ORIGINAL RESEARCH

Socio-demographic characteristics of children and young adults with varied asthma control- does it make a difference?

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Abstract

Background

The socioeconomic status and caregiver perception of asthma as a disease, the availability of specialty care and medication adherence have major influence on outcome of asthma control in children with asthma. The control of asthma therefore depends on the optimizing the interplay of these factors taking into consideration the regional and racial variations.

Objective

The objective of this study was to evaluate the association between socio-demographic factors and asthma control outcome in children with asthma.

Materials and Methods

This was a cross-sectional study involving 66 consecutively enrolled participants with asthma whose economic burden for asthma was assessed in a previous study. Based on the number of registered children attending the clinic, a minimum sample size of 66 calculated for this study was obtained.The participants were consenting children and young adults between the ages of 1 and 20 years. Using standard methods, data on socio-economic status, personal and family demographics, including household number, mothers' educational attainments and employment status; and asthma control were collected and analyzed. Asthma control was assessed using Asthma control test (ACT) and guided by the original developers scoring, participants were grouped into well controlled, partly controlled and uncontrolled. The Chi-square test was used to test for association between participants' socio-demographic characteristics (age, socioeconomic status, mothers' education and employment, and number of children in the household) and asthma control status at 5% level of significance.

Results

Of all study participants, 34 (51.55%) were male, with mean age (SD) of 11.6 (4.8) years. The mean (SD) age at initial asthma diagnosis was 6.2 (4.6) years. The majority 49(76.5%) of the mothers had tertiary education. Study participants belonging to the poorest; very poor; poor; and least poor socio-economic cadres were, 16 (24.2%); 17 (25.8%); 17 (25.8%); and 16 (24.2%) respectively. Asthma control classification showed that, 26 (39.4%); 31 (47%) and 9 (13.6%) participants had well controlled asthma, partially controlled asthma and uncontrolled asthma respectively. The factors like age, socioeconomic status, mothers 'educational level, employment status and number of children in the household did not show any statistically significant association with the asthma control status of participants.

Conclusions

Asthma control outcome remains multifactorial as participants' socio-demographic characteristics did not impact on the level of control of asthma, among participants in the south eastern parts of Nigeria, despite being in a LMIC. A larger study is recommended to further explore this.

Key words: Asthma control; Children; Socio-demographic.

Introduction

Asthma is a chronic respiratory disorder, characterised by episodic acute exacerbations often triggered by protean factors[1,2]. Its time of onset spans from early childhood to adolescent age, after which onset during adulthood is rare. However, poorly managed early onset asthma, predisposes to worse clinical manifestation in adult life, with associated increased morbidity and mortality[3]. There have been a global increase in the prevalence of asthma among children and adolescents in recent years, and this is worse in the Low and Middle Income Countries (LMICs)[3,4]. This global rise in asthma prevalence has been attributed to multiple factors which could be categorized as host or environmental factors[4–7]. Host factors are age, obesity, genetics (family history of asthma), respiratory infections especially viral, habits like smoking, and allergies. The environmental factors are essentially triggers like dust, pollen, mould and cold weather. Determinants of asthma control in sufferers include occupation, socioeconomic status, adherence to medication, and perception of the disease and its symptoms, and availability of specialty care[8]. The control of asthma depends on the optimal management of all the factors, both host and environmental, taking into consideration the regional and racial variations which exit among these factors. Children from LMICs are disproportionately affected by host factors such as younger age at first attack, frequent upper respiratory tract infection, history of other allergic diseases, and time trend of attacks, family history of asthma, low socioeconomic status as it pertains to poor housing conditions; and environmental factors such as indoor and outdoor pollution[4,5], which predispose to them to poor

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asthma control[4,9,10].

Studies have documented that low socioeconomic status which rely mainly on the occupation, education and wealth index of the family head(s) are associated with adverse health outcomes in asthma in all age groups[11–14]. Despite the evidence on the impact of socioeconomic status on individual's predisposition to episodes of asthma 'flares', researchers have omitted giving equal consideration to its impact on the control of acute exacerbations. Parental income is a major determinant of parents' ability to cope with the financial burden associated with the care of a child with poorly controlled asthma laden with frequent hospital admissions for exacerbations[15]. Also, parental education, particularly education of the mothers translates to healthy practices at home which may limit to a great extent the exposure of the child to triggers of asthma exacerbation[16]. Understanding the extent to which these socio-demographic characteristics(age,socioeconomic status, mothers' education and employment, and number of children in the household) of the child interfere with the level of control of his asthma becomes imperative. In this study we reviewed the variations in the socio-demographic characteristics of children and young adults with asthma with regards to their level of asthma control. Findings from this study may assist clinicians to understand the impact of socio-demographics on asthma control in children and adults in south-east, Nigeria when other determinants such as access to optimal care and adherence to medicines are adequately addressed. This will also strengthen the multipronged approach to asthma management in our practice.

Materials and Methods

Study design

This was a descriptive cross-sectional study done over a period of 9 months (September 2017 – May 2018); where consenting parents of children, and consenting adolescents and young adults between ages 1 to 20 years with physician-diagnosed asthma participating in an economic burden of asthma study[15], were interviewed, as they were consecutively enrolled.

Study population

The hospital from which the study population was obtained, is a major tertiary hospital in Enugu State, southeast, Nigeria which renders services to people that reside in Enugu State and in other south eastern states (Abia Anambra, Ebonyi, Imo states). Economically, Enugu State is predominantly rural and agrarian, with a substantial proportion of its working population engaged in farming. In the urban areas, trading is the dominant occupation, followed by civil service. About 18.8% of the inhabitants are traders while 12.9% are civil servants.

Children and young adults with physician-diagnosed asthma on asthma medications according to the Global Initiative for Asthma (GINA) recommendations[17], and their accompanying caregivers who were attending paediatric asthma clinic of University of Nigeria Teaching Hospital (UNTH), Ituku Ozalla Enugu, South-east Nigeria on follow-up visits; were enrolled into the study.

There were 200 officially registered children whose names were recorded in the clinic register, and these served as the study population.

Sample size calculation

Based on the number of registered children, a minimum sample size calculated for this study was obtained using the formula: n = N*X/(X+N-1), Where X = Zα/22*P*(1-P)/MOE2: where Zα/2 is the critical value of the Normal distribution at α/2. At confidence level of 95%, α of 0.05 and the critical value is 1.96. MOE is the Margin of Error, P is the sample proportion of 5% (range from 2.5% to 9%), with N being the population size of 200 (obtained from the total number of registered children with asthma, during the period of the study).The calculation gave a total of 66 child/parent pair, which corresponded to the sample size number suggested by WHO for a small population, based on 10% level of precision. The other details of the sample size calculation and other components of the methods are as previously published[15].

Data Management and analysis

Data collection: Participants with asthma were recruited consecutively until the minimum sample size was completed.

Table 1. Demographic characteristics and socio-economic status of the participants with Asthma

Participant Characteristics	n	%
Gender		
Male	34	51.5
Female	32	48.5
Mean (SD) age in years	11.6 (4.8)	
Mean (SD) age in years at Asthma diagnosis	6.2 (4.6)	
Mean duration of Asthma	5.4 (3.9)	
*Patients' Academic Performance (n=64)	3	4.6
Poor	12	18.8
Fair	24	37.5
Good	17	26.6
Very good	8	12.5
Excellent		
Mothers' educational levels (n=64)	0	0
None	4	6.3
Primary	11	17.2
Secondary	49	76.5
Tertiary		
Fathers educational levels		
None	0	0
Primary	7	11.5%
Secondary	15	24.6%
Tertiary	39	63.9%
Socio-economic status		
Poorest	16	24.2
Very poor	17	25.8
Poor	17	25.8
Least poor (	16	24.2
Average Household size (SD)	5.98(1.63)	
Number of children in the household (SD)	3.59 (1.4)	

***parental report/self-report**

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Table 2. Asthma control Status details of study participants

Variable	n	%
Daytime Asthma control		
Yes	19	28.8
No	47	71.2
Night time Asthma control		
Yes	21	32.3
No	44	67.7
Regular Salbutamol need		
Yes	25	38.5
No	40	61.5
Activity limitation from asthma		
Yes	16	25
No	48	75
Grade of Asthma Control		
Uncontrolled	9	13.6
Partially controlled	31	47
Well controlled	26	39.4

The assessment of Asthma control was done by the researchers themselves, doctors well-versed on the use of the assessment tools. using parent report and Asthma control test scores (ACT) or Childhood Asthma Control Test (C-ACT) for younger children. The ACT is a validated, five-item, patient-completed measure of asthma control with a 4-week recall period. By summing the five-item scores, three levels of control are identified: scores from 5 to 19 indicate uncontrolled asthma; scores from 20 to 24 indicate partially controlled asthma, and a score of 25 (or 27 for children 4 to 11 years) indicates well (fully) controlled asthma[20,21].

Chi square test was used to check for any associations among the categorical variables. A significant value of $p < 0.05$ was used.

Ethical considerations

Ethical approval for the study was obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla. A written informed consent was also obtained from caregivers of all patients and verbal assent from children above 8 years.

Table 3: Association between participants' socio-demographic characteristics and asthma control status

	Asthma Control			χ^2	p-value
Variable	Partially Controlled N=31(%)	Uncontrolled N=9 (%)	Well controlled N=26 (%)		
Current age of participants 5 years and less More than 5 years	4 (12.9) 27 (87.1)	1(11.1) 8 (88.9)	4 (15.4) 22 (84.6)	0.130†	0.94
SES Quartiles 1 2 3 4	8 (25.8) 6 (19.4) 8 (25.8) 9 (29.0)	2 (22.2) 3 (33.3) 2 (22.2) 2 (22.2)	6 (23.1) 8 (30.1) 7 (26.9) 5 (19.2)	1.644	0.95
Mothers' education (a) Secondary school education or less (b) Tertiary education and above	21 (72.4) 8 (27.6)	7 (77.8) 2 (22.2)	21 (80.8) 5 (19.2)	0.542†	0.76
Mothers' employment status (a) Unemployed (b) Employed	1 28	1 7	4 22	2.361†	0.307
Number of Children in households 3 or less More than 3	16 (51.6) 15 (48.4)	4 (44.4) 5 (55.6)	11 (42.3) 15 (57.7)	0.518†	0.77

Historic information (age at asthma diagnosis, duration of asthma disease, frequency of hospital visits, self/parental report of academic performance), and socioeconomic variables including occupation and educational attainment of both parents and annual family income were obtained using an interviewer-administered questionnaire.

Data analysis: Standard statistical software STATA was used to construct principal component analysis (PCA)-based socioeconomic status (SES). The components used in the construct were economic measures like monetary information on income, food consumption expenditure and variables that capture living standards such as households' items owned[18,19]. The PCA index created divided the household into four equal-sized SES quartile groups: Q1 (Poorest), Q2 (Very Poor), Q3 (Poor), Q4 (Least Poor)[15].

Results

Basic characteristics of study participants

Sixty-six child/parent pair were enrolled into the study, and were included in the data analysis. There were 34 (51.5%) males; with a male: female ratio of 1.06: 1. Mean age in years (SD) at asthma diagnosis was 6.2 (4.6) years. The mean (SD) duration of suffering asthma was 5.4 (3.9) years. All the participants were currently attending schools and about 74.2% of the them had self-reported good academic performance in school despite their asthma diagnosis, table 1.

Socio economic status

The mean (SD) household size was 5.98(1.63) total number

of people, with a mean (SD) number of children of 3.59 (1.4) in each of the households. There were forty-nine (76.5%) of the mothers who had attained tertiary education. The principal component analysis (PCA)-based SES of the children revealed that the poorest of the participants were 16 (24.2%); while the very poor were 17 (25.8%); the poor 17 (25.8%); and the least poor were 16 (24.2%); Table 1.

Level of asthma control

Using the Asthma Control Test (ACT) Scores, a greater number, 31 (47%) participants had partially controlled asthma; while there were 26 (39.4%) who were well controlled. Only a few, 9 (13.6%) had uncontrolled asthma; Table 2.

Association between participants' socio-demographic characteristics and level of asthma control

Table 3 shows the association between the socio-demographic variable and participants' asthma control status. The Participants' age, and SES cadre did not affect their asthma control outcome; Furthermore, the mothers' educational level and employment status, and number of children in the household did not impact on the asthma control level.

Discussion

In the index study we explored the impact of participants' socio-demographic indices on asthma control and we found that the parental socioeconomic status and participants' characteristics such as age at asthma diagnosis and duration of asthma did not have any significant impact on the asthma control outcome. Children and young adults of lower socio-economic status did have better control of their asthma than those from higher socio-economic class. Although the socioeconomic status did not significantly relate with their level of asthma control. This finding is quite different from reports by other workers[4,5,22] which suggests the parents' socioeconomic background impacted significantly on their children's asthma control. While some studies have linked socioeconomic status with adverse health outcomes in asthma; including lower asthma control scores[9,12,13,23]and low quality of life of the children and their parents[24,25], a few other studies just as observed in the index study have found no relationships between socioeconomic status and asthma morbidity in their cohorts[26-28]. Low socioeconomic class translates to poor housing conditions, poor symptom control, increased asthma hospitalization rates and increased economic burden of asthma[14,22,29].

Parental educational and employment status are key determinants of socioeconomic status of the family. Studies have alluded poor asthma control to low level of education of both parents. Low parental education were associated with increased risk of both inpatient and outpatient asthma diagnosis, poorer asthma control, more inpatient hospital care[30,31]; and poor home management of asthma in children[32,33] while higher education in the parents reduced the risk of uncontrolled asthma[34]. Low maternal education have been independently associated with poor asthma control in children[16,35] as mothers are primarily charged with the care of their asthmatic child directly, ensuring home care, medication adherence and regular follow up visits to the clinic. The role of mothers in ensuring optimal home environment for the child cannot be overemphasized. Education of the mothers translates to healthy practices at home. Ungar and colleagues[36] observed that children whose mothers had no post-secondary education had higher probability of being exposed to indoor allergens and having worse asthma outcome. In contrast, maternal education was not significantly associated with asthma control status of participants in the current study.

A number of studies have also attributed poor asthma control in children to 'employment status' of the mother rather than maternal educational level. Children of mothers who worked outside the home environment have been reported to have poorer control of their asthma than those whose mothers worked at home[36]. Although 90% of mothers in the current study worked outside the home, mothers' employment status was not significantly associated with the level of asthma control in their children.

The diverse results obtained in the index study and other studies could be due to different study designs and varying measures of SES rather than differences in sample size. Although the sample size for these studies ranges from 50 to 180 participants in most of the studies[4,9,22-25], to as high as 879 to 1504 in others[13,26], their reports did not consistently show that use of small or large sample size had a significant influence on their findings. For instance, Apter et al[23], reported an association between SES and asthma morbidity in their study involving only 50 children while Hancox[28] and Mowat[26], in their respective studies involving a large population of participants (1000 and 1504) did not find any significant association between SES and asthma severity. Mowat and colleagues[26] concluded that that the link between SES and asthma is related to pattern of health service utilization rather than severity of asthma. Also, because of multiple indicators for SES, there is no uniform definition of SES across these studies. Some researchers used family indicators such as household income, level of educational attainment of parents, home ownership, and insurance status[9,13,23,24,31]; while others used community indicators such as percentage of residents living below the poverty level[37]. Beside the traditional social-class variables (income, education and occupation), the spectrum of social stratification also includes differences in urbanization, home sanitation, family history of atopy, family size and diet[4,24,28]. Braveman and colleagues[37] noted that the use of different variables to assess socioeconomic status in health research has given rise to inconsistent reports. They suggested that health research could be improved significantly with a more conceptually and empirically sound approach to measurement of SES.

Besides the socioeconomic status of parents, other attribute of the child such as age at first attack of asthma/asthma diagnosis, duration of asthma, availability and accessibility of optimal asthma care and medication adherence significantly impact on asthma treatment outcomes[27,30]. We observed that asthma diagnoses in our study participants were made at 6 years of age or less; implying young age at first attack of asthma. Participants' age at diagnosis and duration of asthma were, however, not significantly associated with their level of asthma control. This is because asthma control can be affected by a lot of multiple factors, and if medication and environmental control is put in place, then asthma is likely to be well controlled irrespective of when the diagnosis was first made. Furthermore, any long-term effect of childhood asthma may be seen in the adult population when the children are much older. Such effects of chronic asthma may not be easily discernible in the paediatric cohort.

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Although, participants in this study were not selected by random sampling, we attribute the finding of lack of significant association between socioeconomic status and other participants' characteristics with their asthma control status to the gains of a well-organized, patient centered care being rendered to the patients in our clinic, which enhances collaborative patient/caregiver-provider relationships with improved patient/caregiver participation in asthma care rather than to selection bias. This may explain why children from low SES in the current study had better asthma control than those from high SES although not significantly so. The routine asthma education being rendered on every clinic day to our patients and their caregivers who are mainly mothers irrespective of their educational attainment, in addition to the use of individualized asthma action plan for these children translates to medication adherence and conscious efforts at environmental control of possible triggers by the family.

Study limitations

The information on parental income was based on parents' recall and estimation. Underestimation and possible wrong classification of participants into lower SES quintiles may affect the overall outcome of this index study. Furthermore, Asthma Control Test (ACT) scoring was also based on parents or child's ability to recall and report symptom frequency and severity in the last 4 weeks. Under-reporting of mild or remote symptoms in the ACT questionnaires may contribute to inconsistencies in grading of asthma control scores. These notwithstanding, the study has demonstrated that optimal asthma control in our patients may be attributable to other factors which are not directly linked to their socio-economic status. A larger sample size and specific aspects of medication adherence may have been more revealing on other possible factors that influence control outcomes in asthma. These were however not within the scope of the current study.

In conclusion, the findings in this study supports the fact that the relationship between socioeconomic variables and level of asthma control in children remains inconsistent, may vary with sub-regions and definitely multifactorial. Further studies on a large scale are recommended to fully explore the impact of socio-demographic variables on a child's level of asthma control.

Conflict of Interest

The authors have no conflict of interest to declare

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