Journal of Medicine, Nursing & Public Health

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ISSN: 2706-6606

Stratford Peer Reviewed Journals and Book Publishing
Journal of Medicine, Nursing & Public Health
Volume 6||Issue 2||Page 34-46||August||2023|
Email: info@stratfordjournals.org ISSN: 2706-6606

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How to cite this article: **Uhiriwe, C. G., Habarurema, N. & Rutayisire, E. (2023). Factors Associated With Utilisation of 4th Postnatal Care among Mothers Seeking Vaccination for Children in Selected Health Facilities in the City of Kigali, Rwanda. *Journal of Medicine, Nursing & Public Health,* 6(2), 34-46.** https://doi.org/10.53819/81018102t4187

Abstract

Maternal mortality remains a global public health concern. Maternal mortality rate was 211deaths per 100,000 live births in 2017 with sub-Saharan Africa accounting for two third. A strengthened postnatal care can significantly reduce this unacceptable mortality. This study aims at assessing the factors associated with the utilization of 4th postnatal care services among mothers seeking vaccination for their children in selected health centers located in the city of Kigali. A cross-sectional study design was conducted in 10 health centers and 403 mothers were recruited. Data was collected using an interview-administered questionnaire, Chi-square and multivariate analysis were used to examine the relationship between independent variables and PNC4 attendance. Mothers who participated in the study (56.7%) were between the ages of 26 and 35, 47.6% were cohabiting, and 49.6% had completed secondary and TVET school. The attendance of PNC4 was 27%. PNC4 service awareness (AOR = 10.922, 95% CI: 5.869-20.325, P 0.001), ANC attendance (AOR = 2.334, 95% CI, 1.050-5.188, P = 0.038), and religion belief (AOR=0.338, 95% CI, 0.177-0.645, P=0.001) were significantly associated with PNC4 attendance. The utilisation of PNC4 is still low. PNC4 should be strengthened to ensure the well-being of the mothers and children.

Keywords: *Postnatal care, Vaccination for Children, utilization, Selected Health facilities, Kigali, Rwanda*

1.0 Introduction

Maternal and neonatal mortality remains a worldwide problem, with most maternal and neonatal deaths occurring within the first month of life,[(Sharrow, et al., 2022) (Jones & Coelho , 2022) (Joy , et al., 2014). Maternal mortality has declined over time, dropping by 38% between 2000 and 2017 ((UNSD), 2021) (WHO, WHO website, 2019). In 2017, there were 295,000 maternal deaths, representing a rate of 211 deaths per 100,000 live births (WHO, 2019). Maternal mortality is high in developing countries, with Sub-Saharan Africa accounting for two-thirds of the global maternal mortality rate (Sharrow, et al., 2022; WHO, WHO Website, 2019). A strengthened postnatal care service is an excellent way to significantly reduce this unacceptable mortality rate.

The postnatal period is the time from birth up to 6 weeks of age. It is a critical period and dangerous for both mothers and babies (WHO, WHO Technical consultation on postpartum and postnatal care, 2010). Mother and infant care during the PNC phase is important to reduce maternal and neonatal mortality and morbidity (Wudineh, et al. 2018). The postnatal care support mothers with necessary information about taking care of their babies and themselves and treats complications that may arise during this period (Crecious,, Lonia, Patricia, & Margaret, 2018). Even though postnatal care services are crucial for mothers and new-borns, it is among the underutilized health indicator in developing country (Manote & Gebremedhin, 2020)

Globally, only 48% of mothers and newborns receive postnatal care (WHO, 2020), According to countdown to 2030, countdown countries have shown the progress in health indicators, postnatal care coverage have increased from 28% in 2015 to 36% in 2017 among babies unfortunately it is still under 50% (Boerma, Requejo, & Victora, 2017). Postnatal care services administrations use in sub-Saharan Africa countries was 52.48%, central Africa presented the highest coverage of 73.51% while Eastern regions of Africa had the lowest coverage of PNC services of 31.71% (Tessema et al., 2020).

The government of Rwanda has invested in maternal and child health interventions aimed at reducing death from preventable causes through training of health care providers (midwives, nurses, gynaecologists), use of Rapid SMS, CHWs in charge of maternal and child health, provision of financial motivation to CHWs that is based on their performance, free maternal services like ANC, PNC, immunization, and FP (MCCH, Maternal, child and community health annual report, 2021).

1.1 Statement of the Problem

Maternal and neonatal mortality are still high in Rwanda, where MMR count for 203 women per 100000 live birth in 2020 and 19 neonates per 1000 live birth in 2020 (UNICEF, 2020). Many things have been done to improve maternal and child health, MMR showed a remarkable changes from 1071 in 2000 to 203 in 2020 and neonate from 37 to 19 in 2020, however there is a gap in attendance of postnatal care services among moms and children particularly on the 4th PNC scheduled within the sixth week after birth (MCCH, Maternal, child and community health annual report, 2021).

According to MCCH annual report 2020-2021 PNC1 utilization has increased to 91% among mothers and 92% among newborns but there is a significant difference between PNC1 and PNC4. Nationally, PNC4 presents the lowest coverage of 62% among mothers and new-borns compared to other PNC services. The report also shows districts with less than 50% PNC4 coverage: Kicukiro at 36%, Gasabo at 37%, Nyarugenge at 45%, Kamonyi at 46%, and Muhanga at 49% (MCCH,

Maternal, child and community health annual report, 2021). Based on the above statistics, despite, the Government effort to improve maternal and child health, PNC4 is still low and the factors associated with such low utilization are not fully investigated. Therefore, this study aims to assess the factors associated with utilization of 4th postnatal services among mothers seeking vaccinations for children in in the city of Kigali.

1.2 Objective of the Study

The objective of the study was to determine the factors associated with utilization of 4th postnatal care services in Kigali city, Rwanda.

1.3 Research Question

What are the factors associated with utilization of 4th postnatal care services in Kigali City, Rwanda?

2.0 Literature review

2.1 Theoretical literature review

2.1.1 Guidelines for postnatal care

WHO recommends 4 standard postnatal cares to be provided to both mother and babies; all these 4 standards are of great importance to prevent maternal and neonatal mortality, as well as improving the health of the mother and babies. First postnatal care (PNC1) must be provided within the first 24hours after birth wherever the delivery took place and should be performed by a skilled health attendant like midwives, doctors or nurses (WHO,2004), the second postnatal care (PNC2) service is scheduled between 48 -72 hours and PNC3 is scheduled between day 7-14 both are performed either at community level by CHWs or at health care facility(Olaniran *et al.,* 2019) (MCCH, National Postnatal guideline for mothers and newborns, 2015) PNC4 which is the last is scheduled in the sixth week after delivery. All these contacts can take place either at home or at health facility (WHO, 2015).

2.2 Empirical literature Review

2.2.1 Prevalence of Postnatal care

Postnatal care services are still a public health problem due to their low coverage, a study conducted in Nepal 99% of mothers received PNC at least once, 34.7% received two PNC and 21.7% received all the recommended PNC services (Chhetri, Shah, & Rajbanshi, 2020). In 2013, a study done in Palestine showed that 42% of their women population received PNC within the PNC period and 58% of them did not receive (Nabaa, et al., 2013). PNC coverage in low and middle income countries (LMICs) is also low. According to this survey conducted in 36 sub-Saharan countries, Postnatal coverage is 52.48% [95% CI: 52.33-52.63] (Tessema *et al.,* 2020). In Uganda 97% of all women receive at least 1 ANC service and 74% delivered at health facilities with skilled health attendant but 54% receive postnatal care services (Ndugga, Namiyonga, & Sebuwufu, 2020).

2.2.2 Factors associated with Utilization of PNC

A study conducted in Nepal revealed that caste/ethnicity, paternal occupation, delivering in a private hospital was associated with the complete use of PNC services (Chhetri, Shah, & Rajbanshi, 2020). A study done in Palestine showed that having a young partner (less than

29years), living in West Bank influenced the utilisation of PNC services (Nabaa *et al.*, 2013). Factors related to the use of PNC in studies conducted in 36 countries of sub-Saharan Africa was ANC care visits, Residence, maternal education, media exposure, place of delivery, occupation of the mother, region, access to health care and age group (Tessema *et al.*,2020).

According to Kante *et al.* (2015) postnatal care utilization in Tanzania is determined by various factors including: district of residence, ethnic group, attendance of ANC, place of delivery, and sickness of newborn and wanted pregnancy (Kante *et al.*, 2015). Mothers in Kenya declared that Routine immunization services, seek for care due to disease, awareness of PNC services are leading factors to attend PNC services (Kinuthia, 2014). A study conducted in Rwanda illustrated some factors that contribute to utilization on postnatal care services: health facility delivery OR: 2.97, married OR: 1.69 and being in the richest wealth quintile (OR: 2.04; 95 % CI: 1.27-3.29) (Rwabufigiri *et al*. 2016)

3.0 Methodology

A cross-sectional study design was conducted with quantitative approach. The study was conducted in 10 health facilities of city of Kigali scattered in three districts of Kigali city. These include Gahanga, Kabuga, Gikondo, Remera, Kagugu, Kacyiru, Kinyinya, Kabusunzu, Biryogo and Rugarama. Those health centers was selected based on their geographical location some are in the rural area while others are in the urban area of Kigali City.

The research targeted women who attended vaccination services in selected health centers and systematic sampling techniques were used to select participants. Women have been given numbers on the arrival, those with odds number participated in the study. The sample size was calculated using Fisher's formula with additional of 10% to increase the size, at 95% confidence level. A total of 403 women were recruited for the study. The sample size was proportionally distributed into 3 districts of the city of Kigali and equally distributed within the district. A specific number of women were selected in each selected health center Gahanga 38, Kabuga 37, Gikondo 37, Remera 45, Kagugu 45, Kacyiru 45, Kinyinya 44, Kabusunzu 37, Biryogo 38 and Rugarama 37

A structured questionnaire was used to collect quantitative data in selected health centers of each district of Kigali city. Nurses helped the researcher to collect data from respondents under researcher's supervision. All respondents have been informed about the study objectives and importance, interested mothers have signed a consent form.

Data entry and analysis was performed using SPSS version 25. Descriptive statistics was performed, Chi-square was used to check the association between the outcome variable and predictor variables at a significance level of 5%. Variables that have been significantly associated with the outcome variables were then processed into multivariate analysis to quantify the association through Adjusted Odds Ratio (AOR).

4.0 Results

Socio-demographic characteristics of the respondents

Table 1. Socio-demographic characteristics of women attending vaccination services of their babies in selected health centers.

Table 1: Socio-Demographic Characteristics

Variables	Frequency n=403	Percentage
Age group		
Age 15-24	93	23.1
Age 25-34	231	57.3
Age 35	79	19.6
Marital Status		
Married	159	39.5
Single	33	8.2
Divorced	19	4.7
Cohabiting	192	47.6
Maternal Education Level		
No formal education	9	2.2
Primary	156	38.7
Secondary/TVET	200	49.6
University	38	9.4
Ubudehe Category		
Category 1	37	9.2
Category 2	200	49.6
Category 3	166	41.2
Maternal occupation		
Unemployed	218	54.1
Self-employed/Employed	185	45.9
Religion		
Catholic	108	26.8
Adventist	43	10.7
Protestant	228	56.6
Islam/others	24	6
Health Insurance		
No insurance	5	1.2
CBHI	355	88.1
Other insurance	43	10.7

The results in Table 1 presents the socio-demographic characteristics of respondents where majority of those women (57.3 %) were aged between 25-34 years, 38.7% had only completed primary. Many respondents were in ubudehe category 2 and 3 counted for 49.6 % and 41.2% respectively. Mothers who were unemployed counted for 54.1 % and 88.1% of them uses CBHI to access health services.

Proportions of 4th postnatal care services attendance in selected health centers in Kigali city

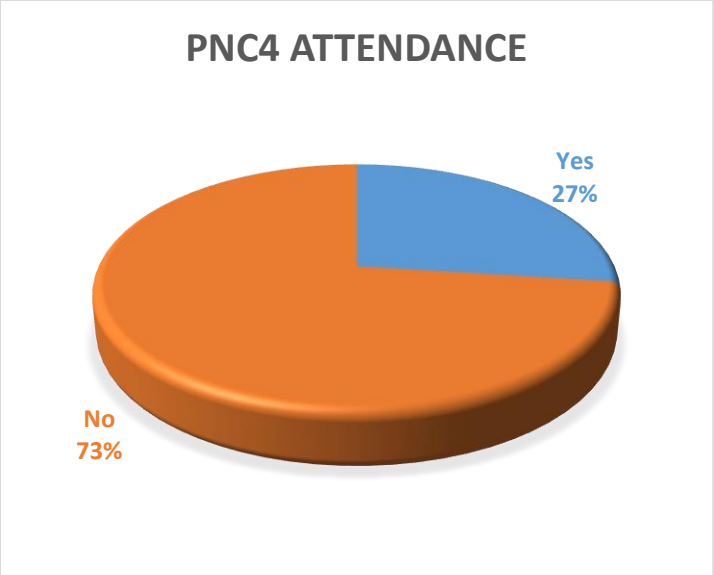

Figure 1: The Prevalence of 4th Postnatal

Among 403 women participated in the study, 109 (27%) have attended and received PNC4 services at Health centers. Therefore, the prevalence of PNC4 in Kigali city is 27%.

Factors associated with utilisation of 4th postnatal care in selected health center in Kigali city

This part focused on different factors categorized as socio-demographic, obstetric, geographical, health facility factors and awareness of PNC4.

Table 2: Bivariate analysis of Socio-demographic factors associated with PNC4 utilisation

Independent variables	Maternal PNC4 attendance n=403		P-Value
	Yes n (%)	No n(%)	
Age of respondent			0.288
15-24 years	31 (28.4)	62 (21.1)	
25-34 years	59 (54.1)	172(58.5)	
35 years	19 (17.4)	60 (20.4)	
Marital status			**0.004**
Married	51 (47.2)	108 (36.6)	
Single	15 (13.9)	18 (6.1)	
Divorced	3 (2.8)	16 (5.4)	
Cohabiting	39 (36.1)	153(51.9	
Maternal occupation			0.924
Unemployed	58 (53.7)	160 (54.2)	
Employed	50 (46.3)	135 (45.8)	
Maternal education level			0.060
Low level of education	36 (33.3)	129 (43.7)	
High level of education	72 (66.7)	166 (56.3)	
Ubudehe Category			0.137
Poor	57(52.8)	180 (61)	
Wealthy	51 (47.2)	115 (39)	
Religion			**<0.001**

Catholic	35 (32.1)	73 (24.8)	
Adventist	17 (15.6)	26 (8.8)	
Protestant	42 (38.5)	186 (63.3)	
Islam and others	15 (13.8)	9 (3.1)	
Health insurance			0.930
No insurance	1 (0.9)	4 (1.4)	
CBHI	95 (88)	260 (88.1)	
Others	12 (11.1)	31 (10.5)	
Awareness of PNC4			**<0.001**
Yes	94(86.2)	111(37.8)	
No	15 (13.8)	183(62.2)	
Antenatal care			**0.010**
<or =2 Visits	9 (8.3)	56 (19)	
3-4 visits	99 (91.7)	239 (81)	
Parity			0.139
1pregnancy	49 (45.4)	103 (34.9)	
2-4 pregnancy	54 (50)	171(58)	
>4 Pregnancy	5 (4.6)	21 (7.1)	
Mode of delivery			0.224
Vaginal delivery	74(68.5)	260 (88.1)	
C-Section	34 (31.5)	29 (9.8)	
Transport			**0.015**
Public transport	12 (11.1)	25 (8.5)	
Moto	35(32.4)	59 (20)	
By foot	60 (55.6)	197 (66.8)	
Bicycle	1 (0.9)	14 (4.7)	
Cost of PNC4			**0.004**
No Cost	49 (45.4)	183 (62)	
100-250Rwfs	43 (39.8)	91 (30.8)	
251-500Rwfs	16 (14.8)	21 (7.1)	
Waiting time			**0.012**
<3hours	94(86.2)	219(74.5)	
>3hours	15 (13.8)	75(25.5)	
Time to reach health center			0.497
<60minutes	96 (88.9)	260 (88.1)	
60-120 minutes	8 (7.4)	29 (9.8)	
>120minutes	4 (3.7)	6 (2)	
Attitude of Health providers			0.710
Good	98 (90.7)	259 (87.8)	
Bad	9 (8.3)	32 (10.8)	
Worse	1(0.9)	4(1.4)	

Many of the mothers who attended PNC4 services (47.2%) were legally married, and 36.1% cohabited. According to the findings, marital status was significantly associated with PNC4 attendance (P=0.004). Respondent religions were significantly associated with PNC4 attendance (P0.001), with 38.5% of attending mothers being protestant and 32.1% being catholic.

Among mothers who attended PNC4 103 (95.4%) were aware of PNC4 service and the awareness of PNC4 was significantly associated with PNC4 attendance (P<0.001). Number of antenatal care

service attended were significantly associated with PNC4 attendance where among mothers who attended PNC4, 99 (91.7%) had attended 3-4 ANC visits while 9 (8.3%) women attended visits. No significant association between mode of delivery and PNC4 attendance. However, a higher number of women who attended PNC4 delivered vaginally and caesarean section with 74 (68.5%) and 31.5% respectively. Parity of respondents were not associated with PNC4 attendance, 50% of mothers who attended PNC4 had 2-4 pregnancy, 45.4% of them have 1 pregnancy while 4.6% had more than 4 pregnancies. Mode of transport used to reach health center was significantly associated with PNC4 attendance (P=0.015) where Mothers attended PNC4 55.6% (60) and 32.4 % (35) walk on foot and by motorbike respectively to reach the nearest health facility. Cost of the services was different among health center, bivariate analysis found that the cost was significantly associated with PNC4 utilisation (P=0.004). Waiting time was significantly associated with PNC4 attendance (P=0.012), 94(86.4%) of mothers who attended PNC4 waited for service for 3hours while 15(13.8%) waited more than 3hours to receive the service.

Table 3: Multivariate analysis of the factors associated with PNC4 attendance

Variables	**Description**	**AOR**	**95% C.I**		**P value**
			Lower	Upper	
Religion	Catholic/protestant	0.338	0.177	0.645	**0.001**
	Other religion	Ref			
Marital status	Married mothers	0.561	0.261	1.207	0.139
	Single mothers	Ref			
PNC4 Awareness	Yes	10.922	5.869	20.325	**<0.001**
	No	Ref			
Transport	Public transport	1.139	0.441	2.939	0.788
	By foot	0.939	0.525	1.679	0.831
	Moto/bicycle	Ref			
Cost of PNC4	No Cost/ 250Rwfs	0.827	0.827	1.411	0.486
	251-500Rwfs and more	Ref			
Waiting time	≤3hours	1.771	0.893	3.511	
	>3hours	Ref			
ANC services	≤ 2 visits	Ref			
	3-4 and more	2.334	1.050	5.188	**0.038**

Multivariate analysis was performed to quantify the significant association among factors had associated with PNC4 usage in Bivariate analysis. The results presented in table 4 showed that being aware of PNC4 services were significantly associated with PNC4 attendance, mothers who were aware of PNC4 were 10.9 times more likely to attend PNC4 than those mothers who do not know anything about PNC4 services (A0R=10.922, 95%CI: 5.869-20.325, P<0.001). Women who attended antenatal care 3-4 or more visits were 2.3 times more likely to attend PNC4 services compared to those who had fewer ANC visits. (AOR=2.334, 95%CI, 1.050-5.188, P=0.038). Women whose religions were catholic, and protestant were found less likely to attend PNC4 services compared to women who belong to other religions (AOR=0.338, 95%CI, 0.177-0.645, P=0.001).

Discussion

Postnatal care period is a critical period for both mothers and babies. To prevent maternal mortality, postnatal care services are one of the appropriate solutions. Fourth postnatal care is the one with the lowest coverage, especially in Kigali city. In this current study, the prevalence of PNC4 attendance was 27% among mothers who attended vaccination services in selected health centers in City of Kigali. These proportions were low compared to the prevalence published in MCCH report in 2021 where PNC4 utilisation at 36% in Kicukiro, 37% in Gasabo and 45% in Nyarugenge. The discrepancy may due to a low sample size, we used 10 health centers among 36 health centers of Kigali city, and the study didn't consider private hospitals.

A study conducted in 36 Sub-Saharan countries showed a PNC coverage of 52.48% (Tessema, Yazachew,, Tesema, & Teshale , 2020) which is high compared to this study finding, a possible explanation to this difference is that the countries in Sub-Saharan African have different level of income including lower income, lower-middle income, upper-middle income and few are 1 in higher income (HAMADEH, ROMPAEY, METREAU, & EAPEN, 2022), so the health services development in those countries are different hence, all 36 countries have different prevalence of PNC and some might have high PNC utilisation that have increased the prevalence to that level. However, comparing to maternal mortality in Africa which is extremely high, this prevalence showed that there is an underutilisation of PNC services, measures need to be taken to increase the PNC coverage. Another study conducted in Nigeria demonstrated that 34% of women attended at least one PNC services this prevalence is high compared to the present study because, the study conducted in Nigeria took into account all the PNC services that should be delivered to mothers while in this study we considered only the last PNC services (4^{th} PNC) (Olajibu, 2021).

Factors related to the use of PNC in studies conducted in 36 countries of sub-Saharan Africa were ANC care visits, residence, maternal education, media exposure, place of delivery, occupation of the mother, region, access to health care and age group (Tessema, Yazachew,, Tesema, & Teshale , 2020). In our current study ANC visits was the one among those mentioned factors found in 36 sub-Saharan countries which was significantly associated with PNC where mothers who attended more than 2 ANC visits are more likely to attend PNC services. May be this is because of emphasis made on reducing maternal and infants' death as one of the SDGs where CHWs and healthcare providers work collaboratively to increase the ANC uptake and educate mothers about the importance of maternal and infant services, so mothers who attend ANCs should have received information regarding availability of postnatal services and encouraged to attend.

The current study demonstrated that PNC awareness increased the uptake of the services similarly a study done in Ethiopia mothers demonstrated that awareness of PNC services were significantly associated with PNC services (Gebreslassie , et al., 2020), a study in Kenya also demonstrated that PNC awareness is the leading factors to its attendance((Kinuthia, 2014; Kinuthia, 2014)).The possible explanation to is that in the Awareness of PNC4 we reveal 2 important things which should be of great importance: the availability of the services and its importance to boost the courage to come for it.

This current study revealed that religion was significantly associated with PNC4 utilisation, unfortunately in the reviewed studies, no study demonstrated the association between religion and PNC4 attendance. Almost all Rwandan belong to a specific religion, Christianity takes 93% of all Rwandans ((NISR), May, 2019) this shows the impact and importance of religion in Rwandan lives, and how much religion matter in the lives of citizen. Religious leader are great influencer

and trustworthy in the society, therefore they should be involved in the sensitization of maternal and child services to reach out their fellow and convince them about the use and importance of the services.

The present study has strengths and limitations: it has been conducted in 3 districts of Kigali city and selected health centers located in different location of Kigali city, some in rural other in urban area of Kigali so it clearly gives the true image of PNC4 situation in the region especially in health centers which deliver primary health services and it has some limitations, participants were those women who come for routine immunization of their baby at selected health centers, so it would increase the probability of obtaining a high PNC4 prevalence. This study has been conducted in public health facilities; the findings of the study should be different from private health facilities.

5.0 Conclusion

PNC4 utilization was still low in Kigali City. PNC4 awareness, ANC participation, and religion were significantly associated with PNC4 attendance. This study supports evidence from other studies conducted in middle-income and low-income countries, and these factors correlated with PNC, availability of ANC, and awareness and health education. It could be used to reduce maternal and neonatal mortality through health education, and the involvement of religious leaders in sensitization on mother and child services.

6.0 Recommendation

The recommendation from the research findings are given to the ministry of health, Kigali city and the healthcare personnel. Ministry of Health is recommended to increase the number of Health care workers in primary health sectors as they are the one who deal with PNC4 services and receive a large number of mother and their babies. To educate mothers about the importance and availability of PNC services and to create a position for personnel who is in charges of postnatal care services to increase the uptake of PNC4 services and follow up of all 4 standard PNC services recommended to mothers and babies. City of Kigali is recommended to encourage head of health center to educate patients about PNC services in the morning before starting consultations as they do for others services like ANC, Malaria prevention, NCDs and communicable disease.

To encourage health care providers to perform PNC4, fix PNC4 appointments with mothers make mothers aware of the services. To encourage CHWs working under management of Health centers located in Kigali, to sensitize mothers about PNC4 service as they do for ANC to lift up the service utilization and to work with religious leaders to educate their fellows about PNC services.

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