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Improving efficiency in healthcare: Effects of deploying electronic claims management system on the implementation of a sub-national health insurance schemes in Anambra state, Nigeria

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SUMMARY

Objective: As healthcare becomes increasingly important to the economic and social development of any nation, the problems healthcare providers face in terms of efficiency and speed of service delivery need to be addressed. By deploying an electronic claims management system, these issues can be resolved, leading to improved efficiency in healthcare. This study examines the effects of deploying an electronic claims management system on the implementation of a sub-national health insurance scheme in Anambra State (ASHIS), Nigeria.

Methods: A qualitative study was conducted in Anambra state, Nigeria. Data were collected from stakeholders- health insurance managers and ASHIS-accredited healthcare providers- who play critical roles in claims management. Twenty in-depth interviews were conducted with the stakeholders to explore their experience and effectiveness of electronic claims management system. Data were analysed using a thematic approach.

Results: Manual claims management was stated to be cumbersome, time-consuming and error prone. The analysis revealed that implementation of the electronic claims management system increased the efficiency of the ASHIS in terms of speed, accuracy, transparency, convenience and cost savings. Furthermore, the system also resulted in greater customer satisfaction among the health service users. However, few respondents claimed that poor internet connectivity often challenges the process.

Conclusion: The study highlights the importance of deploying electronic claims management systems in providing efficient healthcare services, hence, the need to ensure its sustainability.

Keywords: Anambra state health insurance scheme; Claims; E-claims management system; Reimbursement

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INTRODUCTION

In recent times, increasing global commitment to Universal Health Coverage (UHC) has triggered health financing policies and investments to improve access to health services and financial risk protection, particularly in many Low- and Middle- Income Countries (LMICs) [1]. Globally, social health insurance has been recognized as a strong and important financing mechanism capable of enhancing access to care and improving financial protection by mitigating the detrimental effects of user fees towards the attainment of UHC [2]. Consequently, many developing countries have introduced social health insurance schemes [3,4].

However, the performance of the health financing mechanisms adopted largely depends on the provider payment and service delivery methods. Globally, the predominant Provider Payment Mechanisms (PPM) used include Fee-For-Service (FFS), capitation, Diagnostic-Related Group (DRG) and mixed payment methods [5]. Although these PPM assisted in shaping health financing, health outcomes and access to quality healthcare are somewhat attributed to the way health providers' claims for services delivered are reimbursed [6]. This implies that the claims management system – submission, processing and reimbursement of claims is critical to the success of any health insurance system. For instance, delayed and unpredictable reimbursement of claims to health providers is proven to challenge the efficient delivery of healthcare to clients [7-9] and threatens the sustainability of health insurance schemes [10].

Manual system of claims management has been proven to result in unpaid claims due to errors and fraudulent claims [11]. Evidence shows that given the complex nature of claims management, the huge cost of a manual (paper-based) claims management system poses major threat to the performance and sustainability of health insurance schemes [12]. Consequently, insurance agencies seek efficient and innovative methods such as full digitalization of operations using electronic claims (e-claims) management system which significantly improve operational efficiency in healthcare financing, which is considered critical for a well-functioning healthcare system [13].

Several studies have underlined the benefits derived from digitalizing claims management over a paper-based claims system, including allowing for cost-reallocation; facilitating automated pre-payment control; reducing error and fraudulent claims; providing transparent and reliable processes; cost-savings by freeing staff from tedious schedules [14] and reduction of denied claims costs [12]. Hence, digitalizing every step of claims management, from submission of claims to reimbursement, has the potential to boost operational efficiency and overall performance of a health financing mechanism.

As part of renewed efforts at pursuing sustainable healthcare financing mechanisms that promote UHC, in 2016, the Anambra state government launched a sub-national social health insurance scheme – Anambra State Health Insurance Scheme (ASHIS). The goal of the scheme is to provide access to quality, affordable and efficient health services for every resident of the State [15,16]. The scheme which commenced in 2018 is managed by the Anambra State Health Insurance Agency (ASHIA). The principal objective of the agency is to promote, regulate, supervise, implement, and ensure the effective administration of the scheme [15].

The membership of ASHIS comprises all residents of Anambra State including employees of the public and Organized Private Sector (OPS), employees in the informal sector, and vulnerable persons [15]. The scheme is financed through premiums (basically payroll taxes and private contributions), state government subsidies (general and earmarked taxes), and other sources such as donations, donor funds, etc. [15]. Actuarists determine the premium rate be contributed. The ASHIA operational guideline specifies the contributions as follows: i) Earnings for the public and OPS employees where an employer pays 10 per cent of the basic salary while the employee contributes 5 per cent of the basic salary to cover a principal with the spouse and four biological children below 21 years. For employees of the OPS, the employer may decide to pay the entire contribution for the employees. ii) Equity fund established for the vulnerable persons. iii) Fixed contributions for the informal sector. In addition, an enrolee makes a co-payment of only 10 per cent of the cost of medications prescribed by the Health Care Providers (HCPs) at the point of care whether as outpatient or inpatient [15,16]. The scheme operates a single pool as stipulated by the law which established it. The ASHIS covers a basic package of services including promotion, prevention, curative and rehabilitative health care services provided at the primary, secondary and tertiary levels of care at both private and public health facilities [15,16]. The provider payment mechanism is through capitation for primary care and Fee-For-Service (FFS) for secondary and tertiary care. Capitation is paid in advance for a defined population for an agreed amount monthly to the HCPs while FFS is paid by the agency when claims have been submitted and processed [15,16].

Claims management was done manually at the commencement of the scheme in 2018. However, ASHIA introduced an e-claims management system in early 2022 as a more efficient method of claims management following anecdotal evidence that manual claim management which it had employed posed several financial, administrative, and service delivery challenges such as erroneous claims, inflation of bills, delays in submission, processing, and reimbursement of claims to HCPs. These challenges affected the efficiency and overall performance of the scheme and therefore posed existential threat to her.

There is a dearth of empirical evidence on the effectiveness of e-claims management for improving efficiency in healthcare within ASHIS. In addition, study designs targeted to evaluate the effect of the e-claims management system could be informed by operational research to understand whether the e-claims management system is achieving its desired objectives of improving health system performance. Such evidence would inform policymakers, health insurance managers, health insurance advocates and HCPs not only in Nigeria but other low-and-middle-income countries. The study assessed stakeholders' experiences on the effects of deploying an electronic system of claims submission, processing, and reimbursement in the implementation of ASHIS in southeast, Nigeria.

METHODS

Study design and area

This was a cross-sectional qualitative method where an In-Depth Interview (IDI) was used to collect information on stakeholders' experiences of switching from a paper-based system of claims preparation, submission, processing, and reimbursement to an electronic method and the effects of e-claims system on the implementation of ASHIS.

The study was conducted in Anambra state, Nigeria. The projected population of the state in 2022 is six million persons with an estimated annual growth rate of 2.8 per cent [17]. Politically, Anambra state is divided into three senatorial zones: Northern, Central, and Southern. The State has twenty-one Local Government Areas (LGAs) for administrative purposes. The State Ministry of Health (SMOH) coordinates the health system which is organized into three tiers: primary, secondary, and tertiary levels of healthcare. Anambra State Health Insurance Agency has the sole mandate of managing the ASHIS. The provision of healthcare services under ASHIS is done at both private and public hospitals across rural and urban areas of the state [17].

Study population and sampling technique

The study involved two categories of stakeholders - policymaker's/health insurance managers and ASHIA-accredited HCPs who are directly involved in claims management. Junior officers of the ASHIS who are not involved in claims management and HCPs whose health facilities are not accredited to provide services for the scheme were excluded from this study.

Policymakers and health insurance managers were

purposively selected to include those who are directly involved in claims management and approval. These respondents include the Chief Executive Officer of ASHIA; the Technical Assistant to the Governor on Health Insurance; Heads of the various departments of ASHIA (Marketing and Business Development, Planning Research and Statistics (PRS), Administration and Human Resource, Finance, Internal Audit and Accounts, Information, Communication and Technology (ICT) and Health Services Standards and Quality Control) and ASHIA LGA Desk officers. For the health facilities, a multistage sampling of ASHIA-accredited HCPs was adopted. First, the state was stratified into three senatorial zones. Second, Simple Random Sampling (SRS) method was used to select two senatorial zones. Third, the SRS method was used to select a total of four LGAs (two per senatorial zone comprising one urban and one rural LGA in each of the two selected senatorial zones) to ensure representation of geographical locations. In the fourth stage, we purposively selected ten (10) facilities from an updated list of ASHIA-accredited health facilities for the selected four LGAs on the basis of number of enrolees managed (above 500), facility geographical location (five urban and five rural) and facility ownership (five public and five private) to explore diverse experience from the respondents. In the last stage, the respondents, Health Facility Heads (Medical Directors or Hospital Administrators), from the selected health facilities were purposively selected based on their roles. **Tab. 1.** summarizes the background information of the respondents interviewed.

Data collection

A total of twenty (20) In-Depth Interviews (IDIs) were conducted with the respondents between May and June 2022 using a pre-tested, semi-structured IDI guide developed by the researchers. The IDI guide explored information on how claims are submitted, processed, and reimbursed as well as its influence on the effective implementation of ASHIS. The guide was validated by two health systems expert researchers to ensure internal consistency and transferability. Data were collected by ten experienced researchers who were trained for 3 days. The researchers worked in pairs (an interviewer and a note-taker). Interviews were conducted in English and were held in offices or health facilities as convenient for the respondents. Each interview lasted an average of 40 minutes and was audio recorded and transcribed. Notes taken during the interviews were incorporated into the transcripts to ensure the completeness and accuracy of information. Prior to the interviews, both written and verbal informed consents were obtained from all respondents. Permission to audio-record interviews and discussions was also obtained from each respondent.

Data analysis

A thematic framework approach involving coding, charting, and organising the data under themes was used to analyse the data. Transcripts were manually coded using a codebook developed by the researchers. The main themes were deduced from the study objectives. The themes were generated by reading the transcripts and reflecting on how claims are managed and their effect on the implementation of ASHIS. Inter-coder differences were resolved by consensus. The main themes explored included: i) experience with use of the manual and electronic claims processing systems of claims management and ii) effect or outcome of the e-claims management system on the health insurance scheme implementation.

RESULTS

The findings of the study are presented under two headings as described in the data analysis subsection. The summary of the findings is outlined in **Fig. 1**.

Experience with manual and electronic systems of claim management

Manual system: At the commencement of the scheme, claims were reported to be manually (paper-based) processed and sent directly to ASHIA for reimbursement. The manual processing of claims was stated by the actors (health insurance managers and ASHIA-accredited HCPs) to be cumbersome, time-consuming, and prone to several errors and duplications on claims reports. According to an ASHIA respondent "when we started we were doing fully paper-based, people will go to the hospital they call us to request for pre-authorization codes, we send we approve the services they should render and deny the ones we don't think are appropriate, and at the end of the month, they will send us their claims, the claims management unit will then work on the claims from the HCPs or hospitals, match the claims with the pre-authorization codes that we had sent, and then after vetting the bills, we (ASHIA) pay directly into the accounts of the facilities" (Health Insurance Manager, 01). From the viewpoint of the health provider, manual processing and submission of claims is a burdensome and stressful task. In the words of a provider "we are always to go to Awka (the capital of Anambra state where ASHIA head office is situated) to submit claims, so every time my desk officer collects transport money from

Tab. 1. Background information of the study respondents.

Category	Location (n)	Sex (n)	Ownership of Facility (n)
Policymaker	Urban (2)	Male (1) Female (1)	-
Health Insurance Officer/ Manager	Urban (6)	Male (7) Female (4)	-
	Rural (2)		-
Health Care Provider	Urban (5)	Male (7) Female (3)	Public (5)
	Rural (5)		Private (5)
Total	20	20	10

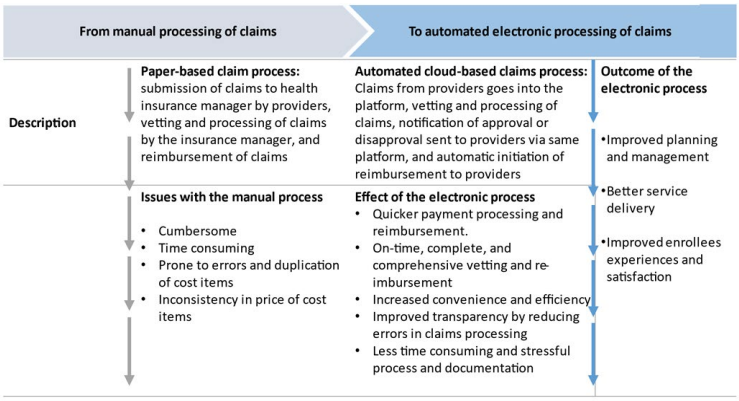

Fig. 1. Summary of the effects of manual and electronic claims management systems on the implementation of a health insurance scheme.

me…. it takes time to do so. By the time one travels to Awka and time for working on the claim report, even, the back-and-forth movement during the vetting of our claims. After everything, ASHIA will now call and tell you that the report has errors and they wouldn't pay this and that" (Health Care Provider, 18).

Electronic system: Respondents reported that the claim management system had been fully digitalized. Claims submission, processing, and reimbursement were stated to be through an automated electronic end-to-end claims management system introduced by the scheme in early 2022. The e-claims management system was said to be designed to allow HCPs who receive a pre-authorization code (for secondary care for a patient) from ASHIA to complete an 'Individual Claims Form' (ICF) and then submit the form to the provider portal. At the end of every month, the system consolidates information from all the submitted ICFs and automatically populates the 'HCP claims form'. The HCP may also upload supporting information for each individual claim such as operation notes, admission reports, laboratory investigation reports etc. These claims (per HCP) are reviewed *via* a multi-level process supported by an electronic system. After the vetting, claims queries, denial or approval are initiated.

Both health insurance managers and ASHIA-accredited HCPs had a good knowledge on the timing and the electronic process of submitting and reimbursing claims. In the words of a health insurance manager, "we have done away with the paper-based methods, at this point, every claim management in ASHIA is done fully electronically. The hospitals have a portal they log in, make their request, and we (ASHIA) give them approval and it shows on their dashboard there, they treat the patients and send in their bills, the system vets it, and automatically we (ASHIA) can reimburse the claims" (Health Insurance Manager, 05). Similarly, a HCP alluded that "for the past few months, a new portal where you submit your claims was established and we have been using it for a couple of months now and the structure is good. At the first week of every new month when the claims are being submitted electronically, the reimbursements come at the right time actually as agreed, kudos to ASHIA" (Health Care Provider, 11). Another said, "we have laptops we use to process these claims, the Desk officer does this and I will sign on it and vet it and then we send it to them new every month through email and when it is time for reimbursements, they send the money directly to the bank and we receive the bank credit alert. The new system is very good" (Health Care Provider, 14).

Effect of e-claims submission, processing and reimbursement

Study participants shared their experiences in preparing claims, submission, processing, and reimbursement of claims, their influence on health service delivery and implementation of ASHIS at large. All the respondents interviewed reported that transiting from the manual method of claims management to an electronic-based system has made the process easier and better, leading to better service delivery, improved customer experiences and satisfaction, with overall improved efficiency in the system. According to an ASHIA respondent, "the electronic process is working very well. It has helped us to work better and enrollees do not have to suffer for secondary care they want to receive" (Health Insurance Manager, 06). In the affirmative, a HCP alluded that, "when it comes to reimbursement ASHIA pays and they pay as at when due. ASHIA pay the fee-for-service unless you didn't send your request. This has helped us with treating our enrolees well and they are happy. Yes, money is everything [laughs]" (Health Care Provider, 18).

Specifically, the respondents mentioned the beneficial effects of the e-claim management system, including i) Quicker payment processing and reimbursement. "We (ASHIA) now operate an online system of receiving claims which makes ASHIA attend to them faster" (Health Insurance Manager, 04). Similarly, HCP held the same view that "there is no delay both in payments of claims, they (ASHIA) pay as at when due. In fact, even the capitation, everything is okay. For now, ASHIA is living above the standard" (Health Care Provider, 10). ii) On-time, complete, and comprehensive vetting, and reimbursement. The e-claim management system was reported to have reduced delays in the vetting and reimbursement of claims. From the experience of the health insurance managers, "during the paper-based system, we (ASHIA) were paying within two months and now we pay our fee for service first of every new month since it is fully electronic. All we do is click on the button (on the digital platform) and it'll calculate everything and we pay. So that's where we are right now, our journey from paper-based to the fully electronic

management system, and we have escaped the complaints on time for paying claims to hospitals arising from the manual system" (Health Insurance Manager, 01). iii) Increased convenience and efficiency. Yes, if I should judge between the paperwork and the computer work, I would say that the computer work is easier for us because then I will pack paper home and I will work, work and work and I will do a lot of photocopies and typing so this computer one is better, easier and saves time than that of paperwork and the submission of claims is smoother than the previous system (Health Care Provider, 18). iv) Improved transparency. Respondents stated that the electronic system removed errors and conflict in vetting claims. v) Less time consuming and stressful process and documentation. Ever since we converted the process to an electronic platform there are no conflicts in the system anymore. Unlike before when we have wrong calculations in the price of e.g., drugs and quantities used. Also, bills were not properly done and sent to us, sometimes the prices are inflated, but now with the help of the electronic system, it is way better this cut-off errors. So, there is no need to check if the hospital entered the wrong drug price, the system automatically does it" (Health Insurance Manager, 04)

Although all the respondents agreed that the electronic system of claims management is very efficient and effective. However, few reported that some HCPs still default in the timely submission of their claim to the ASHIA for reimbursement. Their reason for the late submission of their claims includes the unavailability of the responsible staff and poor internet network access. A health insurance respondent reported, "there are hospitals that are still having delays in sending us their claims, some will give you reasons that their desk officers were not on sit or some went on maternity leave, or some went for their annual leave" (Health Insurance Manager, 02). In agreement, a health provider stated, "there are delays but the reason is from the hospitals. Sometimes network disturbs you when you want to input some data into the system and that becomes a problem. Sometimes, our workers may be lazy to do the work you have to make them do it" (Health Care Provider, 13).

DISCUSSION

This study explored stakeholders' experiences on switching from the manual to an e-claims management system and its influence on service delivery and general implementation of the ASHIS in Nigeria. The study reveals that the manual system of claims management was cumbersome and prone to errors resulting in delayed reimbursement. This could be attributed to the painstaking nature of processing paper-based claims which require more labour strength to accomplish. Our findings agree with previous studies that report manual submission, processing, and reimbursement of claims to be associated with delayed claims reimbursement, and discrepancies in claims vetting which insignificantly impacted health service delivery negatively [7-9,18]. Perhaps, continuing with the manual system of preparing claims and submitting claims with its lapses might eventually encourage HCPs to limit or compromise the provision of secondary health services thus affecting quality access to health care services and the sustainability of ASHIS. It could also lead to HCPs' lack of trust and confidence in the system. Our assertion is in line with a study that reported delay in claims reimbursement as threat to sustainability of a health insurance scheme [8,10].

The use of an e-claims management system benefits HCPs by reducing delays in reimbursement, minimising claims rejection and resultant improved service delivery compared to a paper-based system. The e-claim system was demonstrated to be efficient due to its ability to detect or flag errors that cannot be identified by the paper-based system due to its programming nature. Hence, preventing human entry errors associated with claims preparation, submission, and processing, unlike the paper-based system. This implies that the HCPs and health insurance managers benefit more from processing claims using the electronic system than the manual one thereby achieving more efficiency in healthcare. The implication is that the "digitalization effects" are achieving their objective of enhancing efficiency within ASHIS. Our finding is similar to a study that outlined the benefits of digitalizing claims management in a health insurance scheme [11,14]. In addition, our findings revealed adequate capacity in terms of timing and step-wise processes for submitting and reimbursement of claims using the newly introduce e-claims system. This suggests that the providers had been sufficiently educated on the guidelines or procedures for preparations and submission of claims. Previous studies have reported long delays in reimbursement of claims to be due to unclear claims reporting procedures [19,20].

The outlined beneficial effects of implementing an e-claims management system including faster process, increased convenience and efficiency, improved transparency, and reduction of errors/fraudulent claims were found to lead to build trust and confidence in the system which ultimately promoted better patient experience and satisfaction, improved healthcare, and overall performance of the scheme. This is consistent with a previous study in reporting that lack of transparency in claims led to delays in reimbursement of claims, inefficiency, and high cost of healthcare services [21,22]. More so, large-scale experimental studies on the digitalization of payments in other sectors have demonstrated its benefits [23].

However, while this study demonstrates that the e-claims management system was beneficial to providers and ASHIA compared with paper claims processing, the economic implications- costs and benefits of processing claims manually or electronically to the system is yet unknown. Hence, further study is needed to evaluate the Cost-Benefit Analysis (CBA) of e-claims compared with the paper-claims management system and to establish whether the marginal benefits of electronic processing of claims cover its marginal cost (positive net benefits) or not, thus providing evidence-based information on which claims processing type provides Value-for-Money (V_4forM) to both providers and the overall health system.

The main strength of this research is the representation and mix of stakeholders; HCPs of health facilities (public-

private and urban-rural health facilities) and ASHIS managers. This allowed for diverse experiences and views from stakeholders who are directly involved in claims management and service delivery thereby contributing to the richness and robustness of the findings. More so, the study used a probability sampling technique to select health facilities and participants to share their experiences on the subject matter which may necessarily represent the views of the larger population.

The main limitation was that the study used only a qualitative method to assess the effect of the two claims processing types among HCPs and ASHIS managers. Hence, the design did not permit measuring the magnitude of the effect of the e-claims management system on the implementation of the scheme.

CONCLUSION

The study demonstrates the effectiveness of employing an e-claims management system over a manual system. The e-claims submission, processing and reimbursement improved efficiency and led to better service delivery and performance of ASHIS. It is recommended that the health insurance agency should make effort to ensure the sustainability of the electronic claims management system, with plans for continuous improvement.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study obtained an approval from the Health Research and Ethics Committee of the State Ministry of Health Awka, Anambra State, Nigeria (Ref. no. MH/AWK/M/321/408).

Following ethical approval, permission to conduct data collection was obtained from the management of all the selected health facilities. This study was conducted in accordance with the Declaration of Helsinki. All participants provided both written and verbal informed consent. Participants were informed of the purpose of the research, rights of participants and measures that will be taken to protect them and their data. Hence, participation was voluntary, and confidentiality was assured. Written and verbal permission to audio-record interviews was also obtained from respondents.

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CONSENT FOR PUBLICATION

Written informed consent was obtained from the participants to use quotes from the transcripts in publication.

AVAILABILITY OF DATA AND MATERIALS

The data generated and analyzed in this study are not publicly available due to limitations of ethical approval involving patient data and anonymity but are available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that there is no competing interest.

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AUTHORS' CONTRIBUTIONS

UE and SO conceptualized, designed the study protocol and data collection instruments. UE analyzed the data. UE and SO wrote the first draft of the manuscript. Both authors reviewed and approved the final version for journal submission.

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