

Original Article

Preparedness to Care for Children with Asthma: How Ready Are Schools in Ilorin, Nigeria?

*Ibraheem RM¹, Hamzah AH², Ameen HA³, Katibi OS¹, Abdulkadir MB¹

¹ Department of Paediatrics & Child Health, University of Ilorin and University of Ilorin Teaching Hospital, Kwara State, Nigeria.

² Department of Paediatrics, Sobi Specialist Hospital, Ilorin, Kwara State, Nigeria.

³ Department of Epidemiology & Community Health, University of Ilorin & University of Ilorin Teaching Hospital, Kwara State, Nigeria.

Article History

Submitted: 18/07/2024; Accepted: 01/09/2024; Published: 17/09/2024

*Correspondence: Dr R.M. Ibraheem

Email: ibraheem.rm@unilorin.edu.ng

ABSTRACT

Asthma is a rife chronic condition among school-aged children, necessitating the need for schools to be well-prepared to provide appropriate care and support for affected students. This study assessed the readiness of schools in Ilorin, Nigeria, in caring for children with asthma. Sixty-five primary and secondary schools were surveyed in Ilorin, Nigeria, using a pre-tested questionnaire and inspection tour to evaluate healthcare personnel, facilities, and environmental conditions related to asthma care in schools. Forty-four (67.7%) of the schools were public-owned and 21 (32.3%) schools private-owned. Health personnel were present in 61.5% of schools, with 70% being health assistants/first aiders. Only 34.2% of schools with healthcare facilities had a sick bay. Seventeen schools (26.2%) had records to identify the current number of children with asthma. Salbutamol (tablets or inhalers) was the most common rescue equipment. Only 43 (66.1%) schools could state where the inhaler was kept. None of the schools had an asthma management plan on file for the children with asthma. Twenty (30.8%) schools were less than 200m from major traffic, and 45 (69.2%) were >200m. Health appraisal methods included routine inspections (47.7%) and hospital referrals (29.2%). Overall, there were disparities in healthcare resources and asthma care practices among the schools studied. Addressing gaps in emergency care, equipment availability, and staff training can significantly improve the management of asthma in school settings in the study area.

Keywords: Asthma care, Health appraisal, Nigeria, Schools, School preparedness,

INTRODUCTION

Asthma is a chronic inflammatory airway disease, often associated with widespread but variable airflow obstruction, with manifestations of recurrent or episodic cough, chest pain, and wheezing.¹ Children with asthma reportedly have higher emergency department visits, hospitalizations, and outpatient visits than school-aged children without asthma.² The missed school days in children with asthma increase when the

symptoms are uncontrolled.³ As a disease with no cure, the key to its management is to ensure symptom control. Some key aspect of asthma symptom control involves using appropriate medications and environmental manipulation to reduce or eliminate triggers of symptoms.

The child with asthma spends an average of six to eight hours per weekday in school during the school session, like his peers without asthma. Therefore to optimize the management of children with asthma,

Article Access



Website: www.wjmbbs.org

 10.5281/zenodo.14741234

How to cite this article

*Ibraheem RM, Hamzah AH, Ameen HA, Katibi OS, Abdulkadir MB. Preparedness to Care for Children with Asthma: How Ready Are Schools in Ilorin, Nigeria?. *West J Med & Biomed Sci.* 2024;5(3):148-156. DOI:10.5281/zenodo.14741234.

the school environment needs to be asthma-friendly such that there is access to medications for use when needed, and the triggers of the symptoms in the environment are minimized or abolished. An asthma-friendly school will ensure improvement in school attendance, health status, and quality of life of children with asthma.

School health policies provide the framework for a safe and supportive environment for students with asthma. Studies have reported an equal percentage of attendance among students with or without asthma when those with asthma receive school-based asthma services as part of their overall care.^{4,5} Ensuring members of the school staff can identify the symptoms, and action to take for emergency care is important. An earlier study of asthma-related fatalities in schools had identified a third of the fatal cases in Chicago schools occurred while waiting for medical assistance.⁶ Asthma-friendly schools are defined as those that have taken steps to create safe and supportive learning environments for students with asthma.⁵ These steps include ensuring a smoke-free environment during school activities with a written medication policy that allows prompt access to drugs, and a school-wide emergency plan for handling asthma exacerbations.⁷ Other steps include staff development for all school personnel on school medication policies, emergency procedures, and procedures for communicating health concerns about students.⁷ Studies in the United States of America (USA) have identified suboptimal students' carriage of the needed medications as well as the inadequacy of management plans.^{8,9} The unavailability of equipment to facilitate medication administration or monitor respiratory functioning has also been identified as a hindrance to asthma management in schools.⁸

In Nigeria, a National School Health Policy was introduced in 2006 to improve the state of the School Health Programme.¹⁰ The School Health Programme (SHP) consists of a series of projects/activities in the school environment for the promotion of the health and development of the school community.^{10,11} It includes all aspects of the school programme that contribute to the understanding, maintenance and improvement of the health of the school

community.¹¹ The SHP embodies a school that is constantly strengthening its capacity as a healthy setting for living, learning and working thereby ensuring a state of good health for all members of the school community.¹¹ It consists of three domains namely School Health Services (SHS), School Health Instruction (SHI) and Healthful School Environment (HSE).¹¹ Presently in Nigeria, a specific health policy on the care of children with asthma in schools is nonexistent; however, the three domains of the SHP encompass the care of children with asthma, if correctly deployed. Thus, the current study aimed to identify available SHS for asthma care in primary and secondary schools in Ilorin, Nigeria.

MATERIALS AND METHODS

This was a descriptive, cross-sectional study conducted in Ilorin, the capital of Kwara State. Ilorin is located in the North Central geographical zone of Nigeria, with coordinates 8°30'N 4°33'E. Ilorin metropolis has three Local Government Areas (LGA), namely Ilorin-South, Ilorin-East and Ilorin-West. The indigenous tribes are mainly Yoruba and Fulani, although people from other tribes of Nigeria also reside in the metropolis. The occupations of the residents in Ilorin include civil service, commercial driving, farming, trading, artisans, organized private sector and weaving of traditional attires. As of 2019, Ilorin had 189 public primary schools and 523 registered private primary schools; with 109,492 pupils registered in these schools. There were 63 public and 82 private registered secondary schools with 42,195 students. There were 10,240 and 6,451 qualified teachers in the public and private schools in Ilorin respectively, with a total of 16,691 qualified teachers.

In determining the minimum sample size, the confidence interval was set at 90% with a margin of error of 10%. The proportion of schools performing medical inspection was 51%,¹² with a finite population size of all the schools, 857. Thus, a minimum sample size of 64 was calculated.

A pre-tested, self-administered questionnaire was completed by the principal or head teacher to capture their age, sex, highest educational qualifications and

number of years in teaching service. Responses on the type, location and ownership of the school as well as its duration of existence were sought and recorded. Existing records on the presence of children with asthma in the school and their number were checked and recorded. Availability of nebulizers, spacers and other materials needed for relief of asthma symptoms, as well as the accessibility of their reliever inhalers by children with asthma during school hours, were also sought.

An inspection tour of the school was undertaken to see the available facilities and the environmental condition of the school. The location and general environment of the school: nearness to major road(s), the classrooms, toilets, sources of water and sewage disposal systems were inspected.

Ethical approval was sought and obtained from the Ethical Review Committee of the University of Ilorin Teaching Hospital (ERC_PAN/2019/07/1917). The permission and approval of the Kwara State Ministry of Education, principals and head teachers of the participating schools were also obtained.

The data analysis was conducted using the Statistical Product and Service Solution (SPSS) software version 23. Tables and charts were used for descriptive statistics. Categorical variables such as school location and ownership, and the highest educational qualifications of the teachers were presented using proportions and percentages.

RESULTS

General characteristics and available healthcare services in schools

A total of sixty-five schools were recruited for this study; 24 (36.9%) primary and 41 (63.1%) secondary schools. Forty-four (67.7%) were public schools while 21 (32.3%) were private schools. Fifty-seven (87.7%) schools were located in an urban region. Table 1 shows the available healthcare personnel, facility for healthcare and method of health appraisal in the schools. Forty (61.5%) schools had healthcare personnel, and a majority (70.0%) of the healthcare personnel were health assistants/trained first aiders. Out of the 38 schools with healthcare facilities, only 13 (34.2%) had a sick

bay.

Record keeping and asthma care availability in schools

Overall, 36 (55.4%) schools got information about a child's asthma via notification by the parent while 15 (23.1%) schools got it through the child's medical record. Eight (12.3%) schools had seen a doctor's prescription for a child with asthma, and one (1.5%) got the information via sick bay visits. Only five (7.7%) schools obtained children's asthma information via multiple means.

Asthma records were available in 28 (43.1%) schools, of which only 8 (28.6%) schools had cumulative records. The bar chart (Figure 1) shows the number of schools and the proportion of asthmatic children identifiable in the school. Seventeen schools (26.2%) had records to identify the number of children with asthma, while the remaining 48 (73.8%) schools had no records to identify children with asthma.

Table 2 shows the availability of asthma care in the schools. Twenty-three (35.4%) schools had neither asthma assessment nor rescue equipment. Salbutamol tablet or inhaler was the predominant rescue equipment, accounting for 36.9% of rescue equipment/drugs. 11 (14.7%) schools would administer an inhaler to a student with trouble breathing. Only 43 (66.1%) schools could state where the inhaler was kept, the other 22 (33.9%) schools' response was 'I do not know'. Students were encouraged to keep their inhalers with the teacher (16 schools, 24.6%), bags (14 schools, 21.5%) or at the sick bay in 13 (20.0%) schools. None of the schools had an asthma management plan on file for the children with asthma.

For the care of emergency illnesses and injuries in the schools, the majority 63 (96.9%) schools gave first aid treatment to students in emergency cases, then notified the parents (49 schools, 75.4%). Only 5 (7.7%) schools indicated conveying home or to the nearest health post as required.

Methods of health teaching in schools

Table 3 shows that forty-one schools carried out health teaching while the remaining 24 schools had

no form of health teaching. Of the 41 schools that taught health, 65.9% had it by direct health education of staff.

Only 37 (56.9%) of the 65 schools' principals/ head teachers responded to questions on how their teachers prepare for health teaching. Recommendation via in-service training was the predominant method of preparing teachers for health teaching identified in 32 (49.2%) schools, while the remaining five schools did on specific areas. Overall, only twenty-three (35.4%) schools had time allotted to health teaching as shown in Figure 2.

The school environment

Twenty (30.8%) schools were less than 200m from major traffic, while the others were >200m. Thirty-six (55.4%) schools did open dumping with burning for refuse disposal, six (9.2%) controlled dumping, 22 (33.8%) incineration and one school (1.5%) had a mixed method. Toilet types available in the schools were water closets (23, 35.4%), pit latrines (17, 26.1%), buckets (20, 38.8%) and five (7.7%) schools had no toilet facilities.

Table 4 shows the nature of the school environment. Thirty-eight (58.5%) schools had adequate ventilation, which was only controllable in two (5.3%) schools. Dust bins and waste paper baskets were the predominant evidence of healthful living in the schools, available in 26 (40.0%) schools.

Table 1: School ownership and the available healthcare service in enrolled schools.

Variable	Frequency (N= 65)	Percentage (%)	Cumulative Percentage
School ownership			
Federal government	1	1.5	1.5
State government	23	35.4	36.9
Local Government	17	26.2	63.1
Private	17	26.2	89.3
Faith -based	7	10.7	100.0
Qualification of headmaster/principal			
Nigeria Certificate in Education	3	4.6	4.6
Bachelor of Education	35	53.8	58.4
Bachelor of Science	10	15.4	73.8
Masters	12	18.5	92.3
Doctor of Philosophy	5	7.7	100.0
Available Healthcare personnel			
Health Assistant /Trained first aider	28	43.1	43.1
Nurse	8	12.3	55.4
Health educator	4	6.2	61.6
None	25	38.4	100.0
Facility for healthcare			
None	27	41.5	41.5
Sick bay	13	20.0	61.5
School bus	9	13.8	75.3
Telephone service	16	24.7	100.0
Methods of Health Appraisal			
Routine inspection	31	47.7	47.7
Referral to hospital	19	29.2	76.9
Screening tests to detect illness	5	7.7	84.6
Supervision of those handicapped	5	7.7	92.3
Routine inspection and referral to hospital	3	4.6	96.9
Periodic medical examination for pupils	2	3.1	100.0

Table 2: The availability of services for asthma care in schools.

Variable	Frequency (N=65)	Percentage (%)
Available asthma assessment/ rescue equipment		
None	23	35.4
Peak flow meter	6	9.2
Spacer device	6	9.2
Pulse oximeter	6	9.2
Salbutamol tablet or inhaler	24	36.9
Who supervises children with asthma at your school?		
School health personnel	29	44.6
Teacher	9	13.8
Parent	7	10.8
Headteacher	1	1.5
All of the above	6	9.2
Do not know	13	20.0
If a student has trouble breathing, what steps are taken? (multiple responses)		
Contact the child's parent	18	24.0
Sent to the principal's office and the parents contacted	18	24.0
Sent to school health personnel	16	21.3
Contact the child's doctor	12	16.0
Administer inhaler to a child	9	12.0
Contact the child's parent, give the inhaler and send child to the school health personnel	2	2.7

Table 3: Teaching methods utilized in the schools.

Method	Frequency (N=65)	Percentage (%)
None	24	36.9
Direct- by health education staff	28	43.0
Correlation with other subjects	5	7.7
Integrated with other classroom activities	6	9.2
Visiting medical specialists and voluntary groups	2	3.0

Table 4: Characteristics of the school environment.

Variable	Frequency	Percentage (%)
Building (n=65)		
Strong walls, good roof	25	38.5
Dilapidated	25	38.5
Old walls, leaking roofs	13	20.0
Strong walls with minor cracks	1	1.5
Walls with peeling paint	1	1.5
Floor Space, n=56		
Standard	35	62.5
Non-standard	21	37.5
Floor Finishing, n=56		
Flat, non-glossy	27	48.2
Flat, glossy finishing	10	17.9
Worn off, broken & dusty finishing	12	21.4
Sandy finishing	7	12.5
Ventilation, n=65		
Adequate	36	55.4
Adequate & Controllable	2	3.1
Not adequate	18	27.7
Controllable	3	4.6
Not Controllable	6	9.2
Insulation from heat, n=65		
Proper ceiling	54	83.1
Partial ceiling	10	15.4
None	1	1.5
Nuisance, n=65		
None	49	75.4
Industrial pollution	10	15.4
Faeces in classrooms	3	4.6
Faeces in classrooms & Flood/open drainages	1	1.5
Flood/open drainages	1	1.5
Vectors/pests	1	1.5
Healthful living Evidence, n=65		
Adequate emotional climate	3	4.6
Sports field available	11	17.0
Sports facilities available	6	9.2
Dust bins & waste paper baskets are available	26	40.0
Regular cleaning of toilets and classrooms	6	9.2
Mixed	13	20.0

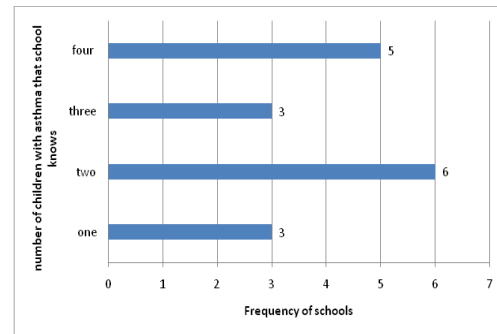


Figure 1: Pattern of identification of current number of children with asthma by schools.

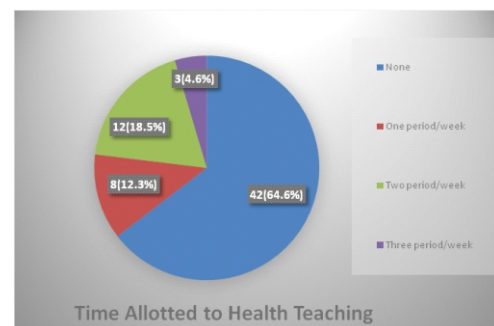


Figure 2: Allotment of time/periods by schools for health teaching.

DISCUSSION

One of the key characteristics of a child-friendly school is its constant strive to promote and support the health of school children by adequately implementing school health programs. However, with the current study, the implementation of school health services in primary and secondary schools in Ilorin, Nigeria, had left much to be desired. More than half of the schools (56.9%) had health personnel, which contrasted the findings of Alex-Hart *et al*,¹³ and Olatunya *et al*,¹⁴ who reported none and 9.3%, respectively. Trained health educators and nurses who are best suited to deliver health education generally and specifically on asthma basics, asthma management, and how to recognize and respond in an asthma emergency, were, however, few. These current study findings were at variance with those reported in the USA where over 82% of the public

schools enjoyed the services of school nurses; 63% of which were full-time school nurses.¹⁵ This disparity may be due to differences in resource availability between resource-rich and resource-poor countries. Additionally, only one-fifth of the schools studied had a sick bay/clinic which is a more appropriate facility for taking care of asthmatic students in case of emergency, akin to this finding were those of many other workers in Nigeria.^{12,16,17}

Furthermore, telephone services dedicated to health services crucial for easy communication especially when there is an emergency, were available in less than a quarter of the schools studied. This finding might be a reflection of the now easy access to mobile phones from school staff. However, this should not be the case, as having a mobile phone does not translate to the capacity to make calls. It is crucial to have a phone dedicated to such services in the schools. The unavailability of school buses in the majority of the schools was similarly reported by many studies from different parts of Nigeria.¹⁸⁻²⁰ The presence of a conducive, well-ventilated school bus will minimize the exposure of asthmatic students to particulate matters and noxious gases which may

arise from the use of other suboptimal means during their daily transit between home and school. Also, it will facilitate easy transportation of students to a nearby hospital when there is an emergency.

Appraisal of students' health in this study was mostly performed via routine inspection. Similar observations were reported in Jos,²¹ and Enugu,²² Nigeria, and in South Africa.²³ This practice is crucial for detecting conditions like atopic dermatitis, fungal infections, and scabies. However, schools perform poorly in other health appraisals, such as pre-admission screening and periodic medical exams, which could help identify undiagnosed asthma and other health issues.

Adequate record keeping is critical to health service monitoring and evaluation, however, it was poor for students with asthma, and other health conditions in the schools studied. This finding was similar to the report of Oyinlade *et al*¹⁶ in Sagamu, Nigeria, but contrasted with the findings in schools in Belgaum, India, where health records were kept by all schools.²⁴ This current study finding may be due to a lack of personnel assigned to this task or ignorance on the part of those saddled with the responsibility. Another observation that is below the recommended standard from the present study is the supervision of students' health that was being done predominantly by school health personnel. Only a few schools involved all school staff in supervising the health of their students. Bridging this gap in health supervision and education is crucial. Indeed, equipping all staff with asthma education and involving them in the health supervision of asthmatic students would be beneficial, as it has been shown to reduce the frequency of asthma flare-ups hence decreasing morbidity, and also improving asthma awareness.^{25,26}

As regards care of emergency illnesses and injuries, most of the schools surveyed gave first aid treatment to students. This finding was similar to the findings of other workers in Nigeria,^{18,20,27} and India,²⁴ which could be a reflection of its recognition as an important first step in the care of emergency. However, the care of students with asthma during emergencies was poor. The available asthma assessment and rescue equipment in the schools were

inadequate. Only nine (13.8%) schools indicated administering inhalers to asthmatic students with troubled breathing, and about a third of the schools did not know where asthmatic students keep their inhalers. This current study finding reflects a paucity of equipment/medications for asthma emergency care and well-trained health personnel. A similar paucity of facilities for emergency asthma care was reported in Lagos,²⁸ and Abuja,²⁹ located in South-west and North-central Nigeria, respectively.

Concerning the preparation of teachers for health teaching, only 37 (56.9%) schools responded, however, most of the respondents (86.5%) had it via in-service training which was at variance with 3.0% reported for schools in Ilesha, Nigeria.¹⁴ This current study finding may be related to the current efforts of the Kwara state government to reposition the educational system in the state. In-service training for teachers will go a long way in correcting deficiencies of teachers with inadequate health knowledge. Also, it will accord them the opportunity to learn the latest updates on health issues.

A majority (64.6%) of the schools in this study had no time allotted to health teaching, which was poor when compared with the finding of Olatunya *et al*,¹⁴ who reported that 100% of the schools studied allotted time to health teaching. The preponderance of schools with zero time allotted to health teaching might have stemmed from the general belief that health teaching was being captured in other subjects such as physical education, family living, social study and basic science.^{14,22} This capturing, however, may be inadequate to cover the scope of health instruction as recommended in the schools' curriculum.²³

The findings in this study of standard floor spacing, adequate ventilation, proper insulation from heat, and freedom from public nuisance in more than half of the schools were commendable. However, the dilapidated school buildings with old walls and leaking roofs, and the poor floor finishing observed in most of the schools similar to reports of other workers in Nigeria,^{13,30} probably due to poor maintenance services of the schools, are unhealthy, and potential sources of dust which can trigger flare up in students with asthma. This could be due to poor

school maintenance services. In addition, the practice of open dumping with the burning of refuse in the schools is unwholesome for students with asthma. This activity reduces the air quality in the school and invariably makes the school environment non-conducive for asthmatic students.^{31,32} It is cheering to note that most schools in the present study were located 200 meters or more away from major traffic. Schools or residences' proximity to major roads has been shown to expose students to environmental pollution which increases the risk of asthma and allergic disorders and negatively impacts respiratory outcomes.³³⁻³⁵

Strengths and Limitations

Strengths of the study include the extensive data collection from numerous primary and secondary schools in Ilorin, Nigeria, providing a broad overview of asthma care in educational settings. The study also offered a detailed assessment of school health services by analyzing healthcare personnel, facilities, and health appraisal methods. However, the study faced limitations such as a limited response rate of 56.9% from schools regarding teacher preparation for health teaching, potentially introducing response bias and limiting generalizability. Additionally, the reliance on self-reported data from school principals or head teachers may have led to biased responses influenced by social desirability or inaccurate information. The disparity in resource availability between resource-rich and resource-poor countries may have impacted the implementation of school health programs and the availability of healthcare personnel in the schools studied. Overall, while the study provides valuable insights into the challenges and opportunities for improving asthma care in schools in Ilorin, Nigeria, the limitations should be considered when interpreting the findings and planning future research or interventions in this area.

CONCLUSION

There were disparities in healthcare resources and asthma care practices among the schools studied. Enhancing asthma care readiness in schools is crucial to support students with asthma effectively. Similarly, addressing gaps in emergency care,

equipment availability, and staff training can significantly improve the management of asthma in school settings. Further efforts are needed to create asthma-friendly environments that prioritize the health and well-being of children with asthma.

Acknowledgement: The authors are grateful to the Kwara State Government for granting permission to carry out this study. We appreciate all heads of schools for their co-operation.

Competing interests & Funding: The authors declare no conflict of interest. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Availability of Data and Material: All materials of this study are available from the corresponding author upon reasonable request.

Abbreviations and Symbols: Healthful School Environment (HSE), Local Government Areas (LGA), School Health Instruction (SHI), School Health Programme (SHP), School Health Services (SHS), Statistical Product and Service Solution (SPSS), and United States of America (USA)

REFERENCES

1. Papadopoulos N, Arakawa H, Carlsen KH, Custovic A, Gern J, Lemanske R, et al. International consensus on (ICON) pediatric asthma. *Allergy*. 2012; 67: 976-97.
2. Sullivan PW, Ghushchyan V, Navaratnam P, Friedman HS, Kavati A, Ortiz B, et al. The national cost of asthma among school-aged children in the United States. *Ann Allergy Asthma Immunol*. 2017; 119: 246-52. e1.
3. Moonie SA, Sterling DA, Figgis L, Castro M. Asthma status and severity affects missed school days. *J Sch Health*. 2006; 76: 18-24.
4. Millard MW, Johnson PT, Hilton A, Hart M. Children with asthma miss more school: fact or fiction? *Chest*. 2009; 135: 303-6.
5. Jones SE, Wheeler LS, Smith AM, McManus T. Adherence to National Asthma Education and Prevention Programs "How Asthma-Friendly Is Your School?" Recommendations. *J Sch Nursing*. 2009; 25: 382-94.

6. Greiling AK, Boss LP, Wheeler LS. A preliminary investigation of asthma mortality in schools. *J Sch Health*. 2005; 75: 286-90.
7. National Asthma Education and Prevention Program. NAEPP Resolution on Asthma Management at School. Updated November 2005.
8. Hillemeier MM, Gusic ME, Bai Y. Rural and urban children with asthma: are school health services meeting their needs? *Pediatrics*. 2006; 118: 1097-103.
9. Snow RE, Larkin M, Kimball S, Iheagwara K and Ozuah PO. Evaluation of asthma management policies in New York City public schools. *J Asthma*. 2005; 42: 51-3.
10. UNICEF. Federal Ministry of Education. National School Health Policy. UNICEF. 2006.
11. Nwadiuto AA, Nkanginieme K. School health programme. In: Azubuike JC and Nkanginieme K, (eds.). *Paediatrics and Child Health in a Tropical Region*. 2nd ed. Port Harcourt: African Educational Services, 2007, p. 47-54.
12. Ofovwé G, Ofili A. Knowledge, attitude and practice of school health programme among head teachers of primary schools in Egor local government area of Edo state, Nigeria. *Ann African Med*. 2007; 6: 99-103.
13. Alex-Hart B, Akani N. Evaluation of school health instruction in public primary schools in Bonny Local Government Area, Rivers state. *Niger J Paediatr*. 2014; 41: 365-9.
14. Olatunya OS, Oseni SB, Oyelami OA, Adegbenro C, Akani N. Health instruction in Nigerian schools: what are the missing links? *Pan Afr Med J*. 2014; 19: 360.
15. Kolbe LJ. School health as a strategy to improve both public health and education. *Annu Rev Public Health*. 2019; 40: 443-63.
16. Oyinlade O, Ogunkunle O, Olanrewaju D. An evaluation of school health services in Sagamu, Nigeria. *Niger J Clin Prac*. 2014; 17: 336-42.
17. Akpabio II. Problems and challenges of school health nursing in Akwa Ibom and Cross River states, Nigeria. *Cont J Nurs Sci*. 2010: 17-28.
18. Kuponiyi OT, Amoran OE, Kuponiyi OT. School health services and its practice among public and private primary schools in Western Nigeria. *BMC Res Notes*. 2016; 9: 1-10.
19. Asiabaka I, Mbakwem J. Assessment of facility needs of government primary schools in Imo State, Nigeria: Some neglected areas. *New York Sci J*. 2008; 1: 22-9.
20. Sanni UA, Airede KI, Anigilaje EA, Offiong UM. Assessment of school health services in primary schools in Gwagwalada area council, Federal Capital Territory, Nigeria. *Pan Afr Med J*. 2022; 41.
21. Toma O, Tinuade OO, Gabriel I, Agaba E. School health services in primary schools in Jos, Nigeria. *Open Sci J Clin Med*. 2014; 2: 83-8.
22. Ejifugha A. Awareness of school health services among primary school teachers in Enugu State. *Nig Sch Hlth J*. 1993; 10: 54-61.
23. Mohlabi D, Van Aswegen E, Mokoena J. Barriers to the successful implementation of school health services in the Mpumalanga and Gauteng provinces. *SA Fam Pract*. 2010; 52: 249-54.
24. Kansal D, Baliga SS, Mallapur M, Katti S. Comparison of school health services among private and government owned schools of Belgaum. *Int J Trop Dis Health*. 2015; 7(1): 1-5.
25. Carvalho Coelho AC, Barretto Cardoso LS, Souza-Machado Cd, Souza-Machado A. The impacts of educational asthma interventions in schools: a systematic review of the literature. *Can Res J*. 2016; 2016(1): 847620, 14 pages.
26. US Department of Health and Human Services. National Asthma Education and Prevention Program. Managing asthma: a guide for schools. NIH Publication; No. 14-2650. 2014. Accessed on Feb 15, 2023. Available at: https://www.nhlbi.nih.gov/files/docs/resources/14-2650/NACI_ManagingAsthma-508%20FINAL.pdf
27. Adeniran A, Ezeiru S. School health programme practices among private secondary school

- administrators in an urban local government area in Lagos state, Nigeria. *Int J Community Med Public Health*. 2016; 3: 240-5.
28. Kuyinu Y, Adeyeye O, Ozoh O. Assessment of the knowledge of teachers about asthma and the availability of facilities for asthma care in public secondary schools in Lagos, Nigeria. *Afr J Thor Crit Care Med*. 2018; 24: 76-81.
29. Ekop EE, Azuik AN. Teachers assessment of asthma-friendliness of primary schools in Abuja. *Niger J Paediatr*. 2022; 49: 298304.
30. Mbaerie I, Ofovwe G, Ibadin M. Evaluation of the performance of primary schools in Oredo LGA of Edo State in the SHP. *J Community Med Prim Health Care*. 2010; 1: 22-32.
31. Hauptman M, Phipatanakul W. The school environment and asthma in childhood. *Asthma Res Prac*. 2015; 1: 1-7.
32. Salo PM, Sever ML, Zeldin DC. Indoor allergens in school and day care environments. *J Allergy Clin Immunol*. 2009; 124: 185-92. e9.
33. Bowatte G, Lodge C, Lowe AJ, Erbas B, Perret J, Abramson MJ, et al.. The influence of childhood traffic-related air pollution exposure on asthma, allergy and sensitization: a systematic review and a meta-analysis of birth cohort studies. *Allergy*. 2015; 70: 245-56.
34. Eldeirawi K, Kunzweiler C, Rosenberg N, Zenk S, Tarlov E, Hebert-Beirne J, et al. Proximity to traffic and asthma among Mexican American children: Independent and interactive effects. *J Allergy Clin Immunol*. 2018; 141: 2306-8. e1.
35. Salam MT, Islam T, Gilliland FD. Recent evidence for adverse effects of residential proximity to traffic sources on asthma. *Curr Opin Pul Med*. 2008; 14: 3-8.