ORIGINAL RESEARCH ARTICLE

Trends in prenatal care among pregnant women in the Marrakesh province, Morocco

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Abstract

This analytical cross-sectional study assessed the evolution of maternal health indicators in the Marrakech province by comparing data from 2014–2015 and 2020–2022. A total of 1,070 pregnant women were surveyed in three health facilities using a self-administered questionnaire and non-probability accidental sampling. Statistical analyses (Chi-square, Student's t-tests, and logistic regression with Wald tests) were performed using SPSS 21.0. The results showed a significant improvement in prenatal care utilization over time. The percentage of women completing four recommended antenatal visits (ANC) increased from 36.9% to 49.5%, and early initiation of care in the first trimester rose from 55.3% to 82.8%. Completion rates of ANC1, ANC3, and ANC4, as well as the medicalization of consultations, also improved significantly. Logistic regression revealed strong associations between the 2020–2022 period, rural residence, and enhanced maternal health indicators. These findings underscore the positive impact of public health strategies and the resilience of Morocco's health system during the COVID-19 pandemic. *(Afr J Reprod Health 2026; 30 [1]: 98-107).*

Keywords: Maternal Health, Antenatal Care, Covid-19, Health Systems, Morocco.

Résumé

Cette étude analytique transversale a évalué l'évolution des indicateurs de santé maternelle dans la province de Marrakech en comparant les données des périodes 2014–2015 et 2020–2022. Au total, 1 070 femmes enceintes ont été interrogées dans trois établissements de santé à l'aide d'un questionnaire auto-administré et selon un échantillonnage non probabiliste accidentel. Les analyses statistiques (tests du Chi carré, test t de Student et régression logistique avec tests de Wald) ont été réalisées à l'aide du logiciel SPSS 21.0. Les résultats ont mis en évidence une amélioration significative de l'utilisation des soins prénatals. Le pourcentage de femmes ayant complété les quatre consultations prénatales recommandées (CPN) est passé de 36,9 % à 49,5 %, tandis que l'initiation précoce du suivi au premier trimestre a augmenté de 55,3 % à 82,8 %. Les taux de complétion des CPN1, CPN3 et CPN4, ainsi que la médicalisation des consultations, se sont également améliorés de manière significative. La régression logistique a révélé des associations fortes entre la période 2020–2022, la résidence rurale et l'amélioration des indicateurs de santé maternelle. Ces résultats soulignent l'impact positif des stratégies de santé publique et la résilience du système de santé marocain durant la pandémie de COVID-19. *(Afr J Reprod Health 2026; 30 [1]: 98-107).*

Mots-clés: Santé maternelle, Soins prénatals, COVID-19, Systèmes de santé, Maroc.

Introduction

Maternal health serves as a key indicator of the overall effectiveness of health systems and remains central to global efforts aimed at reducing preventable mortality. It is a global priority, enshrined in the sustainable development goals (SDGs), which aim to reduce the global maternal mortality ratio to less than 70 deaths per 100,000 live births.[1] In 2015, an estimated 303,000 women worldwide died from complications related to pregnancy or childbirth, predominantly in low- and middle-income countries.[2]

Morocco has achieved notable advancements in maternal and child health over the past decades.[3] This improvement is evidenced by the reduction in childhood mortality and, to a lesser extent, in maternal mortality. Specifically, the

maternal mortality ratio decreased significantly from an estimated 227 per 100,000 live births in 1997 to 72.6 per 100,000 live births in the period 2015-2016.[4] Despite their significance, these advances remain below the targets set by the SDGs, indicating that further interventions are necessary to achieve these objectives. Similarly, the infant mortality rate declined from 40.0‰ in 1997 to 18‰ in 2018.[4] These positive trends are associated with a considerable rise in the living standards of Moroccans, alongside the development of the healthcare system through numerous initiatives implemented by the Ministry of Health.

The 2018 Population and Family Health Survey indicated that prenatal care, crucial for assessing maternal and fetal risk and enabling preventive management of pathological conditions, was used by 88.5% of pregnant women. However, a notable urban-rural gap existed, with 95.6% of urban women receiving antenatal care visits (ANC) compared to only 79.6% in rural areas.[4] According to the same survey, this gap appears to be linked to the perceived severity of certain health problems and physical and financial access to health facilities. These findings suggest a considerable opportunity to further decrease maternal mortality by addressing the obstacles that hinder women's access to obstetric services. Effective prenatal care facilitates the early identification and management of potential pregnancy complications.

In alignment with global efforts, Morocco has committed to achieving the sustainable development goals. Key targets for 2030 include decreasing the maternal mortality ratio from 72.6 to 36 deaths per 100,000 live births and the neonatal mortality rate from 13 to 12 per 1,000 live births. To address preventable deaths, three national confidential inquiry reports were published in 2009, 2010, and 2015, consistently underscoring the need for action in Morocco.

The World Health Organization declared the Covid-19 pandemic in 2020. This event precipitated significant global repercussions on maternal health, notably amplifying existing socioeconomic inequalities. Research in India showed a 56% reduction in prenatal care consultations due to lockdown measures.[5] Across sub-Saharan Africa, the pandemic correlated with an increase in maternal and neonatal mortality.[6-7] Within Morocco, however, the specific impact of the pandemic on maternal health is still understudied. The Marrakesh province presents a compelling setting for the investigation of these dynamics, owing to its heterogeneous socioeconomic profile, diverse healthcare infrastructure, and central geographic position, thereby facilitating a comparative analysis of the pandemic's effects on maternal health across varied contexts. Likewise, Marrakech was among the areas at high risk of infection due to the high number of COVID-19 cases. In addition, restrictive measures were applied there with great rigor.

This study aims to describe and compare trends in prenatal care coverage and accessibility in the province of Marrakech during the pre-pandemic period (2014–2015) and the COVID-19 pandemic period (2020–2022), with a particular focus on identifying disparities and disruptions in services.

Methods

As part of a semi-longitudinal follow-up of maternal health indicators within the population of the Marrakesh province, a first survey was conducted between 2014 and 2015, and a second between 2020 and 2022 by the research team of the Human Ecology Laboratory. This research focused on evaluating antenatal care. In addition to these follow-up indicators, data on socio-economic, demographic, and cultural contexts were collected. These two surveys were conducted on a sample of 535 pregnant women each, across three healthcare facilities in the Marrakech province. These facilities were selected to ensure representativeness of the various primary healthcare establishments in the public sector. The selection criteria included: belonging to an urban or rural setting, and the presence or absence of a delivery unit.

The data were collected using a structured questionnaire, supplemented by information from the pregnancy follow-up records of pregnant women attending health centers for prenatal care. The research team pre-tested the data collection instrument, which included socioeconomic and demographic factors incorporated into the study:
The questionnaire included the following variables:

Socio-demographic variables

Maternal Age Groups: categorized as under 18 years, 18 to 35 years, and over 35 years.
Area of Residence: classified as urban or rural based on the criteria defined by the Ministry of Health.
Social Coverage: including Mandatory Health Insurance (MHI), Medical Assistance Scheme (MAS), or other forms of coverage. Although pregnancy care is free, this variable was primarily used to approximate the woman's socioeconomic status, particularly for those economically disadvantaged.
Educational Level of Pregnant Women.
Parity: the number of live births.

Prenatal care indicators

To evaluate women's adherence to and the quality of prenatal care visits, the following variables were included in the questionnaire:
Date of 1st Contact: This aimed to specify whether the first contact with the healthcare system occurred during the first, second, or third trimester of pregnancy.
Antenatal Care (ANC1, ANC2, ANC3, ANC4): This aimed to verify whether the schedule of prenatal care visits was followed (12-15, 24-28, 32-34, and 36-38 weeks of gestation).
Medicalized Antenatal Care Visits (ANC1m): This aimed to verify whether the pregnant woman was seen by a physician during her first prenatal care visit.
Adherence: Measures adherence to prenatal care visits (the woman spontaneously attends the appointment scheduled for her by the healthcare personnel at the health facility).
Biological Assessment: Whether the mandatory biological tests were conducted completely, incompletely, or not at all.
Ultrasound: Whether an ultrasound examination was performed at any point during the pregnancy.

Statistical analysis

Data obtained from the questionnaires were entered and analyzed using SPSS software (SPSS Inc., version 21.0, Chicago). Prior to statistical analyses, the internal consistency of the dataset was verified through the application of specific algorithms.

For statistical analysis, both univariate and multivariate tests were employed to find potential associations among the study variables. To evaluate the strength of association between categorical variables, Chi-square tests were performed. For multivariate analysis, dichotomous logistic regression was selected to account for the simultaneous and marginal effects of multiple variables in examining relationships. The dependent variables in the logistic regression included prenatal care indicators (ANC1–ANC4, ANCm, visit regularity, and ultrasound). Independent variables comprised cohort year, place of residence, type of health facility, maternal age at risk, educational level, health insurance coverage, and parity. For continuous variables, parametric tests for comparing means (Student's t-test and analyses of variance) were used following confirmation of normal distribution with p-values <0.05 considered statistically significant.

Both surveys were conducted in the three health centers by trained and volunteer staff. A total sample of 1070 pregnant women was equally divided between the two surveys. The first survey took place during 2014-2015, while the second was conducted from 2020 to 2022, during the peak of the Covid-19 pandemic. During this period, significant disruptions were observed in prenatal care due to the reorganization of services and travel restrictions imposed by lockdown measures. The cancellation or postponement of appointments, reduced monitoring of high-risk pregnancies, and limited access to diagnostic services were exacerbated by patients' fear of infection and the stress associated with social isolation.
Both surveys were conducted in compliance with the ethical principles of the Declaration of Helsinki. Informed consent was obtained from all participants prior to the start of the study via an information sheet detailing the survey process. Anonymity of participants was strictly maintained by assigning non-identifiable numerical codes and excluding any personal identifiers. Data were stored securely, treated with full confidentiality, and reported solely in aggregated form to prevent individual identification. And the study protocol was approved by the Ethics Committee of the University Hospital Center of Marrakesh, Morocco (reference number: N° 275/2021).

Results

A total of 1070 pregnant women were enrolled in this study, with an equal distribution across the two study periods. The total number of questionnaires analyzed is detailed in Table 1. Based on the study results, the mean age of participating women was 27.0 ± 6.1 years in the 2014-2015 cohort and 28.1 ± 6.3 years in the 2020-2022 cohort.

Comparative analysis of data from the two surveys highlights significant shifts in the demographic profile of pregnant women. Specifically, a modest increase in the mean age was observed (27.0 to 28.1 years). The distribution by at-risk age category reveals a slight decrease in the prevalence of early pregnancies (1.9% to 0.3% among women under 18 years) and an increase in that of late pregnancies (14.6% to 16.3% among women aged 35 years and older), potentially correlated with the reported rise in the mean age at first marriage in the Marrakech region to 27.70 years in 2024 (urban: 28.70 years, rural: 26.90 years), consequently leading to a later age at primiparity.

Given the established correlation between early childbearing, juvenile marriages, and increased obstetric risks, quantifying the prevalence of these pregnancies was deemed necessary. This information also allows for an evaluation of the effectiveness of legislation prohibiting the marriage of minors under 18 years, except under specific judicial authorization. Parity significantly increased over the study period, with the average number of live births rising from 2.31 to 2.95, suggesting a change in reproductive trends. Moreover, substantial progress has been made in health coverage, largely attributed to the national initiative aimed at universal healthcare access. Consequently, the proportion of women lacking any form of health insurance experienced a significant decline, from 89.1% in the 2014-2015 period to 28.1% in the 2020-2022 period. Concurrently, enrollment in Mandatory Health Insurance (MHI) tripled (from 5.5% to 16.0%), and coverage under the Medical Assistance Scheme (MAS) increased tenfold (from 5.5% to 55.9%) between the two study periods. This notable enhancement in health coverage is anticipated to play a critical role in improving women's access to prenatal care services.

Maternal education is a key determinant of antenatal care utilization. The WHO reports that women with higher education levels are more likely to complete the recommended antenatal visits. This is corroborated in Morocco by the 2018 ENPSF, which shows a substantial increase in prenatal care coverage with higher maternal education, the results of the present study attest to a significant progression. The proportion of participants with primary education or less fell from 77.3% in the first cohort (2014-2015) to 65.5% in the second (2020-2022). Conversely, the proportion of those with secondary or higher education rose from 22.7% to 34.5%. This positive trend is in line with the priority given to the education sector in Morocco and the significant progress made in this area.

These results highlight significant changes in the sociodemographic profile of the pregnant women included in this study, suggesting a favorable trajectory for the improvement of their care. These changes may reflect the positive impact of public health reforms and awareness-raising initiatives that have been implemented.

Concerning antenatal care practices among pregnant women attending health facilities in Marrakech province, statistical analyses show significant temporal evolutions in key maternal health parameters. More specifically, a statistically significant increase in the regularity of antenatal care attendance was observed (36.9% to 49.5%; χ^2=19.4, p<0.001). At the same time, the uptake rate of the first antenatal consultation (ANC1) increased significantly, from 56.7% over the 2014-2015 period to 79.6% over the 2020-2022 period (χ^2=67.1, p<0.001).

Although the temporal variation in the use rate of the second ANC did not reach statistical significance, the utilization rates of the ANC3 and ANC4 increased from 69.6% to 77.9% and from 64.6% to 72.7%, respectively (Figure 1).

Moreover, a statistically significant improvement was observed in the proportion of medically supervised antenatal consultations, increasing from 82.6% in 2014–2015 to 92.6% in 2020–2022 ($\chi 2$ = 27.3; p < 0.001). Consistent adherence to ANC, a key measure of healthcare quality, improved over the period 2020-2022, indicating better compliance with established prenatal monitoring guidelines.

Table 1: sociodemographic characteristics of pregnant women

Variables	Modality	2014 - 2015 N=535 **n (%)**	2020 - 2022 N=535 **n (%)**	Test stat.
Women's age (Y)		27,0 ±6,1	28,1 ±6,3	t= 3.07** (p=0.002)
Women's parity		2,31 ±1,21	2,95 ±1,15	t= 9.17*** (p < 0.001)
Ages of Risk	<18 years	11 (1.9)	2 (0.3)	χ^2= 6.7 *
	18-34 years	486 (83.5)	486 (83.4)	(p= 0.034)
	>= 35 years	85 (14.6)	95 (16.3)	
Insurance Health coverage	Without	488 (89.1)	164 (28.1)	
	CHI	30 (5.5)	93 (16.0)	χ^2= 438.7 ***
	MAS	30 (5.5)	326 (55.9)	(p < 0.001)
Education level	= < at primary level	442 (77.3)	382 (65.5)	χ^2= 19.49 ***
	Secondary and above	130 (22.7)	201 (34.5)	(p < 0.001)

*p < 0.05, **p < 0.01, ***p < 0.001
t : Student's t-test for continuous variables
X^2: Chi-square test for categorical variables
CHI : Compulsory Health Insurance
MAS : Medical Assistance Scheme

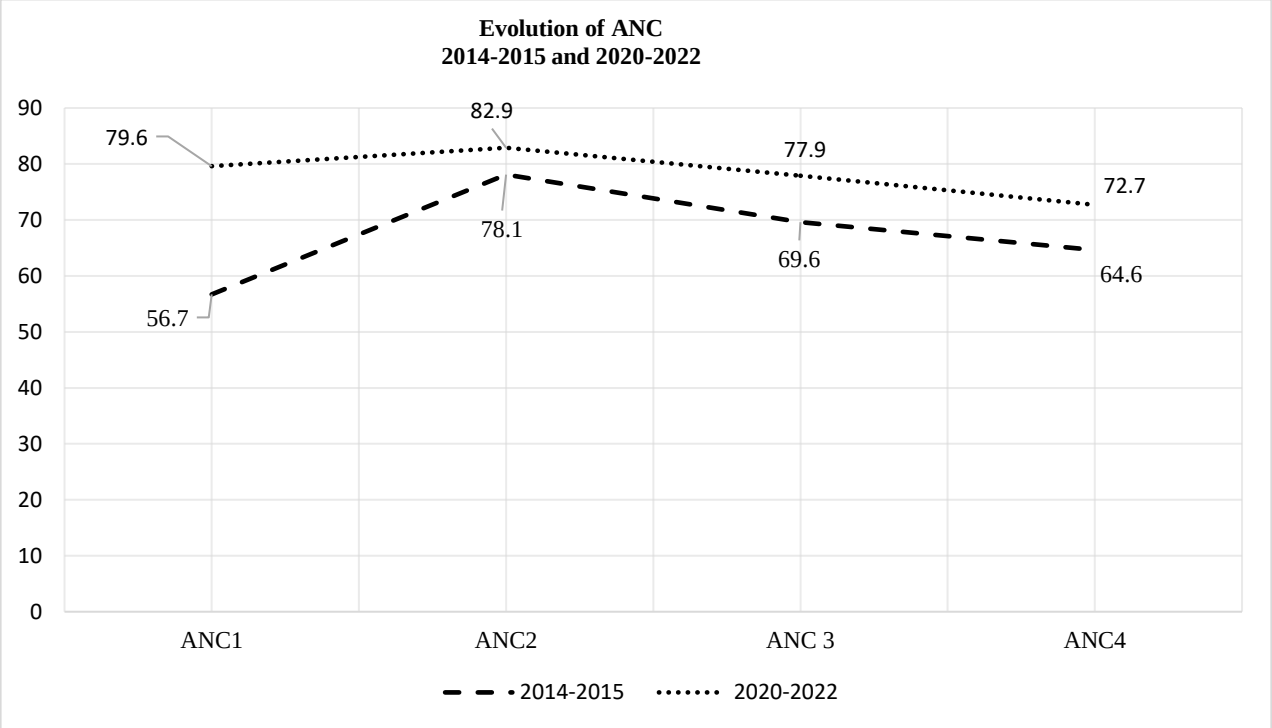

Figure 1: Evolution in antenatal care.

Table 2: Antenatal care characteristics

Variables		Modality	2014 - 2015 **n (%)**	2020 – 2022 **n (%)**	Test χ^2
Initial Contact		T 1	316 (55.3)	461 (82.8)	101***
		T 2	192 (33.6)	81 (14.5)	(p < 0.001)
		T 3	63 (11.0)	15 (2.7)	
Antenatal Care	ANC 1 (12-15 weeks)	Completed	339 (56.7)	4 61 (79.6)	67.1***
		Not Completed	234 (43.3)	118 (20.4)	(p < 0.001)
	ANC 2 (24-28 weeks)	Completed	476 (78.1)	459 (82.9)	3.1n.s.
		Not Completed	116 (21.9)	95(17.1)	
	ANC 3 (32-34 weeks)	Completed	366 (69.6)	413(77.9)	9.49**
		Not Completed	160 (30.4)	117 (27.3)	(p=0.002)
	ANC 4 (36-38 weeks)	Completed	338 (64.6)	378 (72.7)	7.1**
		Not Completed	185 (35.4)	142(27.3)	(p=0.005)
ANC Medicalized		Completed	256 (82.8)	427(92.6)	17.64***
		Not Completed	53 (17.2)	142(7.4)	(p < 0.001)
Regularity of ANC		Regular	187 (36.9)	253 (49.5)	19.4***
		Irregular	333 (64.0)	258 (50.5)	(p < 0.001)
Ultrasound		Completed	476 (82.9)	531 (100)	99.48***
		Not Completed	98 (17.1)	0 (0)	(p < 0.001)

p < 0.05 = significant **(*)**
p < 0.01 = highly significant **(**)**
p < 0.001 = very highly significant **(***)**
ns : not significant
Notes ANC: Antenatal care T: trimester of pregnancy

In summary, the statistically significant increase in the rate of early recruitment in the first trimester of pregnancy, coupled with the high rate of medicalized ANC (82.8% in 2014/2015, compared to 92.6% in 2020/2022), should facilitate more comprehensive monitoring of pregnancy, contributing to the prevention of complications and the timely identification of potential obstetric and fetal morbidities.

Access to complementary examinations, a key indicator of service quality, has shown a notable increase, particularly for ultrasound. This examination, a primary diagnostic tool in obstetrics, allows for the monitoring of fetal development and the early identification of potential anomalies. The study data highlights a significant increase in ultrasound use. Consequently, the proportion of women who underwent an ultrasound assessment reached 100% during the 2020-2022 period, compared to 82.9% in 2014-2015. This positive trend could be attributed to the increased availability of ultrasound equipment in health centers and a growing recognition of their essential role in prenatal care. Simultaneously, these healthcare facilities have received help from capacity-building programs, notably in terms of biomedical equipment acquisition

Discussion

To ensure optimal pregnancy monitoring, the World Health Organization recommends a minimum of four regularly spaced ANC visits, with the first ideally occurring within the first trimester of gestation. High-risk pregnancies require closer surveillance with more frequent consultations. Analysis of our findings shows a statistically significant increase in the regularity of ANC attendance, underscoring the effectiveness of public health strategies and the resilience of the Moroccan healthcare system in maintaining access to essential maternal services during the Covid-19 pandemic. This also reflects the capacity of health authorities to safeguard priority programs such as childhood immunization and ANC despite adverse circumstances.

Table 3: Logistic regression analysis

Variables equation	Test Wald (W)							
	1st Contact in the 1st trimester (75.8)	ANC1 (74.1)	ANC2 (81.9)	ANC 3 (75.7)	ANC4 (70.3)	ANC m (89.9)	Regularity (58.5)	Ultrasound (92.1)
Year (2020-2022)	53.1*** (p < 0.001)	40.1*** (p < 0.001)	0.5 ns	2.1 ns	8.8** (p=0.003)	22.3*** (p<0.001)	6.7* (p=0.009)	0.0 ns
Health center	0.2 ns	0.1ns	0.4 ns	1.5 ns	0.6 ns	0.1 ns	1.4 ns	5.0* (p=0.024)
Women's Origin (rural)	9.5** (p= 0.002)	7.1** (p= 0.005)	11.4** (p=0.001)	16.0*** (p < 0.001)	23.1*** (p < 0.001)	23.1*** (p < 0.001)	2.1 ns	0.0 ns
Ages of Risk	0.9 ns	0.8 ns	0.2 ns	0.7 ns	3.1 ns	0.1 ns	0.0 ns	2.3 ns
Education level	0.0 ns	0.5 ns	0.4 ns	0.5 ns	0.5 ns	1.7 ns	0.3 ns	0.0 ns
Insurance Health coverage	0.7 ns	1,2 ns	1.0 ns	0.04 ns	2.7 ns	0.3 ns	0.1 ns	0.3 ns
Women's parity	1.4 ns	3.0 ns	1.7 ns	0.01 ns	3.1 ns	0.7 ns	0.8 ns	7.8** (p=0.005)
Constant	53.5*** (p < 0.001)	51.8*** (p < 0.001)	0.9 ns	2.2 ns	8.9** (p=0.003)	22.6*** (p<0.001)	7.0* (p=0.008)	0.9 ns

p < 0.05 = significant (*)
p < 0.01 = highly significant (**)
p < 0.001 = very highly significant (***)
ns : not significant
Notes:
(%): of good ranking (in parentheses).
ANC m: Medicalized Antenatal Care.

The binary logistic regression analysis revealed a strong association between the 2020–2022 period, marked by the Covid-19 pandemic, and maternal health indicators, particularly early initiation of ANC (W = 53.1, p < 0.001), ANC4 (W = 8.8, p=0.003), and the medicalization of ANC consultations (ANCm, W = 22.3, p<0.001). The measures implemented to ensure continuity of care, including adapted service pathways and community-based approaches such as mother and parent classes, played a crucial role.

These findings are consistent with international evidence. In India, early initiation of ANC in the first trimester was shown to reduce risks, underscoring the importance of awareness programs targeting families. Similarly, studies in Canada and Europe demonstrated the effectiveness of strategies such as telemedicine, which ensured regular ANC follow-up despite the restrictions imposed during the Covid-19 pandemic.[8-11]

Concerning the regularity of pregnant women's attendance at prenatal care visits, the findings of this study show a statistically significant increase during the 2020-2022 period (w=6.7, p=0.009).

This trend suggests a heightened awareness of the importance of antenatal care. In Europe, research has documented an increase in prenatal consultations during the Covid-19 pandemic, indicating a reinforced feeling of the necessity for rigorous medical follow-up.[12] This observation may be attributable to contextual and psychological factors influencing pregnant individuals. Comparable findings have been reported in Canada and the United States, with a notable increase in ANC regularity. This is partly explained by public health campaigns emphasizing the benefits of prenatal care for maternal and infant health during the pandemic.[9-13]

Similarly, a strong association was observed between rural residence and maternal health indicators, particularly early initiation of consultation (w=9.5, p= 0.002), ANC2 (w=11.4, p=0.001), ANC3 (w=16, p < 0.001), ANC4 (w=23, p < 0.001), and medicalization of prenatal consultations (w=23, p < 0.001). Indeed, in urban areas, the rigors of confinement and restrictive measures may have forced women to restrict their visits to health facilities. This interpretation is consistent with evidence from India, where a significant decline in antenatal visits was documented in urban areas.[14] Similar results have also been reported in other contexts,[7] indicating that restrictions on the functioning of health centers substantially hampered access to maternal health services, particularly in countries with high COVID-19 incidence rates.

Furthermore, research conducted in Bangladesh suggests that perceptions of the risks associated with COVID-19 vary between rural and urban areas, which influences health behaviors.[15] As a result, the pandemic has changed access to healthcare. It has also reshaped perceptions of the risks associated with using healthcare services, depending on where people live. Therefore, attendance at prenatal care in rural areas during the health crisis has improved. Thus, the pandemic shifted risk perceptions about using health services depending on residence, which may have improved prenatal care attendance in rural areas.[16]

In Morocco, several interventions have been implemented to improve maternal health indicators in rural areas. These include the upgrading of healthcare facilities in terms of human and material resources, particularly within the framework of the National Initiative for Human Development, and the strengthening of healthcare professionals' skills in maternal health.

This has contributed to enhancing the attractiveness of the healthcare system, especially in rural areas. Rural areas have seen positive trends in maternal health indicators, particularly with the implementation of the community health approach via community health workers, thereby reducing disparities in maternal health between urban and rural settings. Furthermore, the national project to extend universal health coverage in Morocco, through the significant expansion of health insurance, has helped reduce financial barriers to maternal health services, leading to a marked increase in medical coverage among women. The Ministry of Health and Social Protection has also mandated free coverage for pregnancy-related complications and standard biological pregnancy tests, facilitated by the deployment of automated machines in health centers with delivery units. In addition, free inter-facility transfers for all women and/or newborns have been instituted, alongside the

strengthening and expansion of rural obstetric emergency medical services.

By contrast, in the wider African context, access to maternal health services remains constrained by economic barriers. For example, a study conducted in Nigeria highlighted that the direct and indirect costs associated with antenatal care continue to represent a major obstacle to ANC utilization.[17-18].

Conclusion

In conclusion, maternal health indicators in the Marrakech province showed significant improvement between 2014–2015 and 2020–2022, particularly in rural areas. Regular ANC attendance increased from 82.6% to 92.6%, ANC4 coverage from 70% to 81%, and medicalized ANC consultations from 82.6% to 92.6%, with all changes being statistically significant ($p < 0.05$). These findings underscore the effectiveness of public health initiatives and demonstrate the resilience of the Moroccan health system, even amidst the challenges posed by the COVID-19 pandemic.

Study limits

To reduce the limitations associated with this study, further research should be undertaken to include variables associated with childbirth and the post-natal period. To extrapolate the results, multicenter studies could also be conducted in collaboration with other Moroccan regions.

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Conflict of interest

The authors have approved article and declare no conflict of interest.

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