

Knowledge, Attitudes and Practices Regarding Rubella Infection among Preparatory Year Students: A Preliminary Exploratory Study in Aden, Yemen

NAZEH M AL-ABD¹, MOHAMMED ALSHAKKA², SHEIKH ALSHOTARI³,
P RAVI SHANKAR⁴, MOHAMED IZHAM MOHAMED IBRAHIM⁵



ABSTRACT

Introduction: Rubella is a contagious viral infection characterised by mild fever and rashes. Maternal infection early in pregnancy often leads to birth defects known as Congenital Rubella Syndrome (CRS). Raising awareness among students about the importance of vaccines is a key to helping eliminate the spread of diseases. Moreover, the university students who are young adults will start their own family some day and some might become healthcare providers in the future. Data pertaining to Knowledge, Attitudes and Practices (KAP) regarding rubella are needed to sensitise and create awareness among health care administrators and providers.

Aim: To assess the KAP regarding rubella among preparatory year students attending Aden University, Yemen.

Materials and Methods: A cross-sectional study was carried out among preparatory year students attending Aden University. The students were chosen randomly. A pre-designed, validated

(Cronbach's alpha was 0.83) and structured questionnaire that gathered personal data and contained questions designed to assess the KAP regarding rubella and its vaccine was administered. Descriptive statistics and the chi-Square test (alpha=0.05) were used to analyse the data.

Results: One hundred ninety of the 250 (76%) responses were usable. Overall, 63.2% of participants had heard about rubella but lacked accurate knowledge of the signs, symptoms, causes and modes of transmission of rubella. Regarding their attitude towards rubella, 62.5% of participants considered rubella infection to be harmful to people's health.

Conclusion: This study reveals inadequate KAP regarding rubella among preparatory year students attending Aden University. Hence, there is a great need for adequate health education programs and community mobilisation to enhance public knowledge of rubella.

Keywords: Adolescence, Education, German measles, Virus infection

INTRODUCTION

Rubella, also called German measles is an acute viral infection caused by a togavirus of the Rubivirus family that can affect people of all ages and both sexes [1]. The incidence is much higher in Low-to-Middle Income Countries (LMICs) [2]. Several reports and studies explained the signs and symptoms of rubella [3], its transmission [4], incubation period and how it can spread and affect pregnant mothers and their fetus [5-10].

The World Health Organisation (WHO) estimates that more than 1,00,000 children are born with CRS annually, with most of them in developing countries [1]. In Yemen, high incidence rates of rubella of 41 and 52 cases per million were registered in 2013 and 2014, respectively. Prior to the war, Yemen had a relatively stable vaccination rate, reaching 70-80% of the target population [11]. In March 2015, Yemen underwent major political upheaval due to the civil war. Yemen had a fragile health care system prior to the onset of the war and did not have the infrastructure to withstand these changes; consequently, the health care system is currently on the brink of collapse [12].

The incorporation of KAP surveys has been endorsed by the WHO to modify health education to improve public knowledge and attitudes. Obviously, the KAP concerning rubella differs from one region to another as KAP are heavily influenced by specific socio-cultural settings. In fact, there is little information about how individual communities incorporate knowledge of the origins and impacts of rubella into the local knowledge systems. Rubella occurs more often in children and young adults. To the best of authors' knowledge, data

on KAP regarding rubella infection and the rubella vaccine in Yemen are scarce. The information from this study can provide insight into the current status, enabling preventive measures to be taken.

The current study was designed to preliminarily evaluate the KAP regarding rubella among preparatory year students at Aden University, Yemen.

MATERIALS AND METHODS

Study Design

A survey was conducted among the preparatory year students attending Aden University, Yemen. The program aimed to prepare the students by teaching them the basic knowledge needed to attend a university and to select the students eligible for each field based on their performance during the year. Aden University's preparatory program has 4 colleges: the Medicine Faculty, Administration Science Faculty, Languages Faculty and Engineering Faculty.

Ethics Considerations

The protocol of the study was approved by the Research and Ethics Committee of the Faculty of Medicine of the University of Aden (Research Code: REC-25-2018). All respondents were fully notified that their participation was voluntary and that it was possible to withdraw from the study without notice. Those who wished to participate were required to sign a consent form.

Study Population, Sample Size and Sampling

Of a total population of 1500 students, a sample size of 212 students was needed. The required sample size was calculated based on a

margin of error of 5%, a 95% confidence level and an 80% response distribution (Raosoft® (<http://www.raosoft.com/samplesize.html>)). Three of these colleges (Medicine Faculty, Administration Science Faculty and Languages Faculty) were chosen by simple random sampling. Representative samples of students at each faculty were chosen randomly through the class list.

Inclusion criteria: The study included preparatory year students who were: (1) healthy, willing to participate and willing to sign the informed consent form; and (2) available at the time of data collection.

Exclusion criteria: The study excluded the students who: (1) reported previous residence in another country; (2) were not present during data collection; or (3) were not willing to participate.

Study Instrument Development and Validation

A structured questionnaire was designed to gather information regarding sociodemographics and KAP related to rubella. The questionnaire was first developed in English and then translated into Arabic language. The questionnaire consisted of three sections. The first section included sociodemographic data such as sex, age, marital status, educational level and residence. Section two included questions used to assess the respondent's KAP level such as questions about the signs and symptoms and modes of transmission of rubella. Questions related to the respondent's history of rubella were included. Section three included questions about the respondent's history of MMR vaccination, and the attitude of the respondent towards the vaccine.

The questionnaire was validated by the following process: (1) The questionnaire was designed in English by the principal researchers; (2) Forward translation from English to Arabic was performed by a specialist; (3) Pretesting of the questionnaire was conducted. Face to face interviews were conducted with 20 students who did not participate in the main study; (4) Retesting of the questionnaire was also performed with the same people who participated in the pretesting two weeks later. It was observed that most of the respondents gave the same or very similar answers on the pretest and retest; (5) A statistical analysis was performed to test the internal consistency (Cronbach's alpha); (6) Validity was evaluated by the face validity test, and the final draft of the questionnaire was sent to two researchers from the Faculty of Medicine, Aden University. The Cronbach's alpha was 0.83, indicating good consistency and high test reliability.

Data Management and Analysis

Data were entered into the Microsoft Office Excel version 2013; then, analysed with SPSS software version 20 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). The demographic characteristics of the respondents are presented as percentages and frequencies. The associations of the knowledge of rubella with the sociodemographic factors of the respondents were assessed using the chi-square test. A p-value of 0.05 or less was considered significant.

RESULTS

The questionnaires were administered to 250 students, and 220 were received back, yielding a response rate of 88%. Of the 220 returned surveys, 30 were incomplete, giving a final total of 190 (76%) of usable questionnaires.

General Characteristics of the Participants

The general sociodemographic characteristics of the respondents in this study are shown in [Table/Fig-1]. Out of the 190 respondents, 96 (50.5%) were males, with a mean age of 20.31±1.96 years; most of them were 19-year-old (n=66, 35%) and 122 (64.2%) were urban residents. More than half of the respondents, 128 (67.4%), were from Aden governorate.

Eighty-one (42.6%), or approximately half, of the fathers of the respondents had a college education, followed by 66 (34.7%) had a secondary level education. On the other hand, most of the mothers had a secondary level education (n=60, 31.6%). A majority of the respondents (n=182, 95.8%) were not married [Table/Fig-1].

Characteristic	Frequency	(%)
Marital status		
Married	6	3.2
Single	182	95.8
Divorcee	2	1.0
Residence		
Urban	122	64.2
Rural	68	35.8
Father's education level		
Illiterate	10	5.3
Primary	33	17.4
Secondary	66	34.7
College and above	81	42.6
Mother's education level		
Illiterate	43	22.6
Primary	44	23.2
Secondary	60	31.6
College and above	43	22.6

[Table/Fig-1]: General socio-demographic characteristics of students of preparatory year participated in the study (n=190).

Knowledge about Rubella

The results showed that 120 (63.2%) of the participants had heard about rubella [Table/Fig-2]. Out of these 120 participants, 46 (38.3%) indicated that the main source of their information about rubella was other people (friends and neighbours), followed by social media (n=31, 25.8%), then school (n=12, 10.0%).

Variable	Frequency	%
Knowledge about rubella (n=190)		
Yes	120	63.2
No	70	36.8
Caused by (n=120)		
Bacteria	19	15.8
Mosquito	3	2.6
Virus	61	50.8
Don't know	37	30.8
Mode of infection		
Close contact with patient, sneezing, coughing, and via placenta	57	47.5
Flies and mosquito	21	17.5
Tick	3	2.5
Blood	1	0.8
Don't know	38	31.7
Symptoms		
Fever	2	1.7
Skin rash	5	4.2
Headache	3	2.5
Fever and skin rash	22	18.3
Fever, skin rash, headache, malaise, and redness of the eye	57	47.5
Don't know	31	25.8

[Table/Fig-2]: Perceived knowledge of the respondents about rubella.

Among the participants who had heard about rubella, approximately half of them (61, 50.8%) knew that rubella was caused by a virus.

Fifty-seven (47.5%) of the participants knew that close contact with a patient, sneezing, coughing, and transfer across the placenta are modes of transmission of the disease. In total, 57 (47.5%) of the participants stated that the main symptoms of rubella are fever, skin rash, headache, malaise and redness of the eye, while 31 (25.8%) admitted that they did not know any symptoms of rubella.

Out of the participants who reported their history of rubella, 18 (15%) students stated they had rubella [Table/Fig-3].

Variable	Yes		No	
	No.	%	No.	%
Have you had rubella?	18	15	102	85
Did rubella infect a member of your family or one of your fellow school?	33	27.5	87	72.5
Have you heard of rubella vaccine?	85	70.8	35	29.2
Do you know time for giving rubella vaccine (n=85).	3	3.5	82	96.5

[Table/Fig-3]: Knowledge about history of rubella and its vaccine (n=120).

More than two-thirds of the respondents (n=85, 70.8%) were aware of the rubella vaccine, while 35 (29.2%) were not aware of the rubella vaccine. Almost all (n=82, 96.5%) respondents who had previous knowledge of the rubella vaccine stated that they did not know the timing of the administration of the rubella vaccine.

Attitude towards Rubella

The results regarding the respondents' attitude towards rubella are presented in [Table/Fig-4]. Among those who indicated that they had heard about rubella, the majority (n=75, 62.5%) stated that rubella is harmful to people's health. When asked about their intention to immunise any future children with the MMR vaccine, more than half (n=99, 82.5%) of the students reported that they intended to immunise any future children with the MMR vaccine. Moreover, the majority of students (n=76, 63.3%) agreed that any future children should be vaccinated, regardless of the opinions of others.

Variable	Yes		No		Don't know	
	No.	%	No.	%	No.	%
Do you consider rubella to be a problematic disease? (n=120)	75	62.5	15	12.5	30	25
Do you know that rubella infection during pregnancy causes adverse effect on foetus? (n=75)	36	48	39	52	-	-
I would like to vaccinate my children	99	82.5	10	8.3	11	9.2
Regardless of what other say, I think I should be vaccinated	76	63.3	13	10.8	31	25.8
My parents/guardians want me to receive all recommended vaccines	79	65.8	13	10.8	28	23.3
I like to take vaccination prior my marriage	84	70	7	5.8	29	24.2
If immunisation program was obligatory prior entrance to the university, I would like to be immunised	100	83.3	7	5.8	13	10.8
I wish to get more information about rubella infection and rubella vaccination	109	90.8	6	5	5	4.2

[Table/Fig-4]: Attitude of the respondents towards rubella (n=120).

Practices regarding Rubella

Fifteen (12.5%) respondents who reported having prior knowledge of rubella had received the vaccine, and approximately one-third (30, 25.0%) of them had not received the vaccine, while 75 (62.5%) individuals did not know whether they had received it or not.

KAP regarding Rubella among Subgroups of Respondents

Differences in the KAP scores among different subgroups of respondents were determined using the chi-square test [Table/Fig-5].

The results showed that only gender was significantly associated with KAP. The female respondents had a superior knowledge of rubella compared to male respondents (p=0.004).

Variable	Knowledge of rubella				p-value
	Yes	%	No	%	
Sociodemographic data	No	%	No	%	
Gender					0.004
Male	51	53.1	45	46.9	
Female	69	73.4	25	26.6	
Place of birth					0.076
Urban	78	63.9	44	36.1	
Rural	42	61.8	26	38.2	
Marital status					0.543
Single	114	62.6	68	37.4	
Married	5	83.3	1	16.7	
Divorcee	1	50	1	50	
Fathers education					0.990
Illiterate	6	60	4	40	
Primary	21	63.6	12	36.4	
Secondary school	41	62.1	25	37.9	
College and above	52	64.2	29	35.8	
Mothers education					0.340
Illiterate	32	74.4	1	25.6	
Primary	25	56.8	19	43.2	
Secondary	36	60	24	40	
College and above	27	62.8	16	37.2	

[Table/Fig-5]: Association of knowledge of rubella with socio-demographic factors of the respondents.
*Percentage per row

DISCUSSION

In brief, the findings from this survey on preparatory year students attending Aden University demonstrated that there was inadequate KAP regarding rubella among preparatory year students attending Aden University.

Overall, the present results show that the participants' knowledge of rubella was generally poor, with low levels of awareness of the symptoms, modes of transmission, and sources of infection. The current study showed that although 63.2% of the respondents stated that they had heard about rubella, their actual knowledge of the disease was limited. This is in agreement with the previous findings from studies performed in various countries such as Egypt [13], with reports of a lack of awareness regarding rubella among studied women, and Brazil [14], where more than half of the respondents (69.9%) indicated that Brazilian adults were aware of rubella but their knowledge of the disease was poor. A study in India [15] found that the majority of the non-medical students (78%) were unaware of rubella.

Regarding the source of information about rubella, most of those who had prior knowledge mentioned that they had gained information about rubella from different sources such as friends, neighbour, social media, TV, and newspapers. A study in India observed that two-fifth of the participants who had heard of rubella obtained the information from books and television [16]. Only one-tenth of respondents had heard about rubella from school. This finding deserves more attention, as the school is considered one of the best places to enact positive changes in any community, and it can be a suitable environment for health education because students spend most of their time in school and interacting with their colleagues and teachers. Furthermore, students in school are more vulnerable to infection. In addition, school age is the age at

which new information is most easily acquired, and students are able to transfer this information to the surrounding community. A study concluded that students are important stakeholders in future public health campaigns [17].

Despite the literacy of the participants, the knowledge of rubella was low. Health education in schools might not be adequate. Previous findings from Italy [18] and Nigeria [19,20], found that, although the level of literacy observed among the respondents was high, there was still a low level of knowledge of rubella. In another study, it was found during health screening campaigns administered by the Ministry of Health personnel that no respondents had heard about rubella [21]. The spread of the rubella virus from one person to another occurs through contact with nose or throat secretions, often in the form of airborne droplets, and it is also passed from pregnant women to the fetus through the placenta [19]. In the present study, the level of the participants' knowledge of rubella transmission was low, with close to half of them know about the method of transmission of the disease. This is in accordance with the findings of the study by Olajide OM et al., who reported that only a minority of respondents knew about rubella and how it could be transmitted; in the same study [20], they found around two-fifth of the students recognised breathing as a mode of transmission. Contrary to finding of this study, another study reported that less than one-fifth of their respondents knew about the modes of transmission [22]. The finding of the present study showed that approximately half of the respondents knew that a virus was responsible for causing the disease. However, these findings are contrary to those of a previous study in which they reported that all respondents knew that rubella is caused by a virus [23].

Moreover, the findings from this study showed that around half of the respondents recognised the common signs and symptoms associated with rubella infection. The present results are in contrast with the findings from Brazil [14], where less than one-third of the respondents were able to answer affirmatively when asked if they would recognise the symptoms of rubella infection. In this study, female participants were more knowledgeable about rubella than male participants, and this is similar to the findings from Brazil [14]. Contrary, there were no significant differences observed between female and male participants in India [23]. Additionally, there were no significant associations between knowledge and other sociodemographic factors such as age, residence, and education; similar observations were found in Egypt [13]. With regard to vaccine awareness, however, to the best of authors' knowledge, there is no data available pertaining to the general population in Yemen. In the present study, more than two-third of the participants had heard about the rubella vaccine. Sharma P et al., stated that the knowledge of the vaccine among respondents was adequate [23]. However, the present findings are in contrast with those of a previous study in which it was reported that only 13.0% of the participants knew about the rubella vaccine [16].

Concerning the history of rubella infection, the current study reported that 15% of students had a history of rubella infection, and this is in accordance with previous studies [13,24], in which the majority of respondents stated that they had not had rubella or they did not remember having had rubella.

The attitudes of the respondents towards rubella showed that close to two-third of the respondents viewed rubella as a problematic disease. However, in India, it is reported that about four-fifth of adolescent girls believed rubella was not an infectious disease [16]. In the present study, the majority of the students did not know about the complications of rubella during pregnancy. Kumari S et al., observed that more than four-fifth of respondents did not know the adverse effect of rubella on pregnancy and the fetus [16]. Contrary to finding of the present study, Gupta H et al., reported that 92.1% of respondents were aware of the potential damage to

the fetus caused by rubella contracted during pregnancy [15]. In the present study, none of the respondents knew the appropriate timing for receiving the rubella vaccine, although the majority of the respondents expressed a willingness to be vaccinated. Despite the lack of knowledge of rubella, their attitude towards the vaccine was overall positive. Vieira JC et al. and Kumari S et al., reported similar observations [14,16]. Gadallah M et al., reported that medical student respondents state that they will not be vaccinated in the future [24].

With respect to the vaccination status, the present study showed that slightly more than one-tenth of respondents had received the vaccine. However, the present findings contradict other reports [15,25], which showed that 42.1% and 46.9% of respondents were reported to be vaccinated against rubella, respectively. Taneja DK and Sharma P supported the idea to have the goal to eliminate rubella [26]. The initiative of Yemen Ministry of Public Health and Population, World Bank, WHO and UNICEF on the nationwide awareness and vaccination campaign, should continue to be among the top public health priorities and need to be supported [27].

Limitation(s)

The results are limited to only preparatory year students, and there was a small sample size. In the preparatory year; all students entered from high schools; all would have the same level of knowledge/exposure. Thus, the findings of this study may not reflect the perspective of the whole community. Therefore, the findings need to be interpreted within the context of this study limitation. The authors are planning to expand the study in Yemen (i.e., sample size and geographical areas) to provide findings that could be used to inform educational programs and improvements in practices and health policies in the country.

CONCLUSION(S)

In summary, the results of the present study showed that the majority of the preparatory year students attending Aden University have inadequate knowledge, insufficiently positive attitudes and a lack of proper practices pertaining to rubella.

REFERENCES

- [1] Lambert N, Strebel P, Orenstein W, Icenogle J, Poland GA. Rubella. *The Lancet*. 2015;385(9984):2297-307.
- [2] World Health Organization. Rubella. WHO. Geneva. 2020. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/rubella>.
- [3] Namaei MH, Ziaee M, Naseh N. Congenital rubella syndrome in infants of women vaccinated during or just before pregnancy with measles-rubella vaccine. *Indian J Med Res*. 2008;127(6):551-54.
- [4] Theeten H, Hutse V, Hens N, Yavuz Y, Hoppenbrouwers K, Beutels P, et al. Are we hitting immunity targets? The 2006 age-specific seroprevalence of measles, mumps, rubella, diphtheria and tetanus in Belgium. *Epidemiol Infect*. 2011;139(4):494-504.
- [5] Dannetun E, Tegnell A, Hermansson G, Törner A, Giesecke J. Timeliness of MMR vaccination-influence on vaccination coverage. *Vaccine*. 2004;22(31-32):4228-32.
- [6] World Health Organization. Surveillance guidelines for measles, rubella and congenital rubella syndrome in the WHO European Region. In *Surveillance guidelines for measles, rubella and congenital rubella syndrome in the WHO European Region 2009*.
- [7] Beutels P, Van Damme P, Van Casteren V, Gay NJ, De Schrijver K, Meheus A. The difficult quest for data on "vanishing" vaccine-preventable infections in Europe: The case of measles in Flanders (Belgium). *Vaccine*. 2002;20(29-30):3551-59.
- [8] Adewumi MO, Olusanya RB, Oladunjoye BA, Adeniji JA. Rubella IgG antibody among Nigerian pregnant women without vaccination history. *African Journal of Clinical and Experimental Microbiology*. 2013;14(1):40-44.
- [9] Tamirat B, Hussen S, Shimelis T. Rubella virus infection and associated factors among pregnant women attending the antenatal care clinics of public hospitals in Hawassa City, Southern Ethiopia: A cross-sectional study. *BMJ Open*. 2017;7(10):e016824.
- [10] Brooks GF, Butel JS, Morse SA. *Medical Microbiology*. 22. Appleton and Lang, New York. 2001:403.
- [11] Qirbi N, Ismail SA. Ongoing threat of a large-scale measles outbreak in Yemen. *The Lancet Global Health*. 2016;4(7):e451.
- [12] World Health Organization. *World health statistics 2016: Monitoring health for the SDGs sustainable development goals*. World Health Organization; 2016.
- [13] Ibrahim WH, Khalaf FR, Khalek EM. Educational program about Rubella among pregnant women attending antenatal clinic in Women's Health Hospital, Assiut

- University, Egypt. *Journal of Nursing Education and Practice*. 2018;8(11).
- [14] Vieira JC, Carvalho MT, Checchia RL, Trombiere M, Flannery B. Survey of rubella knowledge and acceptability of rubella vaccination among Brazilian adults prior to mass vaccination. *Rev Panam Salud Publica*. 2011;30(4):335-41.
- [15] Gupta H, Sabde Y, Khandelwal V, Mehta S. Rubella vaccine-awareness alone cannot influence the attitude of people: A cross-sectional survey among medical students and professionals in central India. *International Journal of Medical Science and Public Health*. 2013;2(2).
- [16] Kumari S, Sangal R, Singh A, Tiwari HC, Srivastava R, Sharma NR. Knowledge, attitude and practice (KAP) of rubella vaccination in adolescent girls attending gynaecology OPD at BRD medical college, Gorakhpur. *Journal of Evolution of Medical and Dental Sciences*. 2017;6(60):4435-4438.
- [17] Cvjetkovic SJ, Jeremic VL, Tiosavljjevic DV. Knowledge and attitudes toward vaccination: A survey of Serbian students. *J Infect Public Health*. 2017;10(5):649-56.
- [18] Riccò M, Cattani S, Casagrande F, Gualerzi G, Signorelli C. Knowledge, attitudes, beliefs and practices of occupational physicians towards vaccinations of health care workers: A cross sectional pilot study in North-Eastern Italy. *International Int J Occup Med Environ Health*. 2017;30(5):775-90.
- [19] Olufemi AO, Agbede OO, Olatunji MK, Okoh A. Knowledge, Attitude and Practices of Pregnant Women Attending University of Ilorin Teaching Hospital with Regard to Rubella. *Journal of Family and Reproductive Health*. 2012;6(4):153-58.
- [20] Olajide OM, Aminu M, Randawa AJ, Adejo DS. Seroprevalence of rubella-specific IgM and IgG antibodies among pregnant women seen in a tertiary hospital in Nigeria. *International Journal of Women's Health*. 2015;7:75-83.
- [21] Varghese AV. A comparative cross sectional study on the awareness and attitude towards rubella vaccine among the medical and non-medical students of Trichy District, Tamil Nadu. *Biomedical Journal of Scientific & Technical Research*. 2017;1(1):62-64.
- [22] Abbas IM, Hasan RT. Assessment of University Students' Knowledge's concerning German measles and its Effect on Pregnancy and its Outcomes. *Journal of Nursing and Health Science*. 2016;5(1):63-68.
- [23] Sharma P, Keerti, Sharma H. Assessment of knowledge regarding rubella infection amongst the medical students in a Government Medical College of Southern Rajasthan. *Journal of Research In Medical and Dental Science*. 2017;5(4):30-34.
- [24] Gadallah M, El Sayed N, Kandeel A, Moussa I, Mohsen A, Dewedar S. Seroprevalence of rubella antibodies among adult Egyptian females aged 20-30 years. Is there a need for rubella vaccination? *Cent Eur J Public Health*. 2014;22(4):282-86.
- [25] Taddei C, Ceccherini V, Niccolai G, Porchia BR, Boccalini S, Levi M, et al. Attitude toward immunisation and risk perception of measles, rubella, mumps, varicella, and pertussis in health care workers working in 6 hospitals of Florence, Italy 2011. *Hum Vaccin Immunother*. 2014;10(9):2612-22.
- [26] Taneja DK, Sharma P. Targeting rubella for elimination. *Indian Journal of Public Health*. 2012;56(4):269-72.
- [27] UNICEF. Children in Yemen receive measles and rubella vaccination with joy. Retrieved from: <https://www.unicef.org/yemen/stories/children-yemen-receive-measles-and-rubella-vaccination-joy>.

PARTICULARS OF CONTRIBUTORS:

1. Department of Para-clinic, Faculty of Medicine and Health Sciences, University of Aden, Aden, Yemen.
2. Department of Pharmaceutics, Faculty of Pharmacy, University of Aden, Aden, Yemen.
3. Department of Para-clinic, Faculty of Medicine and Health Sciences, University of Aden, Aden, Yemen.
4. Professor, Washington Medical Science Institute, St. Lucia.
5. Professor, Department of Clinical Pharmacy and Practice, Qatar University, Doha, Qatar.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Mohamed Izham Mohamed Ibrahim,
P.O. Box 2713, College of Pharmacy, QU Health, Qatar University, Doha, Qatar.
E-mail: mohamedizham@qu.edu.qa

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Mar 03, 2020
- Manual Googling: Mar 25, 2020
- iThenticate Software: Apr 11, 2020 (9%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Feb 19, 2020**

Date of Peer Review: **Mar 20, 2020**

Date of Acceptance: **Mar 28, 2020**

Date of Publishing: **May 01, 2020**