



Original research article

## Quantifying disparities in access to public-sector abortion based on legislative differences within the Mexico City Metropolitan Area☆☆☆



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### ABSTRACT

**Objectives:** In the Mexico City Metropolitan Area, only women in the city center have local access to legal first-trimester abortion. We quantify how this legislative discrepancy affects access to legal, public-sector abortion across the metropolitan area.

**Study design:** In this observational study, we used a dataset representing 67.2% of all abortions occurring between 2010 and 2012 in Mexico City's public abortion program and census population data. We calculate utilization rates for 75 municipalities in the metropolitan area for 2010–2012. We compare utilization between municipalities with and without local legal access, adjusting for differences in sociodemographic drivers of abortion demand. We explore the effects of local abortion legality, travel time and socioeconomic status (SES).

**Results:** Women who had to travel into the city center for legal abortions used services at only 18.6% (95% CI 13.3%–33.0%) of the expected rate if they had local access, adjusting for sociodemographic factors. After controlling for travel time and SES, women who lived where abortion is illegal had a 58.6% (95% CI 21.5%–78.1%) reduction in access, and each additional 15 min of travel further reduced access by 33.7% (95% CI 18.2%–46.3%). Women who travel to seek legal abortions are more likely to have completed secondary education compared to other reproductive age women in their municipality ( $p = <.00001$ ).

**Conclusions:** We find that, in the Mexico City Metropolitan Area, both living where abortion is illegal and having to travel further to access services substantially reduce access to legal, public-sector abortion. These burdens disproportionately affect women of lower SES.

**Implications:** Both local legality and proximate access are key to ensuring equity in access to public-sector abortion. Legalization of abortion services across the greater Mexico City Metropolitan Area has the potential to increase equity in utilization and meet unmet demand for legal abortion.

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### 1. Introduction

Latin America is home to some of the world's most restrictive abortion laws; 97% of the population lives where abortion is illegal or very restricted; yet, an estimated 32% of all pregnancies end in abortion

[1,2]. Approximately 60% of these abortions are unsafe [2], and 12% of maternal deaths in the region result from unsafe abortion [3,4]. Mexico City represents one of the few areas in Latin America, and the only area in Mexico, where first-trimester abortion is available on request to all women.

Nevertheless, abortion is not legal across the entirety of the Mexico City Metropolitan Area. The city center is an independent Mexican state (referred to as *Ciudad de México* or *CDMX*), which legalized first-trimester abortion in 2007. The remainder of the municipalities of the metropolitan area lie in an adjacent state (*el Estado de México*), where abortion remains highly restricted. In the city center, women have local access to free and legal first-trimester abortion services through a public-sector program, known as *Interrupción Legal de Embarazo*

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(ILE) [3]. The ILE program is run by the CDMX Ministry of Health and provided more than 202,000 abortions from 2007 to 2018 [5]. Women living in surrounding municipalities must travel through the metropolitan area to access legal abortion in the city center. According to the 2010 census, the Mexico City Metropolitan Area is home to 5.7 million women of reproductive age, 44% of whom live in the city center and 56% of whom reside in 59 surrounding municipalities.

Explicit public-sector responsibility for service provision following legalization of abortion has not been seen universally [6]; this makes CDMX a unique example of legal change linked with a commitment to make abortion services available for all women. Nevertheless, it is not clear that the current policy has created effective access for all women in the larger metropolitan area. There is little precedent in the literature to suggest how legal abortion made available in one part of a city may represent access for women across the metropolitan area, especially in a middle-income country such as Mexico. Previous quantitative studies looking at travel time and abortion access have mainly focused on urban–rural disparities in high-income nations [7–12]. This study aims to examine how the legislative discrepancy affects access to public-sector abortion across the Mexico City Metropolitan Area, with a focus on local legality of abortion, travel time and socioeconomic status (SES).

2. Materials and methods

We reviewed the medical records of women seeking abortions at four ILE program clinics in the city center. Data were collected by leveraging existing electronic databases in addition to paper chart review conducted by trained hospital chart abstractors (see previously published description for more details) [13]. We included all observations of women reporting a valid postal code of residence in 1 of 75 municipalities in the Mexico City Metropolitan Area. We excluded women who reported residing outside of these areas or who did not report a

valid age. We performed a 5% random chart reabstraction data quality validation exercise (see appendix) to verify the data. Our final dataset represents 67.2% of the total ILE program volume from 2010 to 2012. We previously demonstrated that the available sociodemographic characteristics of this subset are very similar to the overall population served by the ILE program [13].

We used this dataset to quantify utilization rates for 75 municipalities in the Mexico City Metropolitan Area. Sixteen municipalities lie in the city center where abortion is legal; the remainder are located in the wider metropolitan area where abortion is not legal (Fig. 1A). We used data from the Mexican national 2010 census for population- and municipality-level characteristics [14].

For all 75 municipalities (m) and 5-year age groups from 15 to 49 (a), we calculated utilization rates as the number of women seeking an abortion with the ILE program between 2010 and 2012 over the number of women in the population according to the 2010 census [14].

$$Utilization_{m,a} = \frac{Abortions\ sought_{m,a}}{Population_{m,a}}$$

To compare utilization between municipalities that do and do not have local access to legal abortion, we calculated an access index (Eq. 2). For each municipality and age group, we compared the observed utilization of the ILE program ( $Utilization_{m,a}$ ) to the average utilization in municipalities with local access to one of the ILE clinics in our dataset. The specific municipalities in the city center with local access to ILE program sites in our study are therefore treated as a 100% benchmark.

$$Access\ index_{m,a} = \frac{Utilization_{m,a}}{Average\ utilization\ with\ local\ access_a} * 100\%$$

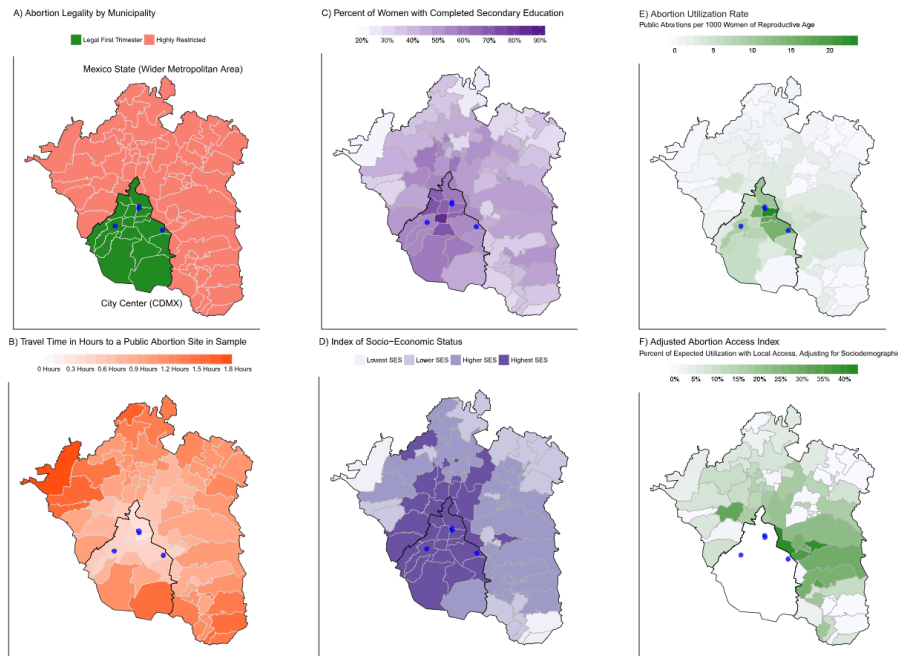


Fig. 1. Abortion legal status, sociodemographic factors and abortion utilization in the Mexico City Metropolitan Area. The blue dots represent the ILE locations where data were collected. (A) The legal status of abortion and our sample sites. (B) The travel time in hours to an ILE site in the sample. (C) The municipality-level percent of women age 15–49 completing at least secondary education. (D) A categorical measure of municipality-level SES. (E) Observed public abortion utilization rates. (F) The adjusted access index, i.e., the percent of expected utilization if there were local access to legal public abortion. Note that panels E and F are drawn from a database representing 67.2% of the total ILE population; see appendix for more details.

Because the access index assumes that all municipalities have the same demand for abortion, we adjusted for possible underlying differences in demand using previously identified sociodemographic drivers of abortion rates (educational attainment, religiosity, relationship status and employment status) [7,15–17] as determined using 2010 census data (see appendix for full details of the estimation method) [18].

$$\text{Adjusted access index}_{m,a} = \frac{\text{Utilization}_{m,a}}{\text{Expected utilization with local access}_{m,a}} * 100\%$$

To calculate travel time by car or public transportation from the center each of the 75 municipalities to any of the 4 ILE sites included in our study, we used software that leverages Google maps [19]. We assumed traffic patterns of travel during a weekday morning, which is the typical service provision time for ILE sites. We tested the sensitivity of our results to the choice of travel metric by exploring the correlation between a number of measures of travel time and travel distance (see appendix). We used the minimum travel time in hours by car or public transit as our metric of travel time.

We mapped travel times as a continuous variable and used a categorical version with 15-min increments to stratify the abortion access indices. We also estimate the dose–response curve between travel time and the adjusted access index to isolate the effect of local illegality, controlling for travel time, using a regression model.

$$\log(\text{Adjusted access index}_m) = \beta_0 + \beta_1 \text{illegality} + \beta_2 \text{travel time}$$

We did not include sociodemographic control variables in this model as they are already incorporated into the construction of the adjusted access index.

We used a categorical index of municipality-level SES, based on 2010 census data and made available by the Mexican National Institute for Statistics and Geography [20], to stratify the access indices. We also examined trends by person-level SES by comparing the educational attainment of individual women who sought abortions in the ILE program to the average educational attainment of all women of reproductive age from the same municipality based on census data [21]. We conducted this comparison separately for each 15-min increment of required minimal travel time to seek care to see if the relationship varied by travel time.

### 3. Results

Of the 35,054 women included in our dataset who reported a valid municipality in 1 of the 75 municipalities in the study (Fig. 1A), we excluded 17 (<0.1%) missing age information. Although 56.0% of women of reproductive age in the metropolitan area live in municipalities surrounding the city center, only 23.6% of women seeking abortion through the ILE sites in our study reported residing in these municipalities. This disparity is reflected in the overall access index value, which shows that, from 2010 to 2012, women of reproductive age living outside of the city center accessed abortion at only 9.7% of the per-person rate of their counterparts with local access (Fig. 2A). After adjusting for differences in sociodemographic drivers of abortion demand, they used care at 18.6% (95% CI 13.3%–33.0%) of the expected rate if they had access to legal abortion located in their community, as shown by the total adjusted access index (Fig. 2).

The abortion utilization rate was related to the travel time required to reach legal care, with a strong dose–response curve observed (Fig. 2A). The access index for the closest municipalities without local legal access, with their centers located only 15–30 min from an ILE site in our study, is 30.0%, with an adjusted access index of 32.4% (95% CI 23.2%–55.6%). This falls to an access index of just 3.1% and an adjusted access index of 6.6% (95% CI 4.5%–13.1%) for the furthest municipalities, i.e., 90 to 105 min from an ILE site in our study. For each additional

15 min of required minimum travel time, we observed a 33.7% (95% CI 18.2%–46.3%) reduction in the adjusted access index.

The municipalities just over the border from the city center show markedly reduced utilization rates compared to those within the city center, with a maximum observed adjusted access index value of 41.0%, despite not having substantially longer travel times than municipalities with local access (Fig. 1B and F). In regression models, which control for travel time, we found that living where abortion is illegal was associated with a 58.6% (95% CI 21.5%–78.1%) reduction in the adjusted access index.

For the analyses of the SES pattern by municipality, we excluded an additional 1522 (4.3%) abortions missing education information of the woman, leaving 33,532 observations. Abortion utilization rates vary by SES for women without local legal access both between (Fig. 2B) and within (Fig. 3) municipalities. Women living in the highest-SES municipalities without legal access had an access index of 16.4%, with an adjusted index of 20.0% (95% CI: 14.2%–34.8%). For women living in the lowest-SES municipalities, the access index falls to 2.8%, with an adjusted access index of 2.5% (95% CI: 1.8%–4.7%). Women traveling further are progressively more educated than the average woman in their municipality (Fig. 3). Overall, women who seek abortions are more likely to have completed secondary education compared to other women of reproductive age in their municipalities ( $p < 0.0001$ ).

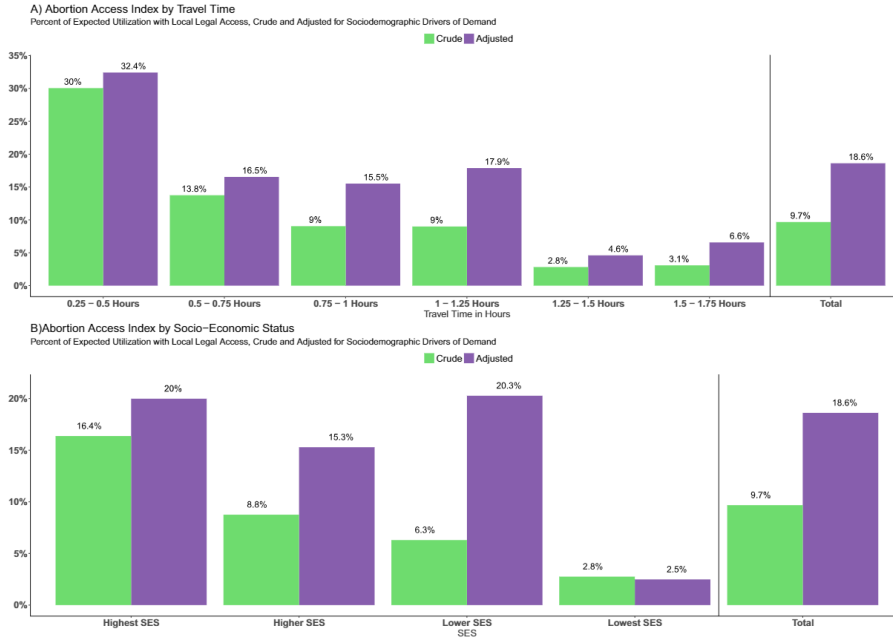
### 4. Discussion

The legalization of abortion in only part of the Mexico City Metropolitan Area has created a situation of reduced access to public-sector abortion services for the approximately 55% of the population of women of reproductive age living outside of the city center. Simply living where abortion is illegal, even accounting for travel time, is associated with an almost two-thirds reduction in expected utilization of public abortion services. Travel time adds a compounding barrier, as each 15 min of added travel time is associated with an additional one-third reduction in access. These barriers are more burdensome to women of lower SES, and we observe that those women who are able to travel to access public services tend to be from higher-SES municipalities and have higher educational attainment than average for their municipalities.

Some possible mechanisms for the barrier posed by local illegality in the context of proximate legal services include increased actual or perceived cost, a decreased level of knowledge about abortion services and increased stigma. The ILE normative and administrative framework indicates that only women in the city center are eligible to receive care for free. Nevertheless, sliding scale payment systems are often used, and in practice, the great majority of women seeking care from out of state are not charged for abortion services. Nevertheless, perceived cost may influence decision making for women considering travel into the city center. It is also possible that women who live where abortion is not legal are simply less aware that legal abortion is available close by due to reduced exposure to advertising or referrals to the ILE program. Stigma has been shown to be an important factor for women seeking abortion in Mexico, which may be more prevalent where abortion is illegal [22,23]. It is therefore possible that living where abortion is illegal is associated with increased experienced stigma even when legal abortion is available in another part of the same city. For all these reasons, women outside of the legal abortion zone may forgo accessing abortion services, or they may find it more feasible to access abortion illegally or outside of a health facility, which can be safe or may expose them to additional medical and legal risks.

Similar to previous studies in higher-income and rural areas [7,8,11,12], we find that travel time represents a substantial barrier to accessing public-sector abortion in an urban middle-income setting. The costs and planning requirements involved in traveling through the metropolitan area may be prohibitive to seeking public-service abortion for many women. Abortion is a time-sensitive service and more so because, in Mexico City, abortion is legal on-demand only in the first trimester.



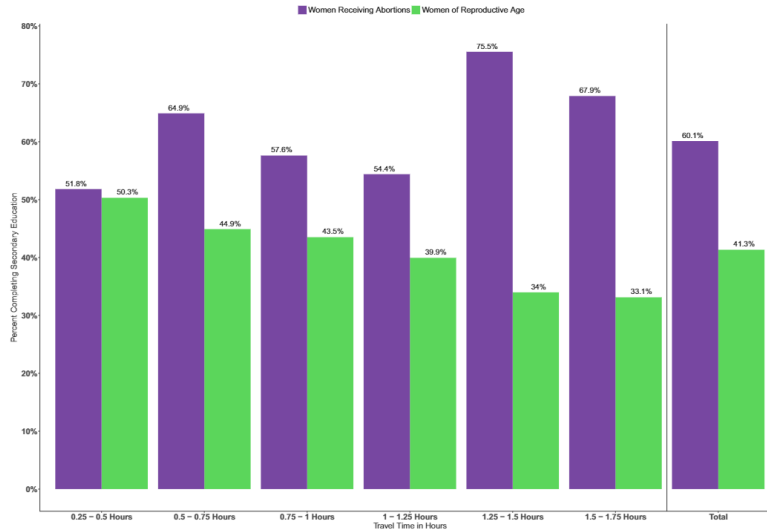


**Fig. 2.** Abortion access by travel time and SES among women without local legal access. Panels A and B show how abortion utilization among women living in the State of Mexico is related to (A) time required to travel into the city center to receive care and (B) a categorical measure of SES. For both parts, the y axis shows the abortion access indices, which represent the percent of the expected abortion utilization that was realized over the study period. The crude access index was calculated from age-specific averages for women living in municipalities with local access to legal care. The adjusted access index was adjusted using a regression model to account for differences in demand for abortion based on sociodemographic factors. In both crude and adjusted indices, women living further from legal care and in lower-SES municipalities use abortion services at much lower than expected rates.

Previous studies have shown that the process of gathering funds and securing transportation can delay accessing of care until after the legal limit [24–28].

We show that the differential legal status of abortion across the Mexico City Metropolitan Area has disproportionately affected women

of lower SES, which may represent the population that could most benefit from access to a public abortion program. Even within the ILE program, adolescents and women with lower levels of education are more likely to present for care past the legal limit [13]. Our results confirm other studies that suggest that SES is a key determinant of abortion



**Fig. 3.** Educational attainment of women traveling to obtain public abortions compared to all women of reproductive age, by travel time. The education of women – represented by the percent completing at least secondary education – in the general population of reproductive age and among women seeking public-sector abortion in the ILE program, shown for increments of travel time required to access services. With increasing distance, the women who are able to travel to utilize abortion services in DF are increasingly more educated than the average women of their municipality, reflecting how travel barriers are more burdensome for women of lower SES.

access [28,29], especially in determining who is able to cross a border to access care [30]. Current legislation may therefore be acting to perpetuate inequalities, creating additional stressors for vulnerable women.

This study is limited by its use of a denominator of all women of reproductive age, which assumes that we accounted for all major sociodemographic drivers of abortion demand. Although we controlled for many known drivers, some factors, such as interpersonal violence rates, were not available at the municipality level. This assumption may lead to small biases in the results; however, the magnitude of the disparity we report likely means that any biases would have a minimal effect on the reported trends. A further limitation is that our analysis uses a subset of the total ILE volume located at four sites. We may therefore be missing trends occurring in the other clinical sites not represented by our sample. Nevertheless, our data include high-volume sites and cover 67% of all ILE program abortions during the study period. Furthermore, the state of residence among women in our sample is very similar to the pattern seen in official aggregate statistics from the ILE program [5], and the subset has been shown to be representative of the population served by ILE in terms of sociodemographic factors [13].

The scope of our results is limited to public-sector abortion and does not consider the total incidence of abortion from all sources. Though abortion incidence is very difficult to measure with accuracy, existing state-level abortion estimates suggest that there may be a substantial number of abortions occurring outside of the ILE program among women who do not have local legal access [31]. Our data do not allow us to estimate if these abortions occurred in the private sector, in a self-induced or clandestine fashion, or in an inpatient hospital setting under narrow legal exceptions [6]. Although self-induced abortion using misoprostol can be a safe alternative to in-facility legal abortion [32–34], the criminalization of self-induced abortion in the wider metropolitan area may expose women to legal and medical risk.

The provision of abortion services in the public sector represents an important, and often underutilized, strategy to ensure that all women have equitable access to abortion following decriminalization. Our results suggest that the local availability of these public-sector services is paramount to facilitate access and that current legislation may be acting to perpetuate inequalities.

The legalization of abortion services in the remainder of the Mexico City Metropolitan Area, as well as their subsequent provision in the public sector free of charge, has the potential to increase equity in care utilization and meet unmet demand for abortion.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.contraception.2018.11.012>.

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