

A Descriptive Study of the Online Kratom Market, an Opioid Alternative

by

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Abstract [243 words]

Objective: Examine the online industry for kratom (*Mitragyna speciosa*), a plant-based substance used by Americans as an opioid alternative, and provide context to the market amidst regulatory attempts by the Food and Drug Administration and numerous state legislatures.

Methods: Using search results collected from the three most widely used search engines, 663 websites were identified selling kratom products to US consumers. The top 100 most visited online vendors were selected and the content of their website and social media profiles were coded for topics including location, payment and shipping options, age verification, health warnings and disclaimers, grassroots advocacy regarding upcoming state and federal regulations, and response to the recent kratom-linked *Salmonella* outbreak.

Results:

25% of vendors made claims that kratom provided relief from opioid withdrawal. 81% of vendors featured a disclaimer that kratom is addictive, with 54% stating that the product is not FDA approved. Only 5% of vendors utilized effective age verification through confirming age on delivery or use of a third party online database. Enforcement of state and locality bans on the vendor's part varied by location; 65% vendors did not sell to Indiana whereas only 27% prohibited sales to Rhode Island.

Conclusions: The kratom internet vendor industry (KIV) was found to have low adherence to US state-level restrictions on the products' purchase. There is a high prevalence of health claims featured on vendor webpages that are discouraged by the Food and Drug Administration.

Keywords: kratom, internet sales, opioid, Food and Drug Administration, age verification

Introduction

The United States is currently undergoing an opioid epidemic and is facing an increasing number of deaths attributed to prescription and illicit opioids. 33,000 people died from an opioid overdose in 2015; the rate of opioid overdoses has tripled since 2000.¹ Only 10 percent of people with a substance use disorder get treatment for it in any given year.² Given the lack of appropriate funding and limited access to conventional treatment, some individuals with substance abuse problems have turned to alternative treatments.

One such treatment is the use of kratom, which consists of the leaves of *Mitragyna speciosa*, a Southeast Asian tree. The natural substance, usually consumed as a tea, powder, or capsule, contains the active alkaloids of mitragynine and 7-hydroxymitragynine, which activates opioid receptors in the brain and reduces pain.³ Low doses of kratom have a stimulating effect, whereas moderate to high doses have a sedative, euphoric effect.^{4,5} Studies indicate that a large proportion of individuals who use kratom do so for the self-treatment of pain, mood disorders, alcohol addiction and/or withdrawal symptoms associated with prescription opioid and heroin use.⁶ However, kratom itself can be addictive and has associated withdrawal symptoms such as nausea, vomiting, diarrhea, and constipation.⁷

The consumption of kratom in the United States has seen steady growth in the past decade, fueled by its widespread availability via the Internet, head shops, smoke shops, convenience stores, and tea houses.^{6,8-11} An estimated 3 to 5 million Americans have consumed kratom.¹² However, kratom is not approved in the U.S. for any medical use. The Drug

Enforcement Agency has kratom listed as a Drug and Chemical of Concern (substances that are not currently regulated by the Controlled Substances Act, but that pose risks to persons who abuse them) and has made attempts to regulate it as a Schedule I drug. On November 14, 2017, the FDA issued a public health advisory related to mounting concerns regarding risks associated with the use of kratom, citing “reports of 36 deaths associated with the use of kratom-containing products”.¹¹ Separately, a *Salmonella* outbreak related to several kratom products led the FDA to request a recall of affected products.¹³ The sale and possession of kratom is currently prohibited in Alabama, Arkansas, Indiana, Tennessee, Vermont, and Wisconsin, as well as locales including San Diego, California; Sarasota County, Florida; Jerseyville, Illinois; Denver, Colorado; Broward, Florida; District of Columbia; Oceanside, California; and Union County, Mississippi.¹⁴ In response to the proliferation of state-level bans on the use of kratom, two organizations, the American Kratom Association (AKA) and Botanical Educational Alliance (BEA), exist to represent the interests of consumers and suppliers of the substance. A survey of business owners conducted by the Botanical Educational Alliance estimates that 2,426 people are employed by the (\$1.2 to \$5 billion) kratom industry.¹²

The aim of this study is to identify and describe the characteristics of the population of kratom internet vendors (KIV), merchants who sell kratom products to the US market via the Internet. The results of this study are intended to identify areas for further research as well as help inform policy makers in the regulation of this substance.

Methodology

Data collection

The population of Internet-based kratom vendors was assessed using a collection of online Internet search tools. Studies show that the primary source of initial Kratom information is through internet searches.⁶ This study implemented similar research methodology as the Internet Tobacco Vendor Study, which has been conducting surveillance of the online tobacco industry since 1999.¹⁵⁻¹⁷ A collection of kratom-related keywords were harvested using Alexa Internet Inc's web traffic tool.¹⁸ These keywords (783 total) were inputted into the search engines of Google, Yahoo, and Bing using Scrapebox software, and the top 1,000 results for each keyword were harvested.¹⁹ The justification for using these three search engines is that they hold 99% of market shares in the United States search engine market; an individual interested in the purchase of kratom over the Internet is likely to go through one of the search engines.²⁰ This process yielded 25,810 potential domains that were automatically screened for kratom-related content using the webpage's metadata (webpage title, description, and keywords). After removing duplicates and visiting websites to apply exclusion criteria, removing websites that were not available in English or did not sell kratom, these domains were visited by a research coder who confirmed that kratom products were available for purchase on the website. Websites that did not allow actual purchase of kratom were not included in the sample. In addition, websites that exclusively sell kratom for wholesale were not included. This process yielded a population of N=663 kratom vendor websites that marked positive for these keywords.

Sampling

From this sample of 663 confirmed kratom vendors, we used three online traffic ranking systems in order to rank vendor popularity to compile a list of the 100 most popular KIVs that were used for content analysis. This included Alexa global rank, SimilarWeb global rank, and SEMrush internet traffic rank, which rank the popularity of websites in comparison to all other websites on the Internet. We standardized each of these rankings from 1-100 (to indicate their popularity among the pool of total kratom vendors) and took an average of the three ranks to formulate a master rank. Any websites that did not have a ranking for one or more of the three systems were void from the master ranking.

Content analysis

Once this process provided a list of the 100 most relevant KIVs, sites were archived using the Wayback Machine, an open source page archiver, to ensure that the site information was preserved in case a KIV was taken offline or was revised. All content analysis data was collected from written material on the website, vendors' social media platforms and simulated checkout process; no actual purchase of products was made. After these webpages were archived, double-coded content analysis was initiated: two researchers coded the same website's snapshot independently, describing vendor characteristics including location, operation of a physical storefront, delivery service, pricing and payment options, types of products sold, featured health claims/disclaimers, and age verification (see Table 1 and 2). The two sets of data were compared and discrepancies were revisited so that a consensus on the

vendor information was reached. Following this, a descriptive analysis was conducted using STATA 13.

Vendor location

The vendor location was determined during the screening process. Most of the kratom websites posted their location in the “Contact Us” or “About Us” pages. For certain websites, it was necessary to explore their social media pages, Terms and Conditions, and Return Policies in order to identify a location. For the KIVs that had multiple locations for offices and warehouses, the location of the headquarters took precedent. KIVs were also screened for a physical storefront and retail locations.

Products sold

The various products sold on the KIVs were examined by viewing the vendor's inventory and categorizing the kratom items as powder, capsules, tinctures, live plants, and resin. Non-kratom items sold alongside kratom were also noted, categorized as Cannabidiol (CBD), Salvia, tobacco products, nicotine vaping products, and/or other psychoactive products such as Blue Lotus, Kanna, and Akuamma. The cheapest price for a kratom-related product on the site (In US dollars) and the size of the cheapest product (in grams of kratom powder) was tracked across all sites.

Activism

We analyzed the extent of a vendors’ political action concerning the legality of kratom by capturing the detailed notices of activism on both the vendor sites and their linked social

media profiles. Specifically, we screened the websites for a presence on Facebook, Twitter, Instagram, Reddit, Tumblr, LinkedIn, Pinterest, Google Plus, MySpace, Fancy, Vimeo, and YouTube. The American Kratom Association and the Botanical Educational Alliance work to rally Kratom users to sign petitions, call politicians, and advocate for the continued legality of the substance; references to these organizations by a KIV were noted.

Health Claims and Disclaimers

The Food and Drug Administration has expressed particular concern over the use of kratom in treating opioid withdrawal symptoms and has not seen sufficient evidence supporting the medicinal properties of the substance.¹¹ For this reason, we analyzed the health claims featured on a vendor's website and linked social media pages, specifically looking for claims that kratom is useful in opioid withdrawal relief, chronic pain, mental health aid, and alcohol addiction relief, as well as any other health claims made. Additionally, disclaimers on the website were tracked, often found in the Terms and Conditions of a vendor's website. Disclaimers tracked included that kratom is not FDA approved, is meant to be used for research use only, and that it is not intended for human consumption.

Payment and Shipping

Payments options offered by each website were tracked, including credit cards, e-checks, bank transfers, PayPal, collect on delivery, money orders, and cryptocurrencies. The increased use of crypto currencies offers an opportunity to explore the use of anonymous online payment options in purchasing illicit/unregulated goods. Similarly, the methods of shipping (e.g., USPS/UPS/FedEx, DHL) were collected.

Response to *Salmonella* Outbreak

During the content coding stage of the study (February/March of 2018), a kratom-related outbreak of *Salmonella* occurred. According to the CDC, 132 people were infected over 38 states, resulting in a number of recalls.¹³ Interested in the industry's reaction, we collected responses from all sampled vendors, noting if they mentioned the outbreak, and their various responses such as featuring lab results of products tested for *Salmonella*, a recall of kratom products, or closure of the online store.

Age Verification

In order to assess the extent to which vendors used (effective or ineffective) techniques to prevent sales to minors, we tracked the use of age verification methods, including the following: conditions in terms of service claiming that submitting an order on the website implies legal age, an age gate at the entrance of the webpage, required upload of drivers' license/ photo identification, required signature at delivery, or the use of a public database or third-party vendor to verify age. For the purpose of this study, we deemed the practices of required signature at delivery and the use of a third-party services to be effective age verification techniques.

Results

The overwhelming majority (84%) of the 100 most popular KIVs were based in the United States, with California, Florida, and Texas having the largest numbers of vendors. Thirteen vendors also sold goods at a physical store. There was a wide gap in the enforcement of rules prohibiting the sale and shipment of kratom to specific locales; consumers in the state

of Indiana were blocked by 65% of the sampled vendors whereas only 27% of sampled vendors prohibited orders from Rhode Island.

Vendor Information

Table 1 describes the various kratom-related products that are sold among all the sites; the most common product was powder with 92% of vendors offering this good. Only 1% of sites sold tobacco products. Eighteen percent of vendors featured CBD and related marijuana products. The average price of the cheapest kratom product available was \$15.35 with a standard deviation of \$1.95. Approximately 80% of vendors offered an ounce (28g) or less as their smallest unit available for sale.

Activism

Concerning activism among the kratom sites, 19% of kratom vendors linked to or featured the American Kratom Association and 16% to the Botanical Educational Alliance. Activism was displayed by way of their website or social media accounts such as Facebook, Twitter, and Instagram. Facebook was the primary method of social media presence for most vendors (62%). 36% of vendors had 1,000+ Facebook followers. For example, some vendors presented petitions for upcoming senatorial bills such as suggesting potential customers to contact their local senator for action on the legality of kratom. In addition, there were a handful of kratom vendors that made sizable donations to the American Kratom Association; one vendor bestowed the AKA with a \$100,000 donation.²¹

Payments and Shipping

The two most common modes of payment were credit cards and cryptocurrencies, 79% and 40% respectively. Three vendors utilized PayPal as a payment option despite its terms and conditions prohibiting selling illicit goods using its platform. Concerning shipping, 93% of US vendors provided USPS as a delivery method.

Age Verification

The overwhelming majority of vendors did not feature adequate age verification to prevent sales to minors, with 84% relying on an ineffective statement that submitting an order implied legal age, and 11% featuring no nods toward age verification at all. Only 5% of vendors required aged verification at delivery and/or through a public database.

Reference to Salmonella

Following the recent outbreak, 9% of vendors mentioned *Salmonella* explicitly on their site and approximately 12% of vendors were no longer processing orders on their website as of April 8, 2018. Thirty-one vendors opted to provide detailed lab results that described the purity standards in the explicit manner in which they produced kratom-related goods, including tests for *Salmonella*. The two most visited vendors in the sample were found to be owned by the same parent company who put out a recall on affected kratom products.

Health Claims and Disclaimers

The top three reported health claims included kratom's ability to provide increased energy/stimulant (56%), relaxation/sleep aid (49%), and pain relief (47%). Twenty-five (25)

percent of vendors noted the use of kratom for relief of opioid withdrawal symptoms. Notably, four vendors made the claim of kratom's cancer preventative properties. Particularly, 33% claimed that any kratom-related product was solely for research purposes while the two most stated disclaimers were that kratom is addictive and not recommended for those under 18/21.

Discussion

The results of this study demonstrate that the current patchwork of state- and local-level bans on the purchase of kratom is not effective, as many vendors do not abide by these restrictions and many states are not covered at all. The variation between the number of vendors that restrict the purchase to a locale may depend on how long the ban has been in place. For example, Rhode Island's ban on kratom has been in place since mid-2017 whereas Indiana has had their restrictions since 2012, thus allowing more time for enforcement and vendor awareness. The geographic distribution of KIVs in the United States does not appear to have any association with a state's intensity of the opioid epidemic; the distribution appears to be more in line with the state's overall population.

Despite the heavy use of text disclaimers noting that kratom is intended for adult consumers, there does not appear to be a strong push by the industry to regulate the sale of kratom to individuals under the age of 18. This may be due to several factors. First, the current legislation involving kratom is typically an outright ban on its purchase and consumption, with little nuance left for age restrictions. Second, there does not appear to be a strong prevalence of kratom abuse by teenagers and young adults; the substance is often used by older adults with chronic pain and opiate addiction.⁶ Though these products are clearly sold for

consumption, disclaimers to deny this are common, with 66% of KIVs stating that their kratom is "Not Intended for Human Consumption", some stating it is instead for research, incense, soap, and for educational purposes only.

The use of health claims by the KIV industry is in line with the documented use of kratom as an alternative treatment to opioid addiction, alcohol addiction, mental health ailments and chronic pain. Despite the FDA's warnings to curtail the use of health claims used by vendors, approximately half of the market featured such claims. The kratom industry has also shown a capacity for political activism, urging consumers to engage in the political process and reaching out to legislators seeking to enact further regulations at the state and federal level. These campaigns show strong engagement among vendors and their close partnerships with the American Kratom Association and the Botanical Educational Alliance.

Vendors often have difficulty working with payment merchants as a result of the federal government's Operation Checkpoint, an initiative enacted to combat fraud for businesses and sales of illicit goods by monitoring banks and payment processors. This has caused several vendors to turn to crypto currencies for payment. Although the privacy of the consumer is maintained, crypto currency transactions are traceable through block chain addresses which allow third-parties to observe their cash flow.

This study benefitted from unrestricted and open access to vendor websites. The webpage information of the KIVs was preserved through the use of the Wayback Machine which allowed content coding of a webpage at one point in time. Furthermore, coder error was

minimized through the use of the double-blind coding. This study exemplified valuable data on activism, social media presence, and policy coinciding with the kratom vendors.

There are several alternatives to kratom that individuals turn to in face of an opioid addiction. Methadone is a popular substitute that is gaining ground in effective treatment. However, the average cost for 1 full year of methadone maintenance treatment is approximately \$4,700 per patient.²² On the other hand, kratom is low-cost and accessible; the average price for the cheapest kratom product on the coded KIVs is \$0.99 per gram. The recommended kratom dose for opioid withdrawal varies from person to person. However, a heavy dosage of 10 grams is usually suitable, which comes out to a daily cost of less than \$10, or \$3,650 annual cost. With fewer costs associated with use and no requirement for a prescription or medical oversight, kratom is expected to see increased usage among Americans.

This study's findings are based on vendors' advertised sales practices as shown on their websites and social media presences; research on Internet Tobacco Vendors have shown that actual and advertised sales practices (the latter measured with actual purchases) are sometimes different. Furthermore, it is possible that vendor sales practices among less popular vendor websites differ from the popular websites sampled. However, it is our assumption that there is a relationship between a vendor's prominence on the 3 major search engines and corresponding high visitor traffic.

Given the increased scrutiny of the kratom industry amidst the backdrop of the Salmonella outbreak as well as the FDA's announcement of kratom-linked deaths, it is expected that other states will follow suit with similar restrictions. This study provides context to the

question of regulatory feasibility; there are over 600 internet vendors that sell kratom products to the US market. Future regulations should take into consideration the resources needed to ensure awareness and compliance among vendors.

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Results

Table 1: Vendor Characteristics

| Variable | Count |
|---|-------|
| Nation of Origin | |
| United States of America | 84 |
| Netherlands | 7 |
| Canada | 4 |
| Great Britain | 2 |
| France | 1 |
| Germany | 1 |
| Unknown | 1 |
| State of Origin (USA) | |
| California | 23 |
| Florida | 14 |
| Texas | 7 |
| North Carolina | 6 |
| Oregon | 6 |
| Missouri | 4 |
| Nevada | 4 |
| Idaho | 3 |
| New York | 3 |
| Washington | 3 |
| Michigan | 2 |
| Illinois | 1 |
| Minnesota | 1 |
| New Jersey | 1 |
| Ohio | 1 |
| Pennsylvania | 1 |
| Unknown | 20 |
| Number of Vendors Refusing Sales to Prohibited Locations | |
| Indiana | 65 |
| Wisconsin | 64 |
| Alabama | 59 |
| Arkansas | 59 |

| | |
|--|----|
| Vermont | 58 |
| Tennessee | 41 |
| San Diego, California | 30 |
| Rhode Island | 27 |
| Sarasota County, Florida | 18 |
| Jerseyville, New Jersey | 12 |
| District of Columbia | 6 |
| Alaska | 2 |
| Hawaii | 1 |
| Has a Physical Storefront | 13 |
| Social Media Presence | |
| Facebook | 62 |
| Twitter | 52 |
| Google+ | 18 |
| Instagram | 16 |
| Pinterest | 11 |
| YouTube | 7 |
| Tumblr | 3 |
| Reddit - | 2 |
| Link to or Member of Association | |
| American Kratom Association (americankratom.org) | 19 |
| Botanical Education Alliance (botanical-education.org) | 16 |
| National Kratom Coalition (nationalkratomcoalition.org) | 1 |
| Kratom United (kratomunited.com) | 1 |
| American Herbal Products Association (ahpa.org) | 1 |
| Kratom Association (kratomassociation.org) | 1 |
| Payment Options | |
| Credit Card | 79 |
| Crypto currency | 40 |
| E-check | 29 |
| Cashier's Check | 25 |
| Money Order | 25 |
| Bank Transfer | 22 |
| Collect on Delivery | 15 |
| Personal Check | 11 |
| Mail in cash | 7 |

| | |
|---|--|
| PayPal | 3 |
| Western Union | 2 |
| Delivery Options | |
| USPS | 93 |
| UPS | 19 |
| FedEx | 24 |
| Free Shipping | 56 |
| Has an Affiliate Program | 19 |
| Age Verification Strategies | |
| Submitting Order implies legal Age | 86 |
| Type in Birthdate | 4 |
| Age Verification at Delivery | 3 |
| Online Age Verification/Public Database | 2 |
| Types of Product Sold | |
| Kratom Powder | 92 |
| Kratom Capsules | 55 |
| Other psychoactive products (e.g. Blue Lotus, Kanna, Akuamma) | 47 |
| Kava | 30 |
| Kratom whole leaf/ crushed leaf | 27 |
| Kratom Tinctures | 20 |
| CBD/ other Marijuana products | 18 |
| Nicotine Vaping products/ e-liquid | 12 |
| Kratom Resin | 9 |
| Kratom Concentrate/ Shots | 8 |
| Kratom Live Seeds | 7 |
| Salvia | 7 |
| Tobacco product (Metal Tobacco Taster – Cigarette Style) | 1 |
| Cheapest Kratom Product Sold | \$15.35 (mean) 1.95 (St dev.) \$11.52-\$19.19(95% CI) |
| Smallest Amount of Kratom Sold | 80% are 28g (ounce or smaller) |
| Free Samples Offered | |
| With Purchase | 10 |
| No Purchase Necessary | 2 |

Table 2: Health Claims and Disclaimers

| Variable | Count |
|-----------------------------|-------|
| Health Claims | |
| Increased energy/ Stimulant | 56 |
| Relaxant/Sleep Aid | 49 |

| | |
|--|----|
| Pain relief | 47 |
| Anxiety relief | 27 |
| Opioid withdrawal relief | 25 |
| Depression relief | 21 |
| Muscle relaxant | 15 |
| Increased focus | 13 |
| Alcohol addiction relief | 7 |
| Cancer preventative | 4 |
| | |
| Disclaimers | |
| Not For Those Under 18/21 | 81 |
| Kratom is addictive | 81 |
| Not Intended for Consumption | 66 |
| Not Intended to cure or diagnose | 56 |
| Not FDA approved | 54 |
| Research Only | 33 |
| For Use as Incense or Soap | 24 |
| Not for pregnant mothers | 9 |
| Educational Purposes Only | 6 |
| Do not use while operating a motor vehicle | 4 |
| Reference to Salmonella | 9 |