



# Significant Burden and Psychological Distress Among Caregivers of Children With Nephrotic Syndrome: A Cross-Sectional Study

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Christopher I. Esezobor<sup>1</sup> , Adaobi U. Solarin<sup>2</sup>,  
and Andrew T. Olagunju<sup>3</sup> 

## Abstract

**Background:** Childhood nephrotic syndrome (NS) follows a chronic course in most children. However, little is known about the psychosocial burden of NS on the caregivers despite evidence that caregiver burden or impairment in their well-being may alter the outcome of chronic childhood illnesses.

**Objectives:** To determine the frequency and predictors of significant caregiver burden and psychological distress among caregivers of children with NS.

**Design:** A cross-sectional study.

**Setting:** Two pediatric nephrology clinics in Lagos, Nigeria.

**Patients:** We included primary caregivers of children with idiopathic NS for at least 6 months.

**Measurements:** The primary outcomes were psychological distress and significant caregiver burden among caregivers.

**Methods:** We interviewed caregivers using the 12-item General Health Questionnaire (GHQ-12) and the 6-item Zarit Burden Interview (ZBI-6). The GHQ-12 scores  $\geq 3$  and ZBI-6 scores  $\geq 6$  indicated psychological distress and significant caregiver burden, respectively.

**Results:** The caregivers were mostly mothers (77.9%) and married (92.4%), whereas the children ( $n = 172$ ) were mainly male (65.1%). Most of the children ( $n = 152$ ; 88.4%) had steroid-sensitive NS including 24 (14%) children with frequent relapses or steroid dependence and 20 (11.6%) with steroid-resistant NS. Of the 172 caregivers, 53 (30.8%) and 30 (17.4%) reported psychological distress and significant burden, respectively. Caregivers of children in relapse had adjusted an odds ratio (aOR) with 95% confidence interval (CI) of 2.45 (1.05–5.67) and 3.30 (1.22–8.92) of psychological distress and significant caregiver burden, respectively. Furthermore, caregivers of male children and those who needed help paying for health care had an aOR of 4.61 (1.34–15.68) and 3.06 (1.06–8.87) of significant caregiver burden, respectively.

**Limitations:** The study was limited by its cross-sectional design and the use of generic rather than disease-specific instruments.

**Conclusion:** One in every 6 caregivers of children with idiopathic NS reported significant caregiver burden, and it was associated with psychological distress. Our findings underscore the need for psychosocial support for caregivers of children with NS, especially those with identifiable vulnerability.

## Abrégé

**Contexte:** Le syndrome néphrotique (SN) de l'enfant suit dans la plupart des cas une évolution chronique. On en sait toutefois peu sur le fardeau psychosocial du SN pour les aidants naturels, malgré qu'il soit prouvé qu'un tel fardeau ou qu'une atteinte à leur bien-être peut altérer l'issue des maladies chroniques de l'enfance.

**Objectif:** Établir la fréquence et les facteurs prédictifs d'un important fardeau des aidants et de la détresse psychosociale chez les personnes qui prennent soin d'un enfant atteint du SN.

**Type d'étude:** Étude transversale.

**Cadre:** Deux cliniques de néphrologie pédiatrique de Lagos au Nigéria.

**Participants:** Ont été inclus les aidants naturels d'enfants atteints du SN idiopathique depuis au moins six mois.

**Mesures:** Les principaux résultats étaient la détresse psychologique et un important fardeau chez les aidants naturels.

**Méthodologie:** Nous avons interrogé des aidants naturels à l'aide d'un questionnaire en 12 points sur l'état de santé général (GHQ-12) et de l'Inventaire du fardeau en six points (*Zarit Burden Interview*—ZBI-6). Un résultat égal ou supérieur à 3 au



GHQ-12 indiquait la présence de détresse psychologique alors qu'un résultat égal ou supérieur à 6 au ZBI-6 signifiait un important fardeau de l'aidant.

**Résultats:** Dans la majorité des cas (77,9 %), l'aidant naturel était la mère et celle-ci était mariée (92,4 %). Les enfants (n = 172) étaient majoritairement des garçons (65,1 %). La plupart des enfants (n = 152; 88,4 %) étaient atteints d'un SN stéroïdosensible, dont 24 (14 %) avaient des rechutes fréquentes ou une dépendance aux stéroïdes. Seuls 20 patients (11,6 %) étaient atteints d'un SN résistant aux stéroïdes. Des 172 aidants naturels inclus, 53 (30,8 %) ont rapporté vivre de la détresse psychologique et 30 (17,4 %) un important fardeau des aidants. Le rapport de cote corrigé (RCc) avec intervalle de confiance à 95 % (IC 95 %) des aidants d'enfants en rechute s'établissait à 2,45 (1,05-5,67) pour la détresse psychologique et à 3,30 (1,22-8,92) pour le fardeau des aidants. En outre, les soignants d'un garçon ou ceux qui avaient besoin d'aide pour payer les soins de santé présentaient respectivement un RCc de 4,61 (1,34-15,68) et de 3,06 (1,06-8,87) pour le fardeau des aidants.

**Limites:** Les résultats sont limités par la nature transversale de l'étude et par l'emploi d'instruments de mesure générique plutôt que spécifiques à la maladie.

**Conclusion:** Une personne sur six s'occupant d'un enfant atteint du SN idiopathique a rapporté un lourd fardeau des aidants associé à de la détresse psychologique. Nos résultats font ressortir le besoin de soutien psychologique pour les soignants d'enfants atteints du SN, particulièrement ceux dont la vulnérabilité est facilement repérable.

## Keywords

nephrotic syndrome, psychological distress, caregiver burden, General Health Questionnaire, Zarit Burden Interview

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## What was known before

Nephrotic syndrome in children has an adverse impact on family functioning. However, only few of these studies have been done and most are limited by small sample size.

## What this adds

Our study, with a relatively large sample size, shows that caregivers of children with idiopathic nephrotic syndrome suffer significant caregiver burden and psychological distress, similar to reports among caregivers of children with other common chronic diseases. Furthermore, we identified caregivers of male children, those having difficulty paying for the child's health care, and those experiencing a recent relapse as the most vulnerable.

## Introduction

Nephrotic syndrome (NS) is the most common glomerular disease in children, worldwide, affecting an estimated 7 to 16 per 100 000 children less than 16 years.<sup>1</sup> Most of the children with NS respond to a course of steroids.<sup>2</sup> However, about 40% to 60% of children with steroid-sensitive nephrotic syndrome

(SSNS) follow a course of frequent relapses or steroid dependence (FRSD), making NS a chronic kidney condition.<sup>3,4</sup> This set of children requires frequent or prolonged courses of steroids and/or other immunosuppressants to maintain long periods of remission. In addition, about 10% to 20% of children with NS develop steroid-resistant nephrotic syndrome (SRNS) form because they fail to achieve remission with high-dose steroids.<sup>2</sup> Most of the children with SRNS have a pattern of glomerular injury, focal segmental glomerulosclerosis, associated with a high risk of end-stage kidney disease.<sup>5</sup> To increase the chances of attaining or maintaining remission, it is recommended to give children with FRSD or SRNS other immunosuppressants such as calcineurin inhibitors, mycophenolate mofetil and rituximab.<sup>6</sup> Importantly, this set of children requires repeated hospital visits and may develop many serious therapy-related adverse effects which adds another layer of needs to their management.

The presence of NS in a child places additional roles and burden on other family members, especially the mother.<sup>7</sup> For example, caregivers of affected children are required to test and record urine protein at home, administer medications for several months, keep clinic appointments, and liaise with the health team. The added burden of care frequently entails loss of work, socioeconomic resources, and social time for the

<sup>1</sup>Department of Paediatrics, Faculty of Clinical Sciences, College of Medicine, University of Lagos, Mushin, Nigeria

<sup>2</sup>Department of Paediatrics and Child Health, Lagos State University College of Medicine, Ikeja, Nigeria

<sup>3</sup>Department of Psychiatry, Faculty of Clinical Sciences, College of Medicine, University of Lagos, Mushin, Nigeria

### Corresponding Author:

Christopher I. Esezobor, Department of Paediatrics, Faculty of Clinical Sciences, College of Medicine, University of Lagos, Idi-Araba, Mushin, Lagos State 100254, Nigeria.

Email: esezobor@gmail.com

caregivers.<sup>7,8</sup> More often, the physical, psychosocial, and economic well-being of the caregivers are affected adversely, albeit to a varied degree depending on several factors including coping resources.<sup>9-11</sup> These potentially stressful effects on the caregivers constitute what is termed caregiver burden<sup>12</sup> and can confer a degree of risk for psychological distress construed as minor mental health morbidity.<sup>13</sup> Importantly, the “stress process model” assumes that caregiving is burdensome (stressful) and may portend declining mental well-being.<sup>14</sup> However, caregiver burden is neither necessary nor sufficient to infer psychological distress.<sup>15</sup> Hence, examining the relationship between psychological distress and caregiving burden is common in caregiver research as it provides an important perspective on the psychosocial burden of caregiving.<sup>16,17</sup> Despite NS being a chronic relapsing condition in most children and the heavy reliance on caregiver’s input in the home management, few studies have examined the psychosocial well-being of caregivers of children with NS.<sup>7,10,18</sup> Indeed, the impact of NS on caregiver’s health has received relatively little attention compared with other chronic childhood illnesses.<sup>19,20</sup> We hypothesized that caregivers of children with NS suffer psychological distress and significant caregiver burden similar to those of children with other chronic illnesses. Because evidence exists to show that caregiver’s health may impact the outcome of chronic illnesses,<sup>21,22</sup> and that measures to improve caregiver’s health exist,<sup>23,24</sup> we investigated caregivers of children with NS for psychological distress and significant caregiver burden. We also investigated factors that could identify caregivers with increased vulnerability to significant caregiver burden and psychological distress.

## Participants and Methods

This observational study was conducted in the Paediatric Nephrology Units of 2 public-funded hospitals in Lagos State, southwest region of Nigeria, over 7 years (February 2012 to April 2019). The 2 hospitals are among the largest tertiary hospitals in Nigeria and receive referrals from within and outside Lagos State.

### Study Participants

We included adult primary caregivers of children aged less than 18 years with NS. The caregivers were included if the child had been treated for NS for at least 6 months. We excluded caregivers of children with secondary NS, chronic kidney disease stage 3-5, and those with other chronic illnesses such as epilepsy, asthma, HIV, cerebral palsy, diabetes mellitus, and structural heart disease. We also excluded caregivers with known psychiatric morbidities such as mania, depression, or schizophrenia. All the caregivers provided written informed consent before enrollment in the study.

### Data Collection

We collected information about caregiver’s sociodemographic characteristics and the clinical course of NS in the child using a data collection form. Information of interest included caregiver’s marital status, relationship to the child, number of children in the family, tribe, socioeconomic class, and the means of paying for the child’s health care. We also reviewed the clinical notes of the children to obtain information about the date of NS diagnosis, response to steroids, clinical course of NS, hospitalization in the prior 6 months before the study, and the use of immunosuppressants such as cyclophosphamide, levamisole, calcineurin inhibitors, and mycophenolic acid derivatives. Next, we interviewed each caregiver using the 12-item General Health Questionnaire (GHQ-12). The GHQ-12 is a well-validated short screening questionnaire for psychological distress or minor mental health morbidity focusing mainly on symptoms of depression and anxiety, with bimodal scores of 0,0,1,1 for each item.<sup>25</sup> The possible range of score is 0 to 12. A score of  $\geq 3$  indicates the presence of psychological distress. Finally, we interviewed each caregiver for the presence of significant caregiver burden using the 6-item Zarit Burden Interview (ZBI) questionnaire. The ZBI questionnaire is a widely validated and reliable instrument that tests caregivers’ perception of their psychological, social, physical health, and financial status as a result of their caregiving role.<sup>26</sup> The 6-item version enjoys shorter interviewer time, good validity, internal consistency and discriminative ability, and high correlation with the original 22-item version.<sup>27,28</sup> Similar to all the other versions, it has a Likert score in the range of 0 to 4 where “0” means “never” and “4” means “nearly always.” The possible range of score for the 6-item version is 0 to 24, with a score  $\geq 6$  indicative of significant caregiver burden. Both GHQ and ZBI have been validated and used widely in research among caregivers of people with chronic illnesses in Nigeria.<sup>29,30</sup>

### Definition of Terms and Case Identification

Nephrotic syndrome and response to steroids were defined according to the 2012 Kidney Disease: Improving Global Outcome Glomerulonephritis guideline.<sup>6</sup> As part of the centers’ protocol, we give calcineurin inhibitors (most often cyclosporine) as the first-line option for children with SRNS; mycophenolate mofetil and rituximab were the second and third options, respectively. For those with FRSD, steroid-sparing options include prolonged prednisolone taper, levamisole, cyclophosphamide, calcineurin inhibitors, or mycophenolate mofetil. We assessed the socioeconomic class of each child using the level of education and occupation of the child’s parents as proposed by Oyedeji.<sup>31</sup> A caregiver was defined as any adult who understood and administered the prescribed medications to the child, liaised with the health care team and performed or supervised urine testing at home.

## Statistical Analysis

The data were analyzed using the IBM SPSS Statistics version 21 (2012; IBM Corporation, Armonk, NY, USA). Continuous data were represented as mean (standard deviation) and median (interquartile range) for normally distributed and skewed data, respectively. Categorical data were summarized as percentages. Furthermore, we performed a univariate analysis, followed by multiple logistic regression, to identify factors associated with caregiver's psychological distress and significant caregiver burden. In the analysis, we included exposures that have been reported in the literature to be associated with adverse caregiver's outcome.<sup>7,10,18</sup> These exposures tested for association were the age and sex of the child, severity features of NS (steroid resistance, frequent relapses or steroid dependence, current relapse, hospitalizations in the last 6 months, and use of nonsteroidal immunosuppressants), and the caregiver's demographic and socioeconomic status (marital status, socioeconomic class, and the ability to pay for health care). We simultaneously entered all the factors in the multiple logistic regression model to address the effects of confounding factors (see Supplemental Material). The results of the univariate and multivariate analyses were presented as odds ratio (OR) with 95% confidence interval (CI) and adjusted odds ratio (aOR) with 95% CI, respectively. Finally, we tested for linear association between GHQ-12 and ZBI-6 scores of the caregivers using Spearman correlation because of the interrelatedness of psychological distress and caregiver burden.<sup>16</sup> A 2-tailed *P* value < .05 was considered statistically significant.

## Results

The study included 172 caregivers of children with NS. Most of the caregivers were mothers (77.9%), of the Yoruba tribe (57.6%), and married (92.4%). About a quarter of them belonged to the high socioeconomic class; only 1 caregiver had health insurance cover. The children (*n* = 172) had a median (interquartile) age of 7.3 (4.6-10.0) years, were mostly male (65.1%), and had lived with NS for a median duration of 13.9 (9.2-31.1) months. Most (*n* = 152; 88.4%) of the children had SSNS including 24 children with FRSD; 20 (11.6%) had SRNS. A total of 30 (17.4%) children needed other immunosuppressants in addition to prednisolone to achieve or maintain remission of NS, and 33 (19.2%) were in relapse at study enrollment. In the 6 months prior to the study, 45 (26.2%) children were hospitalized at least once (Table 1).

### Psychological Distress and Caregiver Burden

The GHQ-12 score ranged from 0 to 12 with a median score of 1 (0-3). A total of 53 (30.8%) caregivers reported psychological distress (GHQ-12 score of  $\geq 3$ ). On the other hand, the ZBI score ranged from 0 to 18 with a median score of 2

**Table 1.** Characteristics of Study Participants.

Child's characteristics	<i>n</i> = 172
Age, median (IQR), years	7.3 (4.6-10.0)
Male, <i>n</i> (%)	112 (65.1)
SSNS: FRSD:SRNS	128:24:20
Time since diagnosis, median (IQR), months	13.9 (9.2-31.1)
In relapse at study enrollment, <i>n</i> (%)	33 (19.2)
Used steroids plus other immunosuppressants, <i>n</i> (%)	30 (17.4)
Hospitalization in the prior 6 months, <i>n</i> (%)	45 (26.2)
Index child as an only child, <i>n</i> (%)	15 (8.7)
Caregiver's characteristics	
Relationship to child, <i>n</i> (%)	
Mother	134 (77.9)
Father	32 (18.6)
Others	6 (3.5)
Marital status, <i>n</i> (%)	
Married	159 (92.4)
Others	13 (7.6)
Socioeconomic status, <i>n</i> (%)	
Low	66 (38.4)
Middle	64 (37.2)
High	42 (24.4)
Tribe, <i>n</i> (%)	
Yoruba	99 (57.6)
Ibo	46 (26.7)
Others	27 (15.7)
Reliance on nonfamily source to pay for health care	39 (22.7)

Note. IQR = interquartile range; SSNS = steroid-sensitive nephrotic syndrome (infrequent relapser); FRSD = frequent relapses or steroid dependence; SRNS = steroid-resistant nephrotic syndrome.

(0-5), and 30 (17.4%) caregivers reported significant caregiver burden (score  $\geq 6$ ). There was a significant positive correlation between the GHQ-12 and ZBI scores (Spearman correlation of 0.383; *P* < .001).

### Factors Associated With Psychological Distress and Caregiver Burden

On univariate analysis (Table 2), only features indicating a more severe form of NS and a recent relapse were associated with caregiver's psychological distress and significant caregiver burden. Caregivers of children in relapse at the time of the study had an OR (95% CI) of 2.6 (1.19-5.66) and 3.16 (1.32-7.54) of psychological distress and significant caregiver burden, respectively, compared with those of children not in relapse. Similarly, caregivers of children who needed immunosuppressants other than prednisolone to achieve or maintain remission had an OR (95% CI) of 2.31 (1.03-5.18) and 3.05 (1.25-7.46) of psychological distress and significant caregiver burden, respectively, compared with those of

**Table 2.** Odds Ratio of Psychological Distress and Significant Burden Among Caregivers of Children With Idiopathic Nephrotic Syndrome.

	Psychological distress		Caregiver's burden	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Child's age at enrollment	1.06 (0.97-1.16)	.190	1.02 (0.91-1.14)	.737
Child's sex: male vs female	1.20 (0.60-2.38)	.606	2.46 (0.94-6.39)	.066
Number of children in the family	1.10 (0.83-1.46)	.513	0.91 (0.64-1.29)	.906
Index child as the only child	1.14 (0.37-3.50)	.825	1.83 (0.54-6.20)	.330
Nonmarried status of caregiver	1.00 (0.29-3.40)	.997	0.85 (0.18-4.05)	.839
Others vs mothers as caregivers	1.12 (0.51-2.47)	.778	1.51 (0.54-4.27)	.433
Family socioeconomic class		.505		.823
Low vs high	1.68 (0.70-4.03)	.249	1.39 (0.48-4.03)	.550
Middle vs high	1.49 (0.62-3.60)	.371	1.33 (0.46-3.88)	.597
Nonfamily sources to health care payment	2.08 (0.99-4.36)	.052	1.95 (0.82-4.61)	.129
Time since diagnosis of nephrotic syndrome, months	1.00 (0.99-1.02)	.711	1.01 (1.00-1.03)	.130
In relapse at study enrollment	2.60 (1.19-5.66)	<b>.017</b>	3.16 (1.32-7.54)	<b>.010</b>
Forms of nephrotic syndrome		<b>.021</b>		.103
FRSD vs SSNS	3.00 (1.23-7.34)	<b>.016</b>	1.15 (0.35-3.73)	.819
SRNS vs SSNS	2.46 (0.93-6.46)	.069	3.09 (1.09-8.74)	<b>.034</b>
Prednisolone plus vs prednisolone only	2.31 (1.03-5.18)	<b>.042</b>	3.05 (1.25-7.46)	<b>.015</b>
Hospitalization of index child in the prior 6 months	1.75 (0.86-3.57)	.123	1.84 (0.80-4.25)	.154

Note. CI = confidence interval; FRSD = frequent relapses or steroid dependence; SSNS = steroid-sensitive nephrotic syndrome (infrequent relapser); SRNS = steroid-resistant nephrotic syndrome.

Bold font indicate  $p$  value < 0.05.

children who did not. Furthermore, caregivers of children with FRSD had an increased OR (95% CI) of 3.00 (1.23-7.34) of psychological distress but not significant caregiver burden than those of children with infrequent relapses. In contrast, caregivers of children with SRNS had an increased OR (95% CI) of 3.09 (1.09-8.74) of significant caregiver burden but not psychological distress compared with caregivers of those with infrequent relapses.

On multiple logistic regression (Table 3), only ongoing relapse at study enrollment was associated with caregiver's psychological distress (aOR [95% CI] of 2.45 [1.05-5.67]). In contrast, the child's sex, reliance on nonfamily sources to pay for the health care needs of the child, and ongoing relapse were associated with significant caregiver burden. Caregivers of male children with NS had an aOR (95% CI) of 4.61 (1.34-15.68) of significant caregiver burden than those of female children. Similarly, caregivers who needed help paying for the child's health care needs and those of children with ongoing relapse had an aOR (95% CI) of 2.91 (1.02-8.29) and 3.30 (1.22-8.92) of reporting significant caregiver burden, respectively.

## Discussion

Management of a child with NS requires significant input from medically untrained family members, usually for a long period of time. In this study, we present findings to support the viewpoint that caregivers of children with NS, like other chronic childhood illness, carry significant burden of care and suffer from psychological distress as a result of their

caregiving role.<sup>18,29</sup> One in 3 and 1 in 6 caregivers of children with NS in this study reported psychological distress and significant caregiver burden, respectively. Importantly, the rates of significant burden and distress in this study are similar to findings among caregivers of children with autism spectrum disorder in a similar setting.<sup>30</sup> However, the proportion of caregivers with psychological distress (17%) in this study is many folds the rate reported in mothers of normal full-term infants (3.7%) in a comparable context.<sup>32</sup>

The onset of a chronic illness in a child imposes an unexpected additional stressor on the caregiving role of parents; it perturbs the balance between the usual demands of parenting, which is stressful in itself, and the intrinsic and extrinsic resources of the family. When the family's coping mechanisms are overwhelmed, a state of distress occurs.<sup>33</sup> Childhood NS requires many additional caregiving activities that include home testing and recording of urine for protein, administration of immunosuppressants, liaising with the medical team, and hospital visits during relapse, major illness, or scheduled clinic appointments. These additional demands on the family may be overwhelming, disruptive, and distressful.<sup>7,10</sup> It is therefore explicable that we found that a third and sixth of caregivers of children with a relatively benign course of NS reported psychological distress and significant caregiver burden, respectively. The few studies that looked at the impact of childhood NS on the family consistently reported that caregivers of children with NS are adversely affected to a varying degree as a result of NS in their children. For example, Mitra and Banerjee<sup>10</sup> reported evidence of moderate and severe

**Table 3.** Independent Predictors of Psychological Distress and Significant Burden Among Caregivers of Children With Idiopathic Nephrotic Syndrome.

Independent variables	Psychological distress		Caregivers' burden	
	Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Child's age at enrollment	1.02 (0.92-1.14)	.707	0.98 (0.86-1.12)	.742
Child's sex: male vs female	1.43 (0.65-3.16)	.372	4.61 (1.34-15.68)	<b>.014</b>
Number of children in the family	1.09 (0.75-1.59)	.660	0.84 (0.52-1.38)	.500
Index child as the only child	1.58 (0.31-8.11)	.581	1.74 (0.24-12.72)	.584
Others vs mothers as caregiver	0.88 (0.37-2.10)	.771	1.32 (0.40-4.33)	.643
Nonmarried status of caregiver	1.09 (0.23-5.09)	.913	0.78 (0.10-6.44)	.818
Family socioeconomic class		.437		.532
Low vs High	1.70 (0.64-4.48)	.288	1.29 (0.37-4.42)	.691
Middle vs High	1.91 (0.69-5.30)	.213	2.00 (0.55-7.27)	.291
Nonfamily sources for health care payment	1.83 (0.78-4.30)	.165	3.06 (1.06-8.87)	<b>.039</b>
Time since diagnosis of nephrotic syndrome	1.00 (0.98-1.01)	.677	1.01 (0.99-1.03)	.486
Forms of nephrotic syndrome		.206		.125
FRSD vs SSNS	2.66 (0.88-8.07)	.083	0.52 (0.10-2.70)	.440
SRNS vs SSNS	2.32 (0.56-9.58)	.246	3.10 (0.59-16.30)	.182
Prednisolone plus vs prednisolone only	1.18 (0.36-3.92)	.787	2.35 (0.55-10.11)	.250
In relapse at study enrollment	2.45 (1.05-5.67)	<b>.037</b>	3.30 (1.22-8.92)	<b>.019</b>
Hospitalization of index child in the prior 6 months	2.00 (0.89-4.48)	.092	2.12 (0.79-5.67)	.137

Note. OR = odds ratio; CI = confidence interval; FRSD = frequent relapses or steroid dependence; SRNS = steroid-resistant nephrotic syndrome; SSNS = steroid-sensitive nephrotic syndrome (infrequent relapser).

Bold font indicate *p* value < 0.05.

depression in 48% of parents of children with NS using the Beck Depression inventory; it is noteworthy that caregivers with high GHQ scores are also at risk of diagnosable psychiatric disorders such as depression, anxiety disorders, and psychosis, among others. Similarly, Mishra et al<sup>7</sup> and Dhooria et al<sup>18</sup> observed that parents of children with NS in India reported lower quality of life than controls using the PedsQL Family Impact Module. The consistent negative correlation between caregiver burden and quality of life in many chronic illnesses means that caregivers of children with NS in this study might have lower quality of life than would have been expected in the absence of NS in the family.<sup>20,34</sup> Our study findings support the viewpoint that caregivers of children of NS, similar to those of children with chronic kidney disease, require supports and interventions aimed at improving their caregiving experience. This is particularly important because evidence indicates that the health of the caregiver impacts on the outcome of chronic illness.<sup>21,22</sup>

Our finding indicates that psychological distress and the presence of significant caregiver burden are closely related; for every unit increase in the GHQ score, there was a four-tenth increase in the ZBI score. The bidirectional nature of this linear relationship means that psychological distress in the caregiver could be a result of significant caregiver burden and vice versa. This relationship further suggests that measures that improve the caregiver's experience may indirectly improve the general well-being of the caregiver.

The additional caregiving demands required for children with either SRNS or FRSD identify them as frequent

predictors of adverse caregiver's psychosocial health in the literature.<sup>10,35</sup> However, similar to the study by Mishra et al<sup>7</sup> among Indian children, we found no significant relationship between either FRSD or SRNS and both caregiver's psychological distress and caregiver burden. The lack of an association in our study may be due to the relatively benign nature of NS and the short duration of follow-up in the children whose caregivers participated in the study.

Inclusion of caregivers of children undergoing a relapse at the time of enrollment in the study allowed us to identify it as a strong predictor of both caregiver's psychological distress and significant caregiver burden. Previous studies on the impact of NS on family health did not report this association; it was unclear from their methodologies whether caregivers of children in relapse were excluded.<sup>7,10,18</sup> Relapse may exert adverse psychosocial effects on the family via several mechanisms. First, it unpleasantly reminds caregivers that NS in the child is not cured yet. Second, a relapse means more frequent urine testing and medication administration, visits to the hospital, and need for laboratory testing. These additional activities increase the cost of health care and potentially disrupt any balance in caregiving already achieved by the family. Furthermore, not being able to meet the child's health care needs increased the likelihood of reporting significant caregiver burden. This is not an unexpected finding, especially in regions of the world such as Nigeria where poverty is rife and out-of-pocket spending for health is the norm.<sup>36</sup> The unexpected financial cost imposed on lean family resources as a result of NS in a child does worsen the subjective perception

of the caregiving role by family members; a relapse reinforces this financial burden. Therefore, it is conceivable that measures that improve family income or scale up coverage of health insurance may improve the experience of caregivers of children with NS. However, the association between socioeconomic class and the impact of NS on the family has been inconsistently reported,<sup>10,18</sup> reflecting the presence of other factors that bear modulating effects on the caregiver's perception of their caregiving role.

The observation that caregivers of male children with NS were about 5 times more likely to report significant burden of care than those of female children was an unexpected finding. In contrast to our finding, Mishra et al<sup>7</sup> documented that, in a cohort of children with NS in India, the caregivers of girl children with NS were more negatively affected than those of male children. In another study involving 70 children with NS in India, Mehta et al<sup>9</sup> showed that aggressive and hyperactivity behaviors were more common in boys with NS, and these behavioral problems correlated with caregiver's anxiety. The preferential value the society, especially in developing countries, places on the male child may explain the increased burden caregivers of male children experienced in this study. For example, in many parts of Africa and Asia, the male child is preferentially enrolled or retained in school and is more likely to be brought to the hospital when sick than the female child.<sup>37,38</sup> In many such regions, the male child is viewed as the heir of the family, and the presence of chronic illness like NS in the male child is viewed as a major threat.

### Limitations

Although this study provides insight into the psychosocial impact of childhood NS on the caregivers, its cross-sectional study design and the use of generic rather than disease-specific instruments may have underestimated the true burden the caregivers bear. Future studies should be longitudinal and include large numbers of children with SRNS and FRSD.

### Conclusion

Caregivers of children with NS, like those of other chronic childhood illnesses, suffer psychologically and experience significant disruptions in their physical, psychological, social, and financial functioning because of their caregiving role. In particular, caregivers of male children with NS and those who need financial support in meeting the health care needs are the most vulnerable. Relapse in children with NS are associated with significant burden and impaired psychological well-being among caregivers. It is conceivable that better management of relapse coupled with needs-based psychosocial support and education can help mitigate the psychosocial impacts of caregiving in children with NS, especially in caregivers with increased vulnerability. Health care practitioners should recognize the burden of caregivers and assist them in improving their caregiving experience and well-being.

### Ethics Approval and Consent to Participate

The research received ethical approval from the Health Research Ethics Committees of both hospitals (ADM/DCST/HREC/353 and LREC/06/10/771).

### Consent for Publication

All authors reviewed and approved the final version of the manuscript for publication.

### Availability of Data and Materials

The data generated in this study are available as a supplemental file.

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### Author Contributions

C.I.E. and A.T.O. conceptualized the study; C.I.E. and A.U.S. collected the data; C.I.E. analyzed the data and drafted the manuscript; all authors interpreted the results and approved the final manuscript for submission.

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### ORCID iDs

Christopher I. Esezobor  <https://orcid.org/0000-0003-1736-4794>  
Andrew T. Olagunju  <https://orcid.org/0000-0003-1736-9886>

### Supplemental Material

Supplemental material for this article is available online.

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