

RESEARCH ARTICLE

**Sante reproductive en Afrique : donnees,
droits et soins postnatals**

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Renforcer les systèmes de données pour promouvoir la santé et les droits sexuels et reproductifs en Afrique subsaharienne

DOI: 10.29063/ajrh2026/v30i11.1

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Le développement de la santé et des droits sexuels et reproductifs (SDSR) en Afrique subsaharienne est fondamentalement entravé par la « pauvreté des données de santé »¹. Si de nombreux pays à revenu élevé ont réalisé des progrès significatifs dans le renforcement de leurs systèmes de données de santé, l'Afrique subsaharienne continue de faire face à d'importantes lacunes¹⁻³. Malgré le besoin crucial de pratiques fondées sur des données probantes, le paysage régional des données est caractérisé par une méconnaissance généralisée de la valeur intrinsèque de données exactes. De nombreux pays de la région ne disposent pas de recensements de population réguliers, de dossiers de santé fiables ni de systèmes fonctionnels d'état civil et de statistiques vitales.

L'exactitude des données est souvent compromise par une réticence profondément ancrée des populations à fournir des informations personnelles. Dans de nombreux contextes africains, les tabous culturels, les croyances religieuses et la méfiance envers les « étrangers » entraînent des taux de refus élevés lors des enquêtes menées auprès des ménages et dans les établissements de santé. Par exemple, une étude menée en Afrique du Sud a mis en évidence comment des femmes peuvent refuser de parler de santé reproductive en raison d'une opposition religieuse ou par crainte d'être jugées par les chercheurs⁴. Les données sont parfois sujettes à la falsification et au biais de désirabilité sociale. Les personnes interrogées « apprennent » souvent à répondre de manière à minimiser la longueur des questionnaires, par exemple en déclarant moins de partenaires sexuels pour éviter les questions complémentaires.⁵

Plus grave encore, la crainte de répercussions juridiques ou sociales conduit à la dissimulation active d'informations sensibles par les individus et les établissements de santé. Des personnes ont déclaré avoir menti sur leur statut sérologique ou sur les violences sexistes qu'elles ont subies par crainte d'une intervention policière ou de la stigmatisation sociale.⁴

Même lorsque des données sont disponibles, on observe une minimisation et une non-utilisation systématiques des informations factuelles pertinentes pour la prise de décision et la planification stratégique. L'institutionnalisation du suivi fondé sur les données demeure faible et les plans annuels sont souvent élaborés sans tenir compte des informations sanitaires courantes.⁶ Dans de nombreux cas, la planification fondée sur des données probantes est supplantée par l'ingérence politique et le népotisme, où les intérêts politiques — plutôt que les données empiriques — déterminent quels programmes de santé sont mis en œuvre et qui est nommé pour les diriger.⁷ Sans s'attaquer à ces barrières culturelles et structurelles, les systèmes de données continueront de produire des informations de mauvaise qualité qui ne permettront pas d'améliorer significativement les résultats en matière de santé sexuelle et reproductive dans la région.^{1,8}

Depuis la Conférence internationale sur la population et le développement (CIPD) du Caire en 1994 et jusqu'aux Objectifs de développement durable (ODD) pour 2030, la santé sexuelle et reproductive est reconnue comme un droit humain fondamental.⁹⁻¹¹ Ce droit est désormais inscrit dans les politiques nationales de santé et les cadres juridiques de nombreux pays.

Le droit à la santé sexuelle et reproductive comprend l'accès à la contraception, aux soins de fertilité et d'infertilité, aux services de santé maternelle et périnatale, à la prévention et au traitement des infections sexuellement transmissibles, à la protection contre les violences sexuelles et sexistes, et à l'éducation à des relations saines et sans risque.¹² comprend également le droit à l'information et la capacité de faire des choix éclairés concernant sa vie reproductive.

Lorsque cet accès est retardé ou refusé, les conséquences peuvent être graves, notamment le décès, un handicap permanent et des difficultés socio-économiques. Pour que ces droits se concrétisent, les systèmes de santé ont besoin de systèmes de données robustes. Des données précises, actualisées et

ORIGINAL RESEARCH ARTICLE

Investigating the individual and contextual factors associated with non-use of newborn postnatal care in Eswatini

DOI: 10.29063/ajrh2026/v30i12.2

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Abstract

Postnatal care is among the most important maternal and child healthcare interventions for reducing maternal and child mortality. Despite efforts to increase the uptake of maternal and child health services, Eswatini is among the countries with the highest prevalence of non-use of newborn postnatal care. This study investigated the individual and contextual factors associated with non-use of newborn postnatal care in Eswatini using secondary data from the 2021-22 Eswatini Multiple Indicator Cluster Survey. A two-level logistic regression modelling approach was used. The prevalence of non-use of newborn postnatal care was 50.6%. Newborns delivered in a health facility and those residing in the Manzini and Shiselweni regions had higher odds of non-use of newborn postnatal care. The study highlights a need to improve regional access to maternal healthcare services as well as the continuum of care between facility births and newborn postnatal care in Eswatini. (*Afr J Reprod Health* 2026; 30 [12]: 16-27).

Keywords: contextual factors, newborn, non-use, place of delivery, postnatal care, variation, women of reproductive age.

Résumé

Les soins postnatals constituent l'une des interventions les plus importantes en matière de santé maternelle et infantile pour réduire la mortalité maternelle et infantile. Malgré les efforts déployés pour accroître le recours aux services de santé maternelle et infantile, l'Eswatini figure parmi les pays présentant une forte prévalence de la non-utilisation des soins postnatals du nouveau-né. Cette étude a examiné les facteurs individuels et contextuels associés à la non-utilisation des soins postnatals du nouveau-né en Eswatini, en utilisant des données secondaires issues de l'Enquête en grappes à indicateurs multiples (MICS) 2021-2022 de l'Eswatini. Une approche de modélisation par régression logistique à deux niveaux a été utilisée. La prévalence de la non-utilisation des soins postnatals du nouveau-né était de 50,6 %. Les nouveau-nés accouchés dans un établissement de santé et ceux résidant dans les régions de Manzini et de Shiselweni avaient des probabilités plus élevées de ne pas recevoir de soins postnatals. L'étude souligne la nécessité d'améliorer l'accès régional aux services de santé maternelle ainsi que la continuité des soins entre les accouchements en établissement de santé et les soins postnatals du nouveau-né en Eswatini. (*Afr J Reprod Health* 2026; 30 [12]: 16-27).

Mots-clés: facteurs contextuels, nouveau-né, non-utilisation, lieu d'accouchement, soins postnatals, variation, femmes en âge de procréer

Introduction

Postnatal care (PNC) is essential for the survival and well-being of both the mother and child, playing a crucial role in ensuring their health after delivery. PNC is defined as the care given to a woman and her newborn from birth up to six weeks after birth, and is one of the most essential maternal and child healthcare services, aimed at preventing impairments and disabilities and reducing mortality

among mothers and infants.^{1,2} Globally, maternal and child mortality remain a significant challenge for healthcare systems, especially in less affluent countries.³ The World Health Organization reported an unacceptably high rate of maternal mortality in 2023, where approximately 260 000 women died during pregnancy, childbirth, or shortly thereafter, with nearly 92% of these deaths occurring in low- and lower-middle-income countries.⁴ Over 2 000 000 babies continue to die

within the first month after birth.⁵ While maternal mortality is a concern, child mortality is equally important and is related to the quality and timing of newborn PNC. In 2022, 2.3 million newborns died within the first 28 days of life, with over 6500 newborns dying each day, making up 47% of all deaths among children under the age of five.⁶ Most of these deaths are preventable with early and adequate PNC interventions. Despite this, newborns often receive inadequate PNC services, especially in low-income settings where there are barriers to the access of these services.⁷

At the global level, reducing maternal and child mortality rates necessitates efforts beyond merely advocating for prenatal care and facility-based deliveries.³ It is equally crucial to tackle the underutilisation of PNC for newborns, as this is vital for enhancing well-being, mitigating health risks, and facilitating better overall care.⁸ Sub-Saharan Africa bears an unequal burden of these challenges, accounting for about 70% of these deaths in 2020.⁹ Fifty per cent of maternal deaths in many African countries happen within the first week after delivery, with most happening within the first 24 hours.¹⁰ Despite the importance of this critical period, less than 13% of women in the region receive PNC within that time frame.⁹ Between 2006 and 2018, PNC utilisation across sub-Saharan Africa averaged 52%, with the eastern region showing the lowest rate at 31.7%.⁹ In Ethiopia, approximately 75% of new mothers in rural areas did not use PNC services.¹¹ This limited uptake is largely due to systemic challenges, including shortages of trained health workers and essential medical supplies.⁹ As a result, over 700 newborns die daily from preventable causes such as infections, low birth weight, and asphyxia, while maternal deaths are commonly caused by postpartum haemorrhage, hypertensive disorders, and sepsis.^{9,12}

Despite advancements through initiatives such as mHealth and telehealth aimed at improving healthcare access in Eswatini, the non-use of PNC for newborns remains high. mHealth refers to the use of mobile devices, including smartphones and tablets, to assist medical procedures.^{13,14} With this service, patients can store and monitor their medical records on their own mobile devices through mHealth services.^{13,14} Telehealth describes the

range of technologies used to enhance and simplify healthcare delivery methods, including the effectiveness of healthcare information dissemination.¹³

However, these tools tend to be underused and sometimes are implemented unevenly, especially in rural areas. Eswatini is among the sub-Saharan African countries with the highest prevalence of non-use of PNC for newborns. The prevalence of newborn PNC non-use increased by 78% between 2014 and 2021-22; from 28.4% in 2014 to 50.6% in 2021-22.^{15,16} These statistics are alarming and suggest that the Eswatini government needs to act urgently to address this issue. Neonatal mortality rates are high in Eswatini, with 20 deaths per 1,000 live births as a result of newborns not using PNC.¹⁶ According to the 2021-2022 report, Shiselweni has a greater percentage of newborns who do not utilise PNC (66.2%).¹⁶

The level of PNC non-use in Eswatini highlights the continued existence of structural, economic, and cultural barriers that hinder access to these services.^{17,18} A study conducted in Eswatini in 2015 reported that more than 75% of women do not use PNC.¹⁸ The low utilisation of PNC may stem from the belief that follow-up visits are not required after birth unless complications arise.¹⁸ Moreover, barriers include transportation costs, travel time to health facilities, and sociocultural practices such as the tradition of women and newborns remaining indoors for about 40 days, and financial dependence on spouses for medical expenses.¹⁷ Given that many neonatal deaths occur during PNC, access to care at this stage is essential.^{18,19} The failure to receive PNC has been linked to disability and death from birth-related problems, which can have long-term effects on both the mother and the child.²⁰ Postnatal services have the lowest median national coverage of interventions on the continuum of maternal and child healthcare, despite the critical role PNC plays in ensuring that women and newborns survive and develop.²¹ However, there is a dearth of research on newborn PNC non-use in Eswatini. Existing studies on this subject focus more on women than newborns and the low utilisation of maternal healthcare services.^{17,22,23}

This study is guided by the Andersen and Newman Behavioural Model (ANBM) for

healthcare utilisation.^{24,25} The ANBM provides a framework that systematically identifies individual and contextual factors which influence healthcare service use. This model of health service utilisation was developed by Andersen in 1968 to explain how and why individuals access healthcare.²⁶ The model identifies three categories of determinants of healthcare utilisation: (i) predisposing factors, (ii) enabling factors (iii) need-based factors.^{27,28} Predisposing factors are individual-level factors that influence the likelihood of seeking healthcare.^{24,29,30} These include socio-demographic factors such as age, level of education, sex of the child, type of delivery, and place of residence. Enabling factors are the structural and logistical resources that facilitate or hinder the use of healthcare services.^{25,31} These include factors such as antenatal care from a skilled provider, media exposure, region, household wealth status, and place of delivery. Need-based factors are factors that reflect the urgency for PNC services.^{24,31} This includes birth weight status (birth size). By applying the ANBM, this study examines how individual and contextual level factors influence non-use of newborn PNC in Eswatini. This study addresses an important gap in the literature by focusing on newborns rather than mothers and using a multilevel modelling approach. Thus, the model provides a lens for understanding the multilevel barriers to healthcare use among newborns. Moreover, the study aims to examine the individual and contextual factors associated with non-use of newborn PNC in Eswatini.

Methods

Study design and setting

This study is based on newborns in Eswatini. Eswatini is a small country that is divided into four regions: Hhohho, Manzini, Shiselweni and Lubombo.¹⁶ The country is predominantly rural, with twenty-five per cent of the population living in urban areas.³² About 1.2 million people are living in Eswatini, 43% are under the age of 17, while teenagers make up 25% of the population.³² This study used a correlational research design. A correlational research design examines the relationships between variables.³³

Data source, sample, and inclusion and exclusion

This study used data collected through the 2021-2022 Eswatini Multiple Indicator Cluster Survey (EMICS). The EMICS is a nationally representative, cross-sectional household survey conducted every three to five years to monitor key indicators of the health of men, women, and children in households in developing countries around the world.¹⁶ The EMICS applied a two-stage sampling technique.¹⁶ The first stage involved the sampling of enumeration areas (EA) using a systematic random sampling in urban and rural strata.¹⁶ In the second stage, households were randomly selected from each EA using probability proportional to size sampling to ensure the representativeness of the four administrative regions in the country.¹⁶ The EMICS sampled 5 265 households, 4 575 women (aged 15-49), 4 401 men (aged 15-49), 5 890 children aged 5-17 years, and 2 310 children aged 0-4 years; with the household sample yielding a 95.6% response rate.¹⁶ The response rate for the women's sample was 93.9%.¹⁶ Therefore, this study is based on a sample of 865 women who had a live birth in the two years before the survey. The study excluded women aged 15-49 years who did not have a live birth in the two years preceding the survey.

Study variables

Outcome variable

In this study, the outcome variable is non-use of newborn postnatal care. This variable is derived from various questions in the MICS questionnaire; these include "Did anyone check on (name)'s health after you left (name or type of facility in MN20)?", "After the (person or persons in MN19) left you, did anyone check on the health of (name)?", and "After (name) was delivered, did anyone check on (his/her) health?." Respondents who answered yes to any of these questions, as well as any of the following options (doctor, nurse/midwife, traditional birth attendant, motivator, and trainee nurse) to the question "Who checked on (name)'s health at that time?", were considered in the study. The outcome variable was coded as "0=No" if

newborns received any PNC and “1=Yes” if newborns did not receive any PNC.

Explanatory variables

The explanatory variables included in this study are maternal age, maternal level of education, sex of child, birth weight status, place of delivery, antenatal care from a skilled provider, type of delivery, media exposure, household wealth status, place of residence, and region. The explanatory variables are briefly described in Table 1.

Data handling and analysis

This study used Stata version 16 to analyse data.³⁴ The analyses that were conducted included univariate analysis, bivariate analysis, and multivariate analysis. Univariate analysis included frequencies. A chi-square test was performed in bivariate analysis to examine the association between the explanatory variables and the outcome variable. A multilevel logistic regression analysis was also carried out to assess the variation in non-use of newborn PNC among communities. The level of significance was determined using the 95% confidence level, with a significance level of 5%. All statistics produced were based on a p-value of less than 0.05 for the different measures of association. The multilevel model was specified as follows:

$$\text{Log} \left[\frac{\pi_{ij}}{1 - \pi_{ij}} \right] = \beta_0 + \beta_1 X_{ij} + \beta_2 Z_{ij} + \tilde{E}_j + e_{ij}$$

where i represents the individual level and j represents the community level. The probability that the i^{th} woman in the j^{th} community may not use newborn PNC is represented by π_{ij} . The probability of not utilising newborn PNC is represented by $1 - \pi_{ij}$. X and Z represent the factors at the individual and community levels, respectively. The intercept (β_0) shows the effect on the likelihood of non-use of newborn PNC when all explanatory variables in the model are set to zero or absent. The fixed coefficients are shown in terms of β 's. π_j denotes the effect of community-level factors on non-use of newborn PNC in the j^{th} community. The random errors occurring at the individual level are denoted by e_{ij} .

Four models were fitted in this study. The study used the null model, which excluded all explanatory factors, to examine the community-attributable variability of non-use of newborn PNC. Model 1 contained the individual-level factors. Model 2 contained the community-level factors. Model 3 contained both individual-level and community-level factors. Moreover, the study used the intra-cluster correlation coefficient (ICC) using the linear threshold model. A high ICC value indicates that the community clusters are relevant for the understanding of non-use of newborn PNC. The formula for the ICC is denoted as follows:

$$\text{ICC} = \frac{V_a}{V_a + \frac{\pi^2}{3}}$$

Where V_a is the variance between the primary sampling units in the null model and models 1-3, respectively. The $\frac{\pi^2}{3}$, which approximately equals to 3.29, is used as the individual-level variance. The median odds ratio (MOR) was used to assess the magnitude of between-community variance in the odds of non-use of newborn PNC. When the two communities are chosen at random, the median value of the odds ratios between the areas with the highest and lowest risk is known as the median odds ratio, and it is inversely proportional to the area-level variance. The MOR can be determined as follows:

$$\text{MOR} = \exp(\sqrt{2 \times V_a \times 0.6745}) \approx \exp(0.95\sqrt{V_a})$$

We also used the proportional change in variance (PCV). The PCV measures the change in the variance between the null model and the following models. It is denoted by the following formula:

$$\text{PVC} = \frac{V_{n-1} - V_{n-2}}{V_{n-1}}$$

where V_{n-1} is the PSU variance of the null model and V_{n-2} is the PSU variance of the successive models (i.e., models 1, 2, and 3). We used the deviance (-2LL) and the area under the curve (AUC) to estimate the goodness of fit as well as the predictive accuracy of the models. We also checked for collinearity using the variance inflation factor (VIF); the mean VIF was 1.08, with a minimum VIF of 1.00 and a maximum VIF of 1.29.

Ethical approval

This study used secondary data from the Multiple Indicator Cluster Survey – <https://mics.unicef.org/surveys>. We sought and were granted permission to download and use this data. This data comes in an anonymized format, making respondent anonymity a priority.

Results

Socio-demographic characteristics

Table 2 presents the distribution of the study participants by socio-demographic factors. The

analysis was based on a sample of 865 women with a live birth in the last two years preceding the survey. The majority (50.9%) of the study mothers were aged 20-29, while only 4.0% were aged 40-49. Just over six in ten (67.5%) mothers had secondary education. At least five in ten (55.6%) newborns were male. Over nine in ten (91.0%) newborns had a normal birth weight (not low). Moreover, 92.7% of mothers delivered in a health facility, 98.6% received antenatal care from a skilled provider, and 95.8% had no media exposure. At least eight in ten mothers (83.5%) delivered their last child through vaginal delivery. In terms of household wealth, the majority of mothers (42.1%) were from poor households.

Table 1: Description of the study variables

Variables	Description	Variable coding
Maternal age	Age of the mother	1= 15-19 2= 20-24 3= 25-29 4= 30-34 5= 35-39 6= 40-44 7= 45-49
Maternal level of education	The highest level of education attained by the mother	1 = Primary or lower 2 = Secondary 3 = Higher
Sex of the child	This indicates the biological sex of the child	1= Female 2 = Male
Birth weight status	The size of the newborn at birth	1 = Normal (not low) 2 = Low
Place of delivery	The mother's place of delivery	1= Health facility 2 =Non-facility
Antenatal care from a skilled provider	Mothers were asked if they utilised antenatal care from a skilled provider or an unskilled provider	0 = Skilled 1 = Unskilled
Type of delivery	The type of delivery of the mother	1 = Natural delivery 2 = Caesarean
Media exposure	Respondents were asked whether they were exposed to the media (radio, TV, and newspaper) or not.	0 =No 1 =Yes
Household wealth status	Household socioeconomic status	1 = Poor 2 = Middle 3 = Rich
Place of residence	The mother's place of residence	1 = Urban 2 = Rural
Region	The province where the mother resides	1 = Hhohho 2 = Manzini 3 = Shiselweni 4 = Lubombo

Table 2: Distribution of the study participants by socio-demographic factors

Variables	Frequency	%
Maternal age		
15-19	94	10.9
20-29	440	50.9
30-39	296	34.3
40-49	34	4.0
Maternal level of education		
Primary or lower	167	19.3
Secondary/Vocational	584	67.5
Higher	114	13.2
Sex of child		
Male	481	55.6
Female	384	44.4
Birth weight status		
Normal (not low)	787	91.0
Low	78	9.0
Place of delivery		
Health facility	802	92.7
Non-facility	63	7.3
Antenatal care from a skilled provider		
Unskilled	12	1.4
Skilled provider	853	98.6
Type of delivery		
Caesarean	143	16.5
Vaginal	722	83.5
Media exposure		
No	828	95.8
Yes	37	4.2
Household wealth status		
Poor	364	42.1
Average	194	22.5
Rich	307	35.4
Place of residence		
Urban	233	27.0
Rural	632	73.0
Region		
Hhohho	275	31.8
Manzini	266	30.8
Shiselweni	150	17.3
Lubombo	173	20.1
Total	865	100.0

In terms of the geographic factors, at least seven in ten mothers (73.0%) were from rural areas, and at least three in ten were from the Hhohho region (31.8%) and the Manzini region (30.8%).

Prevalence of non-use of newborn postnatal care

Table 3 presents the bivariate analysis for the factors associated with non-use of newborn PNC.

The findings showed that community-level factors, such as place of residence and region, were significantly associated with non-use of newborn PNC in Eswatini. The findings showed age-related fluctuations in the prevalence of non-use of newborn PNC. Newborns whose mothers were aged 40-49 years had a higher prevalence of PNC non-use (63.7%). Non-use of newborn PNC was lower (48.6%) among those whose mothers were aged 30-39 years. Newborns whose mothers had secondary or vocational education (52.1%) and those whose mothers had primary or lower education (51.5%) had a higher prevalence of PNC non-use, while it was lower (41.7%) among those whose mothers had higher education. Newborns who were female (52.9%) and those with a normal birth weight (50.7%) had a higher prevalence of PNC non-use. PNC non-use was higher among newborns whose mothers delivered in a health facility (51.5%) and those whose mothers had unskilled antenatal care (68.2%).

Moreover, non-use of newborn PNC was slightly higher among newborns whose mothers had vaginal delivery (50.7%). The findings further showed that the prevalence of non-use of newborn PNC decreased with household wealth status. Newborns from poor households had a higher prevalence of PNC non-use (53.9%), while it was lower (47.8%) among those from rich households. Newborns from rural areas had a higher prevalence of PNC non-use (52.3%), while it was lower among those from urban areas (46.0%). Furthermore, newborns from Shiselweni (66.2%) and Manzini (57.8%) had a higher prevalence of PNC non-use, while it was lower among those from Hhohho (38.1%). Figure 1 shows that the prevalence of non-use of newborn PNC was more pronounced in the western and southern regions of the country. Overall, the prevalence of non-use of newborn PNC was 50.6%.

Multilevel determinants of non-use of newborn postnatal care

Table 4 presents the random effects and model fit statistics for newborn postnatal non-use in Eswatini. The null model showed significant between-cluster variation in newborn postnatal non-use (ICC = 22.84%; variance = 0.974 [95% CI = [0.25-0.90])). The ICC increased and decreased between the models, to 26.14 in model one, then

Table 3: Bivariate analysis for the factors associated with non-use of newborn postnatal care in Eswatini

Variable	Non-use of postnatal care				χ^2 value	p-value
	No %	CI	Yes %	CI		
Individual-level factors						
Maternal age					3.3	0.345
15-19	42.9	[32.6-53.9]	57.1	[46.1-67.4]		
20-29	50.4	[45.1-55.8]	49.6	[44.2-54.9]		
30-39	51.4	[45.5-57.2]	48.6	[42.8-54.5]		
40-49	36.3	[20.9-55.0]	63.7	[45.0-79.1]		
Maternal level of education					4.2	0.123
Primary or lower	48.5	[39.3-57.8]	51.5	[42.2-60.7]		
Secondary/Vocational	47.9	[43.1-52.7]	52.1	[47.3-56.9]		
Higher	58.3	[48.2-67.6]	41.7	[32.4-51.8]		
Sex of child					1.3	0.249
Male	51.2	[46.3-56.1]	48.8	[43.9-53.7]		
Female	47.1	[41.4-52.9]	52.9	[47.1-58.6]		
Birth weight status					0.1	0.733
Normal (not low)	49.3	[45.2-53.4]	50.7	[46.6-54.8]		
Low	50.7	[38.7-62.6]	49.3	[37.4-61.3]		
Place of delivery					3.4	0.065
Health facility	48.5	[44.4-52.7]	51.5	[47.3-55.6]		
Non-facility	60.5	[47.3-72.2]	39.5	[27.8-52.7]		
Antenatal care from a skilled provider					1.6	0.207
Unskilled	31.8	[11.8-61.9]	68.2	[38.1-88.2]		
Skilled provider	49.6	[45.7-53.6]	50.4	[46.4-54.3]		
Type of delivery					0.1	0.762
Caesarean	50.0	[39.7-60.3]	50.0	[39.7-60.3]		
Vaginal	49.3	[44.9-53.7]	50.7	[46.3-55.1]		
Media exposure					2.2	0.143
No	48.7	[44.6-52.7]	51.3	[47.3-55.4]		
Yes	65.6	[47.8-79.9]	34.4	[20.1-52.2]		
Household wealth status					2.3	0.311
Poor	46.1	[40.6-51.7]	53.9	[48.3-59.4]		
Average	51.2	[41.9-60.4]	48.8	[39.6-58.1]		
Rich	52.2	[45.9-58.4]	47.8	[41.6-54.1]		
Community-level factors						
Place of residence					4.3	0.039
Urban	54.0	[46.2-61.7]	46.0	[38.3-53.8]		
Rural	47.7	[43.1-52.3]	52.3	[47.7-56.9]		
Region					36.3	0.000
Hhohho	61.9	[55.4-67.9]	38.1	[32.1-44.6]		
Manzini	42.2	[35.1-49.6]	57.8	[50.4-64.9]		
Shiselweni	33.8	[26.1-42.5]	66.2	[57.5-73.9]		
Lubombo	54.0	[44.5-63.1]	46.0	[36.9-55.5]		
Total	49.4	[45.4-53.3]	50.6	[46.7-54.6]		

Note: CI = confidence interval; χ^2 = Chi-square test

17.67 in model two, and 20.74 in model three. In the full model, the MOR of 2.42 was low because it related to an ICC of 20.74%. This means that only 20.74% of the variation in non-use of newborn PNC is due to between-cluster differences. The PCV in

model 2 suggests that the community-level factors accounted for about 27.52% of the variation observed in non-use of newborn PNC in Eswatini. Model 3 explained 11.60% of the between-cluster variation, highlighting the combined contribution

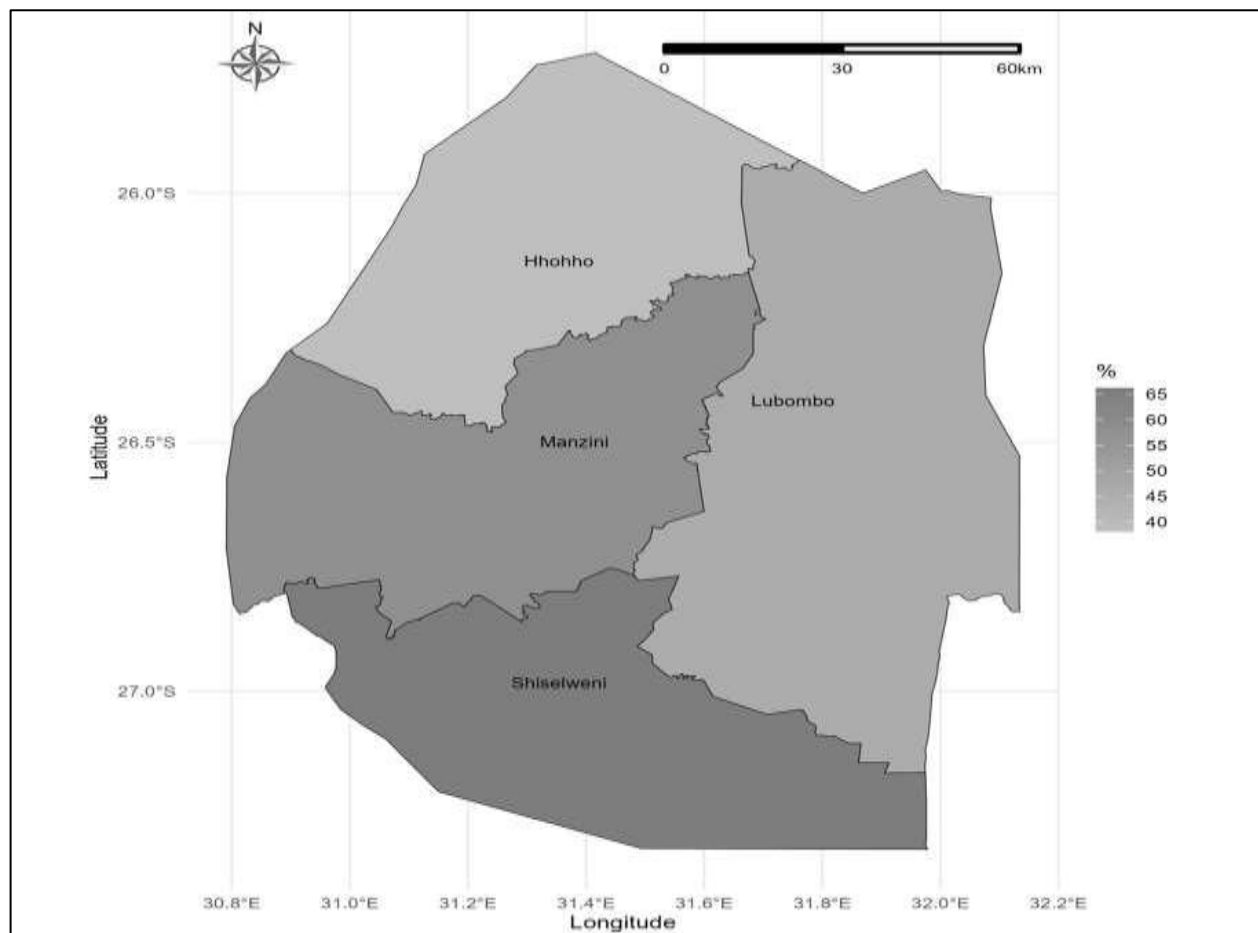


Figure 1: Prevalence of non-use of newborn postnatal care by region

Table 4: Random effects and model fit statistics for non-use of newborn postnatal care in Eswatini

Random effects result	Model 0	Model 1	Model 2	Model 3
PSU variance (95% CI)	0.974 [0.25-0.90]	1.164 [0.64-2.13]	0.706 [0.34-1.47]	0.861 [0.43-1.74]
ICC %	22.84	26.14	17.67	20.74
MOR	2.56	2.80	2.23	2.42
PCV %	®	-19.51	27.52	11.60
Model fitness				
-2LL	1143	1122	1113	1093
AUC (95% CI)	0.88 [0.86-0.90]	0.89 [0.86-0.90]	0.83 [0.81-0.86]	0.85 [0.83-0.88]
PSU	314	314	314	314

Note: ICC = intraclass correlation coefficient; MOR = median odds ratio; PCV = proportional change in variance; -2LL = deviance [-2 log-likelihood]; AUC = area under the curve; PSU = primary sampling unit

of individual- and community-level factors in explaining the variation in non-use of newborn PNC. The deviance (-2LL) was lowest for model three, suggesting that this was the best-fitted model. Model three had an AUC of 0.85, indicating good predictive performance.

Fixed effects – socio-demographic and community factors

Table 5 presents the adjusted odds ratios for the individual-level and community-level factors associated with non-use of newborn PNC in

Table 5: Adjusted odds ratios for the individual level and community level factors associated with non-use of newborn postnatal care in Eswatini

Variable	Model 1 AOR [95% CI]	Model 2 AOR [95% CI]	Model 3 AOR [95% CI]
Individual-level factors			
Maternal age			
15-19	0.66 [0.25-1.71]		0.70 [0.27-1.80]
20-29	0.65 [0.27-1.55]		0.67 [0.28-1.57]
30-39	0.62 [0.26-1.51]		0.62 [0.26-1.48]
40-49 [†]	1		1
Maternal level of education			
Primary or lower	1.73 [0.87-3.46]		1.82 [0.92-3.61]
Secondary/Vocational	1.54 [0.86-2.76]		1.55 [0.87-2.75]
Higher [†]	1		1
Sex of child			
Male [†]	1		1
Female	1.25 [0.9-1.73]		1.21 [0.88-1.68]
Birth weight status			
Normal (not low) [†]	1		1
Low	1.00 [0.55-1.79]		0.97 [0.54-1.73]
Place of delivery			
Health facility	2.49 [1.29-4.81]**		2.51 [1.32-4.77]**
Non-facility [†]	1		1
Antenatal care from a skilled provider			
Unskilled [†]	1		1
Skilled provider	0.43 [0.11-1.76]		0.41 [0.10-1.60]
Type of delivery			
Caesarean [†]	1		1
Vaginal	0.86 [0.54-1.37]		0.85 [0.54-1.35]
Media exposure			
No [†]	1		1
Yes	0.46 [0.19-1.13]		0.53 [0.22-1.27]
Household wealth status			
Poor	1.27 [0.83-1.95]		1.14 [0.74-1.76]
Average	0.94 [0.59-1.51]		0.90 [0.56-1.45]
Rich [†]	1		1
Community-level factors			
Place of residence			
Urban [†]		1	1
Rural		1.61 [0.98-2.66]	1.50 [0.86-2.59]
Region			
Hhohho [†]		1	1
Manzini		2.77 [1.65-4.64]***	3.03 [1.75-5.22]***
Shiselweni		3.27 [1.93-5.53]***	3.44 [1.98-6.00]***
Lubombo		1.45 [0.88-2.40]	1.47 [0.87-2.51]

Note: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$; [†] = reference category; AOR = adjusted odds ratio; CI = confidence interval

Eswatini. Model 3 was the best-fitted model in the random effects statistics and is interpreted below. The findings showed that various factors such as maternal age, maternal level of education, sex of child, birth weight status, antenatal care from a skilled provider, type of delivery, media exposure,

household wealth status, and place of residence were not key predictors of non-use of newborn PNC. However, the findings showed that newborns delivered in a health facility had higher odds of PNC non-use (AOR = 2.51; 95% CI: 1.32-4.77) compared to those who were not delivered in a

health facility. The findings also showed some regional differences in the odds of non-use of newborn PNC. Newborns from Shiselweni (AOR = 3.44; 95% CI: 1.98-6.00) and Manzini (AOR = 3.03; 95% CI: 1.75-5.22) had higher odds of non-use of PNC compared to those from Hhohho.

Discussion

This study investigated the individual and contextual factors associated with non-use of newborn PNC in Eswatini. Despite investments in maternal and child health, we found that over five in ten newborns did not use PNC in Eswatini. This finding raises concerns about gaps in the continuum of care during this stage of life for newborns in the country. The results revealed that place of residence and region were statistically associated with non-use of newborn PNC in Eswatini. The random effects results revealed significant between-cluster variation in non-use of newborn PNC, highlighting the importance of applying multilevel modelling to examine the factors associated with non-use of newborn PNC in Eswatini. After adjusting for other predictors, the results revealed that health facility delivery and region were key predictors of non-use of newborn PNC.

Surprisingly, newborns whose mothers delivered in a health facility had higher odds of non-use of newborn PNC. Previous studies have reported contradictory results where the odds of PNC non-use were higher among mothers delivered at a non-facility setting.^{10,35,36} Our findings are unexpected because one would assume that mothers who delivered in a health facility would have lower odds of PNC non-use due to the level of information they potentially receive at the healthcare facility during and after delivery. The ANBM posits that enabling factors, such as facility-based delivery, should ideally enable access and use of healthcare services.²⁵ Nevertheless, these results show that facility-based births may not always guarantee PNC use. Giving birth at a healthcare facility often provides women with the opportunity to be assessed by healthcare professionals, which, in turn, enables women to learn about the types, benefits, and availability of postnatal care services.¹⁰ It is also possible that mothers who deliver in a health facility may have a false sense of security around

their births and may feel that it is not necessary to have follow-up PNC visits for their newborns. Mothers who give birth outside a facility may have heightened fears around their births, thus increasing their levels of PNC use. This finding could also be influenced by perceived need, where the mother's subjective understanding of the necessity for care influences their healthcare-seeking behaviour for newborn PNC. There could also be a missed opportunity within the healthcare facilities to schedule newborn PNC before the mothers are discharged.

Moreover, there were noticeable regional differences in the odds of non-use of newborn PNC. Newborns from Manzini and Shiselweni had higher odds of non-use of newborn PNC. These findings are consistent with other studies conducted in developing countries, which also found geographic and regional differences in newborn PNC use.^{8,35-37} Sub-Saharan African countries often have geographic disparities in the use of maternal and child healthcare services.^{19,38,39} Shiselweni is a predominantly rural region; rural regions are often characterised by several barriers, such as transportation, distance to healthcare facilities, and availability of healthcare personnel, which hinder the use of maternal and child healthcare services.⁴⁰⁻⁴² The findings for the Manzini region are surprising because predominantly urban regions often exhibit higher use of maternal and child healthcare services.^{43,44} This calls for further research to fully understand the factors driving newborn PNC non-use in this region. However, these findings highlight regional variations that could be attributed to different levels of socio-economic development and accessibility of healthcare services between the regions.

Strengths and limitations

This study used nationally representative data from the 2021-22 EMICS, which increases the generalisability of the findings to the broader population in the country. The use of multilevel modelling allows for a better understanding of the influence of individual and contextual factors on non-use of newborn PNC. However, the study also has some limitations. The cross-sectional nature of the data limits the ability to establish cause-and-

effect relationships between the explanatory factors and non-use of newborn PNC. Moreover, there is also a possibility of recall or social desirability bias due to the self-reported nature of the data.

Implications for policy and practice

Based on the findings from this study, several important policy and practice implications for addressing non-use of newborn PNC in Eswatini emerge. The high prevalence of non-use of newborn PNC indicates that the current maternal and child health strategies are not fully addressing this issue. The findings also highlight a need for targeted and region-specific interventions to improve newborn PNC in the country. There is a need to learn the best practices around PNC use from regions that are performing better, such as Hhohho. The regional differences in newborn PNC call for the Ministry of Health to strengthen outreach through mobile clinics and community health workers in Shiselweni and Manzini. There is also a need for improvements in PNC procedures within the healthcare facilities in these regions to ensure that essential newborn PNC checks are conducted before discharge and mothers get clear follow-up instructions.

Conclusion

The study showed a high prevalence of non-use of newborn PNC in Eswatini, with at least five in ten newborns not using PNC. The study also revealed that contextual factors such as place of residence and region were associated with non-use of newborn PNC. The key determinants of non-use of newborn PNC were health facility delivery and region. Newborns delivered in health facilities had significantly higher odds of not using PNC. There were also regional differences in non-use of newborn PNC. To address these challenges, urgent action is needed. We recommend a multifaceted approach which includes (i) strengthening the procedures for newborn PNC checks before discharging women after birth at the health facilities, (ii) implementing region-specific interventions that are aimed at improving the coverage of newborn PNC in areas like Shiselweni, and (iii) strengthening community awareness programmes to ensure that mothers understand the

importance of newborn PNC. Future research should consider examining the influence of maternal beliefs, health worker practices, and system-related barriers that contribute to non-use of newborn PNC.

Authors' contributions

BAT conceptualised this study. BAT worked on the analysis. BAT, LS, and MT worked on the writing of this study. All authors read and approved the final version of this paper.

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