205469 | | 6575 | 5.0 | 5.0 | 32.9 | 1.5 | 1.5 | 9.9 | 4.0 | 4.0 | 26.3 |
| 38 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 39 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 40 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 41 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 42 | 200902 | | 6429 | 5.0 | 5.0 | 32.1 | 1.5 | 1.5 | 9.6 | 4.0 | 4.0 | 25.7 |
| 43 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 44 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 45 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 46 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 47 | 214523 | | 6865 | 5.0 | 5.0 | 34.3 | 1.5 | 1.5 | 10.3 | 4.0 | 4.0 | 27.5 |
| 48 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 49 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 50 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 51 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 52 | 213113 | | 6820 | 5.0 | 5.0 | 34.1 | 1.5 | 1.5 | 10.2 | 4.0 | 4.0 | 27.3 |
| 53 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 54 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 55 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 56 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 57 | 196603 | | 6291 | 5.0 | 5.0 | 31.5 | 1.5 | 1.5 | 9.4 | 4.0 | 4.0 | 25.2 |
| 58 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 59 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 60+ | 664142 | 2.3% | 15275 | 5.0 | 5.0 | 76.4 | 1.5 | 1.5 | 22.9 | 4.0 | 4.0 | 61.1 |
| | | **TOTAL** | **351800** | | | **1374.2** | | | **324.7** | | | **1081.0** |

*Abbreviations: Physically active (PA), population (pop), average (avg)

Inactive Arizona Females' Fresh Fruit and Vegetable Recommendations

| Age | Cohort Pop | PA % | Active Pop | Fruit per capita (c/d) | Fruit Avg per capita (c/d) | Fruit Cohort recs (1,000 c/d) | Vegetables per capita (c/d) | Vegetables Avg per capita (c/d) | Vegetables Cohort recs (1,000 c/d) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | 1.0 | | | 1.0 | | |
| 3 | 133892 | 100.0% | 0 | 1.0 | N/A | N/A | 1.0 | N/A | N/A |
| 4 | | | | 1.3 | | | 1.5 | | |
| 5 | | | | 1.3 | | | 1.5 | | |
| 6 | | | | 1.3 | | | 1.5 | | |
| 7 | 222434 | | 116200 | 1.3 | 1.3 | 151.1 | 1.5 | 1.6 | 185.9 |
| 8 | | 34.7% | | 1.3 | | | 1.5 | | |
| 9 | | | | 1.5 | | | 2.0 | | |
| 10 | | | | 1.5 | | | 2.0 | | |
| 11 | | | | 1.5 | | | 2.0 | | |
| 12 | 219669 | | 187685 | 1.5 | 1.5 | 281.5 | 2.0 | 2.1 | 394.1 |
| 13 | | 3.4% | | 1.5 | | | 2.0 | | |
| 14 | | | | 1.5 | | | 2.5 | | |
| 15 | | | | 1.5 | | | 2.5 | | |
| 16 | | | | 1.5 | | | 2.5 | | |
| 17 | 224302 | 5.4% | 213087 | 1.5 | 1.6 | 340.9 | 2.5 | 2.5 | 532.7 |
| 18 | | | | 1.5 | | | 2.5 | | |
| 19 | | | | 2.0 | | | 2.5 | | |
| 20 | | | | 2.0 | | | 2.5 | | |
| 21 | | | | 2.0 | | | 2.5 | | |
| 22 | 213022 | | 206205 | 2.0 | 2.0 | 412.4 | 2.5 | 2.5 | 515.5 |
| 23 | | | | 2.0 | | | 2.5 | | |
| 24 | | | | 2.0 | | | 2.5 | | |
| 25 | | | | 2.0 | | | 2.5 | | |
| 26 | | | | 2.0 | | | 2.5 | | |
| 27 | 214390 | 3.2% | 207530 | 2.0 | 2.0 | 415.1 | 2.5 | 2.5 | 518.8 |
| 28 | | | | 2.0 | | | 2.5 | | |
| 29 | | | | 2.0 | | | 2.5 | | |
| 30 | | | | 2.0 | | | 2.5 | | |
| 31 | | | | 1.5 | | | 2.5 | | |
| 32 | 204472 | | 197929 | 1.5 | 1.6 | 316.7 | 2.5 | 2.5 | 494.8 |
| 33 | | | | 1.5 | | | 2.5 | | |
| 34 | | | | 1.5 | | | 2.5 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 35 | | | | 1.5 | | | 2.5 | | |
| 36 | | | | 1.5 | | | 2.5 | | |
| 37 | 205469 | | 198894 | 1.5 | 1.5 | 298.3 | 2.5 | 2.5 | 497.2 |
| 38 | | | | 1.5 | | | 2.5 | | |
| 39 | | | | 1.5 | | | 2.5 | | |
| 40 | | | | 1.5 | | | 2.5 | | |
| 41 | | | | 1.5 | | | 2.5 | | |
| 42 | 200902 | | 194473 | 1.5 | 1.5 | 291.7 | 2.5 | 2.5 | 486.2 |
| 43 | | | | 1.5 | | | 2.5 | | |
| 44 | | | | 1.5 | | | 2.5 | | |
| 45 | | | | 1.5 | | | 2.5 | | |
| 46 | | | | 1.5 | | | 2.5 | | |
| 47 | 214523 | | 207658 | 1.5 | 1.5 | 311.5 | 2.5 | 2.5 | 519.1 |
| 48 | | | | 1.5 | | | 2.5 | | |
| 49 | | | | 1.5 | | | 2.5 | | |
| 50 | | | | 1.5 | | | 2.5 | | |
| 51 | | | | 1.5 | | | 2.0 | | |
| 52 | 213113 | | 206293 | 1.5 | 1.5 | 309.4 | 2.0 | 2.1 | 433.2 |
| 53 | | | | 1.5 | | | 2.0 | | |
| 54 | | | | 1.5 | | | 2.0 | | |
| 55 | | | | 1.5 | | | 2.0 | | |
| 56 | | | | 1.5 | | | 2.0 | | |
| 57 | 196603 | | 190312 | 1.5 | 1.5 | 285.5 | 2.0 | 2.0 | 380.6 |
| 58 | | | | 1.5 | | | 2.0 | | |
| 59 | | | | 1.5 | | | 2.0 | | |
| 60+ | 664142 | 2.3% | 648867 | 1.5 | 1.5 | 973.3 | 2.0 | 2.0 | 1297.7 |
| | | **TOTAL** | **2775133** | | | **4387.4** | | | **6256.1** |

*Abbreviations: Physically active (PA), population (pop), average (avg), not applicable (NA), cups (c), day (d)

Inactive Arizona Females' Vegetable Sub-Group Recommendations (Dark-Green and Red-Orange)

| Age | Cohort Pop (100 thou) | PA % | Active Pop (100 thou) | Dark-Green Vegetables per capita (c/w) | Dark-Green Vegetables Avg per capita (c/w) | Dark-Green Vegetables Cohort recs (100 thou c/w) | Red-Orange Vegetables per capita (c/w) | Red-Orange Vegetables Avg per capita (c/w) | Red-Orange Vegetables Cohort recs (100 thou c/w) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 134 | 100 | 0 | 0.5 | N/A | N/A | 2.5 | N/A | N/A |
| 3 | | | | 0.5 | | | 2.5 | | |
| 4 | | | | 1.0 | | | 3.0 | | |
| 5 | 222 | | 1 | 1.0 | 1.1 | 1.3 | 3.0 | 3.2 | 3.7 |
| 6 | | 35 | | 1.0 | | | 3.0 | | |
| 7 | | | | 1.0 | | | 3.0 | | |
| 8 | | | | 1.0 | | | 3.0 | | |
| 9 | | | | 1.5 | | | 4.0 | | |
| 10 | 220 | | 2 | 1.5 | 1.5 | 2.8 | 4.0 | 4.3 | 8.1 |
| 11 | | | | 1.5 | | | 4.0 | | |
| 12 | | 3 | | 1.5 | | | 4.0 | | |
| 13 | | | | 1.5 | | | 4.0 | | |
| 14 | | | | 1.5 | | | 5.5 | | |
| 15 | 224 | | 2 | 1.5 | 1.5 | 3.2 | 5.5 | 5.5 | 11.7 |
| 16 | | 5 | | 1.5 | | | 5.5 | | |
| 17 | | | | 1.5 | | | 5.5 | | |
| 18 | | | | 1.5 | | | 5.5 | | |
| 19 | | | | 1.5 | | | 5.5 | | |
| 20 | 213 | 3 | 2 | 1.5 | 1.5 | 3.1 | 5.5 | 5.5 | 11.3 |
| 21 | | | | 1.5 | | | 5.5 | | |
| 22 | | | | 1.5 | | | 5.5 | | |
| 23 | | | | 1.5 | | | 5.5 | | |
| 24 | | | | 1.5 | | | 5.5 | | |
| 25 | 214 | | 2 | 1.5 | 1.5 | 3.1 | 5.5 | 5.5 | 11.4 |
| 26 | | | | 1.5 | | | 5.5 | | |
| 27 | | | | 1.5 | | | 5.5 | | |
| 28 | | | | 1.5 | | | 5.5 | | |
| 29 | | | | 1.5 | | | 5.5 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | 1.5 | | | 5.5 | | |
| 31 | | | | 1.5 | | | 5.5 | | |
| 32 | 204 | | 2 | 1.5 | 1.5 | 3.0 | 5.5 | 5.5 | 10.9 |
| 33 | | | | 1.5 | | | 5.5 | | |
| 34 | | | | 1.5 | | | 5.5 | | |
| 35 | | | | 1.5 | | | 5.5 | | |
| 36 | | | | 1.5 | | | 5.5 | | |
| 37 | 205 | | 2 | 1.5 | 1.5 | 3.0 | 5.5 | 5.5 | 10.9 |
| 38 | | | | 1.5 | | | 5.5 | | |
| 39 | | | | 1.5 | | | 5.5 | | |
| 40 | | | | 1.5 | | | 5.5 | | |
| 41 | | | | 1.5 | | | 5.5 | | |
| 42 | 201 | | 2 | 1.5 | 1.5 | 2.9 | 5.5 | 5.5 | 10.7 |
| 43 | | | | 1.5 | | | 5.5 | | |
| 44 | | | | 1.5 | | | 5.5 | | |
| 45 | | | | 1.5 | | | 5.5 | | |
| 46 | | | | 1.5 | | | 5.5 | | |
| 47 | 215 | | 2 | 1.5 | 1.5 | 3.1 | 5.5 | 5.5 | 11.4 |
| 48 | | | | 1.5 | | | 5.5 | | |
| 49 | | | | 1.5 | | | 5.5 | | |
| 50 | | | | 1.5 | | | 5.5 | | |
| 51 | | | | 1.5 | | | 4.0 | | |
| 52 | 213 | | 2 | 1.5 | 1.5 | 3.1 | 4.0 | 4.3 | 8.9 |
| 53 | | | | 1.5 | | | 4.0 | | |
| 54 | | | | 1.5 | | | 4.0 | | |
| 55 | | | | 1.5 | | | 4.0 | | |
| 56 | | | | 1.5 | | | 4.0 | | |
| 57 | 197 | | 2 | 1.5 | 1.5 | 2.9 | 4.0 | 4.0 | 7.6 |
| 58 | | | | 1.5 | | | 4.0 | | |
| 59 | | | | 1.5 | | | 4.0 | | |
| 60+ | 664 | 2 | 6 | 1.5 | 1.5 | 9.7 | 4.0 | 4.0 | 26.0 |
| **TOTAL** | | | **28** | | | **41.2** | | | **132.6** |

*Abbreviations: Physically active (PA), population (pop), average (avg), not applicable (NA), cups (c), week (w), 100,000 (100 thou)

Inactive Arizona Females 'Vegetable Sub-Group Recommendations (Starchy, Bean, and Other)

| Age | Cohort Pop (100 thou) | PA % | Active Pop (100 thou) | Starchy Vegetables per capita (c/w) | Starchy Vegetables Avg per capita (c/w) | Starchy Vegetables Cohort recs (100 thou c/w) | Bean Vegetables per capita (c/w) | Bean Vegetables Avg per capita (c/w) | Bean Vegetables Cohort recs (100 thou c/w) | Other Vegetables per capita (c/w) | Other Vegetables Avg per capita (c/w) | Other Vegetables Cohort recs (100 thou c/w) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 134 | 100 | 0 | 2.0 | N/A | N/A | 0.5 | N/A | N/A | 1.5 | N/A | N/A |
| 3 | | | | 2.0 | | | 0.5 | | | 1.5 | | |
| 4 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 5 | 222 | | 1 | 3.5 | 3.6 | 4.2 | 0.5 | 0.6 | 0.7 | 2.5 | 2.7 | 3.1 |
| 6 | | 35 | | 3.5 | | | 0.5 | | | 2.5 | | |
| 7 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 8 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 9 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 10 | 220 | | 2 | 4.0 | 4.2 | 7.9 | 1.0 | 1.1 | 2.1 | 3.5 | 3.6 | 6.8 |
| 11 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 12 | | 3 | | 4.0 | | | 1.0 | | | 3.5 | | |
| 13 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 14 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 15 | 224 | | 2 | 5.0 | 5.0 | 10.7 | 1.5 | 1.5 | 3.2 | 4.0 | 4.0 | 8.5 |
| 16 | | 5 | | 5.0 | | | 1.5 | | | 4.0 | | |
| 17 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 18 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 19 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 20 | 213 | 3 | 2 | 5.0 | 5.0 | 10.3 | 1.5 | 1.5 | 3.1 | 4.0 | 4.0 | 8.2 |
| 21 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 22 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 23 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 24 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 25 | 214 | | 2 | 5.0 | 5.0 | 10.4 | 1.5 | 1.5 | 3.1 | 4.0 | 4.0 | 8.3 |
| 26 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 27 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 28 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 29 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 30 | 204 | | 2 | 5.0 | 5.0 | 9.9 | 1.5 | 1.5 | 3.0 | 4.0 | 4.0 | 7.9 |
| 31 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 32 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 33 | | | | 5.0 | | | 1.5 | | | 4.0 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 35 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 36 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 37 | 205 | | 2 | 5.0 | 5.0 | 9.9 | 1.5 | 1.5 | 3.0 | 4.0 | 4.0 | 8.0 |
| 38 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 39 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 40 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 41 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 42 | 201 | | 2 | 5.0 | 5.0 | 9.7 | 1.5 | 1.5 | 2.9 | 4.0 | 4.0 | 7.8 |
| 43 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 44 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 45 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 46 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 47 | 215 | | 2 | 5.0 | 5.0 | 10.4 | 1.5 | 1.5 | 3.1 | 4.0 | 4.0 | 8.3 |
| 48 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 49 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 50 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 51 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 52 | 213 | | 2 | 4.0 | 4.2 | 8.7 | 1.0 | 1.1 | 2.3 | 3.5 | 3.6 | 7.4 |
| 53 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 54 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 55 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 56 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 57 | 197 | | 2 | 4.0 | 4.0 | 7.6 | 1.0 | 1.0 | 1.9 | 3.5 | 3.5 | 6.7 |
| 58 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 59 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 60+ | 664 | 2 | 6 | 4.0 | 4.0 | 26.0 | 1.0 | 1.0 | 6.5 | 3.5 | 3.5 | 22.7 |
| **TOTAL** | | | **28** | | | **125.6** | | | **34.8** | | | **103.7** |

*Abbreviations: Physically active (PA), population (pop), average (avg), not applicable (NA), cups (c), week (w), 100,000 (100 thou)

APPENDIX H

ARIZONA MALES' FRESH FRUIT AND

VEGETABLE RECOMMENDATIONS

Physically Active Arizona Males' Fresh Fruit and Vegetable Recommendations

| **Age** | **Cohort Pop** | **PA %** | **Active Pop** | **Fruit** | | | **Vegetables** | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | **per capita (c/d)** | **Avg per capita (c/d)** | **Cohort recs (1,000 c/d)** | **per capita (c/d)** | **Avg per capita (c/d)** | **Cohort recs (1,000 c/d)** |
| 2 | | | | 1.0 | | | 1.0 | | |
| 3 | 139537 | 100.0% | 139537 | 1.5 | 1.3 | 181.4 | 1.5 | 1.3 | 181.4 |
| 4 | | | | 1.5 | | | 1.5 | | |
| 5 | | | | 1.5 | | | 1.5 | | |
| 6 | | | | 1.5 | | | 2.0 | | |
| 7 | 231246 | | 136713 | 1.5 | 1.5 | 205.1 | 2.0 | 2.0 | 273.4 |
| 8 | | 48.9% | | 1.5 | | | 2.0 | | |
| 9 | | | | 1.5 | | | 2.5 | | |
| 10 | | | | 1.5 | | | 2.5 | | |
| 11 | | | | 2.0 | | | 2.5 | | |
| 12 | 228995 | | 61142 | 2.0 | 1.9 | 116.2 | 3.0 | 2.8 | 171.2 |
| 13 | | 11.9% | | 2.0 | | | 3.0 | | |
| 14 | | | | 2.0 | | | 3.0 | | |
| 15 | | | | 2.0 | | | 3.5 | | |
| 16 | | | | 2.5 | | | 3.5 | | |
| 17 | 237280 | 10.0% | 24630 | 2.5 | 2.4 | 59.1 | 3.5 | 3.5 | 86.2 |
| 18 | | | | 2.5 | | | 3.5 | | |
| 19 | | | | 2.5 | | | 3.5 | | |
| 20 | | | | 2.5 | | | 3.5 | | |
| 21 | | | | 2.5 | | | 3.5 | | |
| 22 | 229562 | | 8723 | 2.5 | 2.5 | 21.8 | 3.5 | 3.5 | 30.5 |
| 23 | | | | 2.5 | | | 3.5 | | |
| 24 | | | | 2.5 | | | 3.5 | | |
| 25 | | 3.8% | | 2.5 | | | 3.5 | | |
| 26 | | | | 2.0 | | | 3.5 | | |
| 27 | 225608 | | 8573 | 2.0 | 2.1 | 18.0 | 3.5 | 3.5 | 30.0 |
| 28 | | | | 2.0 | | | 3.5 | | |
| 29 | | | | 2.0 | | | 3.5 | | |
| 30 | 212223 | | 8064 | 2.0 | 2.0 | 16.1 | 3.5 | 3.5 | 28.2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 31 | | | | 2.0 | | | 3.5 | | |
| 32 | | | | 2.0 | | | 3.5 | | |
| 33 | | | | 2.0 | | | 3.5 | | |
| 34 | | | | 2.0 | | | 3.5 | | |
| 35 | | | | 2.0 | | | 3.5 | | |
| 36 | | | | 2.0 | | | 3.5 | | |
| 37 | 210224 | | 7989 | 2.0 | 2.0 | 16.0 | 3.5 | 3.0 | 24.0 |
| 38 | | | | 2.0 | | | 3.5 | | |
| 39 | | | | 2.0 | | | 3.5 | | |
| 40 | | | | 2.0 | | | 3.5 | | |
| 41 | | | | 2.0 | | | 3.5 | | |
| 42 | 205899 | | 7824 | 2.0 | 2.0 | 15.6 | 3.5 | 3.5 | 27.4 |
| 43 | | | | 2.0 | | | 3.5 | | |
| 44 | | | | 2.0 | | | 3.5 | | |
| 45 | | | | 2.0 | | | 3.5 | | |
| 46 | | | | 2.0 | | | 3.0 | | |
| 47 | 212499 | | 8075 | 2.0 | 2.0 | 16.2 | 3.0 | 3.1 | 25.0 |
| 48 | | | | 2.0 | | | 3.0 | | |
| 49 | | | | 2.0 | | | 3.0 | | |
| 50 | | | | 2.0 | | | 3.0 | | |
| 51 | | | | 2.0 | | | 3.0 | | |
| 52 | 202411 | | 7692 | 2.0 | 2.0 | 15.4 | 3.0 | 3.0 | 23.1 |
| 53 | | | | 2.0 | | | 3.0 | | |
| 54 | | | | 2.0 | | | 3.0 | | |
| 55 | | | | 2.0 | | | 3.0 | | |
| 56 | | | | 2.0 | | | 3.0 | | |
| 57 | 178665 | | 6789 | 2.0 | 2.0 | 13.6 | 3.0 | 3.0 | 20.4 |
| 58 | | | | 2.0 | | | 3.0 | | |
| 59 | | | | 2.0 | | | 3.0 | | |
| 60+ | 568649 | 2.5% | 14216 | 2.0 | 2.0 | 28.4 | 3.0 | 3.0 | 42.6 |
| | | **TOTAL** | **439967.0** | | | **722.9** | | | **963.5** |

*Abbreviations: Physically active (PA), population (pop), average (avg), cups (c), day (d)

Physically Active Arizona Males'  Vegetable Sub-Group Recommendations (Dark-Green and Red-Orange)

| Age | Cohort Pop | PA % | Active Pop | Dark-Green Vegetables | | | Red-Orange Vegetables | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) |
| 2 | | | | 0.5 | | | 2.5 | | |
| 3 | 139537 | 100.0% | 139537 | 1.0 | 0.8 | 111.6 | 3.0 | 2.8 | 390.7 |
| 4 | | | | 1.0 | | | 3.0 | | |
| 5 | | | | 1.0 | | | 3.0 | | |
| 6 | | | | 1.5 | | | 4.0 | | |
| 7 | 231246 | | 136713 | 1.5 | 1.4 | 191.4 | 4.0 | 4.1 | 560.5 |
| 8 | | 48.9% | | 1.5 | | | 4.0 | | |
| 9 | | | | 1.5 | | | 5.5 | | |
| 10 | | | | 1.5 | | | 5.5 | | |
| 11 | | | | 1.5 | | | 5.5 | | |
| 12 | 228995 | | 61142 | 2.0 | 1.8 | 110.1 | 6.0 | 5.8 | 354.6 |
| 13 | | 11.9% | | 2.0 | | | 6.0 | | |
| 14 | | | | 2.0 | | | 6.0 | | |
| 15 | | | | 2.5 | | | 7.0 | | |
| 16 | | | | 2.5 | | | 7.0 | | |
| 17 | 237280 | 10.0% | 24630 | 2.5 | 2.5 | 61.6 | 7.0 | 7.0 | 172.4 |
| 18 | | | | 2.5 | | | 7.0 | | |
| 19 | | | | 2.5 | | | 7.0 | | |
| 20 | | | | 2.5 | | | 7.0 | | |
| 21 | | | | 2.5 | | | 7.0 | | |
| 22 | 229562 | | 8723 | 2.5 | 2.5 | 21.8 | 7.0 | 7.0 | 61.1 |
| 23 | | | | 2.5 | | | 7.0 | | |
| 24 | | | | 2.5 | | | 7.0 | | |
| 25 | | | | 2.5 | | | 7.0 | | |
| 26 | | 3.8% | | 2.5 | | | 7.0 | | |
| 27 | 225608 | | 8573 | 2.5 | 2.5 | 21.4 | 7.0 | 7.0 | 60.0 |
| 28 | | | | 2.5 | | | 7.0 | | |
| 29 | | | | 2.5 | | | 7.0 | | |
| 30 | | | | 2.5 | | | 7.0 | | |
| 31 | | | | 2.5 | | | 7.0 | | |
| 32 | 212223 | | 8064 | 2.5 | 2.5 | 20.2 | 7.0 | 7.0 | 56.4 |
| 33 | | | | 2.5 | | | 7.0 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 34 | | | | 2.5 | | | 7.0 | | |
| 35 | | | | 2.5 | | | 7.0 | | |
| 36 | | | | 2.5 | | | 7.0 | | |
| 37 | 210224 | | 7989 | 2.5 | 2.5 | 20.0 | 7.0 | 7.0 | 55.9 |
| 38 | | | | 2.5 | | | 7.0 | | |
| 39 | | | | 2.5 | | | 7.0 | | |
| 40 | | | | 2.5 | | | 7.0 | | |
| 41 | | | | 2.5 | | | 7.0 | | |
| 42 | 205899 | | 7824 | 2.5 | 2.5 | 19.6 | 7.0 | 7.0 | 54.8 |
| 43 | | | | 2.5 | | | 7.0 | | |
| 44 | | | | 2.5 | | | 7.0 | | |
| 45 | | | | 2.5 | | | 7.0 | | |
| 46 | | | | 2.0 | | | 6.0 | | |
| 47 | 212499 | | 8075 | 2.0 | 2.1 | 17.0 | 6.0 | 6.2 | 50.1 |
| 48 | | | | 2.0 | | | 6.0 | | |
| 49 | | | | 2.0 | | | 6.0 | | |
| 50 | | | | 2.0 | | | 6.0 | | |
| 51 | | | | 2.0 | | | 6.0 | | |
| 52 | 202411 | | 7692 | 2.0 | 2.0 | 15.4 | 6.0 | 6.0 | 46.2 |
| 53 | | | | 2.0 | | | 6.0 | | |
| 54 | | | | 2.0 | | | 6.0 | | |
| 55 | | | | 2.0 | | | 6.0 | | |
| 56 | | | | 2.0 | | | 6.0 | | |
| 57 | 178665 | | 6789 | 2.0 | 2.0 | 13.6 | 6.0 | 6.0 | 40.7 |
| 58 | | | | 2.0 | | | 6.0 | | |
| 59 | | | | 2.0 | | | 6.0 | | |
| 60+ | 568649 | 2.5% | 14216 | 2.0 | 2.0 | 28.4 | 6.0 | 6.0 | 85.3 |
| | | **TOTAL** | **439967.0** | | | **651.9** | | | **1988.7** |

*Abbreviations: Physically active (PA), population (pop), average (avg), recommendations (recs), cups (c), week (w)

Physically Active Arizona Males' Vegetable Sub-Group Recommendations (Starchy, Bean, and Other)

| Age | Cohort Pop | PA % | Active Pop | Starchy Vegetables per capita (c/w) | Starchy Vegetables Avg per capita (c/w) | Starchy Vegetables Cohort recs (1,000 c/w) | Bean Vegetables per capita (c/w) | Bean Vegetables Avg per capita (c/w) | Bean Vegetables Cohort recs (1,000 c/w) | Other Vegetables per capita (c/w) | Other Vegetables Avg per capita (c/w) | Other Vegetables Cohort recs (1,000 c/w) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | 2.0 | | | 0.5 | | | 1.5 | | |
| 3 | 139537 | 100.0% | 139537 | 3.5 | 3.0 | 418.6 | 0.5 | 0.5 | 69.8 | 2.5 | 2.2 | 307.0 |
| 4 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 5 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 6 | | | | 4.0 | | | 1.0 | | | 3.5 | | |
| 7 | 231246 | | 136713 | 4.0 | 4.1 | 560.5 | 1.0 | 1.0 | 136.7 | 3.5 | 3.4 | 464.8 |
| 8 | | 48.9% | | 4.0 | | | 1.0 | | | 3.5 | | |
| 9 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 10 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 11 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 12 | 228995 | | 61142 | 6.0 | 5.6 | 342.4 | 2.0 | 1.8 | 110.1 | 5.0 | 4.6 | 281.3 |
| 13 | | 11.9% | | 6.0 | | | 2.0 | | | 5.0 | | |
| 14 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 15 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 16 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 17 | 237280 | 10.0% | 24630 | 7.0 | 7.0 | 172.4 | 2.5 | 2.5 | 61.6 | 5.5 | 5.5 | 135.5 |
| 18 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 19 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 20 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 21 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 22 | 229562 | | 8723 | 7.0 | 7.0 | 61.1 | 2.5 | 2.5 | 21.8 | 5.5 | 5.5 | 48.0 |
| 23 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 24 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 25 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 26 | | 3.8% | | 7.0 | | | 2.5 | | | 5.5 | | |
| 27 | 225608 | | 8573 | 7.0 | 7.0 | 60.0 | 2.5 | 2.5 | 21.4 | 5.5 | 5.5 | 47.2 |
| 28 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 29 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 30 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 31 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 32 | 212223 | | 8064 | 7.0 | 7.0 | 56.4 | 2.5 | 2.5 | 20.2 | 5.5 | 5.5 | 44.4 |
| 33 | | | | 7.0 | | | 2.5 | | | 5.5 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 35 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 36 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 37 | 210224 | | 7989 | 7.0 | 7.0 | 55.9 | 2.5 | 2.5 | 20.0 | 5.5 | 5.5 | 43.9 |
| 38 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 39 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 40 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 41 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 42 | 205899 | | 7824 | 7.0 | 7.0 | 54.8 | 2.5 | 2.5 | 19.6 | 5.5 | 5.5 | 43.0 |
| 43 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 44 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 45 | | | | 7.0 | | | 2.5 | | | 5.5 | | |
| 46 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 47 | 212499 | | 8075 | 6.0 | 6.2 | 50.1 | 2.0 | 2.1 | 17.0 | 5.0 | 5.1 | 41.2 |
| 48 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 49 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 50 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 51 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 52 | 202411 | | 7692 | 6.0 | 6.0 | 46.2 | 2.0 | 2.0 | 15.4 | 5.0 | 5.0 | 38.5 |
| 53 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 54 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 55 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 56 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 57 | 178665 | | 6789 | 6.0 | 6.0 | 40.7 | 2.0 | 2.0 | 13.6 | 5.0 | 5.0 | 33.9 |
| 58 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 59 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 60+ | 568649 | 2.5% | 14216 | 6.0 | 6.0 | 85.3 | 2.0 | 2.0 | 28.4 | 5.0 | 5.0 | 71.1 |
| | | **TOTAL** | **439967.0** | | | **2004.4** | | | **555.4** | | | **1599.6** |

*Abbreviations: Physically active (PA), population (pop), average (avg), recommendations (recs), cups (c), week (w)

Inactive Arizona Males' Fresh Fruit and Vegetable Recommendations

| Age | Cohort Pop | PA % | Active Pop | Fruit | | | Vegetables | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) | per capita (c/d) | Avg per capita (c/d) | Cohort recs (1,000 c/d) |
| 2 | 139537 | 100.0% | 0 | 1.0 | N/A | N/A | 1.0 | N/A | N/A |
| 3 | | | | 1.0 | | | 1.0 | | |
| 4 | | | | 1.3 | | | 1.5 | | |
| 5 | 231246 | | 94533 | 1.3 | 1.3 | 122.9 | 1.5 | 1.7 | 160.7 |
| 6 | | 48.9% | | 1.3 | | | 1.5 | | |
| 7 | | | | 1.3 | | | 1.5 | | |
| 8 | | | | 1.3 | | | 1.5 | | |
| 9 | | | | 1.5 | | | 2.5 | | |
| 10 | 228995 | | 167853 | 1.5 | 1.6 | 268.6 | 2.5 | 2.6 | 436.4 |
| 11 | | | | 1.5 | | | 2.5 | | |
| 12 | | 11.9% | | 1.5 | | | 2.5 | | |
| 13 | | | | 1.5 | | | 2.5 | | |
| 14 | | | | 2.0 | | | 3.0 | | |
| 15 | 237280 | | 212650 | 2.0 | 2.0 | 425.3 | 3.0 | 3.0 | 638.0 |
| 16 | | 10.0% | | 2.0 | | | 3.0 | | |
| 17 | | | | 2.0 | | | 3.0 | | |
| 18 | | | | 2.0 | | | 3.0 | | |
| 19 | | | | 2.0 | | | 3.0 | | |
| 20 | 229562 | 3.8% | 220839 | 2.0 | 2.0 | 441.7 | 3.0 | 3.0 | 662.5 |
| 21 | | | | 2.0 | | | 3.0 | | |
| 22 | | | | 2.0 | | | 3.0 | | |
| 23 | | | | 2.0 | | | 3.0 | | |
| 24 | | | | 2.0 | | | 3.0 | | |
| 25 | 225608 | | 217035 | 2.0 | 2.0 | 434.1 | 3.0 | 3.0 | 651.1 |
| 26 | | | | 2.0 | | | 3.0 | | |
| 27 | | | | 2.0 | | | 3.0 | | |
| 28 | | | | 2.0 | | | 3.0 | | |
| 29 | | | | 2.0 | | | 3.0 | | |
| 30 | 212223 | | 204159 | 2.0 | 2.0 | 408.3 | 3.0 | 3.0 | 612.5 |
| 31 | | | | 2.0 | | | 3.0 | | |
| 32 | | | | 2.0 | | | 3.0 | | |
| 33 | | | | 2.0 | | | 3.0 | | |
| 34 | | | | 2.0 | | | 3.0 | | |
| 35 | 210224 | | 202235 | 2.0 | 2.0 | 404.5 | 3.0 | 3.0 | 606.7 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 36 | | | | 2.0 | | | 3.0 | | |
| 37 | | | | 2.0 | | | 3.0 | | |
| 38 | | | | 2.0 | | | 3.0 | | |
| 39 | | | | 2.0 | | | 3.0 | | |
| 40 | | | | 2.0 | | | 3.0 | | |
| 41 | | | | 2.0 | | | 3.0 | | |
| 42 | 205899 | | 198075 | 2.0 | 2.0 | 396.2 | 3.0 | 3.0 | 594.2 |
| 43 | | | | 2.0 | | | 3.0 | | |
| 44 | | | | 2.0 | | | 3.0 | | |
| 45 | | | | 2.0 | | | 3.0 | | |
| 46 | | | | 2.0 | | | 3.0 | | |
| 47 | 212499 | | 204424 | 2.0 | 2.0 | 408.8 | 3.0 | 3.0 | 613.3 |
| 48 | | | | 2.0 | | | 3.0 | | |
| 49 | | | | 2.0 | | | 3.0 | | |
| 50 | | | | 2.0 | | | 3.0 | | |
| 51 | | | | 2.0 | | | 2.5 | | |
| 52 | 202411 | | 194719 | 2.0 | 2.0 | 389.4 | 2.5 | 2.6 | 506.3 |
| 53 | | | | 2.0 | | | 2.5 | | |
| 54 | | | | 2.0 | | | 2.5 | | |
| 55 | | | | 2.0 | | | 2.5 | | |
| 56 | | | | 2.0 | | | 2.5 | | |
| 57 | 178665 | | 171876 | 2.0 | 2.0 | 343.8 | 2.5 | 2.5 | 429.7 |
| 58 | | | | 2.0 | | | 2.5 | | |
| 59 | | | | 2.0 | | | 2.5 | | |
| 60+ | 568649 | 2.5% | 554433 | 2.0 | 2.0 | 1108.9 | 2.5 | 2.5 | 1386.1 |
| | | **TOTAL** | **2642831.0** | | | **5152.3** | | | **7297.4** |

*Abbreviations: Physically active (PA), population (pop), average (avg), cups (c), day (d)

Inactive Arizona Males' Fresh Vegetable Sub-Group Recommendations (Dark-Greens and Red-Orange)

| Age | Cohort Pop | PA % | Active Pop | Dark-Green Vegetables | | | Red-Orange Vegetables | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) |
| 2 | | | | 0.5 | | | 2.5 | | |
| 3 | 139537 | | 0 | 0.5 | N/A | N/A | 2.5 | N/A | N/A |
| 4 | | 100.0% | | 1.0 | | | 3.0 | | |
| 5 | | | | 1.0 | | | 3.0 | | |
| 6 | | | | 1.0 | | | 3.0 | | |
| 7 | 231246 | | 94533 | 1.0 | 1.1 | 104.0 | 3.0 | 3.5 | 330.9 |
| 8 | | 48.9% | | 1.0 | | | 3.0 | | |
| 9 | | | | 1.5 | | | 5.5 | | |
| 10 | | | | 1.5 | | | 5.5 | | |
| 11 | | | | 1.5 | | | 5.5 | | |
| 12 | 228995 | | 167853 | 1.5 | 1.6 | 268.6 | 5.5 | 5.6 | 940.0 |
| 13 | | 11.9% | | 1.5 | | | 5.5 | | |
| 14 | | | | 2.0 | | | 6.0 | | |
| 15 | | | | 2.0 | | | 6.0 | | |
| 16 | | | | 2.0 | | | 6.0 | | |
| 17 | 237280 | 10.0% | 212650 | 2.0 | 2.0 | 425.3 | 6.0 | 6.0 | 1275.9 |
| 18 | | | | 2.0 | | | 6.0 | | |
| 19 | | | | 2.0 | | | 6.0 | | |
| 20 | | | | 2.0 | | | 6.0 | | |
| 21 | | | | 2.0 | | | 6.0 | | |
| 22 | 229562 | | 220839 | 2.0 | 2.0 | 441.7 | 6.0 | 6.0 | 1325.0 |
| 23 | | | | 2.0 | | | 6.0 | | |
| 24 | | | | 2.0 | | | 6.0 | | |
| 25 | | 3.8% | | 2.0 | | | 6.0 | | |
| 26 | | | | 2.0 | | | 6.0 | | |
| 27 | 225608 | | 217035 | 2.0 | 2.0 | 434.1 | 6.0 | 6.0 | 1302.2 |
| 28 | | | | 2.0 | | | 6.0 | | |
| 29 | | | | 2.0 | | | 6.0 | | |
| 30 | 212223 | | 204159 | 2.0 | 2.0 | 408.3 | 6.0 | 6.0 | 1225.0 |
| 31 | | | | 2.0 | | | 6.0 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 32 | | | | 2.0 | | | 6.0 | | |
| 33 | | | | 2.0 | | | 6.0 | | |
| 34 | | | | 2.0 | | | 6.0 | | |
| 35 | | | | 2.0 | | | 6.0 | | |
| 36 | | | | 2.0 | | | 6.0 | | |
| 37 | 210224 | | 202235 | 2.0 | 2.0 | 404.5 | 6.0 | 6.0 | 1213.4 |
| 38 | | | | 2.0 | | | 6.0 | | |
| 39 | | | | 2.0 | | | 6.0 | | |
| 40 | | | | 2.0 | | | 6.0 | | |
| 41 | | | | 2.0 | | | 6.0 | | |
| 42 | 205899 | | 198075 | 2.0 | 2.0 | 396.2 | 6.0 | 6.0 | 1188.5 |
| 43 | | | | 2.0 | | | 6.0 | | |
| 44 | | | | 2.0 | | | 6.0 | | |
| 45 | | | | 2.0 | | | 6.0 | | |
| 46 | | | | 2.0 | | | 6.0 | | |
| 47 | 212499 | | 204424 | 2.0 | 2.0 | 408.8 | 6.0 | 6.0 | 1226.5 |
| 48 | | | | 2.0 | | | 6.0 | | |
| 49 | | | | 2.0 | | | 6.0 | | |
| 50 | | | | 2.0 | | | 6.0 | | |
| 51 | | | | 1.5 | | | 5.5 | | |
| 52 | 202411 | | 194719 | 1.5 | 1.6 | 311.6 | 5.5 | 5.6 | 1090.4 |
| 53 | | | | 1.5 | | | 5.5 | | |
| 54 | | | | 1.5 | | | 5.5 | | |
| 55 | | | | 1.5 | | | 5.5 | | |
| 56 | | | | 1.5 | | | 5.5 | | |
| 57 | 178665 | | 171876 | 1.5 | 1.5 | 257.8 | 5.5 | 5.5 | 945.3 |
| 58 | | | | 1.5 | | | 5.5 | | |
| 59 | | | | 1.5 | | | 5.5 | | |
| 60+ | 568649 | 2.5% | 554433 | 1.5 | 1.5 | 831.6 | 5.5 | 5.5 | 3049.4 |
| | | **TOTAL** | **2642831.0** | | | **4692.4** | | | **15112.5** |

*Abbreviations: Physically active (PA), population (pop), average (avg), recommendations (recs), cups (c), week (w)

Inactive Arizona Males' Fresh Vegetable Sub-Group Recommendations (Starchy, Bean, and Other)

| Age | Cohort Pop | PA % | Active Pop | Starchy Vegetables | | | Bean Vegetables | | | Other Vegetables | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) | per capita (c/w) | Avg per capita (c/w) | Cohort recs (1,000 c/w) |
| 2 | | | | 2.0 | | | 0.5 | | | 1.5 | | |
| 3 | 139537 | | 0 | 2.0 | N/A | N/A | 0.5 | N/A | N/A | 1.5 | N/A | N/A |
| 4 | | 100.0% | | 3.5 | | | 0.5 | | | 2.5 | | |
| 5 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 6 | | | | 3.5 | | | 0.5 | | | 2.5 | | |
| 7 | 231246 | | 94533 | 3.5 | 3.8 | 359.2 | 0.5 | 0.7 | 66.2 | 2.5 | 2.8 | 264.7 |
| 8 | | 48.9% | | 3.5 | | | 0.5 | | | 2.5 | | |
| 9 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 10 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 11 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 12 | 228995 | | 167853 | 5.0 | 5.2 | 872.8 | 1.5 | 1.6 | 268.6 | 4.0 | 4.2 | 705.0 |
| 13 | | 11.9% | | 5.0 | | | 1.5 | | | 4.0 | | |
| 14 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 15 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 16 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 17 | 237280 | 10.0% | 212650 | 6.0 | 6.0 | 1275.9 | 2.0 | 2.0 | 425.3 | 5.0 | 5.0 | 1063.3 |
| 18 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 19 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 20 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 21 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 22 | 229562 | | 220839 | 6.0 | 6.0 | 1325.0 | 2.0 | 2.0 | 441.7 | 5.0 | 5.0 | 1104.2 |
| 23 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 24 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 25 | | 3.8% | | 6.0 | | | 2.0 | | | 5.0 | | |
| 26 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 27 | 225608 | | 217035 | 6.0 | 6.0 | 1302.2 | 2.0 | 2.0 | 434.1 | 5.0 | 5.0 | 1085.2 |
| 28 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 29 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 30 | 212223 | | 204159 | 6.0 | 6.0 | 1225.0 | 2.0 | 2.0 | 408.3 | 5.0 | 5.0 | 1020.8 |
| 31 | | | | 6.0 | | | 2.0 | | | 5.0 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 33 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 34 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 35 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 36 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 37 | 210224 | | 202235 | 6.0 | 6.0 | 1213.4 | 2.0 | 2.0 | 404.5 | 5.0 | 5.0 | 1011.2 |
| 38 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 39 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 40 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 41 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 42 | 205899 | | 198075 | 6.0 | 6.0 | 1188.5 | 2.0 | 2.0 | 396.2 | 5.0 | 5.0 | 990.4 |
| 43 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 44 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 45 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 46 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 47 | 212499 | | 204424 | 6.0 | 6.0 | 1226.5 | 2.0 | 2.0 | 408.8 | 5.0 | 5.0 | 1022.1 |
| 48 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 49 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 50 | | | | 6.0 | | | 2.0 | | | 5.0 | | |
| 51 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 52 | 202411 | | 194719 | 5.0 | 5.2 | 1012.5 | 1.5 | 1.6 | 311.6 | 4.0 | 4.2 | 817.8 |
| 53 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 54 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 55 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 56 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 57 | 178665 | | 171876 | 5.0 | 5.0 | 859.4 | 1.5 | 1.5 | 257.8 | 4.0 | 4.0 | 687.5 |
| 58 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 59 | | | | 5.0 | | | 1.5 | | | 4.0 | | |
| 60+ | 568649 | 2.5% | 554433 | 5.0 | 5.0 | 2772.2 | 1.5 | 1.5 | 831.6 | 4.0 | 4.0 | 2217.7 |
| | | **TOTAL** | **2642831.0** | | | **14632.6** | | | **4654.6** | | | **11989.8** |

*Abbreviations: Physically active (PA), population (pop), average (avg), recommendations (recs), cups (c), week (w)

# APPENDIX I

## SERVING WEIGHTS FOR FRESH VEGETABLES

**Appendix table 2—Serving weights for the vegetable group**

| Food supply commodity | Nutrient database number[1] | Serving description | Serving weight[2] | Loss from primary to consumer weight[3] | Nonedible share (refuse) | Cooking loss | Retail loss | Foodservice and consumer loss | Calories per serving |
|---|---|---|---|---|---|---|---|---|---|
| | | | Grams | Percent | | | | | Calories |
| **Fresh vegetables:** | | | | | | | | | |
| Artichokes | 11008 | 1 medium (globe or french) cooked, boiled, drained | 120 | 7 | 60 | 6 | 2 | 30 | 60 |
| Asparagus | 11012 | 1/2-cup, cooked, boiled, drained | 90 | 9 | 47 | 7 | 2 | 30 | 22 |
| Beans - snap | 11053 | 1/2-cup, green snap beans, cooked, boiled, drained | 63 | 6 | 12 | 2 | 2 | 30 | 22 |
| Broccoli | 11090 | 1/2-cup chopped or diced, raw | 44 | 8 | 39 | – | 2 | 30 | 12 |
| Brussels sprouts | 11099 | 1/2-cup, cooked, boiled, drained | 78 | 8 | 10 | +9 | 2 | 30 | 30 |
| Cabbage | 11109 | 1/2-cup chopped or shredded, raw | 80 | 7 | 20 | – | 2 | 30 | 17 |
| Carrots | 11124 | 1/2-cup chopped, grated, strips, or slices, raw | 62 | 3 | 11 | – | 2 | 30 | 26 |
| Cauliflower | 11135 | 1/2-cup, raw | 50 | 8 | 61 | – | 2 | 30 | 12 |
| Celery | 11143 | 1/2-cup diced or strips, raw | 61 | 7 | 11 | – | 2 | 30 | 10 |
| Corn - sweet | 11168 | 1/2-cup, yellow, cooked, boiled, drained, cut from cob | 82 | 8 | 64 | 12 | 2 | 30 | 89 |
| Cucumbers | 11206 | 1/2-cup pared, chopped or sliced | 63 | 8 | 27 | – | 2 | 30 | 8 |
| Eggplant | 11210 | 1/2-cup cubes, cooked, boiled, drained | 45 | 10 | 19 | 7 | 2 | 30 | 14 |
| Escarole/endive | 11213 | 1 cup endive chopped, raw | 50 | 7 | 14 | -- | 2 | 30 | 4 |
| Garlic | 11215 | 1/2-cup, raw | 68 | 19 | 13 | – | 2 | 30 | 13 |
| Lettuce-head | 11252, 11250 | 1/2-cup shredded or chopped, iceberg or butterhead, raw | 28 | 7 | 16 | – | 2 | 30 | 3 |
| Lettuce-Romaine/leaf | 11251, 11253 | 1-cup Cos, Romaine or looseleaf, shredded, raw | 56 | 7 | 21 | – | 2 | 30 | 4 |
| Mushrooms | 11260 | 1/2-cup pieces or slices, raw | 35 | na | 3 | – | 2 | 30 | 9 |
| Onions | 11283 | 1/2-cup cooked, boiled, drained | 105 | 6 | 10 | 15 | 2 | 30 | 46 |
| Peppers - bell | 11333 | 1/2-cup sliced or chopped, raw | 61 | 8 | 18 | – | 2 | 30 | 16 |
| Potatoes | 11363, 11367 | 1/2-cup flesh, without skin, boiled; 1/2-cup flesh, baked | 70 | 4 | 23 | 10 | 2 | 30 | 62 |
| Radishes | 11429 | 1/2-cup slices, raw | 58 | 3 | 10 | – | 2 | 30 | 12 |
| Spinach | 11457 | 1-cup, raw | 30 | 15 | 28 | – | 2 | 30 | 7 |
| Sweetpotatoes[4] | 11367 | 1/2-cup flesh, without skin, boiled; 1/2-cup flesh, baked | 70 | 4 | 25 | 11 | 2 | 30 | 62 |
| Tomatoes | 11529 | 1/2-cup chopped or sliced, raw | 90 | 15 | 9 | – | 2 | 30 | 19 |
| **Vegetables for canning:** | | | | | | | | | |
| Asparagus | 11015 | 1/2-cup canned, drained solids | 121 | 18 | 0 | – | 1 | 15 | 23 |
| Snap beans | 11056 | 1/2-cup green, canned, regular pack, drained solids | 68 | +40 | 0 | – | 1 | 15 | 13 |
| Cabbage for sauerkraut | 11439 | 1/2-cup sauerkraut, canned, solids and liquids | 71 | 56 | 0 | – | 1 | 15 | 22 |
| Carrots | 11128 | 1/2-cup, canned, regular pack, drained solids, sliced | 73 | 25 | 0 | – | 1 | 15 | 18 |
| Chile peppers | 11329 | 1/2-cup chopped or diced | 68 | 27 | 0 | – | 1 | 15 | 14 |
| Corn, sweet | 11172 | 1/2-cup, yellow, canned, whole kernel, drained solids | 82 | 27 | 0 | – | 1 | 15 | 66 |
| Cucumbers for pickling | 11907, 11940 | 1/2-cup dill or sweet, diced, chopped, or sliced | 79 | 60 | 0 | -- | 1 | 15 | 55 |
| Green peas | 11308 | 1/2-cup, canned, regular pack, drained solids | 85 | +34 | 0 | – | 1 | 15 | 59 |
| Mushrooms | 11264 | 1/2-cup, canned, drained solids, pieces | 78 | +35 | 0 | – | 1 | 15 | 19 |
| Potatoes | 11376 | 1/2-cup, canned, drained solids | 90 | 29 | 0 | – | 1 | 15 | 54 |
| Tomatoes | 11885 | 1/2-cup, canned, red ripe, whole | 120 | 59 | 0 | – | 1 | 15 | 23 |
| Other (beets, spinach) | 11084, 11461 | 1/2-cup beets, or spinach, chopped or diced, sliced or whole, canned | 107 | 24 | 0 | – | 1 | 15 | 39 |

See notes at end of table.

—Continued

APPENDIX J

SERVING WEIGHTS FOR FRESH FRUIT

**Appendix table 3—Serving weights for the fruit group**

| Food supply commodity | Nutrient database number[1] | Serving description | Serving weight[2] | Loss from primary to consumer weight[3] | Nonedible share (refuse) | Cooking loss | Retail loss | Foodservice and consumer loss | Calories per serving |
|---|---|---|---|---|---|---|---|---|---|
| | | | Grams | Percent | | | | | Calories |
| **Fresh fruit:** | | | | | | | | | |
| Fresh citrus fruit— | | | | | | | | | |
| Oranges/temples | 09200 | Raw, all commercial varieties; 1 medium fruit (2 5/8") | 131 | 3 | 27 | 0 | 2 | 30 | 62 |
| Tangerines/tangelos | 09218 | Raw, 1/2-cup sections | 98 | 5 | 28 | 0 | 2 | 30 | 43 |
| Grapefruits | 09111 | Raw, all varieties; 1/2 medium fruit (4 1/2") | 128 | 3 | 50 | 0 | 2 | 30 | 41 |
| Lemons | 09150 | Raw, 1/2-cup sections | 106 | 4 | 47 | 0 | 2 | 30 | 31 |
| Limes | 09159 | Raw, 1 fruit (2") | 67 | 5 | 16 | 0 | 2 | 30 | 20 |
| Fresh noncitrus fruit— | | | | | | | | | |
| Apples | 09003 | Raw, medium with skin (2 3/4") | 138 | 4 | 8 | 0 | 2 | 30 | 81 |
| Apricots | 09021 | Raw, 1/2-cup halves; 1/2-cup sliced | 80 | 9 | 7 | 0 | 2 | 30 | 38 |
| Avocados | 09037 | Raw, all commercial varieties; 1/2-cup cubes; 1/2-cup sliced | 74 | 6 | 26 | 0 | 2 | 30 | 119 |
| Bananas | 09040 | Raw, 1 medium (7-7 7/8" long) | 118 | 0 | 36 | 0 | 2 | 30 | 109 |
| Cantaloupe | 09181 | Raw, 1/2-cup balls; 1/2-cup cubes; 1/2-cup diced pieces | 82 | 8 | 49 | 0 | 2 | 30 | 29 |
| Cherries | 09070 | Raw, 1/2-cup sweet, whole, pitted | 73 | 8 | 10 | 0 | 2 | 30 | 52 |
| Cranberries | 09078 | Raw, 1/2-cup chopped | 55 | 4 | 5 | 0 | 2 | 30 | 27 |
| Grapes | 09131 | Raw, European type (adherent skin), 1/2-cup seedless | 80 | 9 | 4 | 0 | 2 | 30 | 57 |
| Honeydew melon | 09184 | Raw, 1/2-cup balls, 1/2-cup diced pieces | 87 | 8 | 54 | 0 | 2 | 30 | 30 |
| Kiwifruit | 09405 | Raw, 1 medium fruit without skin | 76 | 0 | 14 | 0 | 2 | 30 | 46 |
| Mangoes | 09176 | Raw, 1/2-cup sliced | 83 | 0 | 31 | 0 | 2 | 30 | 54 |
| Peaches/nectarines | 09191 | Raw, 1 medium (2 1/2") peach; 1 medium (2 1/2") nectarine | 117 | 5 | 11 | 0 | 2 | 30 | 54 |
| Pears | 09252 | Raw, 1 medium (2 1/2") fruit | 166 | 5 | 8 | 0 | 2 | 30 | 98 |
| Pineapple | 09266 | Raw, 1/2-cup diced, pieces | 78 | 5 | 48 | 0 | 2 | 30 | 38 |
| Papayas | 09226 | Raw, 1/2-cup cubed pieces | 70 | 0 | 33 | 0 | 2 | 30 | 27 |
| Plums/prunes | 09279 | Raw, 1 fruit (2 1/8") | 66 | 5 | 6 | 0 | 2 | 30 | 36 |
| Strawberries | 09316 | Raw, 1/2-cup halves; 1/2-cup sliced; 1/2-cup whole | 77 | 8 | 6 | 0 | 2 | 30 | 23 |
| Watermelon | 09326 | Raw, 1/2-cup balls; 1/2-cup diced | 77 | 10 | 48 | 0 | 2 | 30 | 24 |
| **Fruit for canning:** | | | | | | | | | |
| Apples and applesauce | 09401 | 1/2-cup applesauce, unsweetened, canned | 122 | 0 | 0 | 0 | 1 | 15 | 52 |
| Apricots | 09023 | 1/2-cup canned, water packed without skin or pits, solid and liquids | 114 | 0 | 0 | 0 | 1 | 15 | 25 |
| Cherries (sweet & tart) | 09071 | 1/2-cup sweet, canned, water pack, solids and liquid, pitted | 124 | 0 | 0 | 0 | 1 | 15 | 57 |
| Peaches (excludes spiced) | 09237 | 1/2-cup canned, water pack, solids and liquids, halves or slices | 122 | 0 | 0 | 0 | 1 | 15 | 29 |
| Pears (incl. fr. cocktail) | 09253 | 1/2-cup canned, water pack, cooked, drained solids | 122 | 0 | 0 | 0 | 1 | 15 | 35 |
| Pineapples | 09267 | 1/2-cup canned, water pack, solids and liquids, crushed, sliced, or in chunks | 123 | 0 | 0 | 0 | 1 | 15 | 39 |
| Plums and prunes | 09281 | 1/2-cup canned, purple, water pack, solids and liquids, pitted | 125 | 0 | 0 | 0 | 1 | 15 | 51 |

# APPENDIX K

# FRUIT AND VEGETABLE PRICES

**Winter squash—Average retail price per pound and per cup equivalent, 2008**

| Form | Average retail price | | Refuse (inedible share) | Cooking yield | Size of a cup equivalent | | Number of edible cup equivalents | | Average price per cup equivalent |
|---|---|---|---|---|---|---|---|---|---|
| Fresh[1,2] | $2.67 | per pound | 0% | 85% | 205 | grams | 1.881 | per pound | $1.42 |
| Frozen[2] | $1.70 | per pound | 0% | 85% | 205 | grams | 1.881 | per pound | $0.90 |

Note: It is assumed that consumers bake fresh and frozen winter squash prior to consumption.

**Summer squash—Average retail price per pound and per cup equivalent, 2008**

| Form | Average retail price | | Refuse (inedible share) | Cooking yield | Size of a cup equivalent | | Number of edible cup equivalents | | Average price per cup equivalent |
|---|---|---|---|---|---|---|---|---|---|
| Fresh[1,2] | $1.86 | per pound | 5% | 81% | 180 | grams | 1.939 | per pound | $0.96 |
| Frozen[3] | $1.60 | per pound | 0% | 76% | 180 | grams | 1.915 | per pound | $0.83 |
| Canned[4] | $1.15 | per pound | 0% | 61% | 216 | grams | 1.281 | per pound | $0.90 |

Note: It is assumed that consumers boil fresh and frozen summer squash. For canned summer squash, we assume that consumers drain the liquid contents of a can. However, the cooking yield in the above table does not account for any further preparation that may occur prior to consumption. MyPyramid cup equivalent weight for canned summer squash excludes the weight of the liquid medium in which the vegetable is packed.

# APPENDIX L

# FRESH VEGETABLE CONVERSION FACTORS AND LOSS ESTIMATES FOR ARIZONA GROWN CROPS

Fresh Vegetable Conversion Factors (grams per cup) and Loss Estimates For Arizona Grown Crops

| Vegetables: | Grams/cup | % Losses from retail level to consumer level | % Loss from primary (farm) level | Total loss % |
|---|---|---|---|---|
| **Dark-Green Vegetables** | | | | |
| Broccoli | 88.0 | 71.0% | 8.0% | 79.0% |
| Lettuce, head | 56.0 | 48.0% | 7.0% | 55.0% |
| Lettuce, leaf | 56.0 | 53.0% | 7.0% | 60.0% |
| Lettuce, romaine | 56.0 | 53.0% | 7.0% | 60.0% |
| Spinach | 30.0 | 60.0% | 15.0% | 75.0% |
| **Average** | **57.2** | **57.0%** | **8.8%** | **65.8%** |
| **Red-Orange Vegetables** | | | | |
| Carrots | 124.0 | 43.0% | 3.0% | 46.0% |
| Pumpkins | 205.0 | 47.0% | 0.0% | 47.0% |
| Squash, summer | 180.0 | 47.0% | 0.0% | 56.0% |
| Squash, winter | 205.0 | 47.0% | 0.0% | 47.0% |
| Tomatoes in the open | 180.0 | 41.0% | 15.0% | 56.0% |
| **Average** | **178.8** | **45.0%** | **3.6%** | **50.4%** |
| **Starchy Vegetables** | | | | |
| Sweet corn | 164.0 | 77.0% | 8.0% | 85.0% |
| Potatoes | 140.0 | 65.0% | 4.0% | 69.0% |
| **Average** | **152.0** | **71.0%** | **6.0%** | **77.0%** |
| **Bean vegetables** | | | | |
| Dry, edible beans | 74.0 | 16.0% | 0.0% | 16.0% |
| **Other Vegetables** | | | | |
| Beans, snap | 126.0 | 46.0% | 6.0% | 52.0% |
| Cabbage, head | 160.0 | 52.0% | 7.0% | 59.0% |
| Cauliflower | 100.0 | 71.0% | 8.0% | 79.0% |
| Celery | 122.0 | 43.0% | 7.0% | 50.0% |
| Onions, dry | 210.0 | 57.0% | 6.0% | 63.0% |
| Peppers, all | 122.0 | 50.0% | 8.0% | 58.0% |
| **Average** | **140.0** | **53.2%** | **7.0%** | **60.2%** |
| **Total Vegetable Average*** | **129.1** | **53.9%** | **6.4%** | **60.9%** |

*Since beans do make up a large portion of consumption and are the only vegetable included in 'dry' form, they were not included in the 'total vegetable average' category

# APPENDIX M

# FRESH FRUIT CONVERSION FACTORS AND LOSS ESTIMATES FOR ARIZONA GROWN CROPS

Fresh Fruit Conversion Factors (grams per cup) and Loss Estimates for Arizona Grown Crops

| Fruits | Grams/cup | % Losses from retail level to consumer level | % Loss from primary (farm) level | Total loss % |
|---|---|---|---|---|
| Honey dew | 174.0 | 86.0% | 8.0% | 94.0% |
| Cantaloupe | 164.0 | 81.0% | 8.0% | 89.0% |
| Watermelon | 154.0 | 80.0% | 10.0% | 90.0% |
| Apples | 138.0 | 40.0% | 4.0% | 44.0% |
| Apricots | 160.0 | 39.0% | 9.0% | 48.0% |
| Cherries, sweet | 146.0 | 42.0% | 8.0% | 50.0% |
| Dates, dried | 89.0 | 32.0% | 0.0% | 32.0% |
| Grapes | 160.0 | 36.0% | 9.0% | 45.0% |
| Peaches, all | 117.0 | 43.0% | 5.0% | 48.0% |
| Pears, all | 166.0 | 40.0% | 5.0% | 45.0% |
| Plums | 66.0 | 38.0% | 5.0% | 43.0% |
| Grapefruit | 128.0 | 82.0% | 3.0% | 85.0% |
| Lemons | 212.0 | 79.0% | 4.0% | 83.0% |
| Oranges, all | 131.0 | 59.0% | 3.0% | 62.0% |
| Tangerines and mandarins | 196 | 60.00% | 5.00% | 65.00% |
| Blackberries* | 154.0 | 38.0% | 8.0% | 46.0% |
| Raspberries, all * | 154.0 | 38.0% | 8.0% | 46.0% |
| **Average** | **147.6** | **53.7%** | **6.0%** | **59.7%** |

*Conversion factors and losses were unavailable and substituted with those for strawberries

# APPENDIX N

## ACTUAL INTAKE: VEGETABLES

**Table 7. Vegetables**: Mean Amounts of Retail Commodities Consumed per Individual[1], Estimated From Dietary Intake Data, by Gender and Age, in the United States, WWEIA, NHANES 2001-2002

| Gender and Age (years) | Sample size | †Total Vegetables | Brassica: †Total | Brassica: Broccoli and Cauliflower | Carrots | Celery | Cucumbers | Green Peas | Leafy Vegetables: †Total | Leafy Vegetables: Lettuce (head and leaf) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (SE) in grams | | | | | | | | |
| **Males:** | | | | | | | | | | |
| 2 - 5 | 423 | 212 (15.3) | 5 (1.6) | 4* (1.7) | 6 (1.2) | 1 (0.3) | 3* (1.1) | 6* (1.8) | 3 (0.9) | 3 (0.8) |
| 6 - 11 | 568 | 264 (12.6) | 11 (2.9) | 8* (2.9) | 8 (1.5) | 3 (0.7) | 3 (0.5) | 8* (2.8) | 9* (2.9) | 8* (2.9) |
| 12 - 19 | 1139 | 356 (13.6) | 9 (1.7) | 5 (0.9) | 5 (1.1) | 3 (0.5) | 5 (0.9) | 6 (1.5) | 11 (1.3) | 11 (1.2) |
| 2 - 19 | 2130 | 294 (10.6) | 9 (1.2) | 6 (1.1) | 6 (0.9) | 3 (0.4) | 4 (0.4) | 7 (1.5) | 9 (1.2) | 8 (1.2) |
| 20 - 29 | 383 | 448 (42.7) | 9 (2.6) | 7* (2.4) | 7 (1.6) | 3 (0.5) | 6 (1.4) | 10* (3.7) | 15 (2.0) | 14 (1.8) |
| 30 - 39 | 354 | 485 (21.1) | 10 (1.4) | 5 (1.2) | 13 (3.7) | 5 (1.4) | 8 (2.0) | 11* (4.0) | 29 (4.7) | 22 (3.0) |
| 40 - 49 | 429 | 472 (28.6) | 26 (5.7) | 18* (6.3) | 14 (2.7) | 7 (1.2) | 7 (1.3) | 11 (2.4) | 25 (3.0) | 21 (2.8) |
| 50 - 59 | 339 | 410 (20.9) | 19 (3.5) | 11 (2.7) | 12* (4.1) | 5 (1.5) | 7 (1.5) | 10 (2.9) | 32 (4.5) | 21 (3.2) |
| 60 - 69 | 316 | 397 (16.7) | 18 (2.4) | 6 (1.2) | 9 (1.4) | 6 (1.5) | 9 (2.3) | 18 (5.1) | 24 (3.8) | 16 (2.9) |
| 70 and over | 429 | 378 (13.4) | 34 (5.0) | 20 (4.5) | 9 (1.0) | 6 (1.0) | 7 (1.6) | 15 (3.0) | 24 (4.8) | 15 (2.5) |
| 20 and over | 2250 | 444 (16.6) | 18 (1.8) | 11 (1.9) | 11 (1.2) | 5 (0.5) | 7 (0.6) | 12 (1.4) | 25 (2.1) | 19 (1.5) |
| **Females:** | | | | | | | | | | |
| 2 - 5 | 433 | 207 (17.0) | 8 (1.8) | 7 (1.7) | 9 (1.4) | 1 (0.2) | 3* (1.0) | 8* (2.4) | 3 (0.5) | 2 (0.4) |
| 6 - 11 | 568 | 228 (13.7) | 6* (1.9) | 3* (1.1) | 6 (0.8) | 2 (0.5) | 4* (1.4) | 7 (1.8) | 5 (1.1) | 5 (1.1) |
| 12 - 19 | 1158 | 277 (12.5) | 8 (1.3) | 6 (1.2) | 7 (1.7) | 2 (0.6) | 6 (1.4) | 4 (0.9) | 13 (1.7) | 10 (1.4) |
| 2 - 19 | 2159 | 246 (7.9) | 7 (1.2) | 5 (0.9) | 7 (0.8) | 2 (0.3) | 5 (1.1) | 6 (1.0) | 8 (0.8) | 7 (0.6) |
| 20 - 29 | 533 | 339 (14.7) | 18 (3.7) | 10 (2.8) | 8 (1.0) | 3 (0.5) | 6 (1.0) | 7 (2.1) | 19 (4.3) | 12 (1.7) |
| 30 - 39 | 462 | 338 (16.7) | 30 (4.5) | 23 (3.7) | 12 (2.0) | 4 (0.9) | 10 (2.3) | 9 (2.5) | 25 (3.6) | 20 (3.1) |
| 40 - 49 | 417 | 365 (18.6) | 29* (9.6) | 20* (8.9) | 14 (2.1) | 6 (1.2) | 8 (1.2) | 12 (2.5) | 27 (2.2) | 21 (1.6) |
| 50 - 59 | 303 | 343 (22.6) | 37 (8.8) | 20 (5.9) | 9 (1.7) | 6* (1.9) | 6 (0.9) | 7 (2.0) | 28 (3.7) | 22 (3.2) |
| 60 - 69 | 345 | 366 (19.3) | 31 (6.8) | 18* (5.5) | 11 (2.0) | 5 (0.8) | 7 (2.0) | 16* (5.1) | 31 (4.8) | 22 (3.6) |
| 70 and over | 434 | 316 (13.3) | 32 (5.0) | 15 (2.3) | 12 (2.1) | 5 (0.7) | 7* (2.2) | 16 (4.5) | 25 (2.4) | 17 (1.3) |
| 20 and over | 2494 | 345 (6.4) | 29 (3.7) | 17 (2.9) | 11 (0.7) | 5 (0.4) | 8 (1.0) | 10 (0.9) | 25 (1.8) | 19 (1.1) |
| **Males and females:** | | | | | | | | | | |
| 2 and over | 9033 | 360 (7.2) | 19 (1.6) | 12 (1.5) | 10 (0.7) | 4 (0.3) | 7 (0.7) | 10 (0.6) | 20 (1.2) | 16 (0.8) |

*** Indicates an estimate with a relative standard error greater than 30% of the mean.**

**† Total Vegetables; Total Brassica; Total Leafy Vegetables; and Total Roots and Tubers include miscellaneous vegetables not assigned to any of the other commodities listed in the table.**

**DATA SOURCES: [1] *What We Eat In America*, NHANES 2001-2002, individuals 2 years and over (excluding breast-fed children), day 1 dietary intake data, weighted.**
**Food Intakes Converted to Retail Commodities Database 2001-2002.**

**Table 7. Vegetables**: Mean Amounts of Retail Commodities Consumed per Individual[1], Estimated From Dietary Intake Data, by Gender and Age, in the United States, WWEIA, NHANES 2001-2002 ***(continued)***

| Gender and Age (years) | Sample size | Onions | Peppers | Tomatoes | Sweet Corn | Roots and Tubers: †Total | Roots and Tubers: Potatoes | Snap Beans | Legumes (dry) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean (SE) in grams | | | | | | | |
| **Males:** | | | | | | | | | |
| 2 - 5 | 423 | 6 (1.0) | 2* (0.6) | 67 (8.3) | 20 (5.6) | 81 (10.1) | 80 (10.2) | 4* (1.6) | 4 (0.6) |
| 6 - 11 | 568 | 11 (1.2) | 3 (0.8) | 100 (8.9) | 21 (3.2) | 76 (6.2) | 74 (6.3) | 4 (1.0) | 3 (0.7) |
| 12 - 19 | 1139 | 14 (1.0) | 5 (0.8) | 128 (10.9) | 15 (4.1) | 133 (10.7) | 131 (10.7) | 5* (1.6) | 6 (1.3) |
| 2 - 19 | 2130 | 11 (0.7) | 4 (0.4) | 106 (5.5) | 18 (2.3) | 102 (6.2) | 101 (6.2) | 4 (1.1) | 5 (0.7) |
| 20 - 29 | 383 | 26 (5.4) | 18* (6.1) | 166 (40.8) | 17 (5.0) | 146 (16.1) | 146 (16.1) | 5 (1.2) | 10 (2.8) |
| 30 - 39 | 354 | 25 (2.8) | 16 (3.8) | 152 (14.8) | 41 (6.2) | 142 (15.4) | 138 (15.9) | 7* (2.3) | 12 (1.6) |
| 40 - 49 | 429 | 26 (4.2) | 9 (1.9) | 139 (16.8) | 29 (5.0) | 140 (13.7) | 137 (13.5) | 6* (2.0) | 13 (3.0) |
| 50 - 59 | 339 | 21 (2.0) | 9 (1.2) | 119 (15.1) | 16 (4.4) | 120 (6.8) | 118 (6.6) | 6 (1.4) | 10 (2.2) |
| 60 - 69 | 316 | 17 (2.7) | 7 (1.7) | 108 (12.7) | 39 (9.1) | 97 (12.9) | 96 (12.9) | 13 (2.6) | 9 (2.2) |
| 70 and over | 429 | 13 (1.5) | 6 (1.1) | 94 (7.8) | 38 (6.5) | 105 (6.1) | 99 (5.7) | 9 (1.9) | 6 (1.0) |
| 20 and over | 2250 | 23 (2.1) | 12 (1.6) | 136 (10.7) | 29 (2.2) | 131 (4.5) | 128 (4.6) | 7 (1.0) | 11 (0.8) |
| **Females:** | | | | | | | | | |
| 2 - 5 | 433 | 6 (0.9) | 1 (0.2) | 58 (7.3) | 25 (7.4) | 75 (6.5) | 74 (6.5) | 4* (1.4) | 4 (0.6) |
| 6 - 11 | 568 | 9 (1.3) | 3 (0.6) | 76 (6.0) | 16 (3.3) | 81 (6.6) | 77 (5.4) | 3* (0.9) | 4 (1.2) |
| 12 - 19 | 1158 | 10 (0.8) | 4 (0.7) | 89 (6.4) | 13 (2.5) | 104 (6.9) | 103 (6.9) | 2 (0.3) | 5 (1.0) |
| 2 - 19 | 2159 | 9 (0.4) | 3 (0.3) | 78 (3.9) | 17 (2.4) | 90 (4.8) | 88 (4.7) | 3 (0.6) | 5 (0.7) |
| 20 - 29 | 533 | 21 (5.8) | 6 (0.8) | 101 (8.7) | 20* (6.1) | 105 (12.4) | 104 (12.1) | 6 (1.5) | 7 (1.2) |
| 30 - 39 | 462 | 14 (1.4) | 9 (2.1) | 88 (10.1) | 31* (11.0) | 77 (8.3) | 74 (8.1) | 4* (1.4) | 8 (1.3) |
| 40 - 49 | 417 | 16 (1.4) | 10 (1.9) | 91 (12.9) | 41 (11.6) | 83 (8.0) | 78 (7.7) | 5 (1.2) | 7 (1.4) |
| 50 - 59 | 303 | 14 (1.9) | 10 (2.9) | 93 (16.4) | 19 (5.6) | 81 (6.1) | 77 (5.3) | 6 (1.5) | 6 (0.8) |
| 60 - 69 | 345 | 13 (0.8) | 7 (1.3) | 102 (13.6) | 21 (3.7) | 79 (9.8) | 72 (9.3) | 11 (2.6) | 7 (1.4) |
| 70 and over | 434 | 11 (1.0) | 3 (0.7) | 77 (6.8) | 29 (5.5) | 71 (4.9) | 65 (5.0) | 8 (2.4) | 5 (0.8) |
| 20 and over | 2494 | 15 (1.4) | 8 (0.8) | 93 (3.6) | 28 (2.2) | 84 (3.8) | 80 (3.7) | 6 (0.6) | 7 (0.4) |
| **Males and females:** | | | | | | | | | |
| 2 and over | 9033 | 16 (1.1) | 8 (0.8) | 108 (4.5) | 25 (1.5) | 104 (2.1) | 101 (2.2) | 6 (0.6) | 8 (0.5) |

*** Indicates an estimate with a relative standard error greater than 30% of the mean.**

**† Total Vegetables; Total Brassica; Total Leafy Vegetables; and Total Roots and Tubers include miscellaneous vegetables not assigned to any of the other commodities listed in the table.**

**DATA SOURCES:** [1] ***What We Eat In America*, NHANES 2001-2002, individuals 2 years and over (excluding breast-fed children), day 1 dietary intake data, weighted.**
**Food Intakes Converted to Retail Commodities Database 2001-2002.**

# APPENDIX O

## ACTUAL INTAKES: FRUIT

**Table 3. Fruits**: Mean Amounts of Retail Commodities Consumed per Individual[1], Estimated From Dietary Intake Data, by Gender and Age, in the United States, WWEIA, NHANES 2001-2002

| Gender and Age (years) | Sample size | †Total Fruit | Apples: Total | Apples: From Fruit | Apples: From Juice | Bananas | Berries | Grapes | Melons |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean (SE) in grams | | | | | | | |
| **Males:** | | | | | | | | | |
| 2 - 5 | 423 | 462 (30.8) | 115 (14.9) | 34 (5.3) | 81 (13.7) | 25 (2.7) | 10 (2.5) | 46 (10.7) | 28* (14.3) |
| 6 - 11 | 568 | 318 (32.2) | 78 (8.3) | 29 (5.1) | 49 (8.2) | 15 (3.1) | 8 (2.1) | 39* (13.8) | 16* (8.1) |
| 12 - 19 | 1139 | 352 (29.6) | 63 (8.3) | 26 (5.6) | 37 (7.8) | 13 (1.2) | 8 (1.9) | 18 (4.1) | 16* (6.0) |
| 2 - 19 | 2130 | 362 (23.0) | 79 (5.8) | 28 (2.7) | 50 (5.9) | 16 (1.4) | 8 (1.6) | 31 (5.6) | 19 (5.0) |
| 20 - 29 | 383 | 403 (81.6) | 72 (15.6) | 20 (5.8) | 52* (17.1) | 27* (9.5) | 9 (2.5) | 9 (2.5) | 28* (19.7) |
| 30 - 39 | 354 | 406 (78.1) | 33 (5.9) | 15 (3.1) | 18 (5.2) | 26 (6.2) | 12 (2.5) | 21* (8.1) | 24* (8.9) |
| 40 - 49 | 429 | 305 (21.7) | 51 (7.8) | 31 (3.9) | 20 (4.8) | 35 (4.7) | 12 (2.1) | 25 (4.4) | 13* (4.4) |
| 50 - 59 | 339 | 396 (48.0) | 72 (13.6) | 29 (6.3) | 43 (11.0) | 35 (4.6) | 17 (3.2) | 34 (8.2) | 35* (21.0) |
| 60 - 69 | 316 | 360 (32.2) | 46 (7.9) | 23 (5.2) | 23 (5.8) | 41 (7.7) | 10 (3.0) | 29* (11.2) | 29 (8.4) |
| 70 and over | 429 | 355 (21.6) | 39 (6.5) | 29 (4.9) | 10* (3.0) | 42 (5.4) | 9 (2.1) | 26 (4.0) | 37 (9.8) |
| 20 and over | 2250 | 371 (27.2) | 53 (4.5) | 24 (2.3) | 29 (4.2) | 33 (2.8) | 12 (1.5) | 23 (3.2) | 26 (6.2) |
| **Females:** | | | | | | | | | |
| 2 - 5 | 433 | 374 (24.5) | 124 (9.7) | 24 (3.4) | 99 (9.3) | 21 (2.6) | 10 (2.2) | 43 (6.1) | 20* (10.9) |
| 6 - 11 | 568 | 363 (36.0) | 97 (11.3) | 22 (5.4) | 75 (10.3) | 12 (2.9) | 7 (1.5) | 26 (4.7) | 34* (24.6) |
| 12 - 19 | 1158 | 294 (15.5) | 59 (5.8) | 14 (1.8) | 45 (5.6) | 12 (2.5) | 11 (1.9) | 18 (2.1) | 30 (6.7) |
| 2 - 19 | 2159 | 334 (17.8) | 86 (4.8) | 19 (2.3) | 67 (4.5) | 14 (1.1) | 10 (1.3) | 26 (2.3) | 29 (8.1) |
| 20 - 29 | 533 | 252 (28.2) | 40 (7.2) | 12 (3.6) | 28 (4.1) | 14 (2.7) | 10 (1.4) | 22 (5.9) | 17 (4.5) |
| 30 - 39 | 462 | 319 (46.4) | 35 (7.3) | 16 (3.6) | 19 (5.5) | 30 (5.2) | 9 (1.9) | 28 (8.0) | 17* (5.2) |
| 40 - 49 | 417 | 305 (26.0) | 40 (9.0) | 16 (4.3) | 24* (8.1) | 18 (3.0) | 7 (1.5) | 28 (6.7) | 19 (4.9) |
| 50 - 59 | 303 | 301 (23.8) | 45 (6.4) | 29 (7.0) | 16* (5.6) | 35 (4.8) | 10 (2.0) | 27* (8.4) | 32 (6.0) |
| 60 - 69 | 345 | 361 (24.1) | 46 (6.1) | 28 (5.8) | 19 (5.0) | 35 (7.5) | 13 (2.3) | 23 (3.5) | 36* (13.2) |
| 70 and over | 434 | 363 (23.3) | 30 (4.7) | 20 (2.9) | 10* (3.5) | 39 (5.8) | 14 (3.3) | 24 (3.8) | 55 (11.9) |
| 20 and over | 2494 | 310 (15.9) | 39 (3.1) | 19 (2.1) | 20 (2.0) | 27 (1.8) | 10 (0.8) | 25 (3.2) | 26 (4.3) |
| **Males and females:** | | | | | | | | | |
| 2 and over | 9033 | 342 (15.5) | 56 (3.2) | 22 (1.5) | 34 (2.3) | 26 (1.3) | 10 (0.9) | 25 (2.2) | 26 (3.4) |

*** Indicates an estimate with a relative standard error greater than 30% of the mean.**
**† Total Fruit includes miscellaneous fruits not assigned to any of the other commodities listed in the table.**
**DATA SOURCES: [1] *What We Eat In America*, NHANES 2001-2002, individuals 2 years and over (excluding breast-fed children), day 1 dietary intake data, weighted.**
**Food Intakes Converted to Retail Commodities Database 2001-2002.**

**Table 3. Fruits**: Mean Amounts of Retail Commodities Consumed per Individual[1], Estimated From Dietary Intake Data, by Gender and Age, in the United States, WWEIA, NHANES 2001-2002 ***(continued)***

| Gender and Age (years) | Sample size | Oranges: Total | Oranges: From Fruit | Oranges: From Juice | Other Citrus Fruits | Stone Fruits | Tropical Fruits |
|---|---|---|---|---|---|---|---|
| | | Mean (SE) in grams | | | | | |
| **Males:** | | | | | | | |
| 2 - 5 | 423 | 190 (19.3) | 7 (1.9) | 183 (17.9) | 9 (2.4) | 6 (1.6) | 28 (6.3) |
| 6 - 11 | 568 | 112 (14.8) | 11* (3.9) | 101 (12.7) | 13 (3.8) | 6 (1.3) | 26* (8.8) |
| 12 - 19 | 1139 | 196 (22.1) | 5 (1.6) | 190 (22.1) | 16 (2.5) | 5 (1.0) | 14 (3.0) |
| 2 - 19 | 2130 | 165 (15.1) | 8 (1.6) | 157 (14.8) | 14 (1.7) | 6 (0.6) | 21 (3.4) |
| 20 - 29 | 383 | 207 (55.5) | 4* (2.2) | 203 (54.4) | 34 (8.6) | 4 (0.6) | 11* (3.3) |
| 30 - 39 | 354 | 229 (67.3) | 16* (5.9) | 212* (63.7) | 22 (5.6) | 11 (3.3) | 22* (7.1) |
| 40 - 49 | 429 | 111 (12.9) | 7 (1.5) | 104 (12.4) | 35 (6.9) | 11* (4.2) | 8 (1.9) |
| 50 - 59 | 339 | 134 (16.2) | 6 (1.5) | 129 (16.1) | 38 (7.7) | 10* (3.4) | 12* (4.7) |
| 60 - 69 | 316 | 155 (27.8) | 14 (3.7) | 141 (27.2) | 22 (4.1) | 13 (3.5) | 5 (1.2) |
| 70 and over | 429 | 133 (16.3) | 8 (1.7) | 125 (15.6) | 29 (6.2) | 16 (2.3) | 15* (5.8) |
| 20 and over | 2250 | 165 (20.9) | 9 (1.4) | 156 (20.1) | 31 (2.5) | 10 (1.7) | 13 (1.4) |
| **Females:** | | | | | | | |
| 2 - 5 | 433 | 121 (14.9) | 5* (1.6) | 116 (15.3) | 9* (2.8) | 6 (1.5) | 17 (2.5) |
| 6 - 11 | 568 | 133 (19.2) | 9 (2.3) | 124 (18.6) | 28* (10.7) | 5 (1.2) | 16 (2.8) |
| 12 - 19 | 1158 | 121 (11.2) | 5 (1.0) | 116 (10.9) | 18 (3.1) | 10 (1.5) | 12 (1.5) |
| 2 - 19 | 2159 | 125 (8.3) | 6 (1.0) | 118 (8.0) | 19 (3.2) | 7 (1.0) | 15 (1.6) |
| 20 - 29 | 533 | 77 (13.9) | 2* (0.9) | 75 (13.5) | 40 (10.2) | 5 (1.2) | 23* (8.4) |
| 30 - 39 | 462 | 142 (28.0) | 6* (2.1) | 136 (27.2) | 28* (9.7) | 9 (1.6) | 19 (4.7) |
| 40 - 49 | 417 | 115 (17.9) | 7* (2.8) | 108 (17.7) | 35 (6.7) | 17 (3.4) | 19* (6.8) |
| 50 - 59 | 303 | 86 (17.0) | 4* (1.3) | 82 (16.8) | 31* (10.0) | 11 (2.7) | 14 (3.1) |
| 60 - 69 | 345 | 149 (22.4) | 18 (5.2) | 131 (20.1) | 19 (4.2) | 14* (4.9) | 14 (2.5) |
| 70 and over | 434 | 139 (15.2) | 8 (1.9) | 131 (14.6) | 16 (4.0) | 26 (2.8) | 14 (3.5) |
| 20 and over | 2494 | 115 (7.9) | 7 (1.1) | 109 (7.5) | 30 (4.6) | 13 (1.1) | 18 (2.7) |
| **Males and females:** | | | | | | | |
| 2 and over | 9033 | 141 (9.4) | 8 (0.8) | 133 (8.9) | 26 (2.3) | 10 (0.9) | 16 (1.5) |

*** Indicates an estimate with a relative standard error greater than 30% of the mean.**

**DATA SOURCES: [1] *What We Eat In America*, NHANES 2001-2002, individuals 2 years and over (excluding breast-fed children), day 1 dietary intake data, weighted. Food Intakes Converted to Retail Commodities Database 2001-2002.**

APPENDIX P

ESTIMATED ARIZONA FEMALES' FRUIT AND VEGETABLE INTAKE

Arizona Females' Fresh Fruit and Vegetable Intake*

| Age | Cohort Pop | Fruit per capita (g/d) | Fruit Avg per capita (g/d) | Fruit Cohort intake (mil g/d) | Vegetables per capita (g/d) | Vegetables Avg per capita (g/d) | Vegetables Cohort intake (mil g/d) |
|---|---|---|---|---|---|---|---|
| 2 | | 374.0 | | | 207.0 | | |
| 3 | 133892 | 374.0 | 374.0 | 50.1 | 207.0 | 207.0 | 27.7 |
| 4 | | 374.0 | | | 207.0 | | |
| 5 | | 374.0 | | | 207.0 | | |
| 6 | | 363.0 | | | 228.0 | | |
| 7 | 222434 | 363.0 | 365.2 | 81.2 | 228.0 | 223.8 | 49.8 |
| 8 | | 363.0 | | | 228.0 | | |
| 9 | | 363.0 | | | 228.0 | | |
| 10 | | 363.0 | | | 228.0 | | |
| 11 | | 363.0 | | | 228.0 | | |
| 12 | 219669 | 294.0 | 321.6 | 70.6 | 277.0 | 257.4 | 56.5 |
| 13 | | 294.0 | | | 277.0 | | |
| 14 | | 294.0 | | | 277.0 | | |
| 15 | | 294.0 | | | 277.0 | | |
| 16 | | 294.0 | | | 277.0 | | |
| 17 | 224302 | 294.0 | 294.0 | 65.9 | 277.0 | 277.0 | 62.1 |
| 18 | | 294.0 | | | 277.0 | | |
| 19 | | 294.0 | | | 277.0 | | |
| 20 | | 252.0 | | | 339.0 | | |
| 21 | | 252.0 | | | 339.0 | | |
| 22 | 213022 | 252.0 | 252.0 | 53.7 | 339.0 | 339.0 | 72.2 |
| 23 | | 252.0 | | | 339.0 | | |
| 24 | | 252.0 | | | 339.0 | | |
| 25 | | 252.0 | | | 339.0 | | |
| 26 | 214390 | 252.0 | 252.0 | 54.0 | 339.0 | 339.0 | 72.7 |
| 27 | | 252.0 | | | 339.0 | | |
| 28 | | 252.0 | | | 339.0 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29 | | 252.0 | | | 339.0 | | |
| 30 | | 319.0 | | | 338.0 | | |
| 31 | | 319.0 | | | 338.0 | | |
| 32 | 204472 | 319.0 | 319.0 | 65.2 | 338.0 | 338.0 | 69.1 |
| 33 | | 319.0 | | | 338.0 | | |
| 34 | | 319.0 | | | 338.0 | | |
| 35 | | 319.0 | | | 338.0 | | |
| 36 | | 319.0 | | | 338.0 | | |
| 37 | 205469 | 319.0 | 319.0 | 65.5 | 338.0 | 338.0 | 69.4 |
| 38 | | 319.0 | | | 338.0 | | |
| 39 | | 319.0 | | | 338.0 | | |
| 40 | | 305.0 | | | 365.0 | | |
| 41 | | 305.0 | | | 365.0 | | |
| 42 | 200902 | 305.0 | 305.0 | 61.3 | 365.0 | 365.0 | 73.3 |
| 43 | | 305.0 | | | 365.0 | | |
| 44 | | 305.0 | | | 365.0 | | |
| 45 | | 305.0 | | | 365.0 | | |
| 46 | | 305.0 | | | 365.0 | | |
| 47 | 214523 | 305.0 | 305.0 | 65.4 | 365.0 | 365.0 | 78.3 |
| 48 | | 305.0 | | | 365.0 | | |
| 49 | | 305.0 | | | 365.0 | | |
| 50 | | 301.0 | | | 343.0 | | |
| 51 | | 301.0 | | | 343.0 | | |
| 52 | 213113 | 301.0 | 301.0 | 64.1 | 343.0 | 343.0 | 73.1 |
| 53 | | 301.0 | | | 343.0 | | |
| 54 | | 301.0 | | | 343.0 | | |
| 55 | | 301.0 | | | 343.0 | | |
| 56 | | 301.0 | | | 343.0 | | |
| 57 | 196603 | 301.0 | 301.0 | 59.2 | 343.0 | 343.0 | 67.4 |
| 58 | | 301.0 | | | 343.0 | | |
| 59 | | 301.0 | | | 343.0 | | |
| 60 | 184006 | 361.0 | 361.0 | 66.4 | 366.0 | 366.0 | 67.3 |
| 61 | | 361.0 | | | 366.0 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 62 | | 361.0 | | | 366.0 | | |
| 63 | | 361.0 | | | 366.0 | | |
| 64 | | 361.0 | | | 366.0 | | |
| 65 | | 361.0 | | | 366.0 | | |
| 66 | | 361.0 | | | 366.0 | | |
| 67 | 149267 | 361.0 | 361.0 | 53.9 | 366.0 | 366.0 | 54.6 |
| 68 | | 361.0 | | | 366.0 | | |
| 69 | | 361.0 | | | 366.0 | | |
| 70+ | 330869 | 363.0 | 363.0 | 120.1 | 316.0 | 316.0 | 104.6 |
| | | | **Total** | **996.8** | | | **998.3** |

*Intake based on retail-level national estimates (Bowman et al., 2011)

Abbreviations: Population (pop), average (avg), grams (g), day (d), million (mil)

Arizona Females' Fresh Vegetable Sub-Group Intake*

| **Age** | **Cohort Pop** | **Dark-Green Vegetables** | | | **Red-Orange Vegetables** | | | **Starch Vegetables** | | | **Beans Vegetables** | | | **Other Vegetables** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **per capita (g/d)** | **Avg per capita (g/d)** | **Cohort intake (mil g/d)** | **per capita (g/d)** | **Avg per capita (g/d)** | **Cohort intake (mil g/d)** | **per capita (g/d)** | **Avg per capita (g/d)** | **Cohort intake (mil g/d)** | **per capita (g/d)** | **Avg per capita (g/d)** | **Cohort intake (mil g/d)** | **per capita (g/d)** | **Avg per capita (g/d)** | **Cohort intake (mil g/d)** |
| 2 | | 7.0 | | | 67.0 | | | 108.0 | | | 4.0 | | | 19.0 | | |
| 3 | 133892 | 7.0 | 7.0 | 0.9 | 67.0 | 67.0 | 9.0 | 108.0 | 108.0 | 14.5 | 4.0 | 4.0 | 0.5 | 19.0 | 19.0 | 2.5 |
| 4 | | 7.0 | | | 67.0 | | | 108.0 | | | 4.0 | | | 19.0 | | |
| 5 | | 7.0 | | | 67.0 | | | 108.0 | | | 4.0 | | | 19.0 | | |
| 6 | | 8.0 | | | 82.0 | | | 104.0 | | | 4.0 | | | 24.0 | | |
| 7 | 222434 | 8.0 | 7.8 | 1.7 | 82.0 | 79.0 | 17.6 | 104.0 | 104.8 | 23.3 | 4.0 | 4.0 | 0.9 | 24.0 | 23.0 | 5.1 |
| 8 | | 8.0 | | | 82.0 | | | 104.0 | | | 4.0 | | | 24.0 | | |
| 9 | | 8.0 | | | 82.0 | | | 104.0 | | | 4.0 | | | 24.0 | | |
| 10 | 219669 | 8.0 | 13.4 | 2.9 | 82.0 | 90.4 | 19.9 | 104.0 | 114.2 | 25.1 | 4.0 | 4.6 | 1.0 | 24.0 | 26.4 | 5.8 |
| 11 | | 8.0 | | | 82.0 | | | 104.0 | | | 4.0 | | | 24.0 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 13 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 14 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 15 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 16 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 17 | 224302 | 17.0 | 17.0 | 3.8 | 96.0 | 96.0 | 21.5 | 121.0 | 121.0 | 27.1 | 5.0 | 5.0 | 1.1 | 28.0 | 28.0 | 6.3 |
| 18 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 19 | | 17.0 | | | 96.0 | | | 121.0 | | | 5.0 | | | 28.0 | | |
| 20 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 21 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 22 | 213022 | 28.0 | 28.0 | 6.0 | 109.0 | 109.0 | 23.2 | 132.0 | 132.0 | 28.1 | 7.0 | 7.0 | 1.5 | 51.0 | 51.0 | 10.9 |
| 23 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 24 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 25 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 26 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 27 | 214390 | 28.0 | 28.0 | 6.0 | 109.0 | 109.0 | 23.4 | 132.0 | 132.0 | 28.3 | 7.0 | 7.0 | 1.5 | 51.0 | 51.0 | 10.9 |
| 28 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |
| 29 | | 28.0 | | | 109.0 | | | 132.0 | | | 7.0 | | | 51.0 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 31 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 32 | 204472 | 40.0 | 40.0 | 8.2 | 100.0 | 100.0 | 20.4 | 117.0 | 117.0 | 23.9 | 8.0 | 8.0 | 1.6 | 56.0 | 56.0 | 11.5 |
| 33 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 34 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 35 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 36 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 37 | 205469 | 40.0 | 40.0 | 8.2 | 100.0 | 100.0 | 20.5 | 117.0 | 117.0 | 24.0 | 8.0 | 8.0 | 1.6 | 56.0 | 56.0 | 11.5 |
| 38 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 39 | | 40.0 | | | 100.0 | | | 117.0 | | | 8.0 | | | 56.0 | | |
| 40 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 41 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 42 | 200902 | 41.5 | 41.5 | 8.3 | 105.0 | 105.0 | 21.1 | 136.0 | 136.0 | 27.3 | 7.0 | 7.0 | 1.4 | 59.5 | 59.5 | 12.0 |
| 43 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 44 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 45 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 46 | 214523 | 41.5 | 41.5 | 8.9 | 105.0 | 105.0 | 22.5 | 136.0 | 136.0 | 29.2 | 7.0 | 7.0 | 1.5 | 59.5 | 59.5 | 12.8 |
| 47 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 49 | | 41.5 | | | 105.0 | | | 136.0 | | | 7.0 | | | 59.5 | | |
| 50 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 51 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 52 | 213113 | 46.5 | 46.5 | 9.9 | 102.0 | 102.0 | 21.7 | 107.0 | 107.0 | 22.8 | 6.0 | 6.0 | 1.3 | 60.5 | 60.5 | 12.9 |
| 53 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 54 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 55 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 56 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 57 | 196603 | 46.5 | 46.5 | 9.1 | 102.0 | 102.0 | 20.1 | 107.0 | 107.0 | 21.0 | 6.0 | 6.0 | 1.2 | 60.5 | 60.5 | 11.9 |
| 58 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 59 | | 46.5 | | | 102.0 | | | 107.0 | | | 6.0 | | | 60.5 | | |
| 60 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 61 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 62 | 184006 | 46.5 | 46.5 | 8.6 | 113.0 | 113.0 | 20.8 | 116.0 | 116.0 | 21.3 | 7.0 | 7.0 | 1.3 | 58.5 | 58.5 | 10.8 |
| 63 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 64 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 65 | 149267 | 46.5 | 46.5 | 6.9 | 113.0 | 113.0 | 16.9 | 116.0 | 116.0 | 17.3 | 7.0 | 7.0 | 1.0 | 58.5 | 58.5 | 8.7 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 67 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 68 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 69 | | 46.5 | | | 113.0 | | | 116.0 | | | 7.0 | | | 58.5 | | |
| 70+ | 330869 | 41.0 | 41.0 | 13.6 | 89.0 | 89.0 | 29.4 | 116.0 | 116.0 | 38.4 | 5.0 | 5.0 | 1.7 | 58.5 | 58.5 | 19.4 |
| | | | **Total** | **103.1** | | | **308.0** | | | **371.8** | | | **19.2** | | | **152.9** |

*Intake based on retail-level national estimates (Bowman et al., 2011)

Abbreviations: Population (pop), average (avg), grams (g), day (d), million (mil)

APPENDIX Q

ESTIMATED ARIZONA MALES' FRUIT AND VEGETABLE INTAKE

Arizona Males' Fresh Fruit and Vegetable Intake*

| Age | Cohort pop | Fruit | | | Vegetables | | |
|---|---|---|---|---|---|---|---|
| | | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) |
| 2 | | 462.0 | | | 212.0 | | |
| 3 | 139537 | 462.0 | 462.0 | 64.5 | 212.0 | 212.0 | 29.6 |
| 4 | | 462.0 | | | 212.0 | | |
| 5 | | 462.0 | | | 212.0 | | |
| 6 | | 318.0 | | | 264.0 | | |
| 7 | 231246 | 318.0 | 346.8 | 80.2 | 264.0 | 253.6 | 58.6 |
| 8 | | 318.0 | | | 264.0 | | |
| 9 | | 318.0 | | | 264.0 | | |
| 10 | | 318.0 | | | 264.0 | | |
| 11 | | 318.0 | | | 264.0 | | |
| 12 | 228995 | 352.0 | 338.4 | 77.5 | 356.0 | 319.2 | 73.1 |
| 13 | | 352.0 | | | 356.0 | | |
| 14 | | 352.0 | | | 356.0 | | |
| 15 | | 352.0 | | | 356.0 | | |
| 16 | | 352.0 | | | 356.0 | | |
| 17 | 237280 | 352.0 | 352.0 | 83.5 | 356.0 | 356.0 | 84.5 |
| 18 | | 352.0 | | | 356.0 | | |
| 19 | | 352.0 | | | 356.0 | | |
| 20 | | 403.0 | | | 448.0 | | |
| 21 | | 403.0 | | | 448.0 | | |
| 22 | 229562 | 403.0 | 403.0 | 92.5 | 448.0 | 448.0 | 102.8 |
| 23 | | 403.0 | | | 448.0 | | |
| 24 | | 403.0 | | | 448.0 | | |
| 25 | | 403.0 | | | 448.0 | | |
| 26 | 225608 | 403.0 | 403.0 | 90.9 | 448.0 | 448.0 | 101.1 |
| 27 | | 403.0 | | | 448.0 | | |
| 28 | | 403.0 | | | 448.0 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29 | | 403.0 | | | 448.0 | | |
| 30 | | 406.0 | | | 485.0 | | |
| 31 | | 406.0 | | | 485.0 | | |
| 32 | 212223 | 406.0 | 406.0 | 86.2 | 485.0 | 485.0 | 102.9 |
| 33 | | 406.0 | | | 485.0 | | |
| 34 | | 406.0 | | | 485.0 | | |
| 35 | | 406.0 | | | 485.0 | | |
| 36 | | 406.0 | | | 485.0 | | |
| 37 | 210224 | 406.0 | 406.0 | 85.4 | 485.0 | 485.0 | 102.0 |
| 38 | | 406.0 | | | 485.0 | | |
| 39 | | 406.0 | | | 485.0 | | |
| 40 | | 305.0 | | | 472.0 | | |
| 41 | | 305.0 | | | 472.0 | | |
| 42 | 205899 | 305.0 | 305.0 | 62.8 | 472.0 | 472.0 | 97.2 |
| 43 | | 305.0 | | | 472.0 | | |
| 44 | | 305.0 | | | 472.0 | | |
| 45 | | 305.0 | | | 472.0 | | |
| 46 | | 305.0 | | | 472.0 | | |
| 47 | 212499 | 305.0 | 305.0 | 64.8 | 472.0 | 472.0 | 100.3 |
| 48 | | 305.0 | | | 472.0 | | |
| 49 | | 305.0 | | | 472.0 | | |
| 50 | | 396.0 | | | 410.0 | | |
| 51 | | 396.0 | | | 410.0 | | |
| 52 | 202411 | 396.0 | 396.0 | 80.2 | 410.0 | 410.0 | 83.0 |
| 53 | | 396.0 | | | 410.0 | | |
| 54 | | 396.0 | | | 410.0 | | |
| 55 | | 396.0 | | | 410.0 | | |
| 56 | | 396.0 | | | 410.0 | | |
| 57 | 178665 | 396.0 | 396.0 | 70.8 | 410.0 | 410.0 | 73.3 |
| 58 | | 396.0 | | | 410.0 | | |
| 59 | | 396.0 | | | 410.0 | | |
| 60 | | 360.0 | | | 397.0 | | |
| 61 | 166954 | 360.0 | 360.0 | 60.1 | 397.0 | 397.0 | 66.3 |
| 62 | | 360.0 | | | 397.0 | | |
| 63 | | 360.0 | | | 397.0 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 64 | | 360.0 | | | 397.0 | | |
| 65 | | 360.0 | | | 397.0 | | |
| 66 | | 360.0 | | | 397.0 | | |
| 67 | 133599 | 360.0 | 360.0 | 48.1 | 397.0 | 397.0 | 53.0 |
| 68 | | 360.0 | | | 397.0 | | |
| 69 | | 360.0 | | | 397.0 | | |
| 70+ | 268096 | 355.0 | 355.0 | 95.2 | 378.0 | 378.0 | 101.3 |
| | | | **Total** | **1142.5** | | | **1229.0** |

*Intake based on retail-level national estimates (Bowman et al., 2011)

Abbreviations: Population (pop), average (avg), grams (g), day (d), million (mil)

## Arizona Males' Vegetable Sub-Group Intake*

| Age | Cohort pop | Dark-Green | | | Red-Orange | | | Starchy | | | Beans | | | Other | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) | per capita (g/d) | Avg per capita (g/d) | Cohort intake (mil g/d) |
| 2 | | 5.5 | | | 73.0 | | | 107.0 | | | 4.0 | | | 18.5 | | |
| 3 | 139537 | 5.5 | 5.5 | 0.8 | 73.0 | 73.0 | 10.2 | 107.0 | 107.0 | 14.9 | 4.0 | 4.0 | 0.6 | 18.5 | 18.5 | 2.6 |
| 4 | | 5.5 | | | 73.0 | | | 107.0 | | | 4.0 | | | 18.5 | | |
| 5 | | 5.5 | | | 73.0 | | | 107.0 | | | 4.0 | | | 18.5 | | |
| 6 | | 14.5 | | | 108.0 | | | 105.0 | | | 3.0 | | | 29.5 | | |
| 7 | 231246 | 14.5 | 12.7 | 2.9 | 108.0 | 101.0 | 23.4 | 105.0 | 105.4 | 24.4 | 3.0 | 3.2 | 0.7 | 29.5 | 27.3 | 6.3 |
| 8 | | 14.5 | | | 108.0 | | | 105.0 | | | 3.0 | | | 29.5 | | |
| 9 | | 14.5 | | | 108.0 | | | 105.0 | | | 3.0 | | | 29.5 | | |
| 10 | | 14.5 | | | 108.0 | | | 105.0 | | | 3.0 | | | 29.5 | | |
| 11 | | 14.5 | | | 108.0 | | | 105.0 | | | 3.0 | | | 29.5 | | |
| 12 | 228995 | 15.5 | 15.1 | 3.5 | 133.0 | 123.0 | 28.2 | 154.0 | 134.4 | 30.8 | 6.0 | 4.8 | 1.1 | 36.5 | 33.7 | 7.7 |
| 13 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 14 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 15 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 16 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 17 | 237280 | 15.5 | 15.5 | 3.7 | 133.0 | 133.0 | 31.6 | 154.0 | 154.0 | 36.5 | 6.0 | 6.0 | 1.4 | 36.6 | 36.5 | 8.7 |
| 18 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 19 | | 15.5 | | | 133.0 | | | 154.0 | | | 6.0 | | | 36.5 | | |
| 20 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 21 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 22 | 229562 | 19.5 | 19.5 | 4.5 | 173.0 | 173.0 | 39.7 | 173.0 | 173.0 | 39.7 | 10.0 | 10.0 | 2.3 | 62.5 | 62.5 | 14.3 |
| 23 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 24 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 25 | 225608 | 19.5 | 19.5 | 4.4 | 173.0 | 173.0 | 39.0 | 173.0 | 173.0 | 39.0 | 10.0 | 10.0 | 2.3 | 62.5 | 62.5 | 14.1 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 27 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 28 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 29 | | 19.5 | | | 173.0 | | | 173.0 | | | 10.0 | | | 62.5 | | |
| 30 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 31 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 32 | 212223 | 34.0 | 34.0 | 7.2 | 165.0 | 165.0 | 35.0 | 194.0 | 194.0 | 41.2 | 12.0 | 12.0 | 2.5 | 66.0 | 66.0 | 14.0 |
| 33 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 34 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 35 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 36 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 37 | 210224 | 34.0 | 34.0 | 71.5 | 165.0 | 165.0 | 34.7 | 194.0 | 194.0 | 40.8 | 12.0 | 12.0 | 2.5 | 66.0 | 66.0 | 13.9 |
| 38 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 39 | | 34.0 | | | 165.0 | | | 194.0 | | | 12.0 | | | 66.0 | | |
| 40 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 41 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 42 | 205899 | 38.0 | 38.0 | 7.8 | 153.0 | 153.0 | 31.5 | 180.0 | 180.0 | 37.1 | 13.0 | 13.0 | 2.7 | 68.0 | 68.0 | 14.0 |
| 43 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 44 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 45 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 46 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 47 | 212499 | 38.0 | 38.0 | 8.1 | 153.0 | 153.0 | 32.5 | 180.0 | 180.0 | 38.2 | 13.0 | 13.0 | 2.8 | 68.0 | 68.0 | 14.4 |
| 48 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 49 | | 38.0 | | | 153.0 | | | 180.0 | | | 13.0 | | | 68.0 | | |
| 50 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 51 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 52 | 202411 | 41.5 | 41.5 | 8.4 | 131.0 | 131.0 | 26.5 | 146.0 | 146.0 | 29.6 | 10.0 | 10.0 | 2.0 | 57.5 | 57.5 | 11.6 |
| 53 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 54 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 56 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 57 | 178665 | 41.5 | 41.5 | 7.4 | 131.0 | 131.0 | 23.4 | 146.0 | 146.0 | 26.1 | 10.0 | 10.0 | 1.8 | 57.5 | 57.5 | 10.3 |
| 58 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 59 | | 41.5 | | | 131.0 | | | 146.0 | | | 10.0 | | | 57.5 | | |
| 60 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 61 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 62 | 166954 | 33.0 | 33.0 | 5.5 | 117.0 | 117.0 | 19.5 | 154.0 | 154.0 | 25.7 | 9.0 | 9.0 | 1.5 | 61.0 | 61.0 | 10.2 |
| 63 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 64 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 65 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 66 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 67 | 133599 | 33.0 | 33.0 | 4.4 | 117.0 | 117.0 | 15.6 | 154.0 | 154.0 | 20.6 | 9.0 | 9.0 | 1.2 | 61.0 | 61.0 | 8.1 |
| 68 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 69 | | 33.0 | | | 117.0 | | | 154.0 | | | 9.0 | | | 61.0 | | |
| 70+ | 268096 | 41.0 | 41.0 | 11.0 | 103.0 | 103.0 | 27.6 | 158.0 | 158.0 | 42.4 | 6.0 | 6.0 | 1.6 | 58.0 | 58.0 | 15.5 |
| | | | Total | 151.0 | | | 418.4 | | | 486.9 | | | 27.0 | | | 165.8 |

***Intake based on retail-level national estimates (Bowman et al., 2011)**
**Abbreviations: Population (pop), average (avg), grams (g), day (d), million (mil)**

APPENDIX R

ARIZONA CENSUS OF AGRICULTURE: TABLE: VEGETABLES, POTATOES, AND MELONS

SAMPLE PAGE FROM A LARGER DOCUMENT

http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Arizona/st04_1_034_034.pdf

# Table 34. Vegetables, Potatoes, and Melons Harvested for Sale: 2007 and 2002

[Totals may not add due to rounding. For meaning of abbreviations and symbols, see introductory text]

| Crop | 2007 Total harvested | | 2007 Harvested for processing | | 2007 Harvested for fresh market | | 2002 total harvested | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| Vegetables harvested for sale (see text) [1] | 2,565 | 137,574 | 19 | 5,160 | 2,552 | 132,415 | 274 | 134,394 |
| 0.1 to 0.9 acres | 819 | 350 | 2 | (D) | 817 | (D) | 36 | 17 |
| 1.0 to 4.9 acres | 1,209 | 2,565 | - | - | 1,209 | 2,565 | 47 | 104 |
| 5.0 to 14.9 acres | 379 | 2,769 | 3 | 2 | 379 | 2,766 | 26 | 245 |
| 15.0 to 24.9 acres | 47 | 844 | - | - | 47 | 844 | 16 | 307 |
| 25.0 to 49.9 acres | 18 | 609 | - | - | 18 | 609 | 9 | 292 |
| 50.0 to 99.9 acres | 7 | 518 | 1 | (D) | 7 | (D) | 17 | 1,240 |
| 100.0 to 249.9 acres | 19 | 3,217 | 6 | 1,090 | 13 | 2,127 | 41 | 6,692 |
| 250.0 to 499.9 acres | 23 | 7,397 | 4 | 1,206 | 19 | 6,191 | 27 | 9,669 |
| 500.0 to 749.9 acres | 6 | 3,339 | 1 | (D) | 6 | (D) | 11 | 5,946 |
| 750.0 to 999.9 acres | 7 | 5,954 | 1 | (D) | 7 | (D) | 10 | 8,693 |
| 1,000.0 acres or more | 31 | 110,013 | 1 | (D) | 30 | (D) | 32 | 101,190 |
| 1,000.0 to 1,999.9 acres | 10 | 14,975 | 1 | (D) | 9 | (D) | 15 | 21,444 |
| 2,000.0 to 2,999.9 acres | 3 | 7,956 | - | - | 3 | 7,956 | 4 | 10,158 |
| 3,000.0 to 4,999.9 acres | 11 | 41,793 | - | - | 11 | 41,793 | 8 | (D) |
| 5,000.0 acres or more | 7 | 45,289 | - | - | 7 | 45,289 | 5 | (D) |
| Artichokes (excluding Jerusalem) (see text) | 5 | (D) | - | - | 5 | (D) | 1 | (D) |
| Asparagus, bearing age (see text) | 7 | 1 | - | - | 7 | 1 | 14 | 4 |
| Beans, green limas | 5 | 2 | - | - | 5 | 2 | - | - |
| Beans, snap | 224 | 103 | - | - | 224 | 103 | 34 | 26 |
| Beets | 19 | 5 | - | - | 19 | 5 | 33 | 28 |
| Broccoli | 44 | 11,869 | - | - | 44 | 11,869 | 54 | 11,970 |
| Brussels sprouts | 2 | (D) | - | - | 2 | (D) | - | - |
| Cabbage, head | 23 | 2,675 | - | - | 23 | 2,675 | 22 | 3,794 |
| Cantaloupes | 748 | 18,933 | - | - | 748 | 18,933 | 73 | 14,799 |
| 0.1 to 0.9 acres | 617 | 178 | (NA) | (NA) | (NA) | (NA) | 34 | (D) |
| 1.0 to 4.9 acres | 114 | 156 | (NA) | (NA) | (NA) | (NA) | 7 | 9 |
| 5.0 to 14.9 acres | 4 | (D) | (NA) | (NA) | (NA) | (NA) | 5 | 26 |
| 15.0 to 24.9 acres | - | - | (NA) | (NA) | (NA) | (NA) | - | - |
| 25.0 to 49.9 acres | - | - | (NA) | (NA) | (NA) | (NA) | 1 | (D) |
| 50.0 to 99.9 acres | 1 | (D) | (NA) | (NA) | (NA) | (NA) | 4 | 288 |
| 100.0 to 249.9 acres | 3 | 300 | (NA) | (NA) | (NA) | (NA) | 6 | 768 |
| 250.0 to 499.9 acres | 3 | 1,005 | (NA) | (NA) | (NA) | (NA) | 8 | 2,895 |
| 500.0 acres or more | 6 | 17,194 | (NA) | (NA) | (NA) | (NA) | 8 | 10,768 |
| Carrots | 43 | (D) | - | - | 43 | (D) | 33 | 2,190 |
| 0.1 to 0.9 acres | 38 | 8 | - | - | 38 | 8 | 20 | (D) |
| 1.0 to 4.9 acres | 3 | 3 | - | - | 3 | 3 | 5 | 5 |
| 5.0 to 14.9 acres | - | - | - | - | - | - | 2 | (D) |
| 15.0 to 24.9 acres | - | - | - | - | - | - | - | - |
| 25.0 to 49.9 acres | - | - | - | - | - | - | - | - |
| 50.0 to 99.9 acres | - | - | - | - | - | - | - | - |
| 100.0 to 249.9 acres | - | - | - | - | - | - | (NA) | (NA) |
| 250.0 to 499.9 acres | 1 | (D) | - | - | 1 | (D) | (NA) | (NA) |

APPENDIX S

ARIZONA CENSUS OF AGRICULTURE: SPECIFIED FRUITS AND NUTS

SAMPLE PAGE FROM A LARGER DOCUMENT

http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Lev

el/Arizona/st04_1_035_035.pdf

## Table 35. Specified Fruits and Nuts by Acres: 2007 and 2002

[Totals may not add due to rounding. For meaning of abbreviations and symbols, see introductory text]

| Crop | Year | Total: Farms | Total: Acres | Bearing age acres: Farms | Bearing age acres: Acres | Nonbearing age acres: Farms | Nonbearing age acres: Acres |
|---|---|---|---|---|---|---|---|
| Noncitrus fruit, all (see text) | 2007 | 1,005 | 5,029 | 883 | 3,970 | 219 | 1,059 |
| | 2002 | 434 | 7,699 | 289 | 6,183 | 237 | 1,516 |
| Apples | 2007 | 496 | 1,344 | 424 | 1,249 | 111 | 95 |
| | 2002 | 185 | 1,581 | 118 | 1,459 | 103 | 122 |
| 2007 acres: | | | | | | | |
| 0.1 to 0.9 acres | | 378 | 87 | 322 | 70 | 68 | 17 |
| 1.0 to 4.9 acres | | 93 | 122 | 79 | 92 | 32 | 30 |
| 5.0 to 14.9 acres | | 18 | 122 | 16 | 95 | 8 | 27 |
| 15.0 to 24.9 acres | | 1 | (D) | 1 | (D) | 1 | (D) |
| 25.0 to 49.9 acres | | 2 | (D) | 2 | (D) | - | - |
| 50.0 to 99.9 acres | | 1 | (D) | 1 | (D) | 1 | (D) |
| 100.0 acres or more | | 3 | 890 | 3 | (D) | 1 | (D) |
| 2002 acres: | | | | | | | |
| 0.1 to 0.9 acres | | 56 | 21 | 35 | (D) | 29 | (D) |
| 1.0 to 4.9 acres | | 98 | 160 | 52 | 73 | 62 | 87 |
| 5.0 to 14.9 acres | | 21 | 137 | 21 | 110 | 10 | 27 |
| 15.0 to 24.9 acres | | 3 | 61 | 3 | 61 | - | - |
| 25.0 to 49.9 acres | | 4 | 133 | 4 | (D) | 2 | (D) |
| 50.0 to 99.9 acres | | - | - | - | - | - | - |
| 100.0 acres or more | | 3 | 1,070 | 3 | 1,070 | - | - |
| Apricots | 2007 | 382 | 127 | 337 | 106 | 50 | 21 |
| | 2002 | 90 | 34 | 53 | 25 | 42 | 9 |
| Avocados | 2007 | 1 | (D) | - | - | 1 | (D) |
| | 2002 | - | - | - | - | - | - |
| Cherries, sweet | 2007 | 63 | 59 | 48 | 54 | 20 | 5 |
| | 2002 | 23 | 57 | 20 | 57 | 3 | (Z) |
| Cherries, tart | 2007 | 33 | 14 | 19 | 9 | 15 | 5 |
| | 2002 | 1 | (D) | - | - | 1 | (D) |
| Dates | 2007 | 17 | 1,354 | 16 | (D) | 7 | (D) |
| | 2002 | 41 | 1,397 | 37 | 873 | 28 | 525 |
| Figs | 2007 | 7 | (D) | 5 | (D) | 2 | (D) |
| | 2002 | 13 | 5 | 13 | 5 | 6 | 1 |
| Grapes | 2007 | 127 | 400 | 101 | 229 | 44 | 171 |
| | 2002 | 135 | 3,337 | 97 | 2,563 | 62 | 774 |
| 2007 acres: | | | | | | | |
| 0.1 to 0.9 acres | | 89 | (D) | 69 | 13 | 23 | (D) |
| 1.0 to 4.9 acres | | 23 | 53 | 20 | (D) | 8 | (D) |
| 5.0 to 14.9 acres | | 7 | 64 | 4 | 17 | 7 | 47 |
| 15.0 to 24.9 acres | | 4 | 66 | 4 | 24 | 4 | 42 |
| 25.0 to 49.9 acres | | 1 | (D) | 1 | (D) | - | - |
| 50.0 to 99.9 acres | | 3 | 170 | 3 | (D) | 2 | (D) |
| 100.0 acres or more | | - | - | - | - | - | - |
| 2002 acres: | | | | | | | |
| 0.1 to 0.9 acres | | 75 | (D) | 56 | (D) | 27 | (D) |
| 1.0 to 4.9 acres | | 36 | 52 | 23 | 24 | 22 | 28 |
| 5.0 to 14.9 acres | | 12 | 133 | 6 | 57 | 7 | 76 |
| 15.0 to 24.9 acres | | - | - | - | - | - | - |
| 25.0 to 49.9 acres | | 2 | (D) | 2 | (D) | 1 | (D) |
| 50.0 to 99.9 acres | | 3 | 212 | 3 | (D) | 2 | (D) |
| 100.0 acres or more | | 7 | 2,844 | 7 | 2,269 | 3 | 575 |

APPENDIX T

ARIZONA CENSUS OF AGRICULTURE: BERRIES

http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Arizona/st04_1_036_037.pdf

# Table 36. **Berries: 2007 and 2002**

[Totals may not add due to rounding. For meaning of abbreviations and symbols, see introductory text]

| Crop | 2007 | | | | | | 2002 acres harvested | |
|---|---|---|---|---|---|---|---|---|
| | Total acres | | Acres harvested | | Acres not harvested | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| Blackberries and dewberries | 17 | 10 | 13 | 7 | 5 | 2 | 13 | 6 |
| Blueberries, tame | 3 | 1 | - | - | 3 | 1 | - | - |
| Boysenberries | 3 | 1 | 3 | 1 | - | - | - | - |
| Raspberries, all | 5 | 1 | 4 | (D) | 1 | (D) | - | - |
| Strawberries | 9 | 3 | 8 | (D) | 1 | (D) | 4 | (Z) |
| Other berries | 4 | (Z) | 4 | (Z) | - | - | - | - |

# APPENDIX U

## VEGETABLE YIELD AND VALUE

SAMPLE PAGE ONLY FROM A LARGE DOCUMENT:

http://usda01.library.cornell.edu/usda/current/VegeSumm/VegeSumm-01-26-2012.pdf

## Principal Fresh Market Vegetable Area Planted and Harvested – States and United States: 2009-2011

[Only includes estimates for the selected crops in the NASS annual program. These crops are not estimated for all States that might produce them. See the 2007 Census of Agriculture for a comprehensive tally of total vegetable acres by State. Includes processing total for dual usage crops (asparagus, broccoli, and cauliflower)]

| State | Area planted | | | Area harvested | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) |
| Alabama | 7,000 | 6,500 | 6,500 | 5,300 | 5,400 | 5,050 |
| Arizona | 115,100 | 113,600 | 116,900 | 113,800 | 111,900 | 115,000 |
| Arkansas | 2,600 | 2,600 | 2,700 | 2,400 | 2,400 | 2,400 |
| California | 752,300 | 756,400 | 767,600 | 739,600 | 742,200 | 753,700 |
| Colorado | 25,600 | 25,600 | 24,800 | 22,400 | 24,200 | 23,800 |
| Connecticut | 4,500 | 4,000 | 4,300 | 3,900 | 3,500 | 3,100 |
| Delaware | 6,000 | 6,000 | 6,100 | 6,000 | 5,800 | 5,900 |
| Florida | 192,600 | 190,200 | 204,400 | 183,100 | 176,500 | 185,100 |
| Georgia | 117,300 | 114,300 | 110,600 | 110,500 | 107,900 | 101,800 |
| Idaho | 9,000 | 9,200 | 9,400 | 8,800 | 9,000 | 9,200 |
| | | | | | | |
| Illinois | 21,600 | 23,400 | 24,400 | 19,600 | 22,600 | 22,600 |
| Indiana | 17,500 | 17,500 | 17,100 | 16,500 | 16,800 | 16,160 |
| Maine | 2,000 | 1,900 | 1,800 | 1,500 | 1,800 | 1,600 |
| Maryland | 11,460 | 11,430 | 11,250 | 10,580 | 10,630 | 10,500 |
| Massachusetts | 5,400 | 5,400 | 5,300 | 4,700 | 5,200 | 4,500 |
| Michigan | 57,500 | 57,500 | 55,800 | 54,500 | 55,200 | 52,700 |
| Mississippi | 2,800 | 2,900 | 2,800 | 2,300 | 2,500 | 2,400 |
| Missouri | 3,100 | 3,300 | 3,000 | 2,600 | 3,200 | 2,900 |
| Nevada | 3,930 | 4,200 | 4,050 | 3,930 | 4,200 | 4,050 |
| New Hampshire | 1,600 | 1,600 | 1,500 | 1,400 | 1,400 | 1,300 |
| | | | | | | |
| New Jersey | 26,700 | 26,900 | 26,500 | 25,000 | 25,600 | 24,400 |
| New Mexico | 18,000 | 15,150 | 16,100 | 17,300 | 14,600 | 15,400 |
| New York | 68,230 | 69,890 | 66,080 | 64,100 | 67,160 | 58,530 |
| North Carolina | 42,700 | 42,400 | 40,800 | 41,600 | 39,500 | 37,900 |
| Ohio | 34,510 | 34,970 | 34,030 | 28,610 | 31,170 | 31,330 |
| Oklahoma | 5,500 | 5,500 | 5,400 | 3,500 | 5,000 | 2,300 |
| Oregon | 28,500 | 28,500 | 28,800 | 28,300 | 27,150 | 28,100 |
| Pennsylvania | 26,500 | 27,500 | 26,690 | 24,500 | 25,300 | 22,550 |
| Rhode Island | 800 | 750 | 800 | 750 | 700 | 650 |
| South Carolina | 14,700 | 15,200 | 15,800 | 13,200 | 13,900 | 14,300 |
| | | | | | | |
| Tennessee | 13,700 | 16,600 | 17,500 | 11,600 | 14,800 | 15,200 |
| Texas | 62,650 | 66,450 | 62,750 | 55,900 | 59,100 | 54,000 |
| Utah | 1,600 | 1,600 | 1,600 | 1,550 | 1,600 | 1,600 |
| Vermont | 1,200 | 1,100 | 1,000 | 1,000 | 1,000 | 700 |
| Virginia | 16,600 | 16,600 | 17,100 | 15,800 | 15,500 | 16,200 |
| Washington | 42,700 | 45,700 | 41,700 | 42,000 | 45,000 | 40,800 |
| Wisconsin | 13,100 | 13,500 | 12,400 | 12,200 | 12,000 | 11,600 |
| | | | | | | |
| United States | 1,776,580 | 1,785,840 | 1,795,350 | 1,700,320 | 1,711,410 | 1,699,320 |

## ...ge for Fresh Market Area Planted and Harvested – States and United States: 2009-2011

| State | Area planted | | | Area harvested | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) |
| Arizona | 2,300 | 2,100 | 2,500 | 2,300 | 2,100 | 2,500 |
| California | 12,700 | 12,700 | 13,200 | 12,500 | 12,500 | 13,000 |
| Colorado | 3,000 | 3,100 | 2,900 | 2,700 | 2,900 | 2,800 |
| Florida | 10,100 | 10,500 | 8,800 | 9,500 | 9,700 | 8,100 |
| Georgia | 6,900 | 6,200 | 5,400 | 6,300 | 5,700 | 5,200 |
| Michigan | 2,700 | 3,100 | 3,400 | 2,600 | 3,000 | 3,300 |
| New Jersey | 1,700 | 1,800 | 1,500 | 1,600 | 1,700 | 1,400 |
| New York | 9,600 | 10,600 | 10,900 | 9,000 | 10,400 | 10,700 |
| North Carolina | 5,500 | 5,100 | 4,900 | 5,400 | 5,000 | 3,900 |
| Ohio | 1,100 | 1,300 | 1,300 | 1,000 | 1,200 | 1,200 |
| Pennsylvania | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,000 |
| Texas | 8,700 | 8,200 | 7,400 | 7,500 | 7,800 | 6,000 |
| Virginia | 500 | 600 | 600 | 500 | 600 | 500 |
| Wisconsin | 3,200 | 3,300 | 2,900 | 3,200 | 2,900 | 2,800 |
| United States | 69,200 | 69,800 | 66,900 | 65,300 | 66,700 | 62,400 |

## Cabbage for Fresh Market Yield and Production – States and United States: 2009-2011

| State | Yield per acre | | | Production [1] | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (cwt) | (cwt) | (cwt) | (1,000 cwt) | (1,000 cwt) | (1,000 cwt) |
| Arizona | 435 | 515 | 460 | 1,000 | 1,082 | 1,150 |
| California | 395 | 400 | 390 | 4,938 | 5,000 | 5,070 |
| Colorado | 470 | 460 | 460 | 1,269 | 1,334 | 1,288 |
| Florida | 385 | 300 | 340 | 3,658 | 2,910 | 2,754 |
| Georgia | 300 | 290 | 230 | 1,890 | 1,653 | 1,196 |
| Michigan | 260 | 280 | 230 | 676 | 840 | 759 |
| New Jersey | 345 | 280 | 375 | 552 | 476 | 525 |
| New York | 380 | 430 | 440 | 3,420 | 4,472 | 4,708 |
| North Carolina | 220 | 270 | 230 | 1,188 | 1,350 | 897 |
| Ohio | 127 | 280 | 355 | 127 | 336 | 426 |
| Pennsylvania | 220 | 330 | 155 | 264 | 396 | 155 |
| Texas | 320 | 320 | 200 | 2,400 | 2,496 | 1,200 |
| Virginia | 250 | 280 | 210 | 125 | 168 | 105 |
| Wisconsin | 300 | 250 | 320 | 960 | 725 | 896 |
| United States | 344 | 348 | 339 | 22,467 | 23,238 | 21,129 |

APPENDIX V

NON-CITRUS FRUIT YIELD AND VALUE

SAMPLE PAGE ONLY FROM A LARGE DOCUMENT:

http://usda01.library.cornell.edu/usda/current/NoncFruiNu/NoncFruiNu-07-06-2012.pdf

## Commercial Apple Fresh Market Utilization, Price, and Value – States and United States: 2009-2011

[Equivalent packinghouse door returns for California, Michigan, New York, and Washington; price at point of first sale for all other States]

| State | Quantity | | | Price per pound | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (million pounds) | (million pounds) | (million pounds) | (dollars) | (dollars) | (dollars) |
| Arizona | 1.2 | 2.0 | 1.0 | 0.700 | 0.849 | 0.780 |
| California | 110.0 | 115.0 | 125.0 | 0.446 | 0.373 | 0.325 |
| Colorado | 9.0 | 8.0 | 4.0 | 0.390 | 0.310 | 0.450 |
| Connecticut | 15.0 | 18.5 | 17.5 | 0.590 | 0.620 | 0.590 |
| Idaho | 30.0 | 40.0 | 35.0 | 0.305 | 0.315 | 0.335 |
| Illinois | (D) | (D) | (D) | (D) | (D) | (D) |
| Indiana | 19.0 | 19.0 | 13.0 | 0.405 | 0.484 | 0.507 |
| Iowa | (D) | (D) | (D) | (D) | (D) | (D) |
| Maine | 26.0 | 24.0 | 17.0 | 0.490 | 0.540 | 0.595 |
| Maryland | 16.0 | 14.0 | 18.0 | 0.320 | 0.390 | 0.460 |
| Massachusetts | 34.0 | 27.0 | 31.0 | 0.540 | 0.700 | 0.685 |
| Michigan | 400.0 | 210.0 | 340.0 | 0.215 | 0.300 | 0.350 |
| Minnesota | (D) | (D) | (D) | (D) | (D) | (D) |
| Missouri | 13.0 | 22.0 | 9.0 | 0.343 | 0.405 | 0.406 |
| New Hampshire | 18.0 | 14.5 | 13.0 | 0.660 | 0.600 | 0.630 |
| New Jersey | 31.0 | 30.0 | 25.0 | 0.650 | 0.640 | 0.907 |
| New York | 685.0 | 600.0 | 565.0 | 0.225 | 0.263 | 0.333 |
| North Carolina | 42.0 | 56.0 | 59.0 | 0.291 | 0.276 | 0.308 |
| Ohio | 90.7 | 56.2 | 43.4 | 0.404 | 0.460 | 0.460 |
| Oregon | 90.0 | 85.0 | 75.0 | 0.270 | 0.290 | 0.244 |
| Pennsylvania | 170.0 | 190.0 | 184.0 | 0.265 | 0.258 | 0.290 |
| Rhode Island | (D) | (D) | (D) | (D) | (D) | (D) |
| Tennessee | (D) | (D) | (D) | (D) | (D) | (D) |
| Utah | 14.2 | 11.3 | 17.5 | 0.320 | 0.257 | 0.228 |
| Vermont | 21.0 | 27.0 | 16.0 | 0.370 | 0.360 | 0.445 |
| Virginia | 60.0 | 70.0 | 60.0 | 0.308 | 0.267 | 0.364 |
| Washington | 4,300.0 | 4,550.0 | 4,500.0 | 0.321 | 0.321 | 0.383 |
| West Virginia | 20.0 | 14.0 | 19.0 | 0.313 | 0.319 | 0.365 |
| Wisconsin | 32.0 | 28.2 | 32.5 | 0.454 | 0.574 | 0.563 |
| Other States [1] | 66.8 | 65.1 | 57.2 | 0.573 | 0.688 | 0.699 |
| United States | 6,313.9 | 6,296.8 | 6,277.1 | 0.314 | 0.325 | 0.380 |

See footnote(s) at end of table.

–continued

# APPENDIX W

## CITRUS FRUIT YIELD AND VALUE

SAMPLE PAGE ONLY FROM A LARGE DOCUMENT:

http://usda01.library.cornell.edu/usda/current/CitrFrui/CitrFrui-09-20-2012.pdf

## Lemon, Tangelo, Tangerine and Mandarin Acreage, Yield, Utilization, Price, and Value – States and United States: 2009-2010, 2010-2011, and 2011-2012

[See Statistical Methodology for net weight per box and price per box calculations]

| Crop, State, and season | Bearing acreage | Yield per acre | Utilization of production | | | Price per box [1] | | | Value of production | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Fresh | Processed | All | Fresh | Processed | Total | Fresh | Processed |
| | (acres) | (boxes) | (1,000 boxes) | (1,000 boxes) | (1,000 boxes) | (dollars) | (dollars) | (dollars) | (1,000 dollars) | (1,000 dollars) | (1,000 dollars) |
| **Lemons** | | | | | | | | | | | |
| Arizona | | | | | | | | | | | |
| 2009-2010 | 11,000 | 200 | 2,200 | 1,118 | 1,082 | 14.89 | (D) | (D) | 32,751 | (D) | (D) |
| 2010-2011 | 10,500 | 238 | 2,500 | 1,313 | 1,187 | 13.74 | (D) | (D) | 34,360 | (D) | (D) |
| 2011-2012 | 10,000 | 75 | 750 | 481 | 269 | 17.26 | (D) | (D) | 12,946 | (D) | (D) |
| California | | | | | | | | | | | |
| 2009-2010 | 46,000 | 457 | 21,000 | 11,600 | 9,400 | 17.27 | (D) | (D) | 362,588 | (D) | (D) |
| 2010-2011 | 45,000 | 456 | 20,500 | 13,700 | 6,800 | 17.18 | (D) | (D) | 352,154 | (D) | (D) |
| 2011-2012 | 45,000 | 456 | 20,500 | 15,900 | 4,600 | 21.26 | (D) | (D) | 435,752 | (D) | (D) |
| United States | | | | | | | | | | | |
| 2009-2010 | 57,000 | 407 | 23,200 | 12,718 | 10,482 | 17.04 | (D) | (D) | 395,339 | (D) | (D) |
| 2010-2011 | 55,500 | 414 | 23,000 | 15,013 | 7,987 | 16.80 | (D) | (D) | 386,514 | (D) | (D) |
| 2011-2012 | 55,000 | 386 | 21,250 | 16,381 | 4,869 | 21.12 | (D) | (D) | 448,698 | (D) | (D) |
| **Tangelos** | | | | | | | | | | | |
| Florida | | | | | | | | | | | |
| 2009-2010 | 4,700 | 191 | 900 | 415 | 485 | 7.51 | 12.40 | 3.33 | 6,761 | 5,146 | 1,615 |
| 2010-2011 | 4,300 | 267 | 1,150 | 443 | 707 | 8.63 | 10.35 | 7.56 | 9,930 | 4,585 | 5,345 |
| 2011-2012 | 4,100 | 280 | 1,150 | 434 | 716 | 12.43 | 16.45 | 10.00 | 14,299 | 7,139 | 7,160 |
| **Tangerines and mandarins** | | | | | | | | | | | |
| Arizona [2] | | | | | | | | | | | |
| 2009-2010 | 2,500 | 140 | 350 | 205 | 145 | (D) | (D) | (D) | (D) | (D) | (D) |
| 2010-2011 | 2,500 | 120 | 300 | 183 | 117 | (D) | (D) | (D) | (D) | (D) | (D) |
| 2011-2012 | 2,500 | 80 | 200 | 123 | 77 | (D) | (D) | (D) | (D) | (D) | (D) |
| California [2] | | | | | | | | | | | |
| 2009-2010 | 30,000 | 330 | 9,900 | 8,280 | 1,620 | (D) | (D) | (D) | (D) | (D) | (D) |
| 2010-2011 | 33,000 | 321 | 10,600 | 9,100 | 1,500 | (D) | (D) | (D) | (D) | (D) | (D) |
| 2011-2012 | 38,000 | 287 | 10,900 | 9,400 | 1,500 | (D) | (D) | (D) | (D) | (D) | (D) |
| Florida | | | | | | | | | | | |
| 2009-2010 | 13,300 | 335 | 4,450 | 3,011 | 1,439 | 13.64 | 18.70 | 3.06 | 60,709 | 56,306 | 4,403 |
| 2010-2011 | 12,800 | 363 | 4,650 | 3,007 | 1,643 | 13.97 | 17.70 | 7.14 | 64,955 | 53,224 | 11,731 |
| 2011-2012 | 12,100 | 355 | 4,290 | 2,838 | 1,452 | 12.82 | 14.50 | 9.55 | 55,018 | 41,151 | 13,867 |
| United States [2] | | | | | | | | | | | |
| 2009-2010 | 45,800 | 321 | 14,700 | 11,496 | 3,204 | 18.30 | 22.90 | 2.51 | 274,519 | 266,681 | 7,838 |
| 2010-2011 | 48,300 | 322 | 15,550 | 12,290 | 3,260 | 20.87 | 25.70 | 3.46 | 330,503 | 320,350 | 10,153 |
| 2011-2012 | 52,600 | 293 | 15,390 | 12,361 | 3,029 | 22.33 | 26.68 | 5.37 | 351,351 | 336,209 | 15,142 |

(D) Withheld to avoid disclosing data for individual operations.
[1] Equivalent packinghouse-door returns.
[2] Includes tangelos and tangors.

## Box Weights by Crop - States: 2009-2010, 2010-2011, and 2011-2012

| State | Crop year | | |
|---|---|---|---|
| | 2009-2010 | 2010-2011 | 2011-2012 |
| | (pounds) | (pounds) | (pounds) |
| **Oranges** | | | |
| California | 75 | 80 | 80 |
| Florida [1] | 90 | 90 | 90 |
| Texas | 85 | 85 | 85 |
| **Grapefruit** | | | |
| California | 67 | 80 | 80 |
| Florida | 85 | 85 | 85 |
| Texas | 80 | 80 | 80 |
| **Lemons** | | | |
| Arizona | 76 | 80 | 80 |
| California | 76 | 80 | 80 |
| **Tangerines** | | | |
| Arizona | 75 | 80 | 80 |
| California | 75 | 80 | 80 |
| Florida | 95 | 95 | 95 |
| **Tangelos** | | | |
| Florida | 90 | 90 | 90 |

[1] Includes Temples.

APPENDIX X

CROP PRODUCTION YIELD AND VALUE

SAMPLE PAGE ONLY FROM A LARGE DOCUMENT:

http://usda01.library.cornell.edu/usda/current/CropProdSu/CropProdSu-01-12-2012.pdf

## a Planted and Harvested, Yield, and Production – States and United States: 2009-2011

| State | Area planted | | | Area harvested | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (1,000 acres) | (1,000 acres) | (1,000 acres) | (1,000 acres) | (1,000 acres) | (1,000 acres) |
| Arizona | 4.0 | 3.7 | 3.8 | 4.0 | 3.7 | 3.8 |
| California | 38.2 | 33.6 | 36.7 | 37.6 | 33.5 | 36.6 |
| Colorado | 60.0 | 59.5 | 58.5 | 59.1 | 59.1 | 58.3 |
| Delaware | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| Florida | 32.6 | 33.2 | 36.4 | 28.9 | 31.8 | 35.6 |
| Idaho | 320.0 | 295.0 | 320.0 | 319.0 | 294.0 | 319.0 |
| Illinois | 5.4 | 6.5 | 7.0 | 5.2 | 6.3 | 6.8 |
| Kansas | 5.0 | 4.5 | 5.5 | 4.8 | 4.4 | 5.3 |
| Maine | 56.0 | 55.0 | 57.0 | 55.5 | 54.8 | 54.0 |
| Maryland | 2.4 | 2.1 | 2.2 | 2.3 | 2.1 | 2.2 |
| Massachusetts | 3.5 | 3.9 | 3.5 | 3.4 | 3.8 | 2.7 |
| Michigan | 45.0 | 44.0 | 45.0 | 43.5 | 43.5 | 44.0 |
| Minnesota | 47.0 | 45.0 | 49.0 | 45.0 | 42.0 | 47.0 |
| Missouri | 7.3 | 7.3 | 8.3 | 7.1 | 7.2 | 7.1 |
| Montana | 11.2 | 11.5 | 11.7 | 9.7 | 11.3 | 11.5 |
| Nebraska | 20.0 | 19.0 | 20.0 | 19.9 | 18.6 | 19.5 |
| Nevada | 5.1 | (D) | (D) | 5.1 | (D) | (D) |
| New Jersey | 2.1 | 1.9 | 2.0 | 2.1 | 1.7 | 1.8 |
| New Mexico | 6.5 | (D) | (D) | 6.4 | (D) | (D) |
| New York | 17.1 | 16.2 | 16.5 | 16.5 | 16.0 | 16.2 |
| North Carolina | 16.0 | 16.0 | 17.0 | 15.0 | 15.0 | 16.5 |
| North Dakota | 83.0 | 84.0 | 84.0 | 75.0 | 80.0 | 77.0 |
| Ohio | 2.3 | 2.2 | 2.0 | 2.1 | 2.1 | 1.7 |
| Oregon | 37.0 | 35.5 | 40.0 | 37.0 | 35.5 | 39.9 |
| Pennsylvania | 10.0 | 9.5 | 9.2 | 9.5 | 9.0 | 7.8 |
| Rhode Island | 0.5 | 0.6 | 0.6 | 0.4 | 0.6 | 0.6 |
| Texas | 17.8 | 17.7 | 19.1 | 16.4 | 15.9 | 18.5 |
| Virginia | 6.0 | 5.8 | 6.0 | 5.9 | 5.6 | 5.9 |
| Washington | 145.0 | 135.0 | 160.0 | 143.0 | 134.0 | 160.0 |
| Wisconsin | 63.5 | 62.5 | 63.0 | 63.0 | 61.5 | 62.5 |
| Other States [1] | - | 13.4 | 13.3 | - | 13.4 | 13.3 |
| United States | 1,071.2 | 1,025.7 | 1,098.9 | 1,044.0 | 1,008.0 | 1,076.7 |

See footnote(s) at end of table.

--continued

## Potato Area Planted and Harvested, Yield, and Production – States and United States: 2009-2011 (continued)

| State | Yield per acre [2] | | | Production | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| | (cwt) | (cwt) | (cwt) | (1,000 cwt) | (1,000 cwt) | (1,000 cwt) |
| Arizona | 280 | 280 | 280 | 1,120 | 1,036 | 1,064 |
| California | 389 | 411 | 411 | 14,644 | 13,763 | 15,048 |
| Colorado | 401 | 389 | 393 | 23,679 | 22,971 | 22,919 |
| Delaware | 300 | 275 | 250 | 480 | 440 | 400 |
| Florida | 266 | 250 | 256 | 7,700 | 7,950 | 9,112 |
| Idaho | 415 | 384 | 398 | 132,500 | 112,970 | 127,070 |
| Illinois | 385 | 350 | 330 | 2,002 | 2,205 | 2,244 |
| Kansas | 360 | 335 | 280 | 1,728 | 1,474 | 1,484 |
| Maine | 275 | 290 | 265 | 15,263 | 15,892 | 14,310 |
| Maryland | 320 | 340 | 300 | 736 | 714 | 660 |
| Massachusetts | 260 | 285 | 275 | 884 | 1,083 | 743 |
| Michigan | 360 | 360 | 345 | 15,660 | 15,660 | 15,180 |
| Minnesota | 460 | 405 | 355 | 20,700 | 17,010 | 16,685 |
| Missouri | 275 | 300 | 170 | 1,953 | 2,160 | 1,207 |
| Montana | 340 | 325 | 330 | 3,298 | 3,673 | 3,795 |
| Nebraska | 440 | 415 | 400 | 8,756 | 7,719 | 7,800 |
| Nevada | 470 | (D) | (D) | 2,397 | (D) | (D) |
| New Jersey | 260 | 230 | 190 | 546 | 391 | 342 |
| New Mexico | 400 | (D) | (D) | 2,560 | (D) | (D) |
| New York | 300 | 320 | 250 | 4,950 | 5,120 | 4,050 |
| North Carolina | 225 | 195 | 170 | 3,375 | 2,925 | 2,805 |
| North Dakota | 255 | 275 | 245 | 19,125 | 22,000 | 18,865 |
| Ohio | 335 | 290 | 250 | 704 | 609 | 425 |
| Oregon | 580 | 565 | 585 | 21,460 | 20,058 | 23,342 |
| Pennsylvania | 310 | 245 | 230 | 2,945 | 2,205 | 1,794 |
| Rhode Island | 230 | 275 | 250 | 92 | 165 | 150 |
| Texas | 349 | 323 | 297 | 5,718 | 5,143 | 5,487 |
| Virginia | 240 | 170 | 200 | 1,416 | 952 | 1,180 |
| Washington | 610 | 660 | 615 | 87,230 | 88,440 | 98,400 |
| Wisconsin | 460 | 395 | 400 | 28,980 | 24,293 | 25,000 |
| Other States [1] | - | 392 | 439 | - | 5,252 | 5,845 |
| United States | 414 | 401 | 397 | 432,601 | 404,273 | 427,406 |

- Represents zero.
(D) Withheld to avoid disclosing data for individual operations.
[1] Includes data withheld above.
[2] Derived.

# APPENDIX Y

# ARIZONA FRESH VEGETABLE LOSS ADJUSTED YIELD ESTIMATES

*Arizona Fresh Vegetable Loss Adjusted Yield Estimates*

| Crop | Acres Harvested for Fresh Market | Yield per Acre (pounds) | Production (million pounds/year) | Estimated Loss %* | Loss Adjusted Yield Estimate (million pounds/year) |
|---|---|---|---|---|---|
| **Dark-Green Vegetables** | | | | | |
| Broccoli | 7800.0 | 13500.0 | 105.3 | 79.0% | 22.1 |
| Lettuce, head | 34000.0 | 34333.0 | 1167.3 | 55.0% | 525.3 |
| Lettuce, leaf | 7900.0 | 21833.0 | 172.5 | 60.0% | 69.0 |
| Lettuce, romaine | 18033.0 | 34333.0 | 619.1 | 60.0% | 247.7 |
| Spinach | 7200.0 | 18500.0 | 133.2 | 75.0% | 333.0 |
| **Total** | | | **2197.4** | | **1197.1** |
| **Red-Orange Vegetables** | | | | | |
| Carrots | 2190.0 | 32500.0 | 71.2 | 46.0% | 38.4 |
| Pumpkins | 593.0 | 22000.0 | 13.0 | 47.0% | 6.9 |
| Squash, summer | 642.0 | 15800.0 | 10.1 | 56.0% | 4.5 |
| Squash, winter | 47.0 | 15800.0 | 0.7 | 47.0% | 0.4 |
| Tomatoes in the open | 65.0 | 29400.0 | 1.9 | 56.0% | 0.8 |
| **Total** | | | **97.0** | | **51.0** |
| **Starchy Vegetables** | | | | | |
| Sweet corn | 4813.0 | 11900.0 | 57.3 | 85.0% | 8.6 |
| Potatoes | 3833.0 | 28000.0 | 107.3 | 69.0% | 33.3 |
| **Total** | | | **164.6** | | **41.9** |
| **Bean Vegetables Dry edible beans, excluding green lima** | **12100.0** | **1963.0** | **23.8** | **16.0%** | **20.0** |
| **Other Vegetables** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Beans, snap | 103.0 | 5700.0 | 0.6 | 52.0% | 0.3 |
| Cabbage, head | 2300.0 | 47000.0 | 1.1 | 59.0% | 0.4 |
| Cauliflower | 3067.0 | 22000.0 | 67.5 | 79.0% | 14.2 |
| Celery | 437.0 | 69800.0 | 30.5 | 50.0% | 15.3 |
| Onions, fresh | 535.0 | 49800.0 | 26.6 | 63.0% | 9.9 |
| Peppers, chile | 2733.0 | 6800.0 | 18.6 | 58.0% | 7.8 |
| **Total** | | | **144.9** | | **47.8** |
| **Total Vegetables**** | **113567.0** | | **3214.2** | **60.9%** | **1256.7** |

*Estimated loss %: Losses include retail loss, food service/consumer loss, inedible shares, cooking loss (potatoes, corn, snap beans, cauliflower), and loss from primary to consumer weight (Kantor, 1998) for most of the crops. USDA ERS tables ("Fruit and vegetable prices," 2012) were used to find inedible shares , and cooking yield (cauliflower, corn, pumpkin, winter squash, summer squash) and 32% for retail and foodservice/consumer loss.

**For the Total vegetable category, an average of all the listed vegetable loss % (excluding beans) was used

# APPENDIX Z

# ARIZONA FRESH FRUIT LOSS ADJUSTED YIELD ESTIMATES

Arizona Fresh Fruit Loss Adjusted Yield Estimates

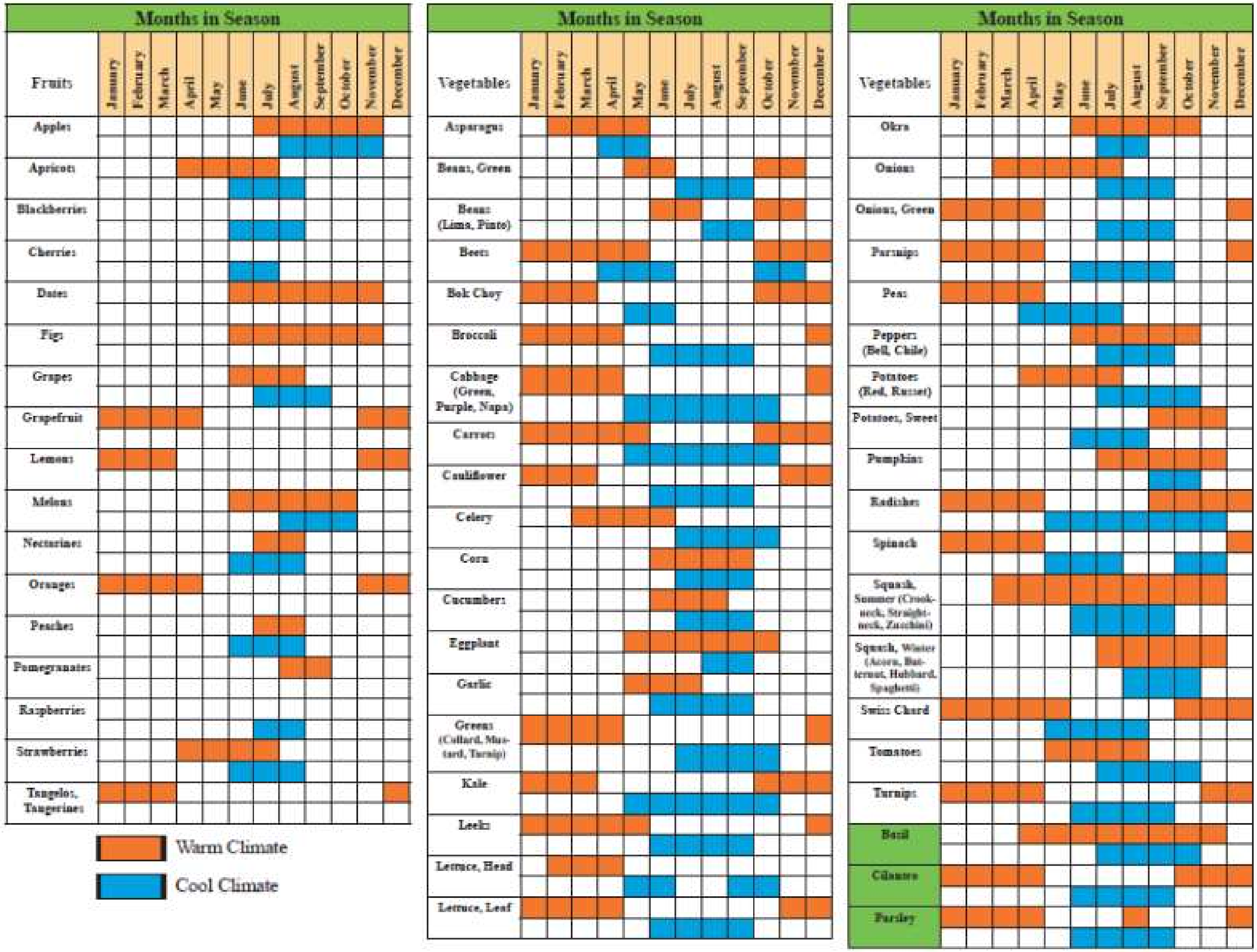
| **Crop** | **Acres Harvested for the Fresh Market** | **Yield per Acre** (pounds) | **Production** (1,000 pounds/year) | **Estimated Loss %*** | **Loss Adjusted Yield Estimate** (million pounds/year) |
|---|---|---|---|---|---|
| Honey dew | 3300.0 | 21500.0 | 70950.0 | 94.0% | 4257.0 |
| Cantaloupe | 21367.0 | 23000.0 | 491441.0 | 89.0% | 54055.5 |
| Watermelon | 5333.0 | 45667.0 | 243542.1 | 90.0% | 24354.2 |
| Fresh Apples** | __ | __ | 4200.0 | 44.0% | 2352.0 |
| Apricots | 106.0 | 11000.0 | 1166.0 | 48.0% | 606.3 |
| Cherries, sweet | 54.0 | 8540.0 | 461.2 | 50.0% | 230.6 |
| Dates | 1354.0 | 7080.0 | 9586.3 | 32.0% | 6518.7 |
| Grapes | 229.0 | 15500.0 | 3549.5 | 45.0% | 1952.2 |
| Peaches, all | 156.0 | 19060.0 | 2973.4 | 48.0% | 1546.1 |
| Pears, all | 40.0 | 32600.0 | 1304.0 | 45.0% | 717.2 |
| Plums | 11.0 | 4720.0 | 51.9 | 43.0% | 29.6 |
| Grapefruit | 520.0 | 35700.0 | 18564.0 | 85.0% | 2784.6 |
| Lemons | 10500.0 | 13453.0 | 141256.5 | 83.0% | 24013.6 |
| Oranges, all | 2526.0 | 29790.0 | 75249.5 | 62.0% | 28594.8 |
| Blackberries | 7.0 | 6920.0 | 48.4 | 46.0% | 26.2 |
| Raspberries | 1.0 | 2080.0 | 2.1 | 46.0% | 1.1 |
| Tangerines and mandarins | 2500.0 | 8851.0 | 22127.5 | 65.0% | 7744.6 |
| **TOTAL FRUIT** | | | **1086473.4** | **59.7%** | **159784.5** |

*Estimated loss %: 32% added to losses for retail loss and food service/consumer loss + inedible shares, cooking loss (potatoes, corn, snap beans, cauliflower), and loss from primary to consumer weight (Kanto, 1998).

**Apple data was gathered from the “Non-Citrus Production” (2012) USDA ERS annual summary and did not include acres harvested for fresh markets and yields

# APPENDIX AA

# ARIZONA HARVEST CALENDAR


Months in Season
Fruits
January
February
March
April
May
June
July
August
September
October
November
December
Apples
Apricots
Blackberries
Cherries
Dates
Figs
Grapes
Grapefruit
Lemons
Melons
Nectarines
Oranges
Peaches
Pomegranates
Raspberries
Strawberries
Tangelos, Tangerines
Warm Climate
Cool Climate
Months in Season
Vegetables
Asparagus
Beans, Green
Beans (Lima, Pinto)
Beets
Bok Choy
Broccoli
Cabbage (Green, Purple, Napa)
Carrots
Cauliflower
Celery
Corn
Cucumbers
Eggplant
Garlic
Greens (Collard, Mustard, Turnip)
Kale
Leeks
Lettuce, Head
Lettuce, Leaf
Months in Season
Vegetables
Okra
Onions
Onions, Green
Parsnips
Peas
Peppers (Bell, Chile)
Potatoes (Red, Russet)
Potatoes, Sweet
Pumpkins
Radishes
Spinach
Squash, Summer (Crookneck, Straightneck, Zucchini)
Squash, Winter (Acorn, Butternut, Hubbard, Spaghetti)
Swiss Chard
Tomatoes
Turnips
Basil
Cilantro
Parsley

# APPENDIX BB

# ROMAINE LETTUCE HARVEST DATES

**Table 69-- U.S. romaine lettuce: Usual planting and harvesting dates**

| State | Usual Planting Dates | | Usual Harvesting Dates | | |
|---|---|---|---|---|---|
| | Begins | Ends | Begins | Most Active | Ends |
| **Winter** | | | | | |
| AZ | Sep 1 | Jan 31 | Nov 1 | Dec 1 - Mar 31 | Apr 30 |
| CA | Sep 15 | Nov 15 | Dec 1 | Jan 1 - Mar 1 | Mar 31 |
| **Spring** | | | | | |
| CA | Jan 1 | Mar 31 | Apr 1 | May 1 - Jun 30 | Jul 31 |
| **Summer** | | | | | |
| CA | Apr 1 | Jul 31 | Jun 1 | Jul 1 - Sep 30 | Oct 31 |
| **Fall** | | | | | |
| CA | Aug 1 | Sep 30 | Oct 1 | Oct 15 - Nov 15 | Nov 30 |

Source: USDA, National Agricultural Statistics Service, *Vegetables Usual Planting and Harvesting Dates, May 2007.*

# APPENDIX CC

## CARROTS HARVEST DATES

**Table 51--Carrots, fresh-market: Usual planting and harvesting dates, 2004-2006**

| Season and State | Usual planting dates | | Usual harvesting dates | | |
|---|---|---|---|---|---|
| | Begins | Ends | Begins | Most Active | Ends |
| **Winter** | | | | | |
| AZ | Oct 1 | Feb 15 | Nov 1 | Dec 15-Jan 15 | July 1 |
| CA | July 1 | Sep 30 | Nov 1 | Dec 1 - Jan 31 | Mar 1 |
| GA | Aug 1 | Dec 15 | Dec 15 | Feb 15 - Jun 1 | Jun 15 |
| TX | Sep 1 | Dec 31 | Dec 1 | Jan 1 - Mar 31 | Apr 30 |
| **Spring** | | | | | |
| CA | Dec 1 | Aug 31 | Mar 1 | Mar 1 - Jun 15 | Jun 30 |
| TX | Nov 1 | Nov 30 | 1-Mar | Apr 1 - Apr 30 | June 30 |
| **Summer** | | | | | |
| CA | Dec 1 | Mar 31 | May 1 | May 15 - Jun 30 | Jul 31 |
| CO | April 15 | June 30 | Aug 1 | Aug 15 - Oct 10 | Oct 31 |
| Mi | April 15 | July 10 | Jul 10 | Aug 5 - Nov 15 | Nov 25 |
| WA | April 15 | Jul 31 | June 30 | Sep 1 - Nov 1 | Dec 31 |
| **Fall** | | | | | |
| CA | Apr 1 | July 31 | Aug 1 | Sep 1 - Nov 30 | Dec 31 |
| TX | July 1 | July 31 | Oct 1 | Nov 1 - Nov 30 | Dec 31 |

*Source: Compiled by ERS from data of USDA, National Agricultural Statistics Service.*

# APPENDIX DD

## PEAR AND PLUM HARVEST DATES

SAMPLE PAGE ONLY FROM A LARGE DOCUMENT:

http://localfoods.about.com/od/searchbyregion/a/arizonaseasons.htm

# Arizona Seasonal Fruits and Vegetables

## Find What's In Season In Arizona

By Molly Watson, About.com Guide
See More About:

- arizona
- seasons
- state guides

The Arizona growing season goes all year long. Mild winters allow for the harvest of cool weather crops and hot summers help make citrus sweet, chiles spicy, and dates ripe. Exactly what is in season in Tuscon or Phoenix and Scottsdale or Flagstaff can differ at any given time, of course, but this will give you a sense of what to expect. Find more fruits and vegetables with the Seasonal Produce Guide, and find more resources with this Guide to Arizona Local Foods.
Pears, mid-August through September
Plums & pluots, June through August

# APPENDIX EE

## ARIZONA LOSS ADJUSTED MONTHLY FRESH VEGETABLE PRODUCTION

Arizona Loss Adjusted Monthly Fresh Vegetable Production by Months in Season

| Crop | Production (1,000 pounds/year) | Months in Season (warm and cool climates of Arizona) | Production by Month (1,000 pounds/month) |
|---|---|---|---|
| **Dark-Green Vegetables** | | | |
| Broccoli | 22113.0 | 9.0 | 2457.0 |
| Lettuce, head | 525294.9 | 7.0 | 75042.1 |
| Lettuce, leaf | 68992.3 | 10.0 | 6899.2 |
| Lettuce, romaine | 247650.8 | 6.0 | 41275.1 |
| Spinach | 33300.0 | 10.0 | 3330.0 |
| **Red-Orange Vegetables** | | | |
| Carrots | 38434.5 | 8.0 | 4804.3 |
| Pumpkins | 6914.4 | 7.0 | 987.8 |
| Squash, summer | 4463.2 | 13.0 | 343.3 |
| Squash, winter | 393.6 | 8.0 | 49.2 |
| Tomatoes in the open | 840.8 | 8.0 | 105.1 |
| **Starchy Vegetables** | | | |
| Sweet corn | 8591.2 | 7.0 | 1227.3 |
| Potatoes | 33270.4 | 8.0 | 4158.8 |
| **Bean Vegetables** | | | |
| Dry beans, excluding green lima beans | 19951.9 | 6.0 | 3325.3 |
| **Other Vegetables** | | | |
| Beans, snap | 287.7 | 7.0 | 41.1 |
| Cabbage, head | 443.2 | 11.0 | 40.3 |
| Cauliflower | 14169.5 | 9.0 | 1574.4 |
| Celery | 15251.3 | 8.0 | 1906.4 |
| Onions, dry | 9857.9 | 8.0 | 1232.2 |
| Peppers, all | 7805.4 | 8.0 | 975.7 |

APPENDIX FF

# ARIZONA LOSS ADJUSTED MONTHLY FRESH FRUIT PRODUCTION

| Crop | Production (1,000 pounds/year) | Months in Season (warm and cool climates of Arizona) | Production by Month (1,000 pounds/month) |
|---|---|---|---|
| Honey dew | 4257.0 | 8 | 532.1 |
| Cantaloupe | 54055.5 | 8 | 6756.9 |
| Watermelon | 24354.2 | 8 | 3044.3 |
| Apples | 2352.0 | 9 | 261.3 |
| Apricots | 606.3 | 7 | 86.6 |
| Cherries, sweet | 230.6 | 2 | 115.3 |
| Dates | 6518.7 | 6 | 1086.4 |
| Grapes | 1952.2 | 6 | 325.4 |
| Peaches, all | 1546.1 | 5 | 309.2 |
| Pears, all | 717.2 | 1.5 | 2868.8 |
| Plums | 29.6 | 3 | 14.8 |
| Grapefruit | 2784.6 | 6 | 464.1 |
| Lemons | 24013.6 | 5 | 4802.7 |
| Oranges, all | 28594.8 | 6 | 4765.8 |
| Tangerines and Mandarins | 7744.6 | 4 | 1936.2 |
| Blackberries | 26.2 | 3 | 8.7 |
| Raspberries | 1.1 | 2 | 0.6 |

APPENDIX GG

ARIZONA FRESH VEGETABLE MONTHLY PRODUCTION CALENDAR

Arizona Loss Adjusted, Fresh Total Vegetable, Dark-Green Vegetable, and Red-Orange Vegetable Monthly Production by Climate Zone (1,000 pounds/month)

| Month | Total Vegetable | Dark-Green Vegetables | | | | | | Red-Orange Vegetables | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Climate Zone | | Broccoli | Lettuce, head | Lettuce, leaf | Lettuce, romaine | Spinach | **Total** | Carrots | Pumpkins | Squash, summer | Squash, winter | Tomatoes | **Total** |
| **January** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **61612.6** | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | **53961.4** | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | **4804.3** |
| **February** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **136654.7** | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | **129003.5** | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | **4804.3** |
| **March** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **138904.5** | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | **129003.5** | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | **5147.6** |
| **April** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **141488.9** | 2457.0 | 75042.1 | 6899.2 | 41275.1 | 3330.0 | **129003.5** | 4804.3 | 0.0 | 343.3 | 0.0 | 0.0 | **5147.6** |
| **May** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 4804.3 | 0.0 | 343.3 | 0.0 | 105.1 | |
| Cool | | 0.0 | 75042.1 | 0.0 | 0.0 | 3330.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **89771.5** | 0.0 | 75042.1 | 0.0 | 0.0 | 3330.0 | **78372.1** | 4804.3 | 0.0 | 343.3 | 0.0 | 105.1 | **5252.7** |
| **June** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 4804.3 | 0.0 | 343.3 | 0.0 | 105.1 | |
| Cool | | 2457.0 | 75042.1 | 6899.2 | 0.0 | 3330.0 | | 0.0 | 0.0 | 3433.2 | 0.0 | 0.0 | |
| Both | **106573.7** | 2457.0 | 75042.1 | 6899.2 | 0.0 | 3330.0 | **87728.4** | 4804.3 | 0.0 | 686.6 | 0.0 | 105.1 | **5596.1** |
| **July** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 987.8 | 343.3 | 49.2 | 105.1 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cool | | 2457.0 | 0.0 | 6899.2 | 0.0 | 3330.0 | | 0.0 | 0.0 | 343.3 | 0.0 | 105.1 | |
| Both | **35463.4** | 2457.0 | 0.0 | 6899.2 | 0.0 | 3330.0 | **12686.2** | 0.0 | 987.8 | 686.6 | 49.2 | 210.2 | **1933.8** |
| **August** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 987.8 | 343.3 | 49.2 | 105.1 | |
| Cool | | 2457.0 | 0.0 | 6899.2 | 0.0 | 0.0 | | 0.0 | 0.0 | 343.3 | 49.2 | 105.1 | |
| Both | **28023.8** | 2457.0 | 0.0 | 6899.2 | 0.0 | 0.0 | **9356.2** | 0.0 | 987.8 | 686.6 | 98.4 | 210.2 | **1983.0** |
| **September** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 987.8 | 343.3 | 49.2 | 0.0 | |
| Cool | | 2457.0 | 75042.1 | 6899.2 | 0.0 | 0.0 | | 0.0 | 987.8 | 343.3 | 49.2 | 105.1 | |
| Both | **103948.6** | 2457.0 | 75042.1 | 6899.2 | 0.0 | 0.0 | **84398.4** | 0.0 | 1975.5 | 686.6 | 98.4 | 105.1 | **2865.7** |
| **October** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 987.8 | 343.3 | 49.2 | 0.0 | |
| Cool | | 0.0 | 75042.1 | 0.0 | 0.0 | 3330.0 | | 0.0 | 987.8 | 0.0 | 49.2 | 105.1 | |
| Both | **91342.1** | 0.0 | 75042.1 | 0.0 | 0.0 | 3330.0 | **78372.1** | 0.0 | 1975.5 | 343.3 | 98.4 | 105.1 | **2522.4** |
| **November** | | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 6899.2 | 41275.1 | 0.0 | | 4804.3 | 987.8 | 343.3 | 49.2 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 3330.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **62629.8** | 0.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | **51504.4** | 4804.3 | 987.8 | 343.3 | 49.2 | 0.0 | **6184.6** |
| **December** | | | | | | | | | | | | | |
| Warm | | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | **61612.6** | 2457.0 | 0.0 | 6899.2 | 41275.1 | 3330.0 | **53961.4** | 4804.3 | 0.0 | 0.0 | 0.0 | 0.0 | **4804.3** |

Arizona Loss Adjusted, Fresh Starchy Vegetables, Beans, and Other Vegetable Monthly Production by Climate Zone (1,000 pounds/month)

| **Month** | **Starchy Vegetables** | | | **Beans*** | **Other Vegetables** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Climate Zone | Corn | Potatoes | **Total** | Dry beans* | Beans, snap | Cabbage, head | Cauliflower | Celery | Onion, dry | Peppers, all | Total |
| **January** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 0.0 | **0.0** | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | **2846.9** |
| **February** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 0.0 | **0.0** | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | **2846.9** |
| **March** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 0.0 | **0.0** | **0.0** | 0.0 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 0.0 | **4753.3** |
| **April** | | | | | | | | | | | |
| Warm | 0.0 | 4158.8 | | **0.0** | 0.0 | 40.3 | 0.0 | 1906.4 | 1232.2 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 4158.8 | **4158.8** | **0.0** | 0.0 | 40.3 | 0.0 | 1906.4 | 1232.2 | 0.0 | **3178.9** |
| **May** | | | | | | | | | | | |
| Warm | 0.0 | 4158.8 | | **0.0** | 41.1 | 0.0 | 0.0 | 1906.4 | 0.0 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 4158.8 | **4158.8** | **0.0** | 41.1 | 40.3 | 0.0 | 1906.4 | 0.0 | 0.0 | **1987.8** |
| **June** | | | | | | | | | | | |
| Warm | 1227.3 | 4158.8 | | **3325.3** | 41.1 | 0.0 | 0.0 | 1906.4 | 0.0 | 975.7 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 0.0 | 0.0 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Both | 1227.3 | 4158.8 | **5386.1** | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 0.0 | 975.7 | **4537.9** |
| **July** | | | | | | | | | | | |
| Warm | 1227.3 | 4158.8 | | **3325.3** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 975.7 | |
| Cool | 1227.3 | 4158.8 | | **0.0** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 975.7 | |
| Both | 2454.6 | 8317.6 | **10772.2** | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 1951.4 | **6745.8** |
| **August** | | | | | | | | | | | |
| Warm | 1227.3 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 975.7 | |
| Cool | 1227.3 | 4158.8 | | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 975.7 | |
| Both | 2454.6 | 4158.8 | **6613.4** | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 1951.4 | **6745.8** |
| **September** | | | | | | | | | | | |
| Warm | 1227.3 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 975.7 | |
| Cool | 1227.3 | 4158.8 | | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 975.7 | |
| Both | 2454.6 | 4158.8 | **6613.4** | **3325.3** | 41.1 | 40.3 | 1574.4 | 1906.4 | 1232.2 | 1951.4 | **6745.8** |
| **October** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **3325.3** | 41.1 | 0.0 | 0.0 | 0.0 | 0.0 | 975.7 | |
| Cool | 0.0 | 4158.8 | | **0.0** | 0.0 | 40.3 | 0.0 | 1906.4 | 0.0 | 0.0 | |
| Both | 0.0 | 4158.8 | **4158.8** | **3325.3** | 41.1 | 40.3 | 0.0 | 1906.4 | 0.0 | 975.7 | **2963.5** |
| **November** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **3325.3** | 41.1 | 0.0 | 1574.4 | 0.0 | 0.0 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 0.0 | **0.0** | **3325.3** | 41.1 | 0.0 | 1574.4 | 0.0 | 0.0 | 0.0 | **1615.5** |
| **December** | | | | | | | | | | | |
| Warm | 0.0 | 0.0 | | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | |
| Cool | 0.0 | 0.0 | | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Both | 0.0 | 0.0 | **0.0** | **0.0** | 0.0 | 40.3 | 1574.4 | 0.0 | 1232.2 | 0.0 | **2846.9** |

*The bean category includes all dry beans, excluded green lima beans

APPENDIX HH

ARIZONA FRESH FRUIT MONTHLY PRODUCTION CALENDAR

Arizona Loss Adjusted, Fresh Total Fruit and Non-Citrus Monthly Production By Climate Zone (1,000 pounds/month)

| **Month** Climate Zone | **Total Fruit** | Honey dew | Cantaloupe | Watermelon | Apples | Apricots | Cherries, sweet | Dates | Grapes | Peaches, all | Pears, all | Plums |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **January** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **1946.2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **February** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **1946.2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **March** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **1946.2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **April** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **5316.5** | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **May** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **86.6** | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **June** | | | | | | | | | | | | |
| Warm | | 532.1 | 6756.9 | 3044.3 | 0.0 | 86.6 | 0.0 | 1086.4 | 325.4 | 0.0 | 0.0 | 14.8 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 115.3 | 0.0 | 0.0 | 309.2 | 0.0 | 0.0 |
| Both | **12366.4** | 532.1 | 6756.9 | 3044.3 | 0.0 | 173.2 | 115.3 | 1086.4 | 325.4 | 309.2 | 0.0 | 14.8 |
| **July** | | | | | | | | | | | | |
| Warm | | 532.1 | 6756.9 | 3044.3 | 261.3 | 86.6 | 0.0 | 1086.4 | 325.4 | 309.2 | 0.0 | 14.8 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.0 | 0.0 | 0.0 | 0.0 | 86.6 | 115.3 | 0.0 | 325.4 | 309.2 | 0.0 | 0.0 |
| Both | **13262.9** | 532.1 | 6756.9 | 3044.3 | 261.3 | 173.2 | 115.3 | 1086.4 | 650.7 | 618.5 | 0.0 | 14.8 |
| **August** | | | | | | | | | | | | |
| Warm | | 532.1 | 6756.9 | 3044.3 | 261.3 | 0.0 | 0.0 | 1086.4 | 325.4 | 309.2 | 1434.4 | 14.8 |
| Cool | | 532.1 | 6756.9 | 3044.3 | 261.3 | 86.6 | 0.0 | 0.0 | 325.4 | 309.2 | 0.0 | 0.0 |
| Both | **25090.1** | 1064.3 | 13513.9 | 6088.6 | 522.7 | 86.6 | 0.0 | 1086.4 | 650.7 | 618.5 | 1434.4 | 14.8 |
| **September** | | | | | | | | | | | | |
| Warm | | 532.1 | 6756.9 | 3044.3 | 261.3 | 0.0 | 0.0 | 1086.4 | 0.0 | 0.0 | 2868.8 | 0.0 |
| Cool | | 532.1 | 6756.9 | 3044.3 | 261.3 | 0.0 | 0.0 | 0.0 | 325.4 | 0.0 | 0.0 | 0.0 |
| Both | **25470.0** | 1064.3 | 13513.9 | 6088.6 | 522.7 | 0.0 | 0.0 | 1086.4 | 325.4 | 0.0 | 2868.8 | 0.0 |
| **October** | | | | | | | | | | | | |
| Warm | | 532.1 | 6756.9 | 3044.3 | 261.3 | 0.0 | 0.0 | 1086.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 532.1 | 6756.9 | 3044.3 | 261.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **22275.8** | 1064.3 | 13513.9 | 6088.6 | 522.7 | 0.0 | 0.0 | 1086.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| **November** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 261.3 | 0.0 | 0.0 | 1086.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 261.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **11641.7** | 0.0 | 0.0 | 0.0 | 522.7 | 0.0 | 0.0 | 1086.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| **December** | | | | | | | | | | | | |
| Warm | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | **1946.2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Arizona Loss Adjusted, Fresh Citrus and Berries Monthly Production By Climate Zone
(1,000 pounds/month)

| Month / Climate Zone | Grapefruit | Lemons | Oranges, all | Tangerines and Mandarins | Blackberries | Raspberries |
|---|---|---|---|---|---|---|
| **January** | | | | | | |
| Warm | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| **February** | | | | | | |
| Warm | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| **March** | | | | | | |
| Warm | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| **April** | | | | | | |
| Warm | 464.1 | 0.0 | 4765.8 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 0.0 | 4765.8 | 0.0 | 0.0 | 0.0 |
| **May** | | | | | | |
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **June** | | | | | | |
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.0 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.0 |
| **July** | | | | | | |
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.6 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.6 |
| **August** | | | | | | |
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.6 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | 0.6 |

**September**

| | | | | | | |
|---|---|---|---|---|---|---|
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **October** | | | | | | |
| Warm | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **November** | | | | | | |
| Warm | 464.1 | 4802.7 | 4765.8 | 0.0 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 4802.7 | 4765.8 | 0.0 | 0.0 | 0.0 |
| **December** | | | | | | |
| Warm | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |
| Cool | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Both | 464.1 | 4802.7 | 4765.8 | 1936.2 | 0.0 | 0.0 |

# APPENDIX II

# ARIZONA WARM CLIMATE DARK-GREEN VEGETABLE PRODUCTION CALENDAR

Arizona Loss Adjusted, Fresh Dark-Green Vegetable Production by Months in Season in the Warm Climate Zone of the State

| Month | Dark-Green Vegetables (million pounds/month) | | | | | |
|---|---|---|---|---|---|---|
| | Broccoli | Lettuce, head | Lettuce, leaf | Lettuce, romaine | Spinach | **Total** |
| **January** | 4.4 | 0.0 | 11.5 | 41.3 | 6.7 | **63.9** |
| **February** | 4.4 | 175.1 | 11.5 | 41.3 | 6.7 | **239.0** |
| **March** | 4.4 | 175.1 | 11.5 | 41.3 | 6.7 | **239.0** |
| **April** | 4.4 | 175.1 | 11.5 | 41.3 | 6.7 | **239.0** |
| **May** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **June** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **July** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **August** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **September** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **October** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **November** | 0.0 | 0.0 | 11.5 | 41.3 | 0.0 | **52.8** |
| **December** | 4.4 | 0.0 | 11.5 | 41.3 | 6.7 | **63.9** |