



## Research Article

## Evaluation of Covid-19 Vaccines Side Effects in Bangourain Health District (Cameroon)

### *Effets Secondaires des Vaccins COVID-19 dans le District Sanitaire de Bangourain (Cameroun)*

Kum Jerry Ngha<sup>1</sup>, Kenmegne Noumsi Elvira<sup>1</sup>, Fankep Dihewou Alphonse<sup>2</sup>, Ketchaji Alice.<sup>3</sup>, Tambo Erenest<sup>4</sup>

#### Affiliations

1. Bangourain District Health Service, West region, Cameroon; PhD student University of Calabar
2. Faculty of Medicine, University of Douala, Douala, Cameroon
3. Department of family Medicine, Ministry of Public Health, Yaoundé, Cameroon.
4. Faculte de Médecine, Université des Montagnes, Bangangte, Cameroun.

#### Auteur correspondant

Kum Jerry NGHHA, PhD student  
University of Calabar  
Email : [drkumjerry@gmail.com](mailto:drkumjerry@gmail.com)

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**Key words:** COVID-19, Vaccine, Side effects, Bangourain Health District.



#### ABSTRACT

**Introduction.** Little is documented on the frequency, severity, and factors associated with Covid 19 vaccine side effects post vaccination campaigns in Cameroon. The main objective of the study was to evaluate post COVID19 vaccination side effects of approved government anti-covid vaccines occurrence, frequency of and severity in Bangourain Health District, Cameroon. **Methodology.** A cross sectional study was conducted. The data collection was collected for 4weeks from the 15 May to 15 June, 2022. Our sample size was consecutive. We included in our study everybody who has received at least one dose of any of the Covid 19 vaccines be it Sinopharm, Johnson-Johnson or Astra-Zeneca and who accepted to take part in the study. **Results.** A total of 162 participants were enrolled in the study with mean age of 42.77. The frequency of occurrence of side effects to Covid-19 vaccine was 66.7% for the first dose, 50.5% for the second dose and 54.8% for the third dose, all vaccine types combined. The most common side effects reported were local pain (84.67%), itch at injection site (15.38%), fever (15.38%), fatigue (15.38%) and functional Impotence (15.38%) for Sinopharm; local pains (68.18%), stiffness of arms (36.36%), Fatigue (36.36%), Headache (31.82%), and fever (25.00%) for AstraZeneca and local pains (90.20%), fatigue (31.37%), Headache (25.49%), fever (19.61%) and Itch at injection site (15.69%) for Johnson and Johnson. **Conclusion.** Irrespective of the type and dose of vaccine, many participants developed side effects after administration of Covid-19 vaccine, most of which are similar to those reported by manufacturers with certain disparities observed in the frequency of occurrence.

#### RÉSUMÉ

**Introduction.** Il existe peu de données sur la fréquence, la gravité et les facteurs associés aux effets secondaires du vaccin Covid 19 après les campagnes de vaccination au Cameroun. L'objectif principal de l'étude était d'évaluer l'occurrence, la fréquence et la gravité des effets secondaires post-vaccination COVID19 des vaccins anti-covidés approuvés par le gouvernement dans le district sanitaire de Bangourain, au Cameroun. **Méthodologie.** Une étude transversale a été menée. Les données ont été collectées pendant 4 semaines, du 15 mai au 15 juin 2022. La taille de notre échantillon était consécutive. Nous avons inclus dans notre étude toutes les personnes ayant reçu au moins une dose de l'un des vaccins Covid 19 que ce soit Sinopharm, Johnson-Johnson ou Astra-Zeneca et qui ont accepté de participer à l'étude. **Résultats.** Au total, 162 participants ont été recrutés pour l'étude, avec un âge moyen de 42,77 ans. La fréquence d'apparition des effets secondaires du vaccin Covid-19 était de 66,7 % pour la première dose, de 50,5 % pour la deuxième dose et de 54,8 % pour la troisième dose, tous types de vaccins confondus. Les effets secondaires les plus fréquents étaient les suivants : douleur locale (84,67%), démangeaison au point d'injection (15,38%), fièvre (15,38%), fatigue (15,38%) et impuissance fonctionnelle (15,38%) pour Sinopharm ; douleur locale (68,18%), raideur des bras (36,36%), fatigue (36,36%), maux de tête (31,82%) et fièvre (25,00%) pour AstraZeneca et douleurs locales (90,20%), fatigue (31,37%), maux de tête (25,49%), fièvre (19,61%) et démangeaisons au point d'injection (15,69%) pour Johnson and Johnson. **Conclusion.** Indépendamment du type et de la dose de vaccin, de nombreux participants ont développé des effets secondaires après l'administration du vaccin Covid-19, dont la plupart sont similaires à ceux rapportés par les fabricants avec certaines disparités observées dans la fréquence d'occurrence.

## KEY RESULTS

### The aim of our study

Evaluate post COVID19 vaccination side effects of approved government anti-covid vaccines occurrence, frequency of and severity in Bangourain Health District, Cameroon

### Key results

1. The frequency of occurrence of side effects to Covid-19 vaccine was 66.7% for the first dose, 50.5% for the second dose and 54.8% for the third dose, all vaccine types combined.
2. The most common side effects reported were local pain (84.67%) for Sinopharm; (68.18%) for AstraZeneca and (90.20%) for Johnson and Johnson.

## INTRODUCTION

Coronavirus Disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2) is changing the pattern of emergency services around the world as the disease is causing a substantial public health emergency. The infection first appeared in Wuhan, China in December 2019 and spread rapidly throughout the world [1]. As of 16 January 2022, over 323 million confirmed cases and over 5.5 million deaths have been reported worldwide, 7.8 million cases with 160 thousand deaths in Africa [2]. As of the 31<sup>st</sup> of December 2021, a total of 109666 cases have been confirmed in Cameroon with 1853 deaths. [3] To overcome this global crisis, the vaccination strategy against COVID-19 is established [4]. The COVID19 vaccine triggers the immune system to be prepared to fight against the virus by producing antibodies. Most of the COVID-19 vaccines utilize S protein, a protein that supports the virus to enter the cells and start the infection process [5,6]. Many vaccines have been introduced and at least 13 different vaccines (across 4 platforms) are currently in use [7]. These vaccines are either Messenger RNA (mRNA) vaccines such as Pfizer-BioNTech and the Moderna COVID-19 vaccines or Vector vaccines such as Janssen/ Johnson & Johnson and AstraZeneca vaccines, Protein subunit vaccines, and inactivated vaccines such as Sinopharm vaccine. In Cameroon, the COVID-19 vaccination was first administered in April, 2021. As of 29 December 2021, a total of 360 697 peoples had received the first dose of either Sinopharm or AstraZeneca against 186 459 who had completed their second doses [3]. In addition, 473 992 people had been vaccinated with Johnson and Johnson vaccine [3]. Studies have reported about side effects of the COVID-19. Few studies had been done to investigate the side effects following immunization against COVID- 19 in Cameroon. We intended to evaluate the real occurrence, extent, and severity of side effects associated with the COVID-19 vaccine among the population of Bangourain Health District.

## PATIENTS AND METHODS

A cross sectional study was carried out in Bangourain health District, located in the West Region of Cameroon. The district is divided into 6 health areas (Bangambi,

Bangourain, Kouhouat, Koumengba and Koutoukpih) with a total population of 52700 inhabitants in 2021 (CIS population) and surface area of 792 km<sup>2</sup>. The population is cosmopolitan with the main tribe being the Bamouns. The health district shares boundaries with Fouban, Kouoptamo and Koumbo East health districts. The data collection was collected for 4 weeks from the 15 May to 15 June, 2022. Our sample size was consecutive. We included in our study everybody that has been vaccinated for Covid 19 (who has received at least one dose of any of the Covid 19 vaccines be it Sinopharm, Johnson-Johnson or Astra-Zeneca,) and who accepted to take part in the study. People who have not received any dose of the vaccine, those vaccinated but refused to take part in the study or people aged 18-21 years who have been vaccinated but no parental consent given were non included in the study. Data was collected by the use of a pretested questionnaire. Trained surveyors visited health facilities during week days and during working hours. Users of these health facilities (Health personnel, patients, guardians, visitors, etc) who met our inclusion criteria were recruited into our study. Data was collected in 5 health areas out of the six that composed the district. Vaccination history was collected based the presence of the vaccination cards. After a good rapport building with the participants, the questionnaires were then administered. The questionnaire was divided into the following sections; Data on socio-demographic profile of the participants, Participants' past medical records, Information on the Vaccination (type, doses), Information on the side effects. Data was collected and entered into Epi Info version 7 software. The data was exported into Microsoft Excel 2016 where tables and figures were done. Statistical tests like chi-square with an error margin of less than or equal to 5% were made to assess the associations using Epi infos 7 and SPSS 20. The independent variables were the socio-demographic data (age, sex, marital status, profession, localization), past history of Covid 19 infection and Vaccine type. The dependent variable was the apparition of a side effect following Covid 19 vaccine. Thus, significant results were considered when the P value was less than 0.05. Institutional ethical clearance was obtained from the Ethical Committee of the Faculty of Medicine and pharmaceutical Sciences of the University of Douala to carry out this study. An administrative authorization from the Regional Delegate for Public Health for the West Region was also obtained. Participants Consent obtained prior to enrolment into the study and they were free to withdraw from the study at any time they wished. All the information obtained or used in the study was treated as confidential. The questionnaires were anonymous (Only codes were used).

## RESULTS

A total of 162 participants took part in the study with their ages ranging from 19 to 80 years with a mean age of 42.77 ±14 years. Most of the participants were below 50 years (64.81%) (Table 1). Majority of our participants were males (55.55%). Bangourain health area was the major residence to the majority of participants (30.86%).

Civil status was dominated by married participants (72.22%). Two main religions of the participants were Islam (67%) followed by Christians (33%).

**Table 1. Sociodemographic profile of participants**

Characteristics	N=162	%
<b>Age</b>		
<50 years	105	64.81
≥50years	57	35.19
<b>Sex</b>		
Male	90	55.55
Female	72	45.45
<b>Localization</b>		
Bangambi	30	18.52
Bangourain	50	30.86
Kouhouat	27	16.67
Koumengba	30	18.52
Kourom	26	16.03
<b>Profession</b>		
Civil Servant	17	10.49
Farmer/Herdsman/ Fisher man	42	25.93
Health personnel	19	11.73
Housewife	50	30.86
Student	11	6.79
Trader	23	14.20
<b>Religion</b>		
Christian	52	32.10
Muslim	110	67.90
<b>Civil status</b>		
Divorced	10	6.17
Married	117	72.22
Single	29	17.91
Widow/ widower	6	3.70

The duration between vaccine administration to the participants and data collection ranged from 3 months to 12 months. The participants were administered three different covid 19 vaccines: Sinopharm, Astra Zenecca and Johnson and Johnson. Most of the participants were vaccinated with Johnson and Johnson whatever the dose of vaccine: 44.44% percent for the first dose, 51.04% for the second dose and 100% for the third dose (Table 2).

**Table 2: Distribution of the types of vaccines and doses administered to participants**

Name of vaccine administered	First Dose	Second Dose	Third dose
Sinopharm	22	17	0
Astrazenecca	68	30	0
Johnson/Johnson	72	49	39
Total	162	96	39

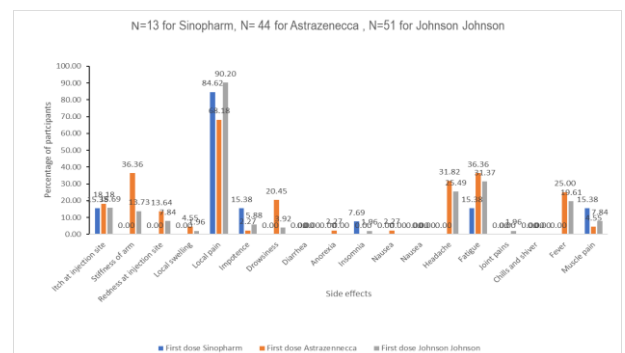
We see that the frequency of occurrence of side effects to covid 19 vaccines vary with regards to the dose of vaccine administered: 66.7% for first dose of the vaccine, 50.0 % for second dose and 53.84% for the third dose (Tableau 3).

**Table3. Frequency of occurrence of side effects to Covid 19 with respect to dose of vaccine**

Dose of vaccine	Side Effects present		No side effects	
	N	%	N	%
First dose (N=162)	108	66.67	54	33.33
Second dose (N=96)	48	50.00	48	33.33
Third dose (N=39)	21	53.84	18	46.15

The most common side effects to covid 19 vaccine after administration of the first dose are local pain (79%), fatigue (32.8%) and headache (23.5%) . Separating the different side effects with respect to the different vaccine types , we see that the most common side effects after administration of the first dose of vaccine were (Figure 1):

- **For Sinopharm:** we had local pain (84.67%), itch at injection site (15.38%), fever (15.38%), fatigue (15.38%) and functional Impotence (15.38%).
- **For AstraZeneca:** we had: local pains (68.18%), stiffness of arms (36.36%), Fatigue (36.36%), Headache (31.82%), and fever (25.00%)
- **For Johnson and Johnson:** we had local paid (90.20%), fatigue (31.37%), Headache (25.49%), fever (19.61%) and Itch at injection site (15.69%).



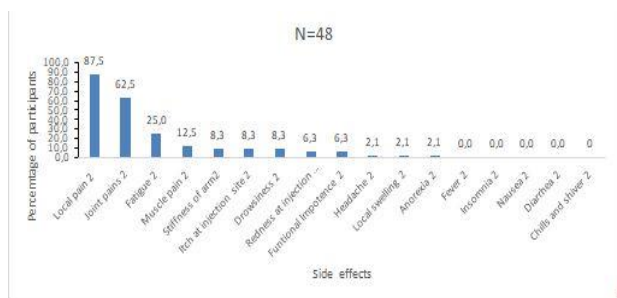
**Figure 1. Frequency of occurrence of different Side effects with respect to vaccine type after first dose administration**

A total of 96 participants received the second doses. Out of this, 48 developed side effects. We see that local pain (87.5%), joint pains (62.5%) and fever (25%) are the most common side effects after administration of the second dose of Covid 19 vaccine. Differentiating this information by type of vaccine , we see that the most common side effects after administration of the second dose of vaccine were (Figure 2):

- **For Sinopharm** we had local pain (39.29%), functional Impotence (5.88%), muscle pain (5.88%) and fatigue (5.88%)
- **For AstraZeneca** we had: Fatigue (13.33%), local pains (6.7%), Headache (3.33%), and drowsiness (3.33%)
- **For Johnson and Johnson,** we had local paid (69.39%), fatigue (51.02%), Headache (22.45%), fever (12.24%) and Itch at injection site (8.16%).







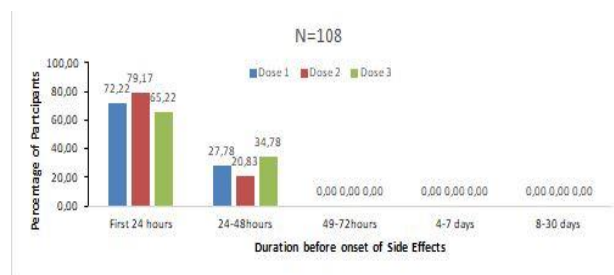
**Figure 2. Frequency of occurrence of different Side effects following administration of the SecondDose of Covid 19 vaccines**

A total of 39 participants had received the third dose of the Covid 19 Vaccine. Out of this, 23 developed at least one side effect. Fatigue (73.9%), local pain (60.9%) and fever (30.4%) were the most common side effects after administration of the third dose .

Differentiating this information by type of vaccine we see that the most common side effects after administration of the second dose of vaccine were :

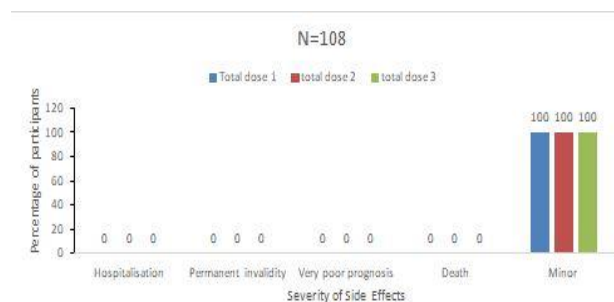
- For Johnson and Johnson, we had fatigue (73.9%), local pain (60.9%) and fever (30.4%)
- No participant received a third dose of AstraZeneca or Sinopharm.

Concerning Sinopharm vaccine most of the side effects reported by the participant are equal to those reported by the manufacturers (Tableau 4). However, some side effects such as fatigue and itch at injection site, reported to be less common by the manufacturers were found to be more common in this study. Also, insomnia, muscle pain and functional impotence of the upper limb which are not reported as a side effects by the manufacturers were found to occur in over 1/100, 1/10 and 1/10 of the participants respectively in this study. For Astrazeneca and Johnson and Johnson all the side effects reported by the participants in our study were those reported by the manufacturers (Tableau 5,6). However, the frequency of occurrence varied for certain side effects: drowsiness (somnia) is reported to be uncommon by manufacturers but found to be very common in our study. Also, fever is reported to be common by the manufacturers as compared to it being very common in our study. The majority of Side effects occurs within the first 24 hours irrespective of the vaccine dose; 72.22% for the first dose, 79.17% for the second dose and 65.22% for the third doses (Figure 3).



**Figure 3. Duration of apparition of Side Effects with respect to vaccine dose**

There is no statistically significant association between the vaccine type and occurrence of Side effects to covid 19 vaccine ( $p > 0.05$ ). All side effects (100%) notified by the participants were minor irrespective of the dose of vaccine (Figure 4).



**Figure 4. Severity of Side Effects to Covid 19 vaccine with respect to vaccine dose**

The occurrence of side effects is associated with being resident in Koumengba (OR=0.2500, CI= [0.0795; 0.7861]) and Kourom ( $p=0.0001$ , OR=0.0750, CI= [0.0209; 0.2691]) . Participants resident in Koumengba and Kourom were 0.25 and 0.08 times more likely to develop side effects respectively than participants resident in Bangambi (Table 7). We can also deduce that people with a past history of covid 19 infection are 0.29 times more likely to develop a side effect to covid 19 vaccine ( $p=0.0280$ , OR=0.2945, [0.0989; 0.8765]) than those who had never suffered from covid 19 infection. There was no statistically significant difference to the occurrence of side effects and type of vaccine, Civil status, and profession, Religion, Age group and sex of the participants).

**Table 4. Comparison between the side effects of sinopharm vaccine reported by the manufacturer to that reported by the participants**

Frequency of side effects	Sinopharm	
	Side effects reported by manufacturer	Side effects reported by participants
Uncommon side effects ( $\geq 1/1,000$ to $< 1/100$ )	Redness at the injection site, Itching at the injection site, Hardness at the injection site, Fatigue	
Common side effects ( $\geq 1/100$ to $< 1/10$ )	Transient fever, Headache, Diarrhea	Insomnia
Very common side effects ( $\geq 1/10$ )	Pain at injection site	Itch at injection site, Pain at injection site, Functional impotence of upper limb, Fatigue, Muscle pain

**Table 5. Comparison between the side effects of Astrazeneca vaccine reported by the manufacturer to that reported by the participants**

Frequency of side effects	Astrazeneca	
	Side effects reported by manufacturer	Side effects reported by participants
Uncommon side effects ( $\geq 1/1,000$ to $< 1/100$ )	Lymphadenopathy, Decreased appetite, Dizziness, Somnolence, Hyperhidrosis, Pruritus, Rash	
Common side effects ( $\geq 1/100$ to $< 1/10$ )	Injection site swelling, erythema, diarrhea	Injection site Fever, Vomiting
Very common side effects ( $\geq 1/10$ )	Headache, Nausea, Myalgia, Arthralgia, Injection site tenderness, Injection site pain, Injection site warmth, Injection site pruritus, Injection site bruising, Fatigue, Malaise, Feverishness, Chills	Local swelling, Anorexia, Nausea, Muscle pain Itch at injection site, Stiffness of arm, Redness at injection site, Local pain, Drowsiness/somnolence, Headache, Fatigue, Fever

**Table 6. Comparison between the side effects of Johnson and Johnson vaccine reported by the manufacturer to that reported by the participants**

Frequency of side effects	Johnson and Johnson	
	Side effects reported by manufacturer	Side effects reported by participants
Uncommon side effects ( $\geq 1/1,000$ to $< 1/100$ )	Rash, Muscle weakness, Arm or leg pain, Feeling weak, Feeling generally unwell, Sneezing, Sore throat, Back pain, Tremor, Excessive sweating Unusual feeling in the skin, such as tingling or a crawling feeling (paresthesia), Diarrhea, Dizziness	
Common side effects ( $\geq 1/100$ to $< 1/10$ )	Redness where the injection is given, Swelling where the injection is given, Chills, Joint pain, Cough, Fever	Redness where the injection is given Swelling where the injection is given, Impotence, Drowsiness/somnolence, Insomnia, Joint pains, Muscle pains
Very common side effects ( $\geq 1/10$ )	Headache, Nausea, Muscle aches, Pain where the injection is given, Feeling very tired	Itch at injection site, Stiffness of arm, Headache, Muscle aches, Pain where the injection is given, Fatigue

**Table 7. Association between sociodemographic factors and the occurrence of side effects following covid 19 vaccination by univariate logistic regression**

Variables	Odds Ratio	95% Confidence interval	p-value	Odds Ratio
<b>Age</b>				
<50years	-	-	-	
$\geq 50$ years	1.5708	0.8146	3.0270	0.0916
<b>Sexe</b>				
Female	-	-	-	0.0037
Male	0.9275	0.4796	1.7937	
<b>Localisation</b>				
Bangambi	-	-	-	-
Bangourain	1.8324	0.5324	6.3063	0.3369
Kouhouat	0.6786	0.1953	2.3578	0.5417
Koumengba	0.2500	0.0795	0.7861	<u>0.0177</u>
Kourom	0.0750	0.0209	0.2691	<u>0.0001</u>
<b>Profession</b>				
Civil Servant	-	-	-	-
Farmer/Herdsman/ Fisher man	1.0909	0.3340	3.5632	0.8854
Health personnel	0.9351	0.2392	3.6549	0.9231
Housewife	1.4026	0.4350	4.5222	0.5711
Student	0.6545	0.1391	3.0792	0.5916
Trader	1.0227	0.2749	3.8044	0.9733
<b>Religion</b>				
Christian	-	-	-	0.0070
Muslim	0.8421	0.4149	1.7094	
<b>Civil status</b>				
Divorced	-	-	-	

Married	0.4646	0.0943	2.2878	0.3459
Single	0.6578	0.1144	3.7834	0.6389
Widow/ widower	0.2506	0.0270	2.3232	0.2232
<b>Past history Of Covid 19 infection</b>				
Yes	0.2945	0.0989	0.8765	0.0280
No	-	-	-	-
<b>Vaccine type</b>				
Sinopharm	-	-	-	0.3965
AstraZenecca	1.2693	0.4741	3.3979	0.6351
JohnsonJohnson	1.6813	0.6246	4.5260	0.3038

## DISCUSSION

Our findings from the severity of AEFI to covid 19 indicated 100% minor side effects amongst those who developed side effects as shown in figure 10. This result is similar to that obtained in a web-based study carried out on 1736 participants in which no case of severe side effect was notified [5]. This also similar to results of a study in Afghanistan carried out on 400 staff and lecturers of Kabul University with the administration of AstraZeneca wherein no severe case was documented [6]. This is however different from others studies that have reported severe side effects after administration of Covid 19 Vaccine, though with very minimal frequency of occurrence. In one online cohort-based study on 19856 participants, the occurrence of a severe side effect such as anaphylaxis was 0.3% after administration of one dose of Pfizer or Moderna, 0.2% after taking the second dose of Moderna or 1 dose on Johnson-Johnson [7]. This difference could be explained by the small sample size of our study and also the absence of vaccines such as Moderna and Pfizer in our study. Association between sociodemographic factors and Past history of Covid 19 infection to AEFI showed that a total of 162 participants were enrolled into the study. The ages of the participants ranged from 19 to 80 years with a mean age of 42.77 ±14.57 years. As shown in table 4, Over 64.8% of the participants were above 50 years. The participants were classified into two age groups as used by the national program for covid 19 vaccine reporting: less than 50 years and more than 50 years. Participants were recruited from 5 out of the 6 health areas of the district with a majority from Bangourain health District (34%) which is the largest health area. With regards to civil status, most of our participants were married (76%). This could be explained by the socio-cultural behaviours of the population characterised by early marriages and polygamy. Christianity (33%) and Islam (67%) which are the two main religions present in Bangourain District. The association between localization and risk of developing side effects was also found in a study carried out in Indonesia which showed that participants living outside of Java, were at higher risk of developing adverse effects [7]. A past history of infection to Covid 19 was associated with increased risk of developing side effects to the vaccine. This finding is similar to that obtained in studies carried out in Afghanistan [4] and Spain [8]. There was no statistically significant association between the occurrence of side effects of

covid 19 vaccine and type of vaccine, Civil status, profession, Religion, Age group and sex of the participants (p= 0.003; OR=0.9275; CI= [0.4796, 1.7937]; This result is different from that obtained by Johan et al in Indonesia were a significant association was found between the female sex and the occurrence of side effects to covid vaccines [7]. This difference could be due to the low participation of women in our study (44%) compared to the 67.5% in the study in Indonesia. The socio-cultural environment of Bangourain, makes it difficult for women to be seen in the community and even to have a long dialogue with one's wife. This explains the low participation of women. This difference could also be explained by the fact that only 13.5 % of our participants in our study were vaccinated with Sinopharm against 98% of participants in the study in Indonesias

## CONCLUSION

These frequencies of occurrence of side effects however varied with the dose of vaccine administered. Most side effects reported were similar to those reported by manufacturers. However certain disparities were observed between the frequency of occurrence of these side effects in our study compared to that reported by the producers of these vaccines. Some side effects reported in this study were not notified by manufacturers: insomnia, muscle pain and functional impotence of the upper limb for Sinopharm; drowsiness, functional impotence of the upper limbs, stiffness of upper limbs, Insomnia and itch at injection site were for Johnson and Johnson. Onset of side effects was within the first 48 hours irrespective of the vaccine type or dose. These side effects to covid 19 vaccines notified were minor to moderate. The participants with a past history of covid 19 infection or those resident in Koumengba or Kourom were more likely to develop side effects to the vaccine. The need to Organise a large-scale study on the side effects Covid vaccines in Cameroon, continuously monitor and document the side effects of Covid 19 vaccines and increase awareness and population outreach

## Competing interests

The authors declare no competing interest.

## Author's Contribution

- KUM Jerry NGHHA Wrote the research proposal, carried out the research work, did data analysis and write up. Wrote this manuscript

- KENMEGNE NOUMSI ELVIRA CHRISTELLE Assisted in carrying out the research work, data analysis and write up.
- FANKEP DIHEWOU Alphonse Bertin Codirected the write up of the proposal and the results.
- KETCHAJI ALICE Codirected the write up of the proposal and the results.
- TAMBO ERNEST Codirected the write up of the proposal and the results.

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