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Caesarean sections (CSs) have increased globally, with concerns being raised involving overutilisation and inequalities in access. In Zimbabwe, where healthcare access varies greatly, we aimed to analyse factors associated with ever having a CS using the 2019 National Multiple Indicator Cluster Survey. The weighted national CS rate was 10.3%, and CS happened more commonly among women in urban than rural areas (15.7% v. 7.4%; odds ratio (OR) 2.34; (95% confidence interval (CI) 1.71 - 3.20;  $p=0.001$ ). Percentages of those having a CS significantly increased with education: overall  $\chi^2$  for a trend of  $p=0.001$  and wealth quintile, and overall  $\chi^2$  for a trend of  $p=0.001$ . Women with insurance coverage were more likely to have had a CS than those without: 26.7% v. 8.7%; OR 3.82; 95% CI 2.51 - 5.83;  $p=0.001$ . The same was the case for women with access to the internet: 15.4% v. 7.0%, OR 2.42; 95% CI 1.71 - 3.41;  $p=0.001$ ). These findings show an association that could indicate this being overutilised by insured women in urban settings, rather than being accessible based on clinical needs. Further research should explore reasons for these disparities and inform interventions to ensure equitable access to optimum childbirth in Zimbabwe.

**Keywords:** caesarean section, women, Multiple Indicator Cluster Survey MICS 2019, Zimbabwe

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Caesarean section (CS) is the surgical delivery of a fetus through incisions on the abdomen or uterus. It is recommended when there are other (significant) risks, not just the death of the mother or fetus.<sup>[1]</sup> While CS remains essential for ensuring maternal and fetal wellbeing in certain cases, concerns arise about potential overutilisation and inequitable access.<sup>[2]</sup> Notably, experts and the World Health Organization (WHO) recommend that CS should be available according to need.<sup>[2-4]</sup> CS rates have emerged as a global public health concern, with increasing trends observed in both high-income and low- to middle-income countries.<sup>[5-7]</sup> In Zimbabwe, understanding CS prevalence and associated factors is crucial for guiding healthcare policy and safe childbirth. This study leverages the 2019 National Multiple Indicator Cluster Survey (MICS2019) to provide the first national estimate of CS prevalence in Zimbabwe. We identify demographic determinants associated with ever having a CS, aiming to contribute to the literature on potential disparities and inform interventions towards equitable access to care.

## Methods

### Sample design and data collection

This study used data from the most recent nationally representative MICS2019, whose methodology, study design and data collection

approach have been described elsewhere.<sup>[8]</sup> The sample for MICS2019 was designed to provide estimates for many indicators of the situation of children and women in urban and rural areas and the 10 provinces of Zimbabwe. Briefly, each province's urban and rural areas were identified as the main sampling strata, and the sample of households was selected in two stages. A specified number of census enumeration areas (clusters) were selected systematically within each stratum with probability proportional to size. After a household listing was carried out within the selected enumeration areas, a systematic sample of 26 households was drawn in each sample enumeration area. A total of 462 clusters and 12 012 homes were selected at the national level. All selected enumeration areas were visited during the fieldwork period. Six questionnaires were used in the survey. Data used in the analysis are based on the questionnaire for individual women administered in each household to all women aged 15 - 49 years. The total sample size used was 2 019 women who had had a live birth in the last 2 years, and asked whether the baby was delivered by CS.

### Statistical analysis

Stata version 16.1 (StataCorp, USA) was used for statistical analysis. We used survey-weighted proportions to describe the women's characteristics in the study. The statistical significance cut-off for

describing the association between various factors and ever having a CS was set at  $p < 0.05$ . The odds ratio (OR) and 95% confidence intervals (95% CI) were also used to establish risk ratios. The outcome considered for this analysis was ever having a CS. This is a binary outcome, and we conducted a logistic regression for various risk factors, such as demographics. Notably, as the MICS2019 sample is not self-weighting, appropriate sample weights were applied in all analyses.

### Ethical approval

An ethical review board of three members of the 2019 MICS Technical Committee was established (no ref. no.), and they were trained using United Nations Children’s Fund’s e-module on ethics. The survey director was the focal person for the survey protection protocol. The protocol included a Protection Protocol, which outlines the potential risks during the life cycle of the survey and management strategies to mitigate these.

## Results

### Demographic characteristics

The 2 019 women were aged 15 - 49 years, and the age group distribution is presented in Table 1. Approximately 65% of the women reside in rural areas, and >69% have achieved at least a secondary level of education. The majority of the women (29.6%) belonged to the Apostolic religion.

### Comparison of factors between those who had a CS and those who did not

The overall weighted CS rate was 209/2 019 (10.3%). The proportion of teenagers and young adults (<20 years) was 7.8%, and the lowest proportion came from women aged 40 - 44 years, at 4.9%. There

was no-one recorded in the 45 - 49 years age range. The 35 - 39-year age group formed the highest proportion (13.1%) followed by the 30 - 34-year, 25 - 29-year and 20 - 24-year age groups, accounting for 11.6%, 11.1% and 9.3%, respectively (Table 2). CSs were performed more commonly among women in urban areas than those in rural areas: 15.7% v. 7.4%, OR 2.34; 95% CI 1.71 - 3.20;  $p = 0.001$ ). Percentages having a CS significantly increased with increasing level of education, and the overall  $\chi^2$  for the trend was  $p = 0.001$ , as well as for the wealth quintile: overall  $\chi^2$  for trend  $p = 0.001$ . Regarding marital status, the most significant proportion (14.6%) were women who were never in marriage or a union. Women with health insurance coverage were more likely to have had a CS than those without: 26.7% v. 8.7%, OR 3.82; 95% CI 2.51 - 5.83;  $p = 0.001$ . The same was the case for women with access to the internet: 15.4% v. 7.0%, OR 2.42; 95% CI 1.71 - 3.41;  $p = 0.001$ ).

## Discussion

We set out to determine factors associated with undergoing CS in Zimbabwe by conducting a secondary data analysis of the multiple indicator cluster survey. We analysed age, area of residence, education level, religion, wealth index, health insurance coverage and access to the internet. The current CS rate of 10.3% is within the WHO-recommended rate of 10 - 15%.<sup>[9,10]</sup> It is, however, higher than the 7.3% reported for Africa.<sup>[11]</sup> These findings are consistent with the results of previous studies showing that factors such as the level of education, socioeconomic status,<sup>[12-14]</sup> and place of residence<sup>[15]</sup> are associated with CS delivery.

These findings highlight the need for multipronged interventions to optimise CS utilisation in Zimbabwe. Educating women about the potential risks and benefits of both CS and vaginal delivery is crucial for informed decision-making, promoting the uptake of vaginal birth whenever is appropriate.<sup>[16,17]</sup> Additionally, focusing on reducing the primary CS rate, which refers to the first caesarean delivery in a woman’s obstetric history, is essential to minimise subsequent CS.<sup>[18,19]</sup>

### Policy recommendations

Policy guidelines on CS in Zimbabwe need to be updated in light of these findings. Additionally, the Zimbabwe Ministry of Health needs to put in place policy measures to monitor the level of CS and to identify ways to curb its rapidly surging rates, particularly in urban settings. There is also a need to improve access to timely and safe CS for rural uninsured women. A follow-up national survey on CS would determine trends for an advanced statistical analysis approach to be employed, and for policy-makers to understand where progress has been made and where evidence-based intervention packages in which to invest exist, for example, respectful labour care and improving skills for assisted delivery. Specific policy recommendations are outlined below.

### Information and empowering women

There is a need to develop and implement comprehensive childbirth education programmes in the country: these should inform about birthing options (vaginal and caesarean), their risks and benefits, and the right to an informed decision. Healthcare providers should be equipped to effectively discuss information with women in a clear, unbiased manner, and support their choices. Women’s empowerment can be strengthened through community-based support groups and peer counselling: these groups can provide information, support and encouragement throughout pregnancy and childbirth.

### Addressing socioeconomic disparities

Expand access to quality prenatal care, especially in rural areas and for low-income women: early and consistent prenatal care can help identify and manage potential risk factors that might lead to

**Table 1. Age distribution of mothers whose data are included in this secondary analysis (N=2 019)**

Variable	n (%)
Age category, years	
15 - 19	280 (13)
20 - 24	561 (28)
25 - 29	443 (22)
30 - 34	380 (19)
35 - 39	277 (14)
40 - 44	75 (4)
45 - 49	3 (0)
Area of residence	
Rural	1 315 (65.2)
Urban	704 (34.8)
Mother’s education level	
None	13 (0.6)
Primary	460 (22.3)
Secondary	1 383 (69.2)
Higher	163 (8.0)
Religion of head of household	
Roman Catholic	116 (6.1)
Protestant	304 (14.7)
Pentecostal	344 (17.1)
Apostolic sect	585 (29.6)
Zion	190 (7.8)
Other Christian	47 (2.3)
Traditional	67 (3.2)
No religion	337 (17.7)
Other	28 (1.3)

**Table 2. Analysis of factors associated with having caesarean section (N=2 019)\***

Variable	Caesarian delivery, n (%) (N=209)	Vaginal delivery, n (%) (N=1 800)	OR (95% CI)	p-value
<b>Age category, years</b>				
15 - 19	23 (7.8)	257 (92.2)	1	
20 - 24	52 (9.3)	509 (90.7)	1.21 (0.69 - 2.11)	0.503
25 - 29	52 (11.1)	391 (88.9)	1.47 (0.84 - 2.58)	0.174
30 - 34	48 (11.6)	332 (88.4)	1.56 (0.88 - 2.75)	0.126
35 - 39	38 (13.1)	239 (86.9)	1.79 (0.98 - 3.26)	0.058
40 - 44	6 (4.9)	69 (95.1)	0.61 (0.21 - 1.73)	0.350
45 - 49	0 (0.0)	3 (100.0)	-	-
<b>Area of residence</b>				
Rural	101 (7.4)	1 214 (92.6)	1	
Urban	118 (15.7)	586 (84.3)	2.34 (1.71 - 3.20)	0.001
<b>Mother's education level</b>				
None	0 (0.0)	13 (100.0)	-	
Primary	35 (7.1)	425 (92.9)	-	
Secondary	134 (9.4)	1 249 (90.6)	1.36 (0.90 - 2.06)	
Higher	50 (27.6)	113 (72.5)	-	0.001
<b>Marital status</b>				
Currently married/in union	185 (10.2)	1 500 (89.8)	1	
Formerly married/in union	14 (8.5)	162 (91.5)	0.82 (0.44 - 1.52)	0.529
Never married/in union	20 (14.6)	138 (85.4)	1.51 (0.87 - 2.63)	0.143
<b>Religion of head of household</b>				
Roman Catholic	14 (10.3)	102 (89.7)	1	
Protestant	55 (17.9)	249 (82.1)	1.90 (0.94 - 3.82)	0.073
Pentecostal	55 (14.1)	289 (85.9)	1.43 (0.71 - 2.87)	0.320
Apostolic sect	45 (7.5)	540 (92.5)	0.70 (0.35 - 1.42)	0.323
Zion	13 (6.8)	177 (93.2)	0.64 (0.26 - 1.53)	0.315
Other Christian	4 (10.8)	43 (89.2)	1.05 (0.31 - 3.58)	0.938
Traditional	1 (1.7)	66 (98.3)	0.15 (0.02 - 1.18)	0.072
No religion	27 (7.2)	310 (92.8)	0.67 (0.32 - 1.43)	0.303
Other	5 (21.9)	23 (78.1)	2.43 (0.72 - 8.22)	0.152
<b>Wealth index</b>				
Poorest	26 (6.1)	388 (93.9)	1	
Second	23 (5.5)	374 (94.5)	0.89 (0.48 - 1.64)	0.707
Middle	35 (8.2)	328 (91.8)	1.37 (0.78 - 2.41)	0.278
Fourth	53 (11.1)	411 (88.9)	1.91 (1.14 - 3.22)	0.015
Richest	82 (20.5)	299 (79.6)	3.93 (2.38 - 6.48)	0.000
<b>Covered by health insurance</b>				
No	171 (8.7)	1 681 (91.3)	1	
Yes	48 (26.7)	119 (73.3)	3.82 (2.51 - 5.83)	0.001
<b>Ever used internet</b>				
No	100 (7.0)	1 284 (93.0)		
Yes	81 (15.4)	414 (84.6)	2.42 (1.71 - 3.41)	0.001
<b>†Duration of stay in health facility</b>				
Hours	350 (0.3)	349 (20.8)	-	
Days	1 584 (82.4)	1 404 (76.9)	-	
Weeks	85 (17.3)	47 (2.3)	-	0.001

\*Possible maximum, but on some factors missing responses were not included.

†Column percentages were used to make statistically meaningful comparisons.

- = OR statistically incalculable.

OR = odds ratio; CI = confidence interval.

unnecessary CS. There is a need to implement financial incentives for healthcare providers to promote vaginal deliveries: this could involve equalising reimbursement rates for vaginal and caesarean births, or introducing performance-based bonuses for achieving lower CS rates. Addressing broader socioeconomic disparities will result in improved maternal health outcomes.

**Data and monitoring**

Establishing a national CS registry would allow monitoring of CS rates, identification of disparities and evaluation of the effectiveness of interventions. This would allow transparency and accountability within this aspect of maternal healthcare. Further research would provide data to understand the specific factors

driving unnecessary CS in the context of Zimbabwe, allowing for more targeted interventions.

### Study limitations

This study benefits from the robustness and representativeness of the MICS data, allowing for reliable urban/rural estimates of CS prevalence and associated factors. However, as a cross-sectional analysis, it cannot establish causal relationships. Longitudinal studies are needed on the temporal dynamics influencing CS utilisation. Additionally, potential limitations arise from the self-reported data and the restricted number of variables available in the MICS 2019 dataset. Despite these limitations, the present study's findings provide unique insights into the Zimbabwean context of CS utilisation.

### Conclusions

This study explored factors associated with CS utilisation in Zimbabwe, which at 10.3% falls within the WHO-recommended range but remains higher than the average for Africa. Our findings highlight associations between CS utilisation and women's education level, socioeconomic status and place of residence. These disparities point towards the need for multipronged interventions to ensure equitable access to safe and appropriate childbirth experiences in Zimbabwe.

Investing in education programmes and patient-centred communication training for healthcare providers is crucial to empower women with informed decision-making. Addressing inequalities through access to quality prenatal care, targeted financial incentives for vaginal deliveries without putting women at increased risk and poverty reduction is essential to address unnecessary CS. Monitoring through a national CS registry and further research on contextual factors influencing CS rates are key to optimising CS utilisation in Zimbabwe. By prioritising addressing disparities and fostering data-driven approaches, we can move towards every woman in Zimbabwe having equitable access to safe and appropriate childbirth, regardless of background or socioeconomic status.

**Data availability.** Deidentified data are available from Globa MICS Program, [www.mics.unicef.org](http://www.mics.unicef.org), upon reasonable request.

**Declaration.** None.

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