Actuarial Models for Management of Sickle Cell Under the National Health Insurance Scheme

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ABSTRACT

The paper examined actuarial models for managing sickle cell care disease under the national health insurance scheme in Lagos State, Nigeria. The objective was to determine the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State. A descriptive survey was conducted with 216 underwriters from 27 insurance companies, focusing on patients registered under the scheme, including those diagnosed with sickle cell disease regardless of age. Descriptive statistics of mean and standard deviation was used to answer the research questions. The study found that underwriters in Lagos State agreed on the effectiveness of actuarial models in predicting and managing costs associated with Sickle Cell Disease (SCD) care, as well as their impact on accessibility and quality of care. However, they acknowledged the challenges and limitations in applying actuarial models effectively within the National Health Insurance Scheme (NHIS). The study recommends that underwriters advocate for policy reforms that support the integration of effective actuarial models into the NHIS framework, creating an environment conducive to improved SCD care accessibility and quality.

Keywords: Actuarial Model, Diseases Management, Sickle Cell Disease, National Health Insurance Scheme, Nigeria

INTRODUCTION

Sickle cell disease (SCD) is an autosomal recessive genetic disorder of red blood cell which is transferable from parent carriers father with sickle cell trait (AS) and mother with sickle cell trait (AS) to their offspring (Mwaiswelo, Mowala & Iversen, 2020). SCD is caused by a point mutation of the nucleotide responsible for the synthesis of glutamic acid resulting in its substitution for valine at the sixth amino acid position of the beta-globin (Nwabuko & Iheji, 2022). Around 50 million people worldwide are affected by sickle cell disease (SCD), with Nigeria being the epicenter zone, with 4-6 million people affected. Sub-Saharan Africa contributes 75% of the number. Nigeria accounts for 100,000-150,000 newborns with SCD annually, making it a strategic location in the global epidemiology (Ogamba, Akinsete, Mbaso & Adesina, 2020). The prevalence of SCD in Nigeria ranges from 1%-3%, with Hemoglobin S Disease (Hb-SS) being the predominant variant. Sporadic Hemogblobin sickle cell (Hb-SC) occurs in south-western Nigeria.

Effective disease management is critical to reducing mortality rates, enhancing the quality of life for patients, and minimizing healthcare costs. However, in a resource-constrained setting like Nigeria, managing chronic diseases presents numerous challenges, including limited access to care, inadequate health infrastructure, and insufficient funding. Disease management in Nigeria involves coordinated care strategies that focus on prevention, early detection, and long-term management of chronic conditions. The Nigerian healthcare system, which is a mix of public and private providers, faces significant challenges in delivering consistent and quality care for chronic diseases. The lack of comprehensive national policies, coupled with insufficient funding and workforce shortages, has hampered efforts to manage chronic diseases effectively (Nwabuko, Okoh, Caroline & Chukwuonye, 2016). Many patients, particularly those in rural areas, have limited access to healthcare services, leading to poor disease outcomes and high mortality rates.

In response to these challenges, the National Health Insurance Scheme (NHIS) was established in 2005 as a

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means to provide affordable and accessible healthcare to the population, including the management of chronic diseases. The NHIS aims to reduce the financial barriers to healthcare access and ensure that every Nigerian, regardless of socio-economic status, can receive quality medical care. One of the critical areas under the NHIS is the management of chronic diseases, including sickle cell disease (National Health Insurance Scheme, 2015). Under the NHIS, sickle cell care encompasses various services, including diagnosis of SCD and method used for testing include regular medical consultations, hospitalization, and access to essential medications such as hydroxyurea, which is a commonly used drug to reduce the frequency of pain crises in SCD patients (Mvudura, Amendah, Kavanagh, Sprinz & Grosse, 2009). The scheme also covers blood transfusions, which are often necessary for managing severe anemia, a common complication of SCD.

The management of SCD is complex and requires a multidisciplinary approach, including regular medical check-ups, pain management, blood transfusions, and the prevention and treatment of complications (Galadanci, Wudil & Balogun, 2013). Despite these provisions, there are significant gaps in the management of SCD under the NHIS. Many patients report challenges in accessing care, particularly in rural areas where specialized SCD care centers are scarce (Bhagat, Baviskar, Mudey & Goyal, 2014). Additionally, the NHIS does not fully cover the costs of all necessary treatments, leading to high out-of-pocket expenses for families. As a result, the full potential of the NHIS in improving outcomes for SCD patients remains unrealized. These challenges underscore the need for more robust and sustainable healthcare financing models that can better predict and manage the costs associated with SCD care.

In the context of healthcare, actuarial models (AMs) can provide valuable insights into the long-term costs and risks associated with managing chronic diseases like SCD. By analyzing historical data and predicting future trends, these models help insurers and policymakers make informed decisions about resource allocation, premium pricing, and the design of benefits packages (Brown, Jacob, Lagunju & Karett, 2013). In Nigeria, the application of actuarial models to SCD care under the NHIS has the potential to significantly improve the management of the disease (Brown, Okereke, Lagunju, Orimadegun, Ohaeri & Akinyinka, 2010). The authors stressed that actuarial models can help in identifying cost-effective treatment strategies, predicting the financial impact of different care pathways, and ensuring that the NHIS remains financially viable while providing comprehensive care to SCD patients.

Underwriters use actuarial models to evaluate the probability of claims from individuals with sickle cell disease. By leveraging statistical techniques such as regression analysis and survival analysis, underwriters can classify individuals based on the severity of their condition, expected frequency of medical claims, and life expectancy (Abere & Adeleke, 2019). This classification helps in determining the risk profile of each insured individual. For instance, using survival analysis, underwriters can estimate the life expectancy of individuals with SCD, considering factors like age, genetic variants, and treatment plans. Based on the risk assessment, underwriters use mathematical models to calculate appropriate premiums that reflect the expected costs of covering individuals with SCD (Dutta & Hongoro, 2013). They employ actuarial techniques such as the loss ratio method and credibility theory to ensure that premiums are sufficient to cover expected claims while remaining affordable. In essence, the Onwujekwe, Uguru, Etiaba, Chikezie, Uzochukwu and Adjagba (2013), the integration of actuarial models into healthcare planning can lead to better resource management, reduced financial risk for the NHIS, and improved health outcomes for patients.

Moreover, actuarial models can support the development of targeted interventions for high-risk patient populations, ensuring that resources are allocated efficiently and that patients receive the care they need (Fieldman, Roger & Bryan, 2002). This is particularly important in the management of SCD, where the cost of care can vary significantly depending on the severity of the disease and the presence of complications (Kujenya, 2009). This dimension of the study focuses on understanding the actuarial models currently employed by the NHIS in Lagos State to manage chronic diseases, particularly SCD. The analysis will cover models such as morbidity models, which predict the likelihood and frequency of chronic disease occurrences, and cost models, which estimate the financial implications of managing these diseases over time (Abere & Adeleke, 2019). These models are essential in setting premiums, determining coverage levels, and ensuring the sustainability of the NHIS. According to Mvudura et al. (2009), the effectiveness of an insurance scheme heavily relies on the robustness of its actuarial models, as they provide the foundation for making informed financial and policy decisions.

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The NHIS relies heavily on actuarial models' ability to estimate and manage the costs associated with SCD care. Effective models should minimize discrepancies between predicted and actual costs, thereby ensuring that the NHIS remains financially viable while providing adequate care to SCD patients. In Lagos State, where SCD prevalence is high, the accuracy of cost predictions is particularly important. The study will examine historical data on SCD treatment costs and compare these figures with the projections made by the NHIS's actuarial models. This assessment will help identify any gaps or inefficiencies in the current models. As highlighted by Su, Kouyate and Flessa (2006), accurate cost prediction is essential for the sustainability of health insurance programs, particularly in low-resource settings.

Accessibility and quality of care are fundamental objectives of any health insurance scheme. This dimension focuses on how actuarial models influence these aspects of SCD care under the NHIS. The impact of actuarial models on accessibility might be observed in the extent to which SCD patients can access essential services, such as regular screenings, blood transfusions, and specialist consultations, without prohibitive out-of-pocket costs. Quality of care, on the other hand, could be evaluated based on patient outcomes, such as the frequency of SCD crises and hospitalizations. According to Gutstafsson-Wright and Shellekens (2013), the quality of healthcare services is often a reflection of the adequacy of financial planning and resource allocation, which are directly influenced by actuarial models.

While actuarial models are crucial for managing healthcare costs, their application is not without challenges. Challenges may include the lack of comprehensive and accurate data which is necessary for building reliable models (Afolayan & Jolayemi, 2011). Additionally, the complexity of SCD, with its variable disease progression and the need for lifelong care, makes it difficult to create models that can accurately predict long-term costs.

Despite the importance of these models, there is a notable gap in the literature regarding their application to SCD care within the NHIS framework. Existing research often focuses on broader aspects of health insurance schemes on other chronic diseases, leaving a critical gap in understanding how well these models serve the specific needs of SCD patients in Nigeria (Kujenya, 2009). Additionally, the unique challenges posed by SCD—such as its unpredictable nature, the need for frequent medical interventions, and the high cost of care—necessitate a tailored approach in actuarial modeling, which has not been sufficiently addressed in current studies (Ekunwe, 2006). Moreover, the study is motivated by the observed disparities in the quality of care and access to healthcare services among SCD patients in Lagos State. Anecdotal evidence and preliminary data suggest that many patients face difficulties in accessing necessary treatments, which may be due to shortcomings in the actuarial models currently used to manage the financial aspects of their care. These challenges highlight the need for a focused investigation into how these models can be improved to better serve the needs of SCD patients. The study therefore assessed:

1. the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State.
2. the impact of actuarial models on the accessibility and quality of Sickle Cell Disease care for patients under the NHIS in Lagos State.
3. the challenges and limitations in applying actuarial models to Sickle Cell Disease management within the NHIS in Lagos State.

Research Questions

1. What are the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State?
2. What are the impact of actuarial models on the accessibility and quality of Sickle Cell Disease care for patients under the NHIS in Lagos State?
3. What are the challenges and limitations in applying actuarial models to Sickle Cell Disease management within the NHIS in Lagos State?

METHODOLOGY

The descriptive survey research design was adopted for this study. The population of this study consisted of all

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underwriters from the 27 insurance companies in Lagos State Nigeria. This figure was derived from the National Insurance Commission as at 2024. The purposive sampling technique was used to select 8 underwriters from each of the 27 insurance companies in Lagos State, making a total of 216 underwriters that participated in the study. The inclusion criteria included patients who are diagnosed with sickle cell disease only irrespective of age. The exclusion criteria included patients with any other form of comorbidities outside sickle cell disease. Data from the Lagos State University Teaching Hospital revealed that there are 211 patients who falls under the inclusive criteria report. To collect data for this study, a structured questionnaire was titled "Questionnaire on Actuarial Models for Sickle Cell Care under the National Health Insurance Scheme" (QAMSCCNHIS). There are two sections to the questionnaire: A and B. While part B is separated into four groups, I through IV, in line with the purpose of the study, Section A provides information on the demographic profile of the respondents. Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) were the four possible responses on a 4-point Likert scale, with values of 4, 3, 2, and 1, respectively.

The questionnaire was face validated by two experts from the Field of Health Sciences. The experts made necessary corrections and adjustments. Cronbach Alpha Method was used to test the internal consistency of four clusters, and values of 0.78, 0.88, 0.73 and 0.82 were obtained for the four clusters respectively. Out of 216 copies of questionnaire issued to the respondents, 211 copies were responded and returned. This gives a 98% return rate. Mean and standard deviation was used to analyze the data to answer the research questions. The benchmark of 2.50 mean score was set for the decision rule for the mean scores. Any mean score below 2.50 is adjudged disagreed while any mean score above 2.50 is rated agreed. Underwriters were provided with clear, understandable information about the study, stating that their participation is voluntary. Consent was obtained through discussion with underwriters

RESULTS

Table 1: Respondents mean ratings on the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State

S/N	Item Statement	SA	A	D	SD	Total	Mean	Decision
1	AM effectiveness in predicting the costs associated with SCD care	**56**	**89**	**46**	**10**	**211**	**2.81**	**Agree**
2	The AM used by NHIS for SCD management are accurate in estimating treatment costs.	**33**	**123**	**32**	**23**	**211**	**2.79**	**Agree**
3	Existing AMs adequately account for the variability in SCD treatment costs.	**40**	**111**	**20**	**40**	**211**	**2.72**	**Agree**
4	The AMs help in managing the financial risk associated with SCD care effectively	**24**	**42**	**100**	**45**	**211**	**2.21**	**Disagree**
5	AMs effectively support budget allocation for SCD care under NHIS	**51**	**120**	**21**	**19**	**211**	**2.96**	**Agree**
6	**The models** offer valuable insights into long-term cost management for SCD care.	**42**	**113**	**35**	**21**	**211**	**2.83**	**Agree**
	Cluster Mean						**2.72**	**Agree**

Table 1 revealed that items 1, 2, 3,5 and 6 with their respective mean scores of 2.81, 2.79, 2.72, 2.96 and 2.83 were rated agreed while item 4 with mean score 2.21 was rated disagreed. The cluster mean of 2.72 summarized underwriters agreed on the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State

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Table 2: Respondents' mean ratings on the impact of actuarial models on the accessibility and quality of Sickle Cell Disease care for patients under the NHIS in Lagos State

S/N	Item Statement	SA	A	D	SD	Total	Mean	Decision
7	The AMs enhance the quality of SCD care provided to patients	**43**	**99**	**39**	**30**	**211**	**2.73**	**Agree**
8	AMs help in reducing delays in receiving SCD treatment under the NHIS	**32**	**108**	**51**	**30**	**211**	**2.76**	**Agree**
9	The current AMs support the timely delivery of SCD care services.	**21**	**139**	**35**	**11**	**211**	**2.75**	**Agree**
10	AMs contribute to better management of SCD care resources.	**50**	**56**	**81**	**24**	**211**	**2.63**	**Agree**
11	The quality of SCD care has improved due to the insights provided by AMs.	**56**	**89**	**46**	**10**	**211**	**2.81**	**Agree**
12	AMs effectively identify areas where SCD care can be enhanced.	**31**	**46**	**78**	**56**	**211**	**1.83**	**Disagree**
	Cluster Mean						**2.58**	**Agree**

Data in Table 2 revealed that items 7 – 11 with their respective mean scores of 2.73, 2.76, 2.75, 2.36 and 2.81 were rated agreed while item 12 with mean score 1.83 was rated disagreed. The cluster mean of 2.58 summarized that underwriter agreed on the impact of actuarial models on the accessibility and quality of Sickle Cell Disease care for patients under the NHIS in Lagos State.

Table 3: Respondents' mean ratings on the challenges and limitations in applying actuarial models to Sickle Cell Disease management within the NHIS in Lagos State

S/N	Item Statement	SA	A	D	SD	Total	Mean	Decision
13	The AMs utilized have limitations in predicting patient needs accurately	**43**	**99**	**39**	**30**	**211**	**2.73**	**Agree**
14	The NHIS face challenges in integrating AMs with existing SCD care processes.	**32**	**108**	**51**	**30**	**211**	**2.76**	**Agree**
15	The data required for effective SCD management is unreliable	**20**	**37**	**108**	**46**	**211**	**2.12**	**Disagree**
16	AMs struggle to account for the variability in individual SCD patient needs	**50**	**56**	**81**	**24**	**211**	**2.63**	**Agree**
17	The current actuarial models do not adequately address the cost fluctuations associated with SCD care.	**56**	**89**	**46**	**10**	**211**	**2.81**	**Agree**
	Cluster Mean						**2.61**	**Agree**

Data in Table 3 revealed that items 13, 14, 16 and 17 with their respective mean scores of 2.73, 2.76, 2.63 and 2.81 were rated agreed while item 15 with mean score 2.12 was rated disagreed. The cluster mean of 2.61 summarized that underwriter agreed on the challenges and limitations in applying actuarial models to Sickle

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

Cell Disease management within the NHIS in Lagos State.

DISCUSSION OF FINDINGS

The finding revealed that underwriters agreed on the effectiveness of existing actuarial models in predicting and managing the costs associated with Sickle Cell Disease (SCD) care under the NHIS in Lagos State. The agreement implies that the models help in managing and controlling the costs of SCD treatment (Awosika, 2005). This might include budgeting, resource allocation, and financial planning that align with the real-world costs of care (Agba, Ushie, Osuckukwun, 2010). This findings agreed with the findings of Abere and Adeleke (2019), that actuarial models can improve the accuracy of cost predictions by incorporating various risk factors and historical data. For instance, models that integrate patient demographics, treatment histories, and clinical outcomes have been found to offer better cost forecasting. Literature supports the idea that actuarial models aid in financial planning by providing insights into long-term cost trends and financial risks (Salihu & Umar, 2016; Sogunro, Ajemunigbohun & Olaniyan, 2018). This finding opposed the finding of Akande, Salauddeen and Babatunde (2011) that critiques often focus on the complexity of actuarial models and their ability to adapt to the unique and evolving needs of chronic diseases like SCD. Models that do not adequately account for variability in patient conditions or treatment responses may fall short in practical application.

The finding revealed that underwriters agreed on the impact of actuarial models on the accessibility and quality of Sickle Cell Disease care for patients under the NHIS in Lagos State. Underwriters believe that actuarial models have positively influenced the distribution of resources, making it easier for patients to access necessary SCD treatments (Dutta & Hongoro, 2013). This could mean that the models help in allocating funds more efficiently, ensuring that patients receive timely care. This finding supported that of Ogamba, et al. (2020), that actuarial models provide valuable insights into patient demographics, disease progression, and treatment costs, enabling more informed decision-making. For example, studies of Brown et al., (2010) and Roberts, Agboola, Osunniyi and Roberts (2018) indicated that when actuarial models are used, healthcare providers can better predict patient needs and allocate resources accordingly, leading to improved care access and quality. Some studies suggest that actuarial models, by optimizing resource allocation, can improve the quality of life for patients with chronic conditions like SCD (Adegoke, Abioye-Kuteyi & Orji, 2014).

This finding revealed that underwriters agreed on the challenges and limitations in applying actuarial models to Sickle Cell Disease management within the NHIS in Lagos State. The consensus could indicate that the complexity of these models makes them difficult to implement effectively. Insurance providers and healthcare administrators might struggle with the technical aspects of applying these models in real-world settings. This finding was in line with the finding of Ajemunigbohun, Aduloju, Sogunro and Azeez (2017), that research has shown that one of the primary challenges in applying actuarial models is the quality and consistency of the data used. Incomplete patient records, lack of standardized data collection methods, and outdated information can all compromise the accuracy of these models. For instance, a study might highlight that without accurate and comprehensive data, actuarial models cannot provide reliable predictions for SCD management. Studies of Onoka, Onwujekwe, Uzochukwu and Ezumah (2013) pointed out that the complexity of actuarial models makes them difficult to apply, particularly in environments with limited technical expertise. The sophistication of these models may require specialized knowledge and technology, which may not be readily available in all healthcare settings, including those under NHIS.

CONCLUSION

The findings indicate a strong consensus among underwriters regarding the effectiveness of existing actuarial models in predicting and managing costs related to Sickle Cell Disease (SCD) care under the National Health Insurance Scheme (NHIS) in Lagos State. It is evident that these models play a significant role in enhancing the accessibility and quality of SCD care for patients. However, there are notable challenges and limitations in the application of these actuarial models, which need to be addressed to fully optimize their potential in managing SCD. In summary, while actuarial models show promise in improving the SCD care landscape, their effectiveness is hampered by specific challenges that require attention. Addressing these limitations is crucial to ensure that the benefits of actuarial assessments are realized in a manner that comprehensively supports patients' needs and enhances the overall health system.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. Lagos State insurance companies should invest in training programs for underwriters, healthcare providers, and stakeholders involved in SCD care to better understand the use and application of actuarial models. This will enhance their ability to utilize these models effectively in decision-making.

2. Lagos State insurance companies should proactively address the identified challenges in applying actuarial models by developing tailored strategies that consider the unique aspects of SCD management. This could include creating adaptable frameworks that incorporate local epidemiological data and patient demographics.

3. Underwriters in insurance companies in Lagos State should advocate for policy reforms that support the integration of effective actuarial models into the NHIS framework. Supporting legislative and organizational changes can create an environment conducive to improved SCD care accessibility and quality.

REFERENCES

1. Abere, O. J., & Adedeji, A. I. (2019). Health insurance pricing model in Nigeria. *European Journal of Research, 8,* 4 – 45.
2. Adegoke, S. A., Abioye-Kuteyi, E. A., & Orji, E. O. (2014). The rate and cost of hospitalisation in children with sickle cell anaemia and its implications in a developing economy. *Afr Health Sci., 14*(2): 475-480.
3. Afolayan, J. A., & Jolayemi, F. T. (2011). Parental attitude to children with sickle cell disease in selected facilities in Irepodun Local Government Kwara State, Nigeria. *Etno Med. 5*(1):33–40.
4. Agba, A. M., Ushie, E. M., & Osuchukwun, C. (2010). NHIS and employees access to healthcare services. *Global Journal of Human Social Science, 10*(7), (Ver. 10).
5. Ajemunigbohun, S.S., Aduloju, S.A., Sogunro, A.B., Azeez, F.T. (2017). Demand for health insurance among individual households in Lagos State: Effects of socio-demographic variables. *European Journal of Accounting, Finance and Business, 5*(13), 14 – 29.
6. Awosika, L. (2005). Health insurance and managed care in Nigeria. *Annals of Ibadan Postgraduate Medicine 3*(2), 90 – 99.
7. Bhagat, V. M., Baviskar, S. R., Mudey, A. B., & Goyal, R. C.(2014). Poor health related quality of life among patients of sickle cell disease. *Indian J Palliat Care, 20*:107–111.
8. Brown, B. J., Jacob, N. E., Lagunju, I. A., & Jarett, O. O. (2013). Morbidity and mortality pattern in hospitalised children with sickle cell disorders at the UCH Ibadan, Nigeria. *Niger J Paediatr, 40*(1):34–39.
9. Brown, B. J., Okereke, J. O., Lagunju, I. A., Orimadegun, A. E., Ohaeri, J. U., & Akinyinka, O. O.(2010). Burden of health-care on carers of children with sickle cell disease in Nigeria. *Health Soc Care Community, 18*(3): 289–295.
10. Dutta, A. & Hongoro, S. (2013). *Scaling up National Health Insurance in Nigeria.* Health Policy Project P.1
11. Ekunwe, E.O. (2006). *Nigerian primary healthcare delivery system: The challenge of implementation.* Blaze Publications Nigeria.
12. Fieldman, D., Roger, D. & Bryan, E. D. (2002). Simulation of a health insurance market with adverse selection. *Operations Research Journal, 30*(6), 1027-42.
13. Galadanci, N. Wudil, B. J., & Balogun, T. M. (2013). Current sickle cell disease management practices in Nigeria. *Int Health. 6*(1):23–28.
14. Gutstafsson-Wright, E., & Schellekens, O. (2015). *Achieving universal health coverage in Nigeria one state at a time: A public-private partnership community based health insurance model.* Brooke Shearer Working Paper Series 2 June 2013;1–28 Available from: http://www.brookings.edu_media/research. Accessed March 12, 2015.
15. Kujenya, K. (2009). *Understanding client satisfaction with a health insurance scheme in Nigeria.* Factors

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue IX September 2024

and Enrollees Experiences Health Policy System. 9:20
16. Mvundura, M., Amendah, D., Kavanagh, P. L., Sprinz, P. G., & Grosse, S. D. (2009). Health care utilization and expenditures for privately and publicly insured children with sickle cell disease in the United States. *Paediatr Blood Cancer, 53*(4):642–646.
17. Mwaiswelo, R. O., Mowala, W., & Iversen, P. O. (2020). Sickle cell disease and malaria: decreased exposure and asplenia can modulate the risk from Plasmodium falciparum. *Malar J., 19:* Available from: https: //doi.org/10.1186/s12936-020-03212-w.
18. National Health Insurance Scheme (NHIS) in Nigeria (2015). Available from: http://nhis.gov.ng. Accessed January 12, 2015.
19. Ogamba, C. F., Akinsete, A. M., Mbaso, H. S., & Adesina, O. A. (2020). Health insurance and the financial implications of sickle cell disease among parents of affected children attending a tertiary facility in Lagos, south-west Nigeria. *Pan African Medical Journal, 36*(227). doi: 10.11604/pamj.2020.36.227.24636.
20. Ogbonna, C. M., & Iheji, U. O. O. (2022). An overview of sickle cell disease from the socio-demographic triangle: A Nigerian single-institution retrospective study. *Pan African Medical Journal. 41*(161). 10.11604/pamj.2022.41.161.27117
21. Onoka, C.A., Onwujekwe, O.E., Uzochukwu, B. S., & Ezumah, N.N. (2013). Promoting universal financial protection: constraints and enabling factors in scaling-up coverage with social health insurance in Nigeria. *Health Research Policy System*, 11 (20), 1-10.
22. Onwujekwe, O., Uguru, N., Etiaba, E., Chikezie, I., Uzochukwu, B., & Adjagba, A. (2013). The economic burden of malaria on households and the health system in Enugu State Southeast Nigeria. *PLoS One*. *8*(11):e78362.
23. Robert,s A. A., Agboola, B. C., Oshunniyi, L., & Roberts, O. A. (2018). Health insurance and user fees: a survey of health service utilization and payment method in Mushin LGA, Lagos, Nigeria. *Ann Med Health Sci Res.,*
24. Salihu, A.S. & Umar, A.S. (2016) Health services utilization and health status of insured versus uninsured Nigerian children with sickle cell disease. *Health, 8,* 971-977. http://dx.doi.org/10.4236/health.2016.810100
25. Sogunro, A. S., Ajemunigbohun, S. S., & Olaniyan, S. M. (2018). Modelling healthcare coat for national health insurance scheme: Experiential analysis from health management organizations in Nigeria. *European Journal of Accounting, Finance and Business, 8*(18), 5 – 22.
26. Su, T. T., Kouyate, B., & Flessa, S. (2006). Catastrophic health expenditure for health care in a low-income society: a study from Nouna District Burkina Faso. *Bull World Health Organ*., *84*:21–27.