

**INTERNATIONAL JOURNAL OF SCIENCE FOR GLOBAL SUSTAINABILITY****Malaria Knowledge, Attitude, Perception and Practices in Gusau Metropolis, Zamfara State (A Preliminary Report II)**

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ABSTRACT

Malaria knowledge, attitude, perception and practices (KAPP) of patients who attended the Microbiology Laboratories of Ahmad Yariman Bakura Specialist Hospital and Federal Medical Centre of Gusau, Zamfara State, Nigeria, between January to December, 2017 was studied. One thousand, one hundred and one (1101) participants (consisted of 428(38.87%) females and 673(61.13%) males) participated and a structured questionnaire was used. The knowledge of the participants about malaria parasites, mosquito vector, signs, symptoms, diagnosis, treatment, prevention and control was remarkable. Majority 796(72.3%) had positive attitude towards malaria infection and in seeking treatment. The perception on malaria (in relation to causes, symptoms, vector, diagnosis and treatment) of the respondents was impressive and this was however guided the positive attitude. The practices of the respondents on malaria diagnosis, treatment, control and prevention varies from individual to individual with majority 655(59.49%) using doctor's prescription, 601(54.49%) using the artemisinin-based combination therapy (ACT). Both adults and children slept under mosquito net with majority 745(67.67%) using insecticide residual sprays both indoor and outdoor.

Keywords: malaria, knowledge, attitude, perception, practices metropolis

1.0 INTRODUCTION

Malaria infection continues to be a major health in Nigeria and North Western parts of Nigeria including Zamfara State. The World malaria report 2019 highlights the burden of malaria among two most-at risk groups- pregnant women and children in Africa. In 2018, 11 million pregnant women in sub-Saharan Africa were infected by malaria, and children under 5 years accounted for 67% of all malaria deaths. In 2019, an estimated 228 million cases occurred worldwide and 405 000 deaths were reported (WHO, 2020) (Rupashree *et al.*, 2014) Malaria has a lot of consequences on the population. It has a negative impact in many sectors such as education (Leighton and Foster, 1993, Bashirat, 2018), agriculture (Aheisibwe, 2008, Rupashree *et al.*, 2014), and lots of

businesses (Leighton and Foster, 1993). Roll Back Malaria (RBM) consortium reported that malaria has negative effect on enterprise. Malaria negatively impacts enterprises. It causes a decrease in productivity and investments due to both increased employee absenteeism and health care expenditures (FMH, 2004).

It is ten years after the first Abuja declaration, Nigeria have failed to halve the malaria burden in 2010, and could not meet up the Millennium Development Goals' (MDG) deadline and yet could not halt or reverse incidence of malaria in 2015 (Rupashree *et al.*, 2014). The failure to consider community's knowledge, attitude, and practice (KAP) about malaria has contributed to the inability of programs to achieve sustainable control

(Rupashree *et al.*, 2014) People's behavior may increase malaria risk, but to change such behavior is not easy. Indeed, there are many reasons why particular behaviors exist and they often are tied to considerable benefits in areas quite distinct from health. Thus, it is not usually the case that “these people don't know any better”, but rather that their native logic and rationality make sense within the realities and limitations of their local circumstances (WHO, 2020).

Families are the primary context within which most health problems and illnesses occur and have a powerful influence on health. Most health belief and behavior are developed and maintained within the family (FMH, 2011). Community perceptions, beliefs, and attitudes about malaria causation, symptom identification, treatment of malaria, and prevention influence efforts to address malaria and are often overlooked in control efforts and it vary from community to community and among individual households (Rupashree *et al.*, 2014). Considering these issues, it can be an important step towards developing strategies aimed at controlling the malaria (FMH, 2011). Understanding who already knows about malaria and malaria prevention, who has adopted malaria prevention and mosquito avoidance practices, and who is at risk of malaria infection is a necessary precursor to identifying and targeting vulnerable populations and ensuring successful implementation and sustainability of malaria control efforts (NMOP, 2014).

There is paucity of data on KAP studies on malaria in northwestern Nigeria. Studies on KAP (Rupashree *et al.*, 2014, FMH, 2004) have demonstrated that, direct interaction with community plays an important role in circumventing malaria spread. Healthcare provider like family physician can focus both on traditional physician-patient model and complement it with population based medicine for primary prevention of malaria as domiciliary care and primary prevention are defining characteristics of family medicine. So, in order to create a synergy between primary care physician and community efforts and governmental/nongovernmental organized malaria control interventions in north Nigeria in particular, there is an urgent need to determine the people's

knowledge, attitude, and practice of malaria and its control.

This study is in sequel to an earlier report (Abdullahi *et al.*, 2009). There were similar malaria researches in Zamfara State (Moyi *et al.* 2013, Garba *et al.*, 2014, Usman *et al.*, 2018, Abdulkadir *et al.*, 2015, Maigemu & Hassan, 2015 and Maigemu, 2015) but none these studies is as detailed as this study. The study looked at the knowledge, attitude, perception and practices of the population of Gusau metropolis on malaria and malaria control. The baseline data on obtained is important in the planning and implementation of malaria control, treatment prevention programmes by the medical personnel, health ministry at the state or federal level.

2.0 MATERIALS AND METHODS

2.1 Study Area

The study area was Gusau metropolis (or township), which is the capital city of Zamfara State and Headquarters of Gusau Local Government Area Council. Gusau is a city and Local Government Area located in northwestern Nigeria. It is the capital of State. The LGA has an area of 3,364 km² and a population of 383,162 at the 2006 census (NPC, 2006). The rainfall starts as early as March and can extend into October. Farming is the major preoccupation greater majority of the population.

2.2 Sample Size

The sample size had been determined in an earlier study of Abdullahi *et al.*, 2020, Cochran, (1999) to be 384 and also according to and Abdullahi *et al.* (2009), using the formula: $n = (z^2pq)/d^2$ where n =minimum sample size, z =standard normal deviation and probability i.e.0.05 at 95% confidence limits, p = prevalence or proportion of value to be estimated from Previous studies, $q=1-p$, and d =tolerance limit, the minimum is 0.05.

2.3 Study Design

This was a cross sectional study of patients, who are adults or healthcare givers of underage sick children, attending the laboratories of Federal Medical Centre, Ahmad Yariman Bakura Specialist Hospital, King Fahd Hospital and Farida Hospital all within Gusau metropolis. The research was conducted between January to December, 2017.

2.4 Study Population and Eligibility Criteria

Participants were drawn from within Gusau metropolis, were informed on the purpose of the study and their permission to participate were sought. Those from outside Gusau metropolis were excluded.

A structured questionnaire was randomly administered to patients those who can read and write and those who cannot were assisted by research assistants. Privacy and confidentiality were maintained throughout the study.

2.5 Data Analysis

Data collected was recorded into Microsoft Excel® - Worksheet was used for data input and Epi Info® version was used for data analysis. Descriptive statistics were carried out to measure relative frequencies, percentages, averages, and relative

frequencies of the variables. All data collected were carefully documented and checked to ensure correctness of entries, were represented in percentages and later carefully entered into an SPSS (statistical package for social sciences) SPSS software version 13.0 (SPSS Inc. Illinois, USA, 2004) for further analysis.

3.0 RESULTS

3.1 Socio-Demographic Characteristics of Participants

The socio demographic characteristics of participants is presented in table 1 showed that one thousand one hundred of one (1,101) participated in the research, out of which 428(%) were female, 673(%) were males and age ranges from 18 to 50+ years. Hausa/Fulani ethnic group and those married were 595 (%) and 624 (%) respectively.

Table 1: Socio-demographic characteristics of participants.

<i>Number of participant, N = 1101</i>			
Characteristics	Categories	N (%)	p value
Gender	Female	428 (38.87)	0.051 ^a
	Male	673 (61.13)	
Age (years)	18 – 35	331 (30.06)	0.057 ^b
	36 – 50	465 (42.23)	
	50 +	305 (27.7)	
Ethnic group	Hausa/Fulani	595 (54.04)	0.012 ^a
	Yoruba	211 (19.16)	
	Igbo	197 (17.89)	
	Others	98 (8.9)	
Marital status	Single	207 (18.8)	0.031 ^a
	Married	624 (56.68)	
	Divorced	167 (15.17)	
	Widow/widower	103 (9.36)	
Educational status	Primary	187 (16.98)	0.055 ^b
	Secondary	298 (27.07)	
	Tertiary	397 (36.06)	
	Non-formal	117 (10.63)	
	Others	102 (9.26)	
Occupation	Civil/Public servant	405 (36.78)	0.023 ^a
	Business/Trading	285 (25.89)	
	Self-employed	255 (23.16)	
	Non-employed	156 (14.17)	

The superscript a indications significance difference $p < 0.05$

3.2 Knowledge on Malaria and Malaria Infection

The results of participants on their knowledge of malaria and malaria infection in presented in table 2

Table 2: Knowledge about malaria infection

Variable	N = 1101	Frequency(percentage)
<i>Malaria infection</i>		
	On the causes:	
	(Parasite) <i>Plasmodium</i>	478 (43.41)
	Other germs (other microbes)	731 (66.39)
	Dirty environment	561 (50.95)
	Other causes	207 (18.80)
<i>Mosquito vector</i>		
	Female <i>Anopheles</i>	921 (83.65)
	Breeding in water	946 (85.92)
<i>Signs and symptoms</i>		
	Headache/fever/shivering	1101 (100.0)
	Vomiting	415 (37.69)
	Joint pains/weakness	935 (84.92)
	Loss of appetite	998 (90.64)
	Other	97 (8.81)
<i>Diagnosis</i>		
	RDT	223 (20.25)
	Blood smear	568 (51.59)
<i>Medication</i>		
	ACT	478 (43.42)
	Pyrimethamine-sulfadoxine(fansidar)	325 (29.52)
	Pain reliever (paracetamol)	1000 (90.83)
	Others	11 (1.0)
<i>Prevention</i>		
	Prophylaxis	112 (10.17)
	Nets	753 (68.39)
	Door & window screen	567 (51.5)
	Cleaning environment	487 (44.23)
	Clearing of drainages	159 (14.44)
	Others	26 (2.36)
<i>Season of malaria infection</i>		
	Dry season	423 (38.42)
	Rainy season	819 (74.38)
	All year round	505 (45.87)

3.3 Attitude

The attitude of an individual is defined as a settled way of thinking or feeling about something, the way a respondent feels or think about something can classified a positive or negative. The attitude of the respondents in this study is presented in Table 3.

Table 3: Attitude of participant towards malaria infection

Variable	N = 1101	Frequency(percentage)
<i>Positive attitude</i>	Seek medical attention	796 (72.3)
	Do malaria diagnosis	689 (62.58)
<i>Negative attitude</i>	Self-treatment	378 (34.33)
	Others	29 (2.63)

3.4 Perception

The perception of an individual is defined as the way in which something is regarded, understood, or interpreted. The understanding of causes malaria, symptoms, prevention/control measures and dangers of malaria is presented in table 4.

Table 4: Perception

Malaria perception on:	N =1101	Frequency(percentage)
The causes of malaria		1100 (99.9)
The symptoms of malaria		1097 (99.6)
The role of female <i>Anopheles</i> mosquito		875 (79.55)
Importance of diagnosis		733 (66.58)
Importance of seeking medical advise		789 (71.66)
<i>Prevention and control measures;</i>		
Use of antimalarial		987 (89.64)
Use of mosquito nets		576 (53.32)
Use of prophylaxis		97 (8.81)
Others		8 (0.73)
<i>On the dangers of malaria infection;</i>		
On underage children		993 (90.19)
On pregnant women		889 (80.74)
On elderly people		912 (82.83)

3.5 Practices Against Malaria and Malaria Infection

To apply or use of an idea, belief, or method and what the respondents practice in respect of malaria and malaria infection in represented in table 5.

Table 5: Practices against malaria and malaria infection

Variable	N = 1101	Frequency(percentage)
<i>Malaria Diagnosis</i>		
Undertake laboratory diagnosis before treatment		681 (61.85)
<i>Malaria Treatment</i>		
Self-treatment of malaria		325 (29.52)
Use doctor's prescription		655 (59.49)
Purchase drugs from pharmacy		511 (46.41)
Prefer anti-malaria tablets		433 (39.33)
Prefer anti-malaria injection		497 (51.14)
Do you use ACT treatment		601 (54.59)
Use other local treatment		132 (11.99)
Use pain reliever (paracetamol)		1097 (99.64)
Use prophylaxis prevention		22 (2.0)
<i>Vector control</i>		
Use of mosquito repellent		41 (3.27)
Use of mosquito net		653 (59.31)
Use of insecticide treated mosquito net		561 (50.95)
<i>Malaria prevention</i>		
Children sleep under mosquito net		411(37.33)

Adult sleep under mosquito net	389 (35.33)
Both Adult & Children sleep under net	400 (36.33)
Screening of windows & doors	599 (54.4)
Use insecticide indoor spray	745 (67.67)
Outdoor residual spray	23 (2.09)
Use of mosquito coil	351 (31.880)
Cleaning of surroundings	427 (38.78)
Draining of stagnant water	256 (23.25)
Use proper clothing preventing mosquito bite	67 (6.09)
Use of smoke from leaves	13 (1.19)

4.0 DISCUSSION

This study observed malaria KAPP and control in selected participants attending health facilities mentioned earlier in the Gusau metropolis. Majority of the respondents had at least tertiary education and earned a living doing one occupation or the other.

Most participants in this study had a very good knowledge of malaria infection, mosquito vector, malaria signs/symptoms, diagnosis, medication, control and prevention. Other researches had similar findings [Rupashree *et al.*, 2014, Abdullahi *et al.*, 2009, & NMIS, 2010] but others differ slightly [Humphrey *et al.*, 2010, Fatungase, 2013].

Majority of the respondents 769(72.3%) had positive attitude in seeking medical attention before commencement of any treatment of malaria or related illnesses, which is consistent with Rupashree, 2014. This because Gusau metropolis is cosmopolitan with highly education residents.

The perception of an individual towards any illness determines how s/he would react. The overall perception of respondents in this study on malaria causes, symptoms, role of female *Anopheles* mosquitoes, diagnosis and seeking medical advice was excellent. Similar, the perception on the prevention and control measures and dangers of malaria was highest. Other reports [Humphrey *et al.*, 2010, Fatungase *et al.*, 2013, Fatungase *et al.*, 2012] reported similar findings but other reports [Rupashree *et al.*, 2014, Okwa *et al.*, 2012, Abate *et al.*, 2013] had slightly much lower than what was observed in this study.

Having observed symptoms related to malaria, 681(61.85) of the respondents ensure they did malaria laboratory diagnosis before

commencement of any medication, 655(59.49%) use prescription from a doctor, 601(54.59%) use ACT and the use of pain reliever was quite common 1097(99.64%), this was consistent with Rupashree *et al.*, 2014]. The use of malaria prophylaxis was however restricted to pregnant women 22(2.0%) only who attended antenatal clinics.

The participants who preferred malaria injections 497(51.14%) were greater than those that preferred tablets 433(39.33%) similar to Rupashree and others [Rupashree *et al.*, 2014, NMIS, 2012, Kroeger *et al.*, 1996]. A small minority 132(11.99%) use local treatment available in the markets.

Malaria control and prevention measures practiced by the respondents can be described as excellent as 653(59.31%) use mosquito nets and 561(50.95%) use insecticide treated nets (ITNs). More than half of participants 599(54.4%) have nets on their door and windows at home and 745(67.67%) use insecticide spray indoors as earlier reported [Rupashree *et al.*, 2015, Humphrey *et al.*, 2010, Okwa *et al.*, 2012] The outdoor residual spraying of insecticide by individuals, community or local authorities was not widely practiced 22(2.09%) but environmental cleaning/clearing of the surroundings was commonly done 427(38.78%), cleaning surrounding and clearing of drainages 256(23.25%), which was consistent with other findings [Rupashree *et al.*, 2014].

Some participants use mosquito coil 351(31.88%) and some negligible number 256(23.78%) wear proper clothing to prevent mosquito bites, while others 67(1.19%) sometimes use smoke from dry leave to drive away mosquitoes (Rupashree *et al.*, 2014, Fatungase *et al.*, 2012, Abate *et al.*, 2013).

5.0 CONCLUSION

The level of knowledge about malaria and infection in Gusau metropolis is high and the perception and practices by the population studied is consistent with their understanding of the infection. This level of awareness and a positive attitude towards malaria infection is a direct reflection of the knowledge the respondents have malaria and other illnesses (Garba *et al.*, 2014, Fatungase, 2013), which is as a result of easy access to media and also health education [Rupashree *et al.*, 2014, FMOH, 2004, FMOH, 2011].

6.0 RECOMMENDATION

KAPP, which is knowledge, attitude, perception and practice on malaria and malaria infection in Gusau metropolis is high being an urban centre, which can have a positive impact on the control and prevention of the population. Health Education on the use ITNs, diagnosis and proper use of antimalarial drugs (ACTs), could be encouraged using the mass media and hospital health care workers. Outdoor spraying of insecticide is recommended and along with cleaning and clearing of surroundings and drainages.

Competing Interests

The authors hereby declare that they have no competing interests.

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REFERENCES

Abate, A., Degarege, A., Erko, B. Community knowledge, attitude and practice about malaria in a low endemic setting of Shewa Robit Town, northeastern Ethiopia. *BMC Public Health*. 2013; 13:312. [PMC free article] [PubMed] [Google Scholar]
 Abdulkadir, Isa; Rufai, Hafsa; Ochapa; Sunday; Malam, Mado; Garba, Bilkisu; Oloko, Adebayo and George, Idemudia Malaria rapid diagnostic

test in children: The Zamfara, Nigeria experience. *Nigerian Medical Journal of Medical Association*, Vol- 56 DOI - 10.4103/0300-1652.169744 (2016/01/13) [Accessed 11. 01. 2021].

Abdullahi, K., S.A.Shinkafi, , B.I. Aguh, L.S. Bilbis , A. Danladi, B.A. Mohammad ,M.A. Mafara, A. Mohammad and B. Ibrahim. Malaria Prevalence in Gusau Township, Nigeria (A Preliminary Report). *International Journal of Science for Global Sustainability, IJS GS FUGUSAU Vol. 6(1) March 2020.* <https://journals.fugusau.edu.ng/index.php/ijsgs/issue/view/1> [Accessed 13. 01. 2021].

Abdullahi, K., Abubakar, U., Adamu, T., Daneji, A.I., Aliyu, R. Jiya, N., Ibraheem, M.T.O. and Nata'ala, S.U. Malaria in Sokoto, North Western Nigeria. *African Journal of Biotechnology Vol. 8 (24), pp.7101-7105, 15 December, 2009.* Available online at <http://www.academicjournals.org/AJB> ISSN 1684-5315©2009 Academic Journals.

Aheisibwe, A. *The Effect of Malaria on Agricultural Production in Uganda*, Makerere University, 2008.

Bashirat MA, "Malaria incidence and crop productivity among farming households in Kabba/Bunnu," *Journal of Agricultural Faculty of Gaziosmanpasa University*, vol. 35, no. 2018-2, pp. 127-133, 2018.

Cochran, W. G. (1999). *Sampling Techniques*, 3rd Ed. John Wiley & Sons, London, pp.72-82.

Fatungase, K. O., Amoran, O. E., Fatungase, O. K. The impact of health education intervention on perception and treatment seeking behaviour about childhood infections among caregivers in rural communities in western. Nigeria. *Br J Med Res*. 2013; 3:1331-43. [Google Scholar]

Fatungase, K. O., Amoran, O.E., Alausa, K.O. The effect of health education intervention on the home management of malaria among the caregivers of children aged under 5 years in Ogun State, Nigeria. *Eur J Med Res*. 2012; 17:11. [PMC free article] [PubMed] [Google Scholar]

Federal Ministry of Health (FMOH). *Nigeria malaria fact sheet*. December 2011. [Last Accessed on 11.01 2021]. Available from: <http://nigeria.usembassy.gov>.

Federal Ministry of Health (FMOH), *Malaria control in Nigeria. A strategy for behavior change*

- communication. 2004-2005. 2004. [Last accessed on 01.01. 2021]. Available from: <http://www.jhpiego.org/files>.
- Garba, Bilkisu Ilah, Muhammad, A., S., Edem, B. E., Adeniji, A. O., Aghadueki, S., Kolawole, T. and Adelakun, M. B. Prevalence and pattern of severe malaria seen in children at a specialist hospital in Gusau, Nigeria. *International Journal of Biomedical Research*. Vol. 5 ,No. 5 (2014): May.
DOI: <https://doi.org/10.7439/ijbr.v5i5.634>. [Accessed 12.01. 2021].
- Humphrey D. Mazigo, Emmanuel Obasy, Wilhellmus Mauka, Paulina Manyiri, Maria Zinga, Eliningaya J. Kweka, Ladslaus L. Mnyone and Jorg Heukelbach. Knowledge, Attitudes, and Practices about Malaria and Its Control in Rural Northwest Tanzania. SAGE-Hindawi Access to Research Malaria Research and Treatment Volume 2010, Article ID 794261, 9 pages. doi:10.4061/2010/794261
- Kroeger, A. R. Meyer, M. Mancheno, and M. Gonzalez, "Health education for community-based malaria control: an intervention study in Ecuador, Colombia and Nicaragua," *Tropical Medicine and International Health*, vol. 1, no. 6, pp. 836–846, 1996.
- Leighton, C and R. Foster, "Economic impacts of malaria in Kenya and Nigeria," in Research Paper 6, Health Financing and Sustainability Project, pp. 1–98, Health Financing and Sustainability (HFS) Project. Abt Associates Inc., Prime Contractor, 1993, <http://pdfs.semanticscholar.org/d8fe/a95b227c935f1b15209596aed6021871a2ba.pdf>.
- Maigemu, Ahmad Yahaya and Kalthum BT Haji Hassan. Influence of Household Behaviour on Malaria Control in Zamfara State North West Nigeria: A Pilot Study for Instruments Validation. *Mediterranean Journal of Social Sciences* MCSER Publishing, Rome-Italy Vol 6 No 3 S2 May 2015. https://www.researchgate.net/publication/277899879_Influence_of_Household_Behaviour_on_Malaria_Control_in_Zamfara_State_North_West_Nigeria_A_Pilot_Study_for_Instruments_Validation [Accessed 11. 01. 2021].
- Maigemu, Ahmad Yahaya, 2015. "The Role of Poverty and Household Economic Conditions to the Treatment of Malaria in Zamfara State North West Nigeria," *Journal of Social and Development Sciences*, AMH International, Vol. 6(2), pages 30-36. DOI: 10.22610/jsds.v6i2.839.g839. <https://ideas.repec.org/a/rnd/arjsds/v6y2015i2p30-36.html> [Accessed 11.01. 2021].
- Moyi, SI, MDA Bunza, U Abubakar, MU Ladan, M Lawal, S Wadatau (2013). Community Perception on the Cause of Malaria and Childhood Convulsion Associated with Malaria in Selected Local Government Areas of Zamfara State, Nigeria. *Nigerian Journal of Parasitology*, Vol. 34 No. 2. <https://www.ajol.info/index.php/njpar/article/view/110630> [Accessed 01.10. 2021].
- National Population Commission: Population Census, 2006.
- Nigeria, Malaria Indicator Survey (MIS) 2010. Final Report, 2012. [Last accessed on 01. 01.2021]: <http://www.microdata.worldbank.org>.
- Nigeria Malaria Operation Plan (NMOP), 2014. USAID President Malaria Initiative. [Accessed on 01. 01. 2021]: <http://www.pmi.gov/docs/default-source>.
- Okwa, O. O., Soremekun, B. M., Adeseko, O., Raheem, A. M. Artisans and traders' knowledge, attitude and practices of malaria in selected areas of Lagos, Nigeria. *Glo Adv Res J Med Sci*. 2012; 1:68–74. [Google Scholar].
- Rabi Usman, Ahmad A. Umar, Saheed Gidado, Abdulrazaq A. Gobir, Izuchukwu F. Obi, Ike Oluwapo Ajayi, Olufemi Ajumobi. Predictors of malaria Rapid Diagnostic Tests' utilisation among healthcare workers in Zamfara State. *PLOS ONE*, December 14, 2018: <https://doi.org/10.1371/journal.pone.0200856> [Accessed 11.01.2021].
- Rupashree Singh, Jamila Musa, Sanjay Singh and Ukatu Victoria Ebere Knowledge, Attitude and Practices on Malaria among the Rural Communities in Aliero, Northern Nigeria. *J Family Med Prim Care*. 2014 Jan-Mar; 3(1): 39–44. Doi: 10.4103/2249-4863.130271. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4005199/>. [Accessed 1st January, 2021].
- WHO Malaria Report, 2020: <https://www.who.int/publications/i/item/9789240015791> [Accessed 11. 01. 2021].