

Legal reform, pandemic, and adolescent marriage: a change-point analysis of marriage dispensation trends in Yogyakarta, 2010–2021

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Abstract

Purpose: This study examined temporal trends in adolescent marriage dispensation applications in the Special Region of Yogyakarta between 2010 and 2021 to better understand the impact of both structural and contextual shifts. **Methods:** This quantitative study used a time-series design and data on marriage dispensation applications from January 2010 to March 2021. Data were obtained from the High Religious Court and the Religious Courts of each district/city across the Special Region of Yogyakarta, using court-issued dispensations as a proxy for adolescent marriage under definitions applicable before and after the 2019 legal amendment. To detect significant shifts over time, we modeled overall trends and applied change-point analysis (CPA) using multiple algorithms, including mean, variance, and mean-variance approaches. **Results:** A statistically significant change point was identified in the second quarter of 2019. Prior to this period, marriage dispensation applications fluctuated within a stable range. After quarter 2 2019, applications increased sharply, peaking in quarter 3 2020 during the COVID-19 pandemic. The variance-based change-point analysis provided the best model fit (MBIC = 11.35), indicating heterogeneous community responses to the revised marriage law that were likely exacerbated by the COVID-19 pandemic. **Conclusion:** The variance-based change point indicates that the legal reform was followed by heterogeneous community responses, which were likely exacerbated by the socioeconomic disruptions of the COVID-19 pandemic. These findings highlight the need to accompany legal reform with community preparedness and public health interventions to minimize unintended increases in marriage dispensation applications.

Keywords: adolescent marriage; change-point analysis; marriage dispensation; pandemic

INTRODUCTION

Adolescent marriage remains a persistent public health and human rights concern, with far-reaching implications for adolescent health, educational attainment, and socioeconomic outcomes. Early marriage has been strongly associated with increased risks of maternal morbidity and mortality, undernutrition,

early and repeated pregnancies, intimate partner violence, school dropout, and reduced access to reproductive health services [1–4]. In 2018, Indonesia ranked among the ten countries with the largest number of child marriages, with an estimated 1.22 million women aged 20–24 having entered marriage before the age of 18, equivalent to one in every nine girls [5]. To address these challenges, the Indonesian

government enacted Law No. 16 of 2019 [6], which amended the previous Marriage Law No. 1 of 1974, which had established different minimum ages for marriage: 16 years for females and 19 years for males [7]. The revised law raised the minimum legal age for marriage to 19 years for both sexes, thereby eliminating the previous gender disparity in the legal marriage age. This legislative shift was expected to reduce adolescent marriage prevalence by tightening legal access [8]. However, previous studies have shown that legal reforms alone are insufficient to eliminate the practice. For instance, Amirapu et al. (2020) found in Bangladesh that increasing the legal age did not significantly reduce early marriage due to persistent sociocultural norms [9]. Similarly, research in Mexico reported that raising the marriage age reduced formal marriages but did not address school dropout and early motherhood [10].

While the COVID-19 pandemic has been widely cited as a driver of increased adolescent marriage due to economic shocks, school closures, and reduced access to reproductive health services [11,12], evidence from Indonesia reveals a more nuanced dynamic. A significant increase in marriage dispensation applications was already apparent after the passage of Law No. 16 of 2019, under which dispensation authorizes marriages for prospective brides and grooms below 19 years of age. Nationally, the prevalence of child marriage declined by only 3.5% between 2008 and 2018, but during the pandemic, the number of court-approved underage marriages rose sharply, from 23,700 applications in 2019 to 34,000 in 2020 [13]. A similar trend occurred in the Special Region of Yogyakarta, where 394 cases were reported in 2019, surging to 948 in 2020, before slightly declining to 757 in 2021 [14].

This temporal pattern suggests that the surge in marriage dispensation applications may not be driven solely by the pandemic, but may also reflect community-level unpreparedness to adapt to sudden legal changes, similar to patterns seen in countries such as Bangladesh and Mexico. In those cases, legal reforms were not immediately effective in curbing early marriage because persistent cultural norms led to increases in formal applications or legal circumvention [9,10]. While existing studies have documented the rise in child marriage dispensation applications during the COVID-19 pandemic in Indonesia, for example, Liem et al. (2023) identified socioeconomic stressors as key drivers nationally [11], and Rahiem (2021) described the phenomenon in Nusa Tenggara Barat [15], several analytical gaps remain to be addressed. Most studies treat the pandemic as the sole or primary inflection point, without statistically isolating the independent

contribution of the 2019 legal reform. Consequently, it remains unclear whether the surge began before the pandemic as a direct consequence of the legal change itself.

Moreover, despite being one of Indonesia's most highly educated provinces (10.20 years mean schooling vs. 9.07 years national average) [16], the Special Region of Yogyakarta exhibits disproportionately high marriage dispensation rates following the 2019 legal reform, challenging the assumption that higher education automatically reduces child marriage. Compounding this paradox, internal disparities within the province, ranging from 12.13 years in Yogyakarta City to 7.35 years in Gunungkidul [16], mean reform responses are unlikely to be uniform. This intra-provincial variation lets us test whether greater variance in dispensation applications reflects heterogeneous community preparedness, a mechanism national-level aggregate studies cannot capture.

Building on these insights, this study examined temporal trends and shifts in adolescent marriage dispensation applications in the Special Region of Yogyakarta between 2010 and 2021. This study paid particular attention to the periods surrounding the enactment of Law No. 16 of 2019 and the onset of the COVID-19 pandemic. By identifying key temporal change-points, this study seeks to elucidate how policy shifts and external crises intersect in shaping patterns of adolescent marriage, and to inform more context-sensitive policy responses.

METHODS

Study design, population, and data sources

This quantitative study used a time-series design and data on marriage dispensation applications from January 2010 to March 2021. The March 2021 endpoint was methodologically appropriate for our primary objective: isolating the independent effect of the 2019 legal amendment from the confounding influence of the COVID-19 pandemic. Including data beyond this period would introduce additional pandemic-related disruptions that could obscure the early post-reform dynamics. This justification is reinforced by Governor's Instruction No. 10 of 2021, issued on April 5, 2021 [17], which shows that post-March 2021 data would reflect ongoing pandemic policy volatility rather than the immediate post-reform response.

The marriage dispensation data were collected from the High Religious Court and the Religious Courts of each district/city across the Special Region of Yogyakarta. In this study, marriage dispensation, used as a proxy for adolescent marriage, is defined as a court-issued permit granted to prospective brides or

grooms who have not yet reached the minimum legal age for marriage, which is 19 years for both males and females as stipulated in Law No. 16 of 2019, which amends Law No. 1 of 1974 on Marriage. Before the legal amendment, dispensation referred to the permit granted to prospective grooms under 19 and brides under 16, as regulated by Law No. 1 of 1974 [7].

Statistical analysis

Before conducting change-point analysis (CPA), we first modeled the overall trend in adolescent marriage to provide a baseline understanding of the temporal dynamics. We then used CPA to identify points in the time series where significant changes occurred. Change-point analysis is a statistical method for detecting structural changes in a sequence of observations over time. It has been widely applied in various fields such as climatology and medical imaging [18]. Researchers have developed several CPA methods, including non-parametric, frequentist, and Bayesian approaches [19]. This analysis helps answer key research questions, such as whether a trend has changed, when it occurred, and how confident we can be in detecting such changes.

We employed several algorithms and approaches in the change-point analysis to determine the optimal position and number of potential change points. We performed change-point detection using two algorithms: “At Most One Change” (AMOC) and “Binary Segmentation” (BinSeg). Both algorithms are provided in the changepoint package version 2.2.4 [18], and all analyses were conducted using R-Studio version 4.4.1 [20]. These algorithms included “At Most One Change (AMOC)” and “Binary Segmentation (BinSeg)”, both provided in the R package: changepoint. The AMOC algorithm detected only one change point, while BinSeg could detect multiple change points. The approaches used included: the mean approach, which detected changes in the mean under the assumption of constant variance; the variance approach, which identified changes in variance while assuming a constant mean; and the mean-variance approach, which detected changes in both mean and variance [18].

To select the most appropriate approach, we compared model fit using the Modified Bayesian Information Criterion (MBIC), with lower values indicating superior fit after penalizing for model complexity [21]. We chose the variance-based approach as the primary method for both statistical and substantive reasons. Statistically, the variance approach is

designed to detect increased volatility in data, wider fluctuations around the average, even when the mean remains relatively stable [22]. Substantively, a variance-driven change would indicate heterogeneous community responses to the 2019 legal reform: some districts adapting quickly while others continued arranging underage marriages through court dispensations, creating erratic application patterns across quarters. Given the substantial inter-district disparities documented in our dataset, including variations in baseline application rates, institutional capacity, and socioeconomic vulnerability, a uniform mean shift across the entire province was considered unlikely, whereas heterogeneous, fragmented responses were theoretically plausible. This study used secondary aggregate data from publicly available court records with no personal identifiers. Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Public Health, University of Jember (No. 661/KEPK/FKM-UNEJ/IV/2026), which determined the study to be “Ethical Exempted” on the basis that no human subjects were directly involved and the data posed minimal risk. The researchers commit to maintaining the confidentiality and integrity of all data obtained.

RESULTS

During the period from January 2010 to March 2021, the Yogyakarta High Religious Court received a total of 5,574 marriage dispensation applications from all districts and cities within the Special Region of Yogyakarta. During this period, Bantul District had the most cases, accounting for more than a quarter of all cases in the region. Meanwhile, Yogyakarta City reported the fewest cases, comprising less than 10% of the total from January 2010 to March 2021. Sleman District once recorded the highest number of marriage dispensation applications in a single quarter, reaching more than 90 cases, followed by Gunungkidul and Bantul Districts (Table 1). Cumulatively, the High Religious Court recorded an average of approximately 124 cases per quarter. The lowest number of cases occurred in the first quarter of 2017, with 65 cases. In contrast, the highest number was recorded in the third quarter of 2020, reaching 321 cases. Figure 1 visually presents quarterly fluctuations in marriage dispensation applications from January 2010 to March 2021 in the Special Region of Yogyakarta.

Table 1. Descriptive statistics of marriage dispensation per quarter from January 2010 to March 2021 in the Special Region of Yogyakarta

District/ City	Cumulative cases	Mean	Standard deviation	95% CI	Median	Min	Max
Kulon Progo	649	14.4	6.4	13.8 - 15.1	13	6	40
Bantul	1497	33.3	14.0	32.3 - 34.2	32	11	84
Gunungkidul	1434	31.9	16.0	30.9 - 32.8	25	9	86
Sleman	1458	32.4	17.7	31.4 - 33.4	28	14	93
Yogyakarta	536	11.9	5.2	11.3 - 12.5	11	2	26
Special Region of Yogyakarta	5574	123.9	52.2	123.0 - 124.7	107	65	321

Source: The Yogyakarta High Religious Court, 2010-2021

Table 2. Results of change point analysis of marriage dispensation applications during the period January 2010 – March 2021 in the Special Region of Yogyakarta

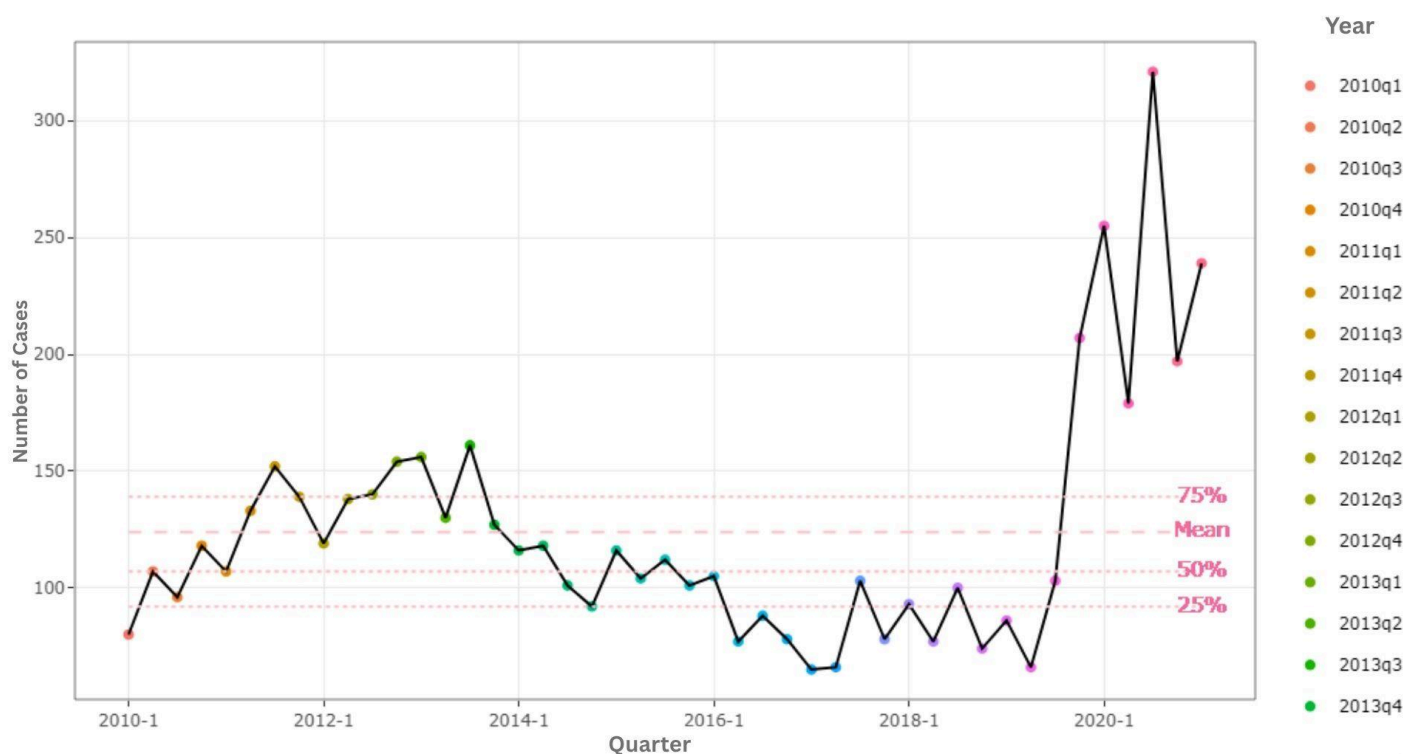
CPA algorithm	Change point position	MBIC value
Mean		
AMOC	3 rd Quarter of 2019	11.42
BinSeg	3 rd Quarter of 2019	11.42
Variance		
AMOC	2 nd Quarter of 2019	11.35
BinSeg	2 nd Quarter of 2019	11.35
Mean-Variance		
AMOC	3 rd Quarter of 2019	11.42
BinSeg	3 rd Quarter of 2019	11.42

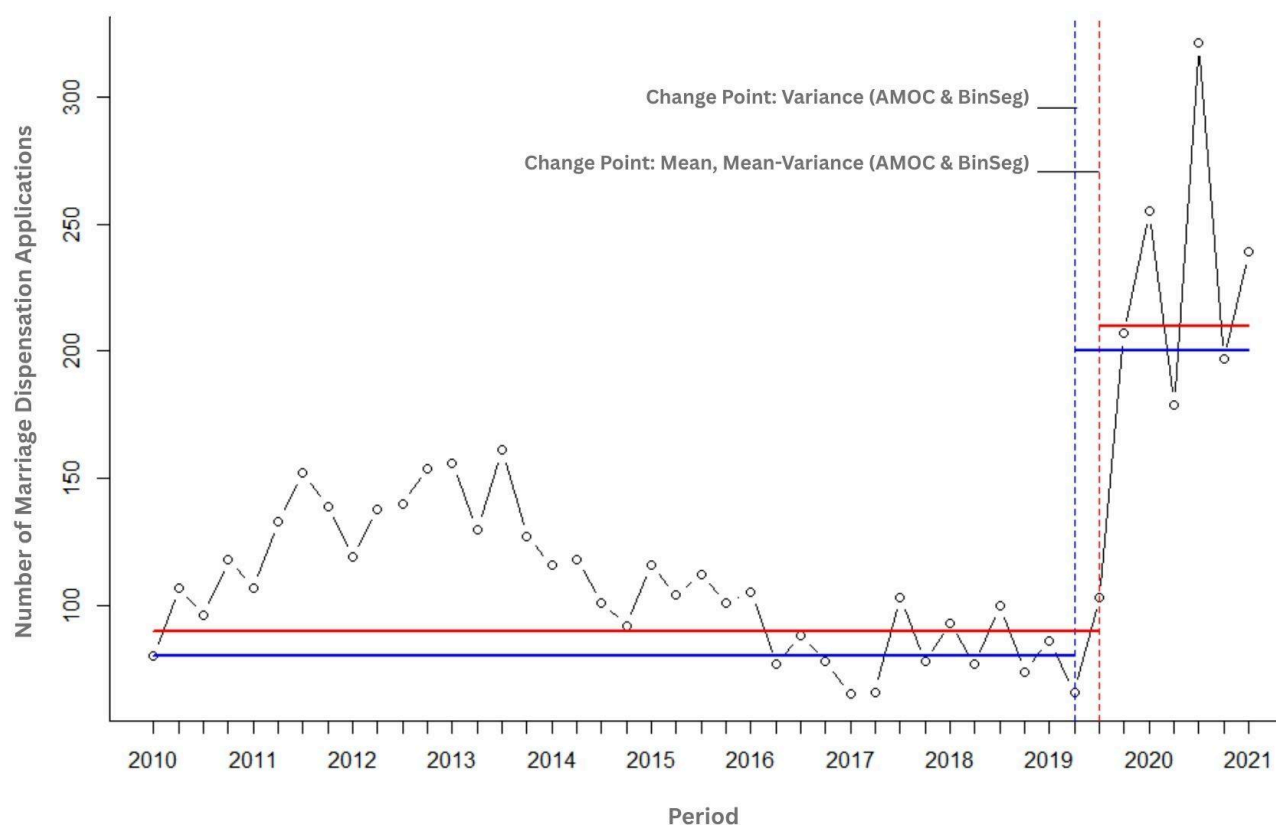
Notes: CPA: Change Point Analysis; MBIC: Modified Bayes Information Criterion; AMOC: At Most One Change; BinSeg: Binary Segmentation

Table 2 shows slight differences in the identified change point depending on the change-point analysis approach used. Both the mean and mean-variance approaches using the AMOC and BinSeg algorithms detected the change point in the third quarter of 2019. In contrast, the variance approach, whether using the AMOC or BinSeg algorithm, identified the change point in the second quarter of 2019. Based on the smallest

Modified Bayesian Information Criterion (MBIC) value, the variance approach, which detected the change point in the second quarter of 2019, provided a more accurate analysis than the other approaches.

Change point analysis, utilizing methods such as AMOC and BinSeg, identifies two significant change points. Before 2019, the data fluctuated around a relatively stable mean and variance. A first change point, detected by the variance-based approach, occurred in the second quarter of 2019, marking the onset of increased volatility in application rates. A second change point, detected by the mean-based and mean-variance approaches, occurred in the third quarter of 2019, reflecting a sustained increase in the average number of applications. After these change points, both the mean and variance rose substantially, with the most dramatic peak in the third quarter of 2020 (Figure 2). The variance-based model provided the best statistical fit (MBIC = 11.35), confirming that increased variability, rather than a simple upward trend, dominated the post-reform period.

**Figure 1. Quarterly trends in marriage dispensation applications in the Special Region of Yogyakarta (2010–2021)**



Notes: Blue horizontal lines = average variance before (lower) and after (upper) change; red horizontal line = average level after change. Red dashed vertical line = mean + variance change; blue dashed vertical line = variance-only change.

Figure 2. Change point analysis of marriage dispensation applications in the Special Region of Yogyakarta (2010–2021)

DISCUSSION

This study's findings highlight significant fluctuations in marriage dispensation applications across districts in the Special Region of Yogyakarta from 2010–2021, with a marked increase beginning around 2019. Several interrelated factors may explain the patterns and changes observed, particularly the surge in 2019 and peak in 2020. One of the most plausible explanations for the increase in marriage dispensation applications in the third quarter of 2019 is the enactment of Law No. 16 of 2019, which revised Law No. 1 of 1974. This revision raised the minimum legal age of marriage for both males and females to 19 years, eliminating the previous gender gap that allowed females to marry at 16. As a result, adolescents who would have previously been legally permitted to marry without court dispensation were now required to seek legal permission [23,24]. The increase in applications during and after the third quarter of 2019, detected by both mean and mean-variance change-point analyses, likely reflects a surge in court petitions triggered by this regulatory change.

Notably, the variance-based change point identified in the second quarter of 2019 preceded the formal promulgation of Law No. 16 of 2019 in October 2019,

suggesting that this earlier shift was anticipatory rather than reactive. This timing plausibly reflects the sustained public and legal discourse triggered by Constitutional Court Decision No. 22/PUU-XV/2017 (December 2018), which mandated equalization of the minimum marriage age within three years and prompted extensive media coverage and legislative drafting activity months before the bill's plenary approval in September 2019 [25]. Such anticipatory behavioral responses to widely publicized impending legal reform, in which affected populations and institutions adjust their conduct before a law's formal enactment, have been documented in the broader policy literature [26], and are consistent with the Supreme Court's own acknowledgment that religious courts were already facing a rising caseload of dispensation applications prior to the issuance of Supreme Court Regulation No. 5 of 2019 [27].

However, the surge in applications also suggests that communities were not fully prepared to respond to the new regulation. This finding aligns with previous research in Bangladesh, which emphasized that while legal reforms such as raising the minimum age of marriage represent progressive steps, they do not automatically lead to immediate changes in social behavior or deeply rooted cultural practices [9]. In many rural or low-income communities, early

marriage is still perceived as a normative solution to social, economic, or moral concerns, such as preserving family honor or reducing financial burdens. A study in Mexico found that raising the legal minimum age of marriage to 18 reduced formal marriages but did not effectively curb school dropout rates or early motherhood [10].

The law's sudden implementation, without sufficient public education, socialization, or behavioral change interventions, may have contributed to confusion and a spike in dispensations. Families continued to arrange underage marriages, now resorting to legal loopholes via the courts. This highlights the difficulty of shifting entrenched social norms, especially when economic vulnerability, limited access to education, and weak enforcement mechanisms reinforce them [28–31]. Furthermore, institutional capacity to enforce the law may have varied across regions [32]. Variations in how local religious courts processed dispensations, combined with community-level resistance or limited awareness, may have also fueled inconsistencies in application trends across districts [32,33].

These district- and city-level inconsistencies are reflected in the profound spatial disparities observed in our data. This contrast reflects a gradient of socioeconomic vulnerability and cultural norms. Districts with higher poverty rates and lower educational attainment consistently recorded more cases, while the city, with lower poverty and higher educational attainment, recorded the fewest. Research in Special Region of Yogyakarta has confirmed that economically disadvantaged families often view child marriage as a strategy to reduce household burdens [34], and that stronger adherence to traditional norms in rural districts creates pressure to legitimize pregnancies through early marriage [14].

In addition, the onset of the COVID-19 pandemic in early 2020 likely intensified the effects of the 2019 legal reform. Previous research documented a nearly threefold increase in child marriage dispensation applications in Indonesia between 2019 and 2020, with case numbers remaining elevated in 2021. This surge was closely associated with the socioeconomic consequences of the pandemic, including poverty, unemployment, family instability, and the direct health impacts of rising COVID-19 cases and deaths [11]. The pandemic also amplified pre-existing social and economic vulnerabilities, particularly in communities where early marriage was already relatively common. Consequently, the convergence of a major legal reform and an unprecedented public health crisis created a “perfect storm” that contributed to the sharp increase

in marriage dispensation applications during this period.

Economic hardships caused by widespread job loss and income reduction pushed some families to seek early marriage as a perceived coping strategy [15,35]. Girls were particularly vulnerable because they were often perceived as an economic burden on the family, especially when households experienced parental loss, asset depletion, or severe financial hardship during the pandemic [36]. In the Special Region of Yogyakarta, a qualitative study found that families viewed marrying off daughters as a practical way to reduce household burdens and escape poverty, with these economic pressures reinforcing sociocultural expectations around early marriage [34]. This pattern is not unique to Indonesia; similar dynamics were observed across multiple countries during the pandemic, where economic vulnerability and school closures compounded the risk of child marriage [37,38].

School closures and the shift to remote learning weakened one of the key protective factors against child marriage, as disengagement from school is strongly linked to increased vulnerability [37]. Previous qualitative research reported that many adolescents experienced considerable stress, frustration, and declining motivation during prolonged online learning because of excessive academic workloads and limited social interaction. For some adolescents, emotional support from romantic partners became a substitute for school-based social connections, and marriage was viewed as an alternative to continuing education under challenging circumstances [15]. Another qualitative study conducted in the Special Region of Yogyakarta identified a complementary pathway. Prolonged school closures substantially increased adolescents' use of the internet and social media, where exposure to sexually explicit content was reported to encourage premarital sexual behavior, resulting in unintended pregnancies that subsequently led to early marriage [39].

Unintended pregnancy represented another important pathway leading to the rise in marriage dispensation during the pandemic. Evidence from the Special Region of Yogyakarta indicates that unintended pregnancy accounted for the majority of marriage dispensation applications, with 72% involving adolescents who were already pregnant and 4% involving those who had already given birth [14]. Previous research similarly identified unintended pregnancy following premarital sexual relationships as a major reason families sought child marriage [34]. Because pregnancy outside marriage carries substantial social stigma in Indonesia, many families viewed marriage as the most socially acceptable solution to preserve family honor and legitimize the

pregnancy. The pandemic likely exacerbated this problem, as social restrictions and disruptions to reproductive health services limited adolescents' access to sexual and reproductive health information and contraception, increasing their vulnerability to unintended pregnancy and, consequently, the likelihood of marriage dispensation applications [12].

This study successfully applied robust change-point analysis methods to detect structural shifts in marriage dispensation trends in response to the 2019 legal reform and the COVID-19 pandemic. However, several limitations remain. The study utilized aggregate-level administrative data, which limits the ability to assess individual- or household-level determinants of marriage dispensation (e.g., education, family income, cultural beliefs). Additionally, the data only capture formal applications submitted to religious courts and may not account for informal or unregistered underage marriages, potentially resulting in an underestimation of the true incidence. The marriage dispensation data were obtained from the Religious Courts, which have jurisdiction over marriage matters involving Muslims in Indonesia. Although the minimum legal age for marriage established under Law No. 16 of 2019 applies to all Indonesian citizens regardless of religion, this study's findings primarily reflect marriage dispensation trends among the Muslim population. They may not fully generalize to non-Muslim populations, whose marriage cases are processed through different legal mechanisms.

Regional disparities in data quality and administrative capacity may have also introduced inconsistencies in reporting across districts. Furthermore, while change-point analysis was effective for identifying structural breaks, it did not estimate the magnitude or direction of effects in response to specific interventions. Future studies could benefit from employing more robust quasi-experimental approaches, such as Interrupted Time Series (ITS) regression, to quantify the causal impact of policy changes (e.g., the 2019 marriage law revision) on child marriage dispensation rates.

CONCLUSION

In conclusion, this study shows a clear increase in marriage dispensation applications after the 2019 revision of the Marriage Law, particularly in the Special Region of Yogyakarta. The findings indicate that legal changes, such as raising the minimum age of marriage, can lead to significant shifts in behavior as individuals and institutions adjust to new requirements. However, the persistence and even surge in applications after the law came into effect suggest that

many families were not yet prepared to comply with the new regulation. This reflects broader challenges in transforming entrenched cultural norms and practices related to early marriage.

These findings underscore that legal reform alone is insufficient to reduce child marriage. Our change-point analysis suggests that implementing the revised marriage law without adequate community preparedness may trigger a temporary surge in marriage dispensation applications. To mitigate this, legal reform should be paired with targeted legal literacy campaigns in high-variance districts, particularly after major crises; mandatory multidisciplinary assessments before granting marriage dispensation; and standardized decision-making guidelines to ensure consistent judicial interpretation of "very urgent reasons" and the "best interests of the child". Together with continued investments in youth empowerment, comprehensive sexuality education, reproductive health services, and gender equality, these measures would strengthen the effectiveness of marriage law reform and reduce the risk of similar surges in future crises.

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Authors' contribution

DS contributed to conceptualization, methodology, data collection and analysis, and manuscript drafting. RM participated in data collection and manuscript drafting. DCA and RFA were responsible for methodology and manuscript drafting. KR and PC conducted critical review and manuscript drafting.

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Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics statement

This study used secondary aggregate data from publicly available court records with no personal identifiers. Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Public Health, University of Jember (No. 661/KEPK/FKM-UNEJ/IV/2026), which determined the study to be "Ethical Exempted" on the basis that no human subjects were directly involved and the data posed minimal risk. The researchers commit to maintaining the confidentiality and integrity of all data obtained.

Conflicts of interest

The authors declare no conflict of interest regarding the publication of this article.

Use of artificial intelligence (AI)

Portions of this manuscript were edited using ChatGPT-4 to improve grammar and clarity. All AI-assisted content was reviewed and validated by the authors, who take full responsibility for the final content.

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