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Research Report

# The lives of intersex people: Socioeconomic and health disparities in Mexico

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## Abstract

This paper reports socioeconomic and health outcomes for individuals born with sex variations (i.e. intersex individuals) in Mexico based on large, nationally representative survey data collected between 2021 and 2022 ($n = 44{,}189$). The sample includes 608 intersex respondents, corresponding to a weighted estimate of ~1.6% of individuals aged 15–64 years, i.e. almost 1.3 million intersex people. The main empirical analyses document substantial negative outcomes for intersex individuals. There are significant disparities in mental, physical, and sexual health between intersex respondents and the endosex population, including higher rates of bullying during childhood (26 vs. 15% for endosex male and female individuals), harassment and violence in adulthood (20 vs. 10% for endosex male individuals), and mental health issues (46 vs. 34% for endosex male individuals). Additionally, intersex individuals have lower educational levels and are more likely to experience workplace rejection, exclusion, and discrimination and to face substantial barriers in healthcare environments.

**Keywords:** intersex, stigma, suicide, Mexico, LGBTQI+

## Significance Statement

This study uses data from the first nationally representative survey conducted by a national statistics office in a middle-income country to identify the LGBTQI+ population. It analyzes socioeconomic and health outcomes of Mexican intersex individuals—that is, people born with sex characteristics that do not fit typical definitions of endosex male or female bodies—a largely invisible group. Findings reveal that intersex individuals are more than twice as likely as endosex individuals to experience workplace rejection (15 vs. 6–7%), and their rates of suicidal intention are over double those of endosex women (13 vs. 6%) and triple those of endosex men (4%). Results highlight the need for targeted policies to address the stigma faced by intersex individuals.

## Introduction

Intersex individuals are individuals whose sex characteristics do not fit the typical binary notion of male and female bodies. These variations, which include differences in genitals, gonads, chromosomes, and hormone patterns, may be visible at birth, become evident during puberty, or not be physically apparent at all (1–4). Intersex status is distinct from a person's sexual orientation or gender identity (1, 3, 4). These sex variations have been recognized since ancient history, for example, in the Hippocratic/Galenic model viewing sex as a spectrum (5) or in epic figures such as Hermaphroditus from Greek mythology or Ardhanarishvara from Hinduism (4). Yet, the mere existence of intersex individuals challenges the widespread notion of sex as binary. For this reason, intersex individuals are often bullied, stigmatized, and subject to unnecessary—and even harmful—surgery during childhood without their consent (6, 7). Medical practitioners have historically tried to correct these "shameful aberrations" (1, p. 139) and to erase any evidence of sex diversity, while social scientists have remained largely oblivious to these groups (1, 8, 9).

Some of the most frequent interventions fall under the categories of "masculinizing" surgery, "feminizing" procedures, "sterilizing" procedures, and other medical and nonmedical practices that are often considered unnecessary and harmful by leading human rights organizations (8–10). For example, in May 2014, an interagency statement from United Nations (UN) bodies explicitly acknowledged that "intersex persons, in particular, have been subjected to cosmetic and other non-medically necessary surgery in infancy, leading to sterility, without informed consent of either the person in question or their parents or guardians" (11). These practices have been recognized as human

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rights violations by international human rights bodies and national courts (12). In response to the growing awareness of these harms, in 1999, the Constitutional Court of Colombia restricted the ages for surgical interventions in intersex children, while countries such as Malta in 2015, Portugal in 2018, Germany and Iceland in 2021, Greece in 2022, and Spain in 2023 implemented bans on such surgeries for minors (13–15). Additional legal details are provided in the Supporting Text. Leading practitioners in patient-centered care now advocate for a long-term management strategy that emphasizes the importance of informed consent and respect for individual autonomy in medical decisions. Such a strategy involves a range of pediatric subspecialists, including intersex-affirming mental health providers and pediatricians, along with parents (16).

In this study, we analyze data from a nationally representative survey conducted in Mexico between 2021 and 2022 to estimate the size of the intersex population and to analyze the socioeconomic and health disparities that it faces. Approximately 1.6% of individuals aged 15–64 years are intersex ($n = 608$), which corresponds to 1,282,296 individuals, a figure consistent with previous medical estimates (17). Using this dataset, we propose and test whether intersex individuals face significant challenges across their life cycle, including higher rates of bullying and stigma during childhood and adolescence, greater exposure to harassment and violence in adulthood, and markedly worse mental health outcomes, such as suicidal ideation and intention. These disparities extend to socioeconomic domains, where intersex individuals report lower educational attainment, higher workplace rejection, and lower life satisfaction than do their endosex counterparts.

We posit that in line with minority stress theory, which argues that chronic stress from stigma, discrimination, and societal exclusion leads to adverse outcomes for marginalized groups. For intersex individuals, this stress is compounded by group-specific factors, such as medical trauma, condition secrecy, and body-related stress, as well as societal assumptions rooted in heteronormativity, cisnormativity, and ableism (18). Resilience factors, including social support, openness, and agency, can mitigate these stressors, but their availability often depends on systemic and cultural contexts (18, 19). Moreover, we contend that the dominance of binary norms in biomedical discourses frequently marginalizes intersex individuals, creating barriers to equitable care and social inclusion (4, 20). While some intersex individuals can "pass" as endosex, enabling them to avoid certain forms of overt discrimination, doing so often comes at the cost of internalized shame and limited opportunities to advocate for their own needs.

In this context, the case of Mexico is particularly interesting, as this country has recently made significant strides in advancing the rights of lesbian, gay, bisexual, transgender, queer, intersex, and other sexual and gender minority individuals (LGBTQI+). For example, in 2024, the Mexican Senate passed a bill banning conversion therapy nationwide (21), while same-sex marriage has achieved legal recognition across the entire country, first, in Mexico City in 2009 (the first jurisdiction in Latin America to do so) and, most recently, in Tamaulipas in 2022 (22). Additionally, intersex individuals are likely to have benefited from the 2023 change to Mexican passports allowing for the selection of option "X" in addition to male or female (23). At the same time, there is evidence of socioeconomic disparities by sexual orientation in Mexico, in line with the literature from other Latin American and high-income countries (24–26).

Our research contributes to the very small set of studies focused on intersex individuals (2). Most of these analyses are based on nonrepresentative samples (27–29), rely on a limited number of respondents (30, 31), and use data only from medical records (2). Nevertheless, the previous literature supports our main findings, documenting the high levels of stigma and discrimination that impact various aspects of intersex people's lives through their influence on romantic relationships, social interactions, well-being, and socioeconomic outcomes (6, 32, 33). For example, respondents in qualitative interviews recall the stigmatizing experience of having their genitalia painfully and intrusively examined in childhood and adolescence, often by groups of trainees (34). None of these studies focuses on Latin American countries, although a few studies use data from other middle-income countries, such as India (35) and Indonesia (36).

In addition, we expand the LGBTQI+ literature by focusing on a subgroup that has often been excluded by LGBTQI+ organizations and events, as well as in LGBTQI+ studies. Indeed, although research on LGBTQI+ issues has recently benefited from an increase in the available data on sexual orientation and gender diversity in many countries (37), including those in Latin America (1, 24, 25, 38–40), intersex status is still not routinely measured in population surveys, healthcare settings, or administrative datasets (1). According to a report by the National Academies (2), intersex populations "have been almost wholly ignored." Interestingly, given that a large share of intersex individuals identify as transgender or nonbinary (as later reported in the empirical analysis), several—but not all—of the challenges faced by intersex individuals are in line with those faced by gender minorities (trans+, as defined by the national statistics office in Mexico), e.g. discrimination, barriers to accessing healthcare and public accommodation, a lifetime experience of stigma and minority stress, and a higher incidence of mental health issues and suicide attempts (2, 37, 41). Notably, however, individuals have multiple intersecting identities that can influence the specific barriers that they encounter, leading to experiences of stigma and oppression that may differ across minoritized groups.

More generally, our findings are linked to the large number of studies analyzing discrimination and disparities by gender or among other marginalized groups. For example, one could argue that the invisibility, social exclusion, and stigma experienced by intersex individuals would resonate with some of the challenges faced by Native Americans and other Indigenous populations. Indeed, Indigenous populations tend to be undercounted in national surveys—or not be counted at all—and are often collapsed into "other" categories due to small sample sizes: American Indians and Alaska Natives have been described as the "Asterisk Nation" because, instead of a data point, an asterisk is often used in data displays to suppress statistics (2). Indigenous individuals have also suffered from the unintended effects of well-meaning paternalistic policies (42). Similarly, as intersex people, Black individuals are more likely to be victims of bullying, and they face barriers to healthcare access, as well as widespread discrimination in health settings and in the labor market (43). Relatedly, intersex individuals have an incidence of mental health issues that is similar to that of women. Furthermore, while intersex individuals have lower educational levels than endosex individuals have, their labor force participation rate is between the labor force participation rates of men and women. These results are likely to be affected by gender norms, as highlighted in several studies in gender economics (44).

## Results

The analysis relies on data from a nationally representative household survey conducted in Mexico between 2021 and 2022, with one randomly selected respondent per household completing

**Table 1.** Descriptive statistics for intersex and endosex individuals.

| | Endosex female (1) | Endosex male (2) | Intersex (3) | (3)–(1) (4) | (3)–(2) (5) |
|---|---|---|---|---|---|
| *Sociodemographic characteristics* | | | | | |
| Age | 37.61 | 37.04 | 36.38 | −1.23 | −0.66 |
| | (13.82) | (14.05) | (14.82) | [0.14] | [0.44] |
| Indigenous | 0.10 | 0.12 | 0.17 | 0.07[a] | 0.05[b] |
| | (0.30) | (0.32) | (0.38) | [0.00] | [0.01] |
| African descendant | 0.02 | 0.03 | 0.04 | 0.01[c] | 0.00 |
| | (0.14) | (0.18) | (0.19) | [0.09] | [0.80] |
| Skin tone | 6.88 | 6.54 | 6.54 | −0.34[a] | 0.00 |
| | (1.22) | (1.34) | (1.48) | [0.00] | [0.96] |
| Married or partnered | 0.57 | 0.58 | 0.54 | −0.03 | −0.04 |
| | (0.50) | (0.49) | (0.50) | [0.31] | [0.13] |
| Divorced, widowed, or separated | 0.14 | 0.07 | 0.09 | −0.05[a] | 0.02 |
| | (0.35) | (0.26) | (0.28) | [0.00] | [0.23] |
| Secondary | 0.26 | 0.28 | 0.27 | 0.00 | −0.01 |
| | (0.44) | (0.45) | (0.44) | [0.96] | [0.67] |
| Postsecondary | 0.25 | 0.26 | 0.11 | −0.14[a] | −0.15[a] |
| | (0.43) | (0.44) | (0.31) | [0.00] | [0.00] |
| Household size | 4.33 | 4.25 | 4.11 | −0.22[b] | −0.15 |
| | (1.98) | (1.91) | (1.75) | [0.04] | [0.17] |
| Children at home | 0.57 | 0.51 | 0.50 | −0.07[b] | −0.01 |
| | (0.50) | (0.50) | (0.50) | [0.02] | [0.81] |
| *Sexual orientation and gender identity* | | | | | |
| Bisexual | 0.04 | 0.01 | 0.05 | 0.01 | 0.03[a] |
| | (0.19) | (0.11) | (0.21) | [0.49] | [0.00] |
| Gay/Lesbian | 0.01 | 0.03 | 0.04 | 0.03[a] | 0.02[c] |
| | (0.10) | (0.16) | (0.20) | [0.00] | [0.08] |
| Other sexual orientation | 0.01 | 0.00 | 0.02 | 0.01[c] | 0.02[b] |
| | (0.08) | (0.06) | (0.15) | [0.08] | [0.03] |
| Trans+ | 0.01 | 0.01 | 0.08 | 0.07[a] | 0.08[a] |
| | (0.10) | (0.09) | (0.28) | [0.00] | [0.00] |
| Observations | 18,866 | 15,730 | 608 | | |

The table reports weighted means for endosex female individuals (assigned at birth), endosex male individuals (assigned at birth), and intersex individuals (regardless of sex assigned at birth) aged 15–64 years via ENDISEG sample weights and according to the ENDISEG sampling design. SDs are reported in parentheses in columns (1) to (3). Columns (4) and (5) present the differences in means between intersex individuals and endosex female individuals and endosex male individuals, respectively, with *P*-values reported in square brackets. See the detailed variable description in the Supporting Text. [a]$P < 0.01$, [b]$P < 0.05$, [c]$P < 0.1$.

a combination of face-to-face and audio-assisted interviews to ensure privacy. The sample size is 44,189 people aged 15 years and over, representing 97.2 million people. The main analysis focuses on the working-age population (respondents aged 15–64 years). This empirical analysis consists of comparisons of weighted means across groups. The variables of interest cover retrospective recall questions (e.g. childhood bullying or stigma) and current measures of well-being (e.g. life satisfaction, mental health challenges, and workplace experiences). All variables are described and summarized in the Supporting Text and Table S1. This dataset has already been used to study LGBTQI+ disparities (45).

## Comparative analysis of sociodemographic characteristics

Table 1 provides an overview of the sociodemographic characteristics of the endosex female respondents (assigned female at birth), endosex male respondents (assigned male at birth), and intersex respondents (assigned either male or female at birth). Intersex individuals are notably more likely than their endosex counterparts to identify as Indigenous, and a higher proportion of intersex individuals report African descent, although this difference is statistically significant only relative to endosex female individuals. Skin tone comparisons indicate that intersex individuals report lighter tones than do endosex female individuals, but no significant difference relative to male individuals is observed.

Regarding marital status, intersex individuals are less likely than endosex female individuals to be divorced, widowed, or separated. With respect to education, while secondary educational levels are comparable across all groups, significant disparities in postsecondary education are apparent. Intersex individuals are 14 percentage points less likely to have completed postsecondary education compared with endosex female individuals and 15 percentage points less likely compared with endosex male individuals, highlighting potential barriers to educational access and achievement for intersex individuals. Household composition varies slightly, with intersex individuals reporting statistically smaller household sizes and fewer children living in their homes compared with endosex female individuals. Notably, in this context, some intersex traits lead to infertility, but these traits do not characterize all intersex individuals (2).

Finally, the statistics in Table 1 show significant differences in sexual orientation and gender identity between intersex and endosex individuals. Indeed, among intersex participants, there is a higher proportion of individuals who identify as bisexual, gay, lesbian, or another sexual orientation category compared with the endosex groups. The proportion of intersex participants identifying as bisexual is 3 percentage points higher than that of endosex male individuals. Similarly, the proportion identifying as a gender minority (trans+) is significantly higher for intersex participants, with a difference of >7 percentage points relative to endosex individuals. This finding aligns with previous evidence suggesting that people with intersex traits are less likely than those without these traits to have cisgender experiences (1, 46). The inclusion of nonbinary individuals within the trans+ category likely contributes to the observed overlap between intersex and trans+ populations. This possibility suggests that the trans+ label, while practical for this analysis, might obscure nuances within

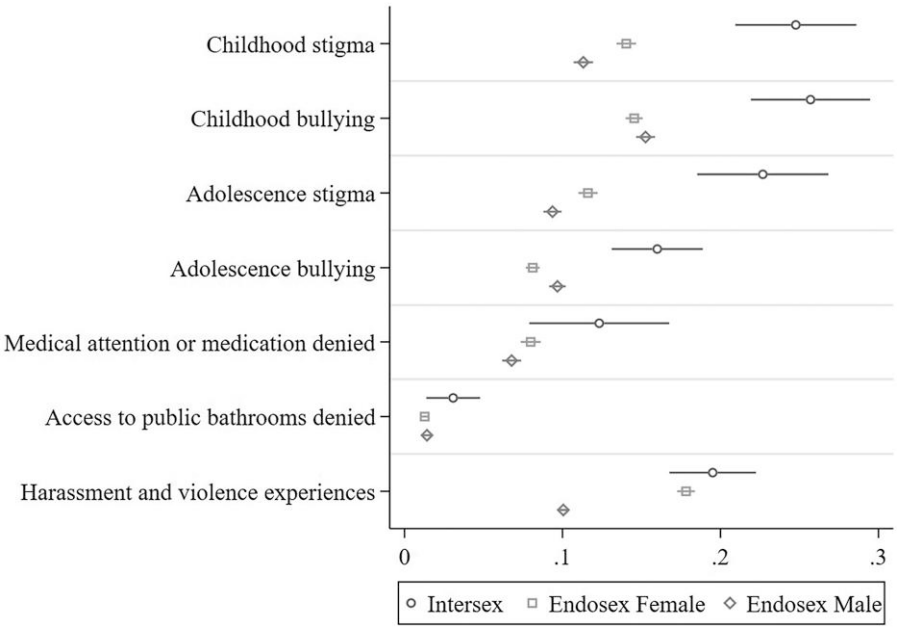


**Fig. 1.** The proportion of individuals reporting experiences of rejection across intersex and endosex groups. The figure illustrates the prevalence of experiences of stigma, bullying, and rejection during childhood, adolescence, and adulthood among intersex, endosex female, and endosex male individuals. All estimates include 95% CIs. Endosex male corresponds to endosex individuals assigned male at birth. Endosex female corresponds to endosex individuals assigned female at birth. See the detailed variable description in the Supporting Text and Tables S3–S5.

the population, particularly for intersex individuals whose identities often challenge traditional binaries. Relatedly, the higher rates of bisexuality reported by intersex individuals may reflect this positioning outside traditional frameworks of sex and gender, as well as broader intersectional experiences of identity.

## Adverse events over the life cycle

Figure 1 shows that intersex individuals face significantly higher rates of stigma and bullying during childhood than their endosex counterparts do. Specifically, 25% of intersex individuals report experiencing stigma during childhood, which is 11 percentage points higher relative to endosex female individuals ($P < 0.001$), and 13 percentage points higher relative to endosex male individuals ($P < 0.001$). As shown in Table S2A, the odds ratios of experiencing childhood stigma are 0.50 (95% CI: [0.39–0.62]) for endosex female individuals and 0.41 (95% CI: [0.32–0.52]) for endosex male individuals. With a statistically significant ratio below 1, these results indicate that both groups have significantly lower odds of experiencing stigma relative to intersex individuals (here, the reference group). Additionally, detailed comparisons using endosex groups instead as the reference group are presented in Table S2B. These experiences of stigma include feeling different from most other girls or boys their age because of how they dress or groom, their tastes or interests, how they speak or express themselves, or their manners or way of behaving (Table S3).

Similarly, 26% of intersex individuals report being bullied during childhood, compared with ∼15% of endosex female and male individuals, highlighting a troubling disparity in early social experiences. Here, the odds ratios are 0.44 for both endosex female (95% CI: [0.35–0.55]) and male (95% CI: [0.35–0.56]) individuals (Table S2A), showing that these groups are less likely than intersex individuals to experience bullying. Experiences of bullying include being rejected or excluded from social activities, being insulted or mocked, having belongings stolen or damaged, being threatened or blackmailed, and being physically assaulted (Table S3).

Adolescence experiences continue the trend of heightened stigma and bullying for intersex individuals. During these years, 23% of intersex individuals experienced stigmatization, which is significantly more than the percentages of endosex female respondents (12%) and endosex male respondents (9%) who report such experiences. The odds ratios—i.e. 0.48 (95% CI: [0.38–0.61]) for endosex female individuals; 0.39 (95% CI: [0.31–0.50]) for endosex male individuals—reflect this disparity (Table S2A). Additionally, bullying persists as an issue, with 16% of intersex individuals reporting such experiences during adolescence. This result represents a gap of 8 percentage points relative to endosex female individuals ($P < 0.001$) and 6 percentage points relative to endosex male individuals ($P < 0.001$). The construction of these averages for stigma and bullying during adolescence, as shown in Table S4, follows the same criteria used for childhood (Table S3) but considers the age range from 12 to 17 years. Once again, in this case, intersex individuals are more likely to have felt different and to have been bullied during adolescence in these subcategories.

Figure 1 also illustrates the experiences of discrimination, harassment, and violence faced by intersex individuals throughout their lives. For example, 12% of intersex individuals were unjustifiably denied medical attention or medication in the 5 years preceding the survey, compared with 8% of endosex female individuals and 7% of endosex male individuals. Put differently, for endosex female and male individuals, the odds of experiencing such denial are 38% (95% CI: [0.41–0.93]) and 48% (95% CI: [0.34–0.79]) lower, respectively, than the odds for intersex individuals (Table S2A). Discrimination also extends to access to public bathrooms: 3% of intersex individuals have been denied access, which is more than double the rate reported by endosex participants. For this experience, the odds ratios are 0.41 (95% CI: [0.22–0.75]) for

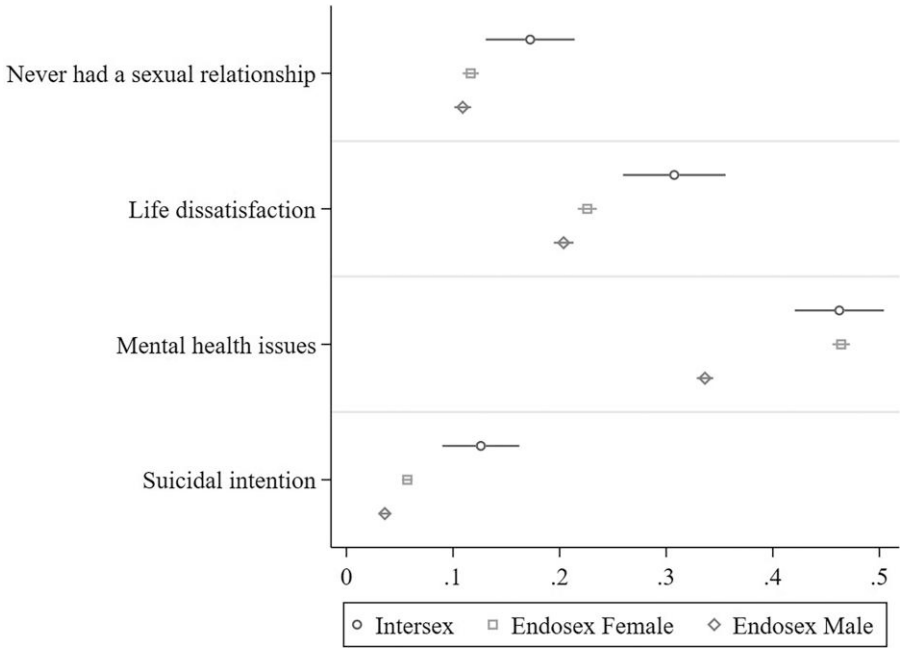


**Fig. 2.** Average values reported for variables associated with well-being across intersex and endosex groups. The figure illustrates disparities in various measures of well-being, such as life dissatisfaction and mental health issues, among intersex, endosex female, and endosex male individuals. All estimates include 95% CIs. Endosex male corresponds to endosex individuals assigned male at birth. Endosex female corresponds to endosex individuals assigned female. See the detailed variable description in the Supporting Text and Tables S7–S9.

endosex female individuals and 0.45 (95% CI: [0.25–0.83]) for endosex male individuals, further illustrating the disproportionate burden on intersex individuals (Table S2A).

Moreover, almost 20% of intersex individuals report experiences of harassment and violence. The odds ratios are 0.77 (95% CI: [0.60–0.99]) for endosex female individuals and 0.48 (95% CI: [0.38–0.62]) for endosex male individuals (Table S2A). These events, as shown in Table S5, include being threatened or sexually assaulted; being bothered by someone making sexual propositions in exchange for payment; being forced to have sexual relations; being humiliated, embarrassed, or verbally abused; receiving offensive messages; and being touched or groped without consent. For each of these subcategories, intersex individuals are more likely than male endosex to have experienced harassment and violence: they are also more likely than both male and female endosex individuals to have been humiliated, embarrassed, or verbally abused and to have received offensive messages.

## Disparities in well-being and sexual experiences

Figure 2 illustrates various aspects of well-being among adults, revealing significant disparities between intersex and endosex individuals. First, there are notable differences in sexual experiences. Specifically, 17% of intersex individuals had not yet had their first sexual relationship at the time of the survey, which is 6 percentage points higher relative to both endosex female ($P < 0.001$) and male ($P < 0.001$) individuals. However, this result drops to 3% for intersex individuals when only individuals aged 25–64 years are considered. This result is similar to the finding for endosex female individuals (3%) but higher than the finding for endosex male individuals (2%) in this age group. As shown in Table S6A, endosex female and male individuals are significantly less likely than intersex individuals to have never had a sexual relationship, with odds ratios of 0.63 (95% CI: [0.47–0.85]) and 0.59 (95% CI: [0.43–0.80]), respectively. These findings are in line with past research noting that many intersex individuals are dissatisfied with their sexual relationships and experience numerous challenges, including reduced sexual activity (33).

The experiences of stigma, bullying, and harassment noted above, as well as the challenges in forming intimate relationships, are likely to be closely intertwined with overall life satisfaction. Indeed, Fig. 2 shows that 31% of intersex individuals report being dissatisfied with their life, compared with 23% of endosex female individuals and 20% of endosex male individuals. The odds ratios are 0.66 (95% CI: [0.52–0.83]) for endosex female individuals and 0.58 (95% CI: [0.46–0.73]) for endosex male individuals (Table S6A). Additional comparisons using endosex groups as the reference category are provided in Table S6B. Table S7 reports the satisfaction levels for certain subdomains: intersex participants are significantly less satisfied with their physical appearance than are either endosex male or female participants. Similarly, they have worse family relationships, and they are less satisfied with their way of being.

The cumulative impact of the adverse experiences documented so far can also have significant consequences for mental health. Indeed, mental health issues are more prevalent among intersex individuals, with 46% reporting such issues, a rate that is comparable to that of endosex female individuals but significantly higher than that of endosex male individuals (34%). Regarding specific components of mental health, intersex individuals report substantially higher levels of insomnia, stress, anxiety, weight issues, and depression than do endosex male individuals, while they report more insomnia and depression but lower stress levels than do endosex female individuals (Table S8).

The severity of mental health issues among intersex individuals is underscored by their high rates of suicidal intention. Approximately 13% of intersex individuals have had suicidal intentions, which is significantly higher than the rates observed in endosex female individuals (6%) and endosex male individuals

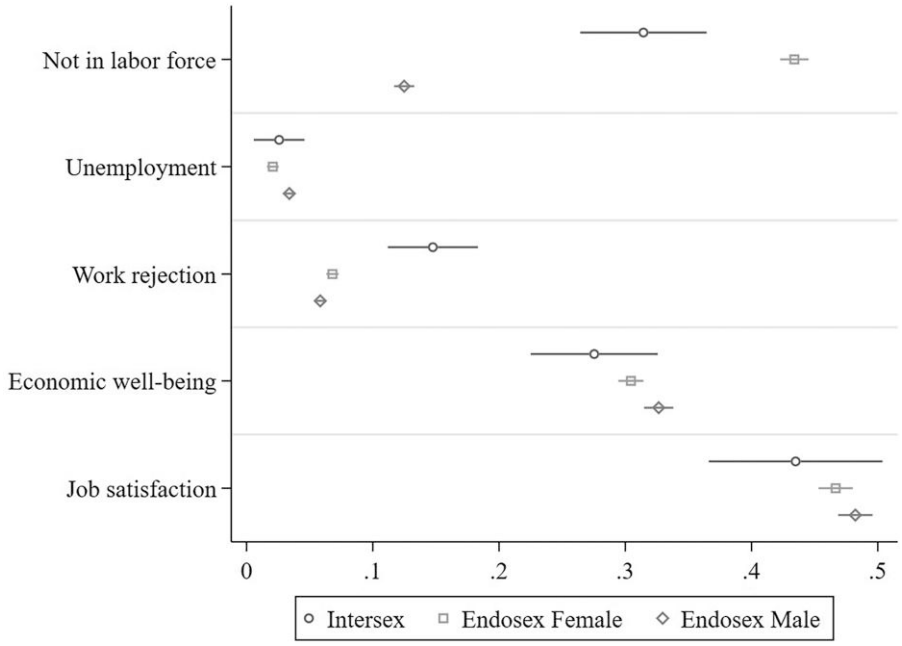


**Fig. 3.** Average labor market outcomes across intersex and endosex groups. The figure illustrates disparities in labor market outcomes, such as workplace rejection, job satisfaction, and economic well-being, among intersex, endosex female, and endosex male individuals. All estimates include 95% CIs. Endosex male corresponds to endosex individuals assigned male at birth. Endosex female corresponds to endosex individuals assigned female at birth. See the detailed variable description in the Supporting Text and Tables S7 and S11.

(4%). Similarly, 16% of intersex individuals report suicidal ideation (Table S9), which is 6 percentage points higher compared with endosex females ($P < 0.001$) and 9 percentage points higher compared with endosex males ($P < 0.001$). For endosex female and male individuals, the odds of having suicidal intentions are 58% (95% CI: [0.30–0.59]) and 74% (95% CI: [0.18–0.37]) lower, respectively, than the odds for intersex individuals (Table S6A). Intersex individuals are significantly more likely than endosex female individuals to cite their gender (34%) and sexual orientation (34%) as reasons for their suicidal ideation and intentions (Table S9).

## Labor market disparities and workplace rejection

Figure 3 presents the labor market outcomes for intersex and endosex people. Intersex individuals have a labor force participation rate of 69%, which is significantly lower than that of endosex male individuals (88%) but higher than that of endosex female individuals (57%). As shown in Table S10A, compared with intersex individuals, endosex female individuals are significantly more likely to be out of the labor force, with an odds ratio of 1.67 (95% CI: [1.32–2.12]), while endosex male individuals are far less likely to be out of the labor force, with an odds ratio of 0.31 (95% CI: [0.24–0.40]). Consistent patterns are observed in Table S10B using endosex groups as the reference category. For intersex individuals, the unemployment rate is 2.6%, which is slightly higher than that for endosex female individuals (2.1%) but lower than that for endosex male individuals (3.4%). However, these differences are not statistically significant, indicating that unemployment rates are relatively similar across these groups.

However, as shown in Fig. 3, a significant disparity in workplace rejection rates is observed. Fifteen percent of intersex individuals report that they have experienced rejection in the workplace, which is 8 percentage points higher compared with endosex female individuals ($P < 0.001$) and 9 percentage points higher compared with endosex male individuals ($P < 0.001$). Similarly, for endosex female and male individuals, the odds ratios are 0.38 (95% CI: [0.26–0.55]) and 0.32 (95% CI: [0.22–0.47]), respectively. Notably, among the different experiences of workplace rejection, compared with endosex male and female workers, intersex workers report receiving more offensive comments or teasing at work; they are more likely to feel excluded from events and social activities; they experience higher rates of unequal treatment in terms of benefits or promotions; and they are more likely to be harassed, hit, assaulted, or threatened (Table S11). These findings are in line with a previous study noting that more than one-fifth of LGBTQI participants (recruited through targeted and snowball sampling) in China reported negative treatment in the workplace due to their sexual orientation, gender identity, or sex characteristics, with intersex individuals being particularly affected (46).

When asked about their economic situation, 28% of intersex individuals report a positive economic situation, compared with 30% of endosex female individuals and 33% of endosex male individuals. Regarding job situation, 43% of intersex individuals are satisfied with their job, compared with 47% of endosex female individuals and 48% of endosex male individuals. In both cases, most of these differences are not statistically significant but are in line with previous statistics. Thus, overall, these results suggest that intersex individuals face challenging workplace environments and may be economically vulnerable.

The findings regarding labor market outcomes echo the broader challenges documented earlier in this paper with respect to the stigma, bullying, and discrimination faced by intersex individuals throughout their lives. These labor market outcomes are likely to be partly driven by the lower educational achievement of intersex individuals, as noted in Table 1 and the previous literature (28): intersex variations significantly disrupt educational trajectories, as many students face bullying and exclusion, leading to higher dropout rates. This diminished educational attainment may restrict future employment opportunities and earning potential, thus reinforcing economic disparities and limiting social mobility.

Furthermore, Table S12 shows that experiences of victimization during childhood and adolescence are significantly related to the health, educational, and economic disparities observed, further emphasizing the importance of early-life factors in shaping outcomes.

## Extensions and robustness checks

This section evaluates the robustness of our findings and presents extensions addressing potential misclassification and confounding factors. To mitigate misclassification, the survey allowed respondents to skip the intersex question if it was unclear (see Supporting Text). Additionally, the estimates do not vary substantially when older individuals (Table S13), who may be more prone to misunderstand the question, are included. This finding suggests that the exclusion of older individuals does not significantly bias the results.

To test the robustness of our findings, Figs. 1–3 are re-estimated excluding LGBTQI+ respondents (see Figs. S1–S3), and the intersex gaps remain consistent, confirming that these disparities are not solely attributable to intersectional identities within the LGBTQI+ population.

As described in the methodological section, all main analyses are conducted via the weights provided by the national statistical agency. Unweighted analyses replicate the primary figures (Figs. S4–S6) and produce consistent conclusions, further supporting the reliability of our results.

To explore whether sex assigned at birth influences the health and socioeconomic outcomes of intersex individuals, Figs. S7–S9 analyze the results separately by sex assigned at birth. While the overall trends remain consistent, notable differences emerge: intersex female individuals generally experience greater social and economic challenges, as well as substantially more experiences of harassment and violence, while intersex male individuals report higher rates of denial of certain services. Importantly, however, splitting the sample decreases statistical power, which may reduce the precision of the estimates and the ability to detect smaller differences. This limitation underscores the challenges of analyzing outcomes within relatively small subpopulations.

To further validate our findings, Tables S14–S19 include further robustness checks that involve regressions that compare intersex individuals against endosex male and endosex female individuals, respectively. These models include progressively detailed controls for demographic characteristics, sexual orientation, and gender identity. The models show that the disparities experienced by intersex individuals persist even after these potential confounders are accounted for. While the magnitude of some effects decreases slightly, the results remain statistically significant and qualitatively consistent across models. These results underscore the persistent inequalities faced by intersex individuals in various domains.

In the same direction, Table S20 presents Bonferroni-corrected results for multiple hypothesis testing, which do not alter the primary conclusions of our analyses. While this technique increases the *P*-values for certain outcomes, such as access to public bathrooms, medical attention denial, and economic well-being, these results were already marginally significant or nonsignificant in the original analysis.

To address potential misclassification in the intersex status variable, Tables S21–S23 report sensitivity analyses that simulate false positives (reclassifying endosex individuals as intersex) and false negatives (reclassifying intersex individuals as endosex) at thresholds of 10, 30, 50, and 80%. The results show that false negatives introduce more variability: for outcomes that were originally significant, statistical significance diminishes at higher thresholds (e.g. 50 and 80%) for key indicators such as suicidal intentions and economic well-being. Conversely, when differences were not significant in the original analysis, they generally remained nonsignificant across simulations. While these findings suggest some sensitivity to misclassification, the overall patterns largely persist, supporting the robustness of the results under reasonable misclassification scenarios.

# Discussion

This study reveals profound disparities faced by intersex individuals throughout their lives, impacting their well-being and labor market outcomes. Intersex individuals face significantly worse rates of stigma and bullying than do their endosex counterparts during both childhood and adolescence. These experiences reveal severe systemic challenges and human rights violations, with early adversities often setting the stage for continued disparities into adulthood.

The consistent and more numerous experiences of stigma, bullying, discrimination, and violence throughout the life cycle reflect broader societal issues, corroborating earlier discussions of systematic challenges and human rights violations, and they are similar to experiences documented in the previous literature (34, 47). For example, researchers have found that women with certain sex variations face significant stigma in romantic and sexual contexts, leading to social avoidance and the internalization of negative perceptions (31). These previous findings, combined with the results on sexual relationships presented in Fig. 2, suggest potential barriers to the formation of intimate relationships for intersex individuals since the complexities of intersex experiences extend into personal relationships and sexuality and may also more generally affect social integration. Likewise, scholars highlight the severe impact of social stigma on children with sex variations in India, which is exacerbated by misinformed medical practices and delayed diagnoses (35). Studies also report that patients with visible physical atypicality and those who have changed gender experience significant social stigmatization, leading to ostracism, depressive symptoms, and social isolation (36).

The mental health challenges among intersex individuals, including their higher rates of insomnia, depression, and suicidal ideation, underscore the compounding effects of stigma and discrimination. These challenges not only diminish individual well-being but also may incur greater economic costs due to intersex individuals' increased demand for mental health services and potential losses in productivity. Prior studies also highlighted these issues (32): intersex adults exhibit higher rates of anxiety, depression, and other psychiatric symptoms than does the endosex population, although some survey items had a significant number of missing values, which may affect the robustness of these findings. The stigma and frequent medical interventions, often conducted without proper consent, contribute to a sense of body dissatisfaction and shame among intersex individuals, exacerbating their mental health issues (2).

Similarly, workplace rejection, harassment, and violence further exacerbate intersex individuals' labor market disparities, even when their unemployment rates appear similar to those of their endosex counterparts. Overall, these findings underscore how vital it is to collect data on intersex individuals and the need for policymakers to recognize and address these socioeconomic and health disparities.

Addressing these disparities has become increasingly important as international organizations, states, and civil society groups recognize the human rights violations faced by intersex

individuals (13, 14). For example, several reports and policy initiatives focus on discrimination against intersex athletes (48, 49). Furthermore, in 2024, the UN adopted a historical resolution specifically targeting discrimination, violence, and harmful practices against intersex persons (50). Despite these initiatives, the lack of systematic data has kept intersex individuals largely invisible in policy settings, limiting the opportunities for meaningful interventions. By presenting evidence of significant disparities based on a nationally representative dataset, this study provides a foundation for future policies aimed at reducing inequalities and improving the well-being of intersex individuals.

The challenges that intersex individuals face, as documented in the main analysis, are comparable to those faced by other marginalized groups, such as individuals with a disability, including difficulty with mobility, sensory abilities, cognitive functions, communication, and emotional and mental health (Figs. S10–S12). The barriers and issues encountered by intersex individuals can also be observed in comparisons of respondents across birth cohorts, thus highlighting similar experiences across generations of intersex individuals (Figs. S13–S15). Similarly, comparisons with endosex sexual minority and gender minority subgroups add nuance with regard to how to interpret intersex experiences (Figs. S16–S21). While endosex sexual minorities and gender minority individuals face significant challenges, intersex individuals encounter unique disparities. The rates of rejection of intersex individuals are comparable with those of endosex sexual minority individuals but lower than those of endosex gender minority individuals for most categories. However, intersex individuals report higher rates of rejection in accessing medical attention and in the workplace, highlighting distinct dimensions of exclusion.

Regarding external validity, it is important to acknowledge that the results of this study are specific to Mexico. One could argue that intersex people may have different experiences and socioeconomic outcomes in other countries. Nevertheless, throughout the world, the medical and psychological approach to intersex infants has historically been aimed at concealing any sex variation and surgically altering intersex bodies whenever possible, often without consent. With a few exceptions, this practice is still the current approach (51). Therefore, it is likely that intersex individuals worldwide suffer from stigma and social exclusion, are victims of harassment and violence, and have lower levels of well-being, as shown for the Mexican intersex individuals considered in this paper.

The main limitation of this study is the lack of data on wages or income. Without such information, it is not possible to test whether intersex individuals are paid less, on average, than are endosex workers, which would be in line with the previous literature documenting gender pay gaps and wage disparities for racial minorities and LGBTQI+ individuals. The analysis of labor market outcomes is further complicated in middle-income countries with high levels of informality and an underground economy. Furthermore, while the available sample of intersex individuals is large enough to show that most disparities are statistically significant, the inclusion of information on sex variations in administrative data would allow researchers to analyze larger samples of intersex individuals, to follow people over time, and to answer additional research questions, for example, by estimating the mortality rates and life expectancy of intersex and endosex groups or by focusing on the specific challenges faced by intersex individuals with disabilities. Initial attempts in Nordic countries show the potential of this approach (52).

A key limitation of our current study relates to measurement strategies. As highlighted in previous reports (1), the way intersex status is measured can significantly impact prevalence estimates and potentially influence the observed patterns of disparities. For example, the current wording of the question used in Mexico does not explicitly include the word "intersex," which may affect how respondents self-identify. This measurement approach could impact our findings in several ways: some intersex individuals might not recognize their condition in the description provided, while some endosex respondents might misunderstand the question. Our sensitivity analyses mentioned above (Tables S21–S23) attempt to address potential misclassification, but different measurement approaches—such as using explicitly the word "intersex" or medical terminology like "disorder of sex development"—might yield different prevalence estimates and potentially different patterns of disparities. Additional guidelines on how to minimize the risk of endosex respondents misunderstanding the question and incorrectly identifying themselves as intersex and on how to detect such false positives are necessary.

In addition, future research that compares endosex women and men with intersex individuals may provide valuable insights into the role of gender norms. In particular, researchers could investigate potential explanations for the female advantage in educational achievement in conjunction with the low female labor force participation rates. It is somewhat striking that intersex individuals face substantial stigma, social exclusion, violence, and discrimination—often to a larger degree than endosex women do—while continuing to show higher labor market participation. This finding clearly suggests that strong factors at play in this context drive women's employment outcomes.

## Materials and methods

### National Survey on Sexual and Gender Diversity

The main analysis uses data from National Survey on Sexual and Gender Diversity (ENDISEG), the first nationally representative survey conducted by a national statistics office in a middle-income country to identify LGBTQI+ individuals aged 15 years and older (53).

The ENDISEG survey follows the sampling framework developed by the National Institute of Statistics and Geography (INEGI), which is a stratified, three-stage, and cluster-based framework. First, geographical clusters, such as blocks and localities, i.e. primary sampling units (PSUs), were selected. Next, households within these PSUs were randomly sampled. Finally, one respondent aged 15 years or older was randomly selected from each household. Interviews were conducted face to face, with the answers to sensitive questions (e.g. about gender identity and sexual orientation) being collected via tablet-based self-interviews to ensure the respondents' privacy and comfort in disclosing sensitive information. This mixed-method approach minimizes potential biases in responses to sensitive questions.

To ensure representativeness, survey weights were constructed through a multistep process. Expansion factors were calculated based on the probability of selection at each stage and were then adjusted to account for nonresponse at the household and individual levels. A final calibration aligned the weighted totals with mid-survey population projections to accurately reflect demographic distributions. These adjustments ensure reliable population estimates while accounting for potential biases. Additional technical details are provided in the Supporting Text.

### Statistical analysis

Intersex, female endosex, and male endosex individuals are identified based on their responses to questions about their sex and intersex status. Intersex individuals are those who respond

affirmatively to having variations in their body related to sex, irrespective of their reported sex at birth. Female and male endosex individuals are identified based on their sex assigned at birth and a negative response to the intersex status question.

All main estimates are unadjusted weighted means, calculated accounting for the complex survey design of ENDISEG, including sampling weights, PSUs, and stratification variables. This comprehensive approach to the survey design ensures that our estimates are nationally representative while correctly accounting for the clustering and stratification in the sampling process. These estimates allow for direct comparisons between intersex, female endosex, and male endosex individuals.

### Sample size by sex at birth and intersex status

In the weighted sample (Table 2), intersex individuals represent ~1.6% of the population aged 15–64 years. This finding is similar to those reported in other studies: depending on the criteria for defining intersex traits, data collection methods, and timing of the diagnosis, between 0.05 and 4% of the population is born with intersex traits (2, 17). Biologically, intersex variations are highly heterogeneous and may not be apparent from an external examination; those with obvious external anatomical diversity account for ~0.05% of births (17). Many intersex traits are detected later in life, often in adolescence or adulthood, or through prenatal testing, and some may go undiagnosed entirely (1). The most expansive estimates suggest that from 1.7 to 4% of the population has an intersex trait (47, 54), while more conservative estimates suggest a prevalence closer to 0.5% (55). The main estimates in this study are also in line with those obtained in other middle-income countries (29), such as China (1.8%).

As shown in Table 2, there is a higher presence of male individuals (with sex assigned male at birth) in the intersex population, accounting for almost 60% of the total, while female individuals (with sex assigned female at birth) amount to only 40% of all intersex people. In contrast, among endosex individuals, there is a more balanced distribution between the two groups, with 52% being female. Previous research has also highlighted that intersex traits are not uniformly distributed between those assigned male and those assigned female at birth (17). The higher proportion of individuals assigned male at birth within the intersex population could reflect the specific medical and social contexts in which these traits are recognized and diagnosed in Mexico. This possibility aligns with findings from India, where parents often prefer male gender assignment for intersex children due to the challenge of arranging marriages for infertile girls and the social advantages of growing up male in a patriarchal society (35).

**Table 2.** Sample size, individuals aged 15–64 years.

| | Unweighted | | Weighted | |
|---|---|---|---|---|
| | Observations | Percentage | Observations | Percentage |
| Intersex | 608 | 1.73 | 1,282,296 | 1.61 |
| Male | 358 | 58.88 | 756,650 | 59.01 |
| Female | 250 | 41.12 | 525,646 | 40.99 |
| Endosex | 34,596 | 98.27 | 78,602,929 | 98.39 |
| Male | 15,730 | 45.47 | 37,053,134 | 47.14 |
| Female | 18,866 | 54.53 | 41,549,795 | 52.86 |

A total of 4.71% of the respondents did not understand the question, and 2.01% did not select an option. These individuals were not included in the main sample. Male corresponds to individuals assigned male at birth. Female corresponds to individuals assigned female at birth. See the detailed variable description in the Supporting Text.

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## Supplementary Material

Supplementary material is available at *PNAS Nexus* online.

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## Author Contributions

E.M., M.S., and D.S. contributed equally to conceptualization, methodology, data curation, formal analysis, writing—original draft, and writing—review & editing. All authors approved the final draft.

## Preprints

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## Data Availability

All data are available at: https://www.inegi.org.mx/programas/endiseg/2021/.

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