



Knowledge, attitudes, and quality of life of caregivers toward asthma in their children: A Nigerian perspective

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ABSTRACT

Introduction: The burden of uncontrolled asthma is high and caregivers can offer support in the management of asthma. Asthma is one of the most common chronic diseases in children. The objective of this study was to assess the knowledge, attitudes, and quality of life (QoL) of caregivers toward asthma in their children.

Methods: This cross-sectional study was conducted in the Paediatric Respiratory Unit of the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State (July 2017-September 2017). We utilized a 46-item questionnaire comprising knowledge and attitude domains and the 13-item Pediatric Asthma Caregiver's QoL Questionnaire (PACQLQ). Data were analyzed using the IBM SPSS Version 25.0. Statistical significance was set at $p < 0.05$.

Results: Fifty-one caregivers participated in the study. More than half ($n = 36$, 70.6%) of the caregivers were 40 years old and above, female ($n = 37$, 72.5%), graduates from higher institutions ($n = 33$, 64.7%), and self-employed ($n = 27$, 52.9%). About a quarter ($n = 13$, 25.5%) had a family history of asthma and a similar proportion ($n = 14$, 27.5%) knew the three main symptoms of asthma.

Conclusion: Less than half ($n = 24$, 47.1%) of the caregivers had good asthma knowledge. Dust ($n = 35$, 68.6%) and smoke ($n = 31$, 60.8%) were identified as the most common asthma triggers in their children. The majority of the caregivers ($n = 41$, 80.3%) agreed that most people can have well-controlled asthma without seeing a doctor regularly. Overall, less than half of the caregivers ($n = 24$, 47.1%) showed positive attitudes toward their children's asthma. The overall score for the PACQLQ was 3.91 (0.98) which implied a poor QoL. The caregivers had both impaired activity and emotional function from managing asthma in their children. More female caregivers had better knowledge about asthma than their male counterparts ($t = -3.178$; $df = 49$; $p = 0.003$). Less than half of the caregivers had good asthma knowledge and positive attitudes toward asthma in their children. They had an impaired QoL from managing asthma in their children.

Keywords: Asthma; attitudes; children; knowledge

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INTRODUCTION

Asthma is a recognized public health problem that affects patients and their caregivers (1,2). Poorly controlled asthma patients have reduced quality of life (QoL) and escalated health-care costs (3-5). Childhood diseases affect not only the child but also the caregivers since children are part of the



dependent population (6). The management of asthma in pediatrics requires caregiver competencies such as the identification and avoidance of triggers, implementation of environmental control protocols at home, recognition of symptoms, and administration of medications (7). Caregivers experience the challenges of identifying and managing allergies, being hypervigilant, differentiating asthma symptoms from other health concerns, and knowing when to seek emergency care (8). These could make asthma caregiving stressful. The knowledge of the disease state, cultural beliefs, attitudes toward chronic illnesses, and psychological stressors can impact asthma control (9,10).

In Nigeria, the poor standard of living makes the management of asthma difficult (11). The burden of managing asthma can affect caregiver's QoL, especially those with a poor economic background (12). Depressive symptoms have been reported among some caregivers who manage pediatric asthma (13). Research works have been conducted among parents and caregivers of asthma patients, but there is a paucity of data from studies conducted in Nigeria. Hence, the general objective of this study was to assess the knowledge, attitudes, and QoL of caregivers toward asthma in their children.

METHODS

Study design and sample population

This was a cross-sectional survey conducted at the Paediatric Respiratory Unit of the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State. The respiratory clinic holds every Tuesday. The eligibility criteria comprised all caregivers of pediatric asthma patients (≤ 18 years old) who were not newly diagnosed and visited the Respiratory Clinic between July 2017 and September 2017. Written and verbal consent were obtained from those willing and able to participate.

Data collection

The study instrument had three major domains. The knowledge domain was adapted from the 31-item Newcastle Asthma Knowledge Questionnaire developed and validated by Fitzclarence and Henry with questions on asthma symptoms, trigger factors, basic physiology, types of medication and their

use, and important general message about asthma (14,15). The open-ended questions of the questionnaire were scored such that Question 1 was rated correctly only when all the three main symptoms of asthma were enumerated. Questions 9, 10, 20, and 22 were rated as correct when the respondent provided at least two of the answers stipulated as correct answers. The total knowledge score was the sum of the individual knowledge items scored as correct = 1 or incorrect = 0. The total knowledge score was categorized with the cutoff point taken as the median score such that those with scores above the median were classified as having good knowledge with below the median, classified as poor knowledge.

The attitudes domain was adapted from the 15-item self-administered questionnaire by Gibson et al. (16). The total attitude score was obtained by the sum of the individual attitude items. Items that depicted positive attitudes (before or after rephrase) were given a score of 1 for those who had any element of an agreement while those who had an element of disagreement were scored 0. The total attitude score was categorized with the cutoff point as the median score such that those with scores above the median were classified as having positive attitudes toward their children's asthma while those below the median score had negative attitudes.

A pilot study was conducted with five caregivers of pediatric asthma patients to ensure the suitability of the instrument for the local context. It provided information about the average time to fill the questionnaire as well as possible questions the respondents might want to ask. These caregivers did not participate in the main study. Six clinical pharmacists of the Department of Clinical Pharmacy and Pharmacy Management, University of Nigeria Nsukka, scrutinized the items of the questionnaire and made suggestions which improved the knowledge and attitude domains.

The QoL domain utilized the Pediatric Asthma Caregivers' QoL Questionnaire (PACQLQ) to find out how asthma interfered with the normal daily activities of caregivers (17).

Data analysis

Data were analyzed using the IBM SPSS Version 25.0. Descriptive statistics, such as mean \pm standard

deviation, were used to summarize data. Inferential statistics utilized the independent t-test and analysis of variance where applicable, with statistical significance set at $p < 0.05$.

Ethical consideration

Ethical clearance to conduct the study was obtained from the Health Research and Ethics Board of UNTH, Ituku-Ozalla, Enugu State. The study participants were informed of the general objective of the study and confidentiality was maintained throughout. Written consent was obtained from those that agreed to participate. Participation was voluntary and the caregivers were informed that they could withdraw if they deemed it necessary. All the caregivers that were eligible to participate gave their consent. None withdrew from the study.

RESULTS

A total of 51 questionnaires were completed by the caregivers of the pediatric asthma patients of UNTH.

More than half ($n = 36, 70.6\%$) of the caregivers were 40 years old and above, female ($n = 37,$

72.5%), graduates from higher institutions ($n = 33, 64.7\%$), and self-employed ($n = 27, 52.9\%$). About a quarter ($n = 13, 25.5\%$) had family history of asthma. Majority of the asthmatic children of the caregivers were between 6 and 14 years ($n = 39, 76.6\%$). These children were mostly first diagnosed for asthma between 3 and 8 years ($n = 25, 49.0\%$). Close to 69% of the caregivers earned less than ₦ 100,000 monthly ($\$1 = ₦356$, as of the time study). Of all the caregivers, about a quarter ($n = 14, 27.5\%$) knew the three main symptoms of asthma. A majority ($n = 46, 90.2\%$) knew that an asthma attack may be due to tightening in the wall of the air passages in the lungs, Table 1A and B. After the categorization of the total knowledge score with a median score of 14, less than half ($n = 24, 47.1\%$) of the caregivers had good knowledge of asthma.

More than half of the caregivers identified dust ($n = 35, 68.6\%$) and smoke ($n = 31, 60.8\%$) as the most common asthma triggers in their children (Figure 1).

The majority of the caregivers ($n = 41, 80.3\%$) agreed that most people can have well-controlled asthma without seeing a doctor regularly. Less

TABLE 1A. Knowledge of asthma (I)

Questions (correct answers)	n (%)
1. Three main symptoms of asthma (cough, breathlessness, and wheezing)	14 (27.5)
2. More than one in 10 children have asthma in their childhood (No)	25 (49.0)
3. Children with asthma have abnormal air passages in their lungs (Yes)	31 (60.8)
4. If one child has asthma then all his/her siblings are almost certain to have asthma as well (No)	37 (72.5)
5. Most children with asthma have an increase in mucus when they drink cow's milk (No)	17 (33.3)
6. During an attack of asthma, the wheeze may be due to tightening in the wall of the air passages in the lungs (Yes)	46 (90.2)
7. During an attack of asthma, the wheeze may be due to swelling in the lining of the passages in the lungs (Yes).	30 (58.8)
8. Asthma damages the heart (Yes)	26 (57.0)
9. Two asthma treatments (medicines), which are taken every day regularly to prevent an attack on asthma from occurring (salmeterol/fluticasone Diskus®/Evohaler®, Montelukast, budesonide/formoterol Symbicort®)	3 (5.9)
10. Three asthma treatments (medicines), which are useful during an asthma attack (Ventolin®, ipratropium bromide, aminophylline slow IV)	1 (2.0)
11. Antibiotics are an important part of treatment for most children with asthma (No)	11 (21.6)
12. Most children with asthma should not eat dairy products (No)	29 (56.9)
13. Allergy injection cures asthma (No)	17 (33.3)
14. If a person dies from an asthma attack, this usually means that the final attack must have begun so quickly that there was no time to start any treatment (No)	11 (21.6)
15. People with asthma usually have "nervous problem" (Yes)	29 (56.9)
16. Asthma is infectious (i.e., you can catch it from other persons) (No)	37 (72.5)
17. Inhaled medications for asthma (e.g., Ventolin inhaler®) have fewer side effects than tablets (Yes)	28 (54.9)

TABLE 1B. Knowledge of asthma (II)

Questions (correct answers)	n (%)
18. A short course of oral steroids (such as prednisolone) usually cause significant side effects (No)	24 (47.1)
19. Some asthma treatments (such as Ventolin®) damage the heart (Yes)	27 (52.9)
20. A 5-year-old boy has an asthma attack and takes two puffs of Ventolin® inhaler. After 5 minutes, he is not better. Give some reasons why this might happen (when an inappropriate dose has been inhaled, improper use of inhaler techniques, expired inhaler)	5 (9.8)
21. During an asthma attack, which you are managing at home, your child required a nebulizer every 2 hours. He/she is gaining benefit but is very breathless after 2 hours. Provided he/she is not getting any worse, it is alright to continue with 2 hourly treatments (No)	18 (35.3)
22. Write down ways of helping to prevent asthma attacks during exercise. (Develop an action plan with the doctor, always use pre-exercise asthma medicine, perform warm-up exercises, and exercise indoors. If weather is cold, restrict exercise when there is a viral infection, and exercise at a level that is appropriate for you)	17 (33.3)
23. Children with asthma become addicted to their asthma drugs (No)	23 (45.1)
24. Swimming is the only suitable exercise for asthmatics (No)	32 (62.7)
25. Parental smoking may make a child's asthma worse (Yes)	42 (82.4)
26. With appropriate treatments, most children with asthma should lead a normal life with no restriction in activity (Yes)	34 (66.7)
27. The best way to measure the severity of a child's asthma is for the doctor to listen to his/her chest (No)	22 (43.1)
28. Asthma is usually more of a problem at night than during the day (Yes)	29 (56.9)
29. Most children with asthma will have stunted growth (Yes)	31 (60.8)
30. Children with frequent asthma should use preventive drugs (Yes)	36 (70.6)

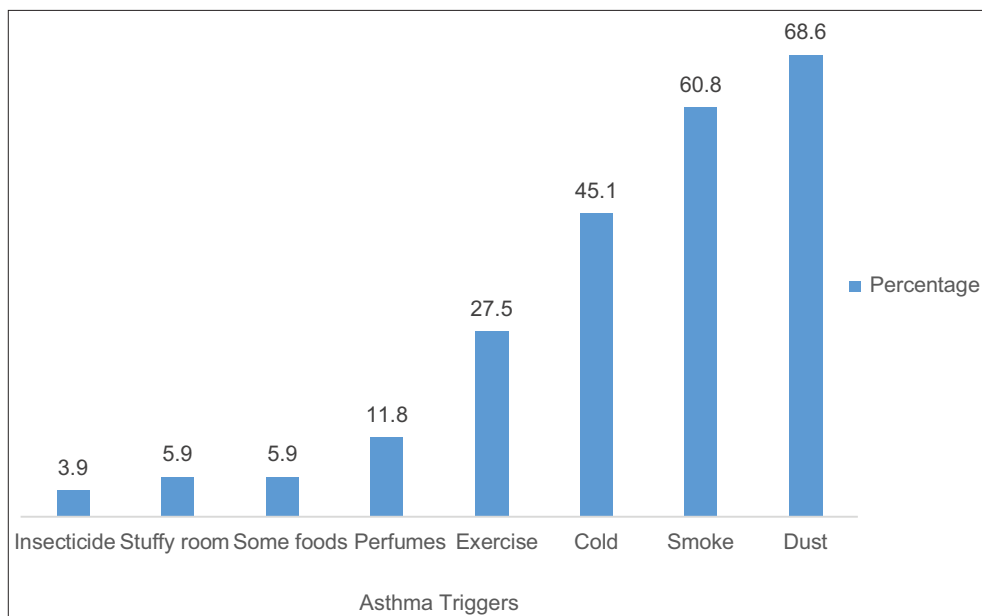


FIGURE 1. Asthma triggers as identified by caregivers of children with asthma.

than half of the caregivers (n = 20, 39.2%) agreed that someone with asthma should not use an inhaler in class (Table 2). After categorization, less than half of the caregivers (n = 24, 47.1%)

showed positive attitudes toward their children's asthma.

More than half of the caregivers (n = 37, 68.6%) felt helpless in many instances that their children

TABLE 2. Attitudes of caregivers toward asthma

Statements	Strongly agree	Agree	Tend to agree	Tend to disagree	disagree	Strongly disagree	Mean (SD)
1. If someone with asthma takes care of him/herself, he/she can avoid most asthma symptoms	19 (37.3)	25(49.0)	5 (9.8)	1 (2.0)	1 (2.0)	0 (0.0)	5.18 (0.84)
2. When someone has an attack of asthma symptoms at school, it is usually because he/she has been careless	7 (13.7)	14 (27.5)	17 (33.3)	4 (7.8)	6 (11.8)	3 (5.9)	4.06 (1.39)
3. How soon someone recovers from an attack of asthma at school depends mainly on how well the teacher takes care of him/her	12 (23.5)	25 (49.0)	8 (15.7)	3 (5.9)	3 (5.9)	0 (0.0)	4.78 (1.06)
4. When someone has an attack of asthma during sport, it is because the teacher has not checked upon whether the student has taken his/her medication	10 (19.6)	14 (27.5)	10 (19.6)	5 (9.8)	9 (17.6)	3 (5.9)	4.04 (1.56)
5. *If someone is going to have an attack of asthma, it will happen no matter what anyone does	0 (0.0)	4(7.8)	8 (15.7)	7 (13.7)	14 (27.5)	18 (35.3)	4.67 (1.32)
6. *How soon someone recovers from an attack of asthma symptoms is mostly a matter of luck	2 (3.9)	6 (11.8)	9 (17.6)	10 (19.6)	18 (35.3)	6 (11.8)	4.06 (1.36)
7. Most people can control their asthma well without seeing a doctor regularly.	12 (23.5)	12 (23.5)	17 (33.3)	4 (7.8)	4 (7.8)	2 (3.9)	4.35 (1.35)
8. *Someone with asthma should not use his/her inhaler in class	7 (13.7)	7 (13.7)	6 (11.8)	10 (19.6)	16 (31.4)	5 (9.8)	3.71 (1.60)
9. *Students are embarrassed about using their inhalers in class	3 (5.9)	7 (13.7)	9 (17.6)	11 (21.6)	14 (27.5)	7 (13.7)	3.92 (1.45)
10. *Students without asthma have negative attitudes toward students with asthma	2 (3.9)	7 (13.7)	7 (13.7)	8 (15.7)	16 (31.4)	11 (21.6)	4.22 (1.49)
11. Students play on their asthma	5 (9.8)	14 (27.5)	12 (23.5)	12 (23.5)	3 (5.9)	5 (9.8)	3.82 (1.42)
12. There would be few problems with asthma at school if students could carry their inhalers around with them.	14 (27.5)	19 (37.3)	8 (15.7)	5 (9.8)	5 (9.8)	0 (0.0)	4.63 (1.26)
13. *Teachers are worried about taking someone with asthma on a school camp or excursion	1 (2.0)	1 (2.0)	5 (9.8)	14 (27.5)	21 (41.2)	9 (17.6)	4.57 (1.08)
14. Students with asthma are just as fit as students without asthma	12 (23.5)	20 (39.2)	12 (23.5)	4 (7.8)	3 (5.9)	0 (0.0)	4.67 (3.94)
15. *School teachers have negative attitudes toward students with asthma.	4 (7.8)	6 (11.8)	7 (13.7)	14 (27.5)	12 (23.5)	8 (15.7)	3.94 (1.49)

Strongly agree (coded as 6); agree (coded as 5); tend to agree (coded as 4); tend to disagree (coded as 3); disagree (coded as 2); strongly disagree (coded as 1); SD: Standard deviation. * The code responses were reversed in a positive direction such that higher mean scores indicated more positive attitudes

experienced asthma symptoms. About three-quarters (n = 38, 74.4%) of the caregivers were noticeably worried about their children's performance of normal daily activities (Table 3).

The overall score for the PACQLQ was 3.91 ± 0.98 which implied a poor QoL. The caregivers had both

impaired activity (3.95 ± 1.07) and emotional function (3.89 ± 1.08) from managing asthma in their children.

More female caregivers had better knowledge about asthma than their male counterparts ($t = -3.178$; $df = 49$; $p = 0.003$) (Table 4A). Those who earned

TABLE 3. Pediatric Asthma Caregiver’s quality of life

During the past week, how often	All of the time	Most of the time	Quite often	Some of the time	Once in awhile	Hardly any of the time	None of the time	Mean (SD)
1. Did you feel helpless or frightened when your child experienced cough, wheeze, or breathlessness?	4 (7.8)	31 (60.8)	2 (3.9)	7 (13.7)	4 (7.8)	1 (2.0)	2 (3.9)	2.75 (1.47)
2. Did your family need to change plans because of your child’s asthma?	3 (5.9)	3 (5.9)	4 (7.8)	5 (9.8)	31 (60.8)	1 (2.0)	4 (7.8)	4.51 (1.42)
3. Did you feel frustrated or impatient because your child was irritable due to asthma?	2 (3.9)	6 (11.8)	4 (7.8)	5 (9.8)	4 (7.8)	25 (49.0)	5 (9.8)	4.92 (1.74)
4. Did your child’s asthma interfere with your job or work around the house?	7 (13.7)	1 (2.0)	27 (52.9)	4 (7.8)	5 (9.8)	4 (7.8)	3 (5.9)	3.45 (1.59)
5. Did you feel upset because of your child’s cough, wheeze, or breathlessness?	5 (9.8)	4 (7.8)	4 (7.8)	6 (11.8)	27 (52.9)	2 (3.9)	3 (5.9)	4.25 (1.57)
6. Did you have sleepless nights because of your child’s asthma	3 (5.9)	4 (7.8)	6 (11.8)	30 (58.8)	2 (3.9)	1 (2.0)	5 (9.8)	3.92 (1.41)
7. Were you bothered because your child’s asthma interfered with family relationships?	2 (3.9)	4 (7.8)	4 (7.8)	5 (9.8)	28 (54.9)	2 (3.9)	6 (11.8)	4.63 (1.47)
8. Were you awakened during the night because of your child’s asthma?	2 (3.9)	7 (13.7)	3 (5.9)	30 (58.8)	4 (7.8)	0 (0.0)	5 (9.8)	3.92 (1.40)
9. Did you feel angry that your child has asthma?	3 (5.9)	5 (9.8)	3 (5.9)	4 (7.8)	6 (11.8)	2 (3.9)	28 (54.9)	5.41(2.07)
During the past week, how worried or concerned were you:	VVW/C	VW/C	FW/C	SW/C	ALW/C	HW/C	NW/C	Mean (SD)
10. About your child’s performance of normal daily activities?	2 (3.9)	32 (62.7)	4 (7.8)	4 (7.8)	5 (9.8)	2 (3.9)	2 (3.9)	2.84 (1.50)
11. About your child’s asthma medications and side effects?	3 (5.9)	5 (9.8)	7 (13.7)	5 (9.8)	30 (58.8)	1 (2.0)	0 (0.0)	4.12 (1.32)
12. About being overprotective of your child?	6 (11.8)	32 (62.7)	2 (3.9)	1 (2.0)	4 (7.8)	3 (7.8)	3 (5.9)	2.73 (1.70)
13. About your child being able to lead a normal life?	6 (11.8)	5 (9.8)	26 (51.0)	3 (5.9)	5 (9.8)	2 (3.9)	4 (7.8)	3.35 (1.60)

All of the time and VVW/C (coded as 1); most of the time and VW/C (coded as 2); quite often and FW/C (coded as 3); some of the time and SW/C (coded as 4); once in a while and ALW/C (coded as 5); hardly any of the time and HW/C (coded as 1); none of the time and NW/C (coded as 7); SD: Standard deviation. VVW/C: Very, very worried/concerned; VW/C: Very worried/concerned; FW/C: Fairly worried/concerned; SW/C: Somewhat worried/concerned; ALW/C: A little worried/concerned; HW/C: Hardly worried/concerned; NW/C: Not worried/concerned

less than ₦20,000 monthly had significantly better attitudes toward asthma than those who earned above ₦100,000 monthly ($F = 4.267$; $p = 0.005$) (Table 4B).

DISCUSSION

Most of the caregivers in our study were between the ages of 30 and 49 years and female. The Organization for Economic Cooperation and Development

TABLE 4A. Mean difference analysis of variables (I)

Variables	n	Mean knowledge score (SD)	95% CI	p-value	Mean attitude score (SD)	95% CI	p-value	Mean AQL	95% CI	p-value	Mean activity score (SD)	95% CI	p-value	Mean emotional function score (SD)	95% CI	p-value
Gender ^a				0.003*			0.298			0.479			0.479			0.291
Male	14	11.36 (4.50)	-6.74-1.52		68.43 (10.80)	-0.78-11.31	0.086	4.14 (0.36)	0.29-0.94		4.13 (0.54)	-0.44-0.91		4.15 (0.41)	-0.32-1.04	
Female	37	15.49 (4.0)			63.16 (9.11)						3.79 (1.23)			3.79 (1.23)		0.479
Family history of asthma ^b				0.095			0.133			0.206			0.477			0.178
Yes	13	16.15 (4.47)	-0.44-5.27		61.08 (8.83)	-10.97-1.49		4.21 (1.17)	-0.23-1.03		4.13 (0.88)	-0.44-0.94		4.24 (1.41)	-0.22-1.16	
No	38	13.74 (4.40)	-0.56-5.40		65.82 (9.91)	-10.79-1.32		3.81 (0.90)	-0.35-1.55		4.24 (1.41)			3.79 (1.23)	-0.42-1.36	

TABLE 4B. Mean difference analysis of variables (II)

Variables	n	Mean knowledge score (SD)	95% CI	p-value	Mean attitude score (SD)	95% CI	p-value	Mean AQL	95% CI	p-value	Mean activity score (SD)	95% CI	p-value	Mean emotional function score (SD)	95% CI	p-value
Parent's age ^a				0.256			0.011*			0.692			0.692			0.667
<30	2	17.50 (3.54)	-14.27-19.27		55.50 (3.54)	23.73-87.27		4.08 (0.00)	4.08-4.08	0.653	4.0 (0.0)	4.0-4.0		4.11 (0.0)	4.11-4.11	
30-39	13	17.31 (3.40)	11.25-15.36		69.00 (7.63)	64.39-73.61		3.79 (1.00)	3.18-4.39		3.75 (1.13)	3.07-4.43		3.8 (1.04)	3.18-4.43	
40-49	25	14.96 (5.3)	12.77-17.15		61.32 (9.55)	57.38-65.26		3.92 (1.05)	3.48-4.35		3.92 (1.05)	3.49-4.35		3.92 (1.21)	3.42-4.41	
50-59	10	12.90 (2.96)	10.78-15.02		70.20 (8.98)	63.78-76.62		4.14 (0.88)	3.51-4.77		4.35 (1.19)	3.50-5.20		4.04 (0.91)	3.39-4.70	
>60	1	21 (0.00)	-		52.00 (0.00)	-		2.62 (0.00)	-	0.819	3.25 (0.0)	-		2.33 (0.0)	-	0.885
Monthly income (₦) ^b				0.019*			0.005*									0.690
<₦20,000	6	11.17 (2.79)	8.24-14.09		76.00 (7.43)	68.20-83.80		3.96 (0.28)	3.66-4.26		3.83 (0.41)	3.78-4.26		4.02 (0.22)	3.78-4.26	
₦20,000-50,000	10	15.60 (2.91)	13.52-17.68		63.60 (11.00)	55.7-71.47		4.00 (1.05)	3.25-4.75		4.05 (1.18)	3.19-4.77		3.98 (1.10)	3.19-4.77	
₦50,000-100,000	19	15.05 (4.29)	12.99-17.11		65.63 (8.42)	61.57-69.69		3.94 (0.96)	3.48-4.41		3.83 (0.89)	3.45-4.54		3.99 (1.14)	3.45-4.54	
>₦100,000	3	20.0 (2.65)	13.43-26.57		54.33 (3.79)	44.93-63.74		4.36 (1.30)	1.13-7.59		4.50 (1.00)	1.10-7.50		4.30 (1.29)	1.10-7.50	
I will not say	13	12.54 (5.24)	9.37-15.70		61.00 (8.27)	56.00-66.00		3.66 (1.16)	2.95-4.36		3.98 (1.32)	2.78-4.25		3.51 (1.22)	2.78-4.25	

*p<0.05; a: ANOVA; b: Independent t-test; CI: Confidence interval; SD: Standard deviation; AQL: Asthma quality of life

defined the working-age population as ages between 15 and 65 years (18). In a New York City study, the primary caregiver for most of the children was their mother with the mean caregiver's age being 33.4 ± 7.5 years and 34.2 ± 8.8 years for Hispanics and African-Americans, respectively (19). In another Nigerian study, mothers constituted 88.5% of the caregivers with the mean age of the caregivers being 38.6 ± 9.1 years (20). Furthermore, almost all the caregivers (97.5%) in a study conducted in Riyadh, Saudi Arabia, were the mothers of the children with a mean age of 35.2 ± 5.6 years (21). Another study that evaluated the association of QoL of caregivers of children with asthma severity and health-care utilization had most of the caregivers as mothers aged between 31 and 40 years old (22). Thus, we should expect a loss of productivity hours if these caregivers are workers since they majorly fall within the working-age population. Caregivers who are students could miss lecture periods while in the hospital. These would be worsened if their children have poor asthma control necessitating frequent hospital visits. The findings of our study also revealed that more female caregivers had better asthma knowledge than their male counterparts. Women are usually the predominant providers of informal care for family members with chronic diseases (23,24).

A quarter of the caregivers reported having a family history of asthma compared to more than 70% in the study conducted in New York City (19). Although caregivers with a family history of asthma might have good knowledge about childhood asthma, the findings of our study revealed no significant association (20).

About a quarter of the caregivers could identify the three main symptoms of asthma. This corroborates the findings of a Spanish study where only 21.5% of the caregivers could enumerate these three symptoms (25). The percentage of caregivers who correctly identified that asthma causes airway swelling, mucus production, and muscle constriction was between 82% and 97% in the New York City study (19). Young children are more dependent on their caregivers for overall health care and medication administration (20). Early identification of worsening symptoms of asthma could be lifesaving. Caregivers should also have a good understanding of the treatment steps when there is an asthma exacerbation.

The majority of the caregivers had received some level of formal education. Another study documented that caregivers' attainment of post-secondary education was significantly associated with good knowledge about childhood asthma (20). It is necessary to tailor the asthma education to the educational level of caregivers (26).

Dust, smoke, cold, and exercise were the major asthma triggers identified by the caregivers. There were similarities with a study conducted in Jazan, Saudi Arabia, where the possible triggers identified by the caregivers included dust mites (89.2%), tobacco (81.6%), animal dander (48.8%), cold air (43.2%), and cold drink (31.6%) (27). Contrarily, roach exposure was the most common trigger for asthma in the New York City study (19). Caregivers need to strive to identify the specific asthma triggers for their children, document them in an asthma control diary, and ensure their children avoid these triggers.

Less than half of the caregivers had a good knowledge of asthma. This was in concordance with the study conducted in Ilesa, Nigeria, where about two-thirds of the caregivers had poor knowledge about childhood asthma (20). Poor knowledge of asthma can lead to preventable deaths. Well-informed caregivers would be able to keep calm during an exacerbation and are in a better position to teach asthma self-management skills, a vital skill in the management of chronic diseases. If caregivers and their children can make informed decisions, total dependence on health professionals during their children's asthmatic attack would be minimized (27). A study revealed that children of caregivers with poor asthma knowledge were 4 times more likely to have a prolonged hospital stay as compared to those with adequate asthma knowledge and education (28).

Less than half of the caregivers had misconceptions about addiction to asthma drugs. Inhalers are an important part of asthma treatment and poor adherence to inhalers is associated with a higher risk of emergency department visits and hospital admissions in children (29). The fear of addiction to asthma medicines may lead to caregivers failing to administer controller inhalers to their children. Misunderstandings about the disease and the underuse of asthma inhalers and medications may lead to poor asthma control (30,31).

Few caregivers could write down the generic or brand names of relievers or controller medicines. This is a surprising fact considering that none of the children were newly diagnosed for asthma. It is possible that these caregivers were conversant with these medicines but did not know the appropriate terminology for them. Nigeria is reported to have poor health literacy (32). Similar results have been obtained in other countries. In a Spanish study, some caregivers listed salbutamol for maintenance treatment while a Sri Lankan study revealed that only 35.4% of the caregivers were able to name a reliever medication correctly (25,33).

Less than half of the caregivers showed positive attitudes toward their children's asthma. The majority of the caregivers agreed that most people can control their asthma without seeing a doctor regularly. This differed from the findings of the study in Ilesa, Nigeria, where 65.4% of the caregivers believed that only doctors could prevent an asthma attack (20). Some caregivers might have a lower threshold for doctor consultation as they believe that any delay would be detrimental to the child's health (34). The attitudes toward asthma, if positive, can improve control (26).

The majority of the caregivers agreed that students with asthma could engage in physical activities. Many children with asthma avoid or are prevented by their caregivers from engaging in physical activity or strenuous activities. This might interfere in the assessment of asthma control parameters, relevant for evaluating the impact of asthma on the daily activities of a child (21,35). Caregivers might want to avoid the burden that comes with managing asthma exacerbations by limiting their child's physical activity, but this could affect the overall development of the child (36). Children with well-controlled asthma can lead normal lives (37). The control of asthma in children is related to the level of both the knowledge and attitude of caregivers (38).

The overall score for the PACQLQ implied a poor QoL. The caregivers had both impaired activity and emotional function from managing asthma in their children. In another study, most of the caregivers had a mean PACQLQ score of 4, indicating a moderate degree of impairment and the caregiver

QoL was influenced by the severity of their child's asthma (22). A Brazilian study revealed that parents/caregivers of children with asthma have a lower QoL compared to those with healthy children (39). Lower QoL among caregivers of children with poorly controlled asthma has been associated with higher life stress, greater asthma caregiving stress, and lower asthma control overtime (40). Caregivers of children with uncontrolled asthma have greater work and activity impairment resulting in lower QoL for emotional, time-related, and family activities (41,42).

Education of parents/caregivers of asthmatic patients on asthma in small groups has been found to improve their knowledge and attitudes (43). Hospital stay should be considered an opportunity to educate children and their families about asthma (28). Tailored education programs for caregivers of young children with asthma seem to be beneficial for increasing caregivers' asthma knowledge, QoL, and self-efficacy in the management of their children's asthma (44).

There are several limitations to our study. One tertiary hospital was utilized and the differences in the services rendered between hospitals might lead to variations in responses. Furthermore, the findings may not be generalizable to all caregivers of asthmatic children. Furthermore, the study is limited by its sample size. It is also possible that the information provided by the caregivers might not reflect the exact problems experienced by asthmatic patients. Since we utilized self-administered questionnaires, recall bias cannot be excluded. Nevertheless, this study has been able to highlight, in a Nigerian setting, the knowledge, attitudes, and QoL of caregivers toward asthma in their children. Future studies should employ interventions targeted at improving the knowledge, attitudes, and QoL of caregivers managing asthmatic children and assess the impact of these interventions on asthma outcomes.

CONCLUSION

Less than half of the caregivers had good asthma knowledge and positive attitudes toward asthma in their children. They had an impaired QoL from managing asthma in their children. The regular provision of educational resources to bridge possible

gaps in the knowledge of asthma might positively influence the attitudes and improve the QoL of caregivers.

COMPETING INTEREST

The authors declare that they have no conflicts of interest.

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