ORIGINAL RESEARCH ARTICLE

Prevalence, trends, and determinants of contraception use among women in Nigeria: An analysis of Nigeria demographic and health surveys 2008 to 2018

DOI: 10.29063/ajrh2023/v27i11.4

Sarwat Mumtaz[1,2], Bhumi Mehta[1] and Chakema Carmack[1]*

Department of Psychological, Health, and Learning Sciences, University of Houston, Houston, TX, USA[1]; Department of Public Health, Faculty of Life Sciences, SZABIST University, Karachi, Pakistan[2]

***For Correspondence:** Email: *ccarmack@central.uh.edu*; Phone :+1 713 743-6231

Abstract

Within Africa, maternal mortality remains a concern that can be prevented and addressed. Among the various African countries, Nigeria has one of the highest mortality rates, particularly in a context where the population continues to rise. The relationship between contraceptive usage among married Nigerian women and low socioeconomic development contributes to another concerning public health issue- performing unskilled abortions. This cross-sectional study examines how seven (7) key social determinants of health impact the usage of contraceptive methods among Nigerian women ages 15-24. Data were analyzed and acquired from the Nigerian Demographic and Health Survey (NDHS) and the National Population Commission (NPC) in 2008, 2013, and 2018. Bivariate and multivariable logistic regression analyses illustrate social determinants have a deep effect on access and usage of contraceptives in Nigeria. Results yielded that as factors such as age, education, and socioeconomic status increase, the use of contraceptives increases as well. While autonomy has little to no significance, religion and urbanity present challenges to Nigerian women who are interested in using contraceptives. More so, this study suggests a stronger need for education for Nigerian women at an early age and deepening the understanding of the barriers to contraception use with the help of the community and religious leaders. *(Afr J Reprod Health 2023; 27 [11]: 26-32).*

Keywords: Nigerian women, contraceptives, social determinants, trends

Résumé

En Afrique, la mortalité maternelle reste une préoccupation qui peut être évitée et traitée. Parmi les différents pays africains, le Nigeria présente l'un des taux de mortalité les plus élevés, notamment dans un contexte où la population ne cesse d'augmenter. La relation entre l'utilisation de contraceptifs chez les femmes nigérianes mariées et le faible développement socio-économique contribue à un autre problème de santé publique préoccupant : la pratique d'avortements non qualifiés. Cette étude transversale examine l'impact de sept (7) déterminants sociaux clés de la santé sur l'utilisation des méthodes contraceptives chez les femmes nigérianes âgées de 15 à 24 ans. Les données ont été analysées et acquises à partir de l'Enquête démographique et de santé nigériane (NDHS) et de la Commission nationale de la population (NPC) en 2008, 2013 et 2018. Les analyses de régression logistique bivariées et multivariées illustrent que les déterminants sociaux ont un effet profond sur l'accès et l'utilisation des contraceptifs. au Nigéria. Les résultats ont montré qu'à mesure que des facteurs tels que l'âge, l'éducation et le statut socio-économique augmentent, l'utilisation de contraceptifs augmente également. Même si l'autonomie n'a que peu ou pas de signification, la religion et l'urbanité présentent des défis pour les femmes nigérianes qui souhaitent utiliser des contraceptifs. Plus encore, cette étude suggère un besoin plus fort d'éducation des femmes nigérianes dès leur plus jeune âge et d'approfondir la compréhension des obstacles à l'utilisation de la contraception avec l'aide de la communauté et des chefs religieux. *(Afr J Reprod Health 2023; 27 [11]: 26-32).*

Mots-clés: Femmes nigérianes, contraceptifs, déterminants sociaux, tendances

Introduction

Sexual and reproductive health is central to improving maternal health globally, particularly, in sub-Saharan African countries where maternal mortality is still high[1]. Sexual and reproductive health includes preventing sexually transmitted infections, eliminating unsafe abortions, and promoting women's general health. It gives women the freedom to make decisions about when to consider having children, and the ability to access quality services for family planning.

Using contraceptives improves maternal and child health by reducing the risk of maternal mortality. The correct choice and consistent use of contraception are mandatory for preventing unplanned pregnancies and sexually transmitted infections[2]. Unsafe abortions due to lack of contraceptive use are one of the major complications that are responsible for 80% of all maternal deaths.[3] Despite global efforts, unsafe abortions due to unwanted pregnancies are still high in many developing countries reflecting an unmet contraceptive need[4,5]. In a study conducted in three hospitals in southwest Nigeria, 43.1% of unmarried women had an abortion and due to their marital status while pregnant led to the strongest predicator of abortions.[6] Unsafe abortions due to unintended pregnancies and their subsequent effect on maternal health are all emerging concerns in sub-Saharan African Countries[5-7]. The most common causes of maternal death in South East Nigeria was sepsis (25.8%) and obstetric hemmorage (23.7%) in which 12.4% accounted for preclampsia/eclampsia and anemia[8].

The maternal mortality rate in Nigeria is fourth among sub–Saharan African countries with 917 deaths following Chad (1,140), Sierra Leone (1,120), and Sudan (1,150).[8] Nigeria is the most populous country on Africa's western coast, with a current population of 218,601,314 and a growth rate of 2.46 percent, and a birth rate of 37 per 1,000 people. Its population ranks sixth in the world, with 401.31 million expected by the end of 2050, surpassing the population of the United States in 2047[9]. Despite the government's efforts to slow population growth by providing free contraception, early marriages, a high birth rate, and a lack of access to family planning are major contributors to Nigeria's high growth rate[10].

Existing literature has shown wide racial, ethnic, and socioeconomic disparities pertaining to the use of contraception worldwide. Some studies highlighted the strong positive association between various social and cultural factors that contribute to the low use of contraception such as false perceptions about sexual pleasure, religion, gender inequality, lack of communication among partners, lack of sex education, lack of motivation, and negative cultural norms[8-11].

Another study analyzed NDHS 2013 and discovered low reproductive health and contraceptive use in Nigeria's Northwestern region, which includes 19 of the country's 36 states. According to the study age groups, 15 and 19 were found to be non-autonomous, whereas age groups 20 and 24 were found to be autonomous in deciding contraception[12].

A study of the Nigerian Demographic survey 2013, indicates that the prevalence of modern contraceptive methods increased by 4% between 2008 and 2013 in secondary and high secondary-educated women respectively; however, economic situation, religion, and experience with intimate partner violence were major factors in lowering contraceptive use, with nearly the same percentage in both secondary and higher secondary educated women[13].

Using the data from thirteen locations across Nigeria, a study explored the difference in sexual behaviors and sexually transmitted infections testing rates among youth aged 17 to 25 years of age and highlighted that students who attended two- or four-year institutions were more willing to use contraceptive as compared to the individuals who did not attend any institution[14]. Numerous studies explored the low prevalence of contraceptives in Nigeria, however, there is a gap in existing literature in addressing the current status, time trends, and major determinants of contraception use. The study aims to examine the current status of the prevalence of contraception using the most recent data from NDHS 2018 and investigate the trends, and determinants of the use of any contraceptive method amongst women aged 15-24 years in Nigeria during the period of 2008 to 2018.

Methods

This is an exploratory, cross-sectional study that used data from three waves of the Nigeria Demographic and Health Survey (NDHS) 2008, 2013, and 2018 (the most recent survey). The DHS surveys are globally authorized and publicly available surveys in developing countries, funded and supported by the United States Agency for International Development. NDHS is a nationally representative survey conducted by the National Population Commission (NPC), publicly available at the website https://dhsprogram.com. We downloaded the data after obtaining permission from the Demographic and Health Survey (DHS) team. A broad range of health information has been

collected in this survey, such as maternal and child health, family planning, knowledge and attitudes about HIV/AIDS, the nutritional status of women and children, and domestic violence. The sample size of NDHS 2008, NDHS 2013, and NDHS 2018 was 33385, 38948, and 41821, respectively.

Study population

The unit of analysis for this study was currently married women. This yielded a total of 23,063, 27,043, and 28121 women from NDHS 2008, NDHS 2013, and NDHS 2018. The sample size was weighted to adjust for differences in the probability of selection and interview among respondents.

Outcome variables

The outcome variable for this study was current contraception use (any method). We coded this variable as 1 if a woman used any method and 0 for not using any method. This variable was investigated in the NDHS surveys through the question "Are you currently using any contraceptive method?"

Independent variables

The independent variables were the socio-demographic characteristics of the women's age, educational level, current working status, wealth index, urbanity (urban/rural residence), region, religion, and women's decision-making authority (women alone or jointly with their husbands). Wealth quintiles were calculated by the characteristics of the home, water and sanitation facilities, and the ownership of household assets. They were classified as the poorest, poorer, middle, richer, or richest group. We selected the variables in this paper based on empirical evidence from similar studies.

Statistical analysis

The socio-demographic characteristics of women using contraceptive methods were examined through descriptive statistics. Bivariate analysis was done to calculate the percentage of women using contraception by demographic characteristics. We used multivariable logistic regression after simultaneously adjusting for socio-demographic variables to examine the independent effect. The results of the multivariable logistic regression analyses were represented as odds ratios (ORs) with 95%. We performed all analyses using SAS statistical software version 9.5 (SAS Institute Inc., Cary, NC, USA).

Ethical considerations

We obtained permission from the DHS program to use the data for this study. No further ethical approval was required as this study was based on publicly available secondary data from a standard DHS survey that has been reviewed and approved by the ICF International Institutional Review Board, and informed consent was already obtained from respondents during the survey.

Results

Table 1 shows the percent distribution of socio-demographic characteristics of participants. Among study participants, approximately 54% belonged to the age group 20-34 years in all surveys. According to the most recent survey, 45.6% of women had no formal education, however, the proportion of women getting higher education has increased from 7.1% in 2008 to 9.6% in 2018. Only 32% of women had decision-making autonomy alone or jointly with their husbands. The majority of women belong to Islam throughout the study period and lived in rural areas.

Table 2 presents the bivariate analysis of the crude rates of contraceptive methods used according to socio-demographic variables. Overall, 14.2%, 14.7%, and 16.7% of women used any contraception method in Nigeria in 2008, 2013, and 2018, respectively. During the study period, women belonging to the 20-34 age group, urban areas, richest wealth quintile, and working class had more tendency to use any contraceptive method as compared to their counterparts. Likewise, women with secondary education were more likely to use any contraception method.

Table 3 presents the results (ORs and associated 95% CIs) of the multivariable logistic regression analysis. In the model, women's age, education, women's working status, wealth index, urbanity, women's autonomy, and religion were simultaneously adjusted to examine the independent effect of each variable. We found that the richest women (OR = 2.9, 95% CI:2.2–3.7), in

Table 1: Socio-demographic characteristics and prevalence of contraception use among respondents

Sociodemographic Characteristics	NDHS 2008 (23,063)		NDHS 2013 (27,043)		NDHS 2018 (28,121)	
	Number	Percent	Number	Percent	Number	Percent
Women's age (years)						
15-19	1809	7.8	2204	8.1	1870	6.6
20-34	12572	54.5	14570	53.9	15236	54.2
35-49	8682	37.6	10269	38.0	11015	39.2
Women's educational level						
No education	11068	48.0	13407	49.5	12812	45.6
Primary	5004	21.7	5153	19.1	4401	15.7
Secondary	5358	23.2	6491	24.0	8185	29.1
Higher	1633	7.1	1992	7.4	2723	9.6
Women's current working status						
Not working	7480	32.7	8190	30.4	8389	29.8
Working	15430	67.4	18744	69.6	19732	70.2
Wealth index						
Poorest	5379	23.3	6409	23.6	5949	21.2
Poorer	4981	21.6	5911	21.9	6090	21.6
Middle	4198	18.2	4828	17.9	5355	19.0
Richer	4048	17.6	4785	17.7	5275	18.8
Richest	4457	19.3	5110	18.9	5452	19.4
Urbanity						
Urban	7183	31.1	9737	36.0	11323	40.3
Rural	15879	68.9	17306	64.0	16798	59.7
Religion						
Catholic	2089	9.1	2328	8.7	2517	9.0
Other Christian	7731	33.7	7591	28.2	8238	29.2
Islam	12711	55.5	16697	62.1	17216	61.2
Traditionalist	362	1.6	272	1.0	99	0.4
Other	31	0.1	8	0.0	51	0.2
Women's decision-making autonomy						
No	15596	67.8	18674	69.2	18934	67.3
Yes	7396	32.2	8317	30.8	9187	32.7

All percentages are weighted, so the absolute number of participants does not perfectly correspond to percentages in some categories. Due to missing cases in some categories, the frequencies do not correspond to the total frequencies given.

Table 2: Contraception prevalence and use according to sociodemographic characteristics of respondents

Sociodemographic Characteristics	NDHS 2008		NDHS 2013		NDHS 2018	
Contraception Prevalence	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No	19779	85.8	23080	85.3	23515	83.3
Yes	3284	14.2	3963	14.7	4606	16.7
Women's age (years)						
15-19	47	1.4	38	1.0	54	1.2
20-34	1771	53.9	1998	50.4	2375	51.6
35-49	1466	44.7	1927	48.6	2177	47.3
Women's educational level						
No education	389	11.9	352	8.9	648	14.1
Primary	849	25.9	1007	25.4	851	18.5
Secondary	1450	44.1	1869	47.2	2205	47.9
Higher	596	18.1	734	18.5	902	19.6
Women's current working status						
Not working	560	17.2	571	14.5	799	17.4

Working	2701	82.8	3370	85.5	3807	82.7
Wealth index						
Poorest	168	5.2	106	2.7	255	5.5
Poorer	254	7.7	289	7.3	462	10.0
Middle	463	14.1	630	15.9	765	16.6
Richer	834	25.4	1064	26.8	1322	28.7
Richest	1565	47.6	1874	47.3	1803	39.1
Urbanity						
Urban	1841	56.1	2570	64.8	2979	64.7
Rural	1443	43.9	1393	35.2	1627	35.3
Religion						
Catholic	446	13.6	648	16.4	656	14.3
Other Christian	1957	59.9	2282	57.8	2313	50.2
Islam	828	25.4	997	25.2	1627	35.3
Traditionalist	30	0.9	22	0.6	6	0.1
Other	7	0.2	0	0.0	3	0.1
Women's decision-making autonomy						
No	1646	49.7	1574	39.8	2138	46.4
Yes	1624	50.4	2382	60.2	2468	53.6

All percentages are weighted, so the absolute number of participants does not perfectly correspond to percentages in some categories. Due to missing cases in some categories, the frequencies do not correspond to the total frequencies given.

Table 3: Adjusted odd ratios (95 % confidence interval) of contraception use among respondents

Sociodemographic Characteristics	**NDHS 2008 (23,062)**	**NDHS 2013 (27,042)**	**NDHS 2018 (28,121)**
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Women's age (years)			
15-19	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
20-34	3.2 (2.2-4.7)	2.4 (1.7-3.4)	3.0 (2.2-4.1)
35-49	4.1 (2.8-6.1)	3.0 (2.0-4.2)	3.6 (2.6-5.0)
Women's educational level			
No education	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Primary	3.5 (2.8-4.3)	2.9 (2.4- 3.4)	2.7 (2.3-3.4)
Secondary	3.9 (3.1-4.9)	3.6 (3.0- 4.3)	3.2 (2.0-4.4)
Higher	3.8 (2.9-5.1)	4.0 (3.2- 5.1)	3.2 (2.0-4.5)
Women's current working status			
Not working	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Working	1.4 (1.2-1.6)	1.6 (1.4-1.8)	1.3 (1.2-1.5)
Wealth index			
Poorest	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Poorer	2.1 (1.5-3.0)	1.3 (1.0-1.7)	1.5 (1.2-1.9)
Middle	3.9 (2.7-5.6)	2.2 (1.7-2.9)	2.1 (1.7-2.7)
Richer	4.9 (3.4-7.1)	3.1 (2.3-4.1)	2.9 (2.3-3.8)
Richest	6.1 (4.1-9.1)	4.0 (3.0-5.5)	2.9 (2.2-3.7)
Urbanity			
Urban	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Rural	0.8 (0.8-1.0)	0.9 (0.7-1.0)	0.7 (0.6-0.8)
Religion			
Catholic	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Other Christian	0.8 (0.7-1.0)	1.0 (0.9-1.2)	1.0 (0.9-1.2)
Islam	0.4 (0.3-0.5)	0.6 (0.5-0.7)	0.6 (0.5-0.7)
Traditionalist	0.5 (0.3-1.2)	0.7 (0.4-1.2)	0.4 (0.2-1.2)
Other	0.6 (0.1-3.0)	n/a	0.2 (0.1-0.4)
Women's autonomy			
No	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Yes	1.6 (1.4-1.8)	1.4 (1.2-1.5)	1.4 (1.2-1.5)

Simultaneously adjusted for all variables.

Nigeria were three times more likely to use contraception than the poorest. The other independent factors associated with contraception use were higher education and old age. The highly educated women were over three times more likely to use contraception (OR=3.2, 95% CI: 2.0-4.5) than women with no education. Older Nigerian (women 35-49 years of age) were 3.6 more likely (OR=3.6, CI: 2.6-5.0) to use contraception methods than teenaged women. Women with decision-making autonomy were 1.4 times more likely to use contraception (OR=1.4, CI: 1.2-1.5) than women who reported no autonomy.

Discussion

This study used the most recent nationally representative data from the standard NDHS 2018 and reported the current status and determinants of the use of any contraception method among women in Nigeria. This study explored the low prevalence of contraception from 2008 to 2018. Our findings have revealed that overall, less than 18% of married women used any contraception method in Nigeria. However, the trend of contraceptive usage has increased from 14.2 % in 2008 to 16.7 % in 2018. The usage of any contraception method is considered an essential factor to reduce maternal mortality and improve maternal health. Evidence suggested a positive relationship between maternal health and contraception use in African countries[15]. Our study found that women's age, education, wealth index, urbanity, and women's autonomy were the independent determinants of contraception use in Nigeria. These findings are consistent with previous studies. Previous literature regarding the usage of any contraception method in developing countries reported several demographic and socioeconomic determinants of contraception use among women, such as knowledge and perception of sexually transmitted diseases, educational level, socioeconomic status, and women's empowerment[16-18]. Safe sexual behavior and sexual practices also have a profound impact on contraception use among women in developing countries[19].

Our study showed that the likelihood of using any contraception method has increased with increasing levels of the mother's education and wealth status. These findings are consistent with previous studies that explored the positive association between educational attainment and being rich with the uptake of contraception. Consistent with other studies in low- and middle-income countries, this study also suggested that women's autonomy is a significant factor in promoting family planning[18-21].

Although this study used an authentic, reliable, and standardized nationally representative demographic and health survey it has some limitations. First, this study was based on secondary data thus the choice of indicators is limited. Second, our analysis was restricted to married women. Third, there might be memory bias among the participants given this study used self reported data.

Conclusion

This study highlighted the low prevalence of contraception with wide disparities among certain socioeconomic determinants during the study period. Significant determinants of contraception use were found to be women's age, educational level, wealth status, and women's autonomy. This emphasized the need for education on the benefits, side effects, and efficacy of contraception use while addressing the barriers to contraception use for married Nigerian women. The findings of the study emphasized unmet family planning needs, that is a critical public health issue in developing countries. Therefore, addressing these unmet needs is vital for promoting reproductive health and family planning and collaborative public health efforts should be made through community participation on providing knowledge to change individuals behaviour regarding family planning and various contraceptive options. It is also imperative to address misunderstandings and cultural beliefs associated with contraception to increase acceptance and utilization of contraceptives among women in Nigera and other developing countries. Future research should focus the underlying reasons of the low prevalence of contraceptive usage. can inform targeted interventions. Researchers should work alongside the community to acquire a deeper understanding of the barriers to contraception use and how those barriers may be addressed or mitigated within the culture of Nigerian women.

References

1. World Health Organization. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.
2. Bankole A, Singh S, Hussain R and Oestreicher G. Condom use for preventing STI/HIV and unintended pregnancy among young men in Sub-Saharan Africa. American Journal of Men's Health. 2009 Mar;3(1):60-78.
3. World Health Organization. Maternal mortality: evidence brief. Geneva: World Health Organization, 2019.
4. Levandowski BA, Kalilani-Phiri L, Kachale F, Awah P, Kangaude G and Mhango C. Investigating social consequences of unwanted pregnancy and unsafe abortion in Malawi: the role of stigma.

International Journal of Gynecology & Obstetrics. 2012 Sep;118:S167-71.

5. Ziraba AK, Izugbara C, Levandowski BA, Gebreselassie H, Mutua M, Mohamed SF, Egesa C and Kimani-Murage EW. Unsafe abortion in Kenya: a cross-sectional study of abortion complication severity and associated factors. BMC pregnancy and childbirth. 2015 Dec;15(1):1-1.
6. Mitsunaga TM, Larsen UM and Okonofua FE. Risk factors for complications of induced abortions in Nigeria. Journal of Women's Health. 2005 Jul 1;14(6):515-28.
7. Otim J. Contraceptive nonuse among women in Uganda: a comparative assessment of predictors across regions. BMC Women's Health. 2020 Dec;20:1-4.
8. World Health Organization. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.
9. UN (United Nations). World population prospects 2019: highlights.
10. Ajayi AI and Akpan W. Determinants of condom use among parous women in North Central and South Western Nigeria: a cross-sectional survey. BMC research notes. 2018 Dec;11(1):1-6.
11. Labat A, Medina M, Elhassein M, Karim A, Jalloh MB, Dramaix M, Zhang WH, Alexander S and Dickson KE. Contraception determinants in youths of Sierra Leone are largely behavioral. Reproductive health. 2018 Dec;15:1-1.
12. Alabi O, Odimegwu CO, De-Wet N and Akinyemi JO. Does female autonomy affect contraceptive use among women in northern Nigeria?. African Journal of Reproductive Health. 2019 Oct 7;23(2):92-100.
13. Aransiola JO, Akinyemi AI and Fatusi AO. Women's perceptions and reflections of male partners and couple dynamics in family planning adoption in selected urban slums in Nigeria: a qualitative exploration. BMC Public Health. 2014 Dec;14:1-4.
14. Renfro KJ, Haderxhanaj L, Coor A, Eastman-Mueller H, Oswalt S, Kachur R, Habel MA, Becasen JS and Dittus PJ. Sexual-risk and STI-testing behaviors of a national sample of non-students, two-year, and four-year college students. Journal of American College Health. 2022 Mar 8;70(2):544-51.
15. Tessema GA, Mekonnen TT, Mengesha ZB and Tumlinson K. Association between skilled maternal healthcare and postpartum contraceptive use in Ethiopia. BMC pregnancy and childbirth. 2018 Dec;18:1-3.
16. Bang KS, Chae SM, Lee I, Yu J and Kim J. Effects of a community outreach program for maternal health and family planning in Tigray, Ethiopia. Asian nursing research. 2018 Sep 1;12(3):223-30.
17. Aduloju-Ajijola NM, Idogho O, Yusuf F, Muhammed F and Anyanti J. Examining the Determinants of Contraceptive Use in Northern Nigeria.
18. Solanke BL, Adetutu OM, Sunmola KA, Opadere AA, Adeyemi NK and Soladoye DA. Multi-level predictors of sexual autonomy among married women in Nigeria. BMC Women's Health. 2022 Apr 12;22(1):114.
19. Mare KU, Aychiluhm SB, Tadesse AW and Abdu M. Married women's decision-making autonomy on contraceptive use and its associated factors in Ethiopia: A multilevel analysis of 2016 demographic and health survey. SAGE Open Medicine. 2022 Jan;10:20503121211068719.
20. Adokiya MN, Boah M and Adampah T. Women's autonomy and modern contraceptive use in Ghana: a secondary analysis of data from the 2014 Ghana Demographic and Health Survey. The European Journal of Contraception & Reproductive Health Care. 2021 Sep 3;26(5):383-9.
21. Mare KU, Aychiluhm SB, Tadesse AW and Abdu M. Married women's decision-making autonomy on contraceptive use and its associated factors in Ethiopia: A multilevel analysis of 2016 demographic and health survey. SAGE Open Medicine. 2022 Jan;10:20503121211068719.