# Illicit Massage Businesses: A Community Problem

A Case Study of the Impact of Illicit Massage Businesses in Fairfax County, Virginia

In partnership with
Northern Virginia Human Trafficking Initiative

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# 1. Abstract

Commercial sex work in the U.S. has been gaining attention due to its links with human trafficking. In 2018, the National Human Trafficking Hotline received 198 reports of human trafficking in Virginia. Illicit massage businesses (IMBs) are the site of the highest number of cases (29 in 2018) (Polaris, 2019c). Despite increased international attention on the commercial sex trade, it is difficult for policy makers to effectively create and implement legal frameworks to regulate this industry. The lack of data on the size, demand, and demographics of the local and national commercial sex economies have hindered these efforts in the U.S. (Swaner, Labriola, Rempel, Walker, & Spadafor, 2016). This paper provides insight for decision-makers on the size and pervasiveness of the illicit massage industry in Fairfax County, Virginia. This research conservatively estimates the expected demand for IMBs, their taxable income, and their proximity to Fairfax County Public Schools. This research also explores the effects of IMBs on legitimate massage therapists. The estimated demand in Fairfax County for IMBs is 558 customers per day and an estimated taxable revenue of over $23.6 million per year. Six IMBs exist within 1,000 feet of a public school and 75 IMBs within a mile of a public school. There are 5,160 students who attend a public school that is within 1,000 feet of an IMB (Schools and Centers, 2019). This is the first known study that evaluates buyer demand at IMBs in Fairfax County.

# 2. Acknowledgements

# 3. Definitions

| TERM | DEFINITION |
| --- | --- |
| **Buyer/Customer** | Any person who is purchasing therapeutic and/or sexual services (Northern Virginia Human Trafficking Initiative, 2019). |
| **Commercial Sex Act** | Any sex act for which anything of value is given to or received by any person (U.S. Government, 2000). |
| **Haversine Distance** | The great-circle distance between two points on a sphere given their longitudes and latitudes (Haversine formula, 2019). |
| **High-Frequency Buyer** | Men who reported buying sex on a weekly or monthly basis (Abolition Demand, 2018). |
| **Human Trafficking** | (A) Sex trafficking in which a commercial sex act is induced by force, fraud, or coercion, or in which the person induced to perform such act has not attained 18 years of age. |
| | (B) The recruitment, harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery (U.S. Government, 2000). |
| **Hyperparameter** | A parameter whose value is used to control the machine learning process (Hyperparameter Optimization, 2019). |
| **Hyperparameter Tuning** | The problem of choosing a set of optimal hyperparameters for a learning algorithm (Hyperparameter Optimization, 2019). |
| **Illicit Massage Businesses (IMBs)** | Establishments with registered business names that ostensibly provide massage, wellness, and/or spa services while in fact deriving some clientele and revenue through the provision of commercial sex acts. IMBs operate in violation of state and federal laws, which may include criminal statutes regarding human trafficking (including sex trafficking and/or labor trafficking), debt bondage, and organized criminal activities such as money laundering, visa and immigration fraud, smuggling, and/or tax evasion (Bouche & Crotty, 2017). |
| **Leave-One-Out (LOO) Cross-Validation** | A special case of cross-validation where the number of folds equals the number of instances in the data set. Thus, the learning algorithm is applied once for each instance, using all other instances as a training set and using the selected instance as a single-item test set (Sammut & Webb, 2011). |
| **Legitimate Licensed Massage Therapist (LMT)** | Any individual certified as a massage therapist by the Board of Nursing of the Commonwealth of Virginia and is not providing sexual services (Fairfax County Government, 2006). |

| | |
|---|---|
| **Mean Squared Error (MSE)** | Measures the average of the squares of the errors (the average squared difference between the estimated values and the actual value) for a procedure that is estimating an unobserved quantity (Mean squared error, 2019). |
| **Monte Carlo Simulation** | A broad class of computational algorithms that rely on repeated random sampling to obtain numerical results. The underlying concept is to use randomness to solve problems that might be deterministic in principle (Monte Carlo method, 2019). |
| **Provider** | Any person who works in an IMB, where workers are providing sex services (Northern Virginia Human Trafficking Initiative, 2019). |
| **Personally Identifiable Information (PII)** | Information that can be used to distinguish or trace an individual's identity, either alone or when combined with other personal or identifying information that is linked or linkable to a specific individual (Cornell Law School, n.d.). |
| **Regression Model** | Set of statistical processes for estimating the relationships between a dependent variable (often called the 'outcome variable') and one or more independent variables (often called 'predictors', 'covariates', or 'features') (Regression Analysis, 2019). |
| **Sex Trafficking** | The recruitment, harboring, transportation, provision, obtaining, patronizing, or soliciting of a person for the purposes of a commercial sex act, in which the commercial sex act is induced by force, fraud, or coercion, or in which the person induced to perform such an act has not attained 18 years of age (U.S. Government, 2000). |
| **Test Set/Partition** | A dataset used to provide an unbiased evaluation of a final model fit on the training dataset (Training, validation, and test sets, 2020). |
| **Training Set/Partition** | A set of examples used to fit the parameters of the model (Training, validation, and test sets, 2020). |

Table 1: Definitions

# 4. Introduction

The purpose of this research is to look at the demand for commercial sex at IMBs and their impact on the community. IMBs are similar to modern day sex brothels and are not similar to legitimate massage businesses, not only in the services that they provide, but also in how they function and operate.[1] In fact, IMBs negatively impact legitimate massage businesses.

> "*The reputation of these places [IMBs] and what they do affects how the public-at-large views the massage profession. It impacts small massage therapy practices more than a franchise or a spa. There sometimes is discrimination against small practice/massage therapists and always extra scrutiny when it comes to leasing commercial space because of these places [IMBs]. The women who work in these brothels [IMBs] are victims, but because the profession of massage therapy has historically been linked with these places [IMBs] in the USA, the licensed massage professional becomes a victim as well.*" (Anonymous, 2019)

IMBs are hidden in plain sight. These establishments can often be found in or near office parks, medical complexes, strip malls, schools, or places of worship. They operate under a "veil of legitimacy" as registered businesses that pay taxes, advertise on legitimate sites, and offer "legal" services. Common characteristics of IMBs include darkened windows, a doorbell to enter the locked business, abnormal business hours, predominantly male clientele, and advertised rates that are lower-than-average for the area for legitimate massage businesses (Polaris, 2011).

According to the National Human Trafficking Hotline, in 2018 there were 10,949 cases of trafficking reported nationwide. Of these cases, 861 were related to human trafficking in IMBs, and 29 of the 861 cases were reported in the state of Virginia. Over the last seven years, both in the U.S. and in Virginia, IMBs have been reported as either the highest or second highest venue for sex trafficking cases (Polaris, 2019b; Polaris, 2019c). Only 25% of active buyers[2] account for 75% of commercial sex transactions. These "high frequency buyers" report IMBs as a frequented venue, despite the higher-than-average transaction costs compared to other forms of commercial sex. Active buyers prioritize their safety and reduced risk of being arrested at IMBs (Abolition Demand, 2018). According to Bradley Myles, former CEO of Polaris:

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[1] Sex work does not necessarily indicate that the location is engaging in human trafficking. IMBs may be engaging in labor exploitation, sex exploitation, and possibly human trafficking.

[2] Who Buys Sex defines active buyers as "those who have paid for sex two or more times this year; or, just once this year but with a history of sex buying and an intent to buy again." (Abolition Demand, 2018)

*"Buyers perceive IMBs as a safe and preferred venue to buy sex. The men that go to the IMBs know that the women there are very unlikely to be undercover cops, so the buyers perceive a sense of impunity and simply don't get arrested. If there is an enforcement action from law enforcement targeted towards an IMB, there is usually time to disguise the illegal activity so that it looks legitimate by the time police actually reach the massage room. Buyers can also pay for illicit commercial sex transactions with credit cards at IMBs to look more legitimate or pay by cash to be less traceable. Buyers and communities in general view the sex acts that occur at IMBs as a victimless crime and, therefore, communities tend not to take these places as seriously or understand the real harm and exploitation that is occurring in many of these venues."* (Myles, 2019).

Commercial sex at IMBs is a subset of the commercial sex industry and has similar research methodology obstacles. Illegal activities are not easily observable; therefore, proxies are used to model and understand illegal markets and demand (Khan, Downey, Dank, & Dombrowski, 2016; Peng, 2016; Cunningham & Kendall, 2016; Eck, 2014; Holt, Blevins, & Fitzgerald, 2016; Kirchgässner, 2016). The techniques used in researching the demand of the commercial sex industry and other illegal activities can provide context for doing the same for IMBs. Illegal market proxies are easier to derive from publicly available data, survey-generated data, and/or online user-generated data rather than directly observing the activities of interest. Research for estimating sex economies lack empirical results to verify and validate proposed models. As a result, there are conflicting estimates for the sex economy based on the methodology used to gather data and modeling techniques. Wilcox, Christmann, Rogerson, and Birch reviewed 181 studies and have shown inconsistencies between estimates and the ability to validate those estimates (Wilcox, Christmann, Rogerson, & Birch, 2009). Also, the internet is fundamentally changing the commercial sex market. According to a 2014 study on commercial sex in major U.S. cities, "The widespread availability and rapid expansion of the Internet has redefined the spatial and social limitations of the sex market by introducing new markets for both recruitment and advertisement." (Dank, et al., 2014). However, the relationship between online commercial sex markets and demand are not yet fully understood. Combining these factors (difficulty in directly observing illegal markets, lack of empirical data on illegal markets, and ongoing economic shifts in the illegal markets), verifying, and validating the results of these models are difficult.

Despite these challenges, most research indicates that the U.S. commercial sex trade is in the billions. An Urban Institute paper estimated that sex work generated 1.28 billion dollars in seven cities in 2005[3] (Khan, Downey, Dank, & Dombrowski, 2016). Abolition Demand estimated that the U.S. commercial sex economy annually generates 5.7 billion dollars in transactions (Abolition Demand, 2018). Polaris estimates that buyers spend 2.5 billion dollars annually at IMBs on commercial sex (Polaris, 2017).

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[3] Converted results from 2005 dollars to 2019 dollars.

Although there are estimates of the commercial sex economy and demand for IMBs at the national level, communities lack data at the local level. Observed demand of IMBs in various cities can provide data to verify and validate models developed to estimate demand at the community level. For example, researchers in Grand Rapids, Michigan and Houston, Texas observed customer arrivals at suspected IMBs to estimate demand for sex work (Bouche & Crotty, 2017; Venema, Heeringa, & Sweda, 2019). This paper builds on prior research by providing estimates for demand for Fairfax County, Virginia. Additionally, this paper offers new aspects of research:

- Exploring different prediction techniques beyond multiple linear regression.
- Interviewing a legitimate licensed massage therapist and observed a legitimate massage business to make preliminary comparisons.
- Calculating proximity of IMBs to nearby schools.

The goals of this study are to:

- Estimate the daily demand of commercial sex services at IMBs in Fairfax County, VA.
- Estimate the annual taxable income for IMBs in Fairfax County, VA.
- Determine characteristics of customers and providers at IMBs in Fairfax County, VA.
- Assess different ways IMBs impact the economy and communities.
- Provide strategic insight to assist decision makers in developing policies to reduce commercial sex and eliminate IMBs.

This paper proceeds in four parts:

1. The *Methodology* section details the criteria used to select locations to observe, the business rules for coding the observations, how the predictive models were trained, how annual revenue and demand were calculated, the interview process with the legitimate licensed massage therapist (LMT), the process for comparing LMTs to IMBs, and how the proximity of schools to IMBs were calculated.
2. The *Results and Observations* section details a summary of the results, results by each district in Fairfax County, VA, customer and provider characteristics, comparison of IMBs to legitimate massage businesses and therapists, the number of schools and students near an IMB, and the results of the predictive models.
3. The *Conclusion* section discusses the paper's analysis results and their implications.
4. The *Further Research* section provides information on additional research opportunities.

# 5. Methodology

This study replicates the methodology of similar studies in Houston, Texas by Bouché and Crotty in 2017 and in Grand Rapids, Michigan by Solutions to End Exploitation in 2018. Both studies aimed to identify the demand and income for the IMBs in their respective areas (Bouche & Crotty, 2017; Venema, Heeringa, & Sweda, 2019).

The researchers combed through user-generated data on rubmaps.com[4] to generate a list of suspected IMBs in Fairfax County, Virginia. This process was completed in February 2019 and produced a list of 85 IMBs. This study focuses on 18 IMBs from that list, including those that:
- Had a customer review within the past six months that mentioned that a commercial sex act was received.
- Had a single entrance.

To observe demand for the 18 selected IMBs, video cameras were placed in public locations that had an unobstructed view of the entrance to the IMB. The IMBs were in 12 different ZIP codes and eight of the nine districts in Fairfax County. Figure 1 depicts a map of Fairfax County (dark grey), IMBs listed as open in Fairfax County (black), and those observed in this study (red).
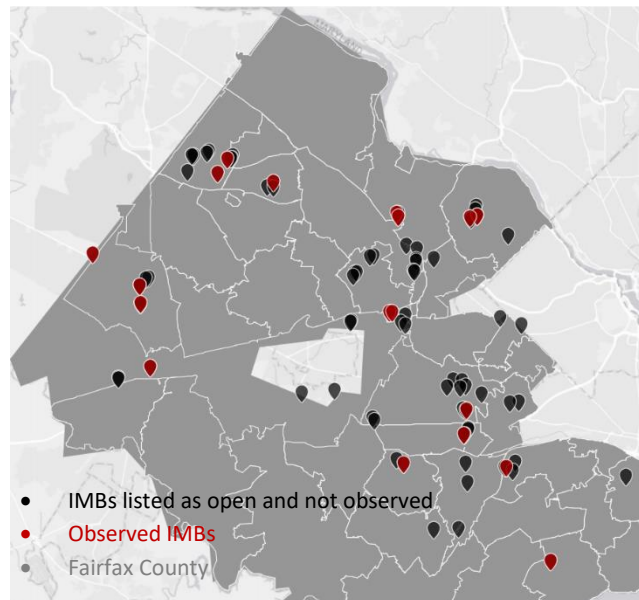


**Figure 1: Map of Observed and Unobserved IMBs in Fairfax County, VA**[5]

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[4] RubMaps is an online database website where users compile meticulous feedback on massage parlors that offer sexual services. The site also allows users to rate women's body parts and write out detailed descriptions of their sexual services.

[5] The light grey carve-out in the middle of the map is Fairfax City, which is not part of Fairfax County.

IMBs by District:

| DISTRICT NAME | IMBs LISTED AS OPEN | IMBs SURVEILLED |
|---|---|---|
| **Braddock** | 7 | 1 |
| **Dranesville** | 17 | 5 |
| **Hunter Mill** | 8 | 1 |
| **Lee** | 5 | 1 |
| **Mason** | 18 | 2 |
| **Mount Vernon** | 2 | 1 |
| **Providence** | 19 | 4 |
| **Springfield** | 1 | 0 |
| **Sully** | 10 | 4 |

**Table 2: Number of IMBs by District**

The legality of video surveillance was assessed by a local independent legal review. In the state of Virginia, video surveillance is allowed in public areas when there is no reasonable expectation of privacy.[6] Surveillance involved placing cameras outside single entrance IMBs, on public property, on random days from March 2019 to May 2019, to monitor the number of people entering and exiting the IMB and the times of entry and exit. Each of the 18 locations were observed for one, 24-hour period. No audio was recorded.

A team of individuals watched the video footage and marked down the time of entry and/or exit for each person they saw entering and/or exiting the IMB. Perceived demographics and other information were captured to build profiles of customers and providers. The fields captured were gender, perceived age, ethnicity, clothing style, person appeared to live on site, if they drove, minors appeared to be on site, and characteristics that indicate a person is a worker. Appendix 3 contains a list of values for each of the observed fields. A second person re-watched the video footage at the places where a person was seen to validate the perceived demographic information. No personally identifiable information was tracked in this study.

Duration of stay was calculated to determine if a person was a customer, provider, courier, or other. Each category is defined as:

- **Customer**: A person whose duration was greater than or equal to 20 minutes and less than or equal to two hours.

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[6] See § 18.2-386.1, Unlawful Creation of Image of Another; Penalty for restrictions of video recording. Audio recording statutes do not apply as audio was not recorded (Code of Virginia, 2019).

- **Provider**: A person whose duration was greater than two hours. This person is considered a worker.
- **Courier**: A person who did not stay but was seen picking up and/or dropping off a provider and/or supplies.
- **Other**: A person who was seen entering and exiting the IMB, but did not meet the definition of any other category. Any person who was counted as "other" was removed from the final counts and was not used in determining demand.

The categories and definitions were developed based on previous research at Grand Rapids, Michigan and heuristics for IMBs based on input from NOVA-HTI (Venema, Heeringa, & Sweda, 2019; Northern Virginia Human Trafficking Initiative, 2019).

If a person was not seen entering or exiting the IMB, then the length of video footage when they were inside the IMB was used for the duration. For example, if a person was seen entering at 12:00 pm and the camera was taken down at 10:00 pm but the person had not left yet, then the duration was marked as 10 hours and the person was classified as a provider.

Using the observed daily demand (customers per day) along with data from rubmaps.com and U.S. census demographic data for Fairfax County, an estimated daily demand was calculated using regression analysis for the rest of the IMBs in the population. The observations from the 18 IMBs were used for training, validating, and comparing the regression models. The 18 IMBs were randomly split into training (13 IMBs) and testing (5 IMBs) partitions. The partitions were kept consistent between statistical tests. The training set was then used to train the models using leave-one-out (LOO) cross validation. Hyperparameter tuning was done using randomized grid search during LOO cross validation. The regression models used to estimate daily demand were multiple linear, ridge, elastic net, and random forest. The models with the lowest mean square error (MSE) from the training partition were evaluated against the test set. The model with the lowest MSE from the test partition was used to estimate the expected daily demand of the unobserved IMBs. Rubmaps.com did not have all data attributes for all IMBs (e.g., average ratings). For those IMBs with missing values, the mean values from the entire dataset were used (e.g., the average rating from IMBs would be used as the average rating for an IMB without a rating). The attributes were min-max normalized. The attributes used to train the models were selected based on statistical analysis.

Demand was estimated for each of the 85 locations using the best performing regression model. The researchers aggregated the locations and calculated values based on the locations' various attributes to perform analysis as discussed in the *Results and Observations* sections. The calculated demand was used to calculate revenue for each location.

The estimated demand for each IMB was added to get the total daily demand for Fairfax County. The average fee (house fee + average tip) for each location was generated using data pulled from

rubmaps.com.[7] This number was multiplied by the IMB daily demand to get the estimated daily revenue. Each IMB was listed as open seven days a week. The annual demand and revenue were calculated by multiplying their daily values by 365.

Researchers performed a high-level comparison between IMBs and legitimate massage therapy locations by observing one legitimate massage therapy business and interviewing a licensed massage therapist at another location. The one legitimate business was observed on the same day as an IMB in the same office park. Video surveillance was attempted at an additional six legitimate places across Fairfax County. However, due to lack of accessibility and/or places to mount a camera these locations could not be taped. The researchers were introduced to an LMT through NOVA-HTI to interview. The interview was conducted by one researcher with the LMT. The interview was conducted in person at the LMT's private practice for one hour. The LMT is the owner and the only employee of the practice.

In addition, a list of public schools in Fairfax County was pulled from the Fairfax County website. The latitude and longitude were determined for each school and IMB using Google's Geo-location API. Researchers calculated the haversine distance of the closest IMB to each school using their latitudes and longitudes. The enrollment of each school was used to show how many students were within a mile of an IMB (Schools and Centers, 2019).

There were several limitations throughout this study. Identifying IMBs relied on a single online data source which contained user generated data. This gives a conservative count as locations from other online sources were not included and/or may not have an online presence. Assumptions are being made that the user-generated data is accurate.

There were limitations in surveillance. Even though the coded observations had quality assurance checks, the video quality made it difficult to determine demographic features. Furthermore, assumptions were made on the gender, ethnicity, and age of the observed individuals based on their appearance. Identifying gender, ethnicity, and age from video footage is subjective and may be incorrectly identified from appearances alone. The number of observed locations was limited by several factors: the number of volunteers, amount of equipment available, locations that had a single outside entrance, viable locations to place surveillance equipment, and weather. This limited the scope of our samples. Each location was observed for one 24-hour period, limited to weekdays. Therefore, demand is assumed stationary for this paper's calculations. There is unaccounted variance in demand cycles based on non-controllable variables, such as the day of the week, seasons, and weather.

Estimating the cost of transactions required several assumptions. Every observed person that met the time requirements for a customer was assumed to make a commercial sex transaction.

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[7] The house fee and tip are fields included in user generated reviews. If the information was not available, an average from all locations was used.

Also, cost estimates relied on user-generated data for fees and tips and some locations were missing that data.

The comparisons between legitimate massage businesses and IMBs is limited in scope. This research does not have enough data points to make statistically significant observations regarding the differences in revenue or demand between legitimate massage businesses and IMBs. Conclusions regarding differences in legitimate massage businesses and IMBs from the interview are limited due to the sample size as well. Possible biases of a single person's viewpoint must be taken into account before drawing conclusions. The LMT has perceived negative financial impacts due to close proximity to an IMB. Not all legitimate massage businesses would have the same experience as the interviewed LMT.

Each of these limitations leads to a conservative estimate for demand. Despite these limitations and assumptions, this paper offers contributions in calculating a baseline of demand for commercial sex at IMBs in Fairfax County.

# 6. Results and Observations

## 6.1. Summary

In Fairfax County, based on the regression analysis, an estimated 558 customers visit illicit massage businesses every day. Each year, approximately 203,670 customers visit the 85 IMBs in Fairfax County. The estimated annual revenue of IMBs in Fairfax County is over $23.6 million.[8] At the 18 IMBs where video footage was recorded, 125 customers and 44 providers were seen entering. From the video footage, it was determined that at minimum, an additional four providers are believed to live on site at four of the IMBs that were surveilled. Figure 2 depicts the number of customers and providers observed at each location.
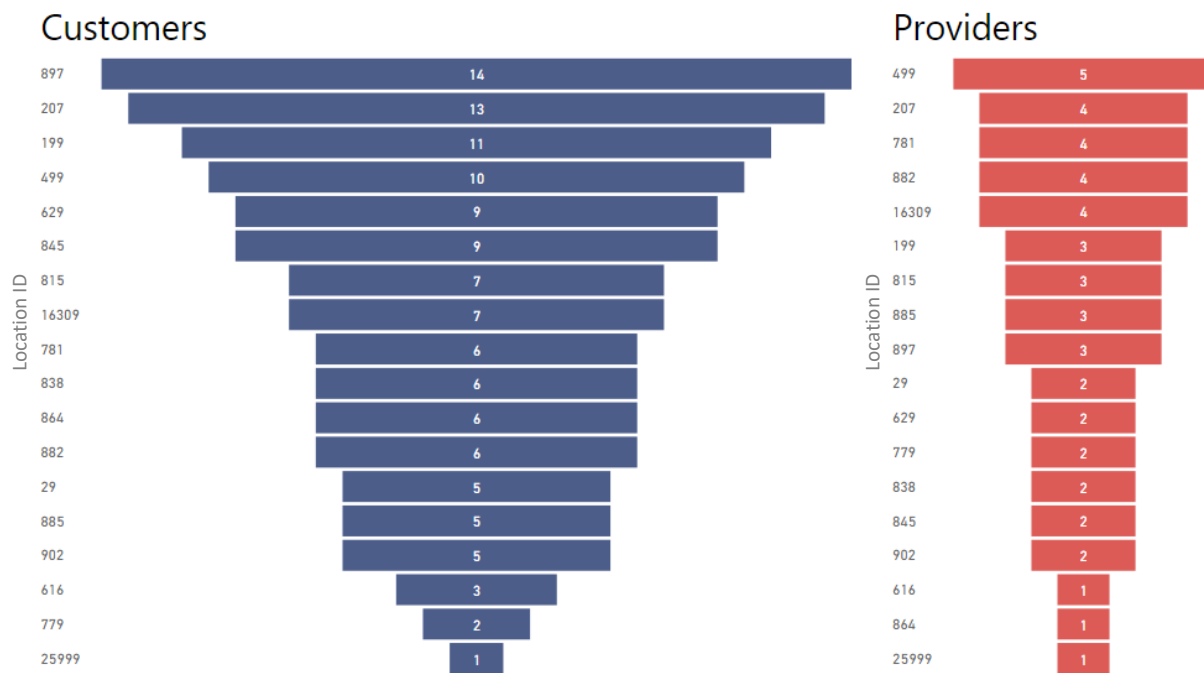


**Figure 2: Number of Customers and Providers Observed by Location ID**

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[8] Each location's predicted demand multiplied by the respective location's average rate and tip, discussed in the methodology section.

## 6.2. Summary by District

Each of the nine districts in Fairfax County has at least one known IMB. Figure 3 and Figure 4 break down the estimated demand and revenue by district.
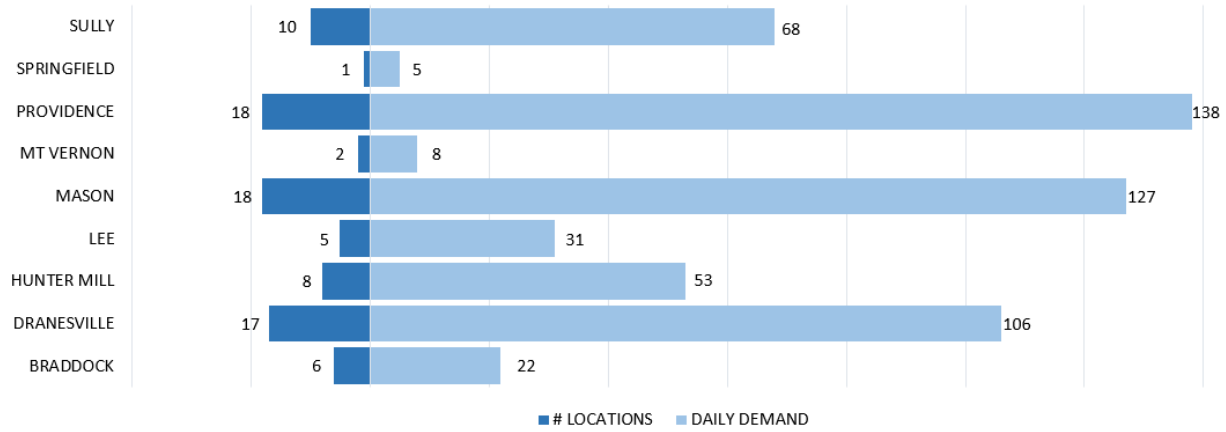


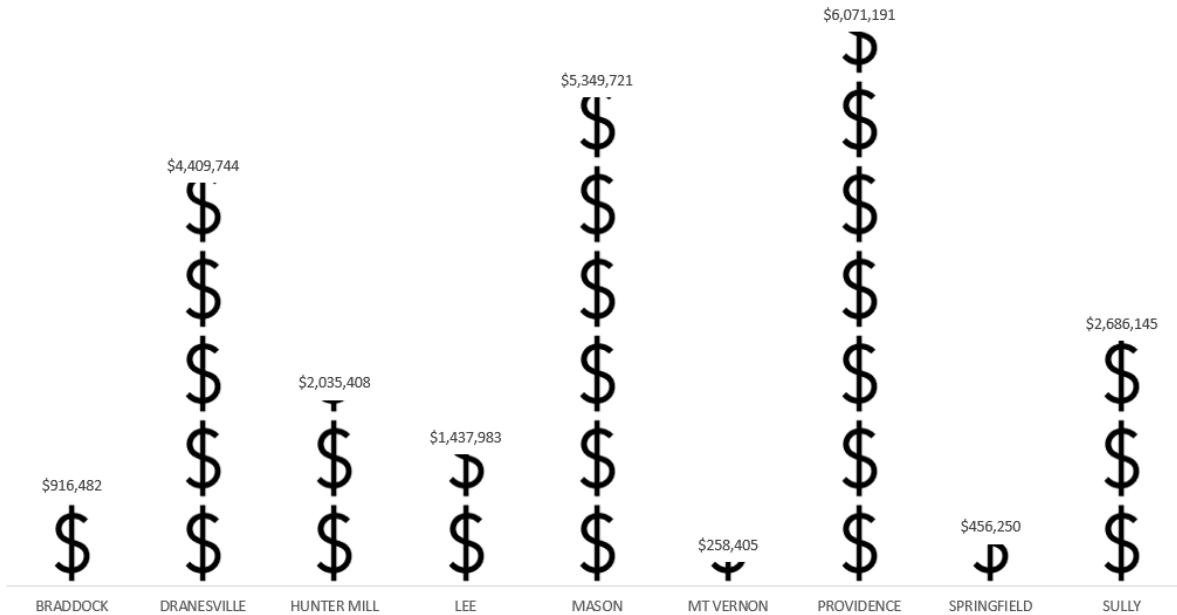**Figure 3: Number of Locations Versus Estimated Daily Demand by District**



**Figure 4: Estimated Annual Revenue by District**

## 6.3. Customer vs Provider

All (100%) of the observed customers presented as male and 78% as Caucasian. All (100%) of the observed providers presented as female and as Asian; however, no providers were observed entering or exiting at four IMBs. A person was counted at each of these locations since surveillance showed evidence of a provider, such as lights being turned on, doors unlocked from the inside, and/or customers going in; however, gender, ethnicity, and age could not be determined. Figure 5 depicts the breakdown of ethnicity by customer and provider.
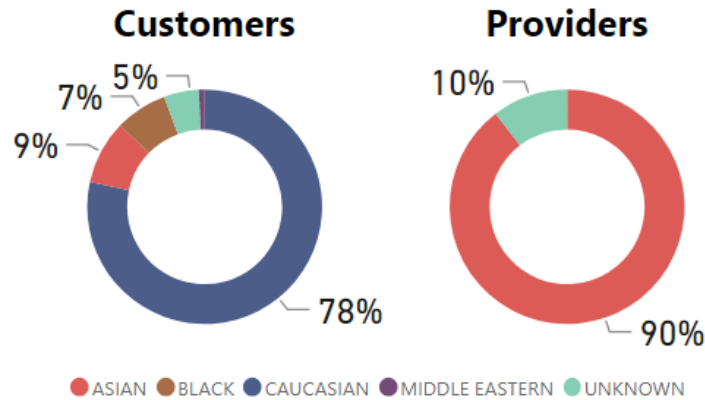


Figure 5: Ethnicity of Customers and Providers

The customer's perceived ages were distributed across each category except less than 18 and greater than 65, with 76 of 125 customers being between the ages of 26-45. 25 of the providers appeared to be between the ages of 26-35 and 16 providers between the ages of 36-45. Figure 6 depicts the ages of customers and providers. The distribution of age for customers seen in this research is consistent with low and high frequency buyers in the report *Who Buys Sex* (Abolition Demand, 2018).
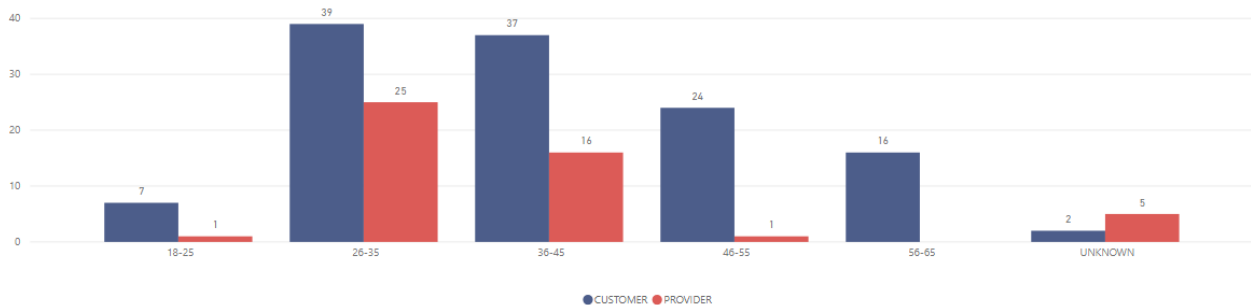


Figure 6: Age by Number of Customers and Providers

The most common arrival time for customers was between 1:00 pm to 3:00 pm and for providers was 9:00 am to 10:00 am. The average length of stay for a customer was 49.2 minutes and for providers was 12.1 hours.

Figure 7 shows a comparison of the average length of stay; the needle indicates the highest arrival time for both customers and providers.



**Customers**

**49.2**
mins average length of stay

**1-3 pm**
highest arrival time

**Providers**

**12.1**
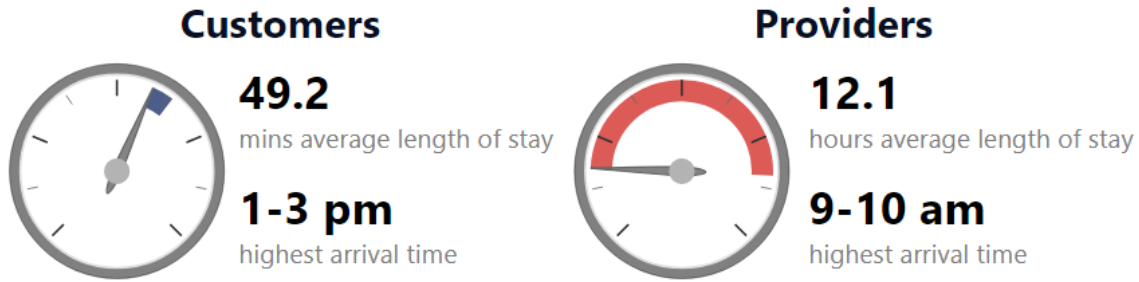hours average length of stay

**9-10 am**
highest arrival time

Figure 7: Average Length of Stay and Highest Arrival Rate by Customers and Providers

When the time of entry was broken down into two-hour increments like in the *Grand Rapids* study, the distribution was consistent with their findings (Venema, Heeringa, & Sweda, 2019). Figure 8 compares this study's findings on customer arrival time with those from the *Grand Rapids* study. The raw data was unavailable for comparison from the *Houston* study.
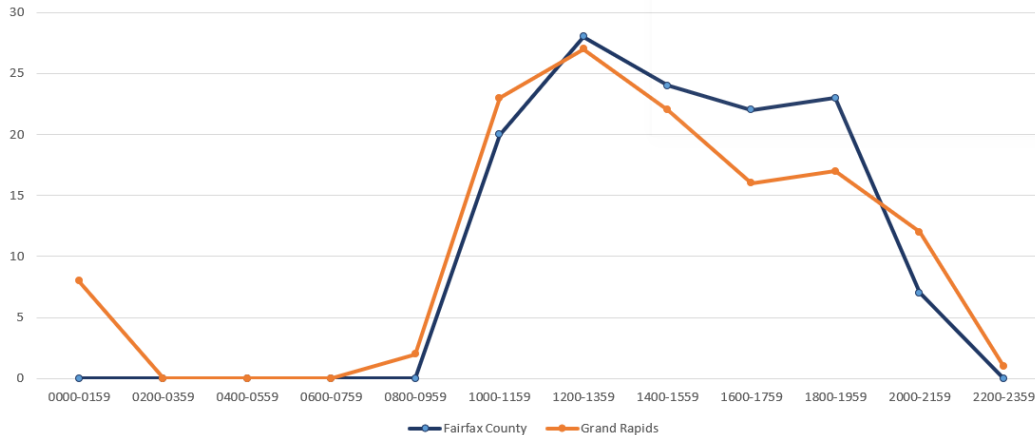


Figure 8: Number of Customers Arrival Times for Fairfax County, VA Versus Grand Rapids, MI

Both the *Houston* and *Grand Rapids* research found the highest peaks for time of arrival for customers in their respective areas to be during lunch from 11:00 am to 1:00 pm (Bouche & Crotty, 2017; Venema, Heeringa, & Sweda, 2019). When the time of entry was broken down into 30-minute increments for Fairfax County, the majority of the customers appeared to arrive between 1:00 pm to 4:00 pm as opposed to during lunch as seen in other areas. Mornings showed a steady increase in customers, but afternoons had a consistent pattern of sharp increases and decreases. Each sharp increase occurred 60 or 90 minutes after the last increase. The arrival times

of the providers showed an expected pattern, with a large influx in the morning and a steady decrease over time. Figure 9 depicts the arrival times of customers and providers in 30-minute increments.
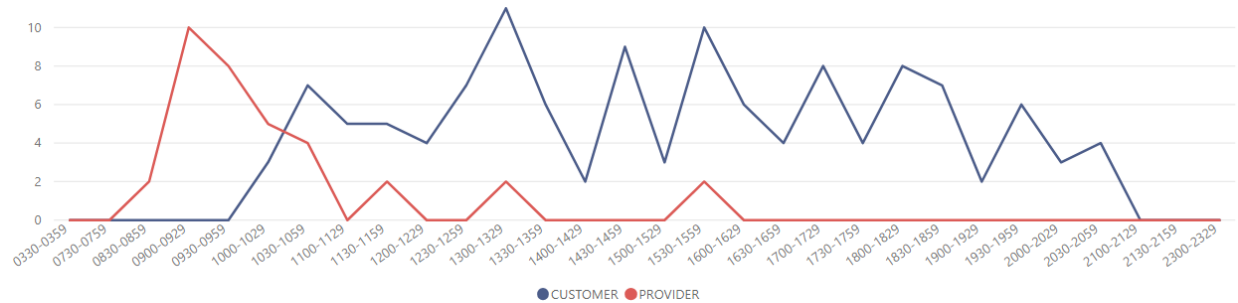


Figure 9: Number of Customers and Providers by Time of Arrival in 30 Minute Increments

On average, Caucasian customers stay longer than other ethnicities. As customer age increased so did the average length of stay, whereas for providers, the younger the provider, the longer the length of stay. Figure 10 depicts the average length of stay in minutes for customers and providers by age and ethnicity.

## Customers

| Ethnicity | 18-25 | 26-35 | 36-45 | 46-55 | 56-65 | Unknown | Total |
|---|---|---|---|---|---|---|---|
| Asian | | 39.56 | 42.00 | | | | 40.00 |
| Black | | 44.75 | 46.50 | 69.00 | | | 48.22 |
| Caucasian | | 45.00 | 54.47 | 54.65 | 54.38 | | 50.74 |
| Middle Eastern | | 31.00 | | | | | 31.00 |
| Unknown | | 95.00 | 22.00 | | | | 45.17 |
| Total | | 45.92 | 52.05 | 55.25 | 54.38 | 29.5 | 49.19 |

## Providers

| | 18-25 | 26-35 | 36-45 | 46-55 | Unknown | Total |
|---|---|---|---|---|---|---|
| Asian | 1374.00 | 745.52 | 579.47 | 683.00 | 1367.00 | 715.14 |
| Unknown | | | 704.00 | | 867.25 | 834.60 |
| Total | 1374.00 | 745.52 | 587.25 | 683.00 | 966.60 | 727.58 |

Figure 10: Average Length of Stay in Minutes by Age and Ethnicity for Customers and Providers

Additionally, 100 of the 125 customers were dressed casually, and most customers did not park near the door. At all locations combined, 17 providers drove themselves and at least four appeared to live at the IMB. Providers were rarely seen taking breaks outside, and several providers had to ring the doorbell to get into the IMB.

The results from this study correspond to the *Grand Rapids* study, findings in *Polaris Report*, and aggregating information from rubmaps.com reviews. Table 3 shows a comparison of the demographic results from this research with those from *Grand Rapids* study, *Polaris Report*, and Rubmaps.

| | FAIRFAX COUNTY | GRAND RAPIDS[9] | RUBMAPS[10] | POLARIS[11] |
|---|---|---|---|---|
| **Customer: Average Demand** | 6.9/Day | 8/Day | N/A | N/A |
| **Customer: Gender** | 100% Male | 100% Male | N/A | N/A |
| **Customers: Ethnicity** | 78% Caucasian 17% Non-Caucasian 5% Could not be determined | 70% Caucasian 10% Non-Caucasian 20% Could not be determined | N/A | N/A |
| **Provider: Gender** | 100% Female | 100% Female | 100% Female | Majority Female |
| **Provider: Ethnicity** | 90% Asian 10% Could not be determined | 45% Caucasian 23% Asian 32% Other/could not be determined | 91.4% Asian 8.6% Other/could not be determined | Majority Asian |
| **Provider: Age** | 52% Perceived to be between 26-35 years | 71% Perceived to be between 20-39 years | 62% Perceived to be between 36-45 years | Most common age range 33-55 years |

**Table 3: A Comparison between Fairfax County, Grand Rapids, Rubmaps, and Polaris on Customer and Provider Demographics**

## 6.4. Illicit vs Non-Illicit Massage Business

The reputation of IMBs affects the reputation of legitimate massage therapists. One location that appeared to be a legitimate massage business (no commercial sex offered) was observed on the same day as an IMB in the same office park. Even though one location is not a large enough sample size to make statistically significant comparisons, the observation provided some noticeable contrasts. Table 4 shows a comparison of noticeable difference between IMBs and the one legitimate massage business.

| | IMB | NON-IMB |
|---|---|---|
| **Worker: Ethnicity** | 100% Asian | 50% Asian, 50% Caucasian[12] |
| **Customer: Gender** | 100% Male | 37% Male, 50% Female, 13% Unknown |
| **Customers: Ethnicity** | 78% Caucasian | Females: 100% Caucasian Males: 100% Asian |

**Table 4: Observed IMB Versus Non-IMB Customer and Provider Differences**

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[9] Information pulled from *Grand Rapids* study (Venema, Heeringa, & Sweda, 2019).
[10] The Rubmaps.com demographic data used all, 1,319 reviews, up to May 2019 for IMBs in Fairfax County. As stated in the *Methodology* section these reviews are user-generated and are subject to errors. Reviews on Rubmaps.com are developed to rate female providers only and lack reviews for male providers.
[11] Information pulled from Polaris report (Polaris, 2017).
[12] Although it has been observed that 100% of IMB providers are Asian, this does not mean that 100% of Asian massage therapists work at IMBs or are providing sexual services.

In addition to observing one location, an interview was conducted with an LMT, who wishes to remain anonymous, about how IMBs affect legitimate businesses. This interview was performed to gather first-hand knowledge on possible community impacts of IMBs. Below are some specific quotes from this LMT (Anonymous, 2019):

- "IMBs pollute the name of massage and give people this belief that all massage businesses provide sexual services."
- "Receives calls from men who ask if they have table showers, provide full body rubs, and other encoded messages that were a nuisance and required navigating to understand what they were looking for."
- "Non-sober men would come to the business looking for a 'massage' which became a constant problem necessitating additional security such as a keypad on the front door"
- "Massage therapists have to take training on how to stop a session when a person becomes inappropriate."
- "Harder to get a lease."

The interviewee cites issues that are consistent with other research, where negative stereotypes about massage therapy have led to the assault and harassment of LMTs (Polaris, 2017).

While the direct effects of IMBs on the regulation of legitimate massage business is not within the scope of this research, it is worth noting some of the regulations for legitimate massage business in Fairfax County. Both the massage business and each therapist must be licensed for providing massages (Massage Establishments, n.d.; Massage Therapist, n.d.). LMTs must undergo background checks every year for Fairfax County (Municode Fairfax County, VA, n.d.). LMTs must have an initial background check for the state and recertify biannually (Virginia Board of Nursing, 2018). The LMTs must also pay the fees associated with the background checks and the recertification costs (Massage Establishments, n.d.; Massage Therapist, n.d.; Virginia Board of Nursing, 2018). These regulations are burdensome to legitimate massage businesses and LMTs. Table 5 shows a comparison of the average IMB operations and information about the business of the LMT that was interviewed.

|  | IMB [13] | LMT [14] |
|---|---|---|
| **Customers: Gender** | 100% Male | 50% Male, 50% Female |
| **Hours of Operation** | 10:00 AM-10:00 PM | 10:00 AM-6:00 PM |
| **Days of the Week Opened** | 7 | 5 |
| **Average Number of Customers a Day** | 7 | 4 |
| **Average One-Hour Rate** | $74.00 | $100.00 |
| **Average Tip Rate** | $43.00 | If there is a tip, 15-20% |
| **Estimated Annual Income** | $277,898 | $100,000 |

**Table 5: Comparison of IMB and LMT Business Operations**

## 6.5. IMBs and Fairfax County Public Schools

In Fairfax County, zoning ordinances for adult bookstores, adult mini motion picture theatres, and commercial nudity establishments require them to be at least 1,000 feet from schools and places of worship (Article 8: Special Permits). IMBs establish near legitimate businesses, schools, and places of worship to seem more legitimate and to mask their operations (Polaris, 2017). This research looked into that claim by reviewing proximity of IMBs to public schools. At the time of this report's publication, six IMBs are within 1000 feet of a public school in Fairfax County. There are 29 IMBs within 1,500 feet of a public school. This count does not include IMBs that are near preschools, private schools, or places of worship. There are four schools and 5,160 kids within 1,000 feet of an IMB. There are 47,050 students within a mile of an IMB. Figure 11 shows the number of students near an IMB in 200 feet increments.
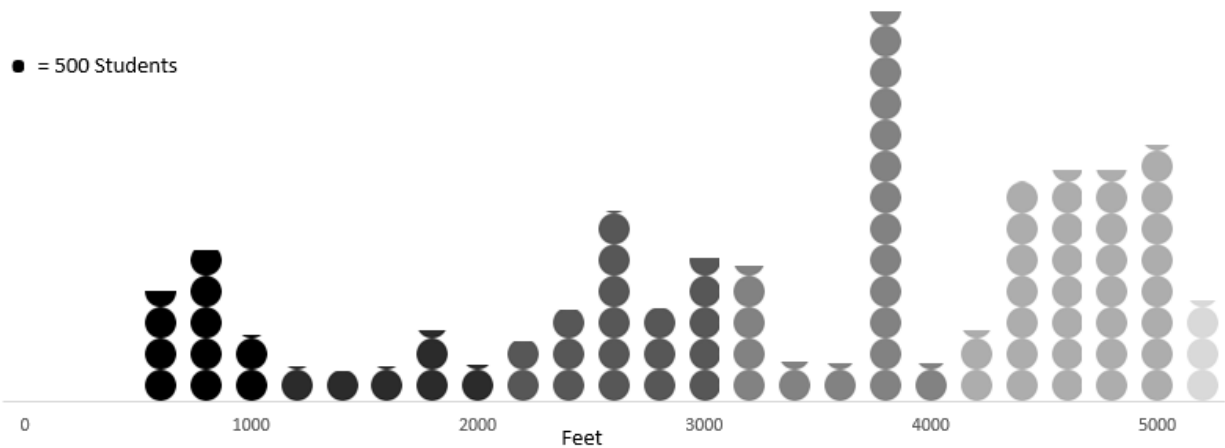


**Figure 11: Number of Students in Public Schools Near an IMB in 200 ft Increments**

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[13] Averages calculated from the 85 IMBs in Fairfax County.

[14] Information provided in an interview with LMT about LMT's business. The revenue was partially validated by the researchers. The LMT told the researcher that they provide massage therapy to approximately 20 clients a week and provided the one-hour rate of $100 (Anonymous, 2019). Assuming 50 work weeks, the LMT's revenue would equal approximately $100,000 dollars not including income from tips.

## 6.6.    Predictive Model Results

Table 6 records the regression model results from the best performing models on the test partition. The lower the MSE the more accurate the model was at predicting the observed demand of the locations. The lower the Test MSE, the better the model was at predicting demand with new data. Therefore, the Random Forest regression model was used to predict the demand for the unobserved locations for Fairfax County. The variables used for prediction and their statistical significance is shown in *Appendix 4: Variables Used for Each Regression Model*.

| MODEL | MULTIPLE LINEAR | RIDGE | ELASTIC NET | RANDOM FOREST |
|---|---|---|---|---|
| Train MSE | 6.51 | 7.53 | 7.44 | 4.10 |
| Test MSE | 8.76 | 9.94 | 9.64 | 7.20 |
| Estimated Demand/Day | 458 | 494 | 492 | 558 |

Table 6: Results of Each Regression Model

# 7. Conclusion

IMBs have a pervasive presence in Fairfax Country, impacting different aspects of the community. IMBs masquerade as legitimate businesses on the surface, but in reality, are involved in a variety of illicit activities, such as commercial sex, human trafficking, wage law violations, tax fraud, money laundering, and/or falsifying documents (Bouche & Crotty, 2017; Polaris, 2017). This paper's results and analysis demonstrates significant demand for commercial sex at IMBs. 125 customers were observed at 18 IMBs. This study estimates that IMBs have an estimated daily demand of 558 customers per day and produces an annual revenue over $23.6 million in Fairfax County, VA. Due to the conservative estimate of the number of IMBs, the actual revenue is likely higher.[15]

IMBs have created a stigma that negatively affects legitimate massage therapists, puts their safety at risk, and has made it operationally harder for LMTs to exist (Anonymous, 2019; Polaris, 2017). 30% of incorporated cities in the U.S. regulate massage businesses in the adult establishment industry, even though massage therapy is not sexual in nature. The American Massage Therapy Association does not list any sexual services as reasons for massage therapy (Polaris, 2017). Fairfax County law states that it is illegal to touch erogenous areas of the body in the massage establishment or during an out-call transaction. This stigma has created high regulatory burdens on LMTs in Fairfax County, for example LMTs are required to get yearly background checks (Municode Fairfax County, VA, n.d.).

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[15] The list of IMBs was generated from a single online source; there are likely additional IMBs that do not have an online presence or have an online presence at a different website.

According to the report *Who Buys Sex*, 29.4% of 8,021 men surveyed believe purchasing sex is a victimless crime. IMBs have normalized sex buying. They are the sex purchasing venue of choice for high frequency buyers, most likely because they provide an environment where the buyer feels safe to purchase sex (Abolition Demand, 2018). The negative sexual stereotypes of massage therapy businesses are perpetuated by the community of individuals that seek sexual services at massage businesses. The stereotype is also perpetuated by IMBs. For instance, rubmaps.com provides a platform for users to generate content that sexually objectives women at massage businesses. This online platform, others like it, and the online culture that generates the content perpetuates sexual exploitation of women at IMBs and harassment of massage therapists. This research identified 44 providers at 18 IMBs. Assuming an average of two providers per IMB, there are at least 170 women being exploited each day in Fairfax County, VA. Women exploited at IMBs are often coerced to perform sexual acts for customers. Often, they work long hours for less than minimum wage or for no wages (Polaris, 2017).

IMBs are often located near office parks, medical complexes, strip malls, near schools, and/or places of worship (Polaris, 2017). This research looks at the proximity of IMBs near schools. In Fairfax County, over 47,000 students go to public schools within one mile of an IMB. Additionally, 88% of the IMBs are located within one mile of a public school. This information could be used to prioritize law enforcement resources to investigate possible IMBs. The proximity of potential IMBs to schools (and potentially other legitimate businesses or places of worship) could be used as a heuristic for choosing locations to investigate.

This paper builds upon previous research to understand demand and impacts of IMBs at the community level. This research shows an estimated demand of 558 customers per day and over $23.6 million for annual revenue for IMBs in Fairfax County for 2019. Understanding the relationships of IMBs with their local community and the demand for them needs to be further researched.

# 8. Further Research

Though this research was detailed in the *Methodology* section, there are many areas that can be built upon due to various resource constraints or availability of data.

Public tax records for each IMB can be pulled to create a supplemental dataset. This information could help distinguish between LMTs and IMBs. The tax records would indicate business registration, the number of employees, and the income reported. The public tax records could be verified against the data pulled from online sources or from observations. For instance, the number of registered workers could be compared to the number of providers observed or identified in online forums. The estimated revenue could be compared to the amount of taxes paid. Outliers could be indicative of tax fraud, labor violations, or other laws being broken.

Further research should be performed to understand temporal factors of demand at IMBs. Specifically, there is a lack of information on how the expected demand changes between days

of the week. The researchers of this paper queried Google for "popular times" for IMBs in Northern Virginia, but there was not enough intersecting information with the observed IMBs to be used for this analysis. The "popular times" data for the observed IMBs indicates that different days of the week have different popular times. Google's data is relative and does not give absolute values; therefore, without supplemental data, demand estimates across different days cannot be made.

A comparison of online data sources that identify IMBs has not been performed. It would be helpful to have a metadata database available to researchers that contains the different sites and the attributes of each site. This data could be used to inform future research when choosing data sources.

Additional research should be done using different estimation techniques to determine the lower and upper bounds of the commercial sex economy, specifically at IMBs. For instance, the Poisson process is a different approach to model demand and evaluate against the regression models used in this research. This process can model temporal factors. The mean daily IMB arrival rates could be modeled as a Poisson distribution and revenue could be calculated using a Monte Carlo simulation or Poisson regression.

Another research methodology worth investigating is population estimation techniques. Research on counting and understanding hidden populations has been performed in many fields, including ecology, health services, epidemiology, etc. For example, one research created fake advertisements to estimate the demand for online sex work (Roe-Sepowitz, Bontrager Ryon, Hickle, Gallagher, & Hedber, 2016).

# 9. Appendices

## 9.1. Appendix 1: List of Tables

## 9.2. Appendix 2: List of Figures

## 9.3.  Appendix 3: List of Values for each Field Observed

| FIELD | VALUES |
| --- | --- |
| Gender | <ul><li>Female</li><li>Male</li><li>Unknown</li></ul> |
| Ethnicity | <ul><li>Asian</li><li>Black</li><li>Caucasian</li><li>Latino</li><li>Middle Eastern</li><li>Unknown</li></ul> |
| Perceived Age | <ul><li><18</li><li>18-25</li><li>26-35</li><li>36-45</li><li>46-55</li><li>56-65</li><li>>65</li><li>Unknown</li></ul> |
| Clothing Style | <ul><li>Casual</li><li>Business Casual</li><li>Professional</li><li>Other</li></ul> |
| Appeared to Live/Sleep on Site | <ul><li>Yes</li><li>No</li></ul> |
| Drove | <ul><li>Drove</li><li>Rode</li><li>Unknown</li></ul> |
| Minor on Site | <ul><li>Yes</li><li>No</li></ul> |
| Characteristics that a Person is a Worker | <ul><li>Unlocking/locking the door</li><li>Taking out the trash</li><li>Taking smoke/other breaks</li><li>Appeared to live on site</li></ul> |

## 9.4. Appendix 4: Variables Used for Each Regression Model

| ATTRIBUTES | REGRESSION MODELS | | | |
| --- | --- | --- | --- | --- |
| | MULTIPLE LINEAR | RIDGE | ELASTIC NET | RANDOM FOREST |
| **Number of Reviews per Location** | X | X | X | X |
| **Average IMB Rating** | | | | X |
| **Average Provider Rating** | X | X | X | X |
| **Average Massage Rating** | X | X | X | X |
| **Number of Reviews per Monday** | X | X | X | X |
| **Number of Reviews per Tuesday** | | | | X |
| **IMB Only Accepts Cash** | | | | X |
| **Tip Amount** | | | | X |
| **Percent of Population Below Poverty** | | | | X |

# 10. References

Abolition Demand. (2018, November). *Who Buys Sex.* Retrieved from Demand Abolition: https://www.demandabolition.org/wp-content/uploads/2019/07/Demand-Buyer-Report-July-2019.pdf

Anonymous. (2019, October). Legitimate Licensed Massage Therapist.

*Article 8: Special Permits.* (n.d.). Retrieved from Fairfax County Government: https://www.fairfaxcounty.gov/planning-development/sites/planning-development/files/assets/documents/zoning/zoning%20ordinance/art08.pdf

Bouche, V., & Crotty, S. M. (2017, June 27). Estimating demand for illicit massage businesses in Houston, Texas. *Journal of Human Trafficking*. doi:10.1080/23322705.2017.1374080

*Code of Virginia*. (2019). Retrieved from Virginia Law: https://law.lis.virginia.gov/vacode/title18.2/chapter8/section18.2-386.1/

Cornell Law School. (n.d.). *Personally Identifiable Information (PII)*. Retrieved from Legal Information Institute: https://www.law.cornell.edu/cfr/text/2/200.79

Cunningham, S., & Kendall, T. D. (2016, October). Examining the Role of Client Reviews and Reputation within Online Prostitution. *The Oxford Handbook of the Economics of Prostitution*, 9-33. doi:10.1093/oxfordhb/9780199915248.013.17

Dank, M., Khan, B., Downey, P. M., Kotonias, C., Mayer, D., Owens, C., & Yu, L. (2014). Estimating the size and structure of the underground commercial sex economy in eight major U.S. cities. *Washington, DC: Urban Institute*. Retrieved from https://www.urban.org/sites/default/files/publication/22376/413047-estimating-the-size-and-structure-of-the-underground-commercial-sex-economy-in-eight-major-us-cities_0.pdf

Eck, J. (2014). A General Model of the Geography of Illicit Retail Marketsplaces. Retrieved from https://www.researchgate.net/publication/254766976

Fairfax County Government. (2006). *Consumer Services Devision.* Retrieved from Fairfax County Virginia: https://www.fairfaxcounty.gov/cableconsumer/sites/cableconsumer/files/assets/documents/pdf/ralb/28.1_massage_110411.pdf

*Haversine formula*. (2019). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Haversine_formula

Holt, T. J., Blevins, K. R., & Fitzgerald, S. (2016, October). Examining the Economics of Prostitution Using Online Data. *The Oxford Handbook of the Economics of Prostitution*, 98-121. doi:10.1093/oxfordhb/9780199915248.013.18

*Hyperparameter Optimization*. (2019). Retrieved from Wikipedia:
https://en.wikipedia.org/wiki/Hyperparameter_optimization

Khan, B., Downey, M., Dank, M., & Dombrowski, K. (2016, October). A Method for Determining the Size of the Underground Cash Economy for Commercial Sex in Seven US Cities. *The Oxford Handbook of the Economics of Prostitution*, 348-365.
doi:10.1093/oxfordhb/9780199915248.013.12

Kirchgässner, G. (2016). On Estimating the Size of the Shadow Economy. *German Economic Review*, 99-111. doi:10.1111/geer.12094

*Massage Establishments*. (n.d.). Retrieved from Fairfax County Consumer Services Division:
https://www.fairfaxcounty.gov/cableconsumer/csd/regulation-licensing/massage-establishments

*Massage Therapist*. (n.d.). Retrieved from Fairfax County Consumer Services Division:
https://www.fairfaxcounty.gov/cableconsumer/csd/regulation-licensing/massage-therapist

*Mean squared error*. (2019, December). Retrieved from Wikipedia:
https://en.wikipedia.org/wiki/Mean_squared_error

*Monte Carlo method*. (2019). Retrieved from Wikipedia:
https://en.wikipedia.org/wiki/Monte_Carlo_method

*Municode Fairfax County, VA*. (n.d.). Retrieved from Chapter 28.1 - Massage Therapy, Establishments and Services:
https://library.municode.com/va/fairfax_county/codes/code_of_ordinances?nodeId=FACOCO_CH28.1MATHESSE_ART1GEPR_S28.1-1-3DE

Myles, B. (2019, October). Former CEO, Polaris.

Northern Virginia Human Trafficking Initiative. (2019).

Peng, H. (2016, October). Economic Theories and Empirics on the Sex Market. *The Oxford Handbook of the Economics of Prostitution*, 33-56.
doi:10.1093/oxfordhb/9780199915248.013.2

Polaris. (2011). *National Human Trafficking Resource Center.* Retrieved from Fake Massage Businesses in the United States:
https://humantraffickinghotline.org/sites/default/files/Fake%20Massage%20Businesses%20AAG.pdf

Polaris. (2017). *Human Trafficking in Illicit Massage Businesses.* Retrieved from Massage Parlor Trafficking: https://polarisproject.org/sites/default/files/Executive%20Summary%20-%20Human%20Trafficking%20in%20Illicit%20Massage%20Businesses.pdf

Polaris. (2019b). *Hotline Statistics*. Retrieved from National Human Trafficking Hotline: https://humantraffickinghotline.org/states

Polaris. (2019c). *Virginia*. Retrieved from Human Trafficking Hotline: https://humantraffickinghotline.org/state/virginia

*Regression Analysis*. (2019, December). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Regression_analysis

Roe-Sepowitz, D., Bontrager Ryon, S., Hickle, K., Gallagher, J. M., & Hedber, E. C. (2016). Invisible Offenders: Estimating Online Sex Customers. *Journal of Human Trafficking, 2*(4), 272-280. doi:https://doi.org/10.1080/23322705.2015.1107711

Sammut, C., & Webb, G. I. (Eds.). (2011). *Leave-One-Out Cross-Validation* (2010 ed.). Springer, Boston, MA. doi:https://doi.org/10.1007/978-0-387-30164-8

*Schools and Centers*. (2019). Retrieved from Fairfax County Public Schools: https://www.fcps.edu/index.php/schools-centers

Swaner, R., Labriola, M., Rempel, M., Walker, A., & Spadafor, J. (2016, June). *Center for Court Innovation.* Retrieved from Youth Involvement in the Sex Trade: A National Study: https://www.courtinnovation.org/sites/default/files/documents/Youth%20Involvement%20in%20the%20Sex%20Trade_3.pdf

*Training, validation, and test sets*. (2020). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Training,_validation,_and_test_sets

U.S. Government. (2000, October). *Victims of Trafficking and Violence Protection Act of 2000.* Retrieved from Discover U.S. Government Information: https://www.govinfo.gov/content/pkg/PLAW-106publ386/pdf/PLAW-106publ386.pdf

Venema, R. M., Heeringa, O., & Sweda, N. (2019). *Estimating the Demand and Gross Annual Economy of Illicit Massage Businesses in Grand Rapids, Michigan.* Calvin College.

Virginia Board of Nursing. (2018). Retrieved from Virginia Department of Health Professions: https://www.dhp.virginia.gov/media/dhpweb/docs/nursing/leg/MassageTherapy_012418.pdf

Wilcox, A., Christmann, K., Rogerson, M., & Birch, P. (2009, December). *Tackling the demand for prostitution: A rapid evidence assessment of the published research literature (Research Report 27).* Retrieved from UK Government National Web Archives: http://webarchive.nationalarchives.gov.uk/20110218135832/rds.homeoffice.gov.uk/rds/pdfs09/horr27c.pdf