Increasing Adult Awareness of Hawai‘i Youth Vaping

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Abstract

Vaping is a novel socially acceptable form of nicotine consumption used by youth as an alternative to traditional cigarettes. Electronic cigarette (e-cig) use in Hawaii County (HC) middle and high school students is higher than state and national rates. Due to the novel onset of youth e-cig use, long-term health implications are unknown. However, numerous federal, national and other evidence-based studies acknowledge the concerns of nicotine exposure to the developing brain, and e-cigs being a socially acceptable gateway to traditional cigarette and other drug use. Numerous studies indicate high youth e-cig rates amongst specific populations (i.e., rural, low socioeconomic status), the strong influence parents and adults have on youth tobacco abuse, and that current youth e-cig preventative strategies are unsuccessful. The rural Puna District has the highest users of both e-cigs and combustible cigarettes in the state of Hawaii. Thus, innovative strategies are needed to improve e-cig health literacy in this high risk population. Thirty participants participated in a project aimed at improving e-cig health literacy in the rural population through a community farmer’s market e-cig information booth. Participants’ level of concern, e-cig knowledge, and the resources utilized to obtain e-cig or other health information were assessed before and after project interventions. Data analysis indicated that for the majority of participants, project interventions changed perception, increased level of concern, knowledge, potential future advocacy against e-cigs, and potential future attendance to convenient health literacy booths. Convenient educational booths have the potential to improve health literacy in rural populations thus leading to improved prevention or management of community health issues.
INCREASING AWARENESS OF VAPEING

*Keywords*: Farmers Market, Farmer’s Market health care, innovative health care, health literacy booth, convenient health care, rural health care, high risk, priority populations, underserved populations, electronic cigarettes, e-cigs, outreach program, prevention booth, rural health prevention.
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Chapter One: Statement of the Problem, Aims and Objectives

Introduction

The utilization of electronic cigarettes also known as “e-cigs” or “vaping” increased by 78% nationally to 20.8% among high school students and by 48% to 4.9% among middle school students from 2017 to 2018 (Centers for Disease Control and Prevention [CDC], 2018). The figures were higher in Hawai‘i State at 27% and even higher in Hawai‘i County (HC) where 34% of high school students used e-cigs daily (CDC, 2018; Coalition for a Tobacco-Free Hawai‘i, 2019). HC middle school e-cig use also increased to 23% which was in stark contrast to the 4.9% national statistic (CDC, 2018; Coalition for a Tobacco-Free Hawai‘i, 2019). In 2018, 49%, and in 2019, 50% of HC high school students reported they had tried e-cigs (Bracken, 2018; State of Hawaii, 2020).

Vaping involves the inhalation of highly addictive nicotine as well as other harmful chemicals via a battery-powered device which heats liquid nicotine and other additives into an aerosol mist (Alzahrani, Pena, Temesgen, & Glantz, 2018; CDC, 2018; U.S. Department of Health and Human Services [USDHHS], 2019). E-cigs are considered tobacco products because the great majority contain nicotine which is derived from tobacco (USDHHS, 2019). These devices are referred to by a plethora of terms such as electronic cigarettes or e-cigs, electronic nicotine delivery systems, electronic smoking devices, e-hookahs, mods, vape pens, vapes, tank systems, and JUUL products (CDC, 2018). Hereafter, all vaping devices will be collectively referred to as e-cigs.
Vaping has introduced a novel socially acceptable form of nicotine consumption to adolescents as an alternative to traditional cigarettes (Barrington-Trimis & Leventhal, 2018; Barrington-Trimis et al., 2016; CDC, 2018). Although presented as a viable alternative to smoking, vaping actually increases the likelihood of smoking traditional cigarettes in this population (CDC, 2018; USDHHS, 2018). E-cig companies have utilized unregulated social media to advertise e-cigs as a healthier, safer, and more flavorful way to receive nicotine with minimal to no odor (Coleman et al., 2016; Malik, Li, Karbasian, Hamari, & Johri, 2019). The promotion of vaping as the “healthier” or “safer” alternative to smoking deceives adults as it does not acknowledge the numerous adverse effects of nicotine, especially on the developing brain (Coleman et al., 2016; USDHHS, 2019). Additionally, vaping is associated with severe respiratory illnesses which can be fatal. These have been defined by the CDC (2019a) as an e-cigarette or vaping, product use associated lung injury (EVALI). The first multi-state outbreak totaling 215 EVALI cases was reported by the CDC on August 27, 2019 and rose to 2,807 hospitalized EVALI cases with 68 deaths as of February 18, 2020 (CDC Health Alert Network [HAN], 2019; CDC, 2020). Currently, the CDC (2020), does not promote e-cigs and states that adults who do not currently use tobacco products should not start using e-cigarette, or vaping products and e-cigarette, or vaping, products (nicotine- or THC-containing) should never be used by youths, young adults, or women who are pregnant.

The State of Hawaii (2019a) reported that protecting children from tobacco products is one of the most important efforts a society can make to prevent children from picking up a habit that is addictive, dangerous to their health, and negatively impacts public health. Although the use of tobacco products such as combustible cigarettes, cigars, and pipes had decreased
substantially, there has been an increase in the use of e-cigs, particularly among adolescents
(12–17 year-olds) and young adults (18–21 year-olds) (Malik, Li, Karbasian, Hamari, & Johri,
2019). The increased e-cig use among United States middle and high school students reversed a
twenty-year trend of decline in overall tobacco use (CDC, 2018). Concerns regarding e-cigs
include nicotine exposure and dependency, e-cigs as a gateway to traditional cigarette use, the
renormalization and social acceptance of a smoking behavior, and EVALI morbidity and
mortality (Allen et al., 2016; Barrington-Trimis & Leventhal, 2018; Barrington-Trimis et al.,
2016; CDC, 2016, 2020; USDHHS, 2019;).

Background and Significance

E-cigs entered the United States (U.S.) market around 2007, and since 2014 have been
the most commonly used nicotine product among U.S. youth (USDHHS, 2019). The rapid rise
in e-cig use threatens to reverse the progress made over the past two decades in reducing
traditional cigarette nicotine consumption among U.S. adolescents (Johnston, Miech, O’Malley,
Bachman, Schulenberg, & Patrick, 2019. p. 43; State of Hawaii, 2019a) (See Appendix A).
Conventional cigarette smoking declined yearly since 1999 when 23.1% of high school seniors
smoked conventional cigarettes (Johnston et al., 2019; Office of Adolescent Health, 2019).
Smoking had in fact become socially unacceptable with only 4.8% of high school seniors
reporting smoking conventional cigarettes in 2016 (Johnston et al., 2019; Office of Adolescent
Health, 2019). Youth who were not likely to smoke conventional cigarettes have been influenced
to use e-cigs. However, the use of e-cigs increases the probability of smoking conventional
cigarettes in the future (CDC, 2018; Malik et al., 2019; USDHHS, 2019).
Nicotine exposure can harm brain development which continues until about age 25 (USDHHS, 2019). Nicotine exposure during periods of significant brain development can disrupt the growth of brain circuits and thus have long-lasting negative effects including deficits in attention and cognition, reduced impulse control, development of mood disorders, and increased propensity to future addiction to other substances (Barrington-Trimis & Leventhal, 2018; Barrington-Trimis et al., 2016; USDHHS, 2016). Nicotine is toxic to developing fetuses and presents a health danger to pregnant women and their developing babies (CDC, 2020; USDHHS, 2016).

Aerosol from e-cigs also contain other harmful substances in addition to nicotine, such as: ultrafine particles that can be inhaled deep into the lungs; flavorings such as diacetyl (a chemical linked to serious lung disease); volatile organic compounds such as benzene (which is found in car exhaust); and heavy metals, such as nickel, tin, and lead (Alzahrani, et al., 2018; USDHHS, 2016). The nicotine in e-cig liquid is concentrated and if swallowed, inhaled, or absorbed through eyes, skin or mucous membrane may cause acute toxicity. Serious injuries caused by fires and explosions from defective devices (USDHHS, 2016) have also been reported. Due to the new onset of youth e-cig use, the full range of health implications from e-cigs is still uncertain, especially for children (Garbutt et al, 2015).

The modern e-cig was developed in 2003 in Beijing and introduced to America in 2007 (Consumer Advocates for Smoke-free Alternatives Association [CASAA], 2018). In 2008, the World Health Organization (WHO) officially declared that the e-cig was not a legitimate smoking cessation aid and insisted that e-cig marketing materials remove any mention that the WHO might consider e-cigs a safe or effective alternative to tobacco (World Health
Organization [WHO], 2008). The Food and Drug Administration (FDA) had not approved e-cigs as drug delivery devices and in 2009, directed the U.S. Customs and Border Protection to deny the entry of electronic cigarettes into the United States (CASAA, 2018). Since its modern inception, India, Brazil and Thailand have banned e-cig import and use due to unexplored health concerns and the consistently expressed concerns over e-cig marketing targeting youth (Reuters, 2019).

In December 2016, “E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General” was the first federal agency comprehensive review of the public health issue of e-cigs. It acknowledged that e-cigs are a major public concern due to their impact on the nation’s adolescent and young adult populations (CDC, 2016). As the problem skyrocketed, on December 18, 2018, U.S. Surgeon General Jerome Adams labeled the situation an epidemic. Adams advocated “emphasizing the importance of protecting our children from a lifetime of nicotine addiction and associated health risks by immediately addressing the epidemic of youth e-cigarette use” (USDHHS, 2018, para. 1).

Although these surgeon general reports acknowledged the e-cig epidemic as a major public health concern and multiple countries have banned e-cig use, it may take years for any meaningful change to occur at the U.S. national level (CDC, 2016; Coalition for a Tobacco-Free Hawai’i, 2019; Reuters, 2019; USDHHS, 2018). In the meantime, it is up to state and local governments to regulate e-cig devices and products, but unfortunately proposed policies and procedures aimed at preventing youth e-cig use have encountered significant legal barriers, creating the need for innovative solutions (Coalition for a Tobacco-Free Hawai’i, 2019; University of Michigan Institute for Social Research, 2018).
While awaiting federal e-cig regulations and innovative solutions to address this epidemic, on August 27, 2019 the CDC Health Alert Network issued the first government alert informing the public of 215 possible EVALI cases reported from 25 states (CDCHAN, 2019). Symptoms of difficulty breathing, shortness of breath and/or chest pain, mild to moderate gastrointestinal illness including vomiting and diarrhea, or other symptoms such as fevers or fatigue were reported in otherwise healthy e-cig users (CDC, 2019a; U.S, Food and Drug Administration Center for Tobacco Products [USFDA], 2019b). As of February 18, 2020, the number of hospitalized EVALI cases reported to the CDC had risen to 2,807 with 68 confirmed deaths (CDC, 2020). EVALI cases were reported from all 50 states, the District of Columbia, and two U.S. territories (Puerto Rico and U.S. Virgin Islands) with confirmed deaths in 29 states and the District of Columbia (CDC, 2020). Due to continued declines in new EVALI cases and the identification of vitamin E acetate as a primary cause of EVALI, February 18, 2020 was the final CDC health alert network update on the number of hospitalized EVALI cases and deaths nationally (CDC, 2020).

During the outbreak, the specific cause(s) of lung injury related to e-cig use were not yet known, and the CDC recommended refraining from the use of all e-cig or vaping products (CDC, 2019a, 2020). All cases had a commonality that patients reported the use of e-cig products (CDC, 2019b). The CDC (2019b) acknowledged that the only way to eliminate the possibility of adverse pulmonary effects is to refrain from the use of e-cig products (CDC, 2019b).

The Study to evaluate the cause of EVALI found the identification of vitamin E acetate as a primary cause of EVALI. The CDC (2020) recommends that adults using
nicotine-containing e-cigarette, or vaping, products as an alternative to cigarettes should not go back to smoking, but adults should weigh all available information and consider using FDA-approved smoking cessation medications. If adults choose to use e-cigarettes as an alternative to cigarettes, they should completely switch from cigarettes to e-cigarettes and not partake in an extended period of dual-use of both products that delays quitting smoking completely. Adults should contact their healthcare professional if they need help quitting tobacco products, including e-cigarettes, as well as if they have concerns about EVALI (CDC, 2020).

Despite the risks, e-cig companies were actively employing deceptive advertising to promote using their products as a “healthier alternative” to smoking traditional cigarettes (Barrington-Trimis & Leventhal, 2018; Barrington-Trimis et al., 2016; USDHHS, 2016). E-cig companies utilized unregulated social media platforms such as Instagram and Twitter in order to promote e-cigs as a healthier, flavorful, technologically advanced, easily concealable, and socially acceptable form of odor-free brisk and highly effective nicotine delivery among impressionable youth (Barrington-Trimis et al., 2016; Coleman et al., 2016; Malik et al., 2019). These manufacturers had resurrected marketing practices used previously by traditional tobacco companies to attract youth to smoking such as celebrity endorsements, “slick” television and magazine advertisements, and sports and music sponsorships (State of Hawaii, 2019a). This marketing tactic was aimed at supporting a persona such as the “Marlboro man” in order to create the image of being “cool” and receive peer validation while avoiding the unhealthy and unappealing “smoker” identity associated with conventional cigarettes (Malik et al., 2019).

The most commonly sold e-cig in the U.S. is made by JUUL and is shaped like a Universal Serial Bus (USB) flash drive (USDHHS, 2019). JUUL introduced its market-leading
e-cig in 2015, but the FDA did not finalize its policy for regulating e-cigs as new tobacco products until 2016. As a result, prior to 2016, JUUL and its competitors could launch their products with virtually no federal oversight, and without having to file the cumbersome applications required of new drugs and devices (Ducharme, 2019b). JUUL experienced a 600% surge in sales from 2016 to 2017, giving it the greatest market share of any e-cig company in the U.S. (USDHHS, 2019). The JUUL device’s novelty, design aesthetics, ease of use, portability, minimal to no odor, and ease of concealment from parents and teachers all contributed to its rise in popularity among youth (Malik et al., 2019). JUUL was responsible for 75% of all e-cig sales in 2018 (American Nonsmokers’ Rights Foundation [ANRF], 2019). In addition, Big Tobacco giant Altria (parent company Philip Morris) invested 12.8 billion dollars for a 35% stake in JUUL on December 19, 2018 (ANRF, 2019).

JUUL and other e-cigs were captivating youth with a variety of technologically appealing devices and 16,000 flavors available (Coalition for Tobacco-Free Hawaii, 2019). The huge assortment of flavors sounded like they belonged in a candy store or ice cream parlor with names like: Gummy Bear, Cotton Candy, Peanut Butter Cup, Cookies n’ Cream, and Pop Rocks (Coalition for Tobacco-Free Hawaii, 2019). According to the USDHHS (2016), 90% of young adult e-cig users in the U.S. stated they use e-cigs which are flavored to taste like menthol, alcohol, fruit, chocolate, or other sweets. In the population of Native Hawaiian and Pacific Islander cigarette smokers specifically, 78% utilize menthol cigarettes (Coalition for a Tobacco-Free Hawai’i, 2019). Flavoring in combination with modern device aesthetics that appeal to youth tastes may act to promote smoking initiation among adolescents, play a
significant role in continuing e-cig use, and contribute to the progression of heightened individual levels of e-cig use (Barrington-Trimis et al., 2016).

In a national study of flavored tobacco use among teens, the primary reason for e-cig use was flavoring, followed closely by the perception of being less harmful than traditional cigarettes (Patrick et al., 2016). While adolescents recognize the risk of traditional smoking, ironically, as youth mature the perceived risk of e-cig use and nicotine dependency actually decreases (Johnston et al., 2019). JUUL always contains nicotine although a study showed that 63% of JUUL users aged 15 to 24 years were under the impression that e-cigs release only harmless water vapor with no nicotine (Crawford, 2018). The deceptive “healthier and safer” promotion of e-cigs distracts many adults, parents and youth from the high nicotine concentrations and adverse health effects (Coleman et al., 2016; Malik et al., 2019).

The rapid development of a multitude of technologically appealing, concealable, vapor free e-cig products which were easily attained by youth from underground social media market platforms made it difficult for parents, adults and other authority figures to recognize e-cig use or the devices (Coleman et al., 2016; Malik et al., 2019; University of Michigan Institute for Social Research, 2018). Unfortunately, limited efforts were made to ascertain the adult population’s knowledge regarding signs and symptoms of e-cig use, product recognition, associated adverse effects, or their level of concern regarding youth utilization of e-cigs (Malik et al. 2019). Adults, parents, youth, and teachers were responsible for self-educating about e-cigs through the navigation of complex websites, unregulated social media, news sources, and word of mouth (Malik et al., 2019). The addition of misleading information from e-cig advertisements did not
simplify the search and led to a decreased level of concern to continue seeking information or navigating complex online sources (Malik et al., 2019).

According to a study by Lupton and Maslen (2019), in the design of online digital health tools, aspects of race, gender, and socioeconomic status were largely unacknowledged with the “universal user” understood to be white, male, and middle class. Even reputable federal agencies such as the CDC provide information that may be steeped in scientific nomenclature that is challenging for the average consumer to interpret or even read on a small device such as a cellphone (Lupton and Maslen, 2019). E-cig advertisements as the healthier alternative to cigarettes may have caused adults to accept this false information and classify e-cigs as a better youth option to traditional cigarettes (Malik et al., 2019).

Multiple child development theories recognize the impact that adults contribute to shaping a child’s personality and behaviors, specifically related to substance abuse (Bry, Catalano, Kumpfer, Lochman, & Szapocznik, 1998). The preponderance of misinformation coupled with the lack of reliable data regarding the risks of e-cig use hindered the adult’s role of child advocacy. Numerous studies indicate that permissive family norms regarding substance use Cambron are linked to an increase in early adolescent smoking (Cambron, Kosterman, Catalano, Guttmannova, & Hawkins, 2017). The lack of health information is compounded by socioeconomic disparities such as poverty and lack of health care (Graves, 2010; Rural Health Information Hub, 2019b).

In the State of Hawaii specifically, access to health care is greatly impacted by a current shortage of over 600 physicians, with an expected shortage of 1,200 by the year 2020 (Hamamura, Withy, & Hughes, 2017). Individuals without resources cannot afford health
services, and communities without resources have difficulty attracting and retaining health care providers (Graves, 2010; Rural Health Information Hub, 2019b). The effects of living in rural, underserved and disenfranchised communities make improving health difficult (Graves, 2010; State of Hawaii, 2019a). Communities suffering from social, economic, political, cultural, and environmental disparities and/or inequities are more inclined to smoke combustible cigarettes and e-cigs. These include certain races or ethnicities (e.g., Native Hawaiian, Filipino); members of the Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Intersex and Asexual or Allied (LGBTQIA) community; and individuals who have low income, high school education or less, behavioral health diagnoses, substance abuse, no health insurance, Medicaid qualifications, and public housing residences (American Lung Association, 2019; Coalition for a Tobacco-Free Hawai‘i, 2019; Evans-Polce et al., 2018; Garbutt et al., 2015; State of Hawaii, 2019a, 2019b).

The population of 44,382 (23.5% of HC) people living in rural Puna specifically are affected by many of the social determinants of health which correlate with higher risks of smoking and e-cig use (State of Hawaii, 2019a, 2019b; U.S. Census Bureau, 2018). Reflective of these socioeconomic disparities, tobacco abuse in Puna is 22.3% compared to 14.7% for the state of HI. These risks include being Native Hawaiian, low SES, unemployment, no health insurance or public health coverage, government assistance programs, behavioral health diagnoses, substance abuse issues, and a high school education or below (“State of Hawaii Primary Care,” 2016; see Appendices B, Figure B1 through B3, and C, Figure C1 through C4). These demographic characteristics identify the Puna population as a high risk of e-cig use, increased nicotine dependence among adolescents and the increased likelihood of smoking regular
cigarettes that foreshadow the increase of acute and chronic adverse effects associated with e-cigs and tobacco abuse (State of Hawaii, 2019a, 2019b).

Smoking is the number one preventable cause of death in the U. S. killing over 480,000 people every year (American Lung Association, 2019). There is currently minimal funding in HI for e-cig or tobacco prevention education targeting youth and adults (Campaign for Tobacco-Free Kids, 2020). The minimal funding is geared toward out of school programs that not all youth are involved in (S. Ancheta, personal interview, February 14, 2020). In HI, 95% of smokers began before they were 21 years of age, and Native Hawaiian adolescents typically start to smoke at an earlier age than peers from other ethnic groups (State of Hawaii, 2019a).

The Hawai‘i Island Department of Education (DOE) has no e-cig curriculum except a brief discussion in health class (S. Masoyana, personal interview, March 3, 2020). Schools in the community are encouraged, but individually responsible for using Stanford Medical School Tobacco Prevention Tool Kits, coordinating with Hawaii Public Health Institute (HIPHI) or other tobacco cessation agencies to access prevention educators, or other additional resources to promote the prevention of e-cig or tobacco abuse (S. Masoyana, personal interview, March 3, 2020). Schools in the Puna district had yet to coordinate with HIPHI or other agencies to provide any education (S. Ancheta, personal interview, September 20, 2019). The lack of e-cig education in Puna will likely continue to contribute to increasing ecig use and thus worsening health outcomes (Graves, 2010; Hamamura et al., 2017; Rural Health Information Hub, 2019b; “State of Hawaii Primary Care,” 2016).

**Problem Statement**
The social determinants of health amongst the rural population of Puna along with the e-cig epidemic, combined with increased the likelihood of smoking regular cigarettes, increasing EVALI cases, deceptive promotion of e-cigs, and the lack of healthcare resources made it imperative to develop an innovative strategy to provide adults in this community with evidence-based information regarding the adverse effects associated with e-cig use (American Lung Association, 2019; Campaign for Tobacco-Free Kids, 2019; CDC, 2019b, 2020; Graves, 2010; HHS, 2016; Malik et al., 2019; Rural Health Information Hub, 2019b; State of Hawaii, 2019a).

The adolescent population of Puna is at risk for significant adverse effects of e-cig use. Evidence demonstrated that current strategies to prevent e-cig use amongst HC, HI, and the U.S. were unsuccessful (Coalition for a Tobacco-Free Hawai‘i, State of Hawaii, 2019a; 2019; University of Michigan Institute for Social Research, 2018). There was thus a need to develop innovative outreach programs to prevent youth e-cig use, especially for susceptible populations such as those living in rural Puna. Adults play a significant role in the development of youth behavior; however, rural populations lack resources to increase adult health literacy (Graves, 2010; Kumpfer, Alvarado, & Whiteside, 2003). Increased adult health literacy regarding the dangers of e-cig use will empower adults to exercise their influence in the community in order to decrease and/or prevent youth usage of e-cigs. Providing easy access to an innovative health literacy booth at a highly trafficked community location such as the Sunday Maku‘u Farmers Market (MFM) in Puna could promote increased e-cig advocacy from adults, parents, and caregivers and has the potential to ultimately improve health outcomes in this rural community.

**Overarching Project Goal**
The overarching project goal was to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth.

**Project Aims and Objectives**

**Aim 1.** Conduct research identifying the community of Puna as an ideal setting for an innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use.

**Objective 1.** Gather evidence-based literature and government statistics validating youth e-cig rates as increasing and HC youth e-cig use as higher than national and state averages.

**Objective 2.** Identify target populations more inclined to use e-cigs.

**Objective 3.** Identify the population demographics of the community of Puna.

**Objective 4.** Verify that innovative outreach programs are needed to combat the increased rise in youth e-cig use.

**Aim 2.** Develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults.

**Objective 1.** Gather evidence-based literature regarding the negative health impacts of e-cigs.

**Objective 2.** Identify local and national health resources available to Puna residents.

**Objective 3.** Contact managers of the project location (Puna community Farmer’s Market) to determine logistics of project implementation.

**Objective 4.** Develop the evidence-based toolkit.

**Objective 5.** Develop a recruitment flyer
**Objective 6.** Develop methods for toolkit intervention evaluations.

**Objective 7.** Pilot implementation of the toolkit.

**Aim 3.** Evaluate the effectiveness of the project interventions.

**Objective 1.** Implement evaluation methods to assess new knowledge learned by project participants.

**Objective 2.** Implement evaluation methods to assess whether participants felt that project interventions were valuable and that interventions met their needs in the way they were designed and implemented.
Chapter Two: Review of Literature and Conceptual Framework

The dramatic rise in e-cig use among U.S. youth moved the U.S. Surgeon General to label it a nationwide epidemic (HHS, 2016). The State of Hawaii (2019a), the CDC (2018), the surgeon general, and numerous other research entities have reported that no form of youth tobacco use is safe and that the importance of protecting youth from the negative impacts of a lifetime of nicotine addiction is paramount (HHS, 2016). This literature review includes some of the findings related to that research. This chapter is organized by salient themes that emerged during the reading of these resources including: Statistics on E-cigarette Users and Smokers of Tobacco; Adverse Health Effects of Smoking; E-cig use and JUUL; Reasons for E-cig Use; Future Cigarette Smoking; Re-normalization of Nicotine Use and Smoking Behavior; Smoking Cessation vs. Dual Use of Combustible and E-cigarettes; Lack of Knowledge About E-cigs; Regulations on Tobacco and E-cigs Use; Populations Inclined to Vape or Use Tobacco; Puna Demographics; Methods to Reduce Smoking and Prevent E-cig Use; Innovation in Prevention of E-cig Use Among Youth; and Future Research.

Data Sources

The literature review was performed via an online electronic search through the University of Hawai’i at Hilo Edwin H. Mookini Library periodical databases in Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct, Google, and Google Scholar. Search terms included electronic cigarettes, vaping, youth cigarette social stigma, e-cig flavors, adolescent, young adult,
youth, and child development theories. The time period of the articles was restricted from 2014 to 2019 for most searches.

**Statistics on E-cigarette Users and Smokers of Tobacco**

Children from elementary school to high school are vaping. The State of Hawaii (2019a) states that e-cigs are the most commonly used tobacco product among U.S youth and representatives from the “West Hawaii Inspire to Breathe” (2019) program discussed an instance in January 2019, where second and third graders were caught using and trading e-cigs at recess at an elementary school on the west side of Hawaii Island. In 2018, 50% of HC high school students reported they had tried e-cigs, while 42% of all Hawaii high schoolers reported trying e-cigs in 2017 (Coalition for a Tobacco Free Hawai’i, 2019; State of Hawaii, 2020). The national rate of e-cig use among middle school students rose from 0.6% (60,000 students) in 2011 to 4.9% (570,000 students) in 2018, with a 3.3% to 4.9% rise nationally from 2017 to 2018 (CDC, 2018; Cullen et al., 2018; HHS, 2016). Among high school students, national e-cig use increased from 1.5% (220,000 students) in 2011 to 20.8% (3.05 million students) in 2018 (CDC, 2018; Cullen et al. 2018; HHS, 2016).

The Office of Adolescent Health (2019) listed the percentage of students who reported smoking conventional cigarettes daily from 1976–2018. These statistics showed that students grade 12 smoking conventional cigarettes wavered between 28.8% to 23.1% from 1976–1999, then declined yearly to only 3.6% in 2018 (See Appendix A). In 2018, 3.6% of high school seniors identified as daily smokers of traditional tobacco, and 7.6% had smoked within the past 30 days (Johnson et al., 2019). Traditional tobacco smoking rates peaked in 1996 for 8th and 10th graders and in 1997 for 12th graders; a fairly steady and substantial decline continued
through 2017 for 8th graders, and through 2018 for 10th and 12th graders (Johnston et al., 2019; Office of Adolescent Health, 2019).

**Adverse Health Effects of Smoking**

Since the 1964 Surgeon General’s report, cigarette smoking has been causally linked to diminished health status and harm to the fetus (National Center for Chronic Disease Prevention [NCCDP] and Health Promotion Office on Smoking and Health, 1970). The NCCDP (2014) states that scientific evidence is incontrovertible: inhaling tobacco smoke, particularly from cigarettes, is deadly. The report mentions that since the first Surgeon General’s Report in 1964, evidence has linked smoking to diseases of nearly all organs of the body, and even 50 years after the first Surgeon General’s report, researchers continue to identify new diseases caused by smoking (NCCDP, 2014).

The report listed that smoking causes lung, colorectal, and liver cancers; coronary heart disease; chronic obstructive pulmonary disease (COPD); diabetes mellitus; rheumatoid arthritis; immune system weakness; increased risk for tuberculosis disease and death; ectopic (tubal) pregnancy; impaired fertility; cleft lip and cleft palates in babies of women who smoke during early pregnancy; erectile dysfunction; age-related macular degeneration; increased failure rate of treatment for all cancers; diminished overall health status; and reduced quality of life (NCCDP, 2014). In 2018 smoking claimed 1,400 adult lives each year and was predicted to contribute to 21,000 premature deaths for children and youth under 18 years old living in Hawaii (Campaign for Tobacco Free Kids, 2019; State of Hawaii, 2019a). In addition to causing multiple diseases, cigarette smoking has many other adverse effects on the body, such as causing inflammation and impairing immune function (NCCDP, 2014). Furthermore, the disease risks associated with
being a female smoker have risen sharply over the last 50 years and are now equal to those of men regarding lung cancer, chronic obstructive pulmonary disease, and cardiovascular diseases (NCCDP, 2014).

**Adverse health effects of e-cigs.** The State of Hawaii (2019a) emphasizes that e-cigs are not harmless and according to the CDC (2018), “The use of any form of tobacco product among youth tobacco is unsafe” (para. 5). The adverse effects of e-cigs include nicotine addiction, priming for use of other addictive substances, reduced impulse control, deficits in attention and cognition, and potential development of mood disorders. Symptoms of nicotine addiction, such as drug withdrawal and forfeiture of social, occupational, or recreational activities in favor of nicotine use, can cause substantial distress and impairment (Barrington-Trimis & Leventhal, 2018). Nicotine exposure during adolescence can harm the developing brain, which continues to develop until about age 25, impacting learning, memory and may increase the risk for future addiction to other drugs (HHS, 2016). The National Institute of Drug Abuse (2018) found that 30.7% of teen e-cig users started smoking traditional cigarettes within six months of starting e-cig use (Crawford, 2018). Coleman (2016) mentioned throat irritation, cough, and lightheadedness as a few additional reported side effects of e-cigs. Barrington and Leventhal (2018) noted that respiratory symptoms were also being reported more often by non-users exposed to secondhand aerosol than by e-cig users themselves.

**Fetal and neonatal effects.** Although research on the long-term health effects of inhaling e-cig aerosol is limited, it is known that nicotine can cross the placenta and affect fetal and postnatal development (Garbutt et al., 2015; HHS, 2016). Multiple adverse consequences can result, including sudden infant death syndrome, altered corpus callosum, auditory processing
deficits, effects on behaviors and obesity, and deficits in attention and cognition (HHS, 2016).

Specific effects of e-cigs to the fetuses of pregnant women and to breastfeeding babies are unknown, but fetal or neonatal exposure to nicotine may contribute to pediatric lung disease and behavioral abnormalities (Garbutt et al., 2015). As noted in Chapter 1, in Puna, 18-year-olds had a 3% pregnancy rate compared to 1.8% for the state of Hawaii. Thus, the effects of nicotine on the fetus and neonate are highly relevant to this population.

**E-cig chemicals.** Recent investigations have focused on the chemical content of e-cigs beyond nicotine, with researchers finding that e-cig users were additionally exposed to carbonyl compounds, volatile organic compounds, and other additives (Allen et al., 2016). The aerosol mixtures inhaled from e-cigs contained toxic aldehydes such as formaldehyde and acetaldehyde; toxic propanol; and acrolein, which forms after heating of the e-cig liquid (Alzahrani, et al., 2018; HHS, 2016; Korfei, 2018). The liquid may also contain the main components of propylene glycol and glycerol as thermal decomposition products; and other aerosols, such as: methyl-benzaldehyde, carcinogenic nitrosamines, terpenic compounds such as limonene, and heavy metal and silicate particles and nanoparticles (Alzahrani, et al., 2018; HHS, 2016; Korfei, 2018). The toxic emissions produced in the inhaled aerosol have been demonstrated to induce oxidative stress, glutathione depletion, and increased production of inflammatory cytokines in human airway epithelial cells in vitro and in the lungs of mice in vivo (Korfei, 2018). These ultrafine particles are the same size as the particles found in smoke and air pollution that increase the risk for cardiovascular disease with acute myocardial infarction (Alzahrani et al., 2018). A study by Alzahrani et al. (2018) examined the cross-sectional association between e-cig and cigarette use from The National Health Interview Surveys of 2014 and 2016, and acknowledged
the risk of myocardial infarction was found to be 1.7 times greater for daily e-cig users, 2.72
times higher for cigarette-only smokers, and 4.62 times higher for dual users.

Laboratory testing of bronchoalveolar lavage (BAL) fluid samples (or samples of fluid
collected from the lungs) from 29 patients with EVALI submitted to the CDC from 10 states
found vitamin E acetate in all the samples (CDC, 2019b). This was the first time the CDC
detected a chemical of concern in biologic samples from patients with these lung injuries,
however, the specific compound or ingredients causing lung injury was not yet known (CDC,
2019b). Vitamin E acetate is used in the production of vaping products as a thickening
ingredient. Vitamin E acetate usually does not cause harm when ingested orally as a vitamin
supplement or applied to the skin, however, research suggested when vitamin E acetate is
inhaled, it may interfere with normal lung functioning (CDC, 2019b).

In six months, the multistate EVALI outbreak rose to 2,807 cases from all 50 states, the
District of Columbia, and two U.S. territories (Puerto Rico and U.S. Virgin Islands), with 68
confirmed deaths in 29 states and the District of Columbia. While the exact cause of lung
injuries in these cases was unknown, the common denominator was the use of e-cig or vaping
products (CDC, 2019a, 2019b, 2020). Thus, the CDC (2019b) recommended refraining from the
use of e-cig or vaping products.

Flavoring chemicals. In a 2014 study, researchers found more than 7,700 unique e-cig
flavors available online, with more than 240 new flavors being added each month (State of
Hawaii, 2019a). Despite over 7,000 e-cig flavors marketed in 2016, only three papers had been
published focusing on exposure to flavoring chemicals specifically (Allen et al., 2016). Per the
FDA (2019), flavoring chemicals used in e-cigs were “generally recognized as safe” (GRAS) for
ingestion; however, very little was known about exposure via inhalation (Allen et al., 2016). As of 2018, there were 16,000 flavors on the market (Coalition for Tobacco Free Hawaii, 2019).

**Additional hazards.** The State of Hawaii (2019a) and the HHS (2016) noted additional e-cig hazards such as battery explosions causing fires, burns, and other serious injuries. Direct ingestion of e-cig liquids containing nicotine can also cause acute toxicity and possible death (HHS, 2016). One concern is that the concentrated nicotine solution in e-liquid can quickly be absorbed through the skin or by oral ingestion, and small doses (less than a teaspoon) can be fatal to children (Garbutt et al., 2015). U.S. poison centers reported a dramatic increase in calls related to e-cig exposure, from one per month in 2010 to 215 per month in 2014 (mostly related to exposure of children younger than five years of age) including fatality of a one-year-old after drinking e-liquid (Garbutt et al., 2015). A study by Garbutt et al. (2015), showed that storage security of e-cig devices and e-juice was often minimal, creating access for small children. Most parents reported storage in a cupboard, drawer, purse, bag, or on an open countertop, with many parents indicating they had no concern about locking up the liquid or using a child-proof cap.

**Financial implications.** Annually, 526 million dollars in health care costs in Hawaii were directly attributed to smoking, with 141.7 million Medicaid dollars and 817 dollars per Hawaii household spent to cover the state and federal tax burden from smoking-caused government expenditures (Campaign for Tobacco-Free Kids, 2019; State of Hawaii, 2019a). Nationwide, the Medicaid program spent more than 39.6 billion dollars in health care for smoking-related diseases each year, which is more than 15.2% of total Medicaid spending, costing the U.S. economy over 332 billion dollars in direct health care costs and loss of productivity each year (American Lung Association, 2019).
E-cig Use and JUUL

JUUL is currently the most commonly sold e-cig and its recent popularity was a large reason for the 78% increase in youth e-cig use from 2017 to 2018 (Crawford, 2018). In 2018, JUUL accounted for more than 75% of all U.S. e-cig sales and was valued at more than 38 billion dollars (ANRF, 2019). The JUUL e-cig was created in 2015, however, the FDA did not finalize its policy for regulating e-cigs as new tobacco products until 2016 (Ducharme, 2019b). This allowed JUUL and all other e-cig manufacturers before 2016 to launch their products with virtually no federal oversight, and without having to file the painstaking applications required of new drugs and devices (Ducharme, 2019b). E-cig makers were required to retroactively apply for FDA approval by May 2020, proving that their devices provide a net benefit to public health (Ducharme, 2019b). Due to the Covid-19 pandemic, this deadline was extended to September 9, 2020 (American Pharmacist Association, 2020).

The JUUL e-cig was created in 2015 by two Stanford design engineers as a small, USB rechargeable, closed-system utilizing disposable pods (Leavens et. al, 2019; Vox By Design, 2018). The JUUL was a benign-appearing, youth-appealing, USB device that did not look like a traditional cigarette or any existing drug delivery device (Vox By Design, 2018). Thus, the JUUL was deemed “the iPhone of e-cigs” due to its technologically appealing look (Vox By Design, 2018). The concentration of nicotine in each JUUL pod was about twice that of many other e-juice nicotine concentrations and was listed at 5% nicotine by weight versus the more common 2.4% or less in other e-juices. A pod was roughly equivalent to a pack of cigarettes or 200 puffs (Crawford, 2018).
JUUL appeals to youth for numerous reasons including the ability to be used discreetly, high nicotine content, flavors, and minimal scent unlike cigarettes (Crawford, 2018). JUUL is unique in that it contains nicotine salts which are more appealing to individuals than the nicotine used in other delivery methods (ANRF, 2019; Crawford, 2018; HHS, 2019; Vox By Design, 2018). The nicotine salts allow particularly high levels of nicotine to be inhaled with less irritation than the free-base nicotine that had traditionally been used in other e-cig tobacco products (HHS, 2019). Crawford (2018) described how JUUL more closely approximates the sensation and smooth feel of combustible cigarettes than other e-cig products (HHS, 2019). Prior to recent regulations (Ducharme, 2019a), JUUL products came in a range of youth-targeted flavors such as Mango, Menthol, Fruit Medley, Crème, and Cucumber (Juul.com, 2018). The higher concentrations of nicotine made JUUL products potentially more addictive than other e-cig products (Crawford, 2018; Ducharme, 2019a). JUUL and other “pod mods” (the interchangeable nicotine storage container located on the bottom of the JUUL or other devices) use protonated adhesive covers, similar to mobile phone cases, which are marketed as “skins”—the same term used for the variety of visual options that video game players can select to personalize their gaming devices (Barrington-Trimis & Leventhal, 2018).

In 2018, Altria (parent company of tobacco giant Philip Morris) purchased 35% of JUUL, investing significant resources including marketing techniques as well as lobbyists to influence legislation regarding the new nicotine delivery system (ANRF, 2019). Altria has been convicted of lying and misleading the American public concerning the hazardous effects of tobacco abuse and secondhand smoke for decades (Big Tobacco and Juul, 2019). In July 2019 the FDA warned JUUL to stop unlawfully marketing its e-cigs as healthier than cigarettes. JUUL responded by
halting U.S. advertising, and ending sales of fruit and dessert flavors in the U.S. (Ducharme, 2019b).

JUUL has been accused of being more addictive than traditional cigarettes to some users and had three lawsuits against them before July 2019, and by November 2019, more than 50 lawsuits against JUUL had been filed (Crawford, 2018; Ducharme, 2019a). In October 2019, JUUL and the Center for Environmental Health, an advocacy group focused on improving environmental and human health, reached a legally binding settlement that made it easier for lawsuits to be filed against JUUL if it violated a number of anti-youth-marketing policies such as promoting its products on social media, within 1,000 feet of schools or at events that allow attendees younger than 21. On October 15, 2019 the first wrongful-death lawsuit against JUUL was filed in federal district court in the Northern District of California after an 18-year-old male in Florida died from health issues the mother attributed to vaping (Ducharme, 2019a). Several school districts have also sued during the Fall of 2019, arguing that patrolling widespread vaping on campus causes an undue strain on resources. Multiple lawsuits, some that have been underway for months or longer, also alleged JUUL purposefully marketed its products to underage users, or blamed defective JUUL products for health problems and injuries (Ducharme, 2019a).

JUUL had recently attempted to offer a lower nicotine concentration of 3% for some flavors, such as Mint and Virginia Tobacco, to counter the accusations that they were the most popular with the largest market because they addicted the most people due to their high nicotine concentrations (Crawford, 2018). Cullen et al. (2018) postulated that the rise in e-cig use can be attributed to JUUL because of its selection of flavors, its sleek look, and its high nicotine
content. According to ANRF (2019), new research indicated that tobacco companies other than
Altria were showing interest in purchasing e-cig products to counter the decline in smoking
traditional cigarettes. Products similar to JUUL that deliver nicotine with nicotine salts (e.g.,
Myblu and Kandypens) have entered the U.S. market (Crawford, 2018). The higher nicotine
concentrations found in these pod mods when compared with other e-cig products increases the
potential for adverse health effects (Barrington-Trimis & Leventhal, 2018).

**Reasons for E-cig Use**

**Attraction.** According to a Report of the Surgeon General, Executive Study, 2016, the
main reason for adolescents using e-cigs was flavor, with more than 85% of e-cig users aged 12
to 17 years using flavored e-cigs (USHHS, 2016). According to Johnson (2019), e-cig liquid
comes in countless flavors such as Bubble Gum and Milk Chocolate Cream, which are likely to
be attractive to teens. Names such as Blue Raspberry, Sour Straws and Cookie Monsta reference
well-known candy brands and children’s television characters (Coalition for a Tobacco-Free
Hawai’i, 2019).

Both youths and adults reported e-cig use because it is trendy (Evans-Polce et. al, 2018;
Garbut et al., 2015). Many authorities discussed a variety of reasons for youth e-cig use
including “cool” peer validation; experimentation; curiosity; flavoring; entertainment;
convenience; not being able to smoke cigarettes; boredom; supporting one’s social image;
technological appeal; marketed wellness; easy accessibility; ease of concealment; underground
marketplace on social platforms; and affordability (Barrington-Trimis et al., 2016; Coleman et
al., 2016; Crawford, 2018; Evans-Polce et al., 2018; Korfei, 2018; Malik et al., 2019; and
In a national study of flavored tobacco use among teens, the primary reason for e-cig use was flavoring, followed closely by “less harmful than regular cigarettes” (Patrick et al., 2016). However, according to Patrick et al. (2016), while e-cigs may be used as a smoking cessation tool amongst adults, few adolescents use e-cigs to help them quit smoking regular cigarettes, which has been purported to be a main health benefit of e-cig use.

**Promotion.** E-cigs were marketed as a safer and “healthier” alternative to traditional cigarettes to reduce cigarette consumption or stop smoking (Korfei, 2018). JUUL actively marketed its product as a smoking cessation device and “harm reduction alternative” with messages like: “JUUL is an alternative to all the distasteful elements of smoking” and “Our mission is to eliminate cigarettes by offering existing adult smokers a true alternative” (Juul.com, 2019; Malik et al., 2019). JUUL specifically promoted flavor variety as an aid to help adults transition from conventional to e-cigs including reviews from consumers relating that experimentation with various flavors eliminated boredom and assisted in finding the fitting sensation on inhale and exhale (Juul.com, 2019).

Advertising dollars for e-cig use increased almost three-fold from 2011 to 2014 (American Lung Association, 2019; Patrick et al., 2016). The 2016 National Youth Tobacco Survey (NYTS) found that 78.2% of middle and high school students (20.5 million youth) had been exposed to e-cig advertisements from at least one source, which was an increase from 68.9% in 2014 (Marynak et al., 2018). These advertising and marketing techniques have been banned for combustible cigarettes but were not banned for e-cigs (Patrick et al., 2016). Tobacco product advertising has proven to cause young people to start using tobacco products (USDHHS, 2016).
Social media platforms became an avenue for unregulated advertising of e-cigs. Adolescents and young adults were researching, watching, and paying attention to new tricks, devices, flavors, products, carriers, and reviews on Facebook, Instagram, Twitter and other forms of social media (Malik et al., 2019). Media advertising that promoted the pleasurable experience of e-cig use was shown to increase teens’ self-reported likelihood of future use (Patrick et al., 2016). Furthermore, advertisements for nicotine-free flavors may initiate e-cig use in adolescents and increase the probability of using e-cigs with nicotine and other tobacco products, leading to future smoking (Korfei, 2018).

**Future Cigarette Smoking**

Evidence is accumulating that e-cig use may actually predict subsequent use of traditional cigarettes and other combustible tobacco products and thus threatens to reverse the progress made in reducing smoking among U.S. adolescents over the past two decades (Barrington-Trimis et al., 2016; Johnson et al., 2019). Among 12th grade students who had never smoked combustible cigarettes, e-cig use strongly predicted smoking initiation a year later (Miech, Patrick, O’Malley & Johnston, 2017). The sensory experience of inhaling and exhaling e-cig aerosol produces some of the same sensory experiences of smoking a regular cigarette which may contribute to cigarette smoking experimentation (Wills et al., 2017).

**Re-normalization of Nicotine Use and Smoking Behavior**

The rapid increase in e-cig use in the adolescent population has contributed to the normalization of e-cig use, which indirectly functions to normalize “smoking-like” behaviors (e.g., clouds of smoke, vapor in public places becoming normative) (Barrington-Trimis et al., 2016). Many adolescent and young adult e-cig users actually do not identify themselves as
“smokers” (Malik et al., 2019). E-cigs are being utilized in areas designated smoke-free such as schools, restaurants and public parks and studies demonstrated that this exposure may contribute to renormalizing smoking behaviors, which could increase smoking initiation and deter quitting among adolescents (Barrington-Trimis et al., 2016; Wills et al., 2017). Furthermore, parental use in the home may also normalize e-cig use, as well as pose a health threat to children from secondhand smoke or ingestion and increase the likelihood of use in children who witness this behavior (Garbutt et al., 2015; HHS, 2016).

Studies suggest that reasons for e-cig use among youth differ substantially than the reasons given by adults (Patrick et al., 2016). For adults, a main reason for e-cig use is that they could vape in places that smoking was not allowed or socially unacceptable, such as work, public places, and social gatherings (Coleman et al., 2016). Adult users of e-cigs also enjoyed the positive reactions they received from friends and family when they explained they were trying to quit smoking (Coleman et al., 2016). In contrast, e-cig experimentation among youth was associated with a positive social image (Coleman et al., 2016). The “West Hawaii Inspire to Breathe” program (2019) noted that e-cig use had become such a huge trend that the different grade levels referred to it differently; such as JUULing, Doming, and modding; and refer to the e-cig experience as getting Domed, modulated, Peaked, and other trendy descriptions.

Smoking Cessation vs. Dual Use of Combustible and E-cigs

Dual use is the term used to describe the concurrent use of combustible cigarettes and e-cigs (Alzahrani et al., 2018). According to the FDA’s Center for Tobacco Products (2019), e-cigs may have the potential to help transition current combustible cigarette smokers toward cessation, but the majority of adult e-cig users simply use both e-cigs and combustibles
(Alzahrani et al., 2018; Garbutt et al., 2015). In 2015, dual use was reported in large, population-based studies of adults and adolescents, and in 2017 was the most common use pattern among adult e-cig users (Alzahrani et al., 2018; Garbutt et al., 2015). Leavens et al. (2019) found that 56% of JUUL users reported using both JUUL and another tobacco product. Dual use is more dangerous than using either alone (Alzahrani et al., 2018). The long-term impact of dual use on smoking behavior is not known, but there is a legitimate concern that e-cig use may actually increase duration of smoking in adults who might have otherwise quit (Garbutt et al., 2015).

According to Alzahrani et al. (2018), the recreational use of e-cigs or the use of e-cigs for smoking cessation should not be recommended. Crawford (2018) notes that researchers have found that e-cigs increase the odds of continuing to smoke. Lawsuits have been filed against JUUL because plaintiffs claim that they became more addicted to nicotine using JUUL products than using conventional cigarettes and that JUUL did not help them quit smoking but led them to smoke even more (Crawford, 2018). Furthermore, although purported to be a main health benefit of e-cig use, few adolescents use e-cigs to help them quit smoking regular cigarettes (Patrick et al., 2016). Evidence-based nicotine replacement and cessation therapies with documented efficacy are already available such as transdermal patches, nicotine gum, nicotine lozenges and prescriptions such as Chantix and Zyban (Crawford, 2018).

Lack of Knowledge About E-cigs

Only a few studies have examined harm perceptions surrounding e-cigs, but consensus shows that e-cigs are often perceived to be less addictive and less harmful than conventional cigarettes (Coleman et al., 2016). As noted in Chapter 1, two-thirds of JUUL users did not know
that all JUUL pods contain nicotine (Crawford, 2018; USFDA Center for Tobacco Products, 2019). Youth and young adults (up to 80% of vapers) reported they believed it is safer and more convenient than smoking cigarettes (Evans-Polce et al., 2018). In a U.S. web survey of young adults, 57.3% responded “Don’t know/Refused” when asked if they believe e-cigs contain toxic chemicals (Coleman et al., 2016).

A U. S. web survey found that adults reported they knew that e-cigs contain nicotine but had no knowledge of the health effects related to inhaling nicotine, flavoring, and additives found in e-liquid solutions. However, adult participants expressed an interest in learning more about the adverse effects of e-cigs (Coleman et al., 2016). When prompted to discuss the health effects associated with e-cigs, participants primarily described side effects such as throat irritation, coughing, and lightheadedness (Coleman et al., 2016).

A study by Garbutt et al. (2015) showed that adults lacked reliable information about the effects that e-liquid can have on young children, even though consumption or absorption through the skin can be harmful and even fatal for small children. Malik et al. (2019) found that parents were often unaware of the negative health effects of their children using e-cigs as well as the underground social media market platforms their children could use to purchase e-cig products. Parents and adults are generally unaware of the variety of ways children obtain e-cig devices, including via online purchase using the personal identification card of another family member and a pre-purchased debit card from a grocery store; underground social media markets; or purchasing from other students (F. Batz, personal communication, December 1, 2018; “West Hawaii Inspire to Breathe,” 2019). Youth may even obtain these products as gifts from parents, siblings, grandparents, and “aunties and uncles” who lack knowledge about e-cigs (C. Coffeen,
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personal communication, December 1, 2018). These products were a popular present for many children under the Christmas tree in 2018 (West Hawaii Inspire to Breathe, 2019).

According to Garbutt et al. (2015), health care providers often failed to ask parents or caregivers whether children were exposed to e-cig use and thus did not provide education on safe handling, storage, and the effects of inhalation or consumption by children. In one survey, only 15.3% of parents who used e-cigs reported that their child’s pediatrician was aware of their use, with only 5.6% of them stating that the pediatrician discussed use, safe handling, storage, or effects with caregivers (Garbutt et al., 2015). Crawford (2018) recommended that health care providers, pediatricians, and family clinics address e-cig use in a consistent way by asking youth if they vape or JUUL as well as asking if they smoke.

**Regulations on Tobacco and E-cig Use**

**Federal regulations.** Federal regulations prohibit advertising for traditional cigarettes, but similar restrictions are not in place for e-cigs and other vaporizers (Patrick et al., 2016). The Family Smoking Prevention and Tobacco Control Act prohibits flavored cigarette products containing tobacco and menthol, however, the flavors in other products such as cigars, cigarillos, e-cigs, or hookahs have no restrictions on flavoring in the U.S. (State of Hawaii, 2019a). The FDA did not gain regulatory power over e-cigs until 2016, so many popular brands that launched before that date, including market leader JUUL, are currently available for sale despite lacking explicit FDA authorization. No current Federal regulations or tobacco taxes exist on e-cig products or flavoring, but discussions and policies have begun to formulate (Cullen et al., 2018; State of Hawaii, 2019a).
In 2018, the FDA launched a large-scale, undercover crackdown on the sale of JUUL products to minors, reaching out to eBay to remove listings for JUUL products and contacting product manufacturers with official requests including: information to better understand its marketing efforts; research on the health, toxicological, behavioral, and physiologic effects of the product; and how design feature, ingredients, or specifications appealed to youth (Crawford, 2018). In September 2018, the FDA issued more than 1,300 warning letters and penalty fines, the majority of which went to myblu, JUUL, Logic, MarkTen XL, and Vuse. This was the largest coordinated e-cig enforcement effort in FDA’s history (Cullen et al., 2018). Manufacturers have until September 9, 2020 to retroactively apply for authorization proving their claim that e-cigs are appropriate smoking cessation tools and thus are “appropriate for the protection of public health” (American Pharmacist Association, 2020; Ducharme, 2019a). Furthermore, in January 2020, new small cartridge-based e-cig regulations prohibited fruit, candy, dessert and mint flavors, but not menthol s, however, disposable e-cigs and larger tank-based systems were exempt (Daly, 2020).

New policies and strategies to curb JUUL sales may help to prevent youth vaping (“National Adolescent Drug Trends,” 2018). These policies may prompt e-cig manufacturers to focus on adult smoking cessation. For instance, Crawford (2018) described JUUL’s decision to offer a 3% nicotine concentration along with its usual 5% nicotine concentration for some flavors such as Mint and Virginia Tobacco after the FDA began taking action related to e-cigs. However, the 3% concentration is still a higher concentration than the 2.6% in other e-cig products (Crawford, 2018).
**State regulations.** Ducharme (2019a) describes how multiple states such as Michigan, New York, Montana, and Oregon attempted to ban various e-cig sales and implement restrictions on flavors; however, these attempts were overturned on appeals. Massachusetts, Rhode Island, and the City of San Francisco are the only regions who have successfully maintained restrictive e-cig policies (Ducharme, 2019a). On November 27, 2019, Massachusetts (MA) became the first state to permanently ban retail sales of all flavored tobacco, including menthol cigarettes and vape products (Brown, 2020). Massachusetts also placed a 75% excise tax on all electronic nicotine delivery systems (Brown, 2020). States continue to advocate for flavor and e-cig legislation, however they continue to face legal barriers in relation to state borders and online purchasing (McGreevy, 2020). Furthermore, their efforts are often delayed due to the temporary federal ban that could be lifted if e-cig manufacturers convince the U.S. FDA that the pods are an effective smoking cessation device by September 9, 2020 (McGreevy, 2020).

**Hawaii regulations.** Hawaii has some of the strictest tobacco laws in the country, with the fifth highest excise tax, strict regulation of underage tobacco sales, and legislation in place for secondhand smoke prevention (State of Hawaii, 2019a). Hawaii legislation Act 712-1258 has established strict mandates regulating tobacco products including e-cigs and electronic smoking devices, prohibiting their sale to persons under 21 years of age by charging fines (State of Hawaii, 2019a). Hawaii was the 14th state to pass comprehensive smoke-free legislation and also banned the sale of all tobacco products including e-cigs to persons under age 18 in 2013 (State of Hawaii, 2019a). Hawaii then raised the age to purchase all e-cig products to 21 in 2016 (State of Hawaii, 2019a). In accordance with Hawaii law, all tobacco products at a store must be out of reach of customers (State of Hawaii, 2019a). In addition, it is illegal to smoke in all public
housing properties as of 2014, and some counties prohibit smoking at beaches, parks, and bus stops (State of Hawaii, 2019a). Sustained implementation of proven population-based strategies, in coordination with the regulation of tobacco products by the FDA, is key to reducing all forms of tobacco product use and initiation, including e-cigs, among U.S. youths (Cullen et al., 2018).

**Populations Inclined to Vape or Use Tobacco**

Although cigarette smoking has declined significantly since 1964, disproportionate health and economic burdens from tobacco use remain high for some populations defined by race, ethnicity, educational level, and low socio-economic status (SES) across regions of the country (NCCDP, 2014; State of Hawaii, 2019a). Compared to rates of tobacco use for the state of HI and nation, rates are higher for select populations, such as Native Hawaiians and Filipinos (State of Hawaii, 2019a). Native Hawaiian adolescents are more inclined to start smoking at an earlier age than their peers in other ethnic groups (State of Hawaii, 2019a). In addition, Filipinos and Native Hawaiians die at higher rates of lung cancer than other groups (Coalition for a Tobacco-Free Hawai‘i, 2019). National and state tobacco use rates are also higher for persons who have low SES; persons who have a high school education or below; persons with a behavioral health diagnosis; persons with substance abuse issues; members of the LGBTQIA community; individuals with no health insurance, Medicaid qualification, and public housing residences (American Lung Association, 2019; Coalition for a Tobacco-Free Hawai‘i, 2019; Garbutt et al., 2015; Evans-Polce et al., 2018; State of Hawaii, 2019a, 2019b) (see Appendix C figure C4). Smoking has become increasingly concentrated among individuals with the lowest levels of education, income, and occupational status (State of Hawaii, 2019a).
The State of Hawaii (2019a) emphasized that tobacco use, like other risk factors for poor health and chronic diseases, is impacted by the social determinants of health, calling them “the non-medical and non-behavioral precursors of health and illness” (p. 29). The WHO (2013) defines social determinants of health as circumstances in which people are born, grow up, live, work, and play, and the systems put in place to deal with illness. These social determinants negatively impact vulnerable populations in the Puna district (“State of Hawaii Primary Care,” 2016) (See Appendix B, Figures B2, and B3 and Appendix C, Figure C1 through C4).

**Puna Demographics**

Puna includes Districts 4 and 5 of HC. HC Council District 4 covers the eastern portion of Puna, including the neighborhoods of Hawaiian Paradise Park, Hawaiian Beaches, Pahoa Village Makai (toward the ocean) off Government Road, Nanawale Estates, Leilani Estates, Pohoiki, and Kapoho (District 4, 2019a, 2019b). HC Council District 5 covers the western portion of Puna, including the areas and neighborhoods of W.H. Shipman Industrial Park, 9-1/2 Mile Camp, Kea’au Ag Lots, Kurtistown, Mountain View, Glenwood, Orchidland Estates, Ainaloa, Hawaiian Acres, Fern Acres, Eden Roc, Fern Forest Estates, Mauka (toward the mountain) of Government Road, Pāhoa Town, Kaohe Homesteads, Kamaili Homesteads, Kalapana, Opihikao, Kehena, and Kaimu (District 5, 2019a, 2019b). See Appendices D, E, and F, Figures D1 through F2.

The average annual income of Puna’s population was $18,900 (compared to the State of Hawaii’s 29,500 dollars average annual income) making Puna residents among the lowest SES in the state (“State of Hawaii Primary Care,” 2016). Puna also had some of the poorest health indicators in Hawaii, with a higher overall mortality rate of 648.5 per 100,000 compared to the
state’s 592.0 per 100,000 ("State of Hawaii Primary Care," 2016). Compared to the State of Hawaii and to HC, Puna’s population has lower incomes; higher rates of government-provided insurance or no insurance; more children receiving government assistance; more households on the Supplemental Nutrition Assistance Program (SNAP); a greater portion of the civilian workforce unemployed; fewer high school graduates; more tobacco abuse; more births to women under the age of 18 years; higher rates of obesity, diabetes, hypertension, cardiovascular disease, cancer, and unintentional injury mortality; and an overall higher mortality rate ("State of Hawaii Primary Care", 2016). These indicators suggested that Puna residents experience poorer health due to preventable chronic conditions and socioeconomic disparities. These statistics comparing Puna’s income, health, and mortality rates to the state of Hawaii and the County of Hawaii are represented in Appendix B, Figures B1 through B3 and Appendix C, Figures C1 through C4 ("State of Hawaii Primary Care", 2016).

**Health care access.** Healthy People 2020 (2020), discusses the importance of health care access for overall physical, social, and mental health disease prevention, detection, diagnosis, and treatment of illness; preventable death, life expectancy, and overall quality of life. According to the Health Resources and Services Administration (2020), the entire HC (i.e., the entire island of Hawaii) is considered rural. Rural residents often encounter barriers that limit their ability to access health care due to financial means to pay for services; lack of provider availability; transportation to distant sources; paid time off to use services; provider communication or culturally competent care; trust that they can use services without compromising privacy; and belief that they will receive quality care due to the stigma associated with conditions in rural communities (Healthy People 2020, 2020; Rural Health Information
Hub, 2019a). A study by Robards et al. (2019) acknowledges hesitancy amongst rural residents to engage with a health system due to the system complexity and need to continuously adjudicate factors of convenience, engagement, perceived effectiveness, and affordability. The study demonstrated the end result of hesitancy leading to delaying healthcare access and foregone care (Robards, et al., 2019).

Access to healthcare in Hawaii is greatly impacted by a shortage of over 600 physicians, with an expected shortage of 1,200 by the year 2020, limiting available providers for the state and rural areas such as Puna (Hamamura, Withy, & Hughs, 2017). HC has one of the fastest growing populations in the state. From 2000 to 2010 there was a population increase of 7.2% compared to 5.0% in the entire state (USCB, 2018). This growing population lacks the health care providers needed to supply information about the adverse effects of e-cigs (Graves, 2010; Hamamura, Withy, & Hughs, 2017). The lack of health care providers demonstrates a need for an innovative approach to inform the vulnerable Puna population about the adverse effects of e-cigs (Coalition for a Tobacco-Free Hawai‘i, 2019; Graves, 2010; “National Adolescent Drug Trends,” 2018).

Methods to Reduce Smoking and Prevent E-cig Use in Hawaii

There is minimal e-cig educational curriculum from the Hawaii Department of Education (DOE) (S. Masoyamo, personal communication, March 3, 2020). East Hawaii public school students receive a brief discussion about e-cigs in a one-semester health class that students take one time between grades 9 through 12 (S. Masoyamo, personal communication, March 3, 2020). Schools on the East side of Hawaii Island are aware of the evidence-based Stanford Tobacco Prevention Toolkit (2020) and the trained health educators in HC available to equip teachers with
this tool kit or other e-cig and tobacco prevention programs (S. Masoyamo, personal communication, March 3, 2020). However, an individual school must independently contact a tobacco cessation agency in Hawaii (such as the Hawaii Public Health Institute [HIPHI], Bay Clinic, or Hui Malama) to request a trained facilitator to address adolescent e-cig use. According to the Hawai‘i Island Community Coordinator for HIPHI, as of September 20, 2019, no schools in the Puna District reached out to HIPHI or other state agencies to provide e-cig education (S. Ancheta, personal communication, September 20, 2019). Furthermore, there are no incentives for teachers to provide e-cig education to their students in East Hawaii (S. Ancheta, personal communication, February 14, 2020).

The Hawai‘i Island Community Coordinator for HIPHI has developed a 12-module youth e-cig and tobacco prevention tool kit. The tool kit is designed for fourth grade and higher, drawn from the Stanford Tobacco Prevention Toolkit (2019) model. These modules were piloted in spring 2019 by HIPHI and the University of Hawai‘i at Hilo School of Nursing at Connections Public Charter School in Hilo. The pilot project seemed to be effective with students demonstrating understanding of e-cigs and tobacco. There are currently 40 trained health educators in HC available to equip teachers with this tool kit or other e-cig and tobacco prevention programs, but schools must specifically ask for it assistance.

According to a Hawaii Public Health Institute Board of Director Member at large, few opportunities currently exist to talk to parents about e-cigs, and many parents misunderstand the information that is available (F. Batz, personal communication, November 5, 2018). In a community such as Puna with significant socioeconomic disparities, more intensive, targeted efforts may be needed for parents with less education and lower household incomes because the
highest users of both e-cigs and regular cigarettes are among these demographics (Garbutt et al., 2015; Malik et al., 2019).

**Innovation in Prevention of E-cig Use Among Youth**

The State of Hawaii (2019a) acknowledges the importance of preventing new generations from becoming addicted to nicotine and experiencing all the health issues related to tobacco abuse. The social determinants of health and population characteristics in the Puna district of Hawaii foreshadow not only an increase in the already high tobacco abuse rates with adults, but an increased nicotine dependency among adolescent youth as well, which will lead to further increases in adult tobacco abuse rates. Sustained implementation of proven, population-based strategies, in coordination with the regulation of tobacco products by the FDA, is key to reducing all forms of tobacco product initiation and use among US youths, including e-cigs (Cullen et al., 2018). Studies show that more-intensive targeted efforts are needed for parents with low education and low household incomes because people experiencing these social determinants of health are generally the highest users of both e-cigs and combustible cigarettes (Garbutt et al., 2015).

**Further Research Needed**

Due to the novelty of e-cigs, much of the current research is focused on populations inclined to use e-cigs or other tobacco products (State of Hawaii, 2019a) including data collection on how many youth are using e-cigs (USFDA, 2019a), the impact of e-cig flavors on e-cig use (Coalition for a Tobacco-Free Hawai’i, 2019), the adverse effects of e-cigs due to nicotine content (HHS, 2016), and the development of e-cig educational modules for youth or adults to engage on their own (Singh et al., 2020). However, an extensive literature review
revealed that generally, adults have minimal knowledge regarding youth e-cig use, and there is little information about preventative strategies adults are using to minimize youth e-cig exposure. Research gaps also included a clear understanding of what e-cig consumers actually know about e-cigs and the associated health effects (Coleman, 2016). There was also limited research on the long-term health effects of inhaled e-cig aerosol for active users as well as those exposed to secondhand aerosol (USFDA, 2019a). More research is also needed to explore the social norms related to e-cigs and anticipated future use of these devices. Furthermore, research is needed to address the differences in each age group related to the ways they learn about e-cigs and the variety of different forms of e-cigs (Patrick, 2016). In addition, the noticeable differences in reasons for e-cig use among adolescents, young adults, and adults need to be studied in more detail (Coleman et al., 2016; Patrick, 2016).

There is also little evidence of effective e-cig reduction methods such as outreach programs or the role and success of internet technology in health care. Furthermore, research conducted regarding the design of online digital health tools that consider aspects of race, gender, and socioeconomic status in healthcare practices, including engagement in preventive care behaviors to promote wellness is needed (Lupton and Maslen, 2019; Laing et al., 2020).

The published literature emphasized that it is up to state and local governments and agencies to implement regulations and innovative solutions aimed at preventing and reducing youth e-cig use, especially amongst populations more at risk fore-cig use (Coalition for a Tobacco-Free Hawai‘i, 2019). This evidence, combined with the lack of evidence regarding proven effective solutions and resources made it imperative to develop an innovative strategy to
provide adults in the high-risk rural Puna community (State of Hawaii, 2019a) with evidence-based information regarding the adverse effects associated with e-cig use (HHS, 2016).

**Theoretical Framework**

Virtually every child development theory stresses the impact of parents in shaping a child’s personality and behaviors (Bry, Catalano, Kumpfer, Lochman, & Szapocznik, 1998). According to Kumpfer, Alvarado, and Whiteside (2003), “Empirical research evidence suggests that parents and families play a very critical role in protecting children from substance abuse” (p.1763). Parental knowledge, high quality communication, attitudes, and setting limits can reduce the likelihood that teens will use substances (Knopf, 2018). Parenting practices such as communication, knowledge and involvement, support, monitoring, and expectations and norms have all shown to be directly protective against growth in substance use (Cohen, Richardson, & LaBree, 1994). Youth-focused approaches for the prevention of substance abuse have very small positive impacts in preventing or reducing substance abuse use without the support of family and or role models (Kumpfer et al., 2003).

Parenting practices have been conceptualized as a system of dynamically interrelated dimensions including monitoring (e.g., attention, tracking, and structuring contexts), behavior management (e.g., negotiation, problem-solving, limit-setting), and social cognitions (e.g., motivation, values, goals, and norms), with the quality of the parent–child relationship (e.g., trust) serving as the foundation (Dishion, & McMahon, 1998). Parental monitoring is one of the most important protective factors contributing to childhood outcomes and has been linked to lower rates of substance use (Bergman, Dudovitz, Dosanjh, & Wong, 2019). Parental monitoring is defined as the parents' awareness of their child's activities and friends and the degree to which
parents set and enforce clear standards for their child (Kopf, 2018). Parental monitoring appears to both delay the onset of high-risk behaviors among naive adolescents and reduce these behaviors among those already practicing such (Li, Stanton, & Feigelman, 2000). Research has documented that the greater the communication between parent and adolescent, and the greater the parent knowledge of the adolescents’ friends, activities and whereabouts (i.e., parental monitoring), the lower the likelihood the adolescent will engage in health risk behaviors (Dishion and McMahon, 1998).

Teaching parents and family members about the adverse effects of adolescent e-cig use will motivate parents and other role models to engage with youth to discourage this use. Providing health literacy to adults regarding the adverse effects of e-cigs will give adults the knowledge to effectively communicate and debate the negative impacts of e-cig use with youth who might claim that e-cigs produce only a harmless vapor and are a healthier alternative to smoking. This information will encourage Puna community adults to advocate for youth e-cig prevention through discussion with youth. Adults demonstrating a negative attitude toward use may contribute to e-cig use becoming a socially unacceptable behavior and categorize e-cig use in the same bracket as smoking.

**Logic Model Framework**

This PIP design was guided by the logic model framework. The logic model was created by the W.K. Kellogg Foundation in 1998 and was documented in the *W. K. Kellogg Foundation Logic Model Development Guide*, as a companion to the *W. K. Kellogg Foundation Evaluation Handbook*. The last updates to the *W. K. Kellogg Foundation Logic Model Development Guide* were made in January 2004. The logic model is a beneficial tool that facilitates effective
program planning, implementation, and evaluation that provides stakeholders with a road map, describing the sequence of related events connecting the need for the planned program with the program’s desired results (W.K. Kellogg Foundation Logic Model Development Guide, 2004, January). The logic model is a series of “if-then” relationships that if implemented as intended lead to the desired outcomes (Hayes, Parchman, & Howard, 2011). Hayes, Parchman, and Howard (2011) describe how the logic model is basic, with a planned component and an intended results component. The planned component is comprised of listing the resources needed to carry out the project and the efforts that will be made to achieve the program’s intended results (i.e., outputs, outcomes, and impact) (Hayes, Parchman, & Howard, 2011). A logic model can also provide much-needed detail about how resources and activities can relate to the desired results, which helps with project management, resource allocations, and strategic planning (Hayes, Parchman, & Howard, 2011). A logic model is a systematic and visual way to present and share understanding of the relationships among: the resources available to operate one’s program, the planned activities, and the changes or results that are intended (W.K. Kellogg Foundation Logic Model Development Guide, 2004).

Using a simple logic model produces: (a) an inventory of what is available and what is needed to operate the program; (b) a strong case for how and why the program will produce the desired results; and (c) a method for program management and assessment (W.K. Kellogg Foundation Logic Model Development Guide, 2004). According to the model, if the necessary materials and resources are available, they can be used to accomplish the planned activities; if the planned activities are accomplished, the intended amount of product and/or service should result. Subsequently, if the planned activities are accomplished to the extent intended, then the
participants will benefit and the impact will be noticeable with expected changes in organizations, communities, or systems.

**Application of the Logic Model in Increasing Adult Awareness of Vaping**

The project’s overarching goal was to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth. The logic model was appropriate for this PIP with application of the “if then” concept since “if” e-cig health literacy amongst the adult community of Puna is increased, “then” adults in the community will become more attentive and advocate to prevent youth e-cig use. This will “then” prevent adverse chronic conditions associated with nicotine and tobacco abuse and improve overall health in the community. If adults are empowered to advocate against youth e-cig use, then use should decrease. If youth e-cig use is decreased or prevented, then the community’s nicotine dependency, e-cig social acceptance, and the likelihood of smoking conventional cigarettes will subsequently be decreased or prevented.

The planning component of the logic model was comprised of specific aims and objectives identifying the resources needed to fulfill the project and to achieve the intended results (i.e., the overarching goal). In this project, the resources needed consisted of a combined community needs and pre-assessment survey (Pre-Assessment), materials to manufacture a booth and educational materials, post-assessment and surveys (Post-Assessment), and a ballot box to protect confidentiality (See Appendix G for full resource table). The Pre-Assessment was used to assess the target population’s level of concern and awareness about e-cigs in general and specifically, the youth e-cig epidemic before attending the booth. The booth was designed to
educate the adult population of Puna using an e-cig device display and evidence-based aesthetically appealing visual aids including tri-fold posters, a detailed booklet, and take-home informational brochures. See Appendix H, Table H1, H2 and H3 illustrating the logic model project components.

Chapter Three: Project Design and Evaluation Plan

The goal of this PIP was to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models towards advocating for the reduction and/or prevention of e-cig use among youth in this community. The specific aims were developed to guide the project towards the accomplishment of the PIP goal. In this chapter the methodology to accomplish each corresponding objective is identified.

Project Designs and Methods of Specific Aims and Objectives

Aim 1. Conduct research identifying the community of Puna as an ideal setting for an innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use.

Objective 1. Gather evidence-based literature and government statistics validating youth e-cig rates as increasing and HC youth e-cig use as higher than national and state averages.

Methods. Use of University of Hawaii online periodical databases; Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct; Google, and Google Scholar; and state and federal government websites and organizations to collect EB literature reviews and statistics to validate the increased youth
use of e-cigs in the U.S, HI and HC. Search terms included electronic cigarettes, e-cigs, vaping, youth cigarette, statistics, JUUL, adolescent, young adult, youth. The time period of the articles was from 2014 to 2019 for most searches. This was part of the planned side of the logic model. These methods were completed by June 1, 2019.

**Objective 2.** Identify target populations more inclined to use e-cigs.

**Methods:** Use of University of Hawaii online periodical databases; Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct; Google, and Google Scholar; and state and federal government websites and organizations to collect EB literature reviews and statistics to identify high risk or susceptible populations in the U.S, and the State of Hawaii that are more susceptible to use e-cigs. Search terms included electronic cigarettes, e-cigs, vaping, high-risk populations, susceptible populations, priority populations, youth cigarette, statistics, JUUL, adolescent, young adult, e-cig flavors, adolescent, youth, child development theories. The time period of the articles was 2014 to 2019 for most searches. This was part of the planned side of the logic model. These methods were completed by June 1, 2019.

**Objective 3.** Identify the population demographics of the community of Puna.

**Methods:** Use State of Hawaii Primary Care Needs Assessment Data Book 2016, United States Census Bureau 2018, and the hawaiicounty.gov/ district mapping and other state and federal government websites to assess the population demographics of Puna (See Appendices B, Figure B1 and B2; C, Figure C1 through C4; D, Figure D1 and D2; E, Table E1 and E2 and F,
Table F1 & F2). The demographic information identified the large variety of e-cig susceptible populations living in Puna. The time period of the articles was restricted from 2014 to 2019 for most searches. Search terms included Hawaii county demographics, characteristics, district zoning, and county zoning. This was part of the planned side of the logic model. These methods were completed by June 1, 2019.

**Objective 4.** Verify that innovative outreach programs are needed to combat the increased rise in youth e-cig use.

*Methods:* Use of University of Hawaii online periodical databases; Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct; Google, and Google Scholar; and state and federal government websites and organizations to collect EB literature and statistics to identify that current strategies were not working and new strategies were needed. Search terms included innovative outreach programs, electronic cigarettes, e-cigs, vaping, high-risk populations, susceptible populations, priority populations, youth cigarette, statistics, JUUL, adolescent, young adult, e-cig flavors, adolescent, youth, child development theories. The time period of the articles was restricted from 2014 to 2019 for most searches. This was part of the planned side of the logic model. These methods were completed by June 1, 2019.

**Aim 2.** Develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults.
Objective 1. Gather evidence-based literature regarding the negative health impacts of e-cigs.

Methods: Use of University of Hawaii online periodical databases; Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct; Google, and Google Scholar; and state and federal government websites and organizations to collect EB literature and statistics to identify the adverse effects of e-cigs and youth e-cig use in particular. Search terms included adverse effects, electronic cigarettes, youth e-cig adverse effects, JUUL, nicotine, addiction, nicotine dependency, adolescent brain development, and child development theories. The time period of the articles was restricted from 2014 to 2019 for most searches. This was part of the Planned side of the logic model as an activity. These methods were completed by November 22, 2019.

Objective 2. Identify local and national health resources available to Puna residents.

Methods: Use of University of Hawaii online periodical databases; Academic Search Premier (EBSCO), CINAHL (EBSCO), Health Source: Consumer Edition (EBSCO), Health Source: Nursing/Academic Edition (EBSCO), MEDLINE (EBSCO), New England Journal of Medicine, Psychology and Behavioral Sciences Collection (EBSCO), PubMed Central, Sanford Guide, Science Direct; Google, and Google Scholar; to collect EB literature reviews to identify EB sources or references that validate useful government websites and organizations such as CDC.gov, tobaccofreekids.org, e-cigarettes.surgeongeneral.gov, and kidshealth.org. Search terms included electronic cigarettes, vaping, youth cigarette, statistics, JUUL, adolescent, young
adult, youth cigarette social stigma, e-cig flavors, adolescent, youth, and child development theories. The time period of the articles was restricted from 2014 to 2019 for most searches. Local agencies such as Sally Ancheta (Hawai`i Island Community Coordinator, Hawai`i Public Health Institute), Kevin Ramirez, (Hawaii Public Health Institute- Youth ESD Prevention Project Coordinator), Cassie T. Baybayan, (MSN-PH, BSN, RN, Public Health Nurse, South Kona District State of Hawaii Department of Health Hawaii District Health Office Public Health Nursing Section, West Hawaii), and Mealani Rahmer (Tobacco Cessation Coordinator Bay Clinic, Inc. Pahoa Family Health Center) were contacted to find state of Hawaii websites such as 808novap.org, hawaii.gov, healthyhawaii.com, hawaiiquitline.org, flavorhookkids.com, and hiphil.org. These state and federal websites, and the local agencies were provided to project participants for future e-cig self-education or tobacco cessation. This was part of the Planned side of the logic model as an activity. These methods were completed by November 22, 2019

**Objective 3.** Contact managers of the project location (Puna community Farmer’s Market) to determine logistics of project implementation.

**Methods:** Discussed with the Sunday Maku’u Farmers Market Project manager the price, rules, and regulations of an educational health care booth. One free educational booth is allowed per month near the food vendors. Any additional Sundays in a month must be purchased, and the location is based on a lottery system (See Appendix I). This method was part of the planned side and was completed on October 6, 2019.

**Objective 4.** Develop the evidence-based toolkit.

**Methods:** Using evidence found in the literature and through contacting local agencies such as Sally Ancheta (Hawai`i Island Community Coordinator, HIPHI), Kevin Ramirez,
(HIPHI - Youth ESD Prevention Project Coordinator), Cassie T. Baybayan, (MSN-PH, BSN, RN, Public Health Nurse, South Kona District, State of Hawaii Department of Health Hawaii District Health Office Public Health Nursing Section, West Hawaii), and Mealani Rahmer (Tobacco Cessation Coordinator, Bay Clinic, Inc. Pahoa Family Health Center) about how to develop a successful educational health literacy booth in a public setting that will draw participants. Contacts recommended developing a modern aesthetically appealing e-cig health literacy booth to captivate attention and draw participants to include visual aids, statistics, informational binder, handheld products and devices, and take-home brochures tailored toward teaching the target population. All educational material was taught and designed to be read at a 5th grade reading level. These methods were part of the planned side of the logic model as an activity and were completed on November 22, 2019.

**Objective 5.** Develop a recruitment flyer

*Methods:* A recruitment flyer was developed following the University of Hawaii System, Office of Research compliance 475 Model Recruitment Flyer template. The recruitment flyer was aimed at captivating the target population's attention and drawing them to the innovative e-cig health literacy booth (See Appendix J). These methods were part of the planned side of the logic model with activity, intervention, and input and were completed on November 22, 2019.

**Objective 6.** Develop methods for toolkit intervention evaluations.

*Methods:* A combined community and pre-test assessment and survey (see Appendix K), and a post-test assessment and survey (see Appendix L) were designed and implemented to evaluate the effectiveness of the e-cig health literacy booth at the Maku’u Farmers Market. The pre and post-assessments/surveys compared participants’ level of concern, knowledge of adverse
effects, HC youth e-cig usage compared to state and national levels, the degree to which participants were more inclined to advocate for e-cig prevention before and after visiting the booth and participant perceptions of a farmer’s market as being a convenient location for receiving e-cig health information. The combined community needs assessment and pre-assessment provided participant demographic information that assessed if participants lived on the Big Island; were parents, caregivers, grandparents, teachers or advisors (e.g., counselor, mentor, etc.), or if they lived with someone less than 18 years old; if they had inquired about e-cig information; how or where they looked for e-cig or other health-related information; and if participants would attend different health literacy booths at convenient locations (See Appendices K and L). These methods were part of the planned side of the logic model, activity, intervention, input, and were completed on November 22, 2019

**Objective 7.** Pilot implementation of the toolkit.

**Methods:** After IRB approval on January 14, 2020 (see Appendix N), implementation of the evidence-based e-cig toolkit via a health literacy booth at the Sunday Maku’u Farmers Market on five Sundays began on January 19, 2020. Thirty participants were recruited (see Appendix J) to the e-cig booth. Thirty participants took a combined community assessment and pre-assessment (i.e., test) (see Appendix K) with an informed consent attached (see Appendix M). Participants were informed about the acute and potential adverse effects of e-cig use, national, state and local youth e-cig use statistics, adult roles in e-cig prevention, advertising impact, useful government websites to self educate, and the Department of Education’s role regarding e-cig education in schools. Discussion, visual aids, take-home brochures, and handheld e-cig devices were used in the education (see Appendix H). After IRB approval on
January 14, 2020 (see Appendix N), the implementation of the booth began on January 19, 2020 and lasted five Sundays ending on February 16, 2020.

**Aim 3.** Evaluate the effectiveness of the project interventions.

**Objective 1.** Implement evaluation methods to assess new knowledge learned by project participants.

*Methods:* Pre and Post Assessment Survey results were analyzed to determine if the program’s intended results (i.e., outputs, outcomes, and impact) were achieved (see Appendix K and L). See data analysis section below for further details. These methods were completed on April 13, 2020.

**Objective 2.** Implement evaluation methods to assess whether participants felt that project interventions were valuable and that interventions met their needs in the way they were designed and implemented.

*Methods:* Pre and Post Assessment Survey results were analyzed to determine if the program’s intended results (i.e., outputs, outcomes, and impact) were achieved (see Appendix K and L). See data analysis section below for further details. These methods were completed on April 13, 2020.

**Project Participants**

The target population was the adult population living in the community of Puna, but all adults that attended the Sunday Maku’u Farmers’ Market in Puna who wanted to participate in the project were included. Participants were recruited directly at the Maku’u Farmers' Market via a convenience sample recruitment flyer (see Appendix E). Five Sundays, during the month of January and February 2020, a convenience sample of 30 adults 18 years of age or older,
visiting the Maku’u Sunday Farmers Market, were invited to participate. Puna has a large
variety of high-risk populations more inclined to use e-cigs including Native Hawaiians, adults
with a high school education or less, low SES, unemployed, substance abuse problems, and
behavioral health diagnoses (“State of Hawaii Primary Care”, 2016). The inclusion of Big Island
zip codes allowed result comparison of the adult population who participated and helped clarify
if adult residents of Puna are interested in participating in an e-cig health literacy booth at the
Maku’u Farmers Market. Adults 18 years of age or older were eligible to participate.

**Human Subjects Protection**

Human subjects were protected by not asking specific questions or collecting data that
could possibly identify participants including name, mailing address, telephone number, email
address, gender, or number of children. Confidentiality was maintained throughout the
collection of data. Responses were gathered via the pre and post assessments and placed in a
locked closed election style ballot box. To maintain anonymity, no follow up was made and no
information linking the participant to the response was obtained (see Appendices K and L). The
informed consent (see Appendix M), was attached to the community needs and pre-assessment.
The informed consent did not require a name or signature and filling out the combined needs
assessment and pre-assessment survey was considered participants consent to participate in the
project (See Appendix M).

**Project Setting**

The project setting was at the Maku’u Sunday Farmers’ Market in the Puna district of HC. The
Maku’u Farmers Market admits around 1,500 vehicles containing one to six people every
Sunday except holidays (H. Botello, personal interview, October 6, 2019). The Maku’u Sunday
Farmers Market had a popular food court and a variety of vendors selling produce, arts, crafts, clothing, and other random products and services. Many people attended regularly for food services.

**Data Analysis Methods**

Data analysis methods were aimed at measuring the project’s overarching goal to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models towards advocating for the reduction and/or prevention of e-cig use among youth in this community. Simple descriptive statistics were used to analyze the results from the convenient, independent, single sample size of 30 participants. Simple descriptive statistical analysis was used for the demographic data and a 5-point Likert-scale survey data measured the effectiveness of the booth interventions. The demographic questions gathered the following participant data: age bracket; Hawaii or Big Island residency with zip code; and status as a parent, caregiver, grandparent, teacher or advisor such as a counselor, mentor, etc. living with someone less than 18 years old. Qualitative responses from fill in the blank questions were grouped into common themes and analyzed with simple descriptive measurement. Participants’ pre and post-assessments were numbered (in no chronological order) to be able to individually match assessments for pre and post-intervention comparison. A post-survey was blended into the post-assessment and a five-point Likert scale was used to assess participant perceptions of the benefits of the e-cig informational booth interventions. Survey monkey was used to analyze Pre and Post Assessment results ultimately to determine the probability of the program's intended results. Specific Pre and
Post question results were compared as either a whole, state, county or district. See results section below. Data analysis was completed on April 13, 2020.

**Project timeline.** See Appendix O for Full Project Timeline

**Chapter Four: Results**

**Results**

In this chapter, results of the project’s aims, and objectives will be discussed. The aims of this project were to 1) Conduct research identifying the community of Puna as an ideal setting for an innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use, 2) Develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults, and 3) Evaluate the effectiveness of the project interventions.

**Results Discussion**

**Project Aim 1.** Project Aim 1 was to conduct research identifying the community of Puna as an ideal setting for an innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use. Four objectives were formulated to achieve this aim including: 1) Gather evidence-based literature and government statistics validating youth e-cig rates as increasing and HC youth e-cig use as higher than national and state averages, 2) Identify target populations more inclined to use e-cigs, 3) Identify the population demographics of the community of Puna, and 4) Verify that innovative outreach programs are needed to combat the increased rise in youth e-cig use. These four objectives were accomplished using methods described in Chapter 3.
**Project Aim 2.** Project Aim 2 was to develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults. Seven objectives were formulated to achieve this aim as described below.

**Objective 1.** Gather evidence-based literature regarding the negative health impacts of e-cigs. Negative health impacts of e-cigs were validated by using the University of Hawaii online periodical databases as described in Chapter 3 methods.

**Objective 2.** Identify local and national health resources available to Puna residents.

County, state, and federal agencies and resources were located using the methods described in Chapter 3. These resources were provided to project participants and other e-cig health literacy booth visitors to use in the future for e-cig self-education or tobacco cessation.

**Objective 3.** Contact managers of the project location (Puna community Farmers Market) to determine logistics of project implementation.

The Maku‘u Farmers Market Project manager was contacted on October 6, 2019. The Maku‘u Sunday Farmers Market provides one free market booth per month for educational purposes and costs 35 dollars for each additional Sunday. Two free market booth Sundays were donated for the project which lasted for five Sundays from Sunday, January 19, 2020 through February 15, 2020. This objective was completed as described under Chapter 3 methods.

**Objective 4.** Develop the evidence-based toolkit.

An aesthetically appealing e-cig health literacy booth (hereafter referred to as “booth”) and educational material were designed, constructed and taught at a 5th grade reading level. The evidence found in the literature review section and the agency contacts listed in the methods
section of Chapter 3 for this objective, were used in the development of the booth. The evidence-based tool kit was completed by January 17, 2020.

**Objective 5.** Develop a recruitment flyer.

This objective was completed as described in the methods section of Chapter 3 above. See Appendix J. Thirty participants were ultimately recruited to participate in the project.

**Objective 6.** Develop methods for toolkit intervention evaluations.

Pre and Post-Assessment surveys were developed as described in Chapter 3 methods. See Appendix K and L.

**Objective 7.** Pilot implementation of the toolkit.

University of Hawaii IRB “exempt” approval was received on January 14, 2020 (see Appendix N), which allowed the implementation of the proposed project plans at the Sunday Maku’u Farmers Market. The first of five Sundays began on January 19, 2020 and ended on Sunday February 16, 2020. Thirty participants were ultimately recruited (see Appendix J) to the booth and completed both Pre and Post-Assessments. The Pre-Assessment (see Appendix K) with the informed consent attached (see Appendix M) was completed before participants were educated in the booth through use of discussion, visual aids including handheld e-cig devices and take home brochures. Participants completed the Post-Assessment after booth education, and placed Pre and Post-Assessments in a locked ballot-style box (see Appendix M, Figure M1).

**Project Aim 3.** Project Aim 3 was to evaluate the effectiveness of the project interventions. Two objectives were formulated to achieve this aim as discussed below.
**Objective 1.** Implement evaluation methods to assess new knowledge learned by project participants. This objective was completed as described in Chapter 3 methods for this objective and in the Chapter 3 Data Analysis section.

**Objective 2.** Implement evaluation methods to assess whether all participants felt that project interventions were valuable and that interventions met their needs in the way they were designed and implemented. This objective was completed as described in Chapter 3 methods for this objective above. See detailed Pre and Post Assessment results below.

**Survey Results**

Thirty participants completed the project, which consisted of completing the Pre-Assessment, participating in the booth education and discussion, and completing the Post-Assessment. However, another 131 people showed up to the booth. These additional booth visitors stayed for discussion from two to 25 minutes, which the majority staying at least 15 minutes. However, these visitors did not wish to participate in the project by completing the Pre and Post-Assessments.

Pre-Assessment Questions 1, 2, 3, 3a and 4 assessed demographic characteristics of participants. These questions evaluated whether the project reached the target population of Puna District community adults, parents, grandparents, teachers or advisors such as counselors, or mentors, etc., or adults who live with someone less than 18 years old. Pre-Assessment demographic data included the following: age bracket; Hawaii or Big Island residency with zip code; and status as a parent, caregiver, grandparent, teacher or advisor such as a counselor, mentor, etc. or if they lived with someone less than 18 years old. See Figures 1 through 4 below.

**Pre-Assessment Results**
In response to Pre-Assessment Question 1 (“What is your age?”), participants could select one of the following age range brackets, which reflected age in years: 18–24, 25–30, 30–40, 40–50, 50+. Of the 30 total participants, 46.67% (14) identified as 50 years old or older, 16.67% (five) identified as 40–50 years old, 16.67% (five) identified as 30–40 years old, 3.33% (one) identified as 25–30 years old, and 16.67% (five) identified as 18–24 years old.

Amongst the 23 Big Island participants specifically, 39.13% (nine) identified as 50 years old or older, 21.74% (five) identified as 40-50 years old, 17.39% (four) identified as 30-40 years old, 17.39% (4) identified as 18-24 years old, and 4.35% (1) identified as 25-30 years old.

Amongst the 15 Puna District participants specifically, 33.33% (five) identified as 50 years old or older, 26.67% (four) identified as 18-24 years old, 20.0% (three) identified as 30-40 years old, 13.33% (two) identified as 40-50 years old, and 6.67% (one) identified as 25-30 years old. See Figure 1 below.

Figure 1: Age of Participants

![Figure 1: Age of Participants](image)

Figure 1. All, Big Island and Puna District participants. PreQ1: “What is your age?”; Choices: 18–24, 25–30, 30–40, 40–50, 50+
In response to Pre-assessment Question 2 (‘‘Do you live in the State of Hawaii?’’), participants could select either Yes, or No. Out of 30 participants, 83.33% (25) selected Yes and 16.67% (five) selected No. In response to Pre-Assessment Question 3 (‘‘Do you live on the Big Island?’’), participants could select either Yes, or No. Out of 30 participants, 76.67% (23) selected Yes, and 23.33% (seven) selected No. See Figure 2 below.

Figure 2: Do You Live in Hawaii or the Big Island?

![Bar chart showing the percentage of participants living in Hawaii or the Big Island.](chart)

Figure 2. All Participants. PreQ2: ‘‘Do you live in Hawaii?’’; PreQ3: ‘‘Do you live on the Big Island?’’; Choices: Yes, No

In Response to Pre-Assessment question 3a (‘‘What is your Big Island zip code?’’), the 23 participants that answered Yes to living on the Big Island listed their Big Island zip codes. Out of the 23 Big Island participants, 30.43% (seven) listed 96778 (Pahoa), 17.39% (four) listed 96749 (Hawaiian Paradise Park), 13.04% (three) listed 96720 (Hilo), 8.70% (two) listed 96760 (Kurtistown), 96771 (Mountain View), 96781 (Papaikou), and 96743 (Waimea) respectively, and 4.35% (one) listed 96728 (Hakalau/Honomu). Big Island participants were categorized into HC Districts based on the zip code provided. Fifteen out of the 23 big island participants (65.22%)
list a Puna district zip code (96778, 96749, 96760, 96771), 26.09% (6) listed a South Hilo District zip code (96720, 96781, 96728), and 8.70% (2) listed a Waimea or South Kohala District zip code (96743). See Figure 3 below. See Appendices D, E, and F, Figures D1 through F2 for HC district maps and detailed descriptions.

**Figure 3**: What is Your Big Island Zip Code?

![Pie chart showing the distribution of zip codes](image)

**Figure 3.** Big Island Participants. PreQ3a: “What is your Big Island zip code?

In response to Pre-Assessment Question 4 (“Are you a parent, caregiver, grandparent, teacher or advisor such as a counselor, mentor, etc., or do you live with someone less than 18 years old?”) participants could select either Yes, or No. Out of 30 participants, 63.33% (19) selected Yes, and 36.67% (11) selected No. Amongst the 23 Big Island participants specifically, 69.57% (16) selected Yes, and 30.43% (7) selected No. Amongst the 15 Puna District participants, 60% (nine) selected Yes, and 40% (six) selected No. See Figure 4 below. Hereafter, all participants that selected Yes to being as a parent, caregiver, grandparent, teacher or advisor such as a counselor, mentor, etc. or to living with someone less than 18 years old will be collectively referred to as “parent/influential adult”.
In response to Pre-Assessment Question 5 ("Do you believe that youth e-cigarette (e-cig) use is a health concern?"), participants could select either Yes, or No. Out of 30 participants, 100% (30) selected Yes, e-cig use is a health concern. In response to Pre-Assessment Question 5a ("If YES; Please circle your level of concern regarding e-cig use amongst youth"), participants could select one of four levels that reflected their level of concern: Not Concerned, Slightly Concerned, Moderately Concerned, or Extremely Concerned. Out of 30 participants, 53.33% (16) selected Extremely Concerned, 36.67% (11) selected Moderately Concerned, 10.0% (three) selected Slightly Concerned, and zero participants (0) selected Not Concerned.

Amongst the 23 Big Island participants specifically, 47.83% (11) selected Extremely Concerned, 39.13% (nine) selected Moderately Concerned and 13.04% (three) selected Slightly Concerned.
Concerned. Amongst the 15 Puna District participants, 46.67% (seven) selected Extremely Concerned, 40.0% (six) selected Moderately Concerned, and 13.33% (two) selected Slightly Concerned. See Figure 5 below.

**Figure 5:** Youth E-cig Use Adult Concern Level

![Graph showing concern levels among participants](image)

In response to Pre-Assessment Question 6 (“Do you approve of youth using e-cigs?”), participants could select either Yes, or No. Out of 30 participants, 96.67% (29) replied No. In response to Pre-Assessment Question 7 (“Have you ever advised someone less than 18 years old not to use e-cigs?”), participants could select either Yes, or No. Out of 30 participants, 53.33% (16) selected Yes, 43.33% (13) selected No, and one participant listed “Maybe” next to the choices. Amongst the 23 Big Island participants specifically, 47.83% (11) selected No, 47.83% (11) selected Yes, and one participant (4.35%) wrote in “Maybe”. Amongst the 15 Puna District participants, 46.67% (seven) selected No, 46.67% (seven) selected Yes, and one replied
“Maybe”. Amongst the 16 Big Island Parent/Influential Adults, 50.0% (eight) selected Yes, and 50.0% (eight) selected No. See Figure 6 below.

Figure 6. All, Big Island, Puna District Participants, and Big Island Parent/Influential Adults.

PreQ7: “Have you ever advised someone less than 18 years old not to use e-cigs?”; Choices: Yes, No.

In response to Pre-Assessment Question 7a (“If you answered YES, please list reasons why”), out of the 17 participants, 94.11% (16) that selected Yes or listed “Maybe” in Pre-Assessment Question 7 listed one or more qualitative responses. Participants’ qualitative responses were categorized into common themes including: 1) Lung Concerns, 2) Health Concerns, 3) Addiction, 4) Heart, 5) Financial, and 6) Other. See Appendix P for a full list of participants’ qualitative responses.

Amongst the 16 participants, 81.25% (13) listed a Lung Concern, 75.0% (12) listed a Health Concern, 12.5% (two) listed Addiction, 6.25% (one) listed either Heart, Financial or Other concerns. Amongst the 15 Puna District participants, 53.34% (8) replied with one or more
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qualitative comments. Out of these eight Puna participants, 87.75% (7) listed a Health Concern, 50.0% (four) listed a Lung Concern, 25% (two) listed Addiction, and 12.50% (one) listed Financial. See Figure 7 below.

![Figure 7: Reasons Why Advised Youth NOT to Use E-cigs](image)

**Figure 7.** All and Puna District Participants. PreQ7a: “If you answered YES, please list reasons why”.

In response to Pre-Assessment Question 8: (“Have you ever looked for information about e-cigs?”), participants could select either Yes, or No. Out of 30 total participants, 53.33% (16) selected No, and 46.67% (14) selected Yes. Amongst the 15 Puna District participants specifically, 53.33% (eight) selected Yes, and 46.67% (7) selected No. Amongst the 19 Parent/Influential Adult participants, 68.42% (13) selected No, and 31.58% (six) selected Yes. Amongst the 16 Big Island Parent/Influential Adults, 87.25% (13) selected No, and 18.75% (three) selected Yes. See Figure 8 below.
Figure 8: Have You Ever Looked for E-cig Information?

Figure 8. All, Puna District, All and Big Island Parent/Influential Adult Participants. PreQ8: “Have you ever looked for information about e-cigs?”; Choices: Yes, No

In response to Pre-Assessment Question 8a (“If you answered YES [to Question 8], Please circle all ways you have tried to find e-cig information”), participants were allowed to select one or more of the following 15 choices: Doctor or Provider’s Office, Pediatrician’s Office, Nurse, Friend, Teacher, Newspaper, TV, TV News, Internet, Government Websites, Social Media, Facebook, Instagram, Twitter, and E-cig Advertisements and other. Participants could select multiple sources they had tried to find e-cig information. Out of the 30 participants, 53.33% (16) selected ways they had looked for e-cig information. Out of the 16 participants, 87.50% (14) selected Internet, 25% (four) selected Newspaper and/or TV News, 20.0% (three) selected Friend and/or Social Media, 12.5% (two) selected Doctor or Provider’s Office, and one participant (6.25%) selected either Government Website, TV, Facebook, and/or Instagram. Four out of 16 participants (25.0%) selected Other and wrote "Myself as I know of just smoking cigarettes, so just by adding liqwid [sic] to smoking casues [sic] the liqwid [sic] to go into the
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lungs”, “Medical journals”, “Documentary”, and “Big Island Substance Abuse Center”. Zero participants (0) selected Pediatrician’s Office, Nurse, or E-cig Advertisements. See Figure 9 below.

Amongst the 15 Puna District participants specifically, 60.0% (nine) selected ways they had searched for e-cig information. Amongst the nine participants 88.9% (eight) selected Internet, 22.22% (two) selected either Doctor or Provider’s Office, Friend, TV News, and/or Social Media, and one participant (11.11%) selected either Teacher, Newspaper, Facebook, Instagram, and/or Other (BISAC). Zero participants (0) selected Pediatrician’s Office, Nurse, TV, Government Websites, Twitter, or E-cig Advertisements. See figure 9 below.

Figure 9: Ways You Have Tried to Find E-cig Information

<table>
<thead>
<tr>
<th></th>
<th>All Participants (16)</th>
<th>Puna District (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Social Media</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Facebook</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Instagram</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Gov Websites</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Twitter</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Newspaper</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TV News</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Friend</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Dr or Provider’s Office</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Newspaper</td>
<td>1</td>
<td>1</td>
</tr>
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</tr>
<tr>
<td>Other</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Figure 9. All and Puna District participants. PreQ8a: “If you answered YES, please circle all ways you have tried to find e-cig information.”; Choices: Doctor or Provider’s Office, Pediatrician’s Office, Nurse, Friend, Teacher, Newspaper, TV, TV News, Internet, Government Websites, Social Media, Facebook, Instagram, Twitter, and E-cig Advertisements and other.
In response to Pre-Assessment Question 9 ("If you used the internet, please list any websites used to search for e-cig information.")}, 11 out of the 14 participants (78.5%) who selected the Internet in Pre-Assessment Question 8a responded. Participants' qualitative replies varied between one or more responses. Amongst the 11 participants, 36.36% (four) listed “Google”, 18.18% (two) listed “YouTube”, and one participant (9.09%) listed either “CDC”, “CNN.com”, “NYTimes”, “e-cig studies”, “Stanford University”, “Medscape”, “Oregon State Legislature”, “Netflix”, “Not on social media”, “Do not remember” and/or “???”.

Amongst the eight Puna participants, 87.50% (seven) responded after selecting the internet in Pre-Assessment Question 8a. Amongst these seven Puna participants, 42.86% (3) listed “Google”, 28.57% (two) listed “YouTube”, and one (14.29%) listed either “CNN.com”, “e-cig studies”, and/or “Stanford University” and 14.29% (1) listed “Do not remember” and/or wrote question marks. See Figure 10 below. See Appendix Q for a full list of participant responses.

Figure 10: Websites Used to Search for E-cig Information

![Bar Chart](chart.png)

- **All Participants (11/30)**
- **Puna District (7/11)**
Figure 10. All and Puna District participants. PreQ9: “If you used the internet, please list any websites used to search for e-cig information.”

In response to Pre-Assessment Question 10 (“Please list ways you search for other health related information”), out of the 30 participants, 66.67% (20) listed qualitative responses. Out the 20 participants, 50% (10) listed “Internet”, 30% (six) listed “Dr’s or Provider's Office”, 15% (three) listed “Friends” and/or “Medical Journals/Academic Journals/ Studies”, 10% (two) listed “Coworkers”, “Google”, “Library”, and/or “News”, and one participant (5%) listed either “Word of mouth”, “Computer”, “CDC”, “Newspaper”, “TV advertisements”, “Radio”, “School Counselor”, “Medscape”, “WebMD”, and/or “Facebook”. See Figure 11 below.

Amongst the 15 Puna District participants specifically, 73.33% (11) responded. Out of the 11, 54.55% (six) listed “Internet”, 27.27% (three) listed either “Providers office” and/or “Friends”, 18.18% (two) listed “Google”, and one participant (9.09%) listed either “Coworkers”, “Computer”, “CDC”, “Medical Journals/Academic Journals/Studies”, “Library”, “Radio”, “WebMD”, and/or “Facebook”. See figure 11 below. See Appendix R for a full list of participant responses.
In response to Pre-assessment Question 11 (“Have you ever asked a school to discuss e-cig use with students?”), participants could select either Yes, or No. Out of the 30 participants, 90% (27) selected No, and 10.0% (three) selected Yes. Amongst the 23 Big Island participants specifically, 95.65% (22) selected No, and 4.34% (one) selected Yes. Amongst the 15 Puna District participants, 100% (15) selected No, and zero participants selected Yes. Amongst the 16 Big Island Parents/Influential Adults, 93.75% (15) selected No, they had never asked the school to discuss e-cig use with students, and one participant (6.75%) selected Yes. See Figure 12 below.

Figure 11. All and Puna District responses. PreQ10: “Please list ways you search for other health related information.”
In response to Pre-Assessment Question 12 (“If you answered YES, what was the school’s response?”), one non-resident of Hawaii responded. The one participant listed “They agreed it is a concern, but not enough time in already full schedule”. In response to the Pre-Assessment Question 13 (“Do you think a farmer’s market would be a convenient place to receive information on e-cigs or other health issues and concerns?”), participants could select either Yes, or No. Out of the 30 participants, 100% (30) selected Yes. In response to Pre-Assessment Question 14 (“E-cig use is increasing among youth?”), participants could select either True or False. Out of the 30 participants, 100% (30) selected True.

In response to Pre-Assessment Question 15 (“Compared to U.S. National averages, State of Hawaii youth e-cig use is?”), participants could select one of the following: Lower, Same,
Higher, or Not Sure. Out of the 30 participants, 46.67% (14) selected Not Sure, 40% (12) selected Higher, 13.33% (four) selected Same, and zero participants (0) selected Lower. See Figure 13 below.

**Figure 13**: Compared to US National Averages, State of Hawaii Youth E-cig Use Is?

![Pie chart showing responses](chart.png)

Figure 13. All Participants. PreQ15: “Compared to U.S. National averages, State of Hawaii youth e-cig use is?”; Choices: Lower, Same, Higher, Not Sure

In response to Pre-Assessment Question 16 (“Compared to the State of Hawaii, youth e-cig use on the Big Island is?”), participants could select one of the following: Lower, Same, Higher, or Not Sure. Out of 30 participants, 53.33% (16) selected Not Sure, 33.33% (10) selected Higher, 13.33% (four) selected Same and zero (0) participants selected Lower. Amongst the 23 Big Island participants specifically, 43.48% (10) selected Higher, 39.13% (10) selected Not Sure, 17.39% (four) selected Same, and zero (0) selected Lower. Amongst the 15 Puna District participants, 40.0% (six) selected Higher, 33.33% (five) selected Not Sure, 26.67% (four) selected Same, and zero (0) selected Lower. Amongst the 16 Big Island parents/influential
adults, 62.50% (10) selected Not Sure, 18.75% (three) selected Same, 18.75% (three) selected Higher, and zero (0) participants selected Lower. See Figure 14 below.

**Figure 14:** Compared to the State of HI-Youth E-cig use on the Big Island is?

![Bar chart showing percentage of participants' responses](chart.png)

**Figure 14.** All, Big Island, Puna District and BI parents/influential adults. PreQ16: “Compared to the State of Hawaii, youth e-cig use on the Big Island is?”; Choices: Lower, Same, Higher, Not Sure.

In response to Pre-Assessment Question 17 (“Please write what % of Big Island High-school seniors use e-cigs. _____%.”), participants’ quantitative responses were grouped within close proximity to the percentage they listed. Out of the 30 participants, 16.67% (five) did not reply, 10.0% (three) listed 0-5%, 13.33% (four) listed 10-14%, 20.0% (six) listed 15%, 6.67% (two) listed 25%, 6.67% (two) listed 29-39%, 3.33% (one) listed 40%, and 23.33% (seven) listed 50% or higher. Out of 30 participants, 6.67% (two) listed a percentage in the range of 29 to 39%, which would be within five percentage points of the correct answer of 34%.

Amongst the 23 Big Island participants specifically, 8.71% (two) did not reply, 13.04% (three) listed 0-5%, 13.04% (three) listed 10-14%, 21.74% (five) listed 15%, 8.69% (two) listed
25%, 8.69% (two) listed 29-39%, 4.35% (one) listed 40%, and 21.74% (five) listed 50% or higher. Amongst the 15 Puna District participants, 13.33% (two) did not reply, 13.33% (two) listed 0-5%, 6.67% (one) listed 10-14%, 20.0% (three) listed 15%, 6.67% (one) listed 25%, 13.33% (two) listed 29-39%, 6.67% (one) listed 40%, and 20.0% (three) listed 50% or higher. See Figure 15 below.

![Figure 15: What % of Big Island HS-Seniors Use E-cigs?](image)

Figure 15. All, Big Island and Puna District Participants. PreQ17: “Please write what % of Big Island High-school seniors use e-cigs. __________ %.”; Correct response=34%.

In response to Pre-Assessment Question 18 (“Please write what % of Big Island middle school students use e-cigs. __________%.”), participants' responses were grouped within close proximity to the percentage they listed. Out of the 30 participants, 16.67% (five) did not reply, 30.0% (nine) listed 0-5%, 20.0% (six) listed 10-15%, 30.0% (nine) listed 35-50%, 3.33% (one) listed 75% or higher. Zero participants listed a percentage within the range of 18 to 28%, which would be within five percentage points of the correct answer of 23%. Amongst the 23 Big Island participants specifically, 8.70% (two) did not reply, 30.43% (seven) listed 0-5%, 26.09% (six)
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listed 10-15%, 30.4% (seven) listed 35-50%, and 4.35% (one) listed 75% or higher. Amongst the 15 Puna District participants, 13.33% (two) did not reply, 20.0% (three) listed 0-5%, 26.67% (four) listed 10-15%, and 40.0% (six) listed 35-50%. See Figure 16 below.

![Figure 16: What % of BI Middle-School Students use e-cigs?](image)

Figure 16. All, Big Island and Puna District Participants. PreQ18: “Please write what % of Big Island middle school students use e-cigs.”; Correct response = 23%.

In response to Pre-Assessment Question 19 (“The majority of e-cigs contain nicotine?”), participants could select either True, False, or Not Sure. Out of 30 participants, 73.33% (22) selected True, 26.67% (8) selected Not Sure, and zero participants (0) selected False. Amongst the 23 Big Island participants specifically, 65.22% (15) selected True, 34.78% (eight) selected Not Sure, and zero participants (0) selected False. Amongst the 15 Puna District participants, 73.33% (11) selected True, 26.67% (four) selected Not Sure, and zero participants (0) selected False. See Figure 17 below.
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Figure 17. All, Big Island, and Puna District Participants. PreQ19: “The majority of e-cigs contain nicotine.”; Choices: True, False, Not Sure.

In response to Pre-Assessment Question 20 ("Are there any adverse health effects of e-cig use?")], participants could select either Yes, No, or Not Sure. Out of 30 participants, 86.67% (26) selected Yes, 10% (three) selected Not Sure and 3.33% (one) selected No. Amongst the 23 Big Island participants, 82.60% (19) selected Yes, 13.04% (3) selected Not Sure, and one participant (4.34%) selected No. Amongst the 15 Puna District participants, 93.33% (14) selected Yes, and one (6.67%) selected Not Sure. See Figure 18 below.
Figure 18: Are There Any Adverse Health Effects of E-cig Use?

<table>
<thead>
<tr>
<th></th>
<th># of Participants</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Big Island</td>
<td>23</td>
</tr>
<tr>
<td>Puna</td>
<td>15</td>
</tr>
</tbody>
</table>

In response to Pre-Assessment Question 21 (“If you answered YES, list one adverse health effect you believe is associated with e-cigs:"), Out of the 30 participants, 86.67% (26) responded by listing 32 qualitative responses. Responses were categorized into four common themes: 1) Lung Concerns; 2) General Health Concerns; 3) Addiction; 4) Mental Health. Among the 32 different responses listed, 71.18% (23) were categorized as Lung Concerns, 12.50% (four) were categorized as General Health Concerns, 12.50% (four) were categorized as Addiction, and one response (3.12%) was categorized as Mental Health. See Figure 19 below. See Appendix S for a full data table of participant responses.

In response to Pre-Assessment Question 22 ( “Please list any other adverse effects that you believe are associated with e-cigs.”), out of the 26 participants, 57.69% (15) responded by listing 26 additional adverse effects believed to be associated with e-cigs. Responses were categorized into seven common themes: 1) Lung Concerns; 2) General Health Concerns; 3)
Addiction; 4) Mental Health; 5) Brain/Heart/Immune System; 6) Financial; 7) Offensive.

Among the 26 responses listed, 26.92% (seven) were categorized as Lung Concerns, 26.92% (seven) were categorized as General Health Concerns, 19.23% (five) were categorized as Addiction, 11.53% (three) were categorized as Brain/Heart/Immune System, 7.69% (two) were categorized as Mental Health, and one response (3.84%) was categorized as either Financial or Offensive respectively. See Figure 19 below. See Appendix T for a full data table of participant responses.

Figure 19: Adverse E-cig Effects Listed

Figure 19. PreQ21 and PreQ22. PreQ21: “If you answered YES, list one adverse health effect you believe is associated with e-cigs.”; Grouped themes: Lung Concerns, General Health Concerns, Addiction, Mental Health; PreQ22: “Please list any other adverse effects that you believe are associated with e-cigs”; Grouped themes: Lung Concerns, General Health Concerns, Addiction, Mental Health, Brain/Heart/Immune System, Financial, Offensive.

In response to Pre-Assessment Question 23 (“Adults and parents have an impact on youth e-cig use?”), participants could select either Yes, No, or Not Sure. Out of the 30 participants,
90% (27) selected Yes, 6.67% (two) selected Not Sure, and 3.33% (one) selected No. The Not Sure (two) and No (one) responses came from Big Island participants. A Puna District participant selected the one No response. See Figure 20 below.

**Figure 20.** All, Big Island and Puna District participants. PreQ23: “Adults and parents have an impact on youth e-cig use?”; Choices: Yes, No, Not Sure”

In response to Pre-Assessment Question 24 (“Do e-cigs contribute to nicotine dependency?”), participants could select either Yes, No, or Not Sure. Out of the 30 participants, 76.67% (23) selected Yes, 16.67% (five) selected Not Sure and 6.67% (two) selected No. Amongst the 23 Big Island participants specifically, 69.57% (16) selected Yes, 21.74% (five) selected Not Sure and 8.70% (two) selected No. Amongst the 15 Puna District participants, 73.33% (11) selected Yes, 20.0% (three) selected Not Sure and 6.67% (two) selected No. See Figure 21 below.
In response to Pre-Assessment Question 25 (“Do e-cigs increase the likelihood of smoking regular cigarettes?”), participants could select either Yes, No, or Not Sure. Out of the 30 participants, 70.0% (21) selected Yes, 26.67% (eight) selected Not Sure and 3.33% (one) selected No. Amongst the 23 Big Island participants specifically, 69.57% (16) selected Yes, and 30.43% (seven) selected Not Sure. Amongst the 15 Puna District participants, 80.0% (12) selected Yes and 20.0% (three) selected Not Sure. See Figure 22 below.
In response to Pre-Assessment Question 26 (“What do you think is the most popular e-cig brand?”), participants were asked to list a qualitative reply. Out of the 30 participants, 23.33% (seven) left the space blank, 43.33% (13) listed “Not sure”, “Do not know”, or question marks, 23.33% (seven) listed or misspelled JUUL, 6.67% (two) listed a flavor, and 3.33% (one) listed “Candy King”. Amongst the 23 Big Island participants specifically, 52.17% (12) listed “Not Sure”, “Do not know” or question marks, 26.09% (six) left the question blank, 8.70% (two) listed or misspelled JUUL, 8.70% (two) listed “Flavors”, and 4.35% (one) participant listed “Candy King”. Amongst the 15 Puna District participants, 33.33% (five) listed “Not Sure”, “Do not know” or question marks, 33.33% (five) left the question blank, 13.33% (two) listed or misspelled JUUL, 13.33% (two) listed Flavors, and 6.67% (one) listed “Candy King”. See Figure 23 below.
Figure 23. All, Big Island, and Puna District Participants. PreQ26: “What do you think is the most popular e-cig brand?”.

In response to Pre-Assessment Question 27 (“The most popular e-cig’s nicotine content compared to other e-cigs is?”), participants could select either *Zero Nicotine*, *More Nicotine*, *Same Amount*, *Less Nicotine*, or *Not Sure*. Out of the 30 participants, 50.0% (15) selected *Not Sure*, 33.33% (10) selected *More Nicotine*, 16.67% (five) selected *Same Amount*, and zero (0) selected *Zero Nicotine*. Amongst the 23 Big Island participants specifically, 52.17% (12) selected *Not Sure*, 30.43% (seven) selected *More Nicotine*, 17.39% (four) selected *Same Amount*, and zero (0) selected *Zero Nicotine*. Amongst the 15 Puna District participants, 53.33% (eight) selected *Not Sure*, 26.67% (four) selected *More Nicotine*, 20.0% (three) selected *Same Amount*, and zero (0) selected *Zero Nicotine*. See Figure 24 below.
Figure 24. All, Big Island and Puna District Participants. PreQ27: “The most popular e-cig’s nicotine content compared to other e-cigs is:”; Choices: Zero Nicotine, More Nicotine, Same Amount, Less Nicotine, Not Sure.

In response to Pre-Assessment Question 28 (“Please circle how schools on the Big Island educate youth about e-cigs?”), participants could select one or more options including: Assemblies, Health Class, Coordinated Efforts with Tobacco Coalition Groups, Mandatory E-cig Education from Department of Education, e-cig Trained Educators, Nothing, Not Sure, or Other. Out of the 30 participants, 66.67% (20) selected Not Sure, 30.0% (nine) selected Health Class, 20.0% (six) selected Assemblies, 13.33% (four) selected Coordinated Efforts with Tobacco Coalition Groups, 6.67% (two) selected Mandatory E-cig Education from Department of Education, 3.33% (one) selected E-cig Trained Educators, 3.33% (one) selected Nothing and 6.67 (two) selected Other. The two “Other” replies were “Project Posters, Tobacco Coalition Advertisements”, and “should be”.
Amongst the 23 Big Island participants specifically, 65.22% (15) selected Not Sure, 30.43% (seven) selected Health Class, 26.09% (six) selected Assemblies, 17.39% (four) selected Coordinated Efforts with Tobacco Coalition Groups, 8.70% (two) selected Mandatory E-cig Education from Department of Education, 4.35% (one) selected E-cig Trained Educators, 4.35% (one) selected Nothing and 8.70 (two) selected Other. Amongst the 15 Puna District participants, 60.0% (nine) selected Not Sure, 33.33% (five) selected Health Class, 26.67% (four) selected Assemblies, 13.33% (two) selected Coordinated Efforts with Tobacco Coalition Groups, 6.67% (one) selected Mandatory E-cig Education from Department of Education, 6.67 (one) selected Other Projects/Posters/Tobacco Coalition Advertisements, and zero participants (0) selected E-cig Trained Educators or Nothing respectively. See Figure 25 below.

Amongst the 19 total Parents/Influential Adults specifically, 84.21% (16) selected Not Sure, 15.79% (three) selected Health Class, 15.79% (three) selected Coordinated Efforts with Tobacco Coalition Groups, 10.53% (two) selected Assemblies, one (5.26%) selected Other, and zero (0) selected Mandatory E-cig Education from Department of Education, E-cig Trained Educators, or Nothing respectively.

Amongst the 16 Big Island Parents/Influential Adults specifically, 87.50% (14) selected Not Sure, 18.75% (three) selected Coordinated Efforts with Tobacco Coalition Groups, 12.50% (two) selected Health Class and/or Assemblies respectively, one participant (6.25%) selected Other and zero participants (0) selected Mandatory E-cig Education from Department of Education ,E-cig Trained Educators, or Nothing respectively. See Figure 25 below.
Figure 25: How Do Big Island Schools Educate Youth About E-cigs?

In Response to Pre-Assessment Question 29 (“Is there Federal or State Funding for e-cig prevention in Hawaii?”), participants could select either Yes, No, or Not Sure. Out of the 30 participants, 83.33% (25) selected Not Sure, 13.33% (four) selected No, and 3.33% (one) selected Yes. Amongst the 23 Big Island participants specifically, 82.61% (19) selected Not Sure, 13.04% (three) selected No, and 4.35% (one) selected Yes. Amongst the 15 Puna District participants, 20.0% (11) selected Not Sure, 20.0% (three) selected No, and 6.67% (one) selected Yes. See Figure 26 below.
Figure 26. All, Big Island and Puna District Participants. PreQ29: “Is there Federal or State Funding for e-cig prevention in Hawaii?”; Choices: Yes, No, Not Sure; Correct Answer=No.

Post Assessment Results

In response to Post-Assessment Question 1 (Do you believe that youth e-cigarette (e-cig) use is a health concern?”), participants could select either Yes, or No. Out of 30 participants, 100% (30) selected Yes, youth e-cig use is a health concern. In response to Post-Assessment Question 1a (“If YES; Please circle your level of concern regarding e-cig use amongst youth.”), participants could select one of four levels that reflected their level of concern: Not Concerned, Slightly Concerned, Moderately Concerned, or Extremely Concerned. Among the 30 participants 83.33% (25) identified as Extremely Concerned, and 16.67% (five) identified as Moderately Concerned, and zero (0) selected either Slightly Concerned or Not Concerned. See Figure 27 below.
**Figure 27**: Youth E-cig Use Adult Level of Concern

![Pie chart with percentages]

**Figure 27.** All Participants. PostQ1a: “If YES; Please circle your level of concern regarding e-cig use amongst youth”; Choices: Not Concerned, Slightly Concerned, Moderately Concerned, or Extremely Concerned.

Amongst the 23 Big Island Participants specifically, 86.96% (20) selected Extremely Concerned, and 13.04% (three) selected Moderately Concerned. Amongst the 15 Puna District participants, 93.33% (14) selected Extremely Concerned, and one (6.67%) selected Moderately Concerned. See Figure 28 below.
Figure 28. Big Island and Puna District Participants. PostQ1a: “If YES”; Please circle your level of concern regarding e-cig use amongst youth.”; Choices: Not Concerned, Slightly Concerned, Moderately Concerned, or Extremely Concerned.

In response to Post-Assessment Question 2 (“Do you approve of youth smoking e-cigs?”), participants could select either Yes, or No. Out of 30 participants, 100% (30) selected No. In response to Post-Assessment Question 3 (“Please circle the LEAST reliable e-cig informational sources to obtain information,”) participants could select one or more of the following 15 choices: Doctor or Provider’s, Office, Pediatrician’s Office, Nurse, Friend, Teacher, Newspaper, TV, TV News, Internet, Government Websites, Social Media, Facebook, Instagram, Twitter, and E-cig Advertisements.

Among the 30 participants, 100% (30) replied. Among the 30, 43.33% (13) selected E-cig Advertisements, 36.67% (11) selected Social Media, 33.33% (10) selected Facebook, 30.0% (nine) selected Twitter, 26.67% (eight) selected Instagram, 16.67% (five) selected Internet, 13.33% (four) selected Friend, 10.0% (three) selected either Doctor or Provider’s...
Office, Pediatrician’s Office, Nurse, and/or TV respectively, 6.67% (two) selected TV News or Government Websites, and one (3.33%) selected Teacher. Zero participants selected Newspaper. See Figure 29 below.

Amongst the 23 Big Island participants specifically, 34.78% (eight) selected E-cig Advertisements, 26.09% (six) selected Social Media and/or Facebook respectively, 21.74% (five) selected Twitter, 17.39% (four) selected Internet, Instagram, and/or Friend respectively, 13.04% (three) selected Doctor or Provider’s Office, Pediatrician’s Office, and/or Nurse; 8.70% (two) selected Government Websites and/or TV; and one (4.35%) selected Teacher and/or TV News. Zero participants selected Newspaper. Amongst the 15 Puna District participants, 40.0% (six) selected E-cig Advertisements, 33.33% (five) selected Facebook, 26.67% (four) selected Twitter and/or Friend respectively; 20.0% (three) selected Social Media, Instagram, Doctor or Provider’s Office, and/or Pediatrician’s Office respectively; 13.33% (two) selected Internet, Government Websites, and/or Nurse respectively; and one (6.67%) selected Teacher, TV, and/or TV News. Zero participants selected Newspaper. See Figure 29 below.
Figure 29. All, Big Island and Puna District Participants. PostQ3: “Please circle the LEAST reliable e-cig informational sources to obtain information.”; Choices: Doctor or Provider’s, Office, Pediatrician’s Office, Nurse, Friend, Teacher, Newspaper, TV, TV News, Internet, Government Websites, Social Media, Facebook, Instagram, Twitter, and E-cig Advertisements.

In response to Post-Assessment Question 4 (“E-cig use is increasing among youth?”), participants could select either True, or False. Among the 30 participants, 100% (30) selected True. In response to Post-Assessment Question 5 (“Compared to U.S. National averages, State of Hawaii youth e-cig use is?”), participants could select one of the following: Lower, Same, Higher, or Not Sure. Among the 30 participants, 100% (30) selected Higher. In response to Post-Assessment Question 6 (“Compared to the State of Hawaii, youth e-cig use on the Big Island is?”), participants could select one of the following: Lower, Same, Higher, or Not Sure. Among the 30 participants, 100% (30) selected Higher.

In response to Post-Assessment Question 7 (“Please write what % of Big Island High-school seniors use e-cigs. ________%”), participants’ quantitative responses were grouped within close proximity to the percentage they listed. Among the 30 participants, 70.0% (21) listed 34% (the correct answer), 13.33% (four) listed 50%, and 3.33% (one) listed 25%, 35%, 37%, and 75% respectively. Amongst the 23 Big Island participants specifically, 96.57% (16) listed 34%, (the correct answer), 13.04% (three) listed 50%, and one (4.35%) listed 25%, 35%, 37% or 75% respectively. Amongst the 15 Puna District participants, 60.0% (nine) listed 34% (the correct answer), 20.0% (three) listed 50%, and one (6.67%) listed 35% or 75% respectively. See Figure 30 below.
Figure 30. All, Big Island and Puna District Participants. PostQ7: “Please write what % of Big Island High-school seniors use e-cigs. _______ %.”; Correct answer: 34%.

In response to Post-Assessment Question 8 (“Please write what % of Big Island middle-school students use e-cigs. ______ %”), participants’ quantitative responses were grouped within close proximity to the percentage they listed. Amongst the 30 participants, 66.67% (20) listed 23% (the correct answer), 6.67% (two) listed 25%, 35%, or 50% respectively, and one (3.33%) listed 15%, 20%, 30%, 60% or higher respectively. Amongst the 23 Big Island participants, 69.57% (16) listed 23% (the correct answer); 8.70% (two) listed 25%; and one (4.35%) listed 15%, 20%, 35%, 50%, 60% or higher respectively. Amongst the 15 Puna District participants, 53.33% (eight) listed 23% (the correct answer); 13.33% (two) listed 25%; and one (6.67%) listed 15%, 20%, 35%, 50%, 60% or higher respectively. See Figure 31 below.
Figure 31: What % of Big Island Middle-School Students Use e-cigs?

Figure 31. All Participants. PostQ8: “Please write what % of Big Island middle-school students use e-cigs. ________%.”; Correct answer=23%.

In response to Post-Assessment Question 9 (“The majority of e-cigs contain nicotine”), participants could select either True, False, or Not Sure. Amongst the 30 participants, 100% (30) selected True. In response to Post-Assessment Question 10 (“Are there any adverse health effects of e-cig use”), participants could select either Yes, No, or Not Sure. Amongst the 30 participants, 100% (30) selected Yes.

In response to Post-Assessment Question 11 (“Please list any other adverse effects you can think of that are associated with e-cigs.”), amongst the 30 participants (86.67%) replied. Participants listed one or more responses. The adverse effects listed were categorized into 11 themes. Common themes included: 1) Nicotine Dependency; 2) Lung Concerns; 3) Risk of Smoking Cigarettes; 4) General Health Concerns; 5) Heart; 6) Risk of Other Substance; 7) Brain Development; 8) Parent and Child Relationship; and 9) Poison to Fetus. See Appendix U for a full list of participant responses.
Amongst the 26 participants, 65.38% (17) listed Nicotine Dependency, 61.53% (16) listed Lung Concerns, 15.38% (four) listed Risk of Smoking Cigarettes; 11.53 (three) listed General Health Concerns; 7.69% (two) listed Heart; and one participant (3.84%) listed Risk of Other Substance Abuse, Brain Development, Parent and Child relationship, and/or Poison to Fetus respectively. See Figure 32 below. See Appendix U for a full list of participant responses.

Figure 32: Post Adverse Effects Listed

![Figure 32](image)

Figure 32. PostQ11: “Please list any other adverse effects you can think of that are associated with e-cigs.”

In response to Post-Assessment Question 12 (“Adults and parents have an impact on youth e-cig use?”), Post-Assessment Question 13 (“Do e-cigs contribute to nicotine dependency”), and to Post-Assessment Question 14 (“Do e-cigs increase the likelihood of smoking regular cigarettes?”), participants could select Yes, No, or Not Sure. Amongst the 30 participants, 100% of selected Yes for all of these questions.
In response to Post-Assessment Question 15 ("What do you think is the most popular e-cig brand?"), participants were asked to list a qualitative reply. Amongst the 30 participants, 90.0% (27) listed JUUL (the correct answer), and one participant (3.33%) listed “SMOK”, “Puff Bar”, “Should be banned”, and “Can Not remember” respectively. Amongst the 23 Big Island participants specifically, 86.95% (20) listed “JUUL” and one participant (4.35%) listed “SMOK”, “Puff Bar”, “Should be banned”, and/or “Can Not remember” respectively. Amongst the 15 Puna District participants, 86.66% (13) listed JUUL while 6.67% (1) listed “SMOK”, “Puff Bar”, and/or “Can not remember” respectively. See Figure 33 below.

![Figure 33: What is the Most Popular e-cig Brand?](image)

Figure 33. All, Big Island and Puna District Participants. PostQ15: “What do you think is the most popular e-cig brand? ______”; Correct answer= JUUL.

In response to Post-Assessment Question 16 ("The most popular e-cig’s nicotine content compared to other e-cigs is?"), participants could select either Zero Nicotine, More Nicotine, Same Amount, Less Nicotine, or Not Sure. Amongst the 30 participants 90.0% (27) correctly
selected *More Nicotine*, 6.67% (two) selected *Not Sure*, one participant (3.33%) selected *Same Amount*, and none (0) selected *Zero Nicotine*. Amongst the 23 Big Island participants specifically, 86.96% (20) correctly selected *More Nicotine*, 8.69% (two) selected *Not Sure*, one (4.35%) selected *Same Amount*, and no participants (0) selected *Zero Nicotine*. Amongst the 15 Puna District participants, 80.0% (12) correctly selected *More Nicotine*, 13.33% (two) selected *Not Sure*, one (6.67%) selected *Same Amount*, and no participants (0) selected *Zero Nicotine*. See Figure 34 below.

![Figure 34](image-url)

*Figure 34. All, Big Island and Puna District Participants. PostQ16: “The most popular e-cig’s nicotine content compared to other e-cigs is”; Choices: Zero Nicotine, More Nicotine, Same Amount, Less Nicotine, Not Sure; Correct answer=More Nicotine*

In response to Post-Assessment Question 17 (“Please circle how schools on the Big Island educate youth about e-cigs?”), participants could select one or more options including: *Assemblies, Health Class, Coordinated Efforts with Tobacco Coalition Groups, Mandatory E-cig*
Amongst the 30 participants, 73.33% (22) correctly selected Health Class, 20.0% (six) selected Nothing, 16.67% (five) selected Assemblies, 6.67% (two) selected Mandatory E-cig Education from Department of Education, E-cig Trained Educators, and/or Other (responses included “Should be” and “I Hope”), and one participant (3.33%) selected Coordinated Efforts with Tobacco Coalition Groups, and/or Not Sure. Amongst the 23 Big Island Participants specifically, 78.26% (18) selected Health Class, 21.74% (five) selected Assemblies, 17.39% (four) selected Nothing; 8.70% (two) selected Mandatory E-cig Education from Department of Education; one (4.35%) selected Coordinated Efforts with Tobacco Coalition Groups and/or E-cig Trained Educators respectively and zero participants (0) selected Not Sure or Other. Amongst the 15 Puna District participants, 73.3% (11) selected Health Class, 26.7% (four) selected Assemblies, 20.0% (three) selected Nothing, 13.33 (two) selected Mandatory E-cig Education from Department of Education, one (6.7%) selected Coordinated Efforts with Tobacco Coalition Groups, and zero participants (0) selected E-cig Trained Educators, Not Sure, or Other.

Amongst the 16 Big Island Parent/Influential Adult participants specifically, 81.25% (13) correctly selected Health Class, 12.25% (two) selected Assemblies, and/or Nothing respectively, one participant (6.25%) selected Coordinated Efforts with Tobacco Coalition Groups and/or E-cig Trained Educators respectively, and zero participants (0) selected Not Sure, Mandatory E-cig Education from the DOE and/or Other. See Figure 38 below.
Figure 35. All, Big Island, Puna District Participants and Big Island Parent or Influential Adults.

PostQ17: “Please circle how schools on the Big Island educate youth about e-cigs?”; Choices: 
Assemblies, Health Class, Coordinated Efforts with Tobacco Coalition Groups, Mandatory E-cig 
Education from Department of Education, e-cig Trained Educators, Nothing, Not Sure, or Other; 
Correct response= Health Class.

In response to Post-Assessment Question 18 (“Is there Federal or State Funding for e-cig prevention in Hawaii?”), participants could select either Yes, No, or Not Sure. Amongst the 30 participants, 60.0% (18) correctly selected No, 26.67% (eight) selected Not Sure, and 13.33% (four) selected Yes. Amongst the 23 Big Island participants specifically, 60.87% (14) correctly selected No, 21.74% (five) selected Not Sure, and 17.39% (four) selected Yes. Amongst the 15 Puna District participants, 60.0% (nine) correctly selected No, 20.0% (three) selected Yes, and 
20.0% (three) selected Not Sure. See Figure 36 below.
Figure 36. All, Big Island and Puna District Participants. PostQ18: “Is there Federal or State Funding for e-cig prevention in Hawaii?”; Choices: Yes, No, Not Sure. Correct Answer=No.

In response to Post-Assessment Question19 (“Please circle how your perception of youth e-cig use changed after attending this e-cig educational booth?”), participants could select one of the following: No Change, Slight Change, Moderate Change, or Extreme Change. Amongst the 30 participants, 50.0% (15) selected Extreme Change, 33.33% (10) selected Moderate Change, 13.33% (four) selected Slight Change, and one participant (3.33%) selected No Change. Amongst the 23 Big Island participants specifically, 56.52% (13) selected Extreme Change, 34.78% (eight) selected Moderate Change, one (4.35%) selected Slight Change, and one participant (4.35%) selected No Change. Amongst the 15 Puna District participants, 46.67% (seven) selected Extreme Change, 40.0% (six) selected Moderate Change, one (6.67%) selected Slight Change, and one (6.67%) selected No Change. See Figure 37 below.
Figure 37. All, Big Island and Puna District Participants. PostQ19: “Please circle how your perception of youth e-cig use changed after attending this e-cig educational booth?”; Choices: No Change, Slight Change, Moderate Change, or Extreme Change.

In response to Post-Assessment Question 20 (“After attending this e-cig educational booth, are you more likely to share your knowledge and try to influence youth not to use e-cigs?”), participants could select either Yes, or No. Amongst the 30 participants, 100% (30) selected Yes. In response to Post-Assessment Question 21 (“Are you more likely to ask the Department of Education or local schools what they are doing in schools to educate and prevent youth from using e-cigs?”), participants could select either Yes, or No. Amongst the 30 participants, 86.67% (26) selected Yes, and 13.33% (four) selected No. Amongst the 23 Big Island participants specifically, 91.30% (21) selected Yes and 8.70% (two) selected No. Amongst the 15 Puna District participants, 93.33% (14) selected Yes and one (6.67%) selected No. Amongst the 19 Parents/Influential Adults specifically, 89.47% (17) selected Yes, and 10.53% (Two) selected No. Amongst the 16 Big Island Parents/Influential Adults specifically,
87.50% (15) selected Yes, and 12.50% (Two) selected No. Amongst the nine Puna District Parents/Influential Adults, 88.89% (eight) selected Yes, and one (11.11%) selected No. See Figure 38 below.

**Figure 38.** Are You More Likely to Ask Schools About Student E-cig Education and Prevention

In response to Post-Assessment Question 22 (“Can you list any websites to search for reliable e-cig information?”), participants could list one or more websites. Amongst the 30 participants, 63.33% (19) replied. Amongst the 19 participants, 33.33% (seven) listed “HIPHI (Hawaii Island Public Health Institute)”, 33.33% (seven) listed “CDC (U.S. Centers For Disease Control & Prevention)”, 15.78% (three) listed “Government Websites”, 10.52% (two) listed “U.S Surgeon General”, “Tobacco-Free Kids”, and/or “808NoVape.org”, and one (5.26%) listed “DOH (Department of Health)”, “State Departments”, “Internet”, “WebMD”, “Medscape”, 
“Brochure Sources”, “Provider’s Office” and/or “not deceptive advertising” respectively. See figure 39 below. See Appendix V for a full list of participant responses.

Amongst the 23 Big Island participants specifically, 69.56% (16) replied. Amongst the 16, 37.50% (six) listed “HIPHI”, 31.25% (five) listed “CDC”, 18.75% (three) listed “Government Websites”, 12.50% (two) listed “Tobacco Free Kids” and/or “808NoVape.org”, and one (6.25%) listed “U.S Surgeon General”, “Internet”, “Brochure Sources”, and/or “Provider’s Office” respectively. Amongst the 15 Puna District participants, 60.0% (nine) replied. Amongst the nine, 55.55% (five) listed “CDC”, 44.44% (four) listed “HIPHI”, 22.22% (two) listed “Tobacco Free Kids”, and one (11.11%) listed “U.S Surgeon General”, “Government Websites”, “Brochure Sources”, “808NoVape.org”, and/or listed “Provider’s Office” respectively. See Figure 39 below.

Figure 39: Can You List Any Websites to Search for Reliable E-cig Information?

Figure 39. All, Big Island and Puna District Participants. PostQ22: “Can you list any websites to search for reliable e-cig information?”
In response to Post-Assessment Question 23 (“Please list how you will look for e-cig or other health information?”), participants could list one or more sources. Amongst the 30 participants, 70.0% (21) replied. Amongst the 21 participants, 47.61% (10) listed “Government Websites”, 23.80% (five) listed “Internet”, 19.04% (four) listed “CDC” and/or “Provider's Office”, 9.52% (two) listed “Government agencies”, and one (4.76%) listed “DOH”, “808NoVape.org.”, “Medscape”, “WebMD”, “Pro Science Health Websites”, “Information Websites”, “Not Social Media” and/or “Market”. See Appendix W for a full list of participant responses.

Amongst the 23 Big Island participants specifically, 69.56% (16) replied. Amongst the 16 participants, 56.25% (nine) listed “Government Websites”, 25.0% (four) listed “Internet” and/or “Provider's Office” respectively, 18.75% (three) listed “CDC”; and one (6.25%) listed “Government agencies”, “DOH”, “Market”, and/or “808NoVape.org” respectively. Amongst the 15 Puna District participants, 73.33% (11) replied. Amongst the 11 participants, 54.54% (six) listed “Government Websites”, 27.27% (three) listed “Internet”, “Provider's Office”, and/or “CDC” respectively, and one (19.09%) listed “Government agencies”, “DOH”, and/or “Market”. See Figure 40 below.
Figure 40. All, Big Island and Puna District Participants. PostQ23: “Please list how you will look for e-cig or other health information?”.

In Response to Post-Assessment Question 24 (“Please check the appropriate box regarding how beneficial you think this e-cig informational booth was in helping you to learn about the adverse effects of youth e-cig use”). Participants could select one of the following options: Very Strong, Strong, Neutral, Weak, or Very Weak. Amongst the 30 participants, 73.33% (22) selected Very Strong, 23.33% (seven) selected Strong, one (3.33%) selected Neutral, and zero participants (0) selected Weak or Very Weak. Amongst the 23 Big Island participants specifically, 78.26% (18) selected Very Strong, 21.74% (five) selected Strong, and zero participants selected Neutral, Weak or Very Weak. Amongst the 15 Puna District participants, 66.67% (10) selected Very Strong, 33.33% (five) selected Strong, and zero participants (0) selected Neutral, Weak or Very Weak. See Figure 41 below.
Figure 41. All, Big Island and Puna District Participants. PostQ24: “Please check the appropriate box regarding how beneficial you think this e-cig informational booth was in helping you to learn about the adverse effects of youth e-cig use?”; Choices: Very Strong, Strong, Neutral, Weak, Very Weak.

In response to Post-Assessment Question 25: “Would you attend other health related educational booths located at convenient locations like a farmer’s market”, participants could select either Yes, No, or Maybe. Amongst the 30 participants, 73.33% (22) selected Yes, 26.67% (eight) selected Maybe, and zero participants (0) selected No. Amongst the 23 Big Island participants specifically, 82.61% (19) selected Yes, 17.39% (four) selected Maybe, and zero participants (0) selected No. Amongst the 15 Puna District participants, 86.67% (13) selected Yes, 13.33% (two) selected Maybe, and zero participants (0) selected No. See Figure 42 below.
Figure 42: Would You Attend Other Conveniently Located Health Booths?

In response to Post Assessment Question 26 ("What other locations would you recommend as being a convenient location for a community health information booth?")

Participant comments were categorized into common themes. Amongst the 30 participants, 83.33% (25) listed one or more suggestions. Amongst the 25 participants, 40% (10) listed Shopping Centers (specific responses including: “Hilo Mall”, “Strip Malls”, “Shopping Centers”, “Walmart”, “KTA”), 32.0% (eight) listed Schools/School Events, 24.0% (six) listed Market/Farmers Markets in Hawaii (Hilo/Kona), 16.0% (four) listed Fairs/Public Events and/or Parks (Beaches/Sports) respectively, 8.1% (two) listed Anywhere, and one (4.0%) listed College Campuses, Community Centers, and/or Library respectively. See Figure 46 below. See Appendix X for full data table of participant suggestions.
Amongst the 15 Puna district participants specifically, 93.33% (14) responded by listing one or more suggestions. Amongst the 14 participants, 35.71% (five) listed Shopping Centers (Hilo Mall, Shopping Centers, Grocery Stores), 28.57% (four) listed Market/Farmers Markets in Hawaii (Hilo/Kona), 28.57% (four) listed Schools/School Events, 28.57% (four) listed Parks (Beaches/Sports), 21.43% (three) listed Fairs/Public Events, one (7.14%) listed Grocery Store (Walmart, KTA, Longs, Sak n Save, Food Land), and/or College Campuses respectively. See Figure 43 below.

![Figure 43: Participants' Suggested Health Care Booth Locations](image)

**Figure 43.** All and Puna District Participants. PostQ26: “What other locations would you recommend as being a convenient location for a community health information booth?”.

Chapter Five: Results Discussion

Results Discussion

In this chapter, the accomplishment of the projects’ aims, and objectives will be discussed based upon the project results and the significance of the results. The aims of this project were to 1) Conduct research identifying the community of Puna as an ideal setting for an
innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use, 2) Develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults, and 3) Evaluate the effectiveness of the project interventions.

Overall, 30 total participants including 23 Big Island and 15 Puna District participants completed the full project. In addition to the 30 participants, another 131 adults showed up to the project booth to discuss e-cig evidence-based information and receive a take-home brochure. The take-home brochure contained evidence-based information, resources, and websites to further increase knowledge and/or search for e-cig or other health information. These additional booth visitors were engaged from two to 25 minutes but did not wish to participate in the project by completing the Pre and Post Assessments. Extensive media coverage on the dangers of e-cigs and EVALI cases at the time of the project (CDC, 2019a, 2020) may have contributed to the high visitor interest.

**Project Aim 1.** Project Aim 1 was to conduct research identifying the community of Puna as an ideal setting for an innovative e-cig health literacy program aimed at preventing and reducing youth e-cig use. Four objectives were formulated to achieve this aim (see Chapter 4, Project Aim 1 and Objectives 1, 2, 3, and 4 above). Accomplishing the methods described in Chapter 3, including completing a literature review, revealed demographic characteristics of populations more inclined to use e-cigs (American Lung Association, 2019; Coalition for a Tobacco-Free Hawai‘i, 2019; Evans-Polce et al., 2018; Garbutt et al., 2015; “State of Hawaii Primary Care,” 2016; State of Hawaii, 2019a, 2019b). Literature indicated the characteristics of the rural Puna District mirror the characteristics of populations that are more inclined to use
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Thus, indicating a need for a innovative strategy to improve health literacy aimed at preventing youth e-cig use in this population (Coalition for a Tobacco-Free Hawai’i, 2019; Garbutt et al., 2015; Malik et al., 2019; State of Hawaii, 2019a; “State of Hawaii Primary Care,” 2016).

The popular Sunday Maku‘u Farmers’ Market proved to be an ideal location to pilot a convenient e-cig health literacy booth designed to reach the target rural population of Puna District adults who often lack access to healthcare resources needed for improved health literacy (Graves, 2010; Hamamura, Withy, & Hughes, 2017). Literature indicates barriers rural communities face in accessing health care and improving health literacy include lack of healthcare providers, difficulty retaining healthcare providers, distance and/or inconvenience (Graves, 2010; Hamamura, Withy, & Hughes, 2017; Robards, et al., 2019; Rural Health Information Hub, 2019b). Piloting the booth at a popular, rural community location gave community members a chance to conveniently access evidence-based e-cig health information. Approximately 1500 vehicles containing one to six passengers attend the Sunday Maku‘u Farmers Market (H. Botello, personal interview, October 6, 2019). The attendants generally buy and/or sell produce, arts, crafts, handmade or vintage merchandise, and/or visit the popular food court.

**Project Aim 2.** Project aim 2 was to develop and implement a toolkit of evidence-based e-cig education and health resources tailored to the target population of Puna adults. The project methods including convenient location, conducting the project continuously over five Sundays, and an aesthetically appealing booth which included an e-cig device display case, attracted 30 participants to complete the project. However, another 131 visitors possibly benefited through
discussion, e-cig device recognition education, and receiving a take-home brochure. These additional 131 visitors possibly did not want to commit to the project due to the lengthy time commitment the Pre and Post Assessments appeared to require. The booth began January 19 and ended on February 16, 2020, proceeding between the hours of 8:00 A.M. to 2:00 P.M.

The overarching project goal was to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth. The results showed that just over 83% of participants were HI residents, just over 69% of Big Island participants were parents/influential adults, 80% were age 30 or older, 50% were Puna District residents, and 30% matched the exact target population of Puna community parents/influential adults. Thus, the demographic results indicate that the booth did reach the exact target population.

Although 30% of participants were the exact target population of Puna District community parents/influential adults, the majority of participants were also Puna District, Big Island, and/or Hawaii residents. See Figures 1, 2, 3, and 4 in Chapter 4 above. Literature indicates a higher State of Hawaii and HC youth e-cig use compared to U.S. National rates (State of Hawaii, 2019a). Thus the booth was able to reach this high-risk population as well.

Results indicated the majority of all participants (63%) specifically identified as parents/influential adults. Furthermore, 80.0% of all participants identified as age 30 years or older. See Figures 1 and 4 in Chapter 4. The literature describes the strong impact parents and adults have on youth behavior, especially tobacco abuse (Bry, Catalano, Kumpfer, Lochman, & Szapocznik, 1998; Kumpfer et al., 2003). In addition, the average age of first-time mothers in
increasing awareness of vaping in rural communities is 24.5 (National Center for Health Statistics, National Vital Statistics System, 2018; Bui & Miller, 2018; Garbutt et al., 2015). What’s more, the Puna District has high rates of births to mothers under age 18 (“State of Hawaii Primary Care”, 2016). See Appendix B, Figures B3, C, and C1. Therefore, the young average age of first-time mothers in rural communities such as Puna, combined with the strong impact parents and adults have on youth behavior make it important to educate young parents/influential adults about the adverse effect of nicotine during pregnancy, which the project accomplished. In addition, the fact that 80.0% of all participants were age 30 years or older indicates that the target population of parents/influential adults of youth were reached.

**Project Aim 3.** Project aim 3 was to evaluate the effectiveness of the project interventions. **Objective 1** was to implement evaluation methods to assess new knowledge learned by project participants. Assessments were completed by participants before (pre) and after (post) attending the booth. These assessments evaluated new knowledge learned and the effectiveness of the project interventions.

The overarching project goal was to increase knowledge amongst Puna community parents/influential adults regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth. Results showed that 100% of participants identified youth e-cig use as a health concern, just over 96% did not approve of youth using e-cigs, and just over 53% indicated being *Extremely Concerned* regarding youth e-cig use. Thus, before participating in the project some were not *Extremely Concerned* regarding youth e-cig use, and one participant actually approved of youth using e-cigs. However, after attending the booth, 100% of participants did not approve
of youth using e-cigs, and just over 78% who were previously not Extremely Concerned, raised their level of concern. Furthermore, 91% of Big Island participants specifically, and 100% of Puna District participants, increased their level of concern. These results indicate the booth was effective at increasing knowledge amongst participants and thus level of concern regarding youth e-cig use, especially amongst the target population of Puna adults. See Figure 44 below.

Figure 44: Change in Level of Concern

![Chart showing change in level of concern](chart.png)

Figure 44. PreQ5a: and PostQ1a: “If YES; Please circle your level of concern regarding e-cig use amongst youth.”.

The one participant who indicated approval of youth using e-cigs in the Pre-Assessment was a non-resident of Hawaii and fell in the 18 to 24 age range. However, the participant indicated youth e-cig use was a health concern and was Moderately Concerned. The participant listed an adverse effect as “a disease of the lung due to unregulated cartridges”. I hypothesize the participant believed e-cigs were safe if they did not use the unregulated cartridges. During the time of the project, unregulated e-cig cartridges (i.e., nicotine oils) were widely discussed in the media as the contributing factor to the increased rise of EVALI cases (CDC, 2020).
However, after attending the booth, the participant identified that the booth *Moderately* changed their perception about youth e-cig use, identified the booth as *Very Strong*, and identified being more likely to share their knowledge and try to influence youth not to use e-cigs.

**Adult impact advocating against youth e-cig use.** Pre-Assessment results demonstrated that 90% of participants were aware of the evidence that adults have a strong impact on youth behavior, especially tobacco abuse (Bry, Catalano, Kumpfer, Lochman, & Szapocznik, 1998; Cohen, Richardson, & LaBree, 1994; Knopf, 2018; Kumpfer et al., 2003) however, 53% of participants and only 52% of parent/influential adult participants had advised someone less than 18 years old not to use e-cigs. Furthermore, two Big Island participants were *Not Sure* regarding adults and parents having a strong impact on youth e-cig use, and one Puna District participant did not think adults and parents have a strong impact on youth e-cig use. These results indicated there were some participants who were unaware of the strong impact adults and parents have on youth e-cig use, and even though the vast majority of participants were aware that adults have a strong impact on youth behavior, especially tobacco abuse, far less of the parent/influential adults had actually advised someone less than 18 years old not to use e-cigs. These results could be due to a lack of knowledge amongst adults regarding the dangers of e-cigs (Barrington-Trimis et al., 2016; Barrington-Trimis & Leventhal, 2018; Coleman et al., 2016; Malik et al., 2019; USDHHS, 2016).

After attending the booth, 100% of participants indicated adults and parents have a strong impact on youth e-cig use and 100% indicated they would be more likely to share their knowledge and try to influence youth not to use e-cigs. These results indicated an increase in knowledge regarding the dangers of e-cigs and thus probably increased confidence as role
models and advocates for the prevention and/or reduction of e-cig use among youth. These results are significant since increasing knowledge amongst Puna community parents/influential adults regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth was the overarching project goal. See Figure 45 below.

Figure 45. All Participants and Parents/Influential Adults. PreQ7: “Have you ever advised someone less than 18 years old not to use e-cigs?” compared to PostQ20: “After Attending this e-cig educational booth, are you more likely to share your knowledge and try to influence youth not to use e-cigs?”

**Informational access barriers.** Results indicated the majority of participants, including parents/influential adults, had not looked for e-cig information. Furthermore, no parents or influential adults had discussed e-cigs with health care providers including pediatricians. The reasons participants, including parents/influential adults, had not spoken with a healthcare provider about e-cigs could be related to barriers rural communities like HC and Puna
specifically face accessing health care needed for improved health literacy (e.g., lack of health care providers in Hawaii; difficulty retaining healthcare providers; distance and/or inconvenience) (Graves, 2010; Hamamura, Withy, & Hughes, 2017; Robards, et al., 2019; Rural Health Information Hub, 2019b). Thus the project was able to directly reach individuals such as these, and provide evidence-based information regarding the negative health effects of youth e-cig use. See Figure 46 below.

Figure 46: All Participants Compared to Influential Adults: Have You Ever Searched for E-cig Information?

<table>
<thead>
<tr>
<th></th>
<th>All Participants (30)</th>
<th>All Influential Participants (19)</th>
<th>Big Island Influential (16)</th>
<th>Puna Influential (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18</td>
<td>12</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Figure 46. All Participants, All Parents/Influential Adults, Big Island Parents/Influential Adults & Puna District Parents/Influential Adults. PreQ8: “Have you ever looked for information about e-cigs?”; Choices: Yes, No

Convenience of the internet. Results showed that the majority of participants that had searched for e-cig information used the internet (87%) rather than the use of doctor/provider, and/or pediatricians’ offices. Just over 12% selected Doctor or Provider’s Office and zero participants selected Pediatrician’s Office as a source used for e-cig information. See Figure 9 in Chapter 4 above. These results support other study findings that health care providers to include
pediatricians, were not specifically asking patients about e-cig use or discussing adverse effects associated with e-cig use with patients at clinical visits (Crawford, 2018; Garbutt et al., 2015). Furthermore, the internet sources that many participants used included social media websites (i.e., Facebook, Instagram, Twitter), Google, YouTube, and/or Government Websites. See Figures 10 and 11 in Chapter 4 above. See Appendix Q and R for a full list of participant responses.

The high use of the internet, particularly social media sites and YouTube, is concerning since literature indicates the internet and social media sites such as Facebook, Instagram, Twitter and YouTube are unregulated and used by e-cig manufacturers to promote products through deceptive advertising with misleading information regarding e-cig dangers (Barrington-Trimis et al., 2016; Barrington-Trimis & Leventhal, 2018; Coleman et al., 2016; Malik et al., 2019; USDHHS, 2016). This could be a contributing factor to the results indicating a lack of participant knowledge about e-cig dangers such as nicotine dependency, brain development damage including nicotine crossing the placenta and affecting fetal and postnatal development, and being a gateway to smoking regular cigarettes (USDHHS, 2016).

The booth provided a take-home brochure with evidence-based information and resources including government websites and local agencies that participants could utilize to further increase knowledge regarding youth e-cig use or other health information. The Post-Assessment results demonstrated a 40% increase in participant knowledge regarding evidence-based resources including websites and/or local agencies to search for reputable e-cig or other health information. After attending the booth, participants no longer listed unregulated sites utilized by e-cig manufacturers (i.e., social media, Facebook, Twitter, Instagram, YouTube) (Coleman et al., 2016).
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2016; Malik et al., 2019) as a valid e-cig information source. See Figures 10, 11, 39, and 40 in Chapter 4. See Appendix V and W for a full list of participant responses. Thus, the project booth interventions increased participant knowledge regarding reputable resources to obtain e-cig or other health information in a rural community lacking access to health care needed for improved health literacy.

Although the internet is a convenient resource to obtain information, even reputable health sites, including government websites, are often difficult to navigate or are filled with scientific nomenclature that may be difficult for laypersons to understand (Lupton and Malsen, 2019; Malik et al., 2019). This is due to the limited exploration of the role of technology in healthcare access and design of online digital health tools pertaining to race, gender, and socioeconomic status (Lupton and Maslen, 2019; Robards, et al, 2019). Due to the lack of studies assessing the validity and/or success of online resources in increasing health literacy, it is unclear if the reputable websites participants visited are increasing health literacy/knowledge effectively, regarding e-cigs or other health conditions.

**E-cig knowledge.** Pre-Assessment results indicated poor participant e-cig knowledge in areas such as high e-cig nicotine content, the most popular e-cig product, e-cig adverse effects including nicotine dependency, e-cigs leading to an increased risk of using regular cigarettes; higher state and HC e-cig use rates; and school preventative measures. This lack of e-cig knowledge combined with the majority of participants utilizing the internet to search for e-cig and other health information supports literature indicating rural communities lack resources to improve health literacy (Coleman et al., 2016; Graves, 2010; Hamamura, Withy, & Hughes, 2017; Malik et al., 2019). Furthermore, the unregulated internet sites used by e-cig manufacturers to
reduce the perceived risks of e-cigs (Coleman et al., 2016; Malik et al., 2019) may be contributing to this poor knowledge regarding e-cig dangers.

On the Pre-Assessment, 86% of participants indicated that there are adverse effects of e-cig use, and just over 53% indicated they had advised youth not to use e-cigs. However, when asked to list adverse health effects of e-cigs and reasons why they had advised youth not to use e-cigs, the majority of participants listed traditional smoking-related adverse effects including various *Lung or Health Concerns*, rather than evidence-based e-cig adverse effects such as *Addiction*, or *Nicotine Dependency*. See Figure 7 and 19 in chapter 4. See Appendix P, S and T for a full list of participant responses. Thirty percent of Big Island participants specifically were unaware that e-cigs contribute to nicotine dependency and increase the likelihood of smoking regular cigarettes, while 34% of Big Island participants were unaware that the majority of e-cigs contain nicotine. Although the full range of health implications from e-cigs is still uncertain due to the fairly new onset of widespread youth e-cig use (Garbutt et al., 2015), these results support the literature indicating that due to deceptive advertising tactics on unregulated social media sites, e-cigs are often perceived to be less addictive and healthier than conventional cigarettes (Coleman et al., 2016; Malik et al., 2019).

After attending the booth, 100% of participants indicated that e-cigs contribute to nicotine dependency, that the majority of e-cigs contain nicotine, that e-cigs increase the likelihood of smoking regular cigarettes, and that there are adverse health effects of e-cig use. The majority of participants also listed the evidence-based e-cig adverse effects of *Nicotine Dependency* and *Addiction* after attending the booth. Other proven adverse effects of youth e-cig use were also newly listed including *Risk of Smoking, Risk of Other Substance Use, Brain*
Development, and “Poison to fetus”. See Figure 32 in chapter 4. See Appendix U for a full list of participant responses. The results indicate participants increased knowledge regarding the evidence-based adverse effects of youth e-cig use (CDC, 2018; Crawford, 2018; HHS, 2016; Malik et al., 2019; NCCDP, 1970, 2014; USDHHS, 2019).

**JUUL and nicotine content.** The Pre Assessment results also showed that 76% of participants were unaware of the most popular e-cig brand JUUL and 66% were unaware that JUUL contained more nicotine than other e-cig products. However, after attending the booth, over 86% indicated JUUL is the most popular e-cig brand, and 90% indicated the most popular e-cig contains More Nicotine. See Figures 47 and 48 below.

The lack of knowledge regarding JUUL and its higher nicotine content is a concern since literature indicates JUUL accounted for more than 75% of all U.S. e-cig sales in 2018 (Crawford, 2018; Cullen et al., 2018; Ducharme, 2019a; USDHHS, 2019), and the rise in e-cig use can be attributed to JUUL and its high level of nicotine content being more addictive than other e-cigs (Crawford, 2018; Cullen et al., 2018; Ducharme, 2019a). The results support other publications indicating that two-thirds of JUUL users did not know that all JUUL pods contain nicotine, and youth and young adults believed it is safer and more convenient than smoking cigarettes (Crawford, 2018; Evans-Polce et al., 2018; USFDA Center for Tobacco Products, 2019). Increasing knowledge regarding JUUL is essential, due to its popularity and belief that it is safer than regular cigarettes. These factors are likely contributing to the continued high youth e-cig use rates in HC and the state (Cullen et al., 2018).
Figure 47. All, Big Island and Puna District Participants. PreQ26 compared to PostQ15: “What do you think is the most popular e-cig brand? ______”; Correct answer= JUUL.

Figure 48. All, Big Island and Puna District Participants. PreQ27 compared to PostQ16: “The most popular e-cig’s nicotine content compared to other e-cigs is?”; Choices: Zero Nicotine, More Nicotine, Same Amount, Less Nicotine, Not Sure. Correct response= More Nicotine.
Big Island seniors and middle school e-cig use. The Pre-Assessment results showed that 100% of participants were aware that e-cig use is increasing among youth, however 60% of participants were unaware that State of Hawaii youth e-cig use is Higher than U.S. National averages, and 66% were unaware that youth e-cig use on the Big Island is Higher than the State of Hawaii. Furthermore, only 8% of Big Island participants listed a Big Island high-school senior e-cig use percentage in the range of 29 to 39%, which would be within five percentage points of the correct answer of 34%.

In addition, Zero participants listed Big Island middle school students’ e-cig use percentage within the range of 18 to 28%, which would be within five percentage points of the correct answer of 23%. The results demonstrate that although all participants were aware that e-cig use is increasing among youth, the great majority were unaware of just how high Hawaii youth e-cig use is, compared to the rest of the U.S. See Figures 13 and 14 in Chapter 4 above. The lack of participant knowledge regarding the high youth e-cig use rates in HI and HC was concerning due to all of the dangers associated with e-cigs (CDC, 2018; Crawford, 2018; HHS, 2016; Malik et al., 2019; NCCDP, 1970, 2014; USDHHS, 2019).

However, after attending the e-cig booth, 100% of participants indicated that youth e-cig use is Higher in the state of Hawaii compared to U.S National levels and Higher in HC compared to the state of Hawaii. Furthermore, after attending the booth, 78% of Big Island participants listed a percentage within the range of 29 to 39%, which was within five percentage points of the correct answer of 34%, and 69%, listed 34%, which was exactly the correct answer. Furthermore, 82% of Big Island participants listed a percentage within the range 18 to 28%, which was within five percentage points of the correct answer 23%, and 69% listed 23%,
which was exactly the correct answer of Big Island Middle School student e-cig use. See Figures 49 and 50 below.

**Figure 49.** Big Island participants. PreQ17 compared to PostQ7: “Please write the % of Big Island High school seniors use e-cigs. ____%”; Correct Answer=34%

**Figure 50.** What % of Big Island Middle-School Students Use E-Cigs? (Pre vs. Post)
Figure 50. PreQ18 and PostQ8 compared: “Please write the % of Big Island Middle-School students use e-cigs. ______?”; Correct Answer=23%.

E-cig education in schools. Pre Assessment results showed that 93% of Big Island Parent/Influential Adult participants had never asked the island schools to discuss e-cig use with students and 88% of these same participants were unaware how Big Island schools educate students about e-cigs (i.e., briefly in Health Class). The results demonstrate that most Big Island parents/influential adults were unaware of what the island schools were doing to educate students about e-cigs. These results combined with those demonstrating a lack of participant advocacy against youth e-cig use, and lack of searching for e-cig information (see figures 6 and 8 above) suggest adults might believe schools are educating and advising students about important youth health issues such as e-cigs, thus eliminating their need to advocate against youth e-cig use. However, anecdotal information from the Hilo-Waiakea complex DOE Health and Physical Education Resource Coordinator verified that the only avenue to provide e-cig education in a full curriculum is a brief discussion in Health Class. However, Health Class is provided only one semester out of eight during high school and one semester out of six in middle school on the East Side of the Big Island (S. Masoyana, personal interview, March 3, 2020).

The results indicating a lack of advocacy from parents/influential adults and minimal e-cig education students on the island receive will likely contribute to ongoing high e-cig rates in Hawaii county (Coalition for a Tobacco-Free Hawai’i, 2019a; State of Hawaii, 2019) unless additional evidence-based interventions are implemented to address the issue.

After attending the project booth, 81% of Big Island Parent/Influential Adult participants correctly indicated that students do get education about e-cigs in Health Class while 87% of Big
Island Parent/Influential Adult participants and 88% of Puna District Parent/Influential Adult participants indicated being more inclined to ask the DOE or local schools what they are doing to educate and prevent youth from using e-cigs. Thus, the booth was able to increase participant knowledge and awareness regarding the schools’ minimal role in educating students about e-cigs and possibly increased the likelihood that parents/influential adults will ask the DOE or local schools what they are doing to educate and prevent youth e-cig use. These changes are likely due to the increased knowledge gained regarding e-cig dangers and the high youth use rates in HI and HC. See Figures 51 and 52 below.

**Figure 51**: How Do Schools on the Big Island Educate Youth About E-cigs? (Pre vs. Post)

![Graph showing percentage of participants and responses](image)

**Figure 51.** Big Island Parent/Influential Adult Participants. PreQ28 compared to PostQ17:

“Please circle how schools on the Big Island educate youth about e-cigs?”; Choices: *Assemblies, Health Class, Coordinated Efforts with Tobacco Coalition Groups, Mandatory E-cig Education from Department of Education, e-cig Trained Educators, Nothing, Not Sure, or Other*. Correct response= Health Class.
Figure 52. All Participants and Big Island and Puna District Parent/Influential Adult Participants. PreQ11: “Have you ever asked a school to discuss e-cig use with students?”; compared to PostQ21: “Are you more likely to ask the Department of Education or local schools what they are doing in schools to educate and prevent youth from using e-cigs?”; Choices: Yes, No.

Objective 2. Objective 2 of Project Aim 3 was to implement evaluation methods to assess whether participants felt that project interventions were valuable and that interventions met their needs in the way they were designed and implemented. Results showed 100% of participants thought a farmers market was a convenient place to receive information on e-cigs or other health issues, 96% indicated the booth was Very Strong or Strong and beneficial in assisting them to learn about the adverse effects of youth e-cig use, with 96% changing their perception of youth e-cig use after attending the booth. Furthermore, 100% of Big Island participants indicated the booth was Very Strong or Strong and beneficial in assisting them to learn about the adverse effects of youth e-cig use. See figures 53 and 54 below.
Figure 53: How Beneficial Was the E-cig Booth?

**Figure 53.** PostQ24: “How beneficial do you think this e-cig informational booth was in helping you to learn about the adverse effects of youth e-cig use?”; Choices: *Very Strong, Strong, Neutral, Weak, Very Weak.*

**Figure 54. Changed Perception of Youth E-cig Use?**

[Bar chart showing the number of participants with different perceptions of youth e-cig use.]

- Extreme Change
- Moderate Change
- Slight Change
- No Change
Figure 54. All, Big Island and Puna District Participants. PostQ19: “Please circle how your perception of youth e-cig use changed after attending this e-cig educational booth.”; Choices: 

No Change, Slight Change, Moderate Change, or Extreme Change

Pre Assessment results also showed that 100% of participants identified youth e-cig use as a health concern, however, after attending the booth, 78% raised their level of concern. See Figure 44 in Chapter 4 above. What’s more, 100% of all participants indicated they were more inclined to share their new knowledge and try to influence youth not to use e-cigs after attending the booth. These results indicate that the project interventions were valuable to participants and that interventions met their needs in the way they were designed and implemented, indicating that the objective was met. Results also showed that 100% were not opposed to attending other health-related education booths located at convenient locations like a farmer’s market with rural Big Island and Puna participants in particular most likely to attend. See Figure 55 below.
Figure 55. PostQ25: “Would you attend other health-related educational booths located at convenient locations like a farmer’s market?”; Choices: Yes, No, or Maybe

Ninety-three percent of participants listed suggestions for other convenient locations such as the Mall/Shopping Centers/Grocery Store, Schools/Campuses/School events, as well as Farmers’ Markets (see figure 43 above). See Appendix X for a full list of participant responses. These findings related to “convenience” are not surprising since the literature describes lack of providers in Hawaii; difficulty retaining healthcare providers; distance and/or inconvenience as barriers rural communities face accessing health care and improving health literacy (Graves, 2010; Hamamura, Withy, & Hughs, 2017; Robards, et al., 2019; Rural Health Information Hub, 2019b). Evidence-based literature indicates it is up to the state and local agencies to continuously adjudicate factors of convenience, engagement, perceived effectiveness, affordability, and population focused efforts and education through new innovative strategies to reach rural populations navigating the complexities of health care (Garbutt et al., 2015; Malik et al., 2019; Robards, et al., 2019; State of Hawaii, 2019a). The project booth seemed to address these issues effectively.

Results Summary

The overarching project goal was to increase knowledge amongst Puna community adults, parents and caregivers regarding negative health impacts of e-cigs thereby increasing their confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth. Demographic results indicate the booth was effective at reaching the target population of Puna community adults, parents and caregivers. Furthermore, all results demonstrate booth interventions increased participants’ knowledge regarding the negative health
impacts of e-cigs including nicotine dependency/addiction and increased likelihood of moving on to smoking traditional cigarettes and/or other substances. Participant knowledge also increased regarding the adverse effects of vaping on brain development and fetal toxicity. What’s more, results indicated an increase in evidence-based knowledge of the high nicotine levels in e-cigs compared to traditional cigarettes and the most popular e-cig brand which contains higher nicotine concentrations compared to other brands. Furthermore, results indicated an increase in evidence-based knowledge regarding the high youth e-cig use rates in Hawaii and the Big Island, the impact adults and parents have on youth e-cig use, how schools on the Big Island are educating students about e-cigs, and reputable resources to access health information including websites, and local agencies. These results indicate that the project was effective at increasing general e-cig knowledge (to include the negative health impacts of e-cigs) amongst participants which included Puna community adults, parents and caregivers, thus accomplishing this part of the overarching project goal.

After attending the project booth 100% of participants acknowledged they were more inclined to share their new knowledge and try to influence youth not to use e-cigs. Just over 87% of Big Island Parent/Influential adult participants and 88% of Puna District Parent/Influential Adult participants acknowledged they were more inclined to communicate with Big Island schools to ask what they are doing to educate and prevent youth from using e-cigs. These results indicate that the part of the overarching project goal to increase Puna community parent/influential adults’ confidence as role models and advocates for the prevention and/or reduction of e-cig use among youth was likely accomplished amongst participants.
The literature emphasizes the need to continuously adjudicate factors of convenience, engagement, perceived effectiveness, affordability, and population focused efforts and education through innovative strategies to access rural populations facing barriers which prevent access health care access and health literacy (Garbutt et al., 2015; Graves, 2010; Hamamura, Withy, & Hughes, 2017; Malik et al., 2019; Robards, et al., 2019; Rural Health Information Hub, 2019b; State of Hawaii, 2019a). The results demonstrated the project was effective in increasing participants' evidence-based e-cig health literacy/knowledge in a population that lacks healthcare access and is more likely to use e-cigs or regular cigarettes (Garbutt et al., 2015; Graves, 2010; Hamamura, Withy, & Hughes, 2017; Robards, et al., 2019; Rural Health Information Hub, 2019b). Thus, this simple, yet innovative project addressed this need and provided the rural Puna District access to evidence based e-cig information to improve e-cig health literacy, and through participant advocacy against e-cigs, may ultimately improve overall community health.

**Literature Discussion and Implications for Practice**

The community based project demonstrated a simple, yet effective strategy to reach a rural population suffering disparate rates of e-cig use and health conditions related to nicotine/tobacco use (Coalition for a Tobacco-Free Hawai‘i, 2019; “State of Hawaii Primary Care,” 2016; State of Hawaii, 2019a). The literature emphasizes the need to continuously adjudicate factors of convenience, engagement, perceived effectiveness, affordability, and population focused efforts and education through innovative strategies to access rural populations facing barriers to health care and improved health literacy (Garbutt et al., 2015; Graves, 2010; Hamamura, Withy, & Hughes, 2017; Malik et al., 2019; Robards, et al., 2019; Rural Health Information Hub, 2019b; State of Hawaii, 2019a). The literature calls for
innovative strategies to improve knowledge regarding e-cig dangers in rural and other underserved communities, yet there are few studies of piloted strategies addressing this need (Coalition for a Tobacco-Free Hawai‘i, 2019; Graves, 2010; Garbutt et al., 2015; Malik et al., 2019).

The project results demonstrated that providing e-cig health information at a convenient location for a rural population in the Puna District engaged community members and increased knowledge/health literacy. Furthermore, with this increased knowledge participants were more inclined to advocate for the prevention of youth e-cig use. Thus, through knowledge, advocacy, and prevention, there is the potential to improve the overall community’s health. National, state, and local agencies can use similar grassroots strategies to improve population health.

Results also revealed that 100% of participants thought the farmers market is a convenient place to receive health information and would attend other similar project booths at convenient locations such as malls/shopping centers and schools/school events. These results are not surprising considering the healthcare access barriers rural populations face including financial, transportation, health insurance, and provider shortages (Graves, 2010; Hamamura, Withy, & Hughes, 2017; Rural Health Information Hub, 2019b). These results suggest the need to bring health information to the community by targeting areas the population frequents. Programs specifically designed to address population health needs in areas the population frequents could lead to a positive increase in health literacy, and ultimately improve overall community health and likely reduce health care costs (Healthy People 2020, 2020).

The results also revealed participants (the vast majority of whom came from the rural Big Island) used the convenience of the internet to search for e-cig and other health information
rather than doctor/providers’ offices. However, there is limited exploration of the role of technology in improving healthcare access and health literacy (Lupton and Maslen, 2019; Robards, et al., 2019). There are also limited studies on the effectiveness of online digital health tool designs in supporting health care practices and preventive care behaviors according to race, gender, and socioeconomic status (Laing et al., 2020; Lupton & Maslen, 2019; Robards, et al., 2019). The limited exploration of the use of technology to obtain health and preventative care information by specific race, gender and socioeconomic status creates a gap in the understanding, validation, and benefits of technologies for improved population health (Lupton & Maslen, 2019; Robards, et al., 2019; Laing et al., 2020).

Future studies should assess rural or underserved communities’ internet service capability, devices, validity, and effectiveness of specific websites utilized to access health information. Healthcare agencies including insurance providers could use familiar social media sites (i.e., Facebook, Instagram, Twitter) their communities access on a daily basis to improve health literacy. Waiting room surveys conducted at providers’ offices could request data on the devices, accessibility, service, affordability, websites, and applications that patients are familiar with to receive health information including assistance with chronic condition management. Community healthcare agencies and insurance providers could collaborate to raise funding for research and innovative pilot projects to address this research gap. The population focused e-cig booth was effective at increasing participants' evidence-based e-cig health literacy/knowledge in a community that is high risk for tobacco/nicotine product use, lacks healthcare access, and utilizes the internet for health information over providers (Garbutt et al., 2015; Graves, 2010;
Hamamura, Withy, & Hughes, 2017; Robards, et al., 2019; Rural Health Information Hub, 2019b).

**Project Facilitators and Barriers**

**Project facilitators.** The rural Puna District population lacks access to health care and has demographic characteristics of populations more inclined to use-e-cigs. The convenience of the project booth served as a facilitator, providing the community access to improve e-cig health literacy. Roughly 1500 vehicles containing one to six passengers attend the market each week for various reasons (e.g., shop for food, plants, clothing, arts/crafts, etc). The booth provided convenience for market attendees to discuss e-cigs anytime during their market experience. The continuity of the booth for five consecutive Sundays demonstrated consistency and allowed time to build a rapport with the community. The design display and presentation of the e-cig information was aesthetically appealing, and simple to interpret.

**Project barriers.** The significant barrier of the project was the length of time required for participants to commit to completing the Pre and Post Assessments. Since the Pre- and Post-Assessments each took 10 to 15 minutes to complete, many booth visitors did not wish to commit that much time to participate. However, most of the 131 non project participant booth visitors stayed 15 to 25 minutes to learn about e-cigs and related health dangers, likely benefiting from knowledge gained. Conducting a very brief Post-Assessment/survey after visiting a similar booth could possibly increase data collection.

**Dissemination Plans**

Results of the project should be shared with local health and insurance agencies to show a simple yet innovative strategy that can be used to improve health access and health literacy in
rural and/or underserved populations. The minimal costs make the project strategies feasible to incorporate into existing community health programs. Publishing these results would demonstrate the impact convenience contributes to health care access for improved health literacy, especially in rural and/or underserved populations. Furthermore, applicable results can be presented at county council meetings and used to submit related legislative testimony to ultimately improve overall community health.
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Appendix A

30 Day Prevalence of Daily Use of Cigarettes by Grade, 1976-2018

(Johnston et al., 2019; Office of Adolescent Health, 2019).
Appendix B

Income Characteristics

Figure B1:

Figure B1: Poverty Guidline for Hawaii Families

Figure B2:

Figure B2: Average Income Per Household

(“State of Hawaii Primary Care,” 2016)
Figure B3:

Figure B3: Puna Income Characteristics

Appendix C

Puna District Health Characteristics Compared to State of Hawaii and Hawaii County

**Figure C1:**

```
<table>
<thead>
<tr>
<th></th>
<th>Puna</th>
<th>Hawaii County</th>
<th>State of Hawaii</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Insurance</td>
<td>12</td>
<td>9.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Public Coverage</td>
<td>47.7</td>
<td>39.9</td>
<td>32.7</td>
</tr>
<tr>
<td>Births &lt;18</td>
<td>3</td>
<td>2.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Adult Obesity</td>
<td>26.3</td>
<td>22.9</td>
<td>22.4</td>
</tr>
<tr>
<td>Tobacco</td>
<td>22.3</td>
<td>18.3</td>
<td>14.7</td>
</tr>
</tbody>
</table>
```

(“State of Hawaii Primary Care,” 2016).

**Figure C2:**
Figure C2: Puna Mortality Rates Compared to State and County

<table>
<thead>
<tr>
<th>Category</th>
<th>Puna</th>
<th>Hawaii County</th>
<th>State of Hawaii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>648.5</td>
<td>638.1</td>
<td>592</td>
</tr>
<tr>
<td>Cancer</td>
<td>151.6</td>
<td>148.5</td>
<td>137.5</td>
</tr>
<tr>
<td>Disease of Heart</td>
<td>154.6</td>
<td>157</td>
<td>138.1</td>
</tr>
<tr>
<td>Unintentional Injury</td>
<td>36.8</td>
<td>35.5</td>
<td>29</td>
</tr>
</tbody>
</table>

(“State of Hawaii Primary Care,” 2016).

Figure C3:

Figure C3: Puna Health Characteristics Compared to the State and County

<table>
<thead>
<tr>
<th>Condition</th>
<th>Puna</th>
<th>County of Hawaii</th>
<th>States of Hawaii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco Disorder</td>
<td>22.3</td>
<td>18.3</td>
<td>14.7</td>
</tr>
<tr>
<td>High Blood Pressure</td>
<td>32.8</td>
<td>29.7</td>
<td>29.3</td>
</tr>
<tr>
<td>Obesity</td>
<td>26.3</td>
<td>22.9</td>
<td>22.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10.5</td>
<td>9.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Teen births&lt;18yrs</td>
<td>3</td>
<td>2.7</td>
<td>1.8</td>
</tr>
</tbody>
</table>
INCREASING AWARENESS OF VAPING

(“State of Hawaii Primary Care,” 2016).

**Figure C4:**

![Bar chart showing communities of tobacco abuse](image)

(“State of Hawaii Primary Care,” 2016).
Appendix D

Map of Hawaii County Districts

Figure D1:

Note. Map of Big Island Districts. Puna District (96778, 96749, 96760, 96771); South Hilo District (96720, 96781, 96728); Waimea or South Kohala District (96743).

Reprinted from the Hawaii County Informational GIS Web Application (2020). (https://gis.hawaiicounty.gov/arcgisportal/apps/webappviewer/index.html?id=6d4a0ca08b9744c9a34e0a6ff65b882e). In the Public Domain

Figure D2:
Note. Map of Big Island Districts. Puna District (96778, 96749, 96760, 96771); South Hilo District (96720, 96781, 96728); Waimea or South Kohala District (96743).

Reprinted from the Hawaii County Informational GIS Web Application (2020). (https://gis.hawaiicounty.gov/arcgisportal/apps/webappviewer/index.html?id=6d4a0ca08b9744c9a34e0a6ff65b882e). In the Public Domain.
Appendix E

Hawaii County Council District 4

Figure E1:


Table E2:

Hawaii County Council District: 4 Beginning at the intersection of Hawaii shoreline and Malama-Ki Forest Reserve boundary and running

<table>
<thead>
<tr>
<th>District: 4</th>
<th><strong>Beginning at the intersection of Hawaii shoreline and Malama-Ki Forest Reserve boundary and running</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Northwesterly along said boundary to Leilani Estates CDP boundary</td>
</tr>
<tr>
<td>2</td>
<td>Westerly along said boundary to Pahoa-Kalapana Road</td>
</tr>
<tr>
<td>3</td>
<td>Northerly along said road to Pahoa Village Road</td>
</tr>
<tr>
<td>4</td>
<td>Northwesterly along said road to Keaau-Pahoa Road</td>
</tr>
<tr>
<td>5</td>
<td>Northwesterly along said road to Hawaiian Paradise Park CDP boundary</td>
</tr>
<tr>
<td>6</td>
<td>Northwesterly along said boundary to Pohaku Drive</td>
</tr>
<tr>
<td>7</td>
<td>Northeasterly along said drive to Keaau-Pahoa Road</td>
</tr>
<tr>
<td>8</td>
<td>Northwesterly along said road to Keaau Pahoa Bypass Road</td>
</tr>
<tr>
<td>9</td>
<td>Northwesterly along said road to Keaau CDP boundary</td>
</tr>
<tr>
<td>10</td>
<td>Northeasterly along said boundary to Railroad Avenue</td>
</tr>
<tr>
<td>11</td>
<td>Northwesterly along said avenue to Milo Street</td>
</tr>
<tr>
<td>12</td>
<td>Northeasterly along said street to Keaau Road</td>
</tr>
<tr>
<td>13</td>
<td>Northeasterly along said road to access road</td>
</tr>
<tr>
<td>14</td>
<td>Easterly along said road to access road extension</td>
</tr>
<tr>
<td>15</td>
<td>Easterly along said extension to Hawaii shoreline</td>
</tr>
<tr>
<td>16</td>
<td>Southeasterly along said shoreline to point of beginning</td>
</tr>
</tbody>
</table>


Appendix F

Hawaii County District 5

**Figure F1:**


**Table F2**

Hawaii County Council 5. Beginning at the intersection of Volcano Road and Old Volcano Road and running
### District: 5

**Beginning at the intersection of Volcano Road and Old Volcano Road and running**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Easterly along said road to Cane Road;</td>
</tr>
<tr>
<td>2</td>
<td>Easterly along said road to Cane Road extension;</td>
</tr>
<tr>
<td>3</td>
<td>Northeasterly along said extension to Pahoa Road;</td>
</tr>
<tr>
<td>4</td>
<td>Southeasterly along said road to Keaau-Pahoa Road;</td>
</tr>
<tr>
<td>5</td>
<td>Southeasterly along said road to Keaau Pahoa Bypass Road;</td>
</tr>
<tr>
<td>6</td>
<td>Southeasterly along said road to Keaau-Pahoa Road;</td>
</tr>
<tr>
<td>7</td>
<td>Southeasterly along said road to Pohaku Drive;</td>
</tr>
<tr>
<td>8</td>
<td>Southwesterly along said drive to Hawaiian Paradise Park CDP boundary;</td>
</tr>
<tr>
<td>9</td>
<td>Southeasterly along said boundary to Keaau-Pahoa Road;</td>
</tr>
<tr>
<td>10</td>
<td>Southeasterly along said road to Pahoa Village Road;</td>
</tr>
<tr>
<td>11</td>
<td>Southeasterly along said road to Pahoa-Kalapana Road;</td>
</tr>
<tr>
<td>12</td>
<td>Southerly along said road to Leilani Estates CDP boundary;</td>
</tr>
<tr>
<td>13</td>
<td>Easterly along said boundary to Malama-Ki Forest Reserve boundary;</td>
</tr>
<tr>
<td>14</td>
<td>Southeasterly along said boundary to Hawaii shoreline;</td>
</tr>
<tr>
<td>15</td>
<td>Southwesterly along said shoreline to Hawaii Volcanoes National Park boundary;</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>16</td>
<td>Northwesterly along said boundary to Kahaualea Natural Area Reserve boundary;</td>
</tr>
<tr>
<td>17</td>
<td>Easterly along said boundary to Kahaualea Road;</td>
</tr>
<tr>
<td>18</td>
<td>Northwesterly along said road to Volcano Road;</td>
</tr>
<tr>
<td>19</td>
<td>Northeasterly along said road to Olaa Forest Reserve boundary;</td>
</tr>
<tr>
<td>20</td>
<td>Northwesterly along said boundary to Olaa Rain Forest boundary;</td>
</tr>
<tr>
<td>21</td>
<td>Northwesterly along said boundary to Volcano CDP boundary;</td>
</tr>
<tr>
<td>22</td>
<td>Northwesterly along said boundary to Mountain View CDP boundary;</td>
</tr>
<tr>
<td>23</td>
<td>Northeasterly along said boundary to South Hilo - Puna District boundary;</td>
</tr>
<tr>
<td>24</td>
<td>Northeasterly along said boundary to Stainback Highway;</td>
</tr>
<tr>
<td>25</td>
<td>Northeasterly along said highway to N Kulani Road;</td>
</tr>
<tr>
<td>26</td>
<td>Southeasterly along said road to North Road;</td>
</tr>
<tr>
<td>27</td>
<td>Northeasterly along said road to North Road extension;</td>
</tr>
<tr>
<td>28</td>
<td>Northeasterly along said extension to Volcano Road;</td>
</tr>
<tr>
<td>29</td>
<td>Southerly along said road to point of beginning.</td>
</tr>
</tbody>
</table>

*Note.* Hawaii County Council District 5 written description.


## Appendix G

Resources and Budget Table

### Project Budget

<table>
<thead>
<tr>
<th>Resources</th>
<th>Quantity</th>
<th>Projected Cost</th>
<th>Funding</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Booth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maku‘u Market Booth</td>
<td>4 Sundays</td>
<td>$35x3= $105</td>
<td>1 Free</td>
<td>Educational Booth a month Purchase 3 Market Total=105</td>
</tr>
<tr>
<td>Booth-includes 1 table and 2 chairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra Table</td>
<td>1</td>
<td>Free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Gel</td>
<td>1 -20oz</td>
<td>$6.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-Purpose First Aid Kit</td>
<td>1</td>
<td>$13.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (140 pieces)</td>
<td>2pack</td>
<td>$7.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clorox Disinfecting Wipes</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trash Can</td>
<td>1</td>
<td>$5.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trash Can liners</td>
<td>1 box (25)</td>
<td>$14.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recruitment flyers</td>
<td>200 Black and White (B&amp;W) Print $0.15 x 200=</td>
<td>$30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booth Total</td>
<td></td>
<td>Total $184.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education Materials</strong></td>
<td>Quantity</td>
<td>Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Fold Standup Cardboard Posters</td>
<td>2 x $10.69</td>
<td>$21.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3lb Hang hooks for posters</td>
<td>2- 6 packs $12.49</td>
<td>$24.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 x $12.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fishing line</strong></td>
<td>1-spool 50lb test</td>
<td>$3.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>White Poster board</strong></td>
<td>5 x $2.99</td>
<td>$14.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Assorted Colors Poster Board</strong></td>
<td>5 x $3.99</td>
<td>$19.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poster making kit</strong></td>
<td>1</td>
<td>$18.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poster letter set</strong></td>
<td>1</td>
<td>$6.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Color Printings</strong></td>
<td>30 x $0.74</td>
<td>$22.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction paper</strong></td>
<td>1 pack (150 pieces assorted color)</td>
<td>$11.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Crayons</strong></td>
<td>1-24 Color Pack</td>
<td>$2.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Colored Pencils</strong></td>
<td>1-24 Color Pack</td>
<td>$6.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sharpie Black</strong></td>
<td>1- 4 pack</td>
<td>$8.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Paint with brush</strong></td>
<td>1-8 color set</td>
<td>$4.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glitter</strong></td>
<td>1-6 color pack</td>
<td>$7.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elmer’s Glue Sticks</strong></td>
<td>1-4 pack (0.21 oz)</td>
<td>$5.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scissors Westcott</strong></td>
<td>1</td>
<td>$8.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scotch Tape Heavy Duty</strong></td>
<td>1</td>
<td>$4.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Presentation Booklet 1” binder with 25 clear sleeves</strong></td>
<td>$8.99 + $8.59</td>
<td>$17.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2 Sided Brochure High Gloss Take Home Educational Brochure</strong></td>
<td>$0.71 color page; $0.20 gloss=((0.71 x 2) +20)=$1.62</td>
<td>$324</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Educational Material Total</strong></td>
<td></td>
<td><strong>Total=$534.62</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Survey**

| Pre-Survey                   | 200 x $0.75                                      | $150       |
| Post-Survey                  | 200 x $0.75                                      | $150       |
| **Clipboards**               | 2- Letter Size 3 pack                            | $19.98     |
|                              | 2 x $9.99                                        |            |
### Golf Pencils
- 2 boxes (144 box)
- 2 x $11.69
- **Total: $23.38**

### Ballot Box
- 1
- **Total: $38.99**

### Survey Folder
- 1 1/2" Heavy Duty
- **Total: $8.89**

### Hole Punch
- 1
- **Total: $8.39**

### Survey Material Total
- **Total: $399.63**

### Prizes

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stickers</td>
<td>1 pack (500)</td>
<td>$2.89</td>
<td><strong>Total: $2.89</strong></td>
</tr>
</tbody>
</table>

### Vaping Devices and Products
- Free
- Donated by Hawaii Public Health Institute

### Market
- **$105**

### Gas
- **$80**

### Tax on Resources
- **$53.45**
| Total | $1360.14 | David P. Buck |
Appendix H

Logic Model

**Figure H1:**

<table>
<thead>
<tr>
<th>Target Population</th>
<th>Underlying Assumptions</th>
<th>Resources/Challenges</th>
<th>Activities</th>
<th>Outputs</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who does the program serve?</td>
<td>Theoretical assumptions about how the program will work?</td>
<td>What resources does the program have to achieve the program activities?</td>
<td>Services/Interventions provided to fulfill program goals and assist participants in reaching the outcomes</td>
<td>Products of a program’s activities such as the number of patients treated, the number of services provided, the number of interventions per patient, etc.</td>
<td>Benefits that occur as a result of the activities including short-term, intermediate, and long-term outcomes. Types of outcomes include changes in knowledge, attitude, behavior, and or status.</td>
</tr>
<tr>
<td>Who will benefit from the program?</td>
<td>Assumptions regarding: 1. Participants 2. Staff 3. Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**Figure H2:**

<p>| Target Population | Underlying Assumptions | Resources/Challenges | Activities | Outputs | Outcomes |</p>
<table>
<thead>
<tr>
<th>Adult population of Puna</th>
<th>Multiple child developmental theories stress the impact of adults and role models.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The entire community of Puna will benefit by decreasing the multiple negative consequences associated with e-cig use</td>
<td>Empirical research evidence suggests that parents and families play a very critical role in protecting children from substance abuse.</td>
</tr>
</tbody>
</table>

### Assumptions

- Participant #s will start low and increase then decline due to the regularity of the crowd going to Maku‘u.
- Adult awareness & recognition of adolescent e-cig use
- Adult realization of their impact on developing adolescent health behavior
- Adults negative perception and unacceptance establishes e-cig use as an unsociable behavior
- Adults communicating with children
- Adults enforce and do not let adolescents use e-cigs
- The realization of providing a convenient accessible booth will motivate other entities continuing the health care booth for other conditions
- Decrease the number of

### Combined Community Needs and Pre-

- Combined Post-Assessment and survey.
  - Convenient location (Maku‘u Farmers market)
  - Booth Recruitment flyers
  - Booth Educational resources Posters (Take home Brochures)
  - On-site devices and products (See Appendix J)

### Combined Community Needs and Pre-

- Combined Post-Assessment and survey.
  - Booth Recruitment flyers
  - Educating the Puna community with an e-cig informational booth for adults and parents about the e-cig epidemic and adverse effects with the use of aesthetically appealing educational posters, booklet, and take-home brochures
  - Visual Demonstrations of the variety of devices
  - Booth Posters Brochures are

### 30 Adults 5 Sundays

- Adults have information to converse, communicate and debate with youth the reasons not to use e-cigs b/c the adverse effects
  - Adults initiating and advocating conversation to their children about not using e-cigs
  - Adults advocating and communicating with the DOE for e-cig education and prevention to be implemented in the schools on the Big Island

### Adult awareness & recognition of adolescent e-cig use

- Adult realization of their impact on developing adolescent health behavior

- Adults negative perception and unacceptance establishes e-cig use as an unsociable behavior

- Adults communicating with children

- Adults enforce and do not let adolescents use e-cigs

- The realization of providing a convenient accessible booth will motivate other entities continuing the health care booth for other conditions

- Decrease the number of
INCREASING AWARENESS OF VAPING

<table>
<thead>
<tr>
<th>Adolescents trying E-cigs for 1st time</th>
<th>Visually appealing to draw a crowd</th>
<th>Decreasing the social norm of E-cigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing the # of Adults using E-cigs or Dual use of E-cigs and Conventional Cigarettes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention of nicotine dependency, and future probability of smoking regular cigarettes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention of e-cig use will Reduce the # of chronic conditions in the community associated with tobacco abuse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Description of Logic Model applying to this Project.


**Figure H3:**
Note. Description of Logic Model applying to this Project.

Appendix I
Maku’u Farmers Market Vendor Application

Maku’u Farmers Market
Rules and Regulations

Market Hours: 8am - 2pm

- All vendors will be set up by 7:00am
- No unloading/loading within walkways after 7:30am or before 1:30pm
- No unloading/loading under tents
- Payment of booth is due upon assignment of booth space.
- Stamp cards have no monetary value. It cannot be combined or replaced
- No switching or reassigning of booth spaces between vendors. All changes will be done by MFM management.
- All vending will take place in the space provided. Do not block walkways
- Vendors are responsible for removing your own trash, boxes, etc...
- Food vendors are responsible for removing any cooking oils or food items from premises.
- Vendors are responsible for their own children’s safety. No running or horseplay are allowed near or in vendor areas
- No animals are allowed on premises except service animals with proper documentation
- No vulgar behavior will be tolerated
- The use of drugs and alcohol on premises is prohibited
- The sales of automobiles on premises is prohibited
- We are not responsible for changes in weather conditions.
- Vendors must take precaution in protecting their own products.
- All rented tables and chairs must be returned to MFM trailer By 2:30pm
- All vendors must be off premises by 3:30pm or there will be a $10.00 Late Fee Charge for anyone remaining on premises after 3:30pm. Gates will be locked at 4:00pm
- Food vendors need to provide a current copy of the “Board of Health Permit” to management and need to display it in your booth throughout the day.
- Only authorize vendors are allowed to collect SNAP/EBT cards in exchange for goods. Any unauthorized vendor observed collecting SNAP/EBT cards will not be allowed to participate in future market opportunities.
- Permanent vendors’ payment is due by 9:00am. A $10.00 Late Fee will be collected if payment is not paid on time.
- Permanent vendors need to notify management of upcoming vacations
- Permanent vendors will call 896-5537 to report an absence no later than 6:00am the morning of to receive a credit
- We Reserve The Right To Refuse Service

MFM 3/3/17
Maku‘u Farmers Market Corporation  
15-2131 B Keau Pahoa Hwy.  
Pahoa, Hawaii 96778  
Phone: 896-5537

<table>
<thead>
<tr>
<th>Booth Price Starting May 7, 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>10x10</td>
</tr>
<tr>
<td>Food 1 (Spices, Drinks, Honey, Salsa, Desserts)</td>
</tr>
<tr>
<td>Food 2 (Fruits, Vegetables)</td>
</tr>
<tr>
<td>Food 3 (Bento, Plates)</td>
</tr>
<tr>
<td>Table Rental</td>
</tr>
<tr>
<td>Chair Rental</td>
</tr>
</tbody>
</table>

Booths are awarded on a lottery system. To be eligible for a booth place a picture ID into the lottery slot. Collection will begin at 5:30am. The drawing for booth space will begin at 6:00am. Additional ID’s will be placed into the lottery bag as they arrive.

GATES OPEN @ 5:30AM
OFFICE OPENS @ 6:00AM

MFM 3/3/17
ABSOLUTELY NO

FOOD SALES
MASSAGE THERAPY
BARBERING
ACUPUNCTURE
CHIROPRACTIC

Until proper documentation is collected and Reviewed by Maku'u market staff.

Submit Copies of

✓ Dept. of Commerce State of Hawaii card
✓ Proper License Documentation
✓ Picture Identification
✓ Liability Insurance with Maku'u Farmers Market named as a place of business
✓ Board of Health Permit (Food Vendors)

MFA Reserve exclusive rights to sell bottled or can soda, water and juice.
Maku’u Farmers Market Corporation
15-2131 B Keau Pahoa Highway
Pahoa, Hawaii 96778
Phone: 896-5537

Vendor Application

Print Full Legal Name: DAVID PRICE BUCK Date: 10/6/2019

Address: 328 Lehua St City: HI State: HI Zip: 96720

Home Phone: Cell Phone: (808) 464-9726

READ CAREFULLY
Give a brief description of all items that will be sold in your designated booth at the Maku’u Farmers Market. Only the items listed below will be allowed to be sold in your booth. If you want to expand or change your item list, re-submit another application.

Educational Booth

Disclaimer Liability

I, David P. Buck, acknowledge sole responsibility for any mishaps directly or indirectly arising from my use of the Maku’u Farmers Market Co. facilities and grounds during my sales event. I acknowledge that I have read and agree to comply with the terms and regulations of the Maku’u Farmers Association/Market. I understand that Maku’u Farmers Market Co. have the right to refuse service to anyone who does not comply with the rules and regulations of the Maku’u Farmers Market.

Print Name: DAVID P. BUCK Signature: David P. Buck

Date: 

MFM USE: 

Received by: Date Received:

MFM 3/3/17
Appendix J

Recruitment Flyer to Participate in Practice Inquiry Project

Be a part of a University of Hawaii at Hilo, School of Nursing Doctoral Student Project aimed at increasing knowledge amongst Puna adults, parents & caregivers about vaping & e-cig use amongst Puna youth.

❖ Are you 18 years or older?
❖ Would you like to know more about electronic cigarettes (e-cigs) & vaping amongst our youth?
❖ Have you ever looked for information about vaping or e-cigs?

❖ If the answer is Yes………

David Buck, registered nurse, would like to invite you to participate in a doctor of nursing practice student project.

❖ Come into the Vaping Awareness booth located here at the Maku‘u Farmers Market today & discuss information & ask questions about Vaping.

❖ You must be 18 years or older to participate. You can leave whenever you want!

The purpose of my project is to evaluate the effectiveness of providing adults in the Puna population with information related to vaping & e-cigs at a convenient location.

❖ The project will address & answer the following topics & questions:
  ● Is vaping better or worse than smoking cigarettes?
  ● Is vaping helpful for quitting smoking?
  ● Device recognition & e-cig products on hand to see.
  ● How youth purchase e-cig devices & products.
  ● School involvement in vaping & e-cig education.
  ● Impact of vaping & e-cigs in society.
  ● National & state vaping & e-cig statistics.
  ● Where to look for vaping or e-cig information.

● The goal of this project is to determine how much you already know about vaping or e-cig use before you enter the booth & compare what you learned about vaping after spending 5-20 minutes in the booth. Total Participation should take 15-50 minutes.

● You will be asked to take two surveys, one before entering the booth then one after you have been in the booth. Each survey will take about 5 to 10 minutes.

● We would like to answer any questions & inform the adult population of Puna, especially those with children, about current vaping & e-cig use in the community.

● We would like to provide website or agency vaping or e-cig resources.

David Buck, DNP Student UH Hilo. Doctorate of Nurse Practitioner Student University of Hawaii at Hilo buckd@hawaii.edu.
IRB Approval Date January 14, 2020
Appendix K

Practice Inquiry Project Combined Community and Pre-Test Assessment and Survey

Community Needs & Pre-Assessment

❖ E-cigarettes are a battery powered device with a heating element that produce an aerosol by heating a liquid into an aerosol the user inhales into their lungs.

❖ Youth are defined as anyone less than 18 years old.

1. What is your age? Please circle: (18-24) (25-30) (30-40) (40-50) (50+)
2. Do you live in the State of Hawaii? Yes No
3. Do you live on the Big Island? Yes No
   a. What is your Big Island zip code? ____________________________
4. Are you a parent, caregiver, grandparent, teacher or advisor such as a counselor, mentor, etc., or do you live with someone less than 18 years old? Yes No
   a. If YES; Please circle your level of concern regarding e-cig use amongst youth
      (Not Concerned) (Slightly Concerned) (Moderately Concerned) (Extremely Concerned)
5. Do you believe that youth e-cigarette (e-cig) use is a health concern? Yes No
   a. If YES; Please circle your level of concern regarding e-cig use amongst youth
5. Do you approve of youth smoking e-cigs? Yes No
6. Have you ever advised someone less than 18 years old not to use e-cigs? Yes No
   a. If you answered YES, please list reasons why

8. Have you ever looked for information about e-cigs? Yes No
   a. If you answered YES, please circle all ways you have tried to find e-cig information.
      (Doctor or Provider’s Office) (Pediatrician’s Office) (Nurse) (Friend)
      (Teacher) (Newspaper) (TV) (TV News) (Internet) (Government Websites)
      (Social Media) (Facebook) (Instagram) (Twitter) (E-cig Advertisements)
      Other ____________________________
9. If you used the internet, please list any websites used to search for e-cig information
10. Please list ways you search for other health related information.

____________________________________________________________________

11. Have you ever asked a school to discuss e-cig use with students?  Yes  No

12. If you answered YES, what was the school’s response?  _____________________________

13. Do you think a farmer’s market would be a convenient place to receive information on e-cigs or other health issues and concerns?  Yes  No

**Pre-Assessment**

14. E-cig use is increasing among youth.
   True  False

15. Compared to U.S. National averages, State of Hawaii youth e-cig use is?
   Lower  Same  Higher  Not Sure

16. Compared to the State of Hawaii, youth e-cig use on the Big Island is?
   Lower  Same  Higher  Not Sure

17. Please write what % of Big Island High-school seniors use e-cigs.  __________ %
   (examples: 1%, 4%, 12% 15% 50% 75%, 100%)

18. Please write what % of Big Island middle school students use e-cigs.  __________ %
   (examples: 1%, 4%, 12% 15% 50% 75%, 100%)

19. The majority of e-cigs contain nicotine.
   True  False  Not Sure

20. Are there any adverse health effects of e-cig use?  Yes  No  Not Sure

21. If you answered YES, list one adverse health effect you believe is associated with e-cigs:
    ______________________________________

22. Please list any other adverse effects that you believe are associated with e-cigs:
    ______________________________________

23. Adults and parents have an impact on youth e-cig use?  Yes  No  Not Sure

24. Do e-cigs contribute to nicotine dependency?  Yes  No  Not Sure

25. Do e-cigs increase the likelihood of smoking regular cigarettes?  Yes  No  Not sure

26. What do you think is the most popular e-cig brand?  _____________________________

27. The most popular e-cig’s nicotine content compared to other e-cigs is:
   (Zero Nicotine)  (More Nicotine)  (Same Amount)  (Less Nicotine)  (Not Sure)

28. Please circle how schools on the Big Island educate youth about e-cigs?
29. Is there Federal or State Funding for e-cig prevention in Hawaii?  Yes  No  Not Sure

1. Thank you for your participation,

    David P. Buck, DNP Student University of Hawaii at Hilo
Appendix L

Post-Assessment

1. Do you believe that youth e-cigarette (e-cig) use is a health concern?  Yes  No
   a. If YES; Please circle your level of concern regarding e-cig use amongst youth
      (Not Concerned)  (Slightly Concerned)  (Moderately Concerned)  (Extremely Concerned)

2. Do you approve of youth smoking e-cigs?  Yes  No

3. Please circle the **LEAST** reliable e-cig informational sources to obtain information.
   (Doctor or Provider’s Office)  (Pediatrician’s Office)  (Nurse)  (Friend)
   (Teacher)  (Newspaper)  (TV)  (TV News)  (Internet)  (Government Websites)
   (Social Media)  (Facebook)  (Instagram)  (Twitter)  (E-cig Advertisements)

4. E-cig use is increasing among youth.
   True  False

5. Compared to U.S. National averages, State of Hawaii youth e-cig use is?
   Lower  Same  Higher  Not Sure

6. Compared to the State of Hawaii, youth e-cig use on the Big Island is?
   Lower  Same  Higher  Not Sure

7. Please write what % of Big Island High-school seniors use e-cigs. ______%  (examples: 1%, 4%, 12% 15% 50% 75%, 100%)

8. Please write what % of Big Island middle-school students use e-cigs. ______%  (examples: 1%, 4%, 12% 15% 50% 75%, 100%)

9. The majority of e-cigs contain nicotine.
   True  False  Not Sure

10. Are there any adverse health effects of e-cig use?  Yes  No  Not Sure

11. Please list any other adverse affects you can think of that are associated with e-cigs:
    ____________________________________________________________________

12. Adults and parents have an impact on youth e-cig use?  Yes  No  Not Sure

13. Do e-cigs contribute to nicotine dependency?  Yes  No  Not Sure

14. Do e-cigs increase the likelihood of smoking regular cigarettes?  Yes  No  Not sure

15. What do you think is the most popular e-cig brand?  _______________________

16. The most popular e-cig’s nicotine content compared to other e-cigs is:
   (Zero Nicotine)  (More Nicotine)  (Same Amount)  (Less Nicotine)  (Not Sure)
17. Please circle how schools on the Big Island educate youth about e-cigs?

(Assemblies) (Health Class) (Coordinated Efforts with Tobacco Coalition Groups)
(Mandatory E-cig Education from Department of Education) (E-cig Trained Educators)
(Nothing) (Not Sure) Other: __________________________

18. Is there Federal or State Funding for e-cig prevention in Hawaii?  Yes  No  Not Sure

Post-Survey

19. Please circle how your perception of youth e-cig use changed after attending this e-cig educational booth?

(No Change) (Slight Change) (Moderate Change) (Extreme Change)

20. After attending this e-cig educational booth, are you more likely to share your knowledge and try to influence youth not to use e-cigs?  Yes  No

21. Are you more likely to ask the Department of Education or local schools what they are doing in schools to educate and prevent youth from using e-cigs?  Yes  No

22. Can you list any websites to search for reliable e-cig information?

____________________________________________________________________

23. Please list how you will look for e-cig or other health information? _____________________

___________________________________________________________________________

24. Please check the appropriate box regarding how beneficial you think this e-cig informational booth was in helping you to learn about the adverse effects of youth e-cig use.

<table>
<thead>
<tr>
<th>Very Strong</th>
<th>Strong</th>
<th>Neutral</th>
<th>Weak</th>
<th>Very Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

25. Would you attend other health related educational booths located at convenient locations like a farmer’s market?  Yes  No  Maybe

26. What other locations would you recommend as being a convenient location for a community health information booth? __________________________

27. Please add any other comments you wish to share: ________________________________

❖ Thank you for your participation,

David P. Buck, DNP Student University of Hawaii at Hilo
Appendix M

Consent to Participate in Practice Inquiry Project

University of Hawai’i
Consent to Participate in a Doctor of Nursing Practice Project
Increasing Adult Awareness and Recognition of Hawai’i Youth Vaping

Aloha! My name is David Buck. I am Doctor of Nursing Practice student at the University of Hawai’i at Hilo (UHH), School of Nursing. As part of the requirements for earning my doctoral degree, I am doing a Practice Inquiry Project.

**What am I being asked to do?** If you participate in this project, you will be asked to visit the Vaping Booth in the farmer’s market & fill out a survey before & after visiting the booth.

**Taking part in this project is your choice.** Your participation is completely voluntary. You may stop participating at any time & there will be no penalty or loss to you.

**Why is this project being done?** The purpose of my project is to evaluate effects of providing adults in the Puna population with vaping & e-cig information at a convenient location. I am asking you to participate because you are an adult who is attending the Maku’u Farmer’s Market.

**What will happen if I decide to take part in this project?** The Vaping Booth will provide information related to vaping & e-cig use, specifically related to Hawai’i & our youth. A pre & post survey will be given before & after receiving the information. The surveys will take about 5 to 10 minutes, & the interaction in the booth will take about 5-20 minutes. Total interaction 15-50 minutes with surveys and booth discussion.

**What are the risks and benefits of taking part in this project?** I believe there is little risk to you for participating. At any time, you can stop taking the survey or you can leave the booth & withdraw from the project altogether. The direct benefit to you for participating may include increased knowledge related to vaping & e-cig use. The results of this project could contribute to improving overall health in the Puna community.

**Privacy and Confidentiality:** I will not ask you for any personal identifiable information, such as your name or address. Please do not include any personal information in your survey responses. I will keep all survey responses secure in a locked box & filing cabinet. Only my UH advisor & I will have access to the information. Other agencies that have legal permission have the right to review my project records including the UH Human Studies Program.

**Questions:** If you have any questions about this project, please call or email me at (808) 932-7067 & buckd@hawaii.edu. You may also contact my faculty advisor, Dr. Patricia Hensley, at (808) 932-7067 & hensleyp@hawaii.edu. You may contact the UH Human Studies Program at (808) 956-5007 or uhirb@hawaii.edu to discuss problems, concerns & questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific project. Please visit http://go.hawaii.edu/jRd for more information on your rights as a participant.
Filling out the survey will be considered your consent to participate in this project. Please keep a copy of the consent form for your records. Mahalo! (Thank You!)

IRB Approval Date January 14, 2020

**Figure M1:**

*Note.* PIP Project E-cig Health Literacy Booth at the Maku’u Farmers Market, Ballot Box, Tri-fold Posters, Brochures, Pre- and Post-Assessment, Consent Form, and Device Display Case.
INCREASING AWARENESS OF VAPEUNG

Appendix N

University of Hawaii IRB Approval

DATE: January 14, 2020
TO: Hensley, Patriona, DNP, APRN, FNP-BC, University of Hawaii at Hilo, School of Nursing
D’Haem, Rebecca, Masters Education, University of Hawaii at Hilo, School of Nursing,
Buck, David, Doctor of Nursing Practice, University of Hawaii at Hilo, School of Nursing
FROM: Rivera, Victoria, Dir, Ofc of Rsch Compliance, Social&Behav Exempt
PROTOCOL TITLE: Increasing Adult Awareness of Hawai‘i Youth Vaping Epidemic
FUNDING SOURCE: 
PROTOCOL NUMBER: 2019-01077
APPROVAL DATE: January 14, 2020

NOTICE OF APPROVAL FOR HUMAN RESEARCH

This letter is your record of the Human Studies Program approval of this study as exempt.

On January 14, 2020, the University of Hawaii (UH) Human Studies Program approved this study as exempt from federal regulations pertaining to the protection of human research participants. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CFR 46.101(b). 3.

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at the CHRP Website www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

Exempt studies do not require regular continuing review by the Human Studies Program. However, if you propose to modify your study, you must receive approval from the Human Studies Program prior to implementing any changes. You can submit your proposed changes via the UH eProtocol application. The Human Studies Program may review the exempt status at that time and request an application for approval as non-exempt research.

In order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of individuals as soon as it is reasonable to do so. Signed consent forms, as applicable to your study, should be maintained for at least the duration of your project.

This approval does not expire. However, please notify the Human Studies Program when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the Human Studies Program by phone at 956-5027 or email uhirb@hawaii.edu. We wish you success in carrying out your research project.
## Appendix O

### Project Timeline Table

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Submit proposal to SRC</td>
<td></td>
<td></td>
<td></td>
<td>6/1</td>
<td>12/5</td>
<td>12/20</td>
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Appendix P

Pre-Assessment Question 7a. (“If you answered YES, please list reasons why.”).

Listed Responses were categorized into common themes of 1) Lung Concerns, 2) Health Concerns, 3) Addiction, 4) Heart, 5) Financial, and 6) Other.

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<th>Qualitative Responses</th>
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<tbody>
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<tr>
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<td>“Unhealthy”</td>
</tr>
<tr>
<td>3</td>
<td>“Cancer”</td>
</tr>
<tr>
<td>4</td>
<td>“not good for health or lungs”</td>
</tr>
<tr>
<td>5</td>
<td>“your damaging your body”</td>
</tr>
<tr>
<td>6</td>
<td>“For my granddaughter’s health”</td>
</tr>
<tr>
<td>7</td>
<td>“Addicting habits are hard to quit”</td>
</tr>
<tr>
<td>8</td>
<td>“Lung Disease”</td>
</tr>
<tr>
<td>9</td>
<td>“Bad for health and lungs”</td>
</tr>
<tr>
<td>10</td>
<td>“Popcorn Lung!!!!”</td>
</tr>
<tr>
<td>11</td>
<td>“Extreme danger to health”</td>
</tr>
<tr>
<td>12</td>
<td>“Dangers to health and well-being”</td>
</tr>
<tr>
<td>13</td>
<td>“Because I am a friend”</td>
</tr>
<tr>
<td>14</td>
<td>“Bad for your health, addicting, expensive”</td>
</tr>
<tr>
<td>15</td>
<td>“Because it has detrimental health affects”</td>
</tr>
<tr>
<td>16</td>
<td>“Dangers and increased rates of lung cancer”</td>
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</table>
Note. Participants listed responses to PreQ7a (“If you answered YES, please list reasons why”).
Comments were categorized into common themes of 1) Lung Concerns, 2) Health Concerns, 3) Addiction, 4) Heart, 5) Financial, and 6) Other.
Appendix Q

Individual responses to Pre-assessment Question 9: “If you used the internet, please list any websites used to search for e-cig information”

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<tr>
<td>2.</td>
<td>“Medscape, Medical Journals see above (Newspapers, TV News, Internet).”</td>
</tr>
<tr>
<td>3.</td>
<td>“YouTube, Stanford university”</td>
</tr>
<tr>
<td>4.</td>
<td>“Google, not on social media”</td>
</tr>
<tr>
<td>5.</td>
<td>“CNN.org/gov”</td>
</tr>
<tr>
<td>6.</td>
<td>“?? E-cig studies”</td>
</tr>
<tr>
<td>7.</td>
<td>“Netflix”</td>
</tr>
<tr>
<td>8.</td>
<td>“Google in general, or YouTube videos”</td>
</tr>
<tr>
<td>9.</td>
<td>“Google”</td>
</tr>
<tr>
<td>10.</td>
<td>“I don’t remember”</td>
</tr>
<tr>
<td>11.</td>
<td>“CDC.gov, NYTimes, Oregon state legislature”</td>
</tr>
</tbody>
</table>

*Note.* Individual qualitative replies to Pre-assessment Question 9 (“If you used the internet, please list any websites used to search for e-cig information”)
Appendix R

Individual responses to Pre-Assessment Question 10: “Please list ways you search for other health related information”

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</tr>
<tr>
<td>2</td>
<td>“Google”</td>
</tr>
<tr>
<td>3</td>
<td>“Online”</td>
</tr>
<tr>
<td>4</td>
<td>“Medscape, Medical Journals see above (Newspapers, TV News, Internet).”</td>
</tr>
<tr>
<td>5</td>
<td>“Radio, Friends”</td>
</tr>
<tr>
<td>6</td>
<td>“Web”</td>
</tr>
<tr>
<td>7</td>
<td>“Internet”</td>
</tr>
<tr>
<td>8</td>
<td>“Internet, Facebook, WebMD”</td>
</tr>
<tr>
<td>9</td>
<td>“Library”</td>
</tr>
<tr>
<td>10</td>
<td>“Internet”</td>
</tr>
<tr>
<td>11</td>
<td>“I am a retired paramedic and health information comes to me”</td>
</tr>
<tr>
<td>12</td>
<td>“Health Professionals, coworkers, school counselors”</td>
</tr>
<tr>
<td>13</td>
<td>“Word of mouth, doctors”</td>
</tr>
<tr>
<td>14</td>
<td>“Doctor”</td>
</tr>
<tr>
<td>15</td>
<td>“Internet, google, friends”</td>
</tr>
<tr>
<td>16</td>
<td>“CDC”</td>
</tr>
<tr>
<td>17</td>
<td>“Computer, Dr. Office”</td>
</tr>
<tr>
<td>18</td>
<td>“Doctors”</td>
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<tr>
<td>19</td>
<td>“Internet, academic journals, libraries”</td>
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</table>
“Studies comparing e-cigs and cigarettes/tobacco”

Note. Individual qualitative responses to Pre-Assessment Question 10: “Please list ways you search for other health related information.”
Appendix S

Individual responses Pre assessment Question 21: “If you answered YES, list one adverse health effect you believe is associated with e-cigs”

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<td>3</td>
<td>“Vape Lung”</td>
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<tr>
<td>4</td>
<td>“Lung Health”</td>
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<tr>
<td>5</td>
<td>“Lung Disease”</td>
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<td>6</td>
<td>“Mental and physical health”</td>
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<td>“Popcorn Lung”</td>
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<tr>
<td>8</td>
<td>“Addiction”</td>
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<tr>
<td>9</td>
<td>“Addicted to nicotine”</td>
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<td>12</td>
<td>“Addictive, hurts lungs”</td>
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<td>“Popcorn Lung”</td>
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<td>14</td>
<td>“General health”</td>
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<td>“Lung Failure”</td>
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<td>17</td>
<td>“Popcorn Lung, Cancer”</td>
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<td>“Bubble Lung”</td>
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<td>19</td>
<td>“Breathing”</td>
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Note. Individual qualitative response to Pre assessment Question 21: If you answered YES, list one adverse health effect you believe is associated with e-cigs:
Appendix T

Individual responses to Pre-assessment Question 22: “Please list any other adverse effects that you believe are associated with e-cigs”

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<td>9</td>
<td>“Cancer, Immune system damage”</td>
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20 | “Cancer”

*Note.* Individual qualitative response to Pre-assessment Question 22: Please list any other adverse effects that you believe are associated with e-cigs:
Appendix U

Individual responses to Post Assessment Question 11: “Please list any other adverse affects you can think of that are associated with e-cigs”

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<td>“Affects brain developments negatively”</td>
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<td><strong>22</strong></td>
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<td>“Popcorn lung, EVALI, nicotine dependency”</td>
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<td><strong>24</strong></td>
<td>“Nicotine Addiction, Myocardial Infarction”</td>
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<td><strong>26</strong></td>
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*Note. Individual qualitative responses Post Assessment Question 11: Please list any other adverse effects you can think of that are associated with e-cigs:*
Appendix V

Individual Responses to Post-Assessment Question 22: “Can you list any websites to search for reliable e-cig information?”

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<td>“WebMD, Medscape”</td>
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<td>“CDC”</td>
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<td>“DOH, Government websites”</td>
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<td>“Tobacco free Hawaii coalition, 808NoVape”</td>
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<td>“HIPHI, Bay Clinic”</td>
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<td>19</td>
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</table>
Note. Individual qualitative responses to Post-Assessment Question 22: Can you list any websites to search for reliable e-cig information?
Appendix W

Individual Responses to Post Assessment Question 23: “Please list how you will look for e-cig or other health information?”

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<td>“CDC, other government websites”</td>
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<td>“Government websites”</td>
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<td>“Informational websites”</td>
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<tr>
<td>14</td>
<td>“CDC website”</td>
</tr>
<tr>
<td>15</td>
<td>“Internet, but not social media”</td>
</tr>
<tr>
<td>16</td>
<td>“Computer and government websites”</td>
</tr>
<tr>
<td>17</td>
<td>“Doctors office, Government websites”</td>
</tr>
<tr>
<td>18</td>
<td>“Governmental agencies, doctors office”</td>
</tr>
</tbody>
</table>
19 “use government websites and pro-science health websites”

20 “DOH, Government websites”

*Note.* Individual qualitative responses to Post-Assessment Question 23: Please list how you will look for e-cig or other health information?
Appendix X

Individual Responses to Post Assessment Question 26: “What other locations would you recommend as being a convenient location for a community health information booth?”

<table>
<thead>
<tr>
<th>#</th>
<th>Qualitative Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“Parents night at school”</td>
</tr>
<tr>
<td>2</td>
<td>“Kalapana, Hilo Mall”</td>
</tr>
<tr>
<td>3</td>
<td>“All Markets, Schools”</td>
</tr>
<tr>
<td>4</td>
<td>“Ball parks, high school football and basketball games”</td>
</tr>
<tr>
<td>5</td>
<td>“Schools libraries, markets, sports facilities”</td>
</tr>
<tr>
<td>6</td>
<td>“Public events; Merrie Monarch”</td>
</tr>
<tr>
<td>7</td>
<td>“Mall”</td>
</tr>
<tr>
<td>8</td>
<td>“Schools Assemblies”</td>
</tr>
<tr>
<td>9</td>
<td>“County fairs, Farmers market, festivals”</td>
</tr>
<tr>
<td>10</td>
<td>“Malls”</td>
</tr>
<tr>
<td>11</td>
<td>“High Schools”</td>
</tr>
<tr>
<td>12</td>
<td>“Any place, any opportunity is helpful”</td>
</tr>
<tr>
<td>13</td>
<td>“Malls, Fairs”</td>
</tr>
<tr>
<td>14</td>
<td>“Parks, malls”</td>
</tr>
<tr>
<td>15</td>
<td>“Hilo market, kona market”</td>
</tr>
<tr>
<td>16</td>
<td>“Community Centers”</td>
</tr>
<tr>
<td>17</td>
<td>“Anywhere is”</td>
</tr>
<tr>
<td>18</td>
<td>“Hilo Farmers market”</td>
</tr>
<tr>
<td>19</td>
<td>“Community park”</td>
</tr>
<tr>
<td>20</td>
<td>“Assemblies”</td>
</tr>
<tr>
<td>----</td>
<td>-------------</td>
</tr>
<tr>
<td>21</td>
<td>“Walmart, longs Drugs, Foodmart, KTA”</td>
</tr>
<tr>
<td>22</td>
<td>“Grocery store, Mall”</td>
</tr>
<tr>
<td>23</td>
<td>“Big Island events”</td>
</tr>
<tr>
<td>24</td>
<td>“On campuses”</td>
</tr>
<tr>
<td>25</td>
<td>“College campus, school assemblies, strip malls, shopping centers”</td>
</tr>
</tbody>
</table>

Note. Individual qualitative responses to Post Assessment Question 26: What other locations would you recommend as being a convenient location for a community health information booth?