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Factors associated with compliance with the vaccination schedule by women before childbirth in the city of Mbujimayi, in the Democratic Republic of Congo

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Abstract

Introduction: Tetanus vaccination is a central element in the system of maternal and child care. It is recommended that all women of childbearing age, and especially pregnant women, get vaccinated against tetanus. The pregnant woman will protect herself and her child by receiving doses of tetanus vaccine. This study aims to assess the level of respectability of the vaccination schedule by women giving birth in the city of Mbuji-Mayi and to identify the factors associated with compliance with this schedule.

Method: This study is quantitative, at the correlational descriptive level. However, the deadline is transversal because the data is collected at one time in the three health zones of the city of Mbuji-Mayi (Diulu, Lubilanji and Muya).

Results: With the exception of the first dose (VAT1 which is at 87.3%), the level of respectability of the vaccination schedule by women before childbirth in Mbuji-Mayi is generally low (49.1% for VAT2 44.2% for VAT3, 40.0% for VAT4, 10.0% for VAT5).

The results of the bivariate analysis showed that the low level of respectability of the tetanus vaccination schedule in the city of Mbuji-Mayi is influenced by: the age of the woman giving birth (age greater than 26 years), the main occupation of the manager or husband (private employee, digger and trader), time spent in current residence (more than 3 years), parity (more than 7 children), having experienced the death of children under 2 month, the mode of delivery (eutocic delivery), the place of delivery (health centre), the habit of not attending the CPN, ignorance of the anti-tetanus vaccination schedule for pregnant women.

Keywords: associated factors, respectability, vaccination schedule, women of childbearing age, childbirth

Introduction

Maternal and neonatal tetanus (MNT) is a highly lethal disease that primarily affects low-income countries and populations with limited or no access to health services. After being vaccinated against tetanus, an adult person is protected for a period of about twenty years. After this deadline, a reminder is therefore necessary to protect it again for another twenty years. From the age of 65, a booster is necessary every 10 years due to the reduced response of the elderly to vaccination [1].

Maternal and neonatal mortality due to tetanus is a public health problem worldwide and is higher in most developing countries. The importance of the vaccination of pregnant women via the prenatal consultation being demonstrated by the extended vaccination program (EPI) to contribute to this, this vaccination must be effective by respecting the vaccination schedule [2].

According to the same source, it sometimes happens that the calendar is modified to adapt: to the evolution of diseases, to their frequency, to the risks of epidemics, to the groups of people most affected (which change over time) ; the protection of the entire population against these diseases, protection which is linked to the proportion of people vaccinated; the existence of new vaccines that require fewer injections; to additional scientific knowledge on the duration of diseases such as poliomyelitis, diphtheria, etc., which are still present in many countries, particularly in the developing world. Several authors have observed that there are factors related to the woman, to the accessibility, to the organization of the vaccination services and to the technical skills of the nursing staff which influence the completeness of the schedule of vaccination against tetanus in pregnant women [3]. In Switzerland, tetanus has become rare. In the last ten years, seventeen cases have been reported, of which 94% were women and 82% were over 60 years old. No patient was up to date with their vaccines, boosters included. Vaccination against tetanus is extremely effective. Danish studies have concluded a protection of at

least twenty years in adults, less in seniors (less prolonged persistence of antibodies). This has been confirmed in other Finnish studies, which have thus modified the frequency of reminders tetanus vaccine after identifying antibody levels that increase the risk of intense local or systemic inflammatory effects (Arthus phenomenon) in the majority of adults years after a booster [3]**.** On the other hand, it should be noted that the correct follow-up of the vaccination schedule of a woman with pregnancy also depends on the number of prenatal consultations carried out during this period. According to the WHO, a pregnant woman must make at least 4 prenatal consultations. Visits begin in the first months and must continue regularly until delivery.

Supported by WHO, UNICEF, the GAVI alliance and several other partners, African countries are working to increase their routine immunization coverage to reduce the devastation caused by disease, disability and death among children under 5 [3] However, progress is slow and there are variations in vaccination coverage between different African countries and within the same country. High and sustained routine immunization coverage over time is needed to sustain ongoing disease control initiatives and maintain their gains. Among the 57 countries classified, 18 are located in Africa and account for 90% of neonatal tetanus cases on the planet. These are Angola, Burkina Faso, Cameroon, Rep. Demo Congo, Eritrea, Ethiopia, Liberia, Mali, Mauritania, Mozambique, Niger, Nigeria, Somalia, Chad, Egypt, Congo, Ivory Coast and Ghana. In these countries, routine vaccination of women of childbearing age has proven difficult to implement and ineffective. It is therefore recommended that routine tetanus immunization services be limited to targeting pregnant women [4].

In the Democratic Republic of the Congo, prenatal consultations have progressed in recent years, going from 68% in 2001, according to the results of the MICS2 survey, to 85% according to the results of the DRC DHS of 2007, but with large disparities between provinces. One out of two pregnant women made the 4 recommended visits, more than 12% made none. From the point of view of tetanus vaccination, nearly three out of ten women (29%) did not receive any injection during the last pregnancy. [5]**.**

However, Kasai Oriental, despite the interventions of the expanded vaccination program in health zones in 2016, has a mortality rate due to neonatal tetanus at 5.7%, or 18 out of a total of 374 deaths recorded by the province (3rd after malaria 74.2% and meningitis 12.3%). but the lethality rate of neonatal tetanus remains in 1st position with 46% followed by meningitis 13% [6]**.**

In view of these results, we certainly felt it was more important to carry out a fairly serious investigation in order to assess the level of respectability of the vaccination schedule by women giving birth in the city of Mbuji-Mayi and to identify the factors associated with this. administrative vaccination coverage of 106% in 2017 [7]**.**

Material and Method

Research quote

This study is quantitative, at the correlational descriptive level. However, the deadline is transversal because the data is collected at one time in the three health zones of the city of Mbuji-Mayi (Diulu, Lubilanji and Muya).

Study population and sample

The target population of this study is made up of mothers staying in health facilities in the health zones mentioned above. In order to draw the sample for this study, we used the probability sampling method, more specifically multistage sampling. In this study we have four degrees:

The first stage consisted of drawing lots for the health zone: we randomly drew the health zone (HZ) of Diulu, Lubilanji and La Muya out of all 10 health zones that make up the city of Mbuji -Mayi; the first is located in the administrative municipality of Diulu, the second in the municipality of Didindi and the tertiary sector in the municipality of Muya. In the 2nd degree, we randomly selected 5 health areas in each health zone.

At the 3rd level: In each health area, we have selected a leading health center where the titulary of the health area is represented; At the 4th degree: in the selected health facility (CS), we drew the number of women giving birth corresponding to the number of women giving birth to be surveyed by health area.

Table 1: Distribution of births concerning our survey in proportion to the population of each health area.

No.	SZ	AS	Total population	Proportion	Number of births selected
1	Diulu	Bupuekela	16896	0.058	24
2		Brigade	25041	0.086	36
3		Form the bank	17500	0.060	25
4		Sankayi	20858	0.071	30
5		Tshikila	27441	0.094	40
		Total	107736	0.369	156
6	Lubilanji	Casop	16232	0.056	23
7		Ditalala	15093	0.052	22
8		Iceka	21312	0.073	31
9		St. Francis	19757	0.068	29
10		From June 30	17911	0.061	26
		Total	90305	0.310	131
11	Muya	Central	18540	0.064	27
12		Cibengabu1	19352	0.066	28

13		Dileji	16914	0.058	24
14		Lake Munkamba	18270	0.063	26
15		Ngalula	20606	0.071	30
		Total	93682	0.321	136
	Total		291723	1	422

Given that the level of respectability of the vaccination schedule by women before childbirth is not known in the health zones of the city of Mbuji-Mayi, we retained the formula of Ficher and applied it as follows: after :

$$n = \frac{z^2 \times p \times q}{d^2}$$

From where
N: sample size;
Z: confidence coefficient for a degree of confidence estimated at 95% (i.e. 1.96);
In this study, we estimated the level of respectability of the tetanus vaccination schedule at 50%.
In this study :
P: represents 50%, ie the share of those who have not complied with the tetanus vaccination schedule .
Q = 1- p : proportion of women giving birth who complied with the tetanus vaccination schedule.
d^2 = the desired precision, its value is 5% or 0.05;

$$n = \frac{1{,}96^2 \times 0{,}50 \times 0{,}50}{0{,}05^2} = 384$$

We considered a non-response rate of 10%, so we increased the sample size by 10% to 422 subjects.

Data collection method, technique and instrument
To carry out the study, we chose the survey method by questionnaire.
To successfully collect the data in the field, we used the face-to-face structured interview technique.
The data were collected using a pre-established questionnaire sent to the women giving birth with the help of three teams; each with three surveyors previously trained according to their training and their ability to speak French and Tshiluba, the languages in which the questionnaire is offered.

Data processing and analysis
The data from the collection sites, recorded on the collection tools by the investigators, were compiled, cleaned and then codified by creating new variables by the analyst. The data was entered on the EXCEL 2017 software and used SPSS 20.

Results
Results of Descriptive Analyzes

Table 2: Sociodemographic characteristics of women giving birth

Characteristics	Effective n=422	Percentage
Age		
Less than or equal to 20 years	75	17.8
21 to 25 years old	103	24.4
26 to 30 years old	89	21.1
31 to 35 years old	99	23.5
36 to 40 years old	31	7.3
41 and over	25	5.9
Average age = 27 years ± 6.829		
Study level		
Primary	85	20.1
incomplete secondary	187	44.3
full secondary	102	24.2
higher/university	21	5.0
without level	27	6.4
Occupation of Manager or Husband		
Trader	94	22.3
Digger	50	11.8
private employee	128	30.3

state official	38	9.0
diamond trafficker	37	8.8
Resourceful	75	17.8

This table shows that 24.4% of the respondents in this study were between 21 and 25 years old, with an average of 27.9 ± 6.8, most had an incomplete secondary education level, i.e. 44 .3%, 30.3% of respondents had their managers working in the private sector.

Table 3: socio-cultural characteristics of women giving birth

Characteristics	Effective (n=422)	Percentage
Religion		
Catholic	84	19.9
revival church	146	34.6
Kimbanguist	21	5.0
Muslim	8	1.9
Protestant	66	15.6
Other (Traditional)	97	23.0
Time spent in current residence		
less than a year	77	18.2
1 to 3 years	158	37.4
more than 3 years	187	44.3
family type		
single parent	23	5.5
in a relationship with	399	94.5
Ethnic group		
Kanyok	4	0.9
Luba	386	91.5
Dream	16	3.8
Tetela	16	3.8

From the analysis of this table we draw the following conclusions: 34.6% of the respondents were Christians from revival churches, 44.3% occupied the plot more than 3 years ago, 94.5% lived as a couple and most of them were of Luba origin.

Table 4: Socio-Economic Characteristics of Women Giving Birth

Characteristics	Effective (n=422)	Percentage
Parity		
1 to 3	240	56.9
4 to 7	119	28.2
more than 7	63	14.9
Having known of the death of a child under 2 months old		
Yes	86	20.4
No	336	79.6
Monthly household income		
Less than $100	218	51.7
$100 to $200	151	35.8
$201 to $300	53	12.6
Causes of death	n= (86)	
Anemia	18	20.9
Dystocia	4	4.7
Fever	14	16.3
Unknown	4	4.7
IRA	5	5.8
Disease	4	4.7
Malaria	4	4.7
stillborn	8	9.3
Malaria	4	4.7
Tetanus	21	24.4

It should be noted that 56.9% of our respondents had a parity of 1 to 3 children, 20.6% of them had already recorded a death of less than 2 months in their family, the main cause of which was tetanus. 24.4% and 51.7% had a monthly household income of less than $100.

Table 5: Sanitary Characteristics

Characteristics	Effective (n=422)	Percentage
Mode of delivery		
Eutocic	394	93.4
dystocic	28	6.6
Place where childbirth takes place		
Home	9	2.1
at the health center	392	92.9
to the hospital	21	5.0
Existence of a center in its surroundings		
Yes	213	50.5
No	209	49.5
Estimated distance between home and nearby CS		
less than an hour's walk	409	96.9
more than an hour walk	13	3.1

In the light of this table, we find that 93.4% of respondents had just given birth without difficulty, 92.0% had given birth at the health center, 50.5% declared that there was a health center in their entourage. and 96.9% estimated it took less than an hour's walk to reach a health center closest to their home.

Table 6: Distribution of respondents according to the characteristics of pregnancy follow-up

Characteristics	Effective (n=422)	Percentage
Have the habit of attending the CPN		
Yes	348	82.5
No	74	17.5
Number of CPN carried out		
Once	53	15.2
Twice	148	42.5
Thrice	80	23.0
four times and more	67	19.3
Knowledge of the vaccination schedule for pregnant women		
Yes	63	14.9
No	359	85.1
Document supporting the dose received		
Vaccination record	14	3.3
CPN sheet	162	38.4
No documents (history)	238	56.4
Others (tokens)	8	1.9

This table shows us that 17.5% of respondents in this study had not attended the CPN. For those who did, 42.5% had visited twice, 85.1% did not know the vaccination schedule for pregnant women against tetanus and most of our respondents did not have a document justifying the taking. doses or 56.4%.

Table 7: Distribution of respondents according to the level of respectability of the number and deadlines for vaccination

Characteristics	Effective (n=422)	Percentage
Have received the first dose (VAT1)		
Yes	348	82.5
No	74	17.5
Have received the second dose (VAT2)		
Yes	175	41.5
No	247	58.5
Have received the third dose (VAT3)		
Yes	104	24.6
No	318	75.4

Have received the fourth dose (VAT4)		
Yes	20	4.7
No	402	95.3
Have received the fifth dose (VAT5)		
Yes	10	2.4
No	412	97.6
Respect of deadlines according to each dose received		
VAT1		
In the first trimester	304	87.3
Beyond the first trimester	44	12.7
VAT2		
4 weeks after VAT 1	86	49.1
Beyond 4 weeks	89	50.9
VAT3		
6 months after VAT2	46	44.2
More than 6 months after VAT2	58	55.8
VAT4		
One year after VAT3	8	40.0
Before or after a VAT3 year	12	60.0
VAT5		
One year after VAT4	1	10.0
Before or after a VAT4 year	9	90.0

The results of this table show us that the respondents had received VAT1, VAT2, VAT3, VAT4 and VAT5 respectively, i.e. 82.5%, 41.5%, 24.6%, 4.7% and 2.4%. Regarding respectability levels, we interpret as follows: VAT1: 87.3%: high level; VAT2: 49.1%: very low level; VAT3: 44.1%: very low level; VAT4: 40.0%: very low level; VAT5: 10.0%: very low level; Overall, 46.12%, the average, represents a very low level.

Results of Bi-Variate Analyzes

Table 8: Association between socio-demographic characteristics and the level of respectability of the woman's vaccination schedule

Characteristics	**Level of respectability**		**P (value)**	**S**
	Good	**Bad**		
	n=89	**n=333**		
Age				
Less than or equal to 26 years old	70 (39.3)	108 (60.7)	0.000	S
26 and over	19 (7.8)	225 (92.2)		
Study level				
without level, primary and secondary incomplete	63 (21.1)	236 (78.9)	0.987	NS
full secondary and higher/university	26 (21.1)	97 (78.9)		
Occupation of Manager or husband				
Trader	12 (16.0)	63 (84.0)	0.000	S
Digger	24 (25.5)	70 (74.5)		
private employee	5 (10.0)	45 (90.0)		
state official	27 (21.1)	101 (78.9)		
diamond trafficker	17 (44.7)	21 (55.3)		
Resourceful	4 (10.8)	33 (89.2)		

After analyzing this table, it should be said that: age less than or equal to 26 years and over and the occupation of the manager (private employee) are factors that are associated with the poor level of respectability of the woman's vaccination schedule pregnant.

Table 9: Association between socio-cultural characteristics and the level of respectability of the woman's vaccination schedule

Characteristics	**Level of respectability**		**P (value)**	**S**
	Good	**Bad**		
	n=89	**n=333**		
Religion				
Christian	65 (20.5)	252 (79.5)	0.608	NS
Others (traditional)	24 (22.9)	81 (77.1)		

Time spent in current residence				
less than a year	28 (36.4)	49 (63.6)	0.000	S
1 to 3 years	41 (25.9)	117 (74.1)		
more than 3 years	20 (10.7)	167 (89.3)		
family type				
single parent	8 (34.8)	15 (65.2)	0.097	NS
in a relationship with	81 (20.3)	318 (79.7)		
Ethnic group				
Luba	85 (22.0)	301 (78.0)	0.124	NS
Songe, Tetela and others	4 (11.1)	32 (88.9)		
Parity				
1 to 3	82 (34.2)	158 (65.8)	0.000	S
4 to 7	5 (4.2)	114 (95.8)		
more than 7	2 (3.2)	61 (96.8)		
Having known of the death of a child under 2 months old				
Yes	5 (5.8)	81 (94.2)	0.000	S
No	84 (25.0)	252 (75.0)		
Monthly household income				
Less than or equal to 200 dollars	77 (20.9)	292 (79.1)	0.767	NS
$201 to $300	12 (22.6)	41 (77.4)		

It should be noted through the results of this table that the time spent in the current residence of 1 to 3 years, the parity greater than or equal to 7 and the fact of having recorded a death of less than 2 months were factors that influenced the poor level of respectability of the pregnant woman's vaccination schedule.

Table 10: Association between health characteristics and the level of respectability of the pregnant woman's vaccination schedule

Characteristics (n=422)	**Level of respectability**		**P (value)**	**S**
	Good	**Bad**		
	n=89	**n=333**		
Mode of delivery				
Eutocic	73 (18.5)	321 (81.5)	0.000	S
Dystocic	16 (57.1)	12 (42.9)		
Place where childbirth takes place				
Home	5 (55.6)	4 (44.5)	0.004	S
at the health center	76 (19.4)	316 (80.6)		
to the hospital	8 (38.1)	13 (61.9)		
Existence of a center in its surroundings				
Yes	41 (19.2)	172 (80.8)	0.349	NS
No	48 (23.0)	161 (77.0)		
Estimated distance between home and nearby CS				
less than an hour's walk	85 (20.8)	324 (79.2)	0.384	NS
more than an hour walk	4 (30.8)	9 (69.2)		
Have the habit of attending the CPN				
Yes	82 (23.6)	266 (76.4)	0.006	S
No	7 (9.5)	67 (90.5)		
Knowledge of the vaccination schedule for pregnant women				
Yes	12 (19.0)	51 (81.0)	0.000	S
No	77 (21.4)	282 (78.6)		

After analyzing these results, we find that the eutocic delivery, the delivery at the health center, the non-attendance of the CPN and the ignorance of the vaccination schedule are factors that had statistically significant links with the poor level of respectability of the vaccination schedule.

Discussion

Results of Descriptive Analyzes

These results indicate that 24.4% of the respondents in this study were between 21 and 25 years old. Most of them had an incomplete secondary education, ie 44.3%, and 30.3% of respondents had their managers working in the private sector.

We should also point out that: 34.6% of the respondents were Christians from revival churches, 44.3% occupied the plot more than 3 years ago, 94.5% lived as a couple and most of them were from Luba origin.

According to our results, it should be noted that 56.9% of our respondents had a parity of 1 to 3 children, 20.6% of them had already recorded a death of less than 2 months in their family whose cause main was tetanus or 24.4% and 51.7% had a monthly household income of less than 100 dollars.
The mode of delivery the most presented was the eutocic delivery with 394 either subjects or 93.4% against 6.6% by dystocic deliveries.
This for 392 subjects or 92.0% had given birth at health centers, 213 subjects or 50.5% declared that there was a health center in their entourage and 409 subjects or 96.9% estimated less than one hour walk to reach a health center closest to his home.
With regard to the characteristics related to the monitoring of pregnancy, we note that 348 subjects of this study, i.e. 82.5% 17.5%, used to attend the CPN, of which 148 subjects, i.e. 42.5%, had attended twice. during the last pregnancy. As for the knowledge of the vaccination schedule of a pregnant woman, 359 subjects or 85.1% did not know and most of our respondents did not have a document justifying the taking of doses of vaccine, i.e. 56.4%, only 14 subjects or 3 ; 3% had a vaccination card and 162 or 38.4% had an ANC card.
By analyzing the results relating to compliance with the tetanus vaccination schedule , we note that in all of the respondents, 348 having received VAT1, i.e. 82.5%, 175 having received VAT2, i.e. 58.6%, 104 having received VAT3, i.e. 24.6 %, 20 having received VAT4 or 4.7% and only 10 having received VAT5 or 2.4%. In relation to compliance with vaccination deadlines, it should be noted respectively that for VAT1, VAT2, VAT3, VAT4 and VAT5 only 87.7% i.e. 304 respondents, 49.1% i.e. 86 respondents, 44.2% i.e. 46 respondents, 40.0% or 8 respondents and 10.0% or one respondent had received the vaccines on time.
In general, the levels of respectability of the vaccination schedule are very low according to the following interpretation per dose of vaccine received: VAT1: 87.3%: high level; VAT2: 49.1%: very low level; VAT3: 44.1%: very low level; VAT4: 40.0%: very low level; VAT5: 10.0%: very low level.
The observation remains the same in other African countries, because a national survey of vaccination coverage in Rwanda also proved that the level of compliance with the anti-tetanus vaccination schedule in pregnant women was low at 34.1%. This situation would be due to the practice of health professionals in prenatal clinics, to start again with the doses of VAT1 at pregnancy regardless of the number of doses received previously. Each woman who comes for ANC for the first time is considered a new case and vaccination status is not requested [8].
This low coverage is also explained by the lack of knowledge of the number of doses that a woman should normally receive. Togora modibo, affirmed in his study that the number of doses necessary for a woman to be immunized during pregnancy was only known by 20% of the respondents and the number of doses to be immunized for life by 19.5% of which Only 1.4% were able to accurately cite the precise dates of the five doses of VAT [9].

Results of bivariate analyzes

These results explain the relationships that exist between socio-demographic, economic and health characteristics and the level of respectability of the vaccination schedule in women who have given birth.
It should be said that the association between the socio-demographic characteristics and the level of respectability of the vaccination schedule of the woman revealed that the age less than or equal to 26 years and over and the occupation of the manager (private employee) are factors which are associated with the poor level of respectability of the vaccination schedule of the pregnant woman, show that a value of the calculated P (value) is 0.000; a result of less than 0.05, the difference of which is significant.
As for the association between socio-cultural characteristics and the level of respectability of the woman's vaccination schedule, it is appropriate to sign through these results that the time spent in the current residence of 1 to 3 years, the higher parity or equal to 7 and the fact of having recorded a death of less than 2 months were factors that influenced the poor level of respectability of the vaccination schedule of the pregnant woman by the fact that a value of the P (value) calculated is 0.000 ; a result of less than 0.05, the difference of which is significant.
In addition, we also find that eutocic delivery, delivery at the health center, non-attendance of the CPN and ignorance of the vaccination schedule are factors that had statistically significant links with the poor level of respectability of the vaccination schedule. by the fact that the value of the calculated P (value) is 0.000; a result of less than 0.05, the difference of which is significant.
On the other hand, for Muleka Masanka Sidonie (10) , the low level of compliance with the tetanus vaccine schedule in women is justified by multiple reasons, among others: shortage of stock of tetanus vaccine and the laziness of pregnant women because the latter comes from several physiological and physical changes in pregnancy that make the woman heavier and heavier.

Conclusion

With the exception of the first dose (VAT1 which is at 87.3%), the level of respectability of the vaccination schedule by women before childbirth in Mbuji-Mayi is generally low (49.1% for VAT2 44.2% for VAT3, 40.0% for VAT4, 10.0% for VAT5).
The results of the bivariate analysis showed that the low level of respectability of the tetanus vaccination schedule in the city of Mbuji-Mayi is influenced by: the age of the woman giving birth (age greater than 26 years), the main occupation of the manager or husband (private employee, digger and trader), time spent in current residence (more than 3 years), parity (more than 7 children), having experienced the death of children

under 2 month, the mode of delivery (eutocic delivery), the place of delivery (health centre), the habit of not attending the CPN, ignorance of the anti-tetanus vaccination schedule for pregnant women.
The Expanded Vaccination Program / Mbuji-Mayi Antenna must strengthen and implement key interventions related to the reasons for failure to comply with the tetanus vaccination schedule.

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